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September 26, 2018

WHEREAS, Dallas Love Field has completed a multi-year master plan update process; and

WHEREAS, short, medium, and long-term plans have been reviewed and studied; and

WHEREAS, plans have identified improvements to serve future demand, preserve and enhance the level of service for travelers, and maximize the use of existing Airport assets; and

WHEREAS, the master plan update process has included close coordination with the Federal Aviation Administration, City of Dallas stakeholders, airlines, and neighborhoods; and

WHEREAS, it is now desirable to authorize adoption of the Dallas Love Field 2015 Master Plan Update and the approval of the recommendations contained therein as an implementation guide for future airport development to support the forecasted operational demand.

Now, Therefore,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF DALLAS:

SECTION 1. That City Council hereby adopts the Dallas Love Field 2015 Master Plan Update and approves recommendations contained therein as an implementation guide for future airport development to support the forecasted operational demand.

SECTION 2. That this resolution shall take effect immediately from and after its passage in accordance with the provisions of the Charter of the City of Dallas, and it is accordingly so resolved.

APPROVED BY
CITY COUNCIL

SEP 26 2018

CITY SECRETARY

RECEIVED

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CITY SECRETARY
DALLAS, TEXAS

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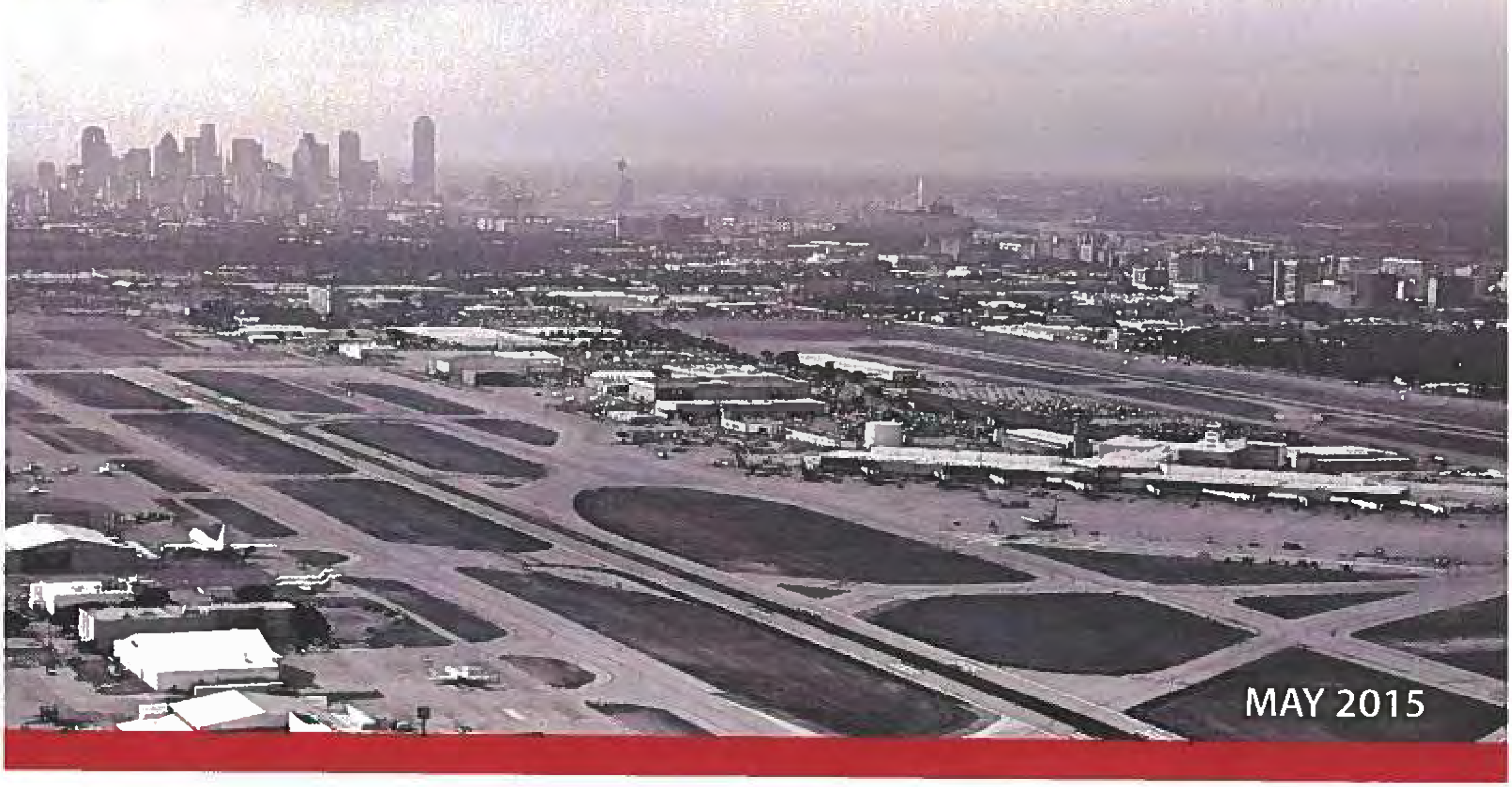
Dallas Love Field

MASTER PLAN UPDATE

GRANT NUMBER 3-48-0062-42



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1. Introduction

This document, organized into nine sections and 15 appendices, describes the analyses and assessments conducted for the Dallas Love Field (also referred to herein as "the Airport" or "DAL") Master Plan Update, as well as recommended facility improvements. This section summarizes the history of the Airport, the Airport setting, and the City of Dallas vision and goals for the Master Plan Update. The remaining sections document the inventory of existing Airport conditions, forecasts of aviation demand at the Airport through 2032 (the end of the planning period for the Master Plan Update), facility requirements determined from the demand/capacity analyses, analysis of the development alternatives and selection of a preferred alternative, the public outreach program for the Master Plan Update and comments, recommended on-Airport land use, a funding plan for implementation of the recommended improvements, and an overview of the environmental issues associated with the recommended development.

- Section 2 – Airport Inventory
- Section 3 – Aviation Demand Forecast
- Section 4 – Demand/Capacity and Requirements
- Section 5 – Alternatives Analysis
- Section 6 – Public Outreach
- Section 7 – Recommended On-Airport Land Use
- Section 8 – Funding Plan
- Section 9 – Environmental Overview

1.1 History of Dallas Love Field

The original Airport site contained several hangars and a grass landing strip in the countryside outside of Dallas. On October 19, 1917 the U.S. Army named Dallas Love Field in honor of First Lieutenant Moss Lee Love, who was ordered to Texas City, Texas, with the 1st Aero Squadron in April 1913 and was killed in a flying accident in San Diego in September 1913. In June 1928, the City of Dallas acquired Love Field.[1] Airline service

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[1] http://www.dallas-lovefield.com/love-notes-chronology-of-events.html (accessed February 2013).

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was initiated at Dallas Love Field on June 1, 1929, when Delta Air Service operated the first passenger flight from Dallas to Jackson, Mississippi, via Shreveport and Monroe, Louisiana. Early flights were operated from a passenger terminal near Bachman Lake, which later served as Southwest Airlines' corporate headquarters.

In 1940, a terminal building was opened at the end of what is now George Coker Circle. After World War II, the building was expanded twice to accommodate the growing demand for commercial airline service to Dallas. The Dallas Love Field Terminal building was developed in its current location in 1958. This building was able to accommodate a larger number of flights and an increased number of passengers. Until the opening of Dallas/Fort Worth Regional Airport (now Dallas/Fort Worth International Airport [DFW]) on January 13, 1974, Dallas Love Field was the primary airport serving North Central Texas.

Southwest Airlines initiated service at Dallas Love Field on June 18, 1971, as an intrastate airline with flights from Dallas to Houston and San Antonio using gates acquired from Delta Air Lines on the North Concourse, and the airline later expanded service from the Airport to most major cities in Texas. The 1978 Airline Deregulation Act gradually removed federal regulation of routes and airfares while maintaining federal oversight of aviation safety standards.

In 1979, then Speaker of the House Jim Wright introduced legislation that would restrict interstate service from Dallas Love Field as a result of concern that such service would negatively affect DFW. The final version of this legislation, referred to as the Wright Amendment, prohibited service between Dallas Love Field and any point outside of Texas and the four states surrounding Texas: Arkansas, Louisiana, New Mexico, and Oklahoma. In 1997, the Shelby Amendment added Kansas, Alabama, and Mississippi to the Dallas Love Field service area; Missouri was added in 2005. The Wright Amendment was since repealed on October 13, 2014.

Other airlines, including American Airlines, Braniff International Airways, Continental Airlines, Delta Air Lines, Legend Airlines, Muse Airlines, and Texas International Airlines, served Dallas Love Field at various times over the three-plus decades following the opening of DFW, and some continue to operate at the Airport. In that same time frame, the Terminal building was modified to adapt to the changing industry and demand.

1.2 Airport Setting

The Airport is located in an urbanized area within the Dallas city limits, approximately 4 miles north of the Dallas Central Business District. The Airport encompasses 1,300 acres and is owned by the City of Dallas and operated through the City's Department of Aviation. **Exhibit 1-1** depicts the geographic location of the Airport and other pertinent information. **Exhibit 1-2** shows an aerial view of Dallas Love Field taken in December 2013.[2]

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[2] North Texas Helicopters, Dallas Love Field Aerial Imagery, December 2013.

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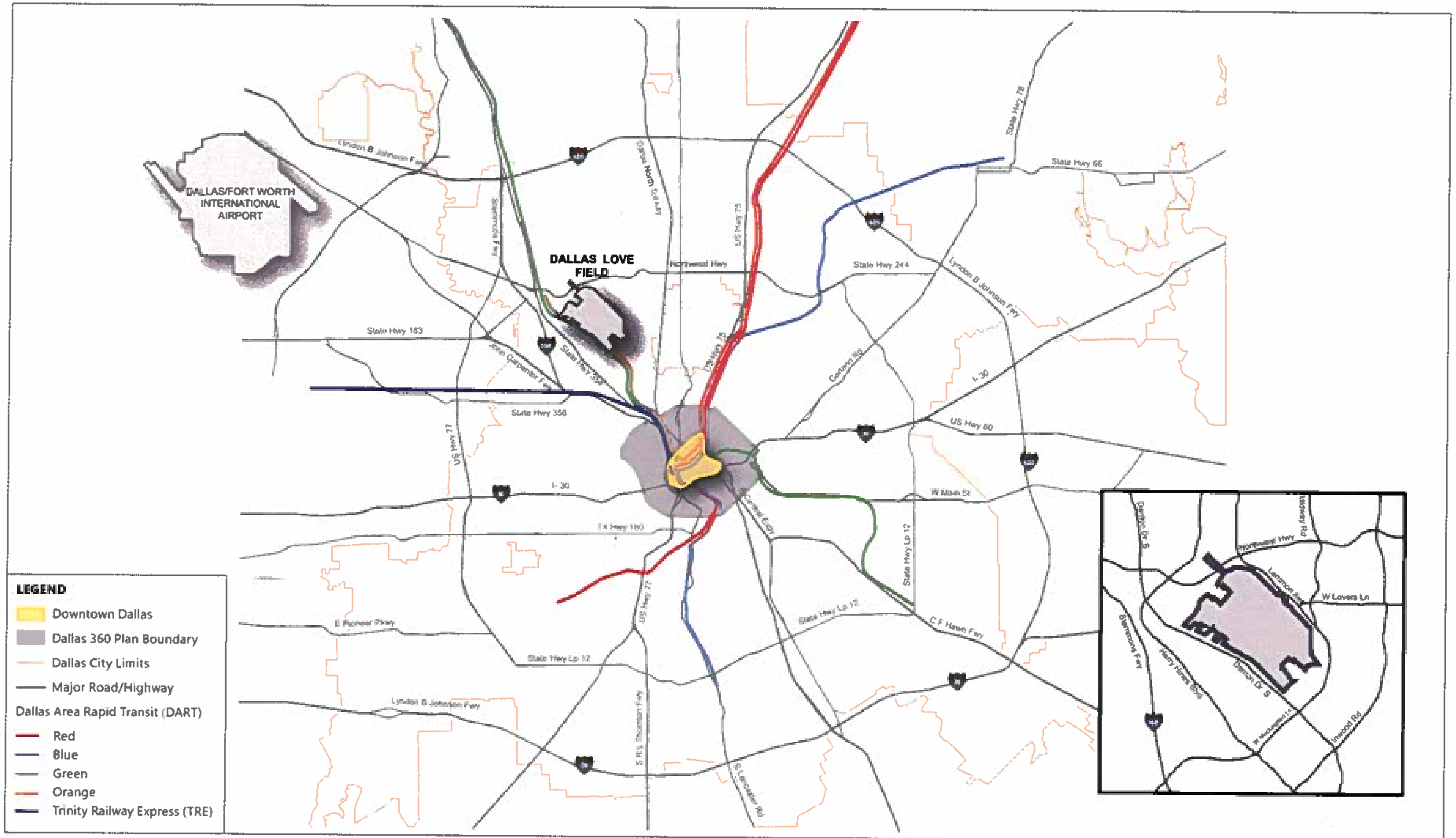

SOURCE: North Central Texas Council of Government, GIS Clearinghouse, 2011.
PREPARED BY: Ricondo & Associates, Inc., April 2013.

EXHIBIT 1-1

Airport Location

NORTH 0 Not to Scale

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SOURCE: North Texas Helicopters, December 2013
PREPARED BY: Ricondo & Associates, Inc., July 2014

EXHIBIT 1-2

Aerial View of Dallas Love Field

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Regional highway access to the Airport is provided by the Dallas North Tollway, the Stemmons Freeway (Interstate 35E [I-35E]), and the John W. Carpenter Freeway (State Highway 183). Regional arterial access is provided by Mockingbird Lane, Lemmon Avenue, Harry Hines Boulevard, and the Northwest Highway. Other arterial roads in the immediate vicinity of the Airport include Inwood Road, Denton Drive, Lovers Lane, and Midway Road.

1.2.1 DALLAS-FORT WORTH-ARLINGTON METROPOLITAN STATISTICAL AREA

The Dallas-Fort Worth-Arlington Metropolitan Statistical Area (MSA) consists of the following counties: Collin, Cooke, Dallas, Delta, Denton, Ellis, Fannin, Grayson, Henderson, Hood, Hunt, Johnson, Kaufman, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, and Wise Counties[3]. Arlington, Dallas, Denton, Fort Worth, Irving, Plano, and Richardson as Principal Cities within the Dallas-Fort Worth-Arlington MSA.

Table 1-1 lists the counties and Principal Cities in the MSA, along with each county's population in 2012 and the approximate distance of each Principal City from Dallas Love Field.

Table 1-1: Counties and Principal Cities in the Dallas-Fort Worth-Arlington Metropolitan Statistical Area

COUNTY	POPULATION (IN THOUSANDS)	PRINCIPAL CITY	DISTANCE FROM DALLAS LOVE FIELD (MILES)
Collin	851	Arlington	24
Cooke	39		
Dallas	2,452	Dallas	6
Delta	5		
Denton	709	Denton	36
Ellis	156	Fort Worth	32
Fannin	34		
Grayson	122		
Henderson	80		
Hood	53	Irving	8
Hunt	87	Plano	20
Johnson	156	Richardson	15
Kaufman	108		
Palo Pinto	28		
Parker	122		
Rockwall	85		
Somervell	9		
Tarrant	1,882		
Wise	62		

SOURCE: Woods & Poole Economics, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., November 2013.

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[3] According to Woods & Poole Economics, Inc.,which is an independent firm that specializes in long-term county economic and demographic projections.

In 2012, Woods and Poole Economics, Inc. reported that more than 4.25 million people in the MSA were employed in nonfarm jobs.

1.2.2 SCHOOL DISTRICTS

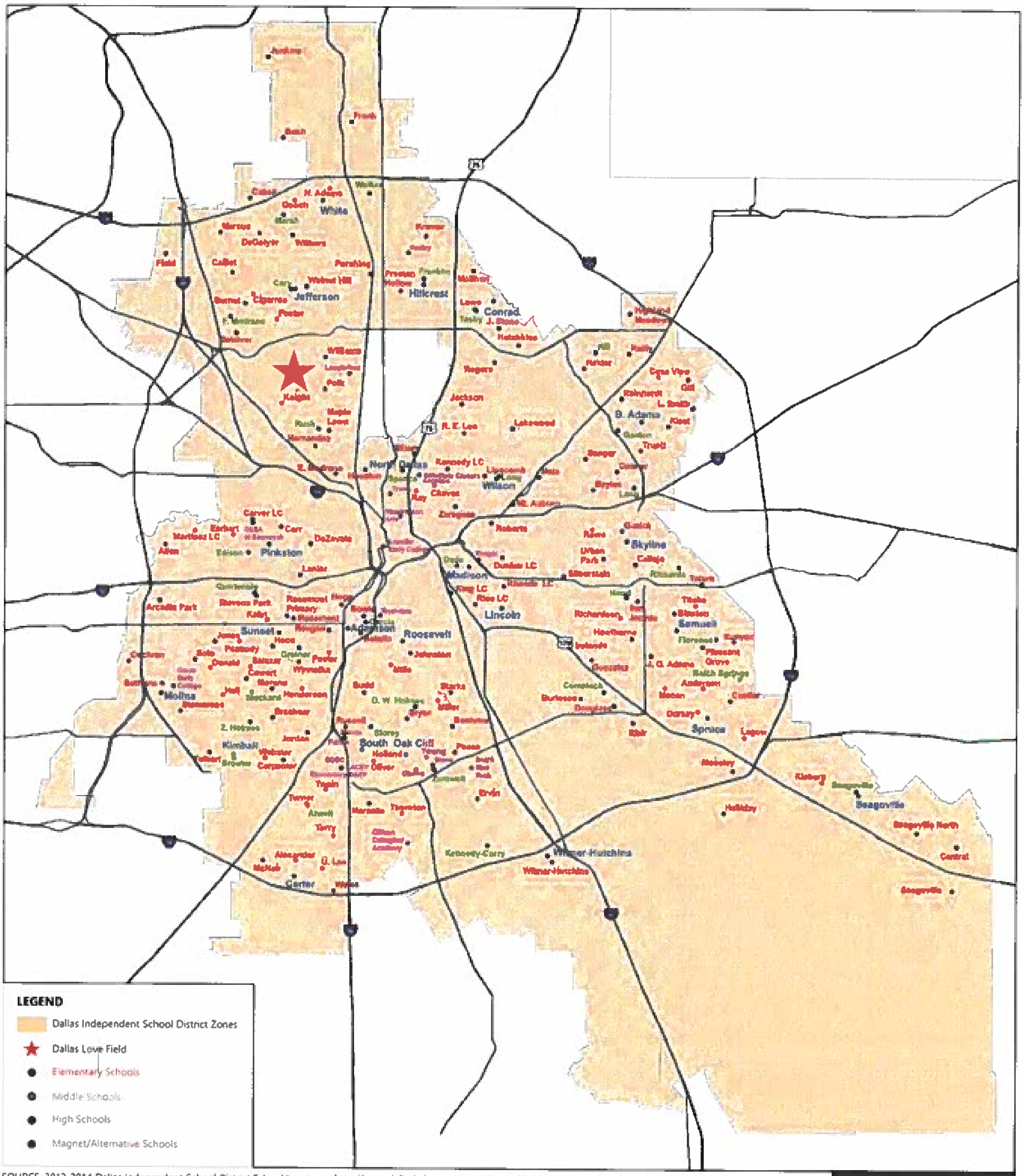
The Airport and surrounding areas are located within two divisions of the Dallas Independent School District (DISD), as shown on **Exhibit 1-3**. The communities north-northeast of Dallas Love Field are served by the Jefferson Division and the communities south-southwest of the Airport are served by the North Dallas Division.

1.3 Airport Vision and Master Plan Goal

The goal of the Airport Master Plan Update is to define a development program for the Airport that will accommodate future aviation demand throughout the planning period (through 2032), be responsive to the needs of the communities served by the Airport, maximize revenue-generating opportunities while effectively managing land uses and development, and provide flexibility to accommodate the dynamic nature of the aviation industry.

The City of Dallas Department of Aviation, as the Airport operator, is taking a prominent role in planning for improved integration between Airport property and operations and the surrounding neighborhoods, business districts, and parks. As part of the Master Plan Update, the Dallas Love Field Good Neighbor Plan Initiative is intended to improve the land and aesthetics within its area of influence to promote economic development opportunities and expand on the City of Dallas' goals of developing livable, walkable, and interconnected neighborhoods. The Good Neighbor Plan Initiative seeks synergies between ongoing plans for the improvement and development of Dallas Love Field facilities with the goals and transformative strategies identified in the Downtown Dallas 360 Plan.

The future success of Dallas Love Field will depend upon having a visionary yet practical approach to capitalizing on new development and redevelopment of on-Airport assets, while maintaining full functionality of the existing airfield and support facilities. The Master Plan Update recommends a new development plan, and describes the size, location, and implementation schedule for Airport facility expansion or construction, following an evaluation of development alternatives that tested the demand/capacity relationship and potential effects associated with their implementation.



SOURCE: 2013-2014 Dallas Independent School District School Locations, http://www.dallasisd.org (accessed June 20, 2014).
PREPARED BY: Ricondo & Associates, Inc., June 2014.

EXHIBIT 1-3

NORTH 0 Not To Scale

Dallas Independent School District Administrative Divisions

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2. Inventory

The initial step in any master planning process is to prepare an inventory of the physical, operational, and functional characteristics of the airport and its immediate environs. The inventory information presented in this section provides the basis for evaluating Airport facilities and subsequently determining future facility needs.

The Department of Aviation is currently the final phase of the Love Field Modernization Program (LFMP), which included a new Terminal complex and associated airfield improvements. The new Terminal facilities were completed by the end of 2014. Minor construction projects are under way to complete the LFMP and will be completed in 2015. For the purposes of this Master Plan Update, the Terminal, Concourse facilities, and apron improvements that will result from final construction are considered to be "existing facilities."

Photographic documentation of the existing facilities at the Airport is provided in **Appendix A**.

2.1 Airfield Facilities

The Airport currently has two parallel runways, Runways 13R-31L and 13L-31R, and one crosswind runway, Runway 18-36. Runway 13R-31L is 8,800 feet long and Runway 13L-31R is 7,752 feet long. The two parallel runways are 150 feet wide and capable of accommodating the commercial airline and general aviation (GA) aircraft types that serve the Airport. The crosswind runway primarily serves as a taxiway and has not been used as a runway since 2011.

Runway 13R-31L is on the south side of the airfield and primarily accommodates commercial airline traffic. Runway 13L-31R generally accommodates both commercial airline and GA traffic. Prior to the opening of the new Terminal, Runway 13L-31R was primarily used by GA traffic, as most of the Airport's GA facilities were located on the north side of the airfield. However, since the opening of the newly designed Terminal building, which is nearly equidistant between the parallel runways, traffic patterns have changed, and the amount of commercial airline traffic using Runway 13L-31R has increased.

The Airport Reference Code (ARC) generally classifies an airport according to its ability to accommodate certain categories of aircraft operations. An ARC does not create limits on the types of operations that can occur at an airport, but is used to broadly identify various planning and design parameters that help ensure safe operations at an airport. It is most often determined based upon the Aircraft Approach Category (AAC) and the Airplane Design Group (ADG) of aircraft using or expected to use the airport on a regular basis (at least 500 operations per year); however, the Federal Aviation Administration (FAA) also considers local characteristics when determining an airport's ARC. The AAC is designated by a letter that represents aircraft approach speed, and the ADG is designated by a Roman numeral based on aircraft wingspan and tail height. The ARC is the combination of the AAC and the ADG. The current DAL ARC is C-III. Examples of ADG III aircraft include the Boeing 737 and regional jets. Even though existing taxiways do not meet ADG IV standards, ADG IV aircraft can be accommodated at the Airport with approval of a prior permission request and by following an approved taxiway route provided by Airport Traffic Control Tower (ATCT) personnel.

The Airport runway, taxiway, and taxilane system is described in the following subsections.

2.1.1 RUNWAYS AND RUNWAY EXITS

The two parallel runways at the Airport are separated by approximately 3,000 feet. **Table 2-1** summarizes the physical characteristics of the runways and **Exhibit 2-1** shows the airfield layout. The runways are further described below.

Table 2-1: Runway Characteristics

	RUNWAYS		
DESCRIPTION	**13R-31L**	**13L-31R**	**18-36**
Length (feet)	8,800	7,752	6,147
Width (feet)	150	150	150
Runway End Elevation (feet above mean sea level [MSL])	13R: 476.1 31L: 476.2	13L: 476.6 31R: 486.7	18: 480.3 36: 481.5
Touchdown Zone Elevation (feet above MSL)	13R: 478.3 31L: 476.3	13L: 484.7 31R: 486.7	18: 481.0 36: 481.5
Displaced Threshold (feet)	490 (13R)	400 (13L)	-
Shoulder Width (feet)	26.5	25.0	25.0
Runway Markings	Precision	Precision	Non-precision
Load Bearing Capacity (1,000 pound units)			
Single-Wheel	100	100	50
Dual-Wheel	200	200	74
Dual-Tandem Wheel	350	350	138
Runway Composition	Concrete	Concrete	Asphalt
Gradient	0.0%	0.1%	0.0%
Current Runway Status	Active	Active	Closed

SOURCES: AirNav, LLC, www.airnav.com (accessed March 2013); AVN Data, http://avnwww.jccbi.gov/datasheet/ (accessed March 2013).
PREPARED BY: Ricondo & Associates, Inc., March 2013.

SOURCE: Google Earth Pro, 2011; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., May 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

EXHIBIT 2-1

Airport Layout

Drawing: P:\Dallas Airport System—On-Call Planning 2012-2014\07 Master Plan\7.2 Inventory\Data Collection\CAD\Ex2-1_Airport Layout.dwg, Layout: Exhibit 2-1 Airport Layout, May 14, 2013, 3:43pm

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2.1.1.1 Runway 13R-31L

Runway 13R-31L is 8,800 feet long and 150 feet wide. Blast pads extend from each end of the runway to protect the ground from erosion during aircraft departures. This runway consists of concrete and has a load bearing capacity of 100,000 pounds for single-wheel landing gear, 200,000 pounds for dual-wheel landing gear, and 350,000 pounds for dual-tandem wheel landing gear. Runway 13R-31L is equipped with high intensity runway edge lights and runway centerline lights. **Table 2-2** indicates the instrumentation and lighting available for this runway and for Runway 13L-31R. As mentioned previously, this runway primarily accommodates commercial airline traffic, as GA facilities are located on the opposite side of the airfield.

Table 2-2: Runway Instrumentation and Lighting

INSTRUMENTATION	RUNWAY 13R	RUNWAY 31L	RUNWAY 13L	RUNWAY 31R
APPROACH AIDS				
Localizer	x	x	x	x
Glide Slope Indicator	x	x	x	x
Distance Measuring Equipment	x	x	x	x
Outer Marker Beacon	x	x	x	x
Runway Visual Range Transmissometer	x	x	x	x
APPROACH LIGHTING SYSTEM				
Precision Approach Path Indicator	x	-	-	x
Medium Intensity Approach Light System with Runway Alignment Indicator Lights	-	x	x	x
RUNWAY LIGHTING				
High Intensity Runway Edge Lights	x	x	x	x
Touchdown Zone Lights	-	x	x	-
Runway Centerline Lights	x	x	x	x

SOURCES: AirNav, LLC, www.airnav.com (accessed March 2013); AVN Data, http://avnwww.jccbi.gov/datasheet (accessed March 2013).
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Runway 13R has a displaced landing threshold of 490 feet and complies with runway safety area (RSA) standards. **Table 2-3** presents the published declared distances.

Table 2-3: Declared Distances (in feet)

RUNWAY	TAKEOFF RUN AVAILABLE	TAKEOFF DISTANCE AVAILABLE	ACCELERATE-STOP DISTANCE AVAILABLE	LANDING DISTANCE AVAILABLE
13R	8,800	8,800	8,800	8,310
31L	8,800	8,800	8,000	8,000
13L	7,752	7,752	7,752	7,352
31R	7,752	7,752	6,952	6,952

SOURCE: AirNav, LLC, www.airnav.com (accessed April 2014).
PREPARED BY: Ricondo & Associates, Inc., April 2014.

Aircraft arriving on Runway 13R can exit the runway at five locations, as shown on Exhibit 2-1. Exits on Taxiways C3, C1, and C are right-angled and the exit on Taxiway J is an angled exit located near the Terminal gates. Taxiway D is also an exit for aircraft arriving on Runway 13R. Runway 13R is equipped with an instrument landing system (ILS) that allows for Category I precision approaches. The Runway 13R ILS includes a localizer, a glide slope, distance measuring equipment (DME), an outer marker beacon, and a runway visual range (RVR) transmissometer. Runway 13R is equipped with a precision approach path indicator (PAPI), as well as high intensity runway edge lights and runway centerline lights.

Aircraft arriving on Runway 31L can exit the runway at six locations. Exits on Taxiways C1 and C6 and at the end of the runway are right-angled; exits on Taxiways C2 and C4 are 45-degree exits; and the exit on Taxiway D is an angled exit. Runway 31L is equipped with an ILS that allows for Category I precision approaches and the same approach aids as those for Runway 13R. This runway is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). Runway 31L lighting consists of high intensity runway edge lighting, touchdown zone lights, and runway centerline lights. **Table 2-4** presents the published instrument approaches and their specifications for the parallel runways.

Table 2-4: Runway Instrument Approach Specifications

RUNWAY	PUBLISHED INSTRUMENT APPROACH	APPROACH MINIMUMS[1/]	DECISION ALTITUDE (FEET ABOVE MSL)
31L	ILS	200 feet – 1,800 feet	676
31R	ILS	200 feet – 2,400 feet	687
13L	ILS	200 feet – 1,800 feet	680
13R	ILS	200 feet – 0.75 mile	678
31L	RNAV GPS (LPV)	293 feet – 2,400 feet	769
31R	RNAV GPS (LPV)	200 feet – 2,400 feet	687
13L	RNAV GPS (LNAV)	460 feet – 4,500 feet [2/]	940
13R	RNAV GPS (LNAV)	442 feet – 1.25 mile (AAC C) 442 feet – 1.5 mile (AAC D)	920
13L	RNAV GPS (LPV)	200 feet – 1,800 feet	680
13R	RNAV GPS (LNAV/ VNAV)	470 feet – 1.5 mile	946

NOTES:

GPS = Global Positioning System

ILS = Instrument Landing System

LNAV = Lateral Navigation

LPV = Localizer Performance with Vertical Guidance

MSL = Mean Sea Level

RNAV = Area Navigation

VNAV = Vertical Navigation

1/ Minimums are the lowest available on each runway: the first component is the Decision Height (feet) and the second value is the Runway Visual Range).

2/ For Aircraft Approach Categories C (aircraft with an approach speed greater than or equal to 121 knots, but less than 141 knots) and D (aircraft with an approach speed greater than or equal to 141 knots, but less than 166 knots).

SOURCE: AirNav, LLC, www.airnav.com (accessed April 2014).
PREPARED BY: Ricondo & Associates, Inc., April 2014.

2.1.1.2 Runway 13L-31R

Runway 13L-31R is 7,752 feet long and 150 feet wide. It has blast pads at each end and its surface consists of grooved concrete. The load bearing capacity of the runway is 100,000 pounds for single-wheel landing gear, 200,000 pounds for dual-wheel landing gear, and 350,000 pounds for dual-tandem wheel landing gear.

Runway 13L-31R is the primary runway for general aviation traffic because of its proximity to GA facilities and fixed base operator (FBO) facilities on the north side of the airfield. As discussed previously, this runway will remain the primary runway for GA activity while continuing to serve commercial airline aircraft operations because of its proximity to the new gates developed as part of the LFMP.

Runways 13L and 31R are each equipped with an ILS that allows for Category I precision approaches. Similar to Runway 31L, Runway 13L is equipped with a MALSR, and its runway lighting consists of high intensity runway edge lighting, touchdown zone lights, and runway centerline lights. Runway 31R is equipped with a PAPI and a MALSR, and the runway lighting consists of high intensity runway edge lighting and runway centerline lights.

To comply with RSA standards, a displaced landing threshold of 400 feet was recently implemented on Runway 13L. Table 2-4 presents the published precision approaches and their specifications with the displaced threshold in place. Aircraft arriving on Runway 13L can exit the runway at five locations to access the Terminal gates or GA facilities located between the two parallel runways. Exits on Taxiways D, B6, B4, and B2 are 45-degree exits and the remaining exit at the end of the runway is a right-angled exit. To access the GA facilities on the northeast side of the airfield, GA aircraft can exit the runway at four locations (Taxiways A3, A2, A1, and A), all of which are right-angled exits.

Runway 31R has five exits to access the gates or GA facilities located southwest of the runway: Taxiways B1, B3, and B5 (45-degree exits), Taxiway D (greater than 90-degree exit), and Taxiway B (right-angled exit). GA aircraft accessing the northeast side of the airfield can exit the runway at five locations: Taxiways A1, A2, and A3 and the exit at the end of the runway are right-angled, and Taxiway D is a 45-degree exit.

2.1.1.3 Runway 18-36

As previously mentioned, Runway 18-36 has not been used as an active runway since 2011. Runway 18-36 is 6,147 feet long and 150 feet wide. It is constructed of asphalt. Currently, Runway 18-36 is used as a taxiway as it does not meet FAA requirements for RSA or runway object free area (ROFA) lengths, or FAA lighting requirements. The FAA standards for the RSA and ROFA of an ARC B-II runway with visual approaches are 300 feet beyond the runway end. Currently, the RSA and the ROFA for Runway 18-36 are only 200 feet, which is a deficit of 100 feet from the FAA standards. In addition, as part of the Taxiway L extension project, some of the visual approach slope indicator (VASI) lights for the Runway 36 approach were removed. These lights have not been replaced.

2.1.2 TAXIWAYS AND TAXILANES

As illustrated on Exhibit 2-1, Runways 13R-31L and 13L-31R each have at least one associated parallel full-length taxiway. Taxiway C is associated with Runway 13R-31L and is located northeast of the runway. The separation between the runway centerline and the taxiway centerline is 416 feet. Taxiways A and B are associated with Runway 13L-31R and both extend the full length of the runway. Taxiway A is located between the runway and the general aviation facilities. Taxiway B is located between Runway 13L-31R and the Terminal building. The separation between the centerline of Taxiway A and the centerline of Runway 13L-31R is 400 feet. For Taxiway B, this separation increases to 618 feet on the Runway 13L end and to 682 feet on the Runway 31R end. Taxiways A, B, and C are 75 feet wide.

The fourth longest taxiway at the Airport is Taxiway D. It is a 4,500-foot-long and 75-foot-wide crossfield taxiway that is partially parallel to Runway 18-36. Taxiway D is located east of Runway 18-36 and extends from the Runway 36 end to Taxiway A.

All other taxiways are 75 feet wide, with the exception of Taxiways E, G, and W, which are 50 feet wide. Taxiway F is closed. Taxiways P and Q, both 75 feet wide, are currently used as taxilanes and are in the process of being converted to taxiways. All taxiways are equipped with taxiway centerline lights.

In accordance with FAA Advisory Circular (AC) 150/5300-13A (Change 1), *Airport Design*, the standard width of an ADG III taxiway safety area is 118 feet. However, a taxiway safety area width of 165 feet is maintained at the Airport for the 75-foot-wide taxiways. The safety areas for Taxiways E, G, and W are 79 feet wide, which is the standard width for an ADG II taxiway safety area.

2.1.3 RAMP AREAS

Exhibit 2-2 depicts the passenger Terminal ramp, the general aviation ramp, and the aircraft maintenance ramp areas. The passenger Terminal ramp includes the recent improvements associated with the LFMP and the opening of the new Terminal building. The Terminal ramp surrounds the Terminal building and provides commercial aircraft access to the taxiways. The ramp is approximately 36 acres and is designed to provide for the safe maneuvering of aircraft to and around the Terminal's 20 gates.

One commercial aircraft maintenance center operated by Southwest Airlines is currently located at the Airport. The maintenance center is located on the northwestern side of the airfield, near the Runway 13R threshold and consists of a large maintenance hangar and an extensive ramp area available for aircraft parking, staging, and maintenance. Pilots access the maintenance center via Taxiway C6, and then cross Runway 13R to Taxiway H. This ramp does not have the necessary sound attenuation or blast deflection equipment to accommodate high-powered and sustained engine runups. Engine runups are performed in designated areas on the airfield. Section 2.2.7 provides information regarding the engine runup areas.

The City does not own or operate a public use general aviation ramp at the Airport. All general aviation aircraft use ramp space exclusive to tenants, such as FBOs and corporate aviation tenants. These tenants lease ramp space appropriate to their respective uses and needs. The overall condition of the pavement used by general aviation tenants is good.

2.1.4 FENCING AND SECURITY GATES

A Transportation Security Administration (TSA) approved Comprehensive Airport Security Plan has been adopted for the Airport, and is regularly reviewed and updated by the TSA for compliance with current regulations. At the time this Master Plan Update was being documented, an updated Comprehensive Airport Security Plan for the Airport had just been approved by the TSA.

The Airport is completely fenced, with controlled access to the Air Operations Area (AOA). Fencing consists mostly of chain link fencing 6 feet to 8 feet high and wrought iron fencing. A clear area of at least 5 feet on each side of the fence line ensures that objects cannot be used to aid in scaling the fence line or obscure the visibility of climbing devices. Access points are available through gates around the Airport and are controlled by a barrier system. Some gates are electronic; others are manually operated and some of the manually operated gates are staffed 24 hours per day. Characteristics of the gates depend on their location and on the type of personnel that use these gates. Closed circuit television camera coverage of the airfield is limited.

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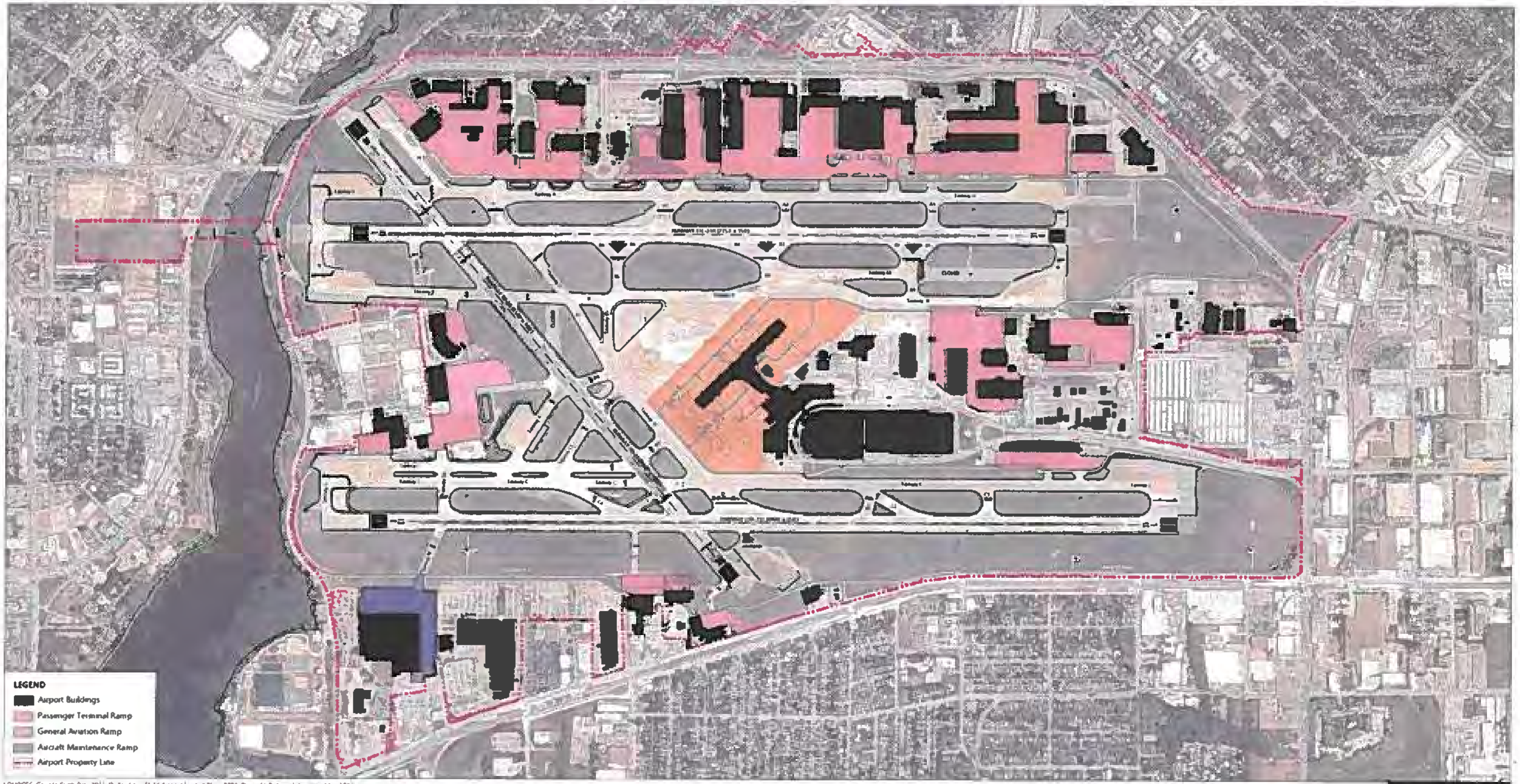

SOURCES: Google Earth Pro, 2011; Dallas Love Field Airport Layout Plan, 2001 Ricondo & Associates, Inc., May 2011
PREPARED BY: Ricondo & Associates, Inc., May 2011

EXHIBIT 2-2

Ramp Areas

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2.2 Airspace Procedures

This section describes the airspace structure and the procedures used by the controllers at the various FAA Air Traffic Control (ATC) facilities serving the Airport. The structure of the airspace surrounding the Airport and the aircraft arrival and departure procedures in use at the Airport are intended to control the flow of aircraft into and out of the Airport.

2.2.1 AIR TRAFFIC CONTROL FACILITIES

In the United States, ATC services are provided by the FAA to ensure a safe, orderly, and efficient flow of traffic In the National Airspace System (NAS). The NAS consists of various components of airspace, all of which are monitored, controlled, and coordinated by FAA ATC personnel. Three-dimensional airspace areas are defined based on the types of activity occurring in each and its relationship to the rest of the NAS. The ATC facilities used to manage air traffic vary depending on the type of airspace. Coordination between facilities occurs when aircraft transition from one type of airspace to another.

The following facilities provide ATC services to pilots of aircraft arriving at or departing from the Dallas Metroplex:

- Fort Worth Air Route Traffic Control Center (ARTCC)
- Dallas/Fort Worth Terminal Radar Approach Control (DFW TRACON)
- Dallas/Fort Worth East and West ATCTs
- Dallas Love Field ATCT

The Fort Worth (ZFW) ARTCC is responsible for managing instrument flight rule (IFR) flights *en route* to or from the Metroplex airports, as well as aircraft that transit the Metroplex above the airspace controlled by the DFW TRACON. The Fort Worth ARTCC controllers' role is to maintain safe separation between aircraft before arrivals enter and after departures leave the DFW TRACON airspace.

FAA controllers at the DFW TRACON, located at Dallas/Fort Worth International Airport, are responsible for establishing efficient and safe sequencing of aircraft arrivals and departures to and from Metroplex airports. Additionally, DFW TRACON controllers provide separation services to pilots of aircraft that transit the Metroplex within TRACON airspace. The airspace controlled by the DFW TRACON extends approximately 40 to 60 miles around DFW. The DFW TRACON is based on four navigational aids (very high frequency omnidirectional range stations [VOR]) that form the four corner posts of the DFW TRACON airspace. Therefore, the flow of traffic in and out of Dallas Love Field is considered a "four-post" design. There are four corridors for arrival routes and four corridors for departure routes. The arrival routes are from the northeast, northwest, southeast, and southwest, whereas the departure routes are centered on north, south, east, and west. In other words, arriving aircraft pass over the corners of the TRACON airspace and departing aircraft exit the TRACON airspace on the sides between the corners.

The Dallas Love Field ATCT operates 24 hours per day every day and ATCT controllers are responsible for controlling arrivals transferred from the DFW TRACON on final approach to the airfield at DAL, clearing departures off the runways, and transferring departures back to the TRACON. ATCT controllers are also responsible for all aircraft ground movements on the runways and taxiways. Dallas Love Field is considered a secondary airport for ATC purposes, as DFW is the primary airport within the airspace above the Metroplex.

2.2.2 DFW AND DAL AIRSPACE INTERACTIONS

The DFW TRACON airspace serves four airports: Dallas/Fort Worth International Airport, Dallas Love Field, Addison Airport (ADS), and Dallas Executive Airport (RBD). Addison Airport and Dallas Executive Airport accommodate GA aircraft only. The airspace surrounding these four airports is structured and organized. Verbal communications between the DFW TRACON and the ATCTs are kept to a minimum because coordination and procedures have been prearranged. Procedures and automatic releases of aircraft are described in letters of agreement followed by controllers in each ATC facility. Occasionally, Dallas Love Field ATCT personnel must call for release if the procedure requested is not included in the letters of agreement. Two reasons for such a call are the weather and aircraft performance characteristics (for example, in case of serious weather conditions affecting usual routes or in case of a slow aircraft that cannot follow the typical procedures). If flights must be redirected because of bad weather in a certain area or if a departing aircraft has an unusual performance characteristic, such as slow speed, DAL ATC will call for release and coordinate with the DFW TRACON.

Most of the runways at DFW have a north-south orientation, whereas the active runways at Dallas Love Field are in a northwest-southeast orientation. Dallas Love Field is located 12 miles east of DFW and the runway orientations of the two airports conflict; therefore, the arrival and departure procedures in use at Dallas Love Field have been adjusted to the DFW north-south flow to eliminate any conflict with operations at DFW.

2.2.3 AIRFIELD OPERATING CONFIGURATIONS

Runways 13L-31R and 13R-31L are both available for arrivals and departures. Air traffic controllers established the use of each runway based on runway length, the relative location of the passenger Terminal and general aviation facilities, and the voluntary Airport noise control program. The two flow configurations (north and south) are generally dictated by weather conditions.

The runways at Dallas Love Field are not assigned based on aircraft destination. However, if two departures occur at the same time and one is heading to the north and the other to the south, the aircraft heading north will be assigned to Runway 13L and the aircraft heading south will be assigned to Runway 13R. Additionally, general aviation aircraft usually operate on Runway 13L because most of the GA facilities are located on the north side of the airfield.

2.2.3.1 North Flow Runway Assignments

Arriving and departing aircraft are assigned to Runway 31R or 31L when the airfield is operating in north flow. Airline and other aircraft that require a longer runway are assigned to Runway 31L. General aviation aircraft parked on the north side of the airfield are usually assigned to Runway 31R.

2.2.3.2 South Flow Runway Assignments

Arriving and departing aircraft are assigned to Runway 13L or 13R when the airfield in operating in south flow.

2.2.3.3 Noise Control Procedure Runway Assignments

A voluntary noise control procedure is in effect at the Airport to minimize noise exposure from aircraft overflights on the surrounding residential neighborhoods. According to the voluntary noise control program currently in effect at the Airport, between 9:00 p.m. and 6:00 a.m., Runway 13R-31L is the preferential runway for turbojet aircraft operations and aircraft weighing more than 12,500 pounds. For IFR flights, the TRINITY SIX, KRUMM FOUR, LOVE TWO, VENUS SEVEN, and BACHMAN SIX departure procedures are used by pilots of aircraft departing from the Airport between 9:00 p.m. and 6:00 a.m. The noise contreol program also includes a series of instructions that pilots of visual flight rule (VFR) flights must follow between 9:00 p.m. and 6:00 a.m. when departing from the Airport on Runway 13R.

2.2.4 INSTRUMENT FLIGHT RULE ARRIVAL PROCEDURES

The DFW TRACON provides approach control services for the region. Dallas Love Field shares approach control airspace and services with other airports in the Metroplex.

Arriving aircraft enter at the corners of the terminal (TRACON) airspace. The airspace fixes used to define the corners are four VORs combined with a tactical air navigation system (TACAN), called VORTACs. VORTACs are navigational aids used to define airspace routes and provide pilots with information regarding their positions and headings in flight. **Exhibit 2-3** depicts the following four VORTACs, which define the DFW TRACON airspace:

- Bowie (UKW)
- Glen Rose (JEN)
- Bonham (BYP)
- Cedar Creek (CQY)

The DFW TRACON controls arriving aircraft by issuing instructions known as radar vectors. A radar vector is a heading issued to a pilot to provide navigational guidance for the aircraft flight. Additionally, the DFW TRACON issues altitude clearances. Radar vectors and altitude clearances are necessary to position arriving aircraft in the proper traffic flow prescribed for landing at the Airport.

Aircraft are transitioned from the *en route* phase of flight to the DFW TRACON by the ZFW ARTCC just prior to reaching the VORTAC navigational aids mentioned above. Aircraft arrivals from the northwestern United States arrive over the Bowie VORTAC; arrivals from the northeastern United States arrive over the Bonham VORTAC; arrivals from the southwestern United States arrive over the Glen Rose VORTAC; and arrivals from the southeastern United States arrive over the Cedar Creek VORTAC. When weather and traffic conditions permit, ATC usually attempts to provide the most expeditious routing possible for arriving aircraft.

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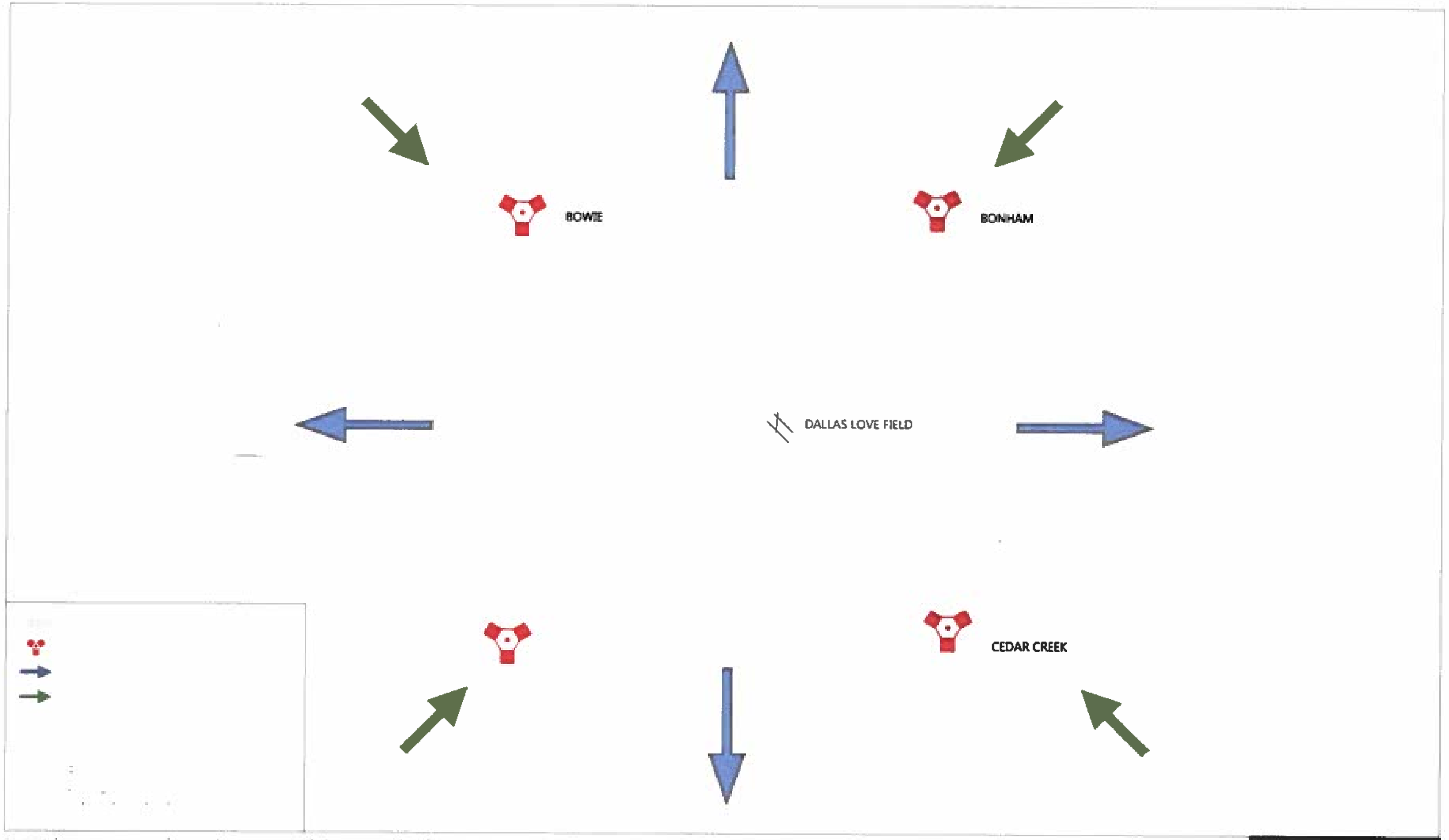

Inc.

EXHIBIT 2-3

DFW TRACON Airspace

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2.2.5 INSTRUMENT FLIGHT RULE DEPARTURE PROCEDURES

Departure procedures are defined by navigational aids, airspace fixes, and radar vectors. Four departure gates, associated with the four departure corridors mentioned previously, serve the DFW TRACON and departing aircraft are guided to these gates. To reach these gates, pilots of departing aircraft are guided to the vector of the specific departure procedure. The departure procedure assigned depends on the destination, the type of aircraft (jet or propeller), and time of departure (the preferential runway procedure is to be used between 9:00 p.m. and 6:00 a.m.). The DFW TRACON vectors departing aircraft toward the departure gates and provides separation from traffic arriving to and departing from DFW and other airports within the Metroplex. The objective is for all departing aircraft to be on the route of a procedure before they leave the DFW TRACON airspace. Prior to aircraft passing the gates, the DFW TRACON transfers control of the departing aircraft to the ZFW ARTCC as the aircraft moves from the terminal environment to the *en route* airspace.

The following four primary standard instrument departures (SIDs) are available for aircraft departing from the Airport and each is associated with a departure gate:

- North Quadrant: TEXOMA SID
- East Quadrant: DALLAS SID
- South Quadrant: JOE POOL SID
- West Quadrant: WORTH SID

Additional SIDs are available, including those dedicated to the voluntary noise control program in effect at the Airport between 9:00 p.m. and 6:00 a.m.

2.2.6 AIRFIELD MOVEMENT PROCEDURES

The ATCT is also responsible for the safe, efficient, and expeditious flow of traffic in the movement area of the airfield. The movement area consists of the runways, taxiways, and other areas of an airport used for aircraft taxiing or hover taxiing, takeoff, and landing. Loading ramps, taxilanes, and aircraft parking areas are not considered movement areas and movements in such areas are the responsibility of the aircraft and vehicle operators. Approval for entry onto the movement areas must be obtained from ATCT personnel.

Ground movement procedures have not been adopted for Dallas Love Field.

2.2.7 ENGINE RUN-UPS

The primary location for engine run-up tests is the midfield area north of Taxiway K and west of Runway 18-36. This area is considered a nonmovement area and coordination with the ATCT is required to taxi to and from this area. Secondary locations for engine run-up tests are runway ends 13L and 31R. Prior approval from Airport Operations and coordination with ATCT controllers is required to use these secondary run-up areas and to taxi to and from these areas. However, engine run-up activities are not controlled by ATCT controllers. Engine maintenance run-up activities are prohibited between midnight and 6:00 a.m. in accordance with City ordinance[4] and between 9:00 p.m. and 6:00 a.m. in accordance with the adopted noise control program for the Airport. In addition, with the exception of high priority circumstances, a voluntary moratorium on engine run-ups is in effect between 10:00 p.m. and midnight.

2.3 Passenger Terminal Facilities

This section provides a brief overview of the Main Terminal facilities. The Terminal facilities at Dallas Love Field were constructed or renovated as part of the LFMP and opened in three main phases between 2012 and 2014. Existing conditions as defined in this Master Plan Update incorporate the completion of development plans as of April 2014. These plans were completed in October 2014.

The Terminal facility inventory was prepared based on information available at the time this document was prepared, such as as-built drawings, current design documents, discussions with LFMP staff, and onsite investigations. This section is organized into seven main subsections. The first two subsections provide background on the political decisions and construction history of the passenger Terminal and a general overview of the Terminal facility. The following four subsections discuss spaces in the passenger Terminal by level, beginning with the Basement Level (Level 0), and followed by the Main Level (Level 1), the Passenger Level (Level 2), and the Office Tower (Levels 3 through 8). The final subsection discusses the concession space in the Terminal. The exhibits that accompany the respective subsections are presented by level and are typically separated into Terminal and Concourse, unless all spaces on a level are able to be presented legibly on one exhibit.

2.3.1 POLITICAL REQUIREMENTS AND CONTRAINTS

To understand how the Main Terminal ultimately took shape, a review of the political environment and constraints at the Airport is necessary. In 1979, the Wright Amendment (**Appendix B**) restricted nonstop commercial air service by aircraft departing from Dallas Love Field with more than 56 seats from flying to destinations beyond the states of Texas, Arkansas, Louisiana, New Mexico, and Oklahoma. In 1997, the Shelby Amendment allowed for nonstop service from DAL to Alabama, Kansas, and Mississippi. Then, in 2001, an Airport Impact Analysis/Master Plan was prepared to clarify Airport constraints based on these amendments. It was determined that the capacity of the Airport was limited to a total of 334,000 annual aircraft operations and a maximum of 32 aircraft passenger boarding gates. In 2005, Missouri Senator Kit Bond introduced an amendment that passed to exempt Missouri from the Wright Amendment restrictions. In April 2006, the Terminal Area Redevelopment Program Study (TARPS) and Revised Capital Improvement Program (CIP) for the Airport were completed and presented to the City of Dallas. The recommended facility improvements were based on revised forecasts of enplaned passengers for 2009, 2014, and 2024. However, at the same

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[4] *The Dallas City Code*, Volume I, Chapter 5, Section 5-25, "Maintenance Run-Ups," May 2014.

time, ongoing discussions for repealing the Wright Amendment were under way. This led to a reevaluation of the TARPS and Revised CIP and development of the Five Party Agreement (FPA). (**Appendix C** contains a copy of the Five Party Agreement and the LFMP Term Sheet.)

The parties that were signatory to the FPA included the City of Dallas, the City of Fort Worth, the Dallas/Fort Worth International Airport Board, Southwest Airlines, and American Airlines. The main provisions of the FPA consisted of eliminating the restrictions on nonstop service from DAL in 2014, as stipulated in the Wright and Shelby Amendments, as well as reducing the number of gates at DAL that accommodated 10 aircraft operations per day from 32 to 20 as soon as practicable. This set in motion the LFMP to reduce the number of available gates to 20 and to repeal the Wright Amendment.

During the LFMP Terminal Schematic Design Process in 2007-2008, several alternative solutions to redevelopment of the Terminal complex were identified and evaluated based on basic principles that were agreed upon by the key project stakeholders. The results were the basis for the LFMP Terminal, including:

- Demolition and complete replacement of the ticketing wing
- Renovation of the Main Lobby
- Renovation and expansion of the main security screening checkpoint (SSCP)
- Demolition and complete replacement of three concourses (32 gates) with a new double-sided Concourse and connector stem with 20 gates and new concessions
- Demolition and complete replacement of the baggage claim area
- New inline screening and baggage handling system
- Renovation of the Office Tower

2.3.2 TERMINAL FACILITY OVERVIEW

The Main Terminal building consists of two distinct sections, the Terminal and the Concourse. The Terminal generally consists of all of the areas before and including the SSCP. The Concourse typically includes the area past the SSCP. The Terminal building as a whole consists of nine levels. Level 0, also known as the Basement Level, primarily contains mechanical space and support for TSA baggage. Level 1, typically referred to as the Main Level, includes all of the pre- and post-flight passenger processing components, such as ticketing, passenger security screening, inbound and outbound baggage handling, concessions, the Main Lobby, and airline support space. Level 2 is typically referred to as the Passenger Level and primarily includes the seating and boarding areas for passengers at aircraft gates, also known as holdrooms. Other components on Level 2 include concessions, office, and various Airport and airline support space. The levels above Level 2 are reserved for Airport and airline functions. Level 3 is the lower level of the area referred to as the Office Tower. The spaces in the Office Tower include concessions support, Airport support, and mechanical/electrical/plumbing (MEP) space. Level 4, also part of the Office Tower, contains room for the Dallas Police Department, Airport office space, and MEP space. Levels 5 through 8 of the Office Tower mostly provide for storage and MEP space. An FAA Weather office is located on Level 5.

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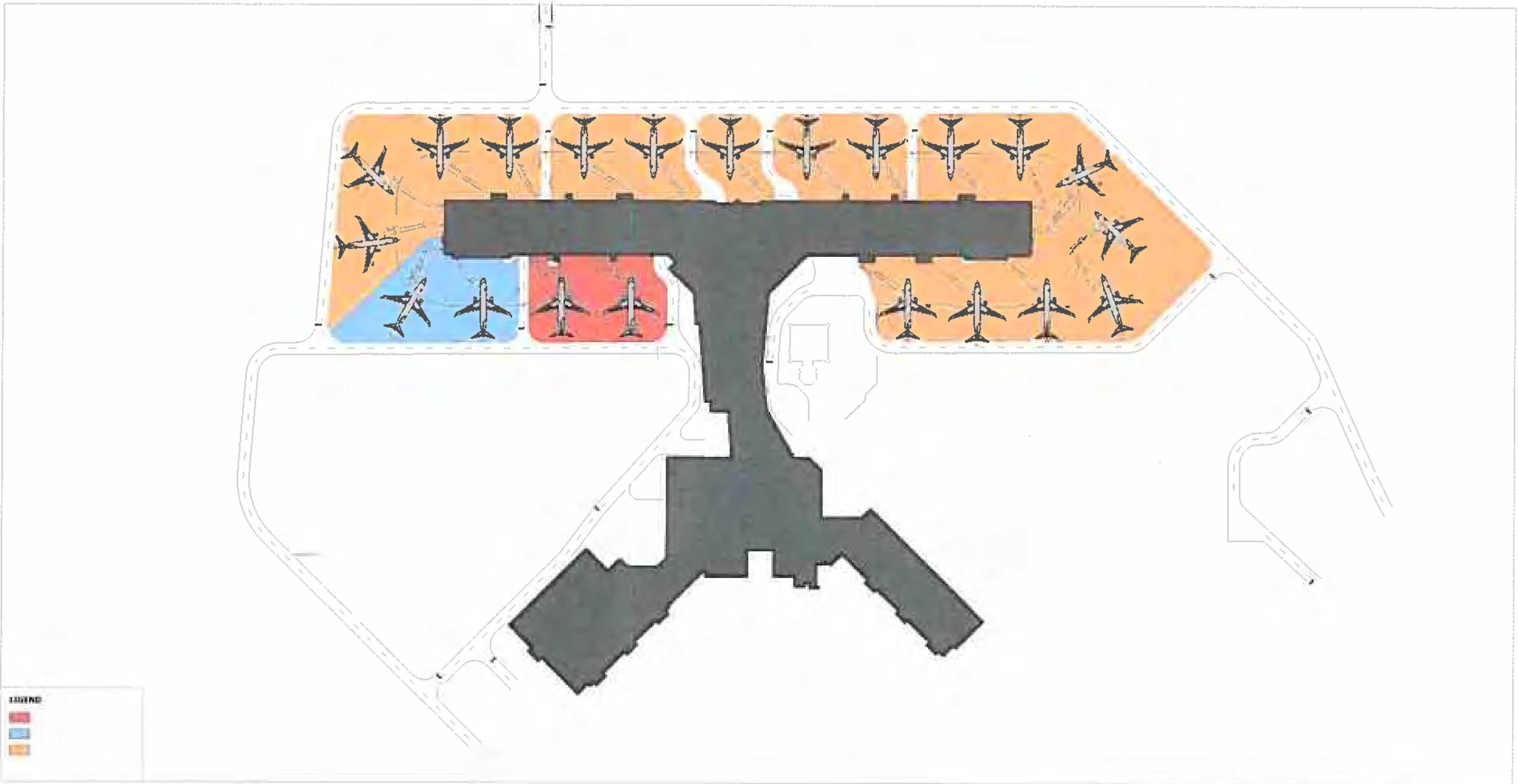
Total Facility Space	



SOURCE: AirOps, LLC, December 2013
ARED BY: Ricondo Inc., January 2014

The major Terminal facility areas are categorized by specific functional space and lease assignments. Space is leased to the airlines operating at the Airport through exclusive-, preferential-, or common-use agreements with the City. An exclusive-use agreement relates to those Airport areas and facilities leased to an airline for its sole use and occupancy. A preferential-use agreement relates to facilities leased by a primary airline and shared with a secondary airline, provided that the primary airline does not require the space at the time and that the secondary airline is subject to the rules, regulations, and conditions of the agreement executed by the primary airline. A common-use agreement relates to areas and facilities that are shared by multiple airlines on a scheduled basis; airlines are not allowed to install proprietary equipment in common-use space and the City's flexibility is preserved to reassign the space as needed. Major Terminal space categories are defined below.

2.3.2.1 Circulation/Restrooms

Circulation space encompasses areas dedicated to secure, nonsecure, and egress circulation of passengers throughout the Terminal and includes areas such as hallways, escalators, stairs, and elevators. Restrooms are provided under the provisions of governing building code standards and are available in public as well as nonpublic areas.

2.3.2.2 Building Systems and Maintenance

This category includes areas dedicated to MEP, communication, and life safety operations and functions within the Terminal facilities. It may include areas with dedicated spaces for components such as:

- **Baggage Right-of-Way:** Area dedicated to the in-line baggage handling system (BHS), a mechanical conveyor system designed to carry checked baggage from the ticketing and check-in areas to baggage screening, and finally to the outbound baggage carousels.
- **Compressor:** Room used to house the compressed air pumps that generate compressed air for various Airport systems.
- **Emergency Fuel Shut Off:** Room containing the emergency fuel shut off switches and components related to gate area aircraft refueling.
- **Facilities Maintenance:** Space dedicated to various maintenance components at the Airport.
- **Fire Riser:** Room used to house the fire sprinkler system components for the Terminal.
- **Intermediate Distribution Frame:** Room used to connect cables, etc; another type of Information Technology (IT) room.
- **IT Closet:** IT room used to store various computer cables and hardware.
- **Janitorial Room:** Storage space for cleaning supplies and equipment.
- **Key Shop:** Room devoted to providing support and control of the various Airport room keys.
- **Lighting Vault:** Room dedicated to providing and controlling the lighting for all areas of the passenger Terminal.
- **Mechanical Chase:** Areas devoted to mechanical ductwork.

- **EP Rooms:** R d dicated to the mechanical, electrical, and plumbing components of the sse g
- **e Action:** Ro s d to prevent accidental activation of the passenger Terminal fire suppression stem.
- **dio:** Ro hou g t e various radio equipment and antennas.

irline Support Fa es

s eased to t e a r n s an exclusive-, preferential-, or common-use basis and used for d/inbo d pas enger proc ng may include:

- **Airline Ticket Office:** Ba -of-house office space dedicated to airline administrative functions assoc ated w th the che rocess.
- **Airline Office, Support, and Storage:** Space dedicated to airline administrative and operating functions.
- **Baggage Service Office:** Space dedicated to airlines for addressing issues related to checked baggage.
- **Ticketing Area:** Space dedicated for passengers obtaining boarding passes and checking baggage.
- **Airline Club/Lounge Room:** Club space provided for airline passengers who are members.

2.3.2.4 Concessions

Concessions are area(s) leased to vendors for merchandise, retail, or food and beverage sales. They may also include:

- **Concessions Office and Storage Area:** Space used for administrative and operating functions.
- **Retail Area:** Space used by concessionaires to store and present merchandise for sale.
- **Food and Beverage Area:** Space used for kitchen operations, food storage, customer service, and customer seating.

2.3.2.5 Transportation Security Administration

These areas dedicated to the TSA for screening passengers and baggage prior to aircraft boarding may include:

- **SSCP:** Space used to conduct security screening of passengers and their carry-on possessions prior to such passengers entering a sterile or secure area; includes screening equipment, queuing area, recomposure zone, and manual search areas or rooms.
- **Offices, Storage, and Support Areas:** Space dedicated to the TSA for administrative and operating functions.
- **Baggage Screening Area**: Space dedicated to outbound baggage conveyance and screening rooms; includes enclosed and nonenclosed rooms, baggage conveyance equipment, and rights-of-way.

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s past the SSCP are provided for airline passengers as they wait to board an aircraft. Holdrooms y part an exclusive-, preferential-, or common-use agreement.

irport Facilities

eas used for the Department of Aviation/Airport staff administration and operations may include:

- **Airport Offices:** Space dedicated to Airport personnel/the Department of Aviation for administrative and operating functions may include conference rooms, copy rooms, offices, Department of Aviation storage rooms and the mail room.
- **Maintenance:** Space dedicated to Airport staff for functions related to maintaining building systems, such as the loading dock and the trash room.
- **Miscellaneous:** All other space used by Airport personnel for a specific administrative and operating function, including Lost and Found, the Airport information kiosk known as Love Info, and the Valet.

2.3.2.8 Outbound Baggage

This area is used to sort and transfer checked baggage from the ticketing/check-in and baggage screening areas to the respective gates for loading onto an aircraft.

2.3.2.9 Baggage Claim

This space includes the baggage carousels and queuing areas used by passengers to identify and retrieve their checked baggage.

2.3.2.10 Vacant Space

Several areas at the Airport are currently vacant and awaiting a prospective tenant or concessionaire.

2.3.2.11 Other Agencies and Contractors

Areas dedicated to third-party agencies and contractors handling Airport- or airline-related operations, maintenance, or special projectsinclude office, conference room, storage, and other miscellaneous spaces for administrative or operating support for:

- **ARINC:** Provider of airport/airline/aircraft communications (subsidiary of Rockwell Collins).
- **AT&T:** Provider of airport Wi-Fi systems.
- **Dallas Police Department:** As DAL is a City-run airport, policing is provided by the Airport subdivision of the City of Dallas Police Department (DPD).
- **FAA Weather:** Area provided for FAA Weather observation technologies and systems.
- **Rental Car Companies:** The counters and storage rooms used by the Airport's rental car providers.
- **United Service Organization (USO):** Provider of lounge space for America's military servicemen and servicewomen.

2.3.2.12

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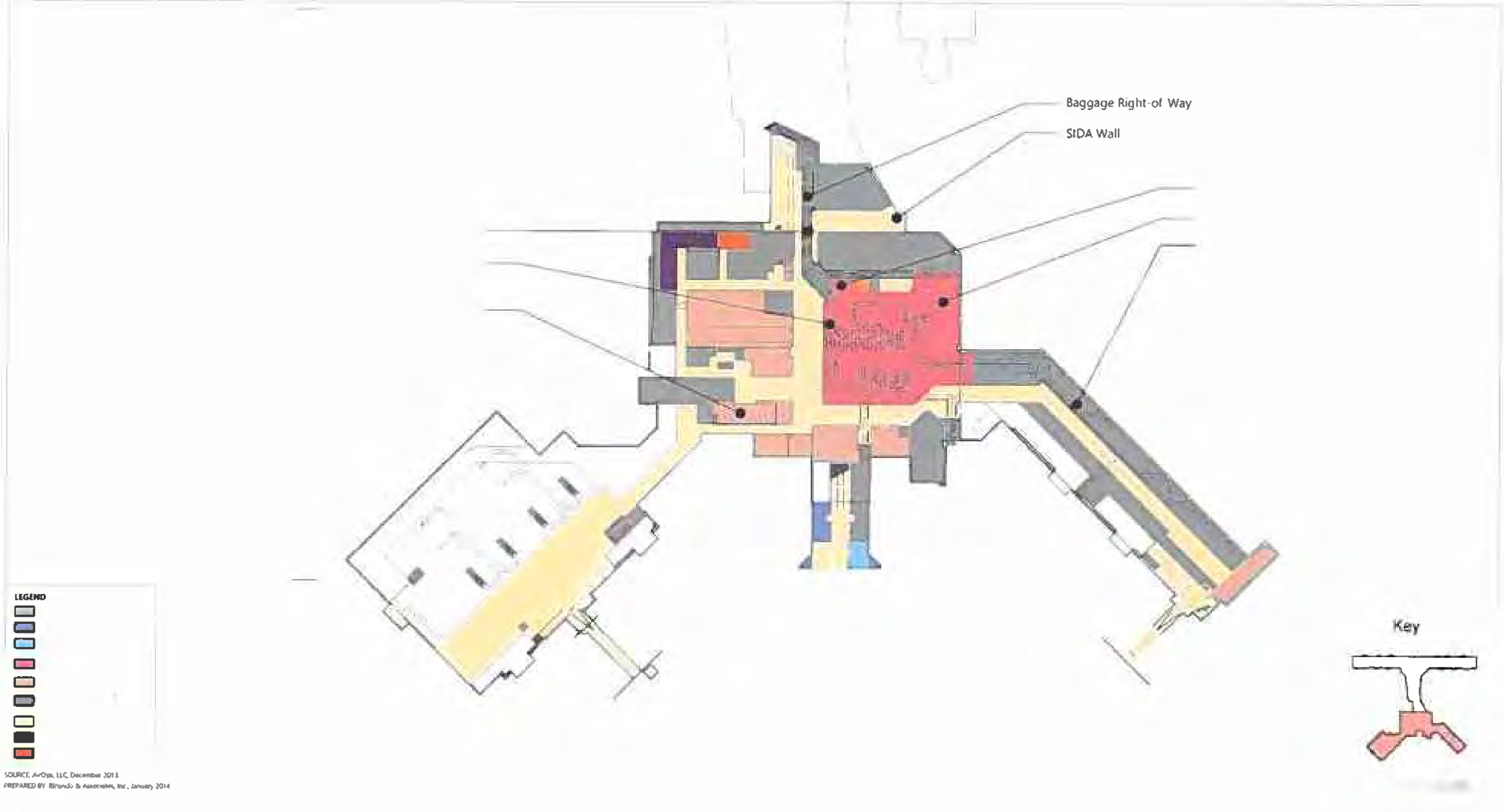

SOURCE: AirOps, LLC, December 2013
PREPARED BY: Ricondo & Associates, Inc., January 2014

Terminal Space Allocation
Basement Level

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2.3.3.1 Circulation

The Basement Level includes a number of access hallways not available to the public to provide Airport staff access to various mechanical and office/support spaces.

2.3.3.2 Building Systems and Maintenance

The Airport-related building systems and storage spaces on the Basement Level include rights-of-way for baggage handling systems, mechanical rooms and chases, electrical rooms, Intermediate Distribution Frame rooms to support the Airport's IT system, IT closets, janitorial rooms, and the lighting vault.

Table 2-7 lists the specific building systems and maintenance areas on the Basement Level.

Table 2-7: Building Systems and Maintenance Space - Basement Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Mechanical Room	13,790
Baggage Right of Way	13,200
Electrical Room	4,570
Intermediate Distribution Frame Room	2,920
Pump Room	2,440
Mechanical Chase	2,120
Lighting Vault	1,620
Information Technology Closet	130
Elevator Mechanical Room	120
Janitorial Room	50
Total Building Systems and Maintenance Space – Basement Level	**40,960**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC., December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.3.3 Airport Facilities

The Airport facilities spaces on the Basement Level include multiple Department of Aviation storage rooms and loading dock/covered parking area.

2.3.3.4 Transportation Security Administration

The TSA leases baggage screening space on the Basement Level, including an on-screen resolution area, the TSA checked baggage resolution area, and space for baggage screening equipment and operations.

2.3.3.5 Airline Support Facilities

Several airline support facilities are located on the Basement Level. The space is held by Southwest Airlines and includes a breakroom, office space for sublessee ERMC to provide facilities services, and office space for sublessee International RAM (IRAM) to provide additional customer services.

2.3.3.6 Ticketing and Check-in

This area includes curbside ticketing and queuing space leased by Southwest Airlines and located outside the building footprint. Although technically on the Basement Level, public access to Basement Level spaces is not available. After using the curbside features, the passenger walks up a ramp to the Main Level.

2.3.3.7 Other Agencies and Contractors

AT&T leases space on the Basement Level for its telecommunications and Wi-Fi services.

2.3.3.8 Restrooms (Nonpublic)

A pair of restrooms is provided on the Basement Level.

2.3.4 MAIN LEVEL

The Main Level, which is also referred to as Level 1, supports passenger ticketing, check-in, processing, and security screening, as well as baggage handling, Airport support, and airline support. **Table 2-8** provides a summary of the square footage on the Main Level. **Exhibit 2-6** depicts the space allocation on the Terminal side (pre-security) of the Main Level and **Exhibit 2-7** depicts the space allocation on the Concourse side (post-security) of the Main Level.

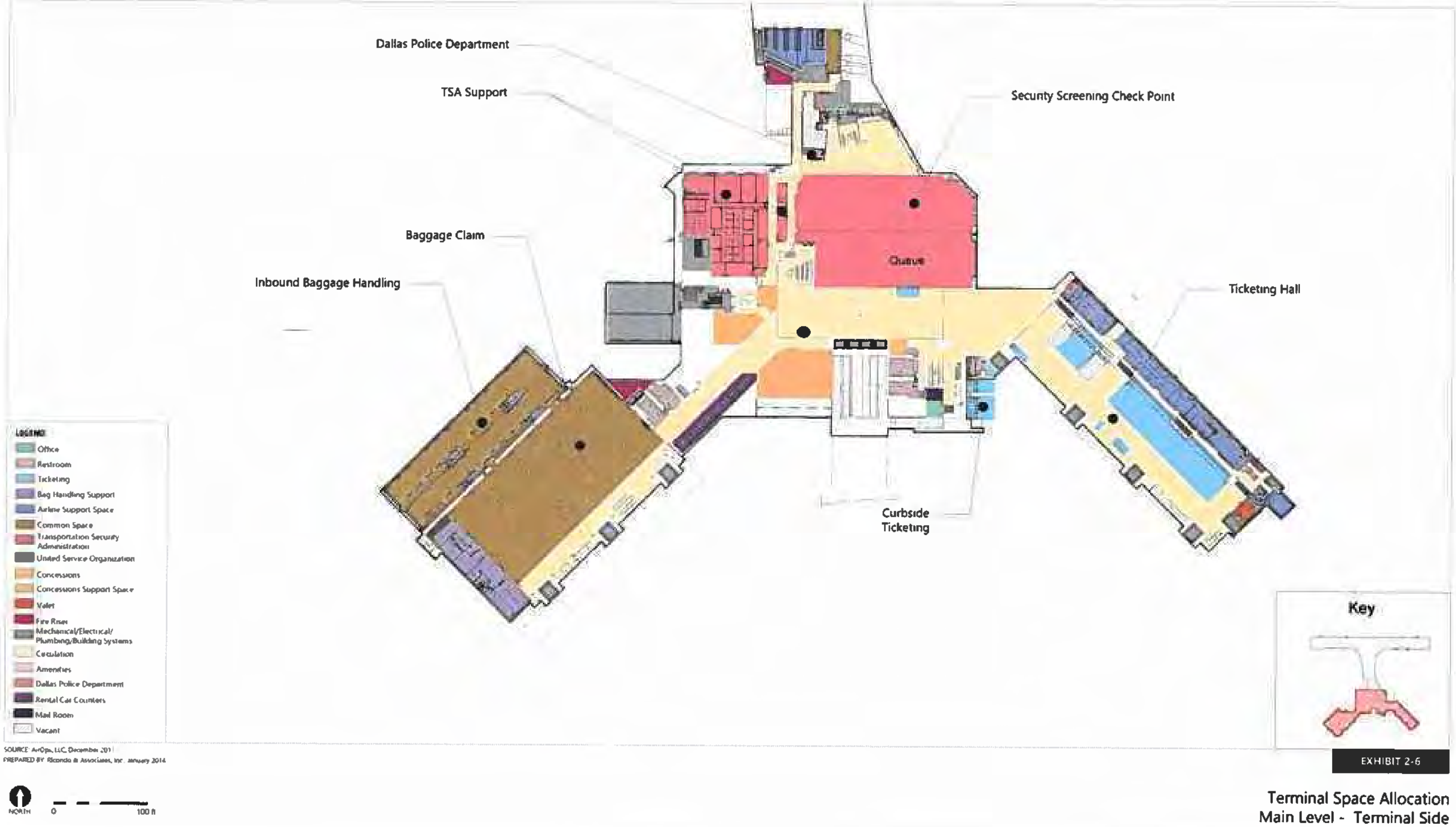
Table 2-8: Main Level Space Summary

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Airline Support Facilities	77,270
Circulation (All)	73,160
Outbound Baggage	40,280
Transportation Security Administration	31,670
Building Systems and Maintenance	24,490
Baggage Claim	24,080
Vacant Space	14,290
Inbound Baggage	12,880
Ticketing and Check-in	8,790
Airport Facilities	8,100
Concessions (including Concessions Support)	7,190
Other Agencies and Contractors	5,820
Restrooms (Public and Nonpublic)	2,720
Amenities	140
Total Main Level Space	**330,880**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.



SOURCE: AirOps, LLC, December 201

PREPARED BY: Ricondo & Associates, Inc., January 2014

EXHIBIT 2-6

Terminal Space Allocation
Main Level - Terminal Side

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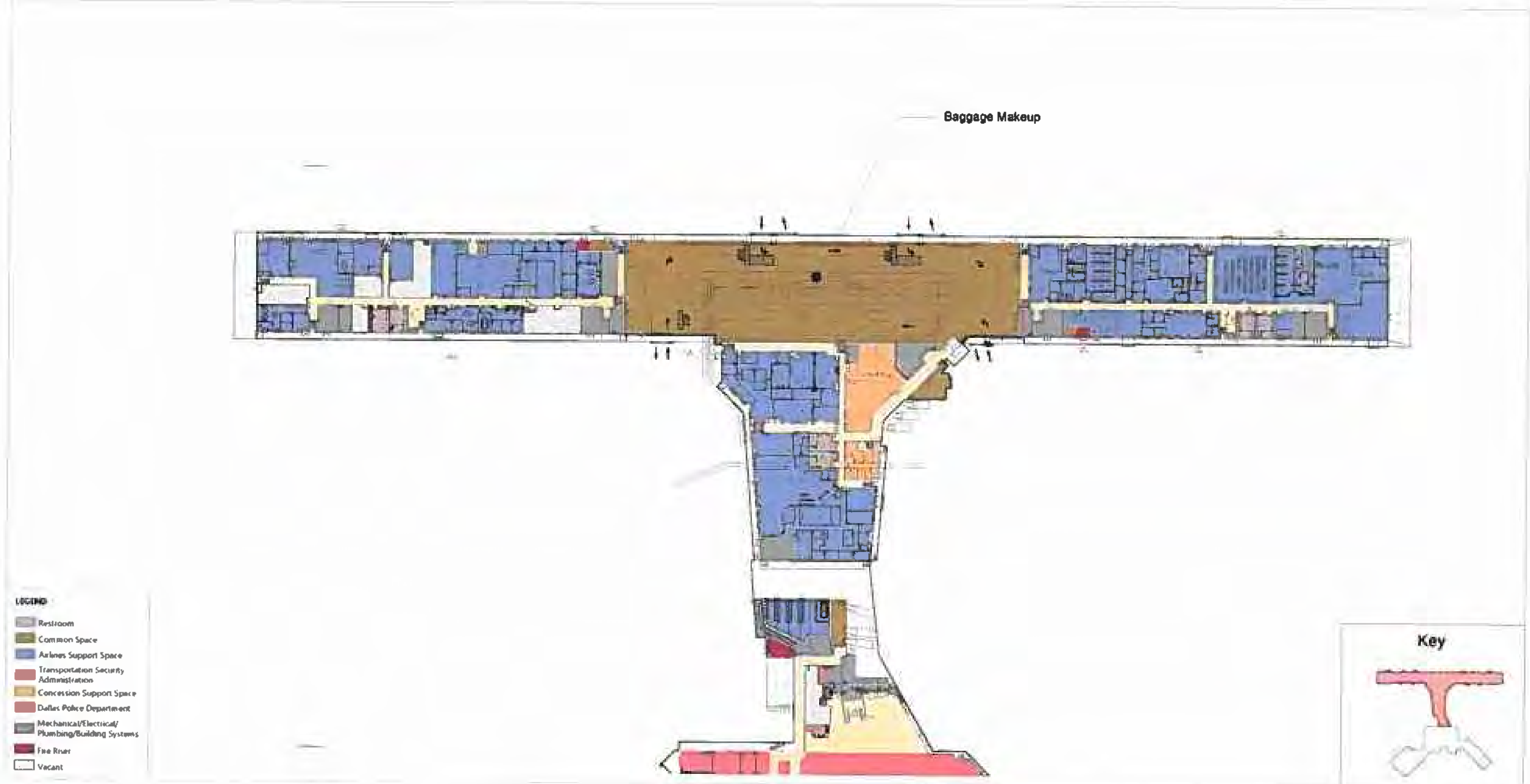

SOURCE: AirOps, LLC, December 2013
PREPARED BY: Ricondo & Associates, Inc. January 2015

EXHIBIT 2-7

Terminal Space Allocation
Main Level - Concourse Side

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2.3.4.1 Airline Support

Airline support space on the Main Level includes airline ticket offices (ATOs), baggage service offices (BSOs), and various support and storage spaces for each airline. It should be noted that information related to the ATOs may also be discussed with ticketing/check-in space and information related to the BSOs may also be discussed with baggage claim space. For this Master Plan Update, both types of space are categorized as airline support because the space is considered office space; however, these spaces support the ticketing/check-in and baggage claim functions, respectively.

Table 2-9 lists the specific airline support facilities space on the Main Level.

Table 2-9: Airline Support Space - Main Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Support Space (Southwest)	66,750
Airline Ticketing Office (Southwest)	4,580
Baggage Service Office (Southwest)	2,860
International RAM Sublease (Southwest)	210
Storage (Southwest)	130
Support Space (United)	1,460
Baggage Service Office (United)	610
Airline Ticketing Office (United)	580
Storage (United)	90
Total Airline Support Space – Main Level	**77,270**

NOTE: Numbers are rounded to the nearest 10 square feet.
SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.2 Circulation

Several categories of circulation space are provided on the Main Level. Areas of public nonsecure circulation include the hallways and open space not designated to a tenant or a specific function, located prior to the SSCP (on all levels). A primary area within the public nonsecure circulation space is the Central Lobby.

The Central Lobby has historically been the symbolic "heart" of the Dallas Love Field Terminal building and a vital component in passenger processing. As part of the LFMP, the Lobby was completely renovated and expanded; however, the basic configuration remained the same. The main features of the approximately 94,000-square-foot Lobby includes access points to ticketing and baggage claim, concessions, general seating, restrooms, the information desk known as Love Info, and the SSCP.

The main entrance/exit, providing access/egress to and from the upper and lower curbsides and the parking garages, was modified to accommodate Americans with Disabilities Act requirements for the ramp. The ceiling was replaced and the old terrazzo floor was overlaid with new terrazzo with one exception; the world map terrazzo floor, originally installed in 1958, was preserved during the renovation, as required by the FAA and the Texas Historical Commission (THC). **Appendix D** provides additional information on the FAA/THC requirements.

Nonpublic nonsecure circulation space includes those hallways and corridors reserved for use by tenants and Airport staff only, prior to the SSCP.

Only a small amount of public secure circulation space is located on the Concourse Main Level. This space is located immediately after the SSCP leading to the stairs/escalators/elevators to the Passenger Level.

Nonpublic nonsecure circulation space on the Main Level consists of the hallways and corridors leading to various airline and support spaces. Nonpublic secure circulation space also consists of the hallways and corridors leading to various airline and support space, but is located after the SSCP.

2.3.4.3 Outbound Baggage

The outbound baggage makeup area is located in the center of the Concourse on the Main Level, and consists of three carousels. Exhibit 2-7 shows the general layout of this area and **Table 2-10** summarizes the allocation of space in the outbound baggage makeup area.

Table 2-10: Outbound Baggage Makeup Area - Main Level

BUILDING CATEGORY	INVENTORY
Number of Devices	3
Device Presentation Frontage (linear feet)	561 (187 x 3)
Device Area (square feet)	9,760
Staging Area (square feet)	9,580
Tug Circulation (square feet)	20,940
Total Outbound Baggage Makeup Area Space (square feet) - Main Level	**40,280**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.4 Transportation Security Administration

The TSA SSCP, dedicated to screening passengers before they enter the secure Concourse, is located in the Lobby on the Main Level (see Exhibit 2-6). Detailed SSCP information is not provided on the exhibit to comply with the TSA's Sensitive Security Information directives. During the schematic design process, the TSA provided information and long-term facility requirements for the SSCP area. The Lobby area was enlarged to accommodate a total of 13 screening lanes, which include 7 walk-through metal detectors, 7 advanced imaging technology scanners, and 13 baggage x-ray machines. **Table 2-11** lists the TSA SSCP facilities on the Main Level.

Table 2-11: Transportation Security Administration Space - Main Level

BUILDING CATEGORY	INVENTORY (SQUARE FEET)
Security Screening Checkpoint Lanes	11,410
Queuing Area	10,550
Offices	8,720
Support Space	720
Storage Space	140
Oversized Baggage Space	130
Total TSA Space – Main Level	**31,670**

NOTES:

Numbers are rounded to the nearest 10 square feet.

TSA = Transportation Security Administration

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.5 Building Systems and Maintenance

Similar to the Basement Level, the Airport-related building system and storage spaces on the Main Level include various MEP spaces.

Table 2-12 lists the building systems and maintenance spaces on the Main Level.

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Table 2-12: Building Systems and Maintenance Space - Main Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Mechanical Chase	5,740
Baggage Right-of-Way	4,850
Electrical Room	4,770
Janitorial Room	2,310
Intermediate Distribution Frame Room	2,150
Mechanical Room	1,730
Fire Riser Room	1,130
Facilities Maintenance	680
Compressor Room	380
Elevator Mechanical Room	330
Key Shop	330
Emergency Fuel Shut Off Room	80
Pre-Action Room	10
Total Building Systems and Maintenance Space – Main Level	**24,490**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.6 Baggage Claim

The baggage claim hall is located on the west side of the Terminal and consists of four carousels with space for an additional carousel in the future.

Exhibit 2-6 shows the layout of the carousels in the baggage claim hall. The International Air Transport Association (IATA) defines a 12-foot band around the presentation face of a baggage claim carousel as the retrieval area where passengers wait to retrieve bags or are in the act of retrieving bags. Circulation space allows for passenger movement between adjacent devices. **Table 2-13** summarizes the allocation of space in the baggage claim hall on the Main Level.

Table 2-13: Baggage Claim Hall Space - Main Level

BUILDING CATEGORY	INVENTORY
Number of Carousels	4
Device Presentation Frontage (linear feet)	700 (175 x 4)
Retrieval Area (square feet)	10,980
Bag Claim Circulation (square feet)	6,580
Device Area (square feet)	6,520
Total Baggage Claim Hall Space - Main Level (square feet)	**24,080**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.7 Vacant Space

The vacant space on the Main Level is primarily reserved for new or expanding concessionaires or airlines.

2.3.4.8 Inbound Baggage

Each baggage claim device requires an offload area within the Security Identification Display Area (SIDA) for general baggage cart circulation, parking of baggage carts while they are being offloaded, a work aisle, and an offload conveyor.

The offload area shown on Exhibit 2-6 includes the following components:

- **Offload Baggage Conveyor:** Conveyor equipment is used to transport bags from the baggage carts onto the baggage claim device. The device presentation frontage provided dictates the number of carts able to be parked in front of the device.
- **Staging Area:** The staging area accommodates baggage cart parking and the baggage offload area.
- **Baggage Cart Parking:** An area typically the width of a tug road, approximately 10 feet to 12 feet wide, is provided for carts to be parked and bags offloaded. Carts are usually parked parallel to the flat plate claim device.
- **Baggage Offload Area:** An area directly between the staging area and the flat plate device, typically 3 feet wide, is provided as a work area for baggage agents to manually load bags from the cart onto the claim device.
- **Baggage Right-of-Way:** This area is occupied by baggage conveyance systems.
- **SIDA Wall:** The SIDA wall separates the secure airside from the unsecure landside to prevent unauthorized persons from accessing the SIDA.

Table 2-14 summarizes the inbound baggage space on the Main Level.

Table 2-14: Inbound Baggage Space - Main Level

BUILDING CATEGORY	INVENTORY
Number of Devices	4
Device Presentation Frontage (linear feet)	456 (114 x 4)
Tug Circulation (square feet)	9,180
Staging Area (square feet)	2,690
Device Area (square feet)	1,010
Total Inbound Baggage Space - Main Level (square feet)	**12,880**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.9 Ticketing and Check-in

To maximize the efficiency of the existing Terminal and the geometry of the site, the LFMP included the demolition and replacement of the ticketing wing to return to the original operating paradigm of the Terminal. All private vehicle traffic is accommodated on the upper (Main Level) roadway for passenger dropoff, while commercial vehicle traffic is accommodated on the lower (Basement Level) roadway.

The new ticketing/check-in facility opened on November 1, 2012. It consists of approximately 38,000 square feet, with an exposed structure, and clerestory windows that result in an open and spacious ticketing hall. The soft northern light filtered through the roof and ceiling reduces the need for artificial lighting during the day while mitigating potential heat gain.

Exhibit 2-6 depicts the general layout of the ticketing hall, with three primary ticket counters in the traditional linear configuration, general ATO areas, outbound baggage belts, kiosks, and a valet parking office. In addition, a charter/group check-in counter is located at the exterior of the building, allowing buses to drop passengers off behind the building. Valet parking is located adjacent to the Terminal building, with offices located in the building.

Southwest Airlines operates two of the ticketing counters and United Airlines operates the third. **Table 2-15** presents a summary of the areas leased to airlines in the ticketing hall. **Table 2-16** presents a summary of the check-in devices by airline.

Table 2-15: Total Passenger Check-in Area - Main Level (in square feet)

	AIRLINES				
	SOUTHWEST	UNITED	TOTAL LEASED	VACANT[1]	TOTAL SPACE
Ticketing Queue	3,510	370	3,880	960	4,840
Ticket Counters	2,310	300	2,610	790	3,400
Curbside Queuing[1]	470	130	600	130	730
Curbside Ticketing[1]	320	90	410	90	500
Kiosks	490	N/A	490	N/A	490
Group Check-in Queue	480	N/A	480	N/A	480
Group Check-in	320	N/A	320	N/A	320
Total Check-in Area Space – Main Level	**7,900**	**890**	**8,790**	**1,970**	**10,760**

NOTES:

N/A = Not Applicable

Numbers are rounded to the nearest 10 square feet.

1/ Curbside queuing and ticketing are located outside of the building footprint.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 2-16: Check-in Devices - Main Level

	AIRLINES				
	SOUTHWEST	UNITED	TOTAL LEASED	VACANT	TOTAL DEVICES
Kiosks	34	N/A	34	N/A	34
Ticket Counters	13	4[1]	17	10[1]	27
Curbside Check-in	4	1	5	1	6
Group Check-in	Unknown	N/A	--	N/A	--
Total Check-in Devices – Main Level	**51**	**5**	**56**	**11**	**67**

NOTES:

N/A = Not Applicable

1/ Based on 4.5 linear feet per position.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Passengers using the covered curbside check-in area adjacent to the ticketing hall can directly enter the Terminal building Lobby and approach the SSCP.

Passengers have several options to access the ticketing hall:

- **Valet Entry:** An entry vestibule located at the end of the ticketing hall provides access for valet parking passengers and group check-in passengers.
- **Curbside Dropoff:** Three entry vestibules equally spaced along the front of the ticketing hall provide direct access to the Terminal building from the curbside.
- **East Tunnel:** Stairs, an "up" escalator, and an elevator from the East Tunnel provide access to the ticketing hall from the commercial vehicle curbside and the parking garage.

2.3.4.10 Airport Support Facilities

Table 2-17 lists the areas used primarily for Airport support on the Main Level.

Table 2-17: Airport Support Facilities Space - Main Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Loading Dock/Covered Parking	5,670
Receiving Dock	930
Trash Room	700
Valet Office	460
Mail Room	210
Love Information Kiosk	130
Total Airport Support Facilities Space – Main Level	**8,100**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.11 Concessions

Concessions space is discussed in Subsection 2.3.7.

2.3.4.12 Other Agencies and Contractors

Table 2-18 lists the agencies and contractors that occupy space on the Main Level.

Table 2-18: Other Agencies and Contractors Space - Main Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Dallas Police Department	460
Dallas Police Department Storage	180
Rental Car Agency Counters	2,190
United Service Organization	2,990
Total Space	**5,820**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.4.13 Restrooms

Both public and nonpublic restrooms are provided on the Main Level.

2.3.4.14 Amenities

An amenities area containing an ATM, a teletypewriter (TTY) telephone for the hearing impaired, and a pay telephone bank is located in the Lobby of the Main Level next to the escalator/stair bank leading to the parking garages.

2.3.5 PASSENGER LEVEL

The Passenger Level, which is also referred to as Level 2, supports the accommodation of passengers prior to boarding their flights in gate areas referred to as holdrooms. Comforts for enplaning passengers (and deplaning passengers) on the Passenger Level include restaurants and retail stores (i.e., concessions; more information is provided in Subsection 2.3.7). This level also includes nonpublic areas, such as offices and support areas. **Exhibit 2-8** depicts the space allocation on the Passenger Level of the Concourse. **Table 2-19** provides a summary of the square footage on the Passenger Level.

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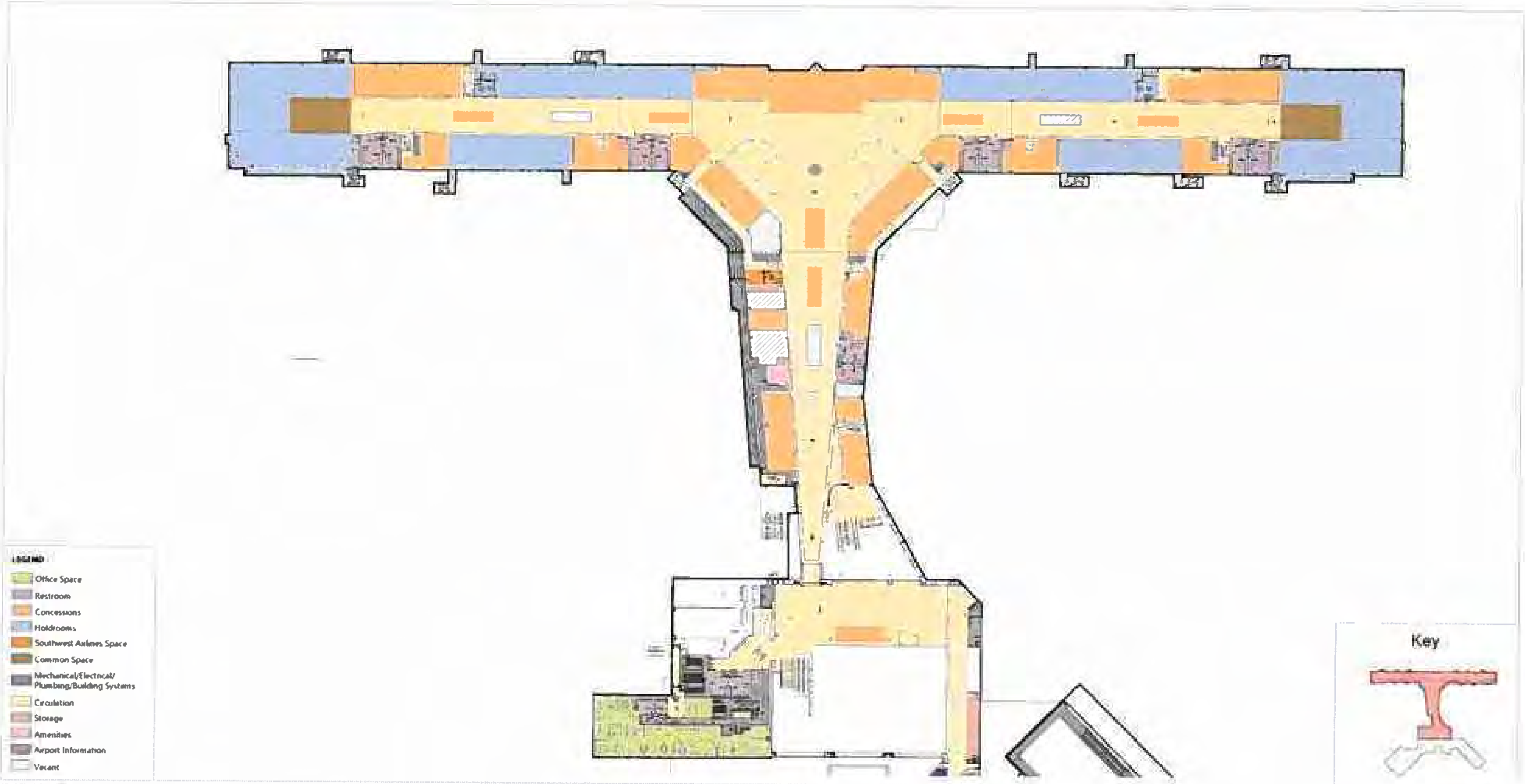

SOURCE: AirOps, December 2014
PREPARED BY: Ricondo & Associates, Inc., January 2015

EXHIBIT 2-8

Concourse Space Allocation
Passenger Level

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Table 2-19: Passenger Level Space Summary

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Circulation (All)	92,860
Holdroom	47,910
Concessions (including Concessions Support)	40,980
Building Systems and Maintenance	19,960
Airport Facilities	13,840
Vacant Space	9,410
Restrooms (Public and Nonpublic)	6,910
Airline Support Facilities	2,370
Amenities	410
Total Passenger Level Space Summary	**234,650**

NOTE: Numbers are rounded to the nearest 10 square feet.
SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.5.1 Circulation

The majority of circulation space on the Passenger Level is public secure space. A few corridors and Love Landing are public nonsecure space.

A key component of the LFMP was reconfiguration of the space directly above the SSCP for use as a meeter/greeter area. Originally designed as a luau dining room in the 1950s, this area was subsequently enclosed and used as Airport Administration offices from the 1970s through 2010. With all arriving passengers exiting through one location, the LFMP incorporated a redesign of this area into open space for the general public to meet passengers, with a direct connection to the parking garage. Referred to as Love Landing, this space consists of approximately 12,610 square feet and offers comfortable furniture and concessions. An observation window in the corner of the space overlooks the ramp and east section of the new Concourse.

In addition, some conference room and office spaces west of Love Landing is also provided on the Passenger Level. These spaces are accessible via public nonsecure and nonpublic nonsecure cooridors.

2.3.5.2 Holdrooms

There are a total of 20 airline contact gates sized to accommodate Boeing 737-700 aircraft. The number of gates is restricted by the Five Party Agreement and additional hardstand operations are not allowed. Two gates can accommodate larger aircraft, up to a Boeing 777. All passenger boarding bridges are owned by the City. Several passenger boarding bridge models are used among the 20 gates. All of the boarding bridges are of the Jetway type and the models include A3 58/116, A3 61/127, A3 64/131, A3 65/133, and A3 68/144.

Holdrooms are designed to provide passenger convenience and follow the Southwest Airlines model for passenger boarding. To accommodate passenger needs for easy access to electrical power for tablets and other personal electronic devices and cell phones, more than 90 percent of all holdroom seats are equipped with individual electrical receptacles, fed from floor outlets, for passenger use via a traditional power cord or Universal Serial Bus (USB) cable.

Some of the holdrooms, specifically those at the ends of the Concourse (Gates 1 through 5, 15, and 17 through 20), are common-use space. This space was considered in the calculation of each gate area because passengers occupy this common-use space prio to boarding at their respective gates.

Table 2-20 lists the preferential use of each gate on the Concourse.

Table 2-20: Preferred Airline Gate Assignments and Holdroom Space – Passenger Level

GATE	PREFERRED AIRLINE USER 1/	SIZE (SQUARE FEET) 2/	NOTES	LARGEST AIRCRAFT
1	Southwest	2,800	includes common use gate area	Boeing 737
2	Southwest	2,800	includes common use gate area	Boeing 737
3	Southwest	2,800	includes common use gate area	Boeing 737
4	Southwest	2,800	includes common use gate area	Boeing 737
5	Southwest	2,800	includes common use gate area	Boeing 737
6	Southwest	2,450		Boeing 737
7	Southwest	2,320		Boeing 737
8	Southwest	2,450		Boeing 737
9	Southwest	2,320		Boeing 737
10	Southwest	2,550		Boeing 737
11	American	2,320		Boeing 737
12	Southwest	2,550		Boeing 737
13	American	2,320		Boeing 737
14	Southwest	2,450		Boeing 737
15	United	3,000	includes common use gate area	Boeing 777
16	Southwest	2,630		Boeing 737
17	United	3,000	includes common use gate area	Boeing 777
18	Southwest	2,730	includes common use gate area	Boeing 737
19	Southwest	2,730	includes common use gate area	Boeing 737
20	Southwest	2,730	includes common use gate area	Boeing 737
	Total Holdroom Space	**52,550**		

NOTES:

1/ All Southwest gates are preferential-use gates; United's and American's gates are exclusive-use gates

2/ Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.5.3 Concessions

Concessions space is discussed in Section 2.3.7.

2.3.5.4 Building Systems and Maintenance

Table 2-21 lists the specific building systems and maintenance space on the Passenger Level.

Table 2-21: Building Systems and Maintenance Space - Passenger Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Mechanical Chase	12,740
Baggage Right of Way	3,600
Mechanical Room	1,790
Intermediate Distribution Frame Room	690
Janitorial Room	620
Electrical Room	440
IT Closet	80
Total Building Systems and Maintenance Space	**19,960**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.5.5 Airport Support Facilities

Table 2-22 lists the space on the Passenger Level that is used primarily by Airport management and staff.

Table 2-22: Airport Support Facilities Space - Passenger Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Airport Offices	7,220
Conference Rooms	3,890
Airport Storage	1,980
Copy Room	260
Airport Systems Manager (ASM) Space	190
Lost and Found	170
Love Information Kiosk	130
Total Airport Support Facilities Space – Passenger Level	**13,840**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.5.6 Vacant Space

The vacant space on the Passenger Level includes Gates 11 and 13, as well as expansion/additional space for concessionaires.

2.3.5.7 Restrooms

Both public and nonpublic restrooms are provided on the Passenger Level.

2.3.5.8 Airline Support Facilities

The airline support facilities on the Passenger Level include airline staff breakrooms, flight crew holding rooms, and storage and office space for both airline and airline support subcontractors, such as IRAM.

Table 2-23 lists the space on the Passenger Level leased to specific airlines for support purposes.

Table 2-23: Airline Support Facilities Space - Passenger Level

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Southwest Airlines Breakroom	850
Southwest Airlines Support	710
Southwest Airlines Flight Crew	570
Southwest Airlines Subcontractor IRAM	240
Total Airline Support Facilities Space	**2,370**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.5.9 Amenities

On the Passenger Level, an amenities area containing an ATM, a TTY, a pay telephone bank, high-end vending machines, and shoe shining services is located just past the Flight Information Display System (FIDS) on the left when walking to the gates.

2.3.6 OFFICE TOWER

The Office Tower begins on Level 3, above the Passenger Level, and extends to Level 8. The Office Tower contains mostly Airport building systems, offices, storage space, and support space. However, Level 3 also includes approximately 3,800 square feet of concessions office and storage space.

Table 2-24 summarizes the allocation of space in the Office Tower. **Exhibits 2-9** and **2-10** show the space allocation on each level of the Office Tower.

Table 2-24: Office Tower Space Allocation (Levels 3 through 8)

BUILDING CATEGORY	TOTAL SPACE (SQUARE FEET)
Building Systems and Maintenance	42,520
Other Agencies and Contractors	6,740
Airport Facilities	6,680
Circulation	5,850
Concessions Support	3,800
Restrooms	770
Airline Support Facilities	100
Total Office Tower Space	**66,460**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.6.1 Building Systems and Maintenance

Table 2-25 lists the specific building systems and maintenance areas in the Office Tower.

2.3.6.2 Other Agencies and Contractors

Table 2-26 lists the nonairline and non-Airport entities and subcontractors with space in the Office Tower. Note that levels that house no other agency or contractor space were omitted from the table.

2.3.6.3 Airport Support Facilities

Table 2-27 lists the Airport support facilities spaces within the Office Tower. Levels that house no Airport support facilities space were omitted from the table.

2.3.6.4 Circulation

All of the circulation space in the Office Tower is nonpublic nonsecure or nonpublic secure.

2.3.6.5 Concessions

No food and beverage or retail concessionaires are located in the Office Tower; however, concessions support space in the form of offices is located in the Office Tower. Concessions space is discussed in Section 2.3.7.

2.3.6.6 Restrooms

All restrooms in the Office Tower are nonpublic and measure 770 square feet.

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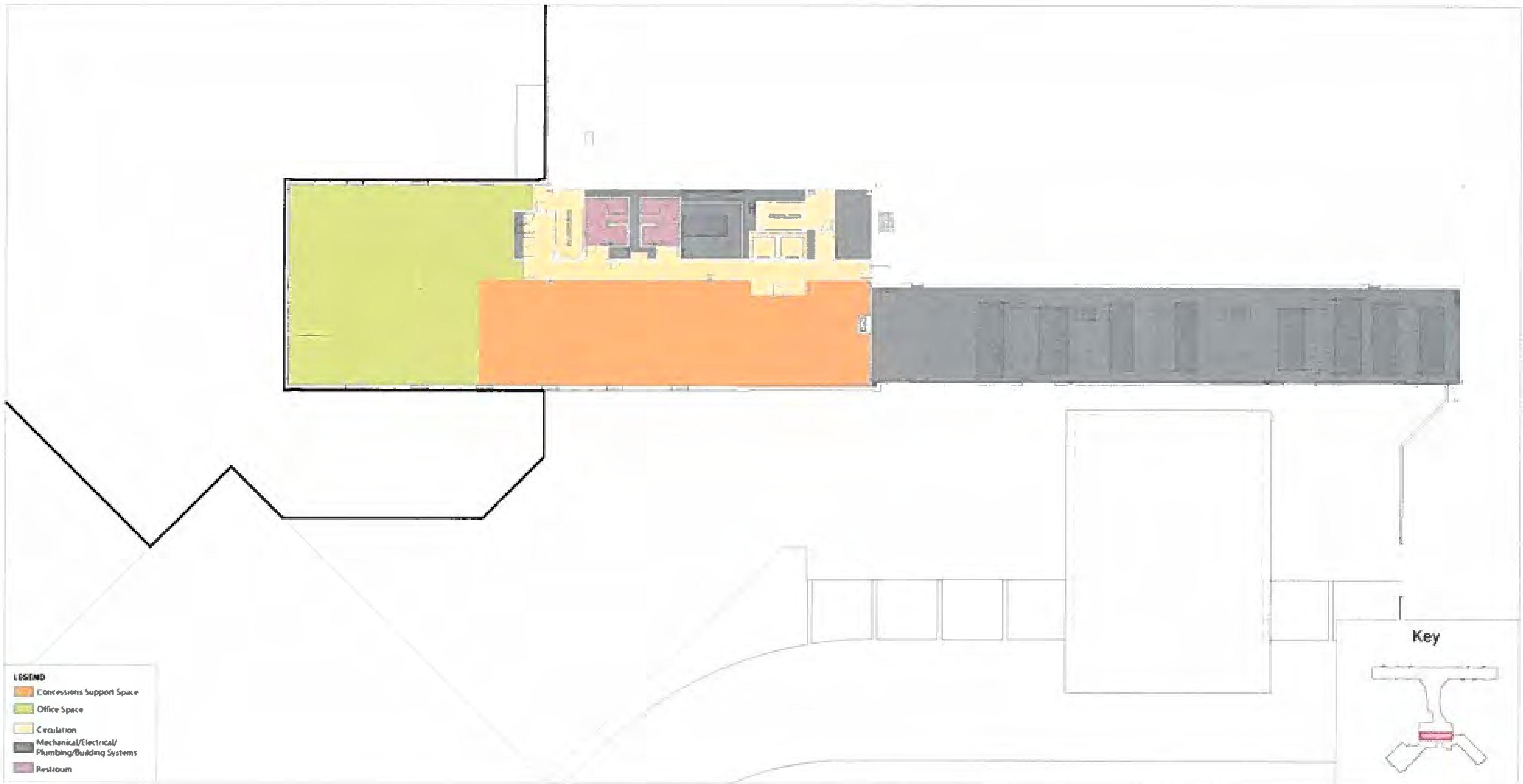

SOURCE: AirOps, LLC, December 2013
PREPARED BY: Ricondo & Associates, Inc. January 2014

EXHIBIT 2-9

Office Tower Allocation (Level 3)

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SOURCE: AirOps, LLC, December 2013
PREPARED BY: Ricondo & Associates, Inc., January 2015

EXHIBIT 2-10

Office Tower Allocation (Levels 4 through 8)

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Table 2-25: Building Systems and Maintenance - Office Tower (in square feet)

BUILDING CATEGORY	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	TOTAL AREA
Mechanical Room	37,470	390	90	0	290	0	**38,240**
Mechanical Chase	2,460	290	60	70	40	0	**2,920**
Elevator Mechanical Room	60	0	0	460	0	0	**520**
Intermediate Distribution Frame Room	230	160	0	0	0	0	**390**
Radio Room	260	0	0	0	0	0	**260**
Electrical Room	40	90	0	0	0	0	**130**
Janitorial Room	20	20	20	0	0	0	**60**
Total Building Systems and Maintenance Space – Office Tower	**40,540**	**950**	**170**	**530**	**330**	**0**	**42,520**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 2-26: Other Agencies and Contractors Space - Office Tower (in square feet)

BUILDING CATEGORY	LEVEL 3	LEVEL 4	LEVEL 5	TOTAL AREA
Dallas Police Department		6,390		**6,390**
FAA Weather Room			330	**330**
ARINC	20			**20**
Total Other Agencies and Contractors Space – Office Tower	**20**	**6,390**	**330**	**6,740**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 2-27: Airport Support Facilities Space - Office Tower (in square feet)

BUILDING CATEGORY	LEVEL 3	LEVEL 4	LEVEL 6	LEVEL 8	TOTAL AREA
Airport Offices	4,010	1,190			**5,200**
Airport Storage		840	350	290	**1,480**
Total Airport Support Facilities Space – Office Tower	**4,010**	**2,030**	**350**	**290**	**6,680**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.3.6.7 Airline Support Space

The only airline support space in the Office Tower, measuring 100 square feet, is on the Level 3 roof above the East Concourse area for Southwest Airlines' communications antennas.

2.3.7 CONCESSIONS

The food and beverage, retail, and concessions support spaces in the passenger Terminal facility are only located on the Main Level, the Passenger Level, and on Level 3 of the Office Tower. As concessions space often has a critical role in airport operating budgets and operations, the concessions spaces in the passenger Terminal facility are discussed in this separate section.

Exhibits 2-6 through 2-8 identify the Airport areas that are leased under food and beverage, retail, or concession support agreements.

2.3.7.1 Food and Beverage Concessionaires

Table 2-28 lists the food and beverage concessionaires and their leased space. Note that some concessionaires may have space on multiple levels. These spaces are combined and noted in the table.

2.3.7.2 Retail Concessionaires

Table 2-29 lists the retail concessionaires and their leased space. Note that some concessionaires may be have space on multiple levels. These spaces are combined and noted in the table.

2.3.7.3 Concessions Support

Table 2-30 presents the concessions support space at the Airport.

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Table 2-28: Food and Beverage Concessionaire Space

NAME	USE	LEVEL	LEASED AREA (SQUARE FEET)
Cool River (Restaurant)	Full-service Restaurant	Passenger Level	4,310
Chili's Too	Full-service Restaurant	Passenger Level	2,710
Cantina Laredo	Full-service Restaurant	Passenger Level	2,440
Sky Canyon	Full-service Restaurant	Passenger Level	1,750
Dunkin' Donuts	Coffee Kiosk	Passenger Level	1,650
Cru Wine Bar	Quick-service Restaurant with Alcohol	Passenger Level	1,470
Bruegger's Bagels	Quick-service Restaurant	Main Level	1,380
Jason's Deli	Quick-service Restaurant	Passenger Level	1,200
LaMadeleine	Quick-service Restaurant	Passenger Level	1,200
Moe's Southwestern Grill	Full-service Restaurant	Passenger Level	1,060
Chick-fil-A	Quick-service Restaurant	Passenger Level	1,120
Campisi's Pizza	Quick-service Restaurant	Passenger Level	1,110
Manchu Wok	Quick-service Restaurant	Passenger Level	1,110
Whataburger	Quick-service Restaurant	Passenger Level	1,060
Dickey's BBQ Pit	Quick-service Restaurant	Passenger Level	950
Cool River (Kitchen)	Restaurant Kitchen	Passenger Level	860
Starbucks	Coffee Kiosk	Passenger Level	800
Baskin-Robbins	Ice Cream Kiosk	Passenger Level	730
Paciugo Gelato	Quick-service Restaurant	Passenger Level	730
Texpress Gourmet	Quick-service Restaurant	Passenger Level	580
Total Food and Beverage Concessionaire Space			**28,220**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 2-29: Retail Concessionaire Space

NAME	USE	LEVEL	LEASED AREA (SQUARE FEET)
Hudson News	Newsstand	Passenger Level	1,790
West End News	Newsstand	Passenger Level	1,360
CNN Newsstand	Newsstand	Passenger Level	1,290
D Magazine News	Newsstand	Passenger Level	1,280
Fair Park Texas	Retail	Passenger Level	1,030
Tech on the Go	Retail	Passenger Level	1,000
Desigual	Retail	Passenger Level	910
Travel and Leisure Store	Newsstand	Passenger Level	910
Soybu Bliss	Retail	Passenger Level	900
Creative Kidstuff	Interactive	Passenger Level	790
Billy Bob's Texas	Retail	Passenger Level	690
The Cowboy Store	Retail	Passenger Level	690
Mallasadi Men's Boutique	Retail	Passenger Level	630
Fire CZ	Kiosk	Passenger Level	410
Spectacles	Kiosk	Passenger Level	410
Texas Monthly News	Newsstand	Main Level	310
Advertisement Kiosk	Kiosk	Passenger Level	50
Total Retail Concessionaire Space			**14,450**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 2-30: Concessions Support Space

	TOTAL SPACE (SQUARE FEET)
Main Level	5,500
Passenger Level	0
Office Tower	3,800
Total Concession Support Space	**9,300**

NOTE: Numbers are rounded to the nearest 10 square feet.

SOURCE: AirOps, LLC, December 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

2.4 Landside

The landside components of the Airport include parking and Airport access roads. Public parking, employee parking, and other off-Airport parking options, as well as Airport access and Airport roadways, are discussed in this subsection.

2.4.1 PUBLIC PARKING

Two public parking garages (A and B) are provided at the Airport, as well as valet storage and a cell phone lot, all of which are owned and operated by the City. In addition, privately owned remote public parking facilities are available in the vicinity of the Airport. **Exhibit 2-11** shows the locations of these parking areas, which are discussed below.

Exhibit 2-11: On-Airport Parking Facilities and Capacities

SOURCES Google Earth Pro, October 2013; Ricondo & Associates, Inc., June 2013.
PREPARED BY: Ricondo & Associates, Inc., June 2013

2.4.1.1 On-Airport Public Parking

Public parking at the Airport is provided in two locations, Garage A and Garage B. Garage A serves as a short-term premium parking product and Garage B serves as a long-term economy parking product. To make garage parking payment easier, patrons may use TollTag – a cashless tolling service administered by the North Texas Tollway Authority – by entering designated lanes where the appropriate parking rate is deducted from the patron's TollTag account or associated credit card. All public Airport parking facilities are compliant with the Americans with Disabilities Act.

Garage A

Garage A is a structured four-level building with 2,980 parking spaces located across from the Airport Terminal and connected to the Terminal by crosswalks and elevated pedestrian walkways. Garage A also provides dedicated parking spaces for electric vehicles, six charging stations on Level 1, and an additional six charging stations on Level 3. As of August 1, 2014, the maximum daily rate for Garage A was $17.

Garage B

Garage B is a structured four-level building with 4,000 parking spaces located next to Garage A, but farther from the Terminal. To reduce walk times to and from the Terminal, a 1,500-foot climate-controlled pedestrian corridor connects Garage B with Garage A and the Terminal via 10 moving walkways. This corridor features public art displays. Garage B also provides six charging stations for electric vehicles. As of August 1, 2014, the maximum daily rate for Garage B was $13.

2.4.1.2 Valet Parking

The City also operates a valet parking service at the Airport. Currently, 69 valet parking spaces are available. As of August 1, 2014, the maximum daily rate for valet parking was $24. The rate is $6 for the first hour, up to 2 hours is $13, from 2 to 3 hours is $16, and from 3 to 5 hours is $19, after which the daily maximum rate of $24 is charged. Drivers of vehicles that are to be valet-parked enter the dropoff area from the upper level curbside roadway prior to the ticketing hall, and enter one of four designated dropoff lanes adjacent to the east side entrance of the ticketing hall.

2.4.1.3 Off-Airport Public Parking

In addition to the two on-Airport parking garages, privately owned off-Airport parking alternatives are available near the Airport. Three privately operated off-Airport parking facilities are located just outside of Airport property. The operators of these off-Airport parking facilities include The Parking Spot, Best Parking, and Thrifty Airport Parking Dallas. All three facilities are located east of Herb Kelleher Way between Tom Braniff Lane and Mockingbird Lane. The three sites occupy a combined area of approximately 21 acres and provide approximately 2,560 parking spaces. Off-Airport parking operators provide independent courtesy shuttles between the Terminal and their respective facilities.

The two largest off-Airport parking facilities are The Parking Spot and Thrifty Airport Parking Dallas. In 2014, the net daily rates at The Parking Spot were $8.61 for covered parking and $6.77 for open air parking. The net daily rate at the Thrifty parking facility was $8.95 per day.

Table 2-31 provides a summary of the capacity of each parking facility and the associated rate structure.

2.4.1.4 Cell Phone Lot

A free-to-use cell phone lot for drivers waiting to pick up arriving passengers is provided off inbound Herb Kelleher Way, just after the National/Alamo/Enterprise rental car facilities. The cell phone lot has 65 marked parking spaces at 90-degree angles on both sides of a dual-direction drive aisle, with a large turning circle at the end of the lot. Lot access and egress are via right turn in/right turn out movements from and to Herb Kelleher Way.

Table 2-31: 2014 Public Parking Supply and Rates

LOCATION	SPACES	RATE STRUCTURE					
ON AIRPORT							
Garage A	2,980	0 - 0.5 hour	0.5 – 1 hour	1 – 2 hours	2 – 3 hours	3 – 5 hours	5 – 24 hours
		FREE	$4.00	$6.00	$10.00	$13.00	$17.00
Garage B	4,000	0 - 0.5 hour	0.5 – 1 hour	1 – 2 hours	2 – 3 hours	3 – 5 hours	5 – 24 hours
		FREE	$3.00	$5.00	$7.00	$10.00	$13.00
Valet Parking	69	0 – 1 hour	1 – 2 hours	2 – 3 hours	3 – 5 hours	5 – 24 hours	
		$8.00	$13.00	$16.00	$19.00	$24.00	
Subtotal	**7,049**						

OFF AIRPORT

	SPACES	BASIC DAILY RATE	TAXES	NET DAILY RATE	PERCENT OF DAILY MAXIMUM GARAGE B PARKING RATE
The Parking Spot and Best Parking (Covered)	1,835 [1/]	$7.95	8.25%	$8.61	86.1%
The Parking Spot (Open Air)	830 [2/]	$6.25	8.25%	$6.77	67.7%
Thrifty Airport Parking Dallas	400 [3/]	$5.50	8.25%	$8.95	89.5%
Subtotal	**3,065**				

NOTES:

1/ Counted from Google Earth Pro, August 12, 2013. Spaces were counted by counting rows and assuming a width of 9 feet per space (475 uncovered, 725 covered, 635 on Best Parking site). Parking grouped together due to similar rate structure.

2/ Counted from Google Earth Pro, August 12, 2013.

3/ Approximate based on vehicle count from Google Earth Pro, August 12, 2013.

SOURCES: Google Earth Pro, August 12, 2013; http://www.dallas-lovefield.com/pdf/ParkingRateChange.pdf (accessed September 2014); http://www.dallas-lovefield.com/parking-transportation.html (accessed September 2014); http://www.theparkingspot.com/locations/locations.aspx?ID=11 (accessed June 2013); http://www.parkrideflyusa.com/dal-dallas-airport-parking/thrifty/ (accessed June 2013).
PREPARED BY: Ricondo & Associates, Inc., September 2014.

2.4.2 EMPLOYEE PARKING

Currently, airline employees and employees working in the Terminal park in Garage B, as well as in surface lots near the Terminal, as shown on Exhibit 2-11. Some Airport tenants also provide parking spaces at their respective facilities.

2.4.3 TERMINAL CURBSIDE ALLOCATIONS

Lane configurations and curbside allocations for passenger dropoff and pickup and pedestrian crossingsat Dallas Love Field were also inventoried. The inventory of the Terminal curbside discussed herein reflects the final build conditions of the LFMP.

Curbside access to the passenger Terminal is provided via a two-level roadway system. The lower-level curbside roadway is designated for commercial vehicle use only (known as the Ground Transportation curbside roadway), while the upper level curbside roadway is designated for private vehicles picking up arriving passengers and dropping off departing passengers and for taxicabs and limousines that are dropping off passengers.

The upper level (private vehicle) curbside roadway is 795 feet long. The passenger dropoff area begins directly in front of the ticketing hall and continues to the curbside check-in area. After the curbside check-in area, a transitional area serves as an overlap between the check-in and baggage claim areas, and is adjacent to the Terminal Lobby and SSCP. The final section of the upper level roadway is for arriving passenger pickup in front of the baggage claim hall. The upper level roadway has four continuous through lanes in the Terminal area, with a 20-foot-wide stopping lane in front of the ticketing hall, curbside check-in, and baggage claim hall areas, and a typical 12-foot-wide stopping lane in front of the Terminal Lobby. No crosswalks are provided on the upper level roadway, as connection between the Terminal and Garages A and B is provided via an overhead pedestrian walkway.

The lower level (Ground Transportation) curbside roadway is divided into a 920-foot-long inner curbside roadway and a 204-foot-long outer curbside roadway. The inner curbside roadway consists of five well-defined zones: the Dallas Area Rapid Transit (DART) stop, a green zone for hotel/parking shuttle dropoff, a blue zone for rental car shuttle pickup/dropoff, a yellow zone for taxicab loading, and another green zone for hotel/parking shuttle pickup. The inner curbside roadway has two through lanes and a single stopping lane for commercial vehicle loading and unloading. The outer curbside is used for limousine staging in the purple zone and shared ride vans in the orange zone. The outer curbside has a single loading lane and one bypass lane.

A channelized taxicab queuing lane on the left side of Herb Kelleher Way as it approaches the Terminal is provided for approved taxicabs dispatched from the remote taxicab staging area. This remote area is approximately 300 feet long and accommodates 12 to 15 taxicabs waiting to be directed to the designated yellow curbside area to pick up passengers.

The lower level curbside has three pedestrian crosswalks connecting the three main areas of the Terminal building with Garage A. The first crosswalk is in the hotel/parking shuttle dropoff area, connecting to the East Tunnel, which leads to the ticketing hall. The second crosswalk connects the Terminal Lobby via the central tunnel with the outer commercial curbside and Garage A. The third pedestrian crosswalk is adjacent to the baggage claim hall tunnel between the taxicab pickup and hotel/parking shuttle pickup zones and connects with Garage A.

Employee shuttle, charter bus, and group check-in areas are provided outside at the east end of the ticketing hall. Two hundred linear feet are provided for charter bus staging and employee shuttle loading/unloading at the back of the ticketing hall on Aviation Place. This location allows for four to five large charter buses to stage while removing congestion from the Terminal curbside.

Table 2-32 summarizes the curbside allocation length for each assigned zone. **Exhibit 2-12** depicts the curbside zones, corresponding color codes, and linear curb length for each designated zone.

2.4.4 AIRPORT ACCESS AND ON-AIRPORT ROADWAY SYSTEM

Since initiation of the LFMP, several roadway alignments and functions have changed, resulting in new traffic patterns and traffic control devices. Operation of the completed on-Airport roadway system, vehicle circulation, and other Airport-related service areas are described in this subsection. **Exhibit 2-13** provides a map of the areas discussed below.

2.4.4.1 Cedar Springs Road/Herb Kelleher Way

Cedar Springs Road serves as the primary public entrance roadway to the Airport. Cedar Springs Road becomes Herb Kelleher Way northwest of Mockingbird Lane. Herb Kelleher Way is an eight-lane divided roadway from Mockingbird Lane to Tom Braniff Lane, and a six-lane divided roadway from Tom Braniff Lane to the Terminal Loop Road, which begins at Aviation Place. The intersections of Herb Kelleher Way with Tom Braniff Lane and Aviation Place are signalized. The T-intersection of Herb Kelleher Way and Hawes Avenue is unsignalized and stop-controlled only on the Hawes Avenue approach. A dedicated left-turn lane is provided for outbound Airport traffic on Herb Kelleher Way turning left onto Hawes Avenue. The posted speed limit on Herb Kelleher Way is 30 miles per hour in both directions.

2.4.4.2 Terminal Loop Road

The inbound segment of Terminal Loop Road, which begins at Aviation Place, provides access to the Terminal curbsides and Garages A and B. Access to both parking garages is provided via a single-lane left exit from Terminal Loop Road just north of Aviation Place. Terminal Loop Road inbound to the curbside also provides access on the right to valet parking located off the east end of the ticketing hall.

The inbound segment of Terminal Loop Road splits to provide access to the upper and lower level curbside roadways described in Section 2.4.3 above. The speed limit on all inbound and curbside areas of Terminal Loop Road is 20 miles per hour.

The outbound segment of Terminal Loop Road begins where two lanes from the upper level roadway merge with a single lane from the lower level curbside roadway, providing three continuous outbound lanes before the roadway joins additional outbound lanes from the consolidated exit plaza serving both parking garages. Two recirculation roads are provided for vehicles returning to the Terminal, parking garages, or Aviation Place. The first recirculation road diverges from Terminal Loop Road and travels along the south side of Garage B. This roadway provides for vehicles to return to the Terminal area without entering the signalized intersection with Aviation Place. The second recirculation road is located just past Howard Megredy Circle, and provides access from the Terminal curbsides and parking garages to Aviation Place and the Spirit of Flight monument.

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Table 2-32: Linear Curbside Length by Zone

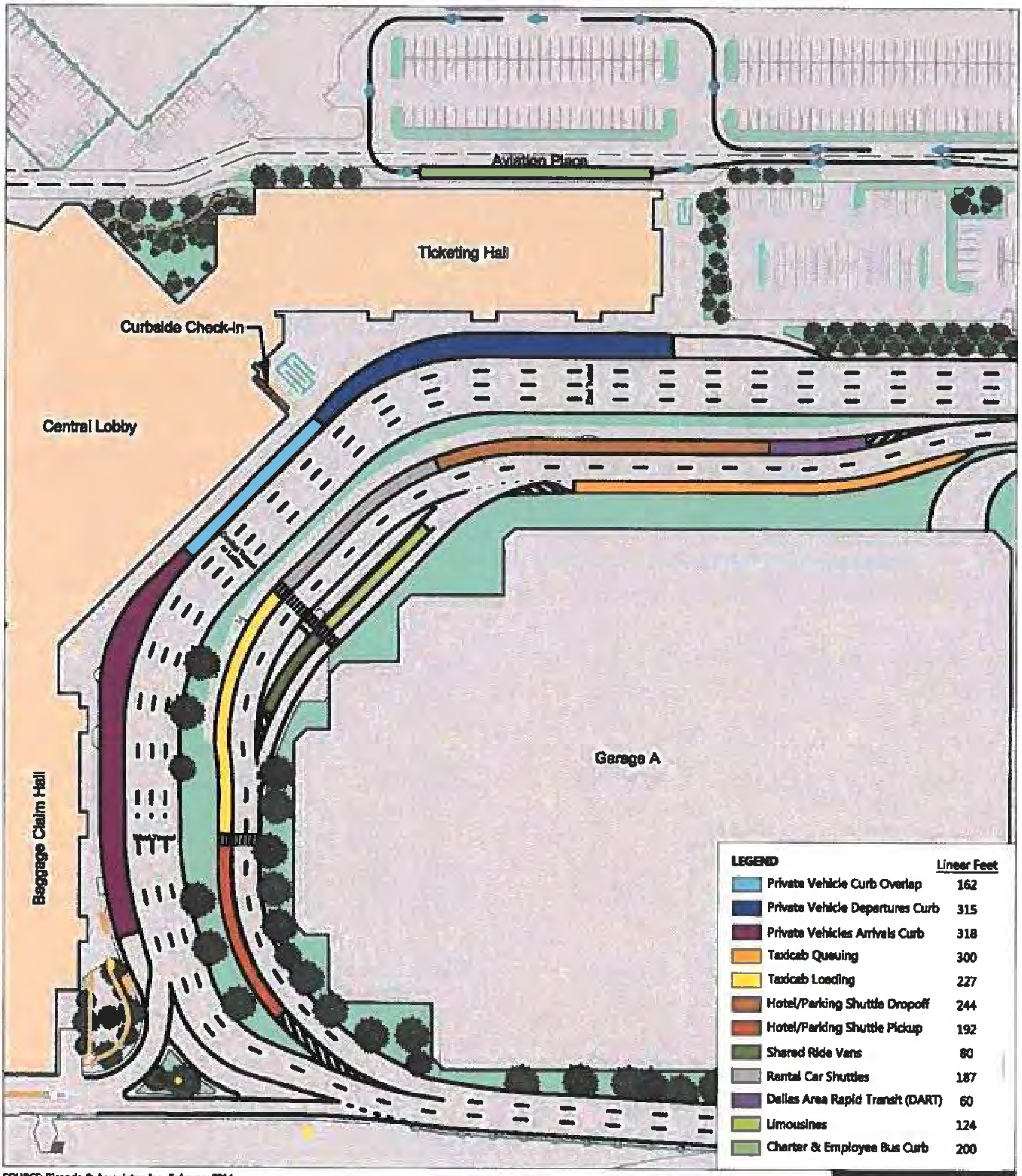
CURBSIDE ALLOCATION		LINEAR FEET
Upper Level Curbside		
Check-in/Departures		315
Overlap		162
Baggage Claim/Arrivals		318
Charter and Employee Bus Curb [1/]		200
	Subtotal	**995**
Lower Level – Inner Curbside		
Dallas Area Rapid Transit		60
Hotel/Parking Shuttle Dropoff		244
Rental Car Shuttle		187
Taxicab Loading [2/]		227
Hotel/Parking Shuttle Pickup		192
	Subtotal	**910**
Lower Level – Outer Curbside		
Limousine Pickup		124
Shared Ride Van Pickup		80
	Subtotal	**204**
	Total	**2,109**

NOTES:

1/ Charter bus staging is provided at the back of the ticketing hall on Aviation Place.

2/ Taxicab queuing is not accounted for in the table as it is not considered a "curbside" function.

SOURCE: Ricondo & Associates, Inc., June 2013.
PREPARED BY: Ricondo & Associates, Inc., June 2013.



SOURCE: Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

EXHIBIT 2-12

Curbside Allocations

Drawing: N:\Love Field\08 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\LANDSIDE SITE PLAN Final_V3.dwg_Layout: Exhibit 2-12_May 18, 2015, 7:00pm

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SOURCES: Google Earth Pro, October 2013 Ricondo & Associates, Inc., February 2014
PREPARED BY Ricondo & Associates, Inc February 2014

EXHIBIT 2-13

On-Airport Terminal Roadways

NORTH 0 700 ft.

Drawing N:\Love Field\08 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\On Airport_Roads dwg Layout On Airport Terminal Roadways Mar 25 2015, 4 27pm

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A new signal has been installed on the outbound Terminal Loop Road at the intersection with Contrail Lane to provide access to a controlled airfield gate.

The speed limit on outbound Terminal Loop Road increases to 30 miles per hour after the merge between the upper and lower level curbside areas, and continues at 30 miles per hour onto outbound Herb Kelleher Way.

2.4.4.3 Aviation Place

Aviation Place is a two-lane undivided roadway that provides access to the Airport's air cargo facilities, General Use Building (GUB), FAA ATCT, and employee parking areas between the Terminal and the airside apron area. A signalized intersection with Herb Kelleher Way allows outbound traffic to either cross inbound Herb Kelleher Way to access the outbound roadway or turn right to access the Terminal curbside and parking garages.

2.4.4.4 Local Access Roads

Numerous local access roads east of Herb Kelleher Way and north of Mockingbird Lane provide access to the rental car facilities, off-Airport privately operated parking facilities, taxicab staging area, and other Airport facilities. These roads include Tom Braniff Lane, Hawes Avenue, Collville Avenue, Waddell Avenue, Ralston Avenue, Aubrey Avenue, Ansley Avenue, Edwards Avenue, and Aviation Place (at Tom Braniff Lane).

2.4.5 OTHER GROUND TRANSPORTATION FACILITIES

Other ground transportation facilities considered in this Master Plan Update include the taxicab staging area and rental car facilities, as discussed below.

2.4.5.1 Taxicab Staging Area

The drivers of all taxicabs picking up passengers at the Airport must first report to the taxicab staging area located in a lot on Edwards Avenue off Ansley Avenue. Taxicabs are staged within this lot until they are called to the terminal curbside by a dispatcher when needed. Approximately 2,100 linear feet of taxicab staging space is available at this site to accommodate 120 taxicabs; generally, 400 to 800 linear feet (approximately 23 to 45 taxicabs) are required at this site on a typical day. At the Terminal curbside, a 300-linear-foot taxicab queuing lane is located on the left side of the entrance to the lower level roadway. This queuing lane typically accommodates 12 to 15 taxicabs and was designed to feed 180 linear feet of curbside space, or 10 active taxicab loading spaces at the curb.

2.4.5.2 Rental Car Facilities

Customer counters are available for nine rental car companies in the Terminal area adjacent to the baggage claim area. The rental car ready/return area is located remotely and is accessible to airline passengers via shuttle buses from the inner commercial vehicle curbside roadway. Each rental car company operates individual or shared facilities on Herb Kelleher Way, ranging from 0.5 to 1.0 mile from the Terminal area. In total, an estimated 16 acres at the Airport are occupied by the rental car companies.

2.5 Airport Tenant Facilities

Tenant facilities at the Airport are shown on **Exhibit 2-14**. Various FBO, fueling, corporate tenant, and support facilities are located within the perimeter fence delimiting Airport property. Support facilities include aircraft maintenance facilities, air cargo facilities, and other Airport support facilities.

Airport tenants other than airlines are primarily businesses and government agencies that provide a full range of services to meet the operational and safety needs of scheduled commercial, private, and general aviation aircraft operators. The tenants are grouped into the following categories: FBOs, aircraft maintenance, air cargo, and other Airport tenants, such as the Frontiers of Flight Museum and rental car companies. See **Appendix E** for a list of Airport tenants by building number, street address, description of the facilities, and other general information.

2.5.1 FIXED BASE OPERATORS

Fixed base operators are business entities that offer general aviation services, such as aircraft rentals, aircraft charters, parking, hangars, refueling, flight instruction, and light maintenance, at public-use airports. Of the five FBOs located at the Airport. They are well equipped to accommodate needs for first-class amenities, such as private meeting rooms, restaurants, rental cars, and limousine services. The facilities for the five FBOs currently located at the Airport are shown on **Exhibit 2-15**. The FBOs are as follows:

- Landmark Aviation
- Business Jet Center
- Jet Aviation
- Signature Flight Support
- Textar Aviation

Most of the general aviation facilities are located on the northeast side of the Airport along Lemmon Avenue. Associated Air Center-Landmark Aviation facilities include a Terminal building along George Coker Circle, a fuel farm, and two hangars. Additional facilities include a hangar and storage facility, located along Lemmon Avenue, adjacent to the Frontiers of Flight Museum. Business Jet Center facilities are located on the northwest side of the Airport and include 11 hangars, an office building, a fuel farm, and a Terminal building. Jet Aviation is located along Herb Kelleher Way.

SOURCES: Tenants/Building Inventory: Google Earth Pro 2011, Dallas Love Field Airport Layout Plan, 2001, Ricondo & Associates, Inc., April 2015.
PREPARED BY: Ricondo & Associates, Inc., April 2015.

EXHIBIT 2-14

Airport Tenant Facilities

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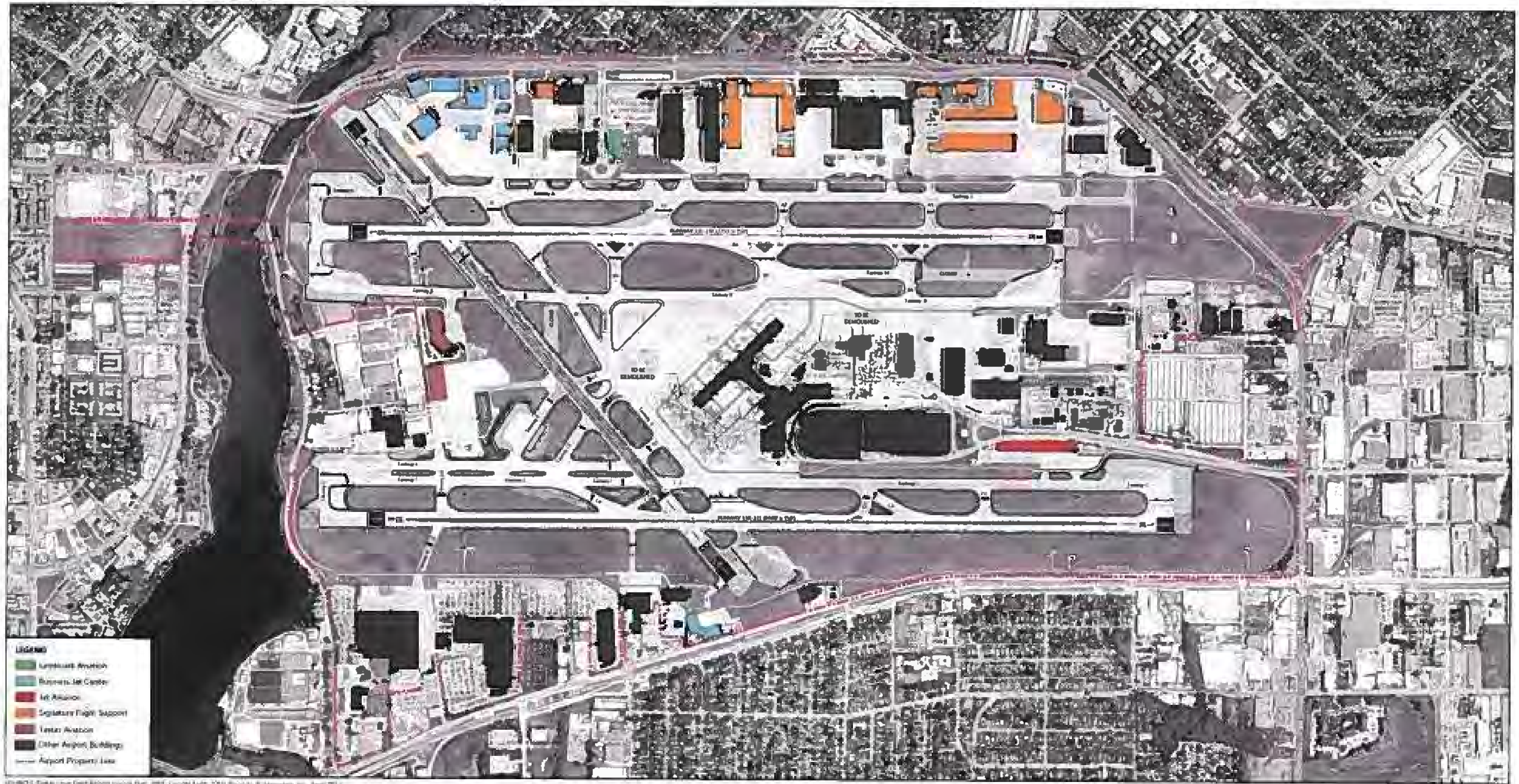

SOURCES: Dallas Love Field Airport Layout Plan, 2011; Google Earth, 2014; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2015.

NORTH 0 1,000 ft

EXHIBIT 2-15

Fixed Base Operator Facilities

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The Signature Flight Support facilities include 18 hangars, fuel farms, and Terminal buildings along Lemmon Avenue. The Dalfort Fueling facility is part of Signature Flight Support and is located on the western side of Runway 31R and is served by Taxiway A. The facility can be accessed via Lemmon Avenue.. Jet Aviation facilities are located southwest of Herb Kelleher Way and include a hangar, a fuel farm, and a Terminal building. Textar Aviation is the sole FBO on the northwest side of airfield, adjacent to Runway 13R. It is served by Taxiway C on the airside and by a road accessible via Love Field Drive on the landside.

2.5.2 CORPORATE HANGAR FACILITIES

Corporate aviation facilities at the Airport are used to store aircraft on ramp areas and in hangars when they are not being utilized. These facilities typically do not allow for on-site fueling facilities or heavy maintenance, althought some light maintenance can be performed. Four companies operate corporate aviation facilities:

- Trinity Industries
- Reeves Street, LLC
- MLT Development Company
- Holly Frontier Aviation

The corporate tenants are located south and east of the Airfield. Two tenants are located between the 31R and 31L thresholds, south of the terminal area.Trinity Indistries can be accessed via Tom Braniff Drive and Holly Frontier Aviation can be accessed vai Aviation Place. Two tenants are located on the northwest side of the Airport along the property line east of the Runway 13R threshold and southwest of the 13R threshold, adjacent to the Allied fuel farm. The Reevese Street LLC hangar can be accessed from Brookfield Avenue and MLT Development Company Hangars are located along Weiss Street. **Exhibit 2-16** depicts the corporate aviation tennats currently operating at the Aiport.

2.5.3 AIRCRAFT MAINTENANCE

Maintenance, Repair, and Overhaul (MRO) Facilities

Typical MRO operations include a mix of light and heavy aircraft maintenance operations. These functions may include airframe, engine, aircraft fuselage repair and inspections. The Airport also houses airport tenants completing aircraft interior finish-out work within their leaseholds. Additionally, some MRO tenants perform avionics testing and repair work in addition to maintenance functions within their leaseholds. MRO facilities present at the Airport include:

- Raytheon Aircraft Services
- Bombardier Aerospace Services
- Associated Air Center
- Gulfstream Aerospace
- Learjet, Inc.

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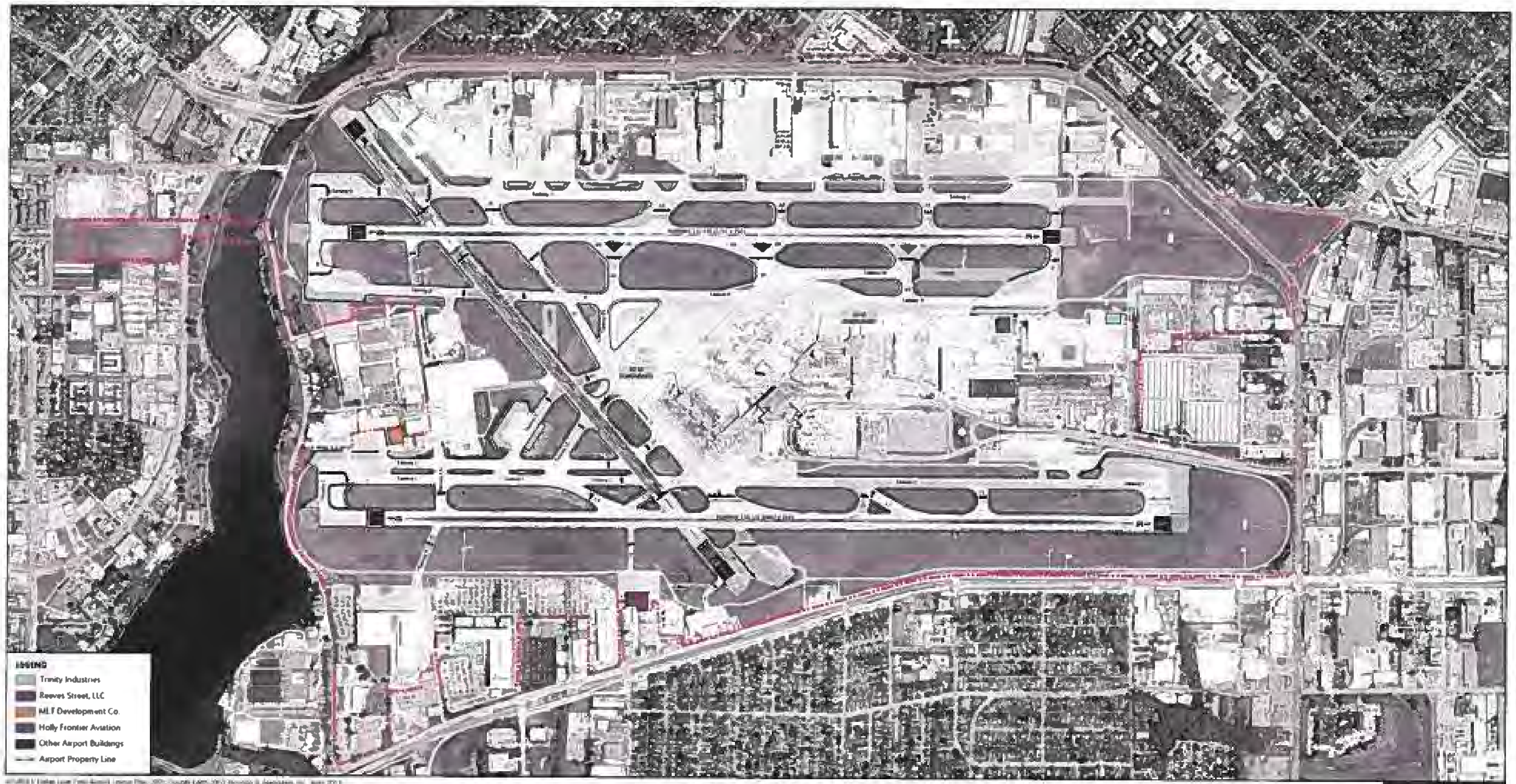

SOURCE: Dallas Love Field Airport Layout Plan, [illegible]; Google Earth, [illegible]; Ricondo & Associates, Inc., April 2015
PREPARED BY: Ricondo & Associates, Inc., April 2015

EXHIBIT 2-16

Corporate Aviation Facilities

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Most MRO facilities are located along Lemmon Avenue in the northeast quadrant of the Airport, east of Runway 13L-31R. Raytheon Aircraft Services and Associated Air Center facilities can be accessed from an entrance road adjacent to Lemmon Avenue while Gulfstream Aerospace and one of Bombardier Aerospace Services hangars can be accessed from George Cocker Road. Additional MRO facilities are located southeast and west of the Runway 31R threshold adjacent to the terminal area and Flight Museaum. Two Associated Air Center buildigs can be accessed from Lemmon Avenue. Gulfstream Aerospace and an additional Bombarider Aerospace Services hangar can be accesed from Tom Braniff Drive; Learjet Inc., hangars can be accessed via Aviation Place.

Southwest Airlines

The Southwest Airlines maintenance hangar is located in Buildings D01 and D02. Buildings D01 and D02 consist of approximately 304,000 square feet. Approximately 330,000 square feet are available for aircraft parking. Southwest Airlines also stores ground support equipment (GSE) and performs maintenance functions in the GUB, with approximately 55,000 square feet dedicated to these activities. The locations of the Southwest Airlines maintenance hangar and MRO facilities are depicted on **Exhibit 2-17**.

2.5.4 AIR CARGO

Southwest Airlines is the sole cargo operator at the Airport. Its cargo facility, located at the GUB, encompasses approximately 55,000 square feet, with a cargo area for public air freight shipping, a provisioning area for on-board food and beverage service, and a GSE area to serve equipment other than aircraft for Southwest Airlines. Surface access is provided via Aviation Place. The location of the GUB is illustrated on **Exhibit 2-18.**

2.5.5 OTHER AIRPORT TENANTS

2.5.5.1 Frontiers of Flight Museum

The Frontiers of Flight Museum is located on 6 acres of land at the southeastern corner of the Airport on Lemmon Avenue. The 100,000-square-foot museum opened in June 2004, and houses several aviation and aerospace-related exhibits. The museum also contains a 200-seat auditorium, dedicated classrooms and conference rooms, a children's discovery area, and two climate-controlled hangars for event rentals.

The northern portion of the structure integrates the original foundation and framework of the historic Mustang Aviation hangar, an aircraft service facility built in the 1940s. In addition, 370 vehicle parking spaces are available at the facility.

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SOURCE: Dallas Love Field Airport Layout Plan, 2001; Google Earth 2013; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2015.

EXHIBIT 2-17

Southwest Airlines Maintenance Hangar and MRO Facilities

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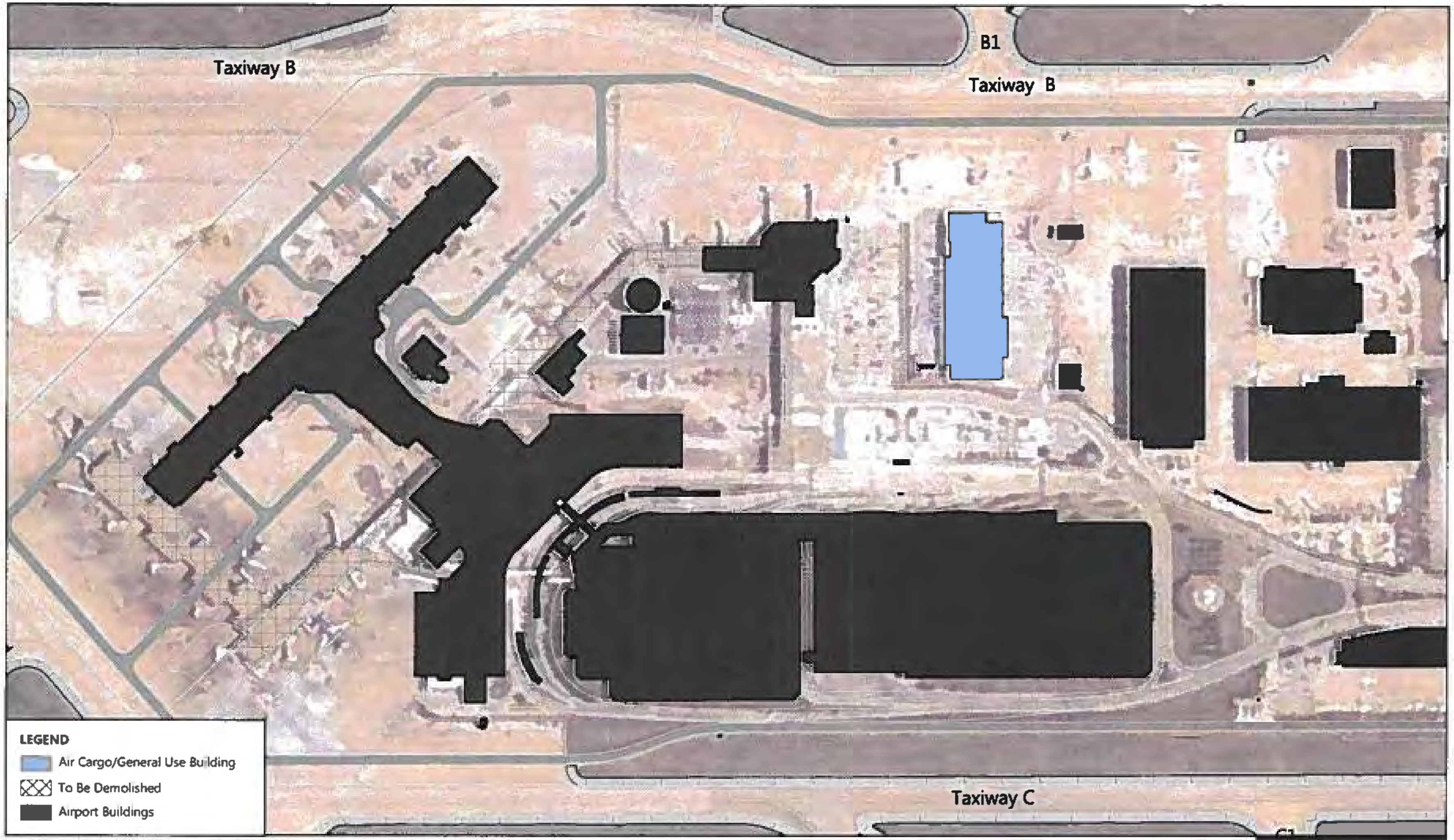

SOURCES: Google Earth Pro, 2011, Dallas Love Field Airport Layout Plan, 2001, Ricondo & Associates, Inc., February 2014
PREPARED BY: Ricondo & Associates, Inc., February 2014

EXHIBIT 2-18

Southwest Airlines Cargo/General Use Hangar

Drawing: P:\Dallas Airport System\~On-Call Planning 2012-2014\07 Master Plan\7 2 Inventory\Data Collection\CAD\Ex2-14 2-17_AirCargo_GeneralUseBuilding_v2.dwg, Layout: 2-17_Air Cargo Exhibit, May 21, 2015, 10:57am

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2.5.5.2 Rental Car Companies

Nine companies have rental car facilities on Airport property. They are Advantage Rent A Car, Alamo Rent A Car, Avis Rent A Car System, Budget Rent A Car System, Dollar Rent A Car, Enterprise Rent-A-Car, Hertz Rent a Car, National Car Rental, and Thrifty Car Rental. Advantage, Alamo, Avis, Budget, Enterprise, Hertz, and National operate along the northeast side of Herb Kelleher Way, southeast of the Termina. Dollar and Thrifty operate on the northwest side of West Mockingbird Lane, northeast of Herb Kelleher Way, southeast of the Terminal. Each company's leasehold includes a rental car ready/return area, vehicle storage parking, employee parking, fueling facilities, wash bays, light maintenance bays, administrative area, and vehicle stacking/staging spaces. With the exeption of Alamo, all of the rental car companies maintain counter space in the Terminal. All of the companies transport their customers between the Terminal building and their facilities via courtesy shuttle buses.

2.6 Airport Support Facilities

Airport facilities that provide services to the Airport Terminal and associated operations include an aircraft rescue and fire fighting (ARFF) station, Airport maintenance facilities, and ground and airport traffic control towers.

2.6.1 AIRCRAFT RESCUE AND FIRE FIGHTING

The ARFF station (Fire Station #21) is located west of Runway 13R. The station is sized to meet the requirements of Title 14, Code of Federal Regulations (CFR) Part 139.315, "Aircraft rescue and firefighting: Index determination," Index C aircraft operations. The ARFF equipment are operated and maintained by the Dallas Fire Department. The station has four bays, and one fire engine can be maneuvered to the midpoint of the Airport in less than 3 minutes, thus meeting the FAA-mandated 3-minute response time. The equipment used at Fire Station #21 consists of one Rosenbauer Panther 6x6 and three Oshkosh TI-3000s, which include reserve ARFF apparatus. Three vehicles are based at the station for incident/accident response. **Table 2-33** lists the ARFF equipment at DAL.

2.6.2 AIRPORT MAINTENANCE FACILITIES

The City's Airport maintenance facilities are located in Buildings C13 and C14 off Hawes Avenue, as depicted on **Exhibit 2-19**. The facilities encompass approximately 204,000 square feet and are primarily used for repairing passenger and service vehicles. Activities include light repairs, such as oil changes, lubrication, and tire changes. Other activities include the repair and maintenance of larger equipment, such as snow removal equipment. Other areas on the Airport are dedicated to parts storage, office and administration, locker rooms, and training rooms.

In addition to the facilities described above, many maintenance and storage functions are performed in the Basement Level of the Main Terminal. There are no current plans to expand or relocate Airport maintenance facilities/functions.

Table 2-33: Aircraft Rescue and Fire Fighting Response Capabilities

CALL SIGN	VEHICLE TYPE	MODEL YEAR	MODEL	CONDITION	PERSONS ASSIGNED	RESPONSE TIME	GALLONS OF WATER	GALLONS OF AFFF [1/]
RED 1	Twin Agent[2/]	2011	Rosenbauer Panther 6x6	Excellent	3	Less than 3 minutes	3,000	380 [3/]
RED 2	Twin Agent	1999	Oshkosh T3000	Fair	2	Less than 2 minutes	3,000	420
RED 3	Twin Agent	2001	Oshkosh T3000	Fair	2	Less than 2 minutes	3,000	420
RED 42	Twin Agent	1999	Oshkosh T3000	Fair	0	Less than 3 minutes	3,000	420

NOTES:

1/ AFFF = Aqueous Film Forming Foam, which is used to extinguish fires.

2/ Twin-agent refers to the fire extinguishing system, which can be configured to be used with a dry chemical agent and AFFF, or both.

3/ Contains 3 percent of foam concentrate

SOURCES: City of Dalles, *Dallas Love Field, Airport Certification Manual*, October 2013, Ricondo & Associates, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., October 2013.

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SOURCES: Google Earth Pro, 2011; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

EXHIBIT 2-19

Airport Maintenance Facilities

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2.6.3 CONTROL TOWERS

An ATCT and a ground control tower are located at the Airport.

2.6.3.1 Airport Traffic Control Tower

The FAA ATCT is located central to the airfield adjacent to the Main Terminal building. The tower is 136 feet high at the line of sight. FAA ATCT personnel are responsible for clearing pilots to take off or land and providing ground clearances to taxiing aircraft operating within the aircraft movement area. Additionally, FAA ATCT personnel also provide separation between departing and arriving aircraft, and transfer/receive control of aircraft to and from the TRACON facilities.

The FAA ATCT encompasses the tower and the adjacent base building. The tower consists of seven levels, which mostly house the elevator shaft and equipment associated with ATCT functions. The tower cab is located on the uppermost level, and access to the main tower cab is provided via a flight of stairs. Additionally, a small area is allocated for a breakroom and restrooms on this level.

The base building consists of a large breakroom, restrooms, and administrative offices for technical operations staff associated with maintenance of the ATCT.[6]

2.6.3.2 Ground Control Towers

At one point, there were two ground control towers located at the East and West Concourses of the former Airport Terminal Building. The East Concourse tower was demolished as part of the LFMP. The West Concourse ground control tower is located central to the new Main Terminal Lobby. It is currently being retrofitted. It should be noted that the tower itself begins on the fifth level. The levels below are considered offices and spaces supplemental to the Main Terminal Lobby.

- Fifth Level – FAA Weather room, various mechanical spaces
- Sixth Level – Department of Aviation storage, restrooms, mechanical rooms, etc.
- Seventh Level – Miscellaneous mechanical spaces
- Eighth Level – Department of Aviation storage

2.6.4 FUEL FARM

The Allied Fuel Farm is located near the intersection of Brookfield Avenue and Denton Drive, in the southwest area of the Airport, as depicted on **Exhibit 2-20**. The existing aircraft hydrant fueling system was built in 1957 and is owned by the City of Dallas, leased to Southwest Airlines, and operated by Allied Aviation (formerly Ogden Aviation). Fuel is delivered to the Airport via two pipelines by Exxon and Equilon. The Exxon system operates on a 10-day cycle and provides fuel through a 4-inch line at a rate of 240 gallons per minute (gpm). The Equilon system operates on a 7-day cycle and provides fuel through a 6-inch line at a rate of 540 gpm. The fuel farm also has the capability of receiving fuel via transport trucks at a single loading position.

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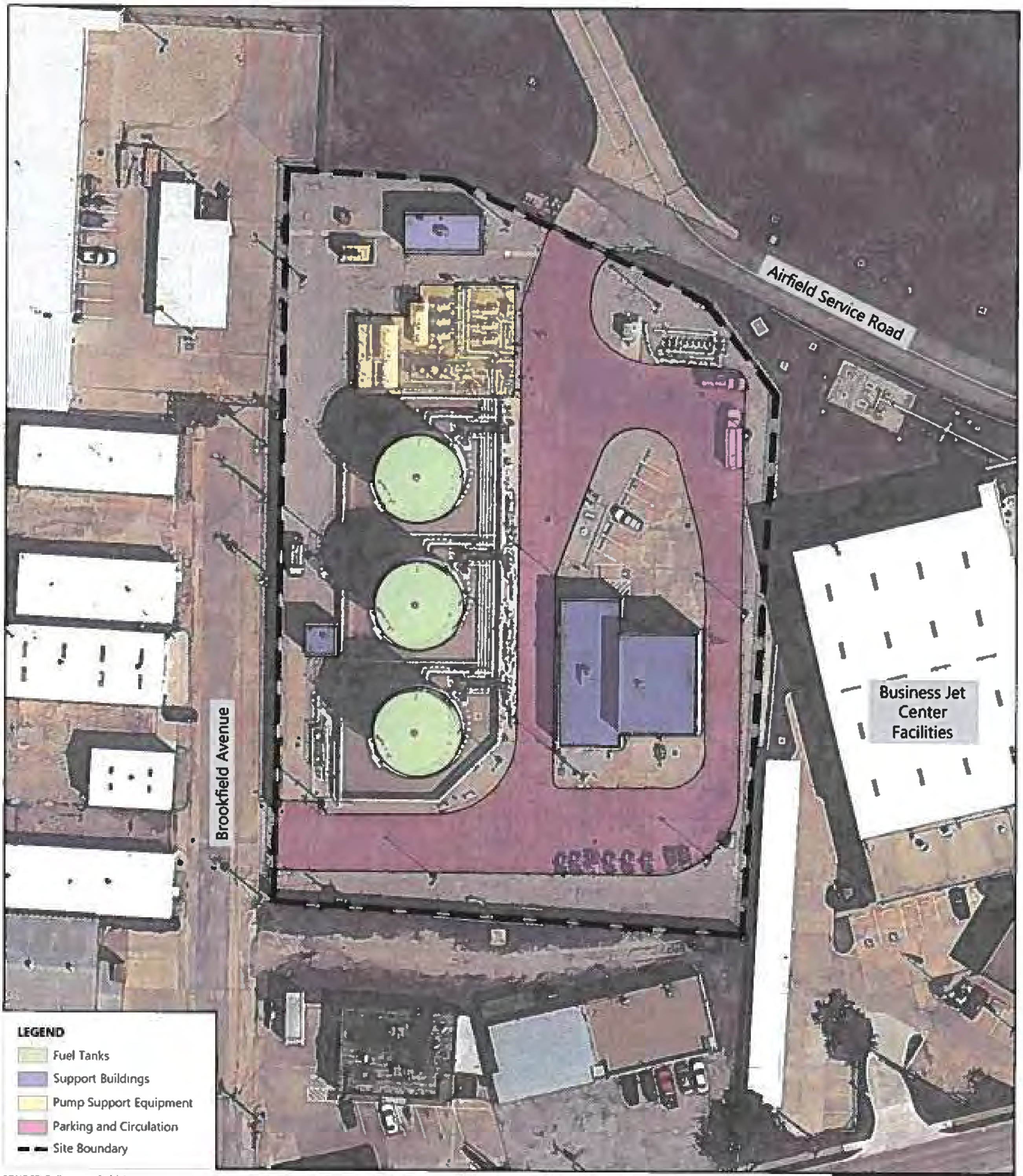

SOURCE: Dallas Love Field Airport Engineering Department, January 2014, Google Earth Pro, October 2013
PREPARED BY: Ricondo & Associates, Inc. January 2014

EXHIBIT 2-20

Allied Fuel Farm

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Fuel is stored in 18 50,000-gallon underground storage tanks (USTs). As the result of tank configuration and fuel level limits, the net fuel capacity of each tank is actually 39,000 gallons. Therefore, the total usable fuel storage capacity is 702,000 gallons. Of the 18 tanks, 4 are dedicated to fuel receipt, while the remaining 14 serve the hydrant system.

All USTs have internal floating suction arms, cathodic protection, high-level controls, inventory monitoring, and a level alarm system. Currently, the daily requirement for jet fuel at DAL is approximately 200,000 gallons; therefore, a 3.5-day fuel reserve is available at the Airport.

The distribution system that connects the storage facility to the hydrant system consists of eight individual lines: two 10-inch lines, four 8-inch lines, and two 6-inch lines. The pipeline is welded carbon steel, externally coated and cathodically protected. Three fuel manifolds connect the hydrant system to selected distribution supply lines. Only two-10 inch lines and one 8-inch line are in operation.

A new fuel hydrant system was installed as part of the LFMP. The hydrant system is a 14-inch loop around the Concourse that includes isolation valve pits, high-point vent pits, low-point drain pits, multiple hydrant pits at each aircraft gate position, and an emergency shutoff system.

2.7 Utility Infrastructure

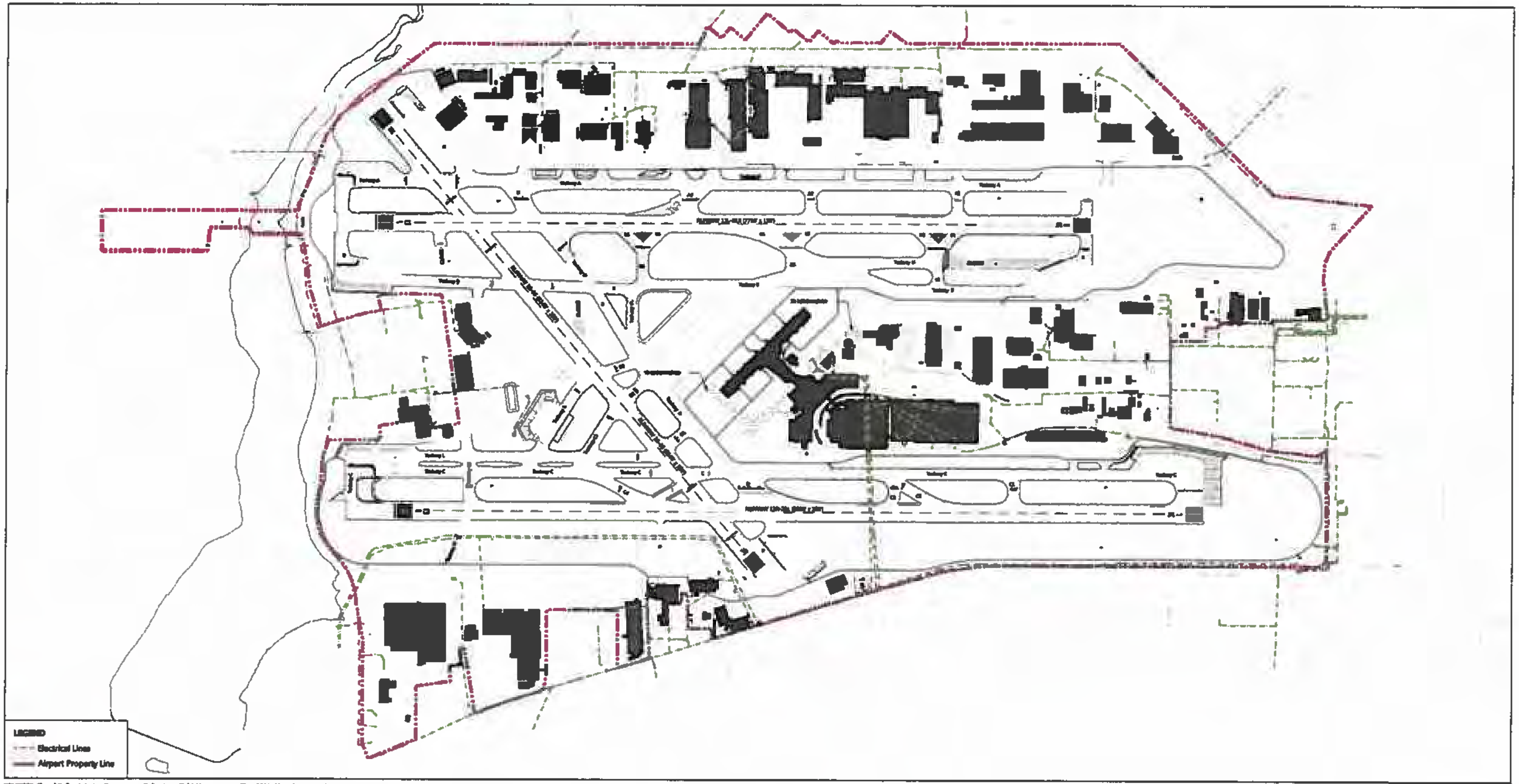
Five utility infrastructure systems serve Dallas Love Field. Utility infrastructure information was obtained through review and consultation with Airport staff and is listed with current service providers in **Table 2-34**. **Exhibits 2-21** through **2-25** present the utility line information that was provided by the Department of Aviation staff. In addition, an *Electrical Systems Inventory and Conditions Assessment* was prepared Parsons Brinkerhoff in 2014.

Table 2-34: Utility Service Providers

UTILITY TYPE	SERVICE PROVIDER
Electricity	TXU Energy
Water	City of Dallas
Communications	City of Dallas, Information Technology Department and AT&T
Gas	Atmos Energy
Sanitary Sewer	City of Dallas, Water Utilities

SOURCES: City of Dallas, Department of Aviation, June 2013; Ricondo & Associates, Inc., July 2013.
PREPARED BY: Ricondo & Associates, Inc., July 2013.

Nineteen separate outfall locations (basins) have been identified at the Airport. Of the 19 basins, 7 are connected to the City of Dallas Municipal Separate Storm Sewer Systems and 12 are connected to Bachman Lake. A comprehensive *Dallas Love Field Stormwater Drainage Master Plan* (SDMP) was prepared by CDM Smith in August 2012, following a review and analysis of the stormwater system at the Airport. The SDMP addressed existing flooding issues at the Airport, including identification and development of future improvements to address stormwater management concerns. **Appendix F** depicts the existing (and planned) drainage systems at the Airport, as presented in the SDMP.



SOURCES: City of Dallas Aviation Department: Dallas Love Field Airport Layout Plan, 2001, Ricondo & Associates, Inc., May 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2012.

EXHIBIT 2-21

Electrical Systems

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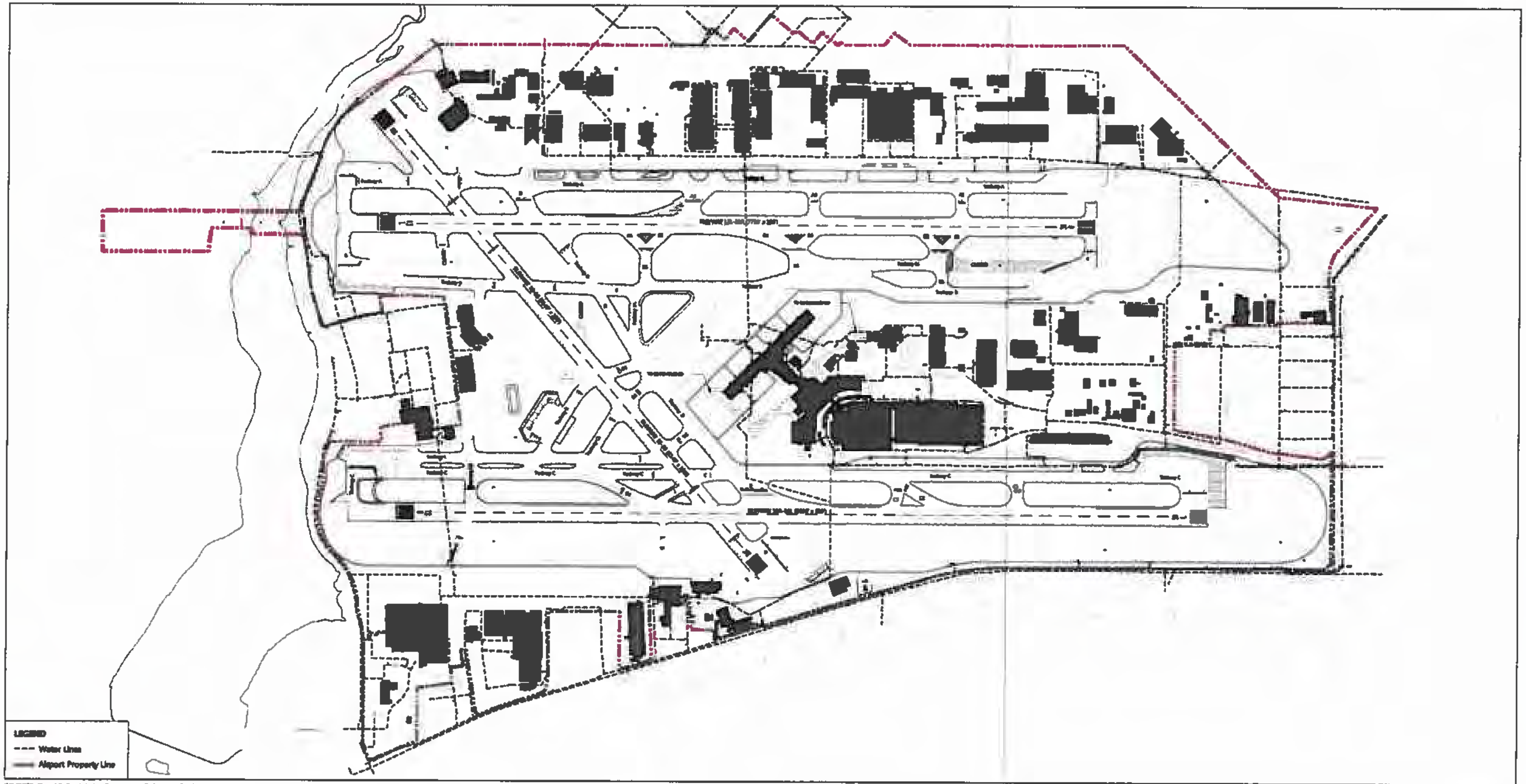

SOURCES: City of Dallas Aviation Department; Dallas Love Field Airport Layout Plan, 2003; Ricondo & Associates, Inc., May 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

EXHIBIT 2-22

Water Systems

181354

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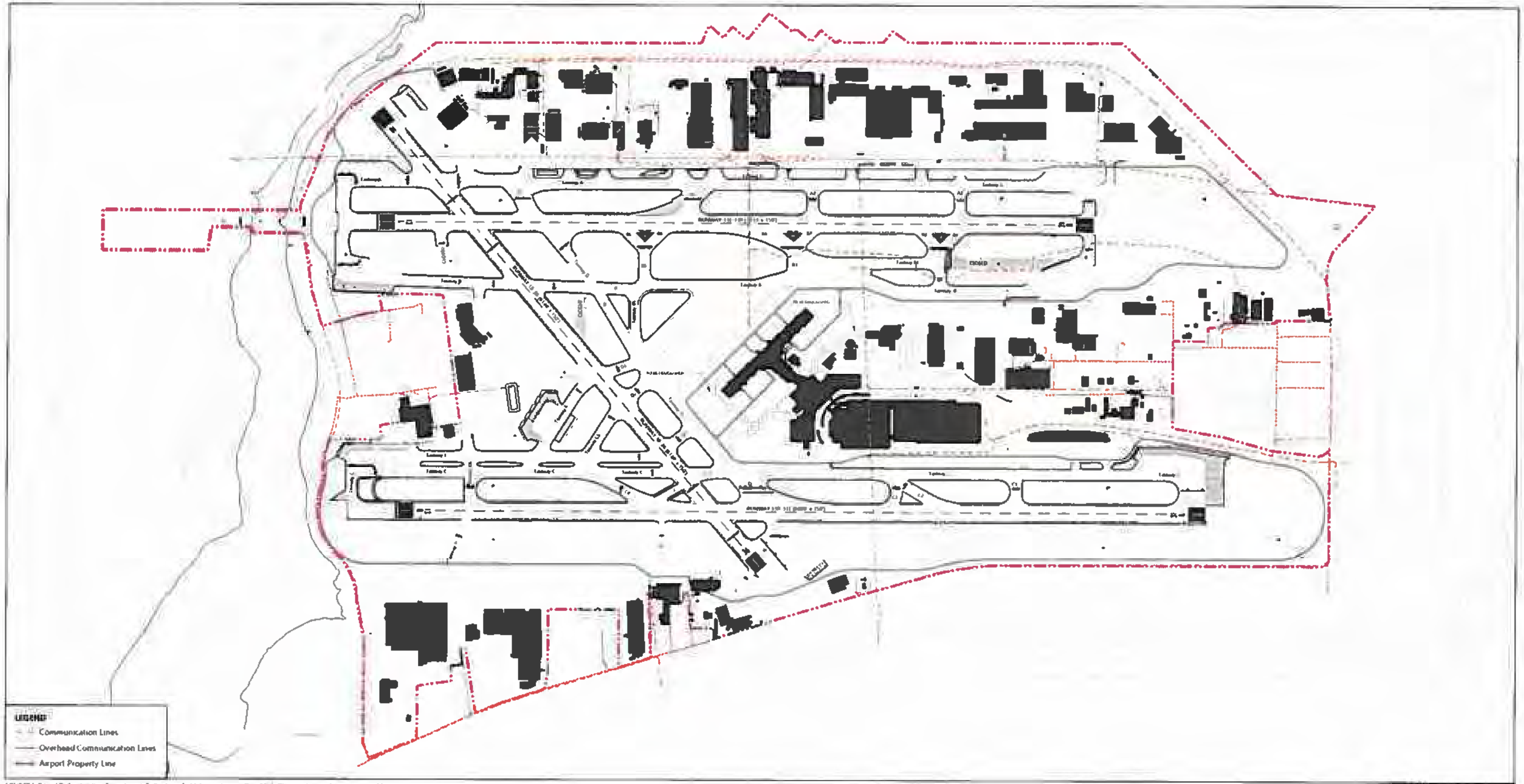

SOURCES: City of Dallas Aviation Department, Dallas Love Field Airport Layout Plan, 2011; Ricondo & Associates, Inc., May 2015
PREPARED BY: Ricondo & Associates, Inc., May 2015

NORTH 0 1,000 ft

EXHIBIT 2-23

Communication Systems

181354

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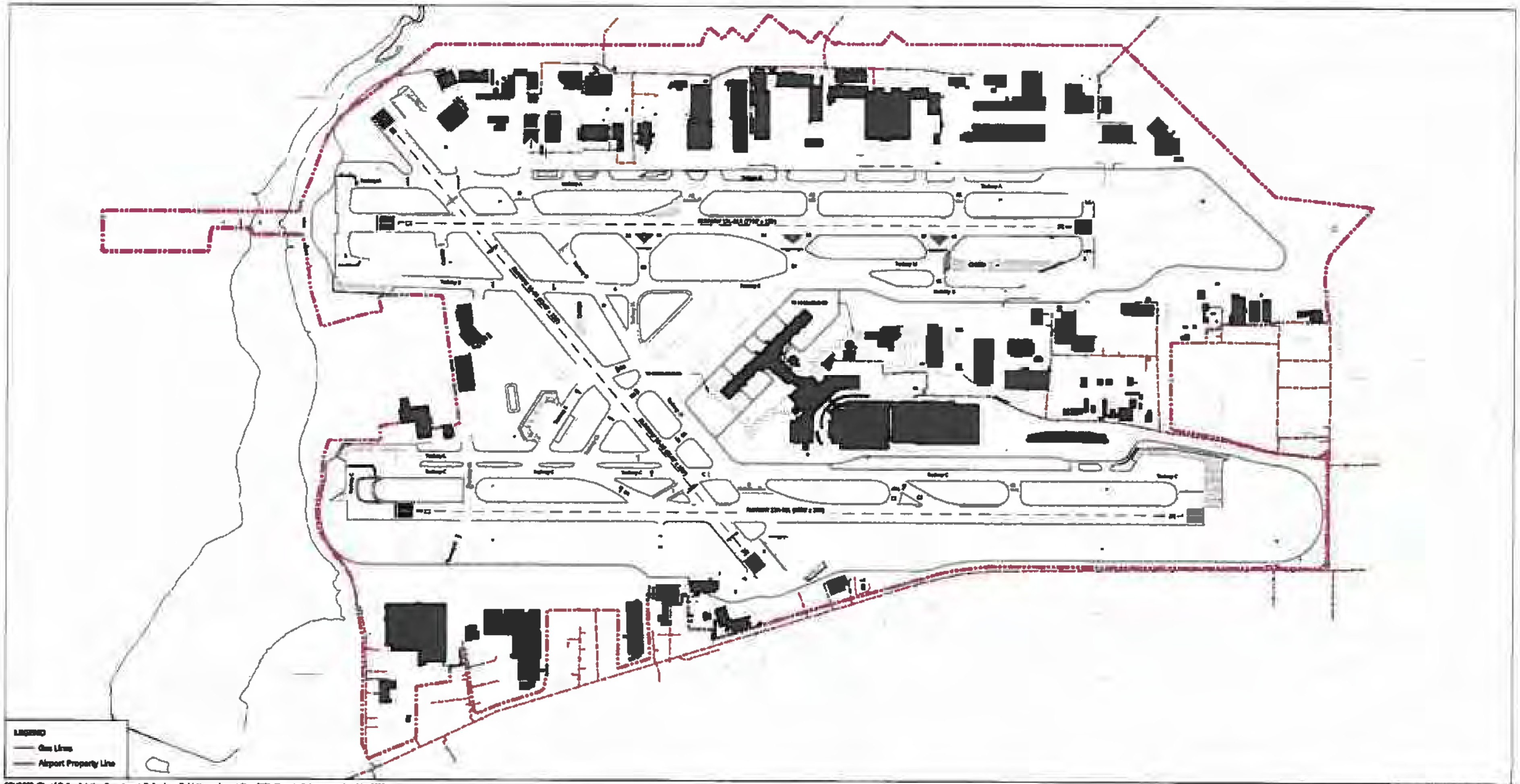

SOURCES: City of Dallas Aviation Department, Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., May 2013
PREPARED BY: Ricondo & Associates, Inc., May 2013.

EXHIBIT 2-24

Gas Systems

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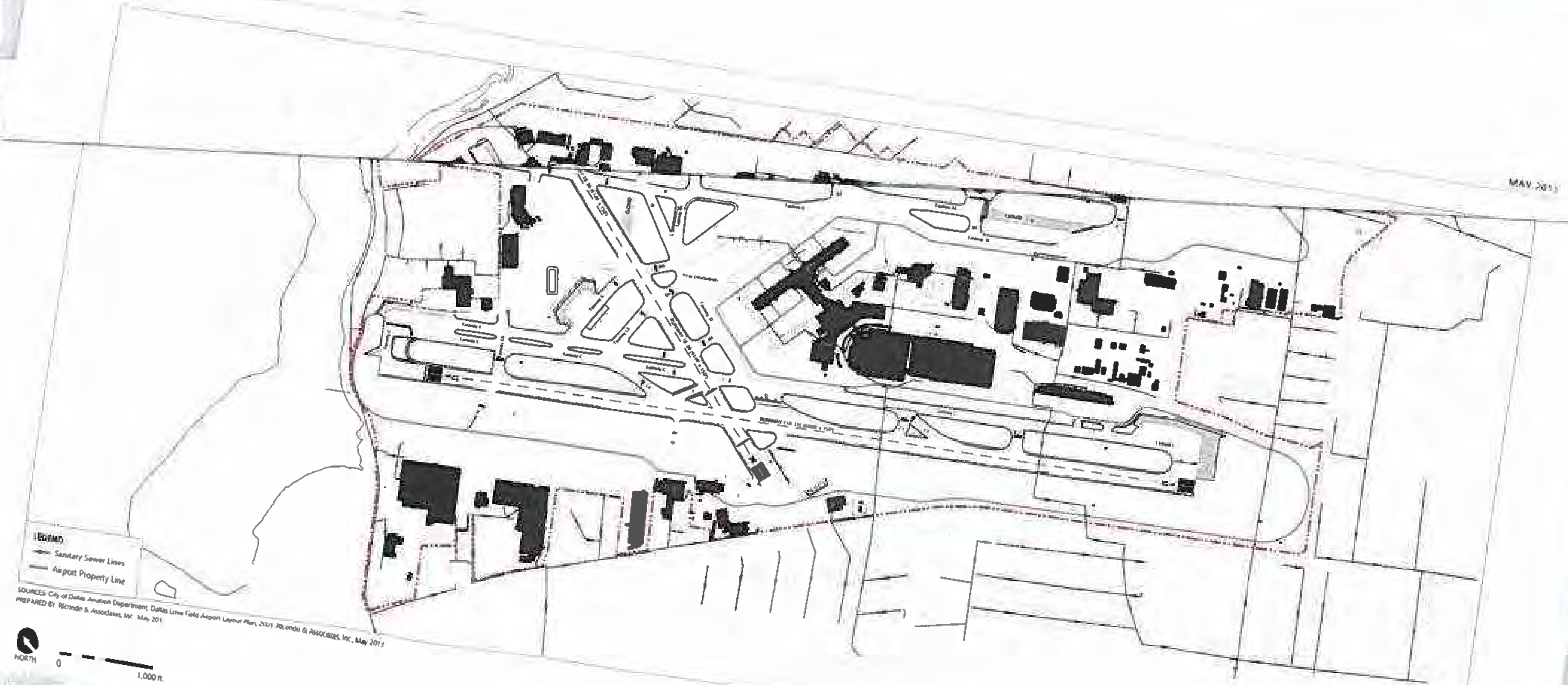

SOURCES: City of Dallas Aviation Department, Dallas Love Field Airport Layout Plan, 2001. Ricondo & Associates, Inc., May 2015
PREPARED BY: Ricondo & Associates, Inc. May 201

EXHIBIT 2-25

Sanitary Sewer Systems

181354

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2.8 Land Uses

2.8.1 ON-AIRPORT LAND USES

The Airport is situated on 1,256 acres of land approximately 4 miles north-northwest of downtown Dallas and is the only commercial service airport within the Dallas city limits. As previously mentioned, airfield facilities consist of two parallel runways (Runways 13R-31L and 13L-31R) 8,800 feet and 7,752 feet long, respectively, and one crosswind runway (Runway 18-36) 6,147 feet long, which is currently used as a taxiway. Airfield facilities also include associated taxiways and support facilities, including the ATCT, the ARFF station, and GA facilities. The Airport can be divided into the following land areas:

- **Central Terminal Area:** The area between Runways 13R-31L and 13L-31R primarily accommodates the Airport Terminal building and aircraft gates along with associated commercial aviation facilities. Two large parking garages are located adjacent to the Terminal at the center of the Herb Kelleher Way Terminal loop.
- **Southeast Central Area:** The area southeast of the Central Terminal Area between Runways 13R-31L and 13L-31R accommodates Airport-related businesses and FBO facilities for GA aircraft and rental car facilities.
- **Northwest Central Area:** The area northwest of the Central Terminal Area between Runways 13R-31L and 13L-31R accommodates Airport-related businesses and industrial land uses.
- **North Side:** The north side of Runway 13L-31R primarily accommodates FBO facilities for GA aircraft located along Lemmon Avenue.
- **South Side:** The south side of Runway 13R-31L accommodates Southwest Airlines corporate headquarters, aviation, and training facilities, as well as other FBO facilities for GA aircraft. Additionally, the DART green and orange line light rail routes and the DART Burbank station are located on the south side of the Airport along Denton Drive outside the Airport property boundary.

2.8.2 OFF-AIRPORT LAND USES

The area surrounding the Airport consists of various land uses, including single- and multi-family homes, commercial and industrial land uses, and several mixed-use developments. The Airport surroundings are described in the following paragraphs, aligned with the north, south, west, and east quadrants of the Airport.

- **North:** Immediately outside the Airport boundary is Bachman Lake and its associated park facilities, located west of Shorecrest Road. The area farther west of Bachman Lake and Northwest Highway consists primarily of commercial/industrial development. Single- and multi-family family homes are located in the land bordering Webb Chapel Road, Denton Drive, and Lombardy Lane. Residential land use are predominant north of Lombardy Lane and the Calvary Hill Cemetery and east of Harry Hines Boulevard. Additional commercial and industrial development is located farther west, along the corridors of Denton Drive and Harry Hines Boulevard bounded by I-35E and the Northwest Highway.
- **South:** Mockingbird Lane is located directly south of the Airport, and accommodates commercial and industrial uses along the corridor leading to Lemmon Avenue. Several multi-family houing complexes and commercial/industrial uses are situated in the area between Mockingbird Lane and Inwood Road.

The area enclosed by Harry Hines Boulevard, the Dallas North Tollway, and Lemmon Avenue becomes predominantly residential south of Inwood Road. The neighborhoods of Oak Lawn Heights, Perry Heights, and Oak Lawn Place also lie within these boundaries. The area remains mostly residential and extends into Highland Park, east of Lemmon Avenue. Highland Park's northernmost boundary borders University Park.

- **West:** The Dallas Love Field West Neighborhood is located directly west of the Airport, and is bounded by Harry Hines Boulevard, Mockingbird Lane, Denton Drive, and Burbank Street. The neighborhood consists of predominantly single-family housing with several multi-family housing complexes. Some commercial strip developments are also located along Denton Drive and Harry Hines Boulevard, west of the Airport. The Brook Hollow Country Club is west of Harry Hines Boulevard and east of the Stemmons Freeway, and is surrounded by a mix of commercial and industrial land uses south to Record Crossing. A pocket of residential development is bounded by Harry Hines Boulevard to the east, Record Crossing to the north, the railroad and Stemmons Freeway to the west, and Inwood Road to the south.
- **East:** Lemmon Avenue is located along the eastern edge of the Airport. Several residential neighborhoods, including Shorecrest Estates, North Park Love Field, Greenway Park, and Bluffview, are located east of Lemmon Avenue, bounded by Mockingbird Lane, the Dallas North Tollway, and the Northwest Highway. North and east of the Northwest Highway, land uses remain predominantly single-family residential.

In addition to general land use categories, environmentally sensitive sites, such as schools, medical facilities, and churches are also located near the Airport, as presented in **Tables 2-35**, **2-36**, and **2-37**.

2.9 Environmental Overview

An environmental overview of the categories considered during the planning process for any airport master plan was conducted for Dallas Love Field. To provide a baseline for the environmental overview, existing conditions related to the following environmental categories in the Airport environs were inventoried:

- Aircraft Noise
- Compatible Land Use
- Socioeconomic Conditions
- Air Quality
- Water Quality
- Department of Transportation Act, Section 4(f) Lands
- Historical, Architectural, Archaeological, and Cultural Resources
- Biotic Communities
- Wetlands
- Floodplains
- Coastal Zone Management Program
- Wild and Scenic Rivers
- Farmland
- Energy Supply and Natural Resources
- Light Emissions
- Solid Waste and Hazardous Materials

Table 2-35 (1 of 2): Neighboring Schools

SCHOOL NAME	SCHOOL ADDRESS
Amelia Earhart Learning Center	3531 North Westmoreland Road
Arlington Park Community Learning Center	5606 Wayside Drive
Armstrong Elementary School	3600 Cornell Avenue
Ben Milam Elementary School	4200 McKinney Avenue
Bradfield Elementary School	4300 Southern Avenue
C F Carr Elementary School	1952 Bayside Street
Callier Center Pre-School for the Deaf (0-5)	1966 Inwood Road
Christ The King Catholic School	4100 Colgate Avenue
Dallas Christian Academy	4025 N. Central Expressway
Dallas Environmental Science Academy	3635 Greenleaf Street
David G Burnet Elementary School	3200 Kinkaid Drive
Edward H. Cary Middle School	3978 Killion Drive
Eladio R. Martinez Learning Center	4500 Bernal Drive
Episcopal School of Dallas	4100 Merrell Road
Esperanza Medrano Elementary School	2221 Lucas Drive
Everette Lee Degolyer Elementary School	3453 Flair Drive
F P Caillet Elementary School	3033 Merrell Road
Francisco Medrano Middle School	9815 Brockbank Drive
George Bannerman Dealey International Academy	6501 Royal Lane
George Bannerman Dealey Montessori Vanguard	6501 Royal Lane
George W. Carver Learning Center	3719 Greenleaf Street
Good Shepherd Episcopal School	11110 Midway Road
Grace Academy of Dallas	11306a Inwood Road
Harry C Withers Elementary School	3959 Northaven Road
Heights Preparatory School	2650 Canada Drive
Henry W Longfellow Career Exploration Academy	5314 Boaz Street
Herbert Marcus Elementary School	2911 Northaven Road
Highland Park High School	4220 Emerson Avenue
Highland Park Middle School	3555 Granada Avenue
Highland Park Presbyterian Day School	3821 University Boulevard
Holy Cross Lutheran School	11425 Marsh Lane
Holy Trinity Catholic School	3815 Oak Lawn Avenue
Hyer Elementary School	3920 Caruth Boulevard
John J Pershing Elementary School	5715 Meaders Lane
Julian T Saldivar Elementary School	9510 Brockbank Drive
K B Polk Center for Academically Talented and Gifted	6911 Victoria Avenue
L G Pinkston High School	2200 Dennison Street
Leonides Gonzalez Cigarroa M.D. Elementary School	9990 Webb Chapel Road
Letot Campus	10505 Denton Drive
Lorenzo De Zavala Elementary School	3214 North Winnetka Avenue

Table 2-35 (2 of 2): Neighboring Schools

SCHOOL	ADDRESS
Maple Lawn Elementary School	3120 Inwood Road
McCulloch Intermediate School	3555 Granada Avenue
Middle Campus	1750 Viceroy Drive
North Dallas High School	3120 North Haskell Avenue
Notre Dame School	2018 Allen Street
Oak Hill Academy	9407 Midway Road
Obadiah Knight Elementary School	2615 Anson Road
Onesimo Hernandez Elementary School	5555 Maple Avenue
Our Lady of Perpetual Help Catholic School	7625 Cortland Avenue
Pegasus Charter High School	601 North Akard Street
Preston Hollow Elementary School	6423 Walnut Hill Lane
Preston Hollow Presbyterian School	9800 Preston Road
Pri Campus	1750 Viceroy Road
Providence Christian School of Texas	5002 W Lovers Lane
Sam Houston Elementary School	2827 Throckmorton Avenue
Sequoyah Learning Center	3635 Greenleaf Street
St. Mark's School of Texas	10600 Preston Road
St. Mary Of Carmel School	1716 Singleton Boulevard
St. Monica School	4140 Walnut Hill Lane
Stephen C. Foster Elementary School	3700 Clover Lane
Sudie L Williams Elementary School	4518 Pomona Road
The Cambridge School of Dallas	3877 Walnut Hill Lane
The Hillier School	3821 University Boulevard
The Hockaday School	11600 Welch Road
The Lamplighter School	11611 Inwood Road
The Winston School	5707 Royal Lane
Thomas A. Edison Middle Learning Center	2940 Singleton Boulevard
Thomas C. Marsh Middle School	3838 Crown Shore Drive
Thomas J. Rusk Middle School	2929 Inwood Road
Thomas Jefferson High School	4001 Walnut Hill Lane
Tom W. Field Elementary School	2151 Royal Lane
University Park Elementary School	3505 Amherst Avenue
Ursuline Academy of Dallas	4900 Walnut Hill Lane
Walnut Hill Elementary School	10115 Midway Road
Wesley Preparatory School	9200 Inwood Road
West Dallas Community School	2300 Canada Drive
Westminster Presbyterian Preschool	8200 Devonshire Drive
William B. Travis Academy	3001 McKinney Avenue
Williams Preparatory School	1750 Viceroy Road

SOURCES: Dallas Schools, www.nces.ed.gov (accessed April 2013); Ricondo & Associates, Inc., April 2013.
PREPARED BY: Ricondo & Associates, Inc., April 2013.

Table 2-36: Neighboring Medical Facilities

MEDICAL FACILITY	ADDRESS
Baylor Medical Center at Uptown	2727 E. Lemmon Avenue
Children's Medical Centre - Dallas	1935 Motor Street
Dallas Rehabilitation Institute	9713 Harry Hines Boulevard
Life Care Hospital of Dallas	1950 Record Crossing Road
Parkland Memorial Hospital	5201 Harry Hines Boulevard
Pine Creek Medical Center	9032 Harry Hines Boulevard
St. Paul University Hospital	5909 Harry Hines Boulevard
Texas Health Presbyterian Hospital	8200 Walnut Hill Lane
Texas Scottish Rite Hospital	2222 Welborn Street
University of Texas-Southwestern Medical Center	5323 Harry Hines Boulevard
Zale Lipshy University Hospital	5151 Harry Hines Boulevard

SOURCE: www.healthgrades.com (accessed April 2013).
PREPARED BY: Ricondo & Associates, Inc., April 2013.

Table 2-37 (1 of 2): Neighboring Churches

RELIGIOUS FACILITY	ADDRESS
All People's Assembly of God	2814 Oak Lawn Avenue
Bethany Missionary Baptist Church	6710 Webster Street
Bethany Presbyterian Church	4523 Cedar Springs Road
Cathedral of Hope	5738 Cedar Springs Road
Cathedral of Hope	5910 Cedar Springs Road
Catholic Diocese of Dallas	3725 Blackburn Street
Central Christian Church	4711 Westside Drive
Church of God - Dallas Love Field	2634 Langdon Avenue
Church of Jesus Christ of Latter Day Saints	9509 Midway Road
Church of the Holy Cross	4052 Herschel Avenue
Coaches Outreach Ministry	2621 West Mockingbird Lane
Deeper Life Bible Church	10414 Harry Hines Boulevard
Diocese - South Orthodox Church	4222 Wycliff Avenue
El Buen Samaritano Methodist Church	2903 Cherrywood Avenue
Faith Tabernacle Church	7523 Thurston Street
Gilford Avenue Missionary Baptist	2146 Gilford Street
Grant Lorene	2519 Oak Lawn Avenue
Greater Zion Baptist Church	4751 Hopkins Avenue
Holy Spirit Association for the Unification of World Christianity	1922 Anson Road
Holy Trinity Catholic Church	3826 Oaklawn Avenue

Table 2-37 (2 of 2): Neighboring Churches

RELIGIOUS FACILITY	ADDRESS
Iglesia de Cristo	2145 Empire Central
Jehovah's Witnesses	5308 W. Mockingbird Lane
Knights Chapel Methodist Church	6615 Tyree Street
Korean Dallas Christian Service	2829 W. Northwest Highway #625
Letot Baptist Church	2687 Lombardy Lane
Macedonia Missionary Church	6635 Roper Street
Migration Refugee Service	5415 Maple Avenue #414
North Dallas Baptist Church	4231 Maple Avenue
North Park Church of God	6533 Victoria Avenue
North Park CME Church	6725 Tyree Street
North Park Missionary Baptist Church	6927 Roper Street
Oak Lawn Church United	3811 Oak Lawn Avenue
Oak Lawn United Methodist Church	3014 Oak Lawn Avenue
Our Lady of Perpetual Help Church	7617 Cortland Avenue
Park Cities Presbyterian Church	4124 Oak Lawn Avenue
Reach the World Ministries	10505 Shady Trail
River of Life Church	5202 Wateka Drive
Soka Gakki International USA	2733 Oak Lawn Avenue
St. Luke's Baptist Church	6702 Victoria Avenue
St. Luke's Love Field United Methodist Church	2408 Gilford Street
St. Seraphim Orthodox	4112 Throckmorton Street
St. Thomas the Apostle Church	6525 Inwood Road
Templo El Redentor	8519 Craighill Avenue
Texas Presbyterian Foundation	3500 Oak Lawn Avenue #300
Third Church - Christ Scientist	4419 Oak Lawn Avenue
United in Christ Baptist Church	7715 Denton Drive
University Church of Christ	6540 Victoria Avenue
Whitlow Missionary Baptist Church	3810 Thedford Avenue

SOURCE: www.yellowpages.com (accessed April 2013).
PREPARED BY: Ricondo & Associates, Inc., April 2013.

The recommended Master Plan Update alternatives may affect environmental aspects of the Airport environs.

2.9.1 AIRCRAFT NOISE

The FAA has developed specific guidelines and requirements for assessing aircraft noise to comply with the National Environmental Policy Act (NEPA). FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures,* establishes the standard methodology for conducting aircraft noise analyses. The FAA has determined that the cumulative noise exposure on noise-sensitive land uses resulting from aircraft noise are to be evaluated using the yearly day-night average sound level (DNL) metric.

DNL is used to describe existing and predicted cumulative aircraft noise exposure for communities in airport environs in most of the United States, and to estimate the effects of airport operations on land use compatibility. DNL has been widely accepted as the best available method to describe aircraft noise exposure and is the noise descriptor required by all federal agencies, including the FAA, for use in aircraft noise exposure analyses and noise compatibility planning.

The Dallas Love Field Noise Abatement Program was officially adopted by the Dallas City Council in December 1981 to provide a voluntary noise abatement and mitigation program for the Airport. To balance the operating needs of the Airport and land use compatibility with the surrounding communities, the City adopted the Dallas Love Field Policies. These policies recognize the Airport's importance to the Dallas community at large while establishing a goal to reduce the effects of noise from aircraft operations at the Airport on the surrounding neighborhoods.

Sensitive noise receptors (residences, schools, hospitals, etc.) in proximity to the Airport were examined. A list of sensitive noise receptors is provided in Section 9.2. The City of Dallas conducted noise analyses in 2001 for the Airport Master Plan and in 2006 to assess effects of the future repeal of the Wright and Shelby Amendments.

According to the 2001 noise analysis, the population exposed to DNL 65 (expressed in A-weighted decibels) was projected to decrease from nearly 27,000 people in 1998 to 23,000 in 2010 as a result of new, quieter aircraft that were scheduled to replace older models, along with mandatory and voluntary noise abatement procedures.

The 2006 noise analysis determined the following:

- The level of noise exposure for the 20-Gate No Wright Amendment scenario would decrease from that estimated for the 2001 Master Plan 32-Gate scenario, while the 32-Gate No Wright Amendment scenario would increase noise exposure. See Section 7 for further information.
- The DNL 65 noise exposure area for the 20-Gate No Wright Amendment scenario would be approximately 4.3 percent smaller than the noise exposure area associated with the 2001 Master Plan 32-Gate scenario and affect approximately 3,800 fewer people.

- The DNL 65 noise exposure area for the 32-Gate No Wright Amendment scenario would be approximately 4 percent larger than the noise exposure area associated with the 2001 Master Plan 32-Gate scenario and affect approximately 4,350 additional people.

The Department of Aviation conducted an analysis of 2013 aircraft operations to determine noise exposure in preparation for this Master Plan Update. The 2013 DNL noise exposure area reflects aircraft operations during the entire calendar year. Operations totals were obtained from the FAA Air Traffic Activity Data System (ATADS), also referred to as the tower counts.

Results of the 2013 noise exposure analysis showed that a total area of 6.01 square miles were within the area exposed to DNL 60, including a total of 30,049 residents. The existing DNL 65 noise exposure area encompasses approximately 2.17 square miles and 3,091 residents.

2.9.2 COMPATIBLE LAND USE

Land in the vicinity of the Airport is densely developed because of the Airport's proximity to downtown Dallas. The primary land uses immediately surrounding the Airport site are institutional, residential, commercial, light industrial, and manufacturing. No historic or landmark districts exist within the vicinity of the Airport. The nearest landmark district is Magnolia Station, located approximately 3 miles southeast of the Airport.

Fifty sensitive land uses are located within 1 mile of the Airport property boundary. Of these land uses, 13 locations are schools, 30 locations are religious institutions, 6 locations are healthcare facilities and the remaining 13 locations are parks. The following five sensitive land uses are located within the 2013 area exposed to DNL 65: Obadiah Knight Elementary School, Thomas J Rusk Middle School, Bethany Missionary Baptist Church, El Buen Samaritano Methodist Church, and the United in Christ Baptist Church.

2.9.2.1 Surrounding Areas

Land uses north of the Airport are predominantly single-family residential neighborhoods alongside several commercial parcels. Bachman Lake and Bachman Lake Park are located to the immediate northwest of the Airport. A small area to the northwest has been developed in industrial (mostly aviation-related) and single-family residential uses. Land southwest of the Airport is dominated by industrial uses with a mix of commercial developments along Mockingbird Lane and Lemmon Avenue. The area southeast of the Airport is mostly single-family residential development surrounded by industrial development. East of the Airport along Lemmon Avenue is a small corridor of commercial use, with predominantly residential use farther east.

2.9.2.2 Zoning

Zoning in the City of Dallas is planned and mapped by the City's Development Services Department. The Airport is currently zoned as Industrial Research. Zoning in the immediate areas surrounding the Airport tends to be multi-family and single-family residential or industrial, which is consistent with the current land uses for these areas. Several areas in the immediate vicinity of the Airport consist of Planned Development District zoning. This zoning has specific stipulations and requirements particular to each district. These specific designations vary in development intensity, the mix of uses, and types of uses allowed.

2.9.2.3 Regional Planning and Development

A number of planning projects in the Airport vicinity and in the Dallas-Fort Worth metroplex merit consideration in this Master Plan Update. Applicable plans and planning studies currently under way are discussed below.

forwardDallas! Comprehensive Plan

The 2006 *forwardDallas! Comprehensive Plan* is the City's most inclusive planning effort, having been developed through more than 11 public workshops, more than 100 public meetings, and a 75-member Advisory Committee appointed by the City Council. The *forwardDallas!* plan identifies action plans for several key areas of the City.

The Stemmons Corridor-Southwestern Medical District Area Plan is one of nine identified plans in the *forwardDallas!* initiative, and encompasses land south of Dallas Love Field along both sides of Harry Hines Boulevard. Many organizations in the Stemmons Corridor, such as the Stemmons Corridor Business Association and the University of Texas Southwestern Medical Center, have initiated their own master planning projects. As a result, the *forwardDallas! Comprehensive Plan* focuses on overlapping and collaborative efforts to ensure the Corridor's continued success.

Downtown Dallas 360, The Downtown Dallas Action Plan

The *Downtown Dallas 360* plan was completed as a collaborative effort between the City of Dallas, Downtown Dallas Incorporated, and other downtown residents, business owners, and related stakeholders. Its primary goal is to facilitate a more pedestrian-friendly and transit-connected Central Business District in the City. The plan's goals include urban design standards, zoning recommendations, and guidelines for various forms of public transportation. The plan emphasizes the importance of light rail DART service connecting DFW and Dallas Love Field with downtown Dallas and, in particular, Union Station.[5]

2.9.3 SOCIOECONOMIC CONDITIONS

Socioeconomics relate to the activities and resources associated with the human environment, particularly population centers, their demographics, and economic activities generated. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was enacted in 1994. This Executive Order was adopted to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment is defined to mean that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations, or the execution of federal, state, tribal, and local programs and policies. Consideration of environmental justice concerns must be given to populations in the vicinity of a proposed project.

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[5] City of Dallas, *Downtown Dallas 360, The Downtown Dallas Action Plan*, April 2011, p. 43

A series of U.S. Census tracts, including the Airport and immediately adjacent areas, were identified for socioeconomic analysis. The Airport and adjacent tracts include U.S. Census Tracts 4.06, 71.02, 73.02, and 9801. The Airport and adjacent Census tracts encompass a population that is predominantly white (46.2 percent), with Hispanics or Latinos accounting for the next largest ethnic group.[6] A mix of median household incomes, ranging from $38,419 in Census Tract 4.06 to $131,477 in Census Tract 73.02, is represented in the Airport and adjacent tracts. No data are provided for Census Tract 9801 because the tract consists mainly of Airport property, on which there are no residents.

2.9.4 AIR QUALITY

2.9.4.1 Regulatory Requirements

The federal Clean Air Act, as amended, requires individual states to identify general geographic areas where the National Ambient Air Quality Standards (NAAQS) are not met for seven criteria pollutants (listed below) The U.S. Environmental Protection Agency (EPA) has designated such areas as nonattainment areas. A state with a nonattainment area must prepare a State Implementation Plan (SIP) that stipulates the programs and requirements that the state will implement to attain the NAAQS by the deadlines specified in the Clean Air Act Amendments of 1990 (CAAA) and subsequent rules promulgated by the U.S. EPA. In Texas, the Texas Commission on Environmental Quality (TCEQ) is responsible for formulating and maintaining the SIP.

NAAQS have been established for the following seven air contaminants or criteria pollutants:

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Sulfur dioxide (SO_2)
- Lead (Pb)
- Particulate matter (PM_{10})
- Fine particulates ($PM_{2.5}$)

The primary standards were established at levels sufficient to protect public health with a satisfactory margin of safety. The regulation and management of ambient (i.e., outdoor) air quality conditions in Dallas County is the combined responsibility of federal, State, and local governmental agencies.

On the federal level, the U.S. EPA establishes the guiding principles and policies for protecting air quality conditions throughout the nation. Relevant to this assessment, the EPA is also responsible for promulgating the NAAQS, approving the SIP, and regulating aircraft emissions.

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[6] This calculation is representative of "race alone or in combination with another race" of the total population.

On the State level, the Texas SIP helps ensure that federal air quality requirements and guidelines are met. The Texas Emissions Reduction Program (TERP) monitors air quality and regulates mobile sources of emissions (i.e., on-road and off-road motor vehicles and equipment). The TCEQ operates 11 permanent ambient air quality monitoring sites scattered throughout the Dallas/Fort Worth TCEQ Region as part of its ongoing State and local air quality monitoring programs.[7] The closest of these air quality monitoring stations to DAL is located approximately 1.3 miles southwest of the Airport in Dallas. No air quality monitoring stations are located directly on or adjacent to the Airport.

2.9.4.2 Existing Conditions

The Airport is located in the Dallas-Fort Worth Intrastate Air Quality Control Region, which is currently designated as a severe nonattainment area for O_3 (8-hour).[8] Therefore, the applicable *de minimis* emission levels are 25 tons per year for nitrogen oxides (NO_x) and volatile organic compounds (VOCs). NO_x and VOCs are ozone precursors, and their emissions are regulated to control the creation of ozone.

2.9.5 WATER QUALITY

The regional hydrogeologic gradient of the Airport is presumed to flow toward the south-southwest. However, the actual hydrogeologic gradient may be affected by local influencing factors, such as the topography of the bedrock geology, underground structures, and other variables.

The City of Dallas currently obtains water from the following area reservoirs: Lake Ray Hubbard, Lake Lewisville, Lake Grapevine, Lake Ray Roberts, and Lake Tawakoni. Because of its poor quality, groundwater underlying the Airport is not used for drinking, irrigation, or industrial supply purposes. The City of Dallas approved the *Municipal Setting Designation Ordinance* in 2005, which restricts the use of groundwater in areas designated as contaminated for potable water by ordinance/restrictive covenant.[9] The City of Dallas is in the process of obtaining a Municipal Setting Designation (MSD) Ordinance for the entire Airport.

Surface water in the vicinity of the Airport consists primarily of Bachman Lake to the northwest. Rainfall on runways, taxiways, and industrial and commercial sites picks up a multitude of pollutants when it reaches the ground. These pollutants dissolve in the runoff or adsorb onto soil particles and are quickly transported by gravity flow through the network of concrete channels and underground pipes that compose the Airport storm drain conveyance systems. These systems ultimately discharge the polluted runoff, without treatment, directly to the City's stormwater system, Bachman Lake, or nearby streams and drainage channels.

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[7] State of Texas, Texas Commission on Environmental Quality. *Geographical Texas Air Monitoring, online mapping database*, http://www.tceq.texas.gov/airquality/monops/sites/mon_sites.html (accessed June 21, 2012).

[8] U.S. Environmental Protection Agency, *Criteria Pollutant Reports*, http://www.epa.gov/air/oaqps/greenbk/multipol.html (accessed August 23, 2012).

[9] City of Dallas, Office of Environmental Quality, *Municipal Setting Designation Ordinance, http://www.dallascityhall.com/oeq/msd.html* (accessed June 7, 2012).

Dallas Love Field requires authorization for storm water discharges under the Texas Pollutant Discharge Elimination System (TPDES) permit. The requirement is based on the Airport's Standard Industrial Classification (SIC) code. The TPDES permit provides authorization for point source discharges of storm water associated with industrial activity and certain non-storm-water discharges to surface water.

2.9.6 DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(f) LANDS

Section 4(f) of the Department of Transportation (DOT) Act of 1966, which was recodified and renumbered as Section 303(c) of the DOT Act, dictates that, for any program or project undertaken or approved by the U.S. DOT, impacts on the use of any publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land from a historic site of national, state, or local significance must be considered. The Act prohibits the Secretary of Transportation from approving actions that would result in use of these properties for transportation purposes unless no prudent and feasible alternative exists and all efforts have been made to minimize impacts.

A number of parks and other recreational areas are located near the Airport. Midway Manor Park is located northeast of Runway 13L-31R on Airport property, but is maintained by the City of Dallas Park and Recreation Department. Other public parks northeast of the Airport include Field Frazier Park and Bluff View Park. Bachman Lake Park is immediately adjacent to the northwestern Airport property boundary and is the largest park in the vicinity of the Airport. To the east of Bachman Lake is the Bachman Creek Greenbelt, owned and maintained by the Dallas Park and Recreation Department. Other parks in the vicinity of the Airport include Grauwyler Park to the southwest, which includes athletic fields, a recreation center, and the Grauwyler Park Library. Weichsel Park is located south-southwest of the Airport and is associated with the Thomas J. Rusk Middle School. East of the Airport is Polk Park, a small neighborhood park associated with the K.B. Polk Elementary School. All public parks and lands in the vicinity of the Airport are operated and maintained by the Dallas Park and Recreation Department.

2.9.7 HISTORIC, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Historic, architectural, archaeological, and cultural resources are prehistoric and historic sites, districts, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Numerous laws and regulations require that possible effects on these resources be considered during the planning and execution of federal undertakings.

The Texas Historical Commission's *Historic Sites Atlas* was consulted to determine the presence of previously designated or identified historic properties in and around the Airport, including National Register of Historic Places (NRHP) properties, State Archaeological Landmarks, and Official Texas Historical Markers, which include Recorded Texas Historic Landmarks, historic cemetery markers, thematic markers, and 1936 Centennial Markers. A records search found no previously designated historic properties in the vicinity of the Airport.

However, the Environmental Assessment (EA) of the redevelopment of the Dalfort site at the Airport required a historic structures survey at the former Dalfort Aerospace facilities located on Lemmon Avenue. Through consultation among the FAA, the THC, and the National Park Service, the 1958 Operations and Maintenance

Building on the Dalfort site was determined eligible for listing in the NRHP, as indicated by the Keeper of the NHRP in May 2013. The National Park Service determined that the building retains sufficient integrity to convey its historic and architectural significance and is, therefore, eligible for listing in the NRHP. No other sites or facilities at the Airport are known as historic, architectural, archaeological, or cultural resources.

2.9.8 BIOTIC COMMUNITIES

According to the U.S. Department of Agriculture Soil Conservation Service, *Soil Survey of Dallas County, Texas,* the soil located at and surrounding the Airport is classified as Urban Land. The Urban Land area identified on the map, consists of extensively built up areas where 75 percent or more of the surface is covered with buildings and pavement. The soils in these areas have been altered or covered during urban development; therefore, it was not feasible to identify and separate them in mapping.

The habitat surrounding and including the Airport supports a limited number of biological resources because much of the area is already extensively developed. The entire area within the perimeter of the Airport boundary is developed or disturbed in some manner, with no native vegetation existing on the site. According to the U.S. Fish and Wildlife Service (FWS) Critical Habitat Portal, no critical habitat has been found within Dallas County.[10] Because of the lack of habitat and the developed condition of the Airport and vicinity, no threatened or endangered species are present or known.

2.9.9 WETLANDS

The U.S. Army Corps of Engineers' (ACE) *Wetland Delineation Manual* defines wetland areas that have positive indicators for hydrophytic vegetation, wetland hydrology, and hydric soils as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The Airport is highly developed (i.e., buildings, paved surfaces, ornamental landscaping) and contains few areas with the potential to support wetlands. No wetlands or other waters of the United States are present within Airport property. Virtually all areas that would be affected by the Master Plan Update recommendations consist of bare earth, paved surfaces, structures, or ornamental (low habitat value) landscaping.

2.9.10 FLOODPLAINS

Executive Order 11988, *Floodplain Management,* was enacted to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practical alternative. Floodplains are defined as lowland and flat areas adjoining waters that are subject to a 1.0 percent or greater chance of flooding in any given year, i.e., a 100-year flood event.

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[10] U.S. Fish and Wildlife Service, *Critical Habitat Portal*, http://criticalhabitat.fws.gov/crithab/ (accessed July 30, 2012).

The Airport lies outside of the 100-year flood zone as delineated by Federal Emergency Management Agency (FEMA) maps.[11] The Airport is located within Flood Zone X (area of minimal flood hazard, depicted on Flood Insurance Rate Maps as above the 500-year flood level).

2.9.11 COASTAL ZONE MANAGEMENT PROGRAM

The Coastal Barriers Resources Act of 1982 prohibits federal financial assistance for development within the Coastal Barrier Resources System, which contains undeveloped coastal barriers along the Atlantic and Gulf Coasts and the Great Lakes. The federal Coastal Zone Management Act of 1972 ensures effective management, beneficial use, protection, and development of the coastal zone. Coastal resources are identified in accordance with the Texas Coastal Public Lands Management Act of 1973 ("Management of Coastal Public Land," Texas Natural Resources Code, Chapter 33 *et seq.*). This Texas Act, which is consistent with the federal Coastal Zone Management Act, contains the State's adopted policies with regard to the protection of coastal resources.

The nearest coastal zone to the Airport is the Gulf of Mexico, over 200 miles to the southeast. No other costal zones are located on or near the Airport. Coastal barriers are narrow islands or margins along the Texas Gulf Coast with active dunes (or structures built to replace them). The Airport is not located on a coastal barrier.

2.9.12 WILD AND SCENIC RIVERS

Wild and scenic rivers are designated by the U.S. Department of the Interior to protect the most beautiful and unspoiled rivers in the nation under the Wild and Scenic River Act. At the time that the Master Plan Update was initiated in 2012, the Wild and Scenic River system protected 12,598 miles of 203 rivers in 39 states and the Commonwealth of Puerto Rico.[12] These rivers are designated because of their beauty, historical and natural sources, aquatic and wildlife habitats, and geological values. Only one river in Texas, the Rio Grande at Big Bend National Park, is designated a wild and scenic river. The Airport is at least 300 miles north/northeast of this river.

2.9.13 FARMLAND

Preservation of prime farmland is a priority of the U.S. Department of Agriculture, and assessment of the impacts of projects with federal support on prime farmland is required. The Airport is located primarily in a commercial and industrial area of Dallas. No farmland is on or adjacent to the Airport. No impacts to farmland would occur as a result of recommended Master Plan Update development.

2.9.14 ENERGY SUPPLY AND NATURAL RESOURCES

The Airport is not an energy-producing location, nor does it produce mineral resources. The effects of Airport development on energy and natural resources are generally related to the amount of energy required for

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[11] U.S. Department of Homeland Security, Federal Emergency Management Agency, FIRM Panel FM48113C0330J, accessed online: January 2015, https://msc.fema.gov/portal.

[12] National Wild and Scenic River System, http://www.rivers.gov/national-system.php (accessed August 8, 2014).

stationary facilities (i.e., Terminal building cooling or heating equipment, electrical lighting for building interiors and the airfield, and approach or radar control systems), and the movement of aircraft and ground vehicles.

Oncor Electric Delivery is the sole provider of electricity for the Airport. Oncor provides electrical power to the City of Dallas, Department of Aviation and to all on- and off-Airport customers. The Airport is a major consumer of petroleum-based fuels for aircraft.

2.9.15 LIGHT EMISSIONS

The primary sources of light emissions from airports are the FAA-required lighting for security, obstruction clearance, and navigation. An analysis of the impacts of light emissions on the surrounding environment is required when proposed projects include the introduction of new lighting that may affect residential or other sensitive land uses.

Lighting is used throughout the Airport to support existing operations during nighttime periods, and other periods of low visibility. Lighting consists of in-pavement high intensity runway edge lights and runway centerline lights, lights along taxiways, and lights mounted on towers used for the approach navigation system. Lighting systems in use at the Airport are in conformity with current land use and zoning designations for the Airport.

2.9.16 SOLID WASTE AND HAZARDOUS MATERIALS

2.9.16.1 Municipal Solid Waste Landfill Sites

The City of Dallas Sanitation Services provides solid waste disposal services throughout the Metroplex. One landfill and three waste transfer stations are located within the City of Dallas, the closest of which to DAL is the northwest transfer station (Bachman), located approximately 1,000 feet west-northwest of the Airport. The McCommas Bluff Landfill is more than 11 miles south-southeast of the Airport at 5100 Youngblood Road.[13] As of a 2010 report from the City of Dallas,, the McCommas Bluff Landfill had a remaining capacity of 104 million cubic yards.[14] Wastes designated as hazardous or special wastes must be handled, transported, and disposed of at licensed facilities in accordance with all federal, State, and local regulations. The TCEQ provides assistance for permitting and regulation of these wastes.

2.9.16.2 Hazardous Materials

Hazardous materials are regulated by a number of federal laws and regulations, most of which are promulgated by the U.S. EPA. These regulations govern the storage, use, and transportation of hazardous and other regulated materials from their time of origin to their ultimate disposal. The recovery and cleanup of

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[13] City of Dallas Sanitation Services, *McCommas Bluff Landfill*, http://dallascityhall.com/sanitation/mccommas_bluff.html (accessed June 5, 2012).

[14] City of Dallas, Sanitation Services, *Green Energy from McCommas Bluff Landfill*, February 2010.

environmental contamination resulting from the accidental or unlawful release of these materials and substances are also governed by these regulations.

At the State level, hazardous materials include substances or materials, including mixtures and solutions, that the TCEQ has identified as hazardous or dangerous wastes and that the U.S. EPA has designated for special consideration under federal laws and regulations. Hazardous materials also include constituents of petroleum products, marine pollutants, and elevated-temperature materials that have been determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce. Locally, hazardous material regulations are overseen by the City of Dallas Office of Environmental Quality (OEQ).

Environmental Data Resources, Inc., conducted an environmental database search in 2008 for a portion of the Airport as well as some areas in the Airport vicinity. The nearest database listing to the Airport Terminal is the Dalfort Terminal, East Concourse Dallas Love Field, located from 7440 to 8036 along Aviation Place and registered as a Texas Voluntary Cleanup Program database site.

A number of sites and facilities located on, or adjacent to, Airport property are known, or have the potential, to contain environmental contamination of the soil and/or groundwater. Identification of these sites was based on documents and other sources of information from previous environmental reports on the Dalfort site; an electronic search of federal, State, and local agency databases; and an in-field survey of existing conditions. From this document review, six individual sites (five on Airport and one off Airport) were identified, as presented in **Table 2-38**. Of the on-Airport listings in Table 2-38, only the Dalfort Terminal site is known to have outstanding hazardous materials issues. This site is currently undergoing environmental investigations in coordination with the TCEQ and OEQ prior to redevelopment plans that are not part of the recommended development in the Master Plan Update.

Table 2-38: Environmental Database Listings for Properties Adjacent to or near the Area of Potential Effect

COMPANY NAME	ADDRESS	DATABASE LISTING	SUMMARY OF LISTING
Signature Flight Support	7515 Lemmon Avenue Building J	RCRA-CESQG[1/]	Conditionally exempt, no violations.
		TCEQ-LPST[2/]	November 1989: leaking incident, contaminated soils. Status: closed.
Dallas Airmotive, Inc.	7515 Lemmon Avenue Hangar L	RCRA-NonGen[3/]	Conditionally exempt, no violations.
Signature Flight Support Regional Maintenance Center	7511 Lemmon Avenue Hangar C	RCRA-CESQG	Conditionally exempt, no violations.
Signature Flight Support	8001 Lemmon Avenue	RCRA-CESQG	Conditionally exempt, one minor violation found.
		TCEQ-PST[4/]	Currently nine 20,000 gallon tanks containing either gasoline or jet fuel.
		TCEQ-LPST	October 1993: leaking incident, contaminated soils. Corrective action plan issued.
Dalfort Terminal	7440-8036 Aviation Place	TCEQ-VCP[5/]	This facility is classified as a maintenance aircraft fueling facility. The contaminant reported as hydrocarbons. Currently in the investigation phase.
Sewell Village Cadillac	4350 West University Boulevard	TCEQ-VCP	Soils and groundwater are reported to be contaminated with total petroleum hydrocarbons. VCP has been completed for this facility.

NOTES:

1/ RCRA-CESQG: Resource Conservation and Recovery Act - Conditionally Exempt Small Quantity Generators.

2/ TCEQ-LPST: Texas Commission on Environmental Quality-Leaking Petroleum Storage Tank database.

3/ RCRA-NonGen: RCRA - Non Generators.

4/ TCEQ-PST: Texas Commission on Environmental Quality – Petroleum Storage Tank.

5/ TCEQ-VCP: Texas Commission on Environmental Quality-Voluntary Cleanup Program.

SOURCES: QORE, Inc., Draft Report, *Phase I Environmental Site Assessment and Additional Services, Dalrort Aerospace, 7701 Lemmon Avenue, Dallas, Dallas County, Texas 75209*, August 2003; Benchmark Environmental Consultants, *Phase I Environmental Site Assessment, City of Dallas, Dalfort Aerospace and Former Legend Terminal*, 7701 and 7777 Lemmon Avenue, Dallas, Dallas County, Texas, November 17, 2008.

PREPARED BY: Ricondo & Associates, Inc., August 2014.

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3. Aviation Activity Forecasts

This section presents a discussion of historical aviation activity and trends at the Airport between 2002 and 2012 and summarizes the forecasts of aviation activity for the Airport from 2013 through 2032 (the end of the planning period for the Master Plan Update). Forecasts were developed for enplaned passengers, air carrier and regional/commuter aircraft operations, general aviation and based aircraft activity, and projections were developed for the aircraft fleet mix serving the Airport. The forecasts and projections provide the basis for determining facility requirements and for conducting the environmental, financial, and other analyses necessary in preparing the Airport Master Plan Update.

The forecasts were developed in 2013 using the City's Fiscal Year (FY) 2012 (October-September) as the base year, the latest fiscal year for which complete data were available at the time this Master Plan Update was initiated. The aviation activity forecasts presented in this section are based on assumptions about aviation activity in the Dallas-Fort Worth-Arlington MSA and other factors that may affect future aviation activity at the Airport, including:

- National aviation industry trends and factors affecting those trends, including events related to the economy, fuel cost changes, etc., over the past 10 years
- The changing role of the Airport in the Dallas -Fort Worth-Arlington MSA
- Historical activity and trends in airline and other services at the Airport, including comparisons with historical U.S. market shares
- Local socioeconomic and demographic trends compared with State of Texas and national trends

The forecasts represent potential activity at the Airport through the planning period. Actual activity may vary from the forecasts because of unforeseen events or changes in airline service at the Airport or competing airports. In addition, the way the airlines respond to changes in operating costs and demand adds further uncertainty to the forecasts. Therefore, the forecasts developed for this Master Plan Update, as described in this section, represent a range of possible, not necessarily actual, future airline and other activity at DAL.

The remainder of this section is organized as follows:

- Historical Aviation Activity and Trends
- Factors Affecting Aviation Activity

- Forecast Methodology Overview and Results
    - Enplaned passenger forecast
    - Aircraft operations and based aircraft forecast
    - Projected fleet mix
    - Peak activity forecast
    - Forecast comparisons

Southwest Airlines is the primary airline serving the Airport; Southwest Airlines considers Dallas one of its major focus cities. This Master Plan Update was developed as Airport management and the airlines serving DAL prepared for significant changes in air service enabled by the October 2014 repeal of the Wright Amendment, which placed significant restrictions on service from the Airport. Most restrictions, as discussed later in this section, were eliminated as of October 2014. Many of the characteristics of the Airport, from origin and destination (O&D) and connecting passenger flows to nonstop markets served and gate demand, are expected to change. These activity changes are reflected in the forecasts developed for this Master Plan Update, as discussed below.

3.1 Historical Aviation Activity and Trends

The Airport is classified as a medium-hub airport[1] by the FAA. As shown in **Table 3-1**, approximately 4.1 million passengers were enplaned and approximately 177,000 aircraft operations were conducted at the Airport in 2012.

Between 2002 and 2012, the number of enplaned passengers at DAL increased at a compound annual growth rate (CAGR) of 3.8 percent, including 6.8 percent average annual growth between 2002 and 2007. Between 2007 and 2012, the number of enplaned passengers increased at a CAGR of 0.8 percent. In comparison, the number of enplaned passengers at DFW increased at a CAGR of 1.0 percent between 2002 and 2012, but decreased at a CAGR of 0.5 percent between 2007 and 2012. **Table 3-2** shows historical enplaned passenger activity at the two Dallas commercial passenger airports between 2002 and 2012. The Airport's share of the region's total enplaned passengers decreased from 9.7 percent in 2002 to a low of 8.9 percent in 2004, but has accounted for more than 12.0 percent of the region's passengers since 2008.

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[1] As defined by the FAA, a medium hub airport enplanes at least 0.25 percent but less than 1.0 percent of nationwide enplaned passengers during a calendar year. This percentage range of nationwide enplaned passengers equates to 1.9 million to 6.2 million enplaned passengers in Calendar Year 2013, the latest calendar year for which data are available to determine airport hub size.

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Table 3-1: Historical Enplaned Passengers and Aircraft Operations

FISCAL YEAR[1/]	ENPLANED PASSENGERS[2/]	AIRCRAFT OPERATIONS
2002	2,819,117	239,732
2003	2,781,153	239,901
2004	2,902,942	253,442
2005	2,975,332	235,899
2006	3,244,374	241,990
2007	3,910,527	247,334
2008	4,068,268	231,348
2009	3,871,687	176,977
2010	3,949,122	168,373
2011	4,017,673	178,056
2012	4,074,167	177,067
Compound Annual Growth Rate		
2002 - 2007	6.8%	0.6%
2007 - 2012	0.8%	-6.5%
2002 - 2012	3.8%	-3.0%

NOTES:

1/ For Fiscal Years ended September 30.

2/ Because of limited detailed data, the numbers of enplaned passengers in 2004 and 2005 were estimated from total passenger data.

SOURCE: City of Dallas Department of Aviation, March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-2: Historical Enplaned Passenger Comparison - Dallas Region Airports

FISCAL YEAR [1]	LOVE FIELD [2]	DALLAS LOVE FIELD SHARE OF REGION	DFW [3]	DFW SHARE OF REGION	REGION TOTAL	TOTAL ANNUAL GROWTH RATE
2002	2,819,117	9.7%	26,378,648	90.3%	29,197,765	-
2003	2,781,153	9.5%	26,589,585	90.5%	29,370,738	0.6%
2004	2,902,942	8.9%	29,682,274	91.1%	32,585,216	10.9%
2005	2,975,332	9.1%	29,547,553	90.9%	32,522,885	-0.2%
2006	3,244,374	9.7%	30,072,115	90.3%	33,316,489	2.4%
2007	3,910,527	11.6%	29,852,240	88.4%	33,762,767	1.3%
2008	4,068,268	12.3%	29,037,818	87.7%	33,106,086	-1.9%
2009	3,871,687	12.2%	27,749,259	87.8%	31,620,946	-4.5%
2010	3,949,122	12.3%	28,187,848	87.7%	32,136,970	1.6%
2011	4,017,673	12.3%	28,684,597	87.7%	32,702,270	1.8%
2012	4,074,167	12.3%	29,161,041	87.7%	33,235,208	1.6%
Compound Annual Growth Rate						
2002 - 2007	6.8%		2.5%		2.9%	
2007 - 2012	0.8%		-0.5%		-0.3%	
2002 - 2012	3.8%		1.0%		1.3%	

NOTES:

DFW = DALLAS/FORT WORTH INTERNATIONAL AIRPORT

1/ For Fiscal Years ended September 30.

2/ Because of limited detailed data, the numbers of enplaned passengers at Dallas Love Field in 2004 and 2005 were estimated from total passenger data.

3/ Because of limited detailed data, the numbers of enplaned passengers at Dallas/Fort Worth International Airport in 2002 through 2006 and 2011 were estimated from total passenger data.

SOURCES: City of Dallas Department of Aviation; Dallas/Fort Worth International Airport records; March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

DAL's enplaned passenger market share of total U.S. enplaned passengers increased between 2002 and 2012, as shown in **Table 3-3**. As noted above, the number of enplaned passengers at DAL increased an average of 3.8 percent per year between 2002 and 2012; the number of enplaned passengers in the nation increased an average of 1.5 percent per year over the same period.

Table 3-3: Historical Enplaned Passengers Comparison – Dallas Love Field and United States

FISCAL YEAR [1]	DALLAS LOVE FIELD ENPLANED PASSENGERS [2]	ANNUAL GROWTH RATE	U.S. TOTAL ENPLANED PASSENGERS	ANNUAL GROWTH RATE	LOVE FIELD SHARE OF U.S. TOTAL
2002	2,819,117	-	627,651,689	-	0.00449%
2003	2,781,153	-1.3%	643,224,649	2.5%	0.00432%
2004	2,902,942	4.4%	690,967,755	7.4%	0.00420%
2005	2,975,332	2.5%	733,406,048	6.1%	0.00406%
2006	3,244,374	9.0%	732,886,414	-0.1%	0.00443%
2007	3,910,527	20.5%	756,525,465	3.2%	0.00517%
2008	4,068,268	4.0%	747,466,798	-1.2%	0.00544%
2009	3,871,687	-4.8%	695,488,533	-7.0%	0.00557%
2010	3,949,122	2.0%	702,818,621	1.1%	0.00562%
2011	4,017,673	1.7%	721,387,972	2.6%	0.00557%
2012	4,074,167	1.4%	725,202,832 [3]	0.5%	0.00562%
Compound Annual Growth Rate					
2002 - 2007	6.8%		3.8%		
2007 - 2012	0.8%		-0.8%		
2002 - 2012	3.8%		1.5%		

NOTES:

1/ For Fiscal Years ended September 30.

2/ Because of limited detailed data, the numbers of enplaned passengers at Dallas Love Field in 2004 and 2005 were estimated from total passenger data.

3/ 2012 U.S. total enplaned passengers forecast.

SOURCES: City of Dallas Department of Aviation; FAA *Terminal Area Forecast FY 2012-2040*, March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

As of July 2013, four commercial airlines served the Airport, including one mainline airline and three regional/commuter airlines. Regional/commuter airline passengers account for a small share of total passengers at the Airport – approximately 2.5 percent in 2012 – because of the dominance of Southwest Airlines, which does not affiliate with regional airlines.

Table 3-4 presents enplaned passengers by the scheduled airlines serving the Airport between 2008 and 2012. Southwest Airlines' enplaned passenger share of Airport passengers increased from 94.7 percent in 2008 to 97.5 percent in 2012. No other airline or airline group accounted for more than 3.3 percent of enplaned passengers in the years shown in the table. As presented in **Table 3-5**, the passenger airlines serving the Airport provided nonstop service to 21 destinations in 2013 compared with 17 destinations in 2008.

Southwest Airlines has been the dominant airline at DAL since 1971 when the airline initiated service at the Airport. In July 2013, Southwest Airlines was scheduled to operate approximately 121 daily departures from the Airport to 18 nonstop destinations, as shown in Table 3-5.

Airlines operating at the Airport primarily serve O&D passengers (consisting of enplaned and deplaned passengers) traveling to and from short- and medium-haul destinations, although the number of connecting passengers has been increasing in recent years. O&D passengers consist of local residents and visitors who begin and end their trips at the Airport. As shown in **Table 3-6**, 850,296 O&D passengers – or nearly 15 percent of the Airport's O&D passengers – traveled between DAL and Houston in 2012. **Table 3-7** lists originating (i.e., enplaned passengers beginning their trips at Dallas Love Field) and connecting passenger percentages at the Airport in 2002 through 2012. According to the U.S. DOT's *Origin-Destination Passenger Survey*, in 2012, approximately 70 percent of the passengers at the Airport were classified as O&D, a decrease from approximately 81 percent O&D passengers in 2002. The number of originating passengers at the Airport increased from 2.3 million in 2002 to 2.8 million in 2012, at a CAGR of 2.0 percent. During the same period, the number of connecting passengers increased from 0.5 million to 1.3 million, at a CAGR of 9.1 percent.

Table 3-4: Historical Enplaned Passengers at Dallas Love Field by Airline

	FISCAL YEAR 1/					
AIRLINE	**2008**	**2009**	**2010**	**2011**	**2012**	**2012 AIRPORT SHARE**
Southwest Airlines	3,853,325	3,722,812	3,823,138	3,916,851	3,973,171	97.5%
United Airlines Affiliates 2/	135,146	102,828	90,891	61,905	68,715	1.7%
Delta Air Lines Affiliates	-	9,662	35,093	38,365	29,442	0.7%
SeaPort Airlines	-	-	-	552	2,839	0.1%
American Airlines Affiliates	79,797	36,385	-	-	-	-
Total	**4,068,268**	**3,871,687**	**3,949,122**	**4,017,673**	**4,074,167**	**100.0%**

NOTES:

1/ For Fiscal Years ended September 30.

2/ Continental Airlines merged with United Airlines and the FAA granted a single operating certificate to United on November 30, 2011. All data for United include data for Continental affiliates.

SOURCE: City of Dallas Department of Aviation, March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-5: Scheduled Nonstop Passenger Service from Dallas Love Field in July 2013

MARKET	AVERAGE DAILY NONSTOP DEPARTURES	NUMBER OF AIRLINES	OPERATING AIRLINE
Albuquerque	7	1	Southwest
Amarillo	5	1	Southwest
Atlanta	5	1	Delta
Austin	11	1	Southwest
Birmingham	3	1	Southwest
Branson	1	1	Southwest
El Dorado	2	1	SeaPort
El Paso	6	1	Southwest
Harlingen	2	1	Southwest
Hot Springs	1	1	SeaPort
Houston [1/]	29	2	Southwest - 23 (HOU), United (SkyWest) - 6 (IAH)
Kansas City	8	1	Southwest
Little Rock	5	1	Southwest
Lubbock	6	1	Southwest
Midland	5	1	Southwest
New Orleans	8	1	Southwest
Oklahoma City	4	1	Southwest
San Antonio	12	1	Southwest
St. Louis	8	1	Southwest
Tulsa	5	1	Southwest
Wichita	2	1	Southwest
Total	**135**		

NOTE:

1/ Includes William P. Hobby Airport (HOU) and Bush Intercontinental Airport/Houston (IAH).

SOURCE: Diio LLC, March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-6: Top 20 Origin and Destination Passenger Markets for Dallas Love Field in 2012

RANK	MARKET	TOTAL O&D PASSENGERS	AVERAGE FARE	NONSTOP SERVICE [1]
1	Houston [2]	850,296	$125	●
2	San Antonio	404,915	$114	●
3	New Orleans	270,627	$131	●
4	Austin	266,775	$127	●
5	Kansas City	237,638	$127	●
6	St. Louis	201,468	$151	●
7	Midland	191,545	$95	●
8	El Paso	181,840	$144	●
9	Lubbock	176,219	$100	●
10	Albuquerque	165,086	$137	●
11	Amarillo	158,786	$90	●
12	Chicago [3]	148,984	$131	
13	Las Vegas	145,929	$152	
14	Tulsa	133,889	$93	●
15	Little Rock	127,536	$101	●
16	Denver	124,885	$140	
17	Phoenix	120,359	$163	
18	Los Angeles	115,344	$139	
19	Orlando	107,865	$143	
20	Baltimore	106,909	$172	
Total Top 20 Markets		4,236,895		
Other O&D Markets		1,374,188		
Total O&D Passengers/Average Airfare		5,611,083	$134	

NOTES:

[1] Nonstop service as of July 2013.

[2] Includes William P. Hobby Airport (HOU) and Bush Intercontinental Airport/Houston (IAH).

[3] Includes Chicago Midway and Chicago O'Hare International Airports.

SOURCE: Diio LLC, March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-7: Historical Originating and Connecting Passengers at Dallas Love Field

FISCAL YEAR 1/	ORIGINATING	SHARE OF ORIGINATING	CONNECTING	SHARE OF CONNECTING	TOTAL 2/
2002	2,287,729	81.2%	531,388	18.8%	2,819,117
2003	2,224,274	80.0%	556,879	20.0%	2,781,153
2004	2,209,793	76.1%	693,149	23.9%	2,902,942
2005	2,238,931	75.2%	736,401	24.8%	2,975,332
2006	2,578,851	79.5%	665,523	20.5%	3,244,374
2007	3,080,215	78.8%	830,312	21.2%	3,910,527
2008	3,143,116	77.3%	925,152	22.7%	4,068,268
2009	2,635,446	68.1%	1,236,241	31.9%	3,871,687
2010	2,664,002	67.5%	1,285,120	32.5%	3,949,122
2011	2,685,785	66.8%	1,331,888	33.2%	4,017,673
2012	2,802,275	68.8%	1,271,892	31.2%	4,074,167
Compound Annual Growth Rate					
2002 - 2007	6.1%		9.3%		6.8%
2007 - 2012	-1.9%		8.9%		0.8%
2002 - 2012	2.0%		9.1%		3.8%

NOTES:

1/ For Fiscal Years ended September 30.

2/ The numbers of enplaned passengers in 2004 and 2005 were estimated from total passenger data.

SOURCE: Diio LLC, March 2013.

PREPARED BY: Ricondo & Associates, Inc., March 2013.

It should be noted that the approximately 30 percent connecting passenger share at DAL in 2012 compares with an approximately 60 percent connecting passenger share at DFW. Numbers of connecting passengers are heavily influenced by airline scheduling and route strategies.

Table 3-8 presents historical aircraft operations (landings and takeoffs) at the Airport in 2002 through 2012. Operations in each category of activity (mainline, regional/commuter, all-cargo, other air carrier/air taxi, general aviation, and military) fluctuated from year to year. Overall, the number of aircraft operations at the Airport decreased at a CAGR of 3.0 percent between 2002 and 2012. General aviation operations were the primary factor in the decrease in overall aircraft operations at DAL. The number of air carrier (mainline) passenger airline aircraft operations remained relatively flat between 2002 and 2012, with a low of 77,626 in 2005 and a high of 91,734 in 2008. The number of regional/commuter airline aircraft operations increased at a CAGR of 2.2 percent over the same period; however, operations by the regional/commuter airlines fluctuated greatly over the historical period. Following the 2008 peak at DAL, the number of passenger airline aircraft operations decreased more than 13 percent overall.

Table 3-8: Historical Aircraft Operations

	PASSENGER AIRLINES							
FISCAL YEAR	MAINLINE (AIR CARRIER)	REGIONAL/ COMMUTER	TOTAL	ALL-CARGO	OTHER AIR CARRIER/ AIR TAXI	GENERAL AVIATION	MILITARY	TOTAL
2002	83,944	7,652	91,596	52	35,647	110,399	2,038	239,732
2003	82,480	6,416	88,896	1,540	35,877	111,984	1,604	239,901
2004	82,996	5,262	88,258	1,601	40,156	121,474	1,953	253,442
2005	77,626	6,538	84,164	1,632	39,861	107,774	2,468	235,899
2006	80,526	11,988	92,514	1,734	37,719	107,220	2,803	241,990
2007	87,768	17,990	105,758	1,111	39,976	97,991	2,498	247,334
2008	91,734	16,760	108,494	1,260	40,572	78,767	2,255	231,348
2009	88,488	9,116	97,604	208	22,276	55,420	1,469	176,977
2010	85,318	6,758	92,076	88	21,325	53,795	1,089	168,373
2011	84,110	7,398	91,508	82	23,801	61,578	1,087	178,056
2012	84,232	9,502	93,734	94	25,936	55,807	1,496	177,067
Compound Annual Growth Rate								
2002 - 2007	0.9%	18.6%	2.9%	84.5%	2.3%	-2.4%	4.2%	0.6%
2007 - 2012	-0.8%	-12.0%	-2.4%	-39.0%	-8.3%	-10.6%	-9.7%	-6.5%
2002 - 2012	0.0%	2.2%	0.2%	6.1%	-3.1%	-6.6%	-3.0%	-3.0%

NOTE: For Fiscal Years ended September 30.

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; U.S. DOT T-100 database; accessed March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-9 presents the passenger airline aircraft operations at DAL from 2008 through 2012. Overall, passenger airline aircraft operations decreased from 108,494 in 2008 to 93,734 in 2012. Southwest Airlines had an 89.7 percent share of the total, with 84,122 operations in 2012. United Airlines affiliates followed with a 6.5 percent market share in 2012. **Table 3-10** presents the passenger airline aircraft operations by mainline and regional/commuter airlines, with mainline operations accounting for approximately 90 percent of total passenger airline aircraft operations and total mainline and regional/commuter airline aircraft operations accounting for more than 50 percent of total aircraft operations at the Airport. The total passenger airline share of DAL aircraft operations increased from 38.2 percent in 2002 to 52.9 percent in 2012, primarily as a result of the significant decrease in general aviation aircraft operations at the Airport.

Table 3-9: Historical Passenger Airline Aircraft Operations

	FISCAL YEAR[1/]					
AIRLINE	**2008**	**2009**	**2010**	**2011**	**2012**	**2012 SHARE OF TOTAL**
Southwest Airlines	91,608	88,396	85,158	83,946	84,122	89.7%
United Airlines Affiliates[2/]	8,168	5,872	4,632	5,014	6,060	6.5%
SeaPort Airlines	-	-	-	394	1,830	2.0%
Delta Air Lines Affiliates	-	516	2,090	1,970	1,598	1.7%
American Airlines Affiliates	8,578	2,654	-	-	-	-
Other[3/]	140	166	196	184	124	0.1%
Total	**108,494**	**97,604**	**92,076**	**91,508**	**93,734**	**100.0%**

NOTES:

1/ For Fiscal Years ended September 30.

2/ Continental merged with United and the FAA granted a single operating certificate to United on November 30, 2011. All data for United include data for Continental affiliates.

3/ Includes nonscheduled passenger airline aircraft operations.

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; U.S. DOT T-100 database; accessed March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-10: Historical Mainline and Regional/Commuter Passenger Airline Aircraft Operations

	PASSENGER AIRLINES						
FISCAL YEAR	**MAINLINE**	**SHARE OF PASSENGER AIRLINES**	**REGIONAL/ COMMUTER**	**SHARE OF PASSENGER AIRLINES**	**TOTAL PASSENGER AIRLINES**	**SHARE OF AIRPORT TOTAL**	**AIRPORT TOTAL**
2002	83,944	91.6%	7,652	8.4%	91,596	38.2%	239,732
2003	82,480	92.8%	6,416	7.2%	88,896	37.1%	239,901
2004	82,996	94.0%	5,262	6.0%	88,258	34.8%	253,442
2005	77,626	92.2%	6,538	7.8%	84,164	35.7%	235,899
2006	80,526	87.0%	11,988	13.0%	92,514	38.2%	241,990
2007	87,768	83.0%	17,990	17.0%	105,758	42.8%	247,334
2008	91,734	84.6%	16,760	15.4%	108,494	46.9%	231,348
2009	88,488	90.7%	9,116	9.3%	97,604	55.2%	176,977
2010	85,318	92.7%	6,758	7.3%	92,076	54.7%	168,373
2011	84,110	91.9%	7,398	8.1%	91,508	51.4%	178,056
2012	84,232	89.9%	9,502	10.1%	93,734	52.9%	177,067
Compound Annual Growth Rate							
2002 - 2007	0.9%		18.6%		2.9%		0.6%
2007 - 2012	-0.8%		-12.0%		-2.4%		-6.5%
2002 - 2012	0.0%		2.2%		0.2%		-3.0%

NOTE: For Fiscal Years ended September 30.

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; U.S. DOT T-100 database; accessed March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

All-cargo, other air carrier/air taxi, and general aviation aircraft operations at the Airport are shown in **Table 3-11**, **Table 3-12**, and **Table 3-13**, respectively. Historically, all-cargo aircraft operations at DAL have been provided by a number of nonscheduled all-cargo airlines. In 2003 through 2008, scheduled all-cargo airline service was provided by DHL (2003), Airborne Express (2003 – 2005), and ABX Air (2006 – 2008). Since ABX Air discontinued scheduled service, all-cargo aircraft operations at the Airport have been provided on a nonscheduled basis. Between 2002 and 2012, all-cargo airline aircraft operations increased at a CAGR of 6.1 percent and have historically accounted for less than 1.0 percent of total aircraft operations at the Airport. Other air carrier/air taxi operations include all operations flown for hire, not including scheduled commercial passenger airline aircraft operations. These operations decreased at a CAGR of 3.1 percent between 2002 and 2012. During that same period, nearly 100 percent of general aviation aircraft operations at the Airport were itinerant. Other air carrier/air taxi and general aviation operations accounted for nearly 15 percent and 32 percent, respectively, of total aircraft operations at the Airport in 2012. Military aircraft operations at the Airport decreased between 2002 and 2012, numbering 1,496 in 2012, and accounting for 0.8 percent of the Airport total (see **Table 3-14**).

Table 3-11: Historical All-Cargo Airline Aircraft Operations

FISCAL YEAR	ALL-CARGO AIRLINE AIRCRAFT OPERATIONS	SHARE OF AIRPORT TOTAL	AIRPORT TOTAL
2002	52	0.0%	239,732
2003	1,540	0.6%	239,901
2004	1,601	0.6%	253,442
2005	1,632	0.7%	235,899
2006	1,734	0.7%	241,990
2007	1,111	0.4%	247,334
2008	1,260	0.5%	231,348
2009	208	0.1%	176,977
2010	88	0.1%	168,373
2011	82	0.0%	178,056
2012	94	0.1%	177,067
Compound Annual Growth Rate			
2002 - 2007	84.5%		0.6%
2007 - 2012	-39.0%		-6.5%
2002 - 2012	6.1%		-3.0%

NOTE: For Fiscal Years ended September 30.

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System, U.S. DOT T-100 database; accessed March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013

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Table 3-12: Historical Other Air Carrier/Air Taxi Aircraft Operations

FISCAL YEAR	OTHER AIR CARRIER/ AIR TAXI AIRCRAFT OPERATIONS	SHARE OF AIRPORT TOTAL	AIRPORT TOTAL
2002	35,647	14.9%	239,732
2003	35,877	15.0%	239,901
2004	40,156	15.8%	253,442
2005	39,861	16.9%	235,899
2006	37,719	15.6%	241,990
2007	39,976	16.2%	247,334
2008	40,572	17.5%	231,348
2009	22,276	12.6%	176,977
2010	21,325	12.7%	168,373
2011	23,801	13.4%	178,056
2012	25,936	14.6%	177,067
Compound Annual Growth Rate			
2002 - 2007	2.3%		0.6%
2007 - 2012	-8.3%		-6.5%
2002 - 2012	-3.1%		-3.0%

NOTE: For Fiscal Years ended September 30.

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; U.S. DOT T-100 database; accessed March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-13: Historical General Aviation Aircraft Operations

FISCAL YEAR	ITINERANT OPERATIONS	ITINERANT SHARE	LOCAL OPERATIONS	LOCAL SHARE	TOTAL	GENERAL AVIATION SHARE OF AIRPORT TOTAL	AIRPORT TOTAL
2002	110,251	99.9%	148	0.1%	110,399	46.1%	239,732
2003	111,984	100.0%	0	0.0%	111,984	46.7%	239,901
2004	121,474	100.0%	0	0.0%	121,474	47.9%	253,442
2005	107,740	100.0%	34	0.0%	107,774	45.7%	235,899
2006	107,219	100.0%	1	0.0%	107,220	44.3%	241,990
2007	97,731	99.7%	260	0.3%	97,991	39.6%	247,334
2008	78,761	100.0%	6	0.0%	78,767	34.0%	231,348
2009	55,420	100.0%	0	0.0%	55,420	31.3%	176,977
2010	53,795	100.0%	0	0.0%	53,795	31.9%	168,373
2011	61,576	100.0%	2	0.0%	61,578	34.6%	178,056
2012	55,807	100.0%	0	0.0%	55,807	31.5%	177,067
Compound Annual Growth Rate							
2002 - 2007	-2.4%		11.9%		-2.4%		0.6%
2007 - 2012	-10.6%		-100.0%		-10.6%		-6.5%
2002 - 2012	-6.6%		-100.0%		-6.6%		-3.0%

NOTE: For Fiscal Years ended September 30.

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; U.S. DOT T-100 database; accessed March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-14: Historical Military Aircraft Operations

FISCAL YEAR	ITINERANT OPERATIONS	ITINERANT SHARE	LOCAL OPERATIONS	LOCAL SHARE	TOTAL	MILITARY SHARE OF AIRPORT TOTAL	AIRPORT TOTAL
2002	1,981	97.2%	57	2.8%	2,038	0.9%	239,732
2003	1,604	100.0%	0	0.0%	1,604	0.7%	239,901
2004	1,953	100.0%	0	0.0%	1,953	0.8%	253,442
2005	2,468	100.0%	0	0.0%	2,468	1.0%	235,899
2006	2,803	100.0%	0	0.0%	2,803	1.2%	241,990
2007	2,491	99.7%	7	0.3%	2,498	1.0%	247,334
2008	2,255	100.0%	0	0.0%	2,255	1.0%	231,348
2009	1,469	100.0%	0	0.0%	1,469	0.8%	176,977
2010	1,089	100.0%	0	0.0%	1,089	0.6%	168,373
2011	1,087	100.0%	0	0.0%	1,087	0.6%	178,056
2012	1,495	99.9%	1	0.1%	1,496	0.8%	177,067
Compound Annual Growth Rate							
2002 - 2007	4.7%		-34.3%		4.2%		0.6%
2007 - 2012	-9.7%		-32.2%		-9.7%		-6.5%
2002 - 2012	-2.8%		-33.3%		-3.0%		-3.0%

NOTE: For Fiscal Years ended September 30.

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; U.S. DOT T-100 database; accessed March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

In 2012, 778 aircraft were based at the Airport, as summarized in **Table 3-15**. Between 2002 and 2012, the number of based aircraft increased at a CAGR of 4.0 percent, led by an increase in single-engine and jet aircraft. Jet aircraft accounted for 745 of the 778 based aircraft at the Airport in 2012 (95.8 percent). The number of multi-engine (piston and turboprop) aircraft based at the Airport decreased by a CAGR of 18.2 percent between 2002 and 2012.

Table 3-15: Historical Based Aircraft

FISCAL YEAR [1/]	SINGLE-ENGINE	MULTI-ENGINE	JET [2/]	HELICOPTER	TOTAL
2002	16	30	472	7	525
2003	15	29	479	6	529
2004	11	62	522	7	602
2005	11	62	522	7	602
2006	20	24	577	6	627
2007	20	24	577	6	627
2008	32	53	649	6	740
2009	31	29	669	8	737
2010	31	29	669	8	737
2011	22	4	734	7	767
2012 [3/]	22	4	745	7	778
Compound Annual Growth Rate					
2002 - 2007	4.6%	-4.4%	4.1%	-3.0%	3.6%
2007 - 2012	1.9%	-30.1%	5.2%	3.1%	4.4%
2002 - 2012	3.2%	-18.2%	4.7%	0.0%	4.0%

NOTES:

1/ For Fiscal Years ended September 30.

2/ Figures sourced from FAA TAF. Jet aircraft total likely includes a portion, if not all of Southwest's fleet.

3/ 2012 numbers are forecast.

SOURCE: FAA *Terminal Area Forecast FY 2012-2040*, March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-16 presents a comparison of average annual growth rates in activity at the Airport and in the nation between 2002 and 2012. Except for general aviation and total aircraft operations, growth rates in Airport activity between 2002 and 2012 were higher (in some cases, less negative) than those for the United States as a whole. In particular, growth in the numbers of enplaned passengers at the Airport averaged 3.8 percent annually versus 1.5 percent annual growth nationwide. Air carrier and air taxi operations at the Airport decreased at a CAGR of 0.6 percent compared with a CAGR decrease of 1.0 percent for the nation.

Table 3-16: Historical Dallas Love Field and National Growth Rate Comparisons

	COMPOUND ANNUAL GROWTH RATE (2002 - 2012)	
CATEGORY	**LOVE FIELD**	**UNITED STATES**
Enplaned Passengers	3.8%	1.5%
Air Carrier and Air Taxi Operations	-0.6%	-1.0%
General Aviation Operations	-6.6%	-2.0%
Total Aircraft Operations	-3.0%	-1.7%
Based Aircraft	4.0%	-1.5%

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; FAA *Terminal Area Forecast FY 2012-2040*; U.S. DOT T-100 database; accessed March 2013.

PREPARED BY: Ricondo & Associates, Inc., March 2013.

3.2 Factors Affecting Aviation Activity

A number of factors affect aviation activity. On a national basis, aviation activity is closely tied to the economy. Each segment of the industry (commercial passenger airlines, general aviation, and air cargo) is affected by the strength or weakness of the economy. Airport activity is also affected by changes in the economy, although the effects vary depending on the type and size of the airport and the type of activity accommodated at the airport. Changes in the industry itself – including the introduction of new aircraft, airline and aviation business practices, and federal aviation policy – also affect aviation activity. The following subsections describe some of the aviation industry factors and other factors that influence aviation activity at the Airport.

3.2.1 AVIATION INDUSTRY FACTORS

Significant national and international events since 2001 have affected aviation activity at the Airport and elsewhere. Of the several factors that continue to affect the aviation industry and add uncertainty to the forecasts, the cost of aviation fuel, economic conditions, airport security, and the threat of terrorism are among the most significant and are discussed below.

3.2.1.1 Cost of Aviation Fuel

The cost of fuel is one of the most significant factors affecting the airline industry today. In 2000, aviation (jet) fuel accounted for nearly 14 percent of airline industry operating expenses, making it the industry's second largest operating expense after labor. In 2008, jet fuel surpassed labor as the largest operating expense for the airlines, accounting for 30.6 percent of an airline's total operating costs, according to the industry group Airlines for America (formerly, the Air Transport Association of America), while labor accounted for 20.3 percent of the total. As oil prices decreased in the first quarter of 2009, airline fuel costs decreased and labor once again became the airline industry's largest operating expense, accounting for 25.8 percent of total operating expenses in that year, while fuel accounted for 21.3 percent.

The average cost of jet fuel was $0.82 per gallon in 2000 compared with $2.95 per gallon in 2012, an increase of 260 percent. According to Airlines for America, every one-cent increase in the cost per gallon of jet fuel increases annual airline operating expenses by approximately $190 million to $200 million.

In March 2015, the average price of jet fuel was $2.03 per gallon; however, airlines do not generally base capacity decisions based on short-term jet fuel prices due to the overall volatility of jet fuel prices. If jet fuel prices approach or surpass their mid-2008 peak (July's average price was $3.84), aviation activity nationwide may be negatively impacted due to route reductions the airlines might make or higher ticket prices the airlines might impose in an attempt to remain profitable.

3.2.1.2 Economic Conditions

In addition to airline cost factors, the overall state of the economy affects the propensity to travel and, therefore, airline revenue. Because economic conditions are typically cyclical over time (over longer periods, average changes are more regular and predictable), trends can be identified from the balance of strong and weak economic years. However, when combined with uneven growth in the industry and at the Airport since 2000 (DAL annual growth rates in numbers of passengers have varied from -4.8 percent to 20.5 percent since 2002), changing economic conditions can affect the reliability of forecasts of aviation activity by reducing the correlation between economic results and airport activity.

3.2.1.3 Airport Security

The requirements and uncertainties related to airport security and the processes and procedures of the Department of Homeland Security (DHS) can affect the decision to, and the mode choice for, travel. With enactment of the Aviation and Transportation Security Act (ATSA) in November 2001, the Transportation Security Administration was created, followed by the Homeland Security Act (which created the DHS) in November 2002. The ATSA stipulates certain passenger, cargo, and baggage screening requirements, mandates security awareness programs for airport personnel, and mandates deployment of explosives detection devices. These security requirements have increased the time passengers spend in the terminal to reach aircraft gates as well as baggage checking decisions. Wait time expectations at a particular airport may affect the travel mode choice of passengers.

3.2.1.4 Threat of Terrorism

As has been the case since September 11, 2001, terrorist incidents against either domestic or world aviation during the planning period remains a risk to achieving the activity forecasts presented later in this section. Tighter security measures have restored the public's confidence in the integrity of U.S. and world aviation. Any terrorist incident related to aviation could have an immediate and significant effect on the demand for aviation services.

3.2.1.5 Summary

The cost of aviation fuel, unpredictable economic conditions, increasing airport security measures, and threats of terrorism could affect the assumptions underlying the forecasts and skew the results of the Master Plan Update forecasts. Given how these circumstances, along with other unforeseen airline business decisions (such as starting or stopping service in different markets, changes in aircraft fleets, and growth or reduction in capacity at the Airport), could also affect forecast variables, the DAL planning forecasts indicate possible rather than predictable results.

It is expected that, in the long term, the Airport will maintain its role as a medium-hub airport, serve domestic passengers only (on a nonstop basis; international passengers can connect through other U.S. airports). Given the strength of its economic base and leading socioeconomic indicators, the Dallas-Fort Worth-Arlington MSA will be able to support long-term growth in passenger demand at the Airport, with regional demand continuing to be predominantly served at the Airport, including nonstop travel to major medium- and long-haul domestic markets.

3.2.2 SOUTHWEST AIRLINES

Southwest Airlines has traditionally provided point-to-point service from strategic markets, operating at less congested, secondary airports in large metropolitan regions. By offering lower fares and operating under a model that promotes efficient use of aircraft and minimizes overall operating costs (e.g., common aircraft fleet), the airline has successfully captured market share and competes head-to-head with other major airlines.

The introduction of service by Southwest Airlines and other low-fare airlines in the last four decades has made airline travel generally more affordable and available to a wider number of people. In recent years, Southwest Airlines has developed a network of focus airports in strategic locations, including Baltimore, Chicago (Midway), Dallas (Love Field), Denver, Houston (Hobby), and Las Vegas. Southwest Airlines operates more centralized connecting route structures out of these airports, accommodating a high number of direct connecting passengers in addition to local O&D passengers. As Southwest Airlines' fleet has expanded into long-range Boeing 737-800 aircraft, the airline's ability to serve coast-to-coast and long-haul markets has expanded. It is anticipated that certain airports will naturally become focus locations for the airline. With improved terminal facilities, the Airport is strategically positioned (in terms of facilities and geographic location) to remain a key mid-continent focus airport for Southwest Airlines.

The acquisition of AirTran Airways by Southwest Airlines in 2011 should be noted. AirTran has not operated at the Airport and the combination of these airlines is not likely to significantly affect Southwest Airlines' operations at the Airport. With the acquisition, Southwest Airlines gained access to the world's busiest airport and AirTran's primary hub, Hartsfield-Jackson Atlanta International Airport.

3.2.3 THE WRIGHT AMENDMENT

Since the development of DFW, flights from Dallas Love Field have been restricted to nonstop flights to states adjacent to Texas (Alabama, Kansas, Mississippi, and Missouri were added later). These restrictions were included in the Wright Amendment, passed by the U.S. Congress in 1979 (subsequently amended in 1997, 2005, and 2006). As a consequence, Southwest Airlines, the primary airline serving DAL, has served passengers who want to fly to states beyond these limits by routing them through other airports, such as William P. Hobby Airport in Houston or El Paso International Airport. In October 2014, the Wright Amendment has been repealed by Congress. At that time, flight stage lengths from DAL to points in the United States will not be restricted. Passengers desiring to fly beyond the old limits will no longer need to fly to intermediate airports, such as William P. Hobby Airport in Houston or El Paso International Airport. However, certain restrictions will be maintained, as set forth in the Wright Amendment Reform Act of 2006, including restrictions on nonstop flights to points outside the 50 United States and the District of Columbia, and a limit on the number of available gates at the Airport.

3.2.4 AIRLINE AIRCRAFT FLEET MIX

With a 90 percent market share at the Airport, Southwest Airlines dominates the aircraft fleet mix. Therefore, it is expected that the Boeing 737 will be the primary aircraft serving the Airport during the planning period. For other airlines serving DAL, it is expected that regional jets will be used for a significant portion of aircraft operations. Regional jets with 30 to 90 seats can efficiently serve traditional turboprop and small markets previously served using narrowbody aircraft with the passenger comfort and convenience associated with jet aircraft. Although demand for these jets escalated in the last two decades, the smaller 30-to-50-seat models are being phased out. Larger regional jets operate on routes up to 1,700 miles, allowing airlines to serve lighter-demand markets with passenger-preferred aircraft.

3.2.5 GENERAL AVIATION AND BASED AIRCRAFT, AND OTHER AIR TAXI AND MILITARY OPERATIONS

In its *Aerospace Forecasts FY 2013-2033,* the FAA notes that general aviation activity at U.S. airports with FAA or contract ATCTs increased 0.6 percent in 2012, reversing a decade-long downward trend. The changes have taken place primarily in the single-engine and multi-engine (non-jet) portions of the fleet, where aircraft purchase and maintenance, insurance, and fuel costs depress discretionary flying. These trends in non-jet aircraft operations are not expected to change in the near future.

3.2.6 AIR CARGO

Based on the *FAA Aerospace Forecast Fiscal Years 2013-2033* for the United States, total domestic and international air cargo revenue-ton-miles (RTMs) increased at a CAGR of 1.6 percent between 2000 and 2012, led by a CAGR of 3.9 percent in international cargo RTMs. Domestic freight/express RTMs decreased at a CAGR of 1.6 percent during this period.

As relatively low volumes of cargo and mail are handled at the Airport, changes in the air cargo industry, particularly as a result of new security requirements, are not anticipated to have a large effect on the airlines serving the Airport.

3.2.7 POLICY ISSUES

Following the repeal of the Wright Amendment, the role of Dallas Love Field will be primarily defined by natural market forces rather than specific mandates. Two exceptions are: (1) all-cargo aircraft operations will be accommodated primarily at DFW and other area airports, such as Fort Worth Alliance Airport, and (2) some artificial constraints will still apply at the Airport, including restrictions on international flights and the number of available gates.

This Master Plan Update documents the facilities and services necessary to accommodate unconstrained aviation activity at the Airport through 2032. Airport facilities must be adequate to accommodate narrowbody aircraft operations (up to Boeing 737-800) to all domestic markets.

It is anticipated that the Airport will continue to serve as the Central Business District airport that provides O&D service to numerous domestic markets, as well as storage and support services for corporate aviation and fractional ownership customers.

3.2.8 SOCIOECONOMIC AND DEMOGRAPHIC TRENDS

Airport activity is sensitive to changes in local and national socioeconomic conditions. Barring other circumstances that may influence aviation demand, the strength of the national and local economies – measured by growth in population, per capita income, per capita retail sales, employment, and other economic indicators – typically correlates with the level of aviation activity at an airport. An airport located in a region with a strong economy will typically experience positive growth in aviation activity. The following subsections describe the socioeconomic and demographic trends in the Dallas-Fort Worth-Arlington MSA, which served as the basis for the aviation activity forecasts developed for this Master Plan Update.

Data were included for the Dallas-Fort Worth-Arlington MSA, which includes Collin, Cooke, Dallas, Delta, Denton, Ellis, Fannin, Grayson, Henderson, Hood, Hunt, Johnson, Kaufman, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, and Wise Counties. The City of Dallas lies in five counties: Collin, Dallas, Denton, Kaufman, and Rockwall. The Dallas-Fort Worth-Arlington MSA, which represents the air trade area – or the service region – for the Airport, is illustrated on **Exhibit 3-1**.

3.2.8.1 Population and Household Trends

The population of the Dallas-Fort Worth-Arlington MSA increased at a faster rate than the population of the State of Texas and the nation, as shown in **Table 3-17**. With a population of 5.8 million in 2002, the MSA experienced 2.0 percent average annual growth through 2012, to 7.0 million. During the same period, the populations of Texas and the United States increased at averages of 1.9 percent and 0.9 percent per year, respectively. The fastest growing county during this period was Rockwall County, with 5.4 percent average annual growth, followed by Collin County, with 4.2 percent average annual growth, and Denton County, with 3.8 percent average annual growth. The population of the City of Dallas increased from 2.3 million in 2002 to 2.5 million in 2012, at a CAGR of 0.9 percent.

Table 3-17 summarizes population growth in the Dallas-Fort Worth-Arlington MSA from 2002 through 2012, and projections by Woods & Poole Economics, Inc. through 2032. The population of the Dallas-Fort Worth-Arlington MSA is projected to increase at a CAGR of 1.9 percent while the populations of Texas and the United States are projected to increase at CAGRs of 1.7 percent and 1.0 percent, respectively, between 2012 and 2032.

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Sources: Map resources, 2007 (vector map graphics); Ricondo & Associates, Inc., November 2012; Woods and Poole, Inc.
Prepared by: Ricondo & Associates, Inc., March 2013

Exhibit 3-1

Dallas-Forth Worth-Arlington Metropolitan Statistical Area

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Table 3-17: Historical and Projected Dallas-Fort Worth-Arlington Metropolitan Statistical Area Population (in thousands)

CALENDAR YEAR	COLLIN	COOKE	DALLAS	DELTA	DENTON	ELLIS	FANNIN	GRAYSON	HENDERSON	HOOD	HUNT	JOHNSON	KAUFMAN	PALO PINTO	PARKER	ROCKWALL	SOMERVELL	TARRANT	WISE	DALLAS-FORT WORTH-ARLINGTON MSA	TEXAS	UNITED STATES
Historical																						
2002	564	37	2,250	5	488	119	32	113	75	43	80	133	78	27	94	50	7	1,524	52	5,773	21,690	287,625
2003	589	38	2,246	5	510	123	32	114	76	44	81	136	81	27	97	53	7	1,553	54	5,869	22,031	290,108
2004	618	38	2,244	5	530	126	33	115	78	45	82	139	84	27	99	56	8	1,581	54	5,962	22,394	292,805
2005	647	38	2,251	5	554	130	33	116	78	46	83	141	87	28	102	60	8	1,612	56	6,074	22,778	295,517
2006	684	38	2,275	5	585	135	34	117	78	48	84	143	91	28	105	66	8	1,662	57	6,243	23,360	298,380
2007	714	38	2,292	5	609	140	34	118	78	49	84	145	96	28	109	71	8	1,707	57	6,383	23,832	301,231
2008	741	38	2,314	5	630	144	34	119	78	50	84	149	99	28	113	74	8	1,746	58	6,513	24,309	304,094
2009	766	38	2,346	5	650	147	34	120	78	51	85	151	102	28	116	77	8	1,784	59	6,646	24,802	306,772
2010	789	38	2 375	5	667	150	34	121	79	51	86	151	104	28	117	79	9	1,817	59	6,761	25,253	309,330
2011	812	38	2,416	5	686	153	34	121	79	52	87	153	105	28	118	81	8	1,850	60	6,887	25,675	311,592
2012	851	39	2,452	5	709	156	34	122	80	53	87	156	108	28	122	85	9	1,882	62	7,040	26,175	314,659
Projected																						
2017	1,047	41	2,635	5	823	174	35	127	85	59	89	175	122	28	140	103	9	2,049	72	7,819	28,727	330,673
2022	1,239	43	2,821	5	936	192	37	133	90	66	92	193	136	28	157	120	9	2,217	83	8,598	31,296	347,115
2032	1,629	47	3,199	5	1,165	229	39	144	100	79	98	231	165	29	191	156	10	2,558	108	10,178	36,491	380,231
Compound Annual Growth Rate																						
2002 – 2012	4.2%	0.4%	0.9%	-0.3%	3.8%	2.8%	0.7%	0.8%	0.7%	2.0%	0.8%	1.6%	3.4%	0.4%	2.6%	5.4%	1.7%	2.1%	1.7%	2.0%	1.9%	0.9%
2012 – 2032	3.3%	0.9%	1.3%	0.0%	2.5%	1.9%	0.7%	0.8%	1.1%	2.0%	0.6%	2.0%	2.1%	0.2%	2.3%	3.1%	0.5%	1.5%	2.6%	1.9%	1.7%	1.0%

NOTES: Rows may not add to Dallas – Fort Worth – Arlington MSA total numbers shown because of rounding

Compounded annual growth rates are based on actual numbers and not based on rounded numbers shown

SOURCE: Woods & Poole Economics, Inc., March 2013
PREPARED BY: Ricondo & Associates, Inc., March 2013

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3.2.8.2 Employment and Income

The size and growth of its labor force are indications of the strength of a region's economic base. Between 2002 and 2012, employment increased significantly in the Dallas-Fort Worth-Arlington MSA, from 3.6 million to 4.2 million, at a CAGR of 1.8 percent, as shown in **Table 3-18**.

Table 3-18: Historical and Projected Dallas-Fort Worth-Arlington Metropolitan Statistical Area Socioeconomic Factors

CALENDAR YEAR	EMPLOYMENT (THOUSANDS)	INCOME (MILLIONS)	PER CAPITA PERSONAL INCOME
Historical			
2002	3,564	$209,108	$33,608
2003	3,564	$210,824	$34,002
2004	3,657	$218,977	$35,669
2005	3,773	$230,017	$37,867
2006	3,923	$242,924	$39,969
2007	4,065	$252,599	$41,749
2008	4,162	$260,282	$43,536
2009	4,082	$242,714	$39,811
2010	4,096	$248,742	$40,872
2011	4,176	$259,471	$42,869
2012	4,248	$264,847	$43,583
Projected			
2017	4,667	$304,993	$51,751
2022	5,126	$356,838	$64,661
2032	6,182	$492,453	$106,265
Compound Annual Growth Rate			
2002 - 2012	1.8%	2.4%	2.6%
2012 - 2032	1.9%	3.1%	4.6%

SOURCE: Woods & Poole Economics, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Employment in the United States increased from 165.1 million jobs in 2002 to 177.1 million jobs in 2012, at a CAGR of 0.7 percent. Over the same period, employment in Texas increased from 12.3 million jobs to 14.8 million jobs, at a CAGR of 1.9 percent. Over the planning period, employment in the Dallas-Fort Worth-

Arlington MSA, Texas, and the United States is projected to increase at CAGRs of 1.9 percent, 1.8 percent, and 1.3 percent, respectively.

Per capita personal income in the Dallas-Fort Worth-Arlington MSA increased at a CAGR of 2.6 percent between 2002 and 2012 compared with CAGRs of 3.4 percent in Texas and 3.1 percent in the United States.

3.2.8.3 Dallas-Fort Worth-Arlington MSA Gross Domestic Product

Overall, the gross domestic product (GDP) in the Dallas-Fort Worth-Arlington MSA and Texas is projected to increase at a comparable rate as that of Texas throughout the planning period and to continue exceeding GDP growth in the United States, as shown in **Table 3-19**. Between 2002 and 2012, the Dallas-Fort Worth-Arlington MSA GDP increased at a CAGR of 1.9 percent, while the Texas GDP increased at a CAGR of 2.5 percent and the U.S. GDP increased at a CAGR of 1.3 percent. Through 2032, GDP is projected to increase at CAGRs of 2.9 percent in the Dallas-Fort Worth-Arlington MSA and Texas and 2.3 percent in the United States.

Table 3-19: Historical and Projected Gross Domestic Product Comparison (in millions)

CALENDAR YEAR	DALLAS-FORT WORTH-ARLINGTON MSA	TEXAS	UNITED STATES
Historical			
2002	$276,268	$843,713	$11,395,361
2003	$280,080	$871,019	$11,692,437
2004	$298,038	$930,467	$12,123,442
2005	$308,140	$968,553	$12,539,116
2006	$323,684	$1,026,463	$12,936,968
2007	$339,647	$1,087,597	$13,209,790
2008	$338,168	$1,110,000	$13,028,025
2009	$319,981	$1,036,234	$12,691,919
2010	$321,772	$1,042,006	$12,666,042
2011	$328,055	$1,061,556	$12,787,312
2012	$333,620	$1,082,392	$12,911,575
Projected			
2017	$385,644	$1,270,449	$14,539,930
2022	$443,410	$1,457,624	$16,262,415
2032	$585,608	$1,918,776	$20,351,419
Compound Annual Growth Rate			
2002 - 2012	1.9%	2.5%	1.3%
2012 - 2032	2.9%	2.9%	2.3%

SOURCE: Woods & Poole Economics, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

3.3 Forecast Methodology Overview and Results

Several methodologies were used to develop forecasts of enplaned passengers, aircraft operations, and based aircraft and to project the fleet mix at the Airport. These methodologies are discussed below. The forecasts were developed for two time periods: the pre-Wright Amendment repeal period, referred to as the short-term forecasts (Fiscal Years 2013 and 2014), and the post-Wright Amendment period (Fiscal Years 2015 through 2032), referred to as the long-term forecasts.

3.3.1 SHORT-TERM ENPLANED PASSENGER FORECASTS (FY 2013 AND FY 2014)

Published airline schedules for 2013 were analyzed, and individual market-level estimates of enplaned passengers were developed based on actual passenger data provided by the Department of Aviation for the first 4 months of FY 2013 (October through December 2012 and January 2013). Using the 2013 data, schedule capacity and growth in numbers of enplaned passengers were forecast using a combination of trend analysis and the FAA forecasts of domestic enplaned passengers between 2013 and 2014, as set forth in the *FAA Aerospace Forecast Fiscal Years 2013-2033.*

3.3.2 LONG-TERM ENPLANED PASSENGER FORECASTS (FY 2015 THROUGH FY 2032)

It was assumed that the Airport's airline service profile will change significantly with the repeal of the Wright Amendment in October 2014. Nonstop flights into and out of the Airport on aircraft with 56 or more seats at the time of the Master Plan Update forecast development, were restricted to points within Texas and the nearby states of Alabama, Arkansas, Kansas, Louisiana, Mississippi, Missouri, New Mexico, and Oklahoma. In October 2014, these restrictions ended, and airlines are permitted to operate from the Airport to any market in the United States on a nonstop basis regardless of aircraft size. International nonstop service continues to be prohibited. In addition, the total number of available gates at the Airport is limited to 20, which are allocated to Southwest Airlines (16), American Airlines (2), and United Airlines (2). As of May 2015, American Airlines subleases its gates to Delta Air Lines.

3.3.2.1 Estimated Base Demand (2013)

To forecast aviation demand at the Airport in the period after the Wright Amendment restrictions are repealed, a potential airline service profile was modeled to determine a potential network structure that could evolve. This modeling was accomplished using common airline network planning techniques, including observation of 2012 O&D passenger traffic flows to identify potential demand for new nonstop flights and flights that may require downsizing should current traffic flows change, examination of the top unserved/underserved O&D markets, and examination of connecting passenger traffic that would benefit from additional connections offered through the Airport. Three airline service profiles were developed based on three possible schedules operated by Southwest Airlines. These schedules are defined by the number of turns, or departures, per gate per day on an average weekday in the peak month of service for the airline. Airline service profiles incorporating 10, 11, and 12 turns per gate were developed.

Schedules of service by other airlines (currently, United, Delta, and SeaPort) were also developed for these airline service profiles. It was assumed that these other airlines will continue to use the Airport as a spoke in their route systems, and increases in aircraft size or the initiation of new nonstop service would occur only as local market demand and/or demand through connecting hubs warrant.

For each airline service profile developed, a Quality of Service Index fair share demand analysis was performed to estimate O&D and connecting passenger demand for each modeled flight segment. For O&D passenger demand, additional analysis was conducted to estimate the percentage of demand above or below the fair share of capacity that might be realized on each segment. This analysis (often referred to as city presence or S-curve analysis) incorporates the historical patterns of actual O&D passenger distributions across flight segments compared with the fair share of passenger demand each segment would be expected to garner, and helps account for additional factors, such as loyalty programs, that affect customer choice of airlines. The resulting O&D and connecting passenger demand values were calculated on an unconstrained[2] basis to provide an adjusted 2012 base demand for the Airport upon which growth could be forecast.

3.3.2.2 Unconstrained Demand

Both passenger traffic segments, O&D and connecting, were increased through the planning period at rates derived through traditional methods. For O&D passenger demand, socioeconomic regression analysis was used. Socioeconomic regression analyses are used to compare historical relationships between a dependent variable (e.g., enplaned passengers) and one or more independent variables (socioeconomic factors, such as population, employment, per capita personal income) to forecast future growth in aviation activity. Socioeconomic regression analyses were conducted to determine causal relationships between Dallas area O&D passenger traffic (the dependent variable) and socioeconomic variables at the national level and for the Dallas-Fort Worth-Arlington MSA. To determine growth in potential connecting passenger activity over the planning period, the results of socioeconomic regression analyses were also considered, as forecast growth in numbers of U.S. domestic enplaned passengers, as published in the *FAA Aerospace Forecast Fiscal Years 2013-2033*. Regression results for both O&D and connecting passengers are presented in **Table 3-20**.

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[2] For purposes of this discussion, the term "unconstrained" refers to seat capacity on a flight segment. The overall hub profile was developed on a gate-constrained basis.

Table 3-20: Forecast Growth Rates for Unconstrained O&D and Connecting Passenger Demand

PASSENGER DEMAND ELEMENT	INDEPENDENT VARIABLES	R-SQUARE	ANNUAL GROWTH RATE
O&D Passenger Demand	U.S. Employment	87.7%	1.6%
	U.S. Population/U.S. Employment	90.1%	1.7%
	U.S. Employment/U.S. Gross Domestic Product	91.6%	1.7%
	U.S. Employment/U.S. per Capita Personal Income	88.3%	1.8%
	U.S. Employment/U.S. Personal Income	89.2%	2.2%
	FAA Aerospace Forecast of Domestic Enplaned Passengers	NA	1.9%
	Growth Rate Used		1.8%
Connecting Passenger Demand	MSA Population/MSA Employment	84.4%	1.4%
	U.S. Population/MSA Employment	80.6%	1.7%
	U.S. Employment/U.S. Gross Domestic Product	81.1%	1.7%
	MSA Population/MSA Personal Income	82.3%	2.8%
	Growth Rate Used		1.7%

NOTE: MSA = Metropolitan Statistical Area; NA = Not Applicable

SOURCES: Woods & Poole Economics, Inc., March 2013; Ricondo & Associates, Inc. (analysis), March 2013.
PREPARED BY Ricondo & Associates, Inc., March 2013.

A standard measure of how well each socioeconomic variable or combination of socioeconomic variables explains the annual variations in passenger numbers is the regression model's coefficient of determination, or R-square. For O&D passengers, the models exhibited coefficients of determination ranging from a high of 91.6 percent to a low of 87.7 percent. For connecting passengers, the models exhibited coefficients of determination ranging from a high of 84.4 percent to a low of 80.6 percent. A result of 100.0 percent is the maximum possible for a coefficient of determination and represents a perfect fit between the variables analyzed. The socioeconomic regression analyses provided a range of possible annual growth rates between 1.6 percent and 2.2 percent for O&D passengers. For connecting passengers, the socioeconomic regression analyses provided a range of possible annual growth rates between 1.4 percent and 2.8 percent. In comparison, the FAA forecast for U.S. domestic enplaned passengers for the period is an average increase of 1.9 percent per year.

Growth rates for both O&D and connecting passengers were applied to the unconstrained demand estimated for each flight segment in all three of the airline service profiles developed, resulting in an unconstrained demand forecast for each segment in each year of the planning period. In addition, growth rates were applied to demand elements for potential markets that might materialize over the planning period to help determine if and when new service would be initiated.

3.3.2.3 Constrained Demand

For each flight segment in each airline service profile, demand was constrained each year based on estimates of the number of aircraft available, the capacity of those aircraft, the best assignment of those aircraft at the Airport, and assumptions regarding maximum sustainable load factors on a segment.

- **Southwest Airlines constrained**: Southwest Airlines' aircraft fleet plan was analyzed, and the total number of aircraft by type (Boeing 737-300/500/700/800) was projected for the airline for each year of the planning period. It was assumed that no regional aircraft would enter the airline's fleet during the planning period, and that aircraft would be allocated by Southwest Airlines to operations at the Airport generally in proportion by type to the overall Southwest Airlines network. As stated earlier, total operations were limited to the number of turns per gate determined to be the limit on the average weekday of the peak month for each profile, and the number of gates available for Southwest Airlines was restricted to 16.
- **Other Airlines constrained**: Additional demand for existing or new nonstop markets was considered achievable mainly by increases in load factor and aircraft size. The fleet profiles of the other airlines serving the Airport contain or will likely contain numerous variations of aircraft size, which enables growth in smaller increments. In addition, operations by the other airlines were assumed to remain unconstrained by gate availability.

As demand constraints were encountered at the flight segment level, where demand could not be met by increasing aircraft size, increasing the load factor, or adding flights, demand was rejected or "spilled." Because O&D demand is central to the sustainability of an airline's core operation at any airport, connecting passenger demand was spilled at a higher rate than O&D demand. Connecting passengers spilled on one segment because of capacity constraints were removed from the corresponding connecting segment.

On the basis of conversations with Southwest Airlines' representatives, observations of the Southwest Airlines network, and professional judgment, the 10 turns-per-gate airline service profile was used as the basis for the activity forecasts presented herein. The lower number of turns per gate is sensible, particularly as aircraft size and average load factors increase throughout the planning period, increasing operational challenges associated with more turns per gate.

3.3.3 SPECIFIC ASSUMPTIONS AND RESULTS

3.3.3.1 Southwest Airlines

Actual 2012 and forecast operating statistics through 2032 are presented in **Table 3-21**. It was assumed that Southwest Airlines would implement a new service profile in October 2014 (the first month of FY 2015), upon the repeal of the Wright Amendment restrictions. Prior to that period, in the short term, the airline's hub system was expected to operate as published by Official Airline Guides, Inc., for 2013 and through September 2014. The average number of seats per departure for the airline was estimated to number 134.7 in 2013 and 2014, down from 136.4 in 2012 as a result of the greater use of the 122-seat Boeing 737-500 aircraft at the Airport as the airline concentrates this fleet geographically until ultimately retiring the aircraft from its fleet in 2016. Also in the short term, the average number of daily departures is generally estimated to remain flat, while load factors increase to approximately 78 percent. The total number of Southwest Airlines passengers at the Airport was split 65 percent O&D and 35 percent connecting in 2012, and that split was expected to be consistent through 2014.

With implementation of the new airline service profile as of October 2014, the average number of daily departures increases to 151, as the airline takes advantage of the liberalization of service opportunities, and offers new nonstop service to destinations outside the restricted boundaries. Demand, both by O&D and connecting passengers, would support the maximum number of operations under the 10 turns-per-gate profile in 2015. Therefore, in subsequent years, capacity growth by Southwest Airlines would only materialize through the use of larger aircraft and an ability to manage a higher average load factor.

The increased use of 175-seat Boeing 737-800 aircraft, along with the continued increase in seat capacity across the Boeing 737-700 and Boeing 737-300 fleet to 143 seats (from 137 seats), would result in an increase in average number of seats per departure to 146.7 in 2015, and ultimately to 151.0 in 2032. Southwest Airlines' average load factor is projected to increase to 80.4 percent in 2015 and to 85.2 percent in 2032. In 2015, the airline's passengers at the Airport are expected to consist of approximately 53 percent O&D passengers and 47 percent connecting passengers as a result of greater opportunities for connections in the new airline service profile. However, because Southwest Airlines' growth at the Airport would be constrained over the planning period, demand will outpace supply, and it was assumed that O&D passengers will be accommodated at a greater rate than connecting passengers. By 2032, the composition of Southwest Airlines' passengers was assumed to consist of 62 percent O&D passengers and 38 percent connecting passengers.

3.3.3.2 Other Airlines

Other airlines serving the Airport are expected to continue operating as they currently do, with the Airport operating as a spoke destination served from the hubs of those airlines, or on a point-to-point basis. The primary operations of the other airlines (Delta and United) are anticipated to remain largely concentrated at DFW. Historically, United served Denver International Airport and Delta served Memphis International Airport nonstop from the Airport. The repeal of the Wright Amendment restrictions is not expected to be a catalyst for significant structural changes for these airlines; however, it will allow larger aircraft to operate to destinations in non-Wright Amendment states, which may drive additional capacity to current destinations (specifically, Delta to Hartsfield-Jackson Atlanta International Airport), or help support profitable operations to new destinations.

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Table 3-21: Actual 2012 and Forecast Operating Statistics for Airlines Serving the Airport

	SOUTHWEST AIRLINES				OTHER AIRLINES				COMBINED AIRLINES			
FISCAL YEAR	AVERAGE SEATS/ DEPARTURE	DAILY DEPARTURES	LOAD FACTOR (%)	LOCAL O&D SHARE (%)	AVERAGE SEATS/ DEPARTURE	DAILY DEPARTURES	LOAD FACTOR (%)	LOCAL O&D SHARE (%)	AVERAGE SEATS/ DEPARTURE	DAILY DEPARTURES	LOAD FACTOR (%)	LOCAL O&D SHARE (%)
2012	136.4	115.1	73.9%	64.8%	46	13.2	70.0%	100%	127.1	128.3	73.8%	66.0%
2013	134.7	117.0	77.7%	64.8%	46	13.2	71.1%	100%	125.7	131.2	77.5%	66.0%
2014	134.7	119.0	77.7%	64.8%	46	13.2	73.2%	100%	125.9	132.2	77.5%	66.0%
2015	146.7	150.8	80.4%	52.6%	60	13.9	67.5%	100%	139.4	164.7	79.9%	54.1%
2016	146.7	150.8	82.0%	52.6%	61	14.2	67.8%	100%	139.3	165.0	81.5%	54.1%
2017	146.7	150.8	83.3%	52.9%	62	14.5	68.0%	100%	139.3	165.3	82.7%	54.4%
2018	146.9	150.8	84.3%	53.2%	63	14.8	68.3%	100%	139.4	165.6	83.6%	54.7%
2019	147.3	150.8	85.2%	53.4%	64	15.1	68.5%	100%	139.7	165.9	84.5%	55.0%
2020	147.5	150.8	85.3%	54.1%	64	15.4	68.8%	100%	139.8	166.2	84.6%	55.7%
2021	147.7	150.8	85.2%	54.9%	65	15.7	69.0%	100%	139.9	166.5	84.5%	56.5%
2022	147.9	150.8	85.2%	55.7%	66	15.9	69.3%	100%	140.1	166.8	84.5%	57.3%
2023	148.1	150.8	85.2%	56.4%	67	16.2	69.5%	100%	140.2	167.0	84.5%	58.0%
2024	148.1	150.8	85.2%	57.2%	68	16.5	69.8%	100%	140.2	167.3	84.5%	58.8%
2025	148.3	151.2	85.2%	57.8%	69	16.8	70.0%	100%	140.3	168.0	84.5%	59.5%
2026	148.7	150.8	85.2%	58.5%	70	17.1	70.2%	100%	140.6	167.8	84.5%	60.2%
2027	149.0	150.8	85.2%	59.0%	71	17.3	70.5%	100%	141.0	168.1	84.5%	60.8%
2028	149.4	150.8	85.2%	59.6%	71	17.6	70.7%	100%	141.3	168.4	84.4%	61.4%
2029	149.8	150.8	85.1%	60.2%	72	17.8	71.0%	100%	141.6	168.6	84.4%	62.0%
2030	150.2	150.8	85.1%	60.8%	73	18.1	71.2%	100%	142.0	168.9	84.4%	62.6%
2031	150.6	150.8	85.1%	61.2%	74	18.3	71.5%	100%	142.3	169.1	84.4%	63.1%
2032	151.0	150.8	85.2%	61.6%	75	18.6	71.7%	100%	142.7	169.3	84.4%	63.5%

SOURCES: City of Dallas Department of Aviation; U.S. DOT T-100 database, accessed March 2013; Ricondo & Associates, Inc. (forecasts), March 2013.
PREPARED BY Ricondo & Associates, Inc. March 2013.

In the near term, average numbers of seats and daily departures are expected to remain constant at approximately 46 seats per departure and 13 departures per day. Load factors are also expected to remain constant in the low 70 percent range. All passengers enplaned by the other airlines are expected to be O&D passengers. In the longer term, average seat capacity is forecast to increase, initially to 60 seats per departure as seat capacity restrictions lapse, and also as smaller regional aircraft are replaced in airline fleets with larger capacity regional aircraft allowed under new labor scope arrangements with the larger network airlines. The average number of daily flights would initially remain constant at approximately 14 per day in 2015.

The increase in average seat capacity would initially result in a decrease in average load factors to approximately 68 percent in 2015. Over the course of the long-term forecasts, the other airlines' average seat capacity is forecast to increase by approximately one seat per departure per year with the increased use of larger regional aircraft in service at the Airport, and with the potential for large mainline aircraft to enter service at the Airport by airlines other than Southwest Airlines. Load factors are forecast to increase gradually to approximately 71.7 percent in 2032 as a result of overall demand growth, tempered by gradually increasing aircraft size.

3.3.3.3 Combined Forecast Results for Passengers

In 2012, O&D passengers accounted for approximately 66 percent of total enplaned passengers at the Airport, with connecting passengers accounting for the remaining 34 percent. As the new airline service profile is implemented at the Airport, greater schedule connectivity will lead to an increase in the connecting share of enplaned passengers to approximately 45 percent. However, as both O&D and connecting passenger demand increases over the planning period, capacity constraints will result in a substantial spill of demand, which is expected to affect connecting passenger demand disproportionately more than originating passenger demand. As a result, by 2032, the O&D share of passengers is expected to increase to nearly 64 percent, and the connecting share would decrease to approximately 36 percent.

Enplaned passenger forecasts are presented in **Table 3-22** and shown graphically on **Exhibit 3-2**. Using the approach outlined above, the combined forecasts of O&D and connecting enplaned passengers are 4.2 million in 2013, increasing to 6.2 million in 2015, following the repeal of the Wright Amendment when the Airport is able to accommodate a significantly different airline service profile. By 2032, enplaned passengers are forecast to number 7.0 million, reflecting the effects of a gate-constrained environment. Between 2012 and 2015, the number of enplaned passengers is forecast to increase nearly 52 percent, or an average of 15 percent annually, as a result of the expected change in airline service. Over the planning period (2013-2032), the number of enplaned passengers is forecast to increase at a CAGR of 2.7 percent, but at a CAGR of only 0.7 percent between 2015 and 2032.

3.3.4 AIRCRAFT OPERATIONS FORECAST DEVELOPMENT PROCESS AND RESULTS

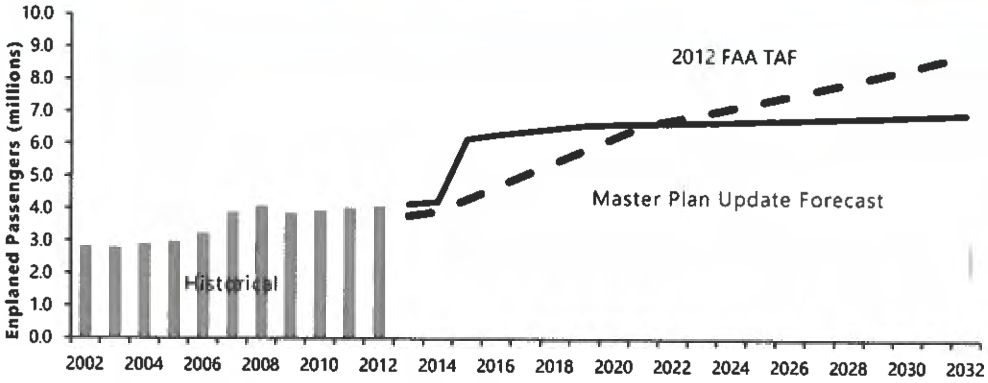
The forecasts of aircraft operations at the Airport are presented in **Table 3-23**, and are shown graphically on **Exhibit 3-3** compared with the 2012 FAA *Terminal Area Forecast* (TAF) for the Airport. The various components of the aircraft operations forecasts were developed as described in the following subsections.

Table 3-22: Historical and Forecast Enplaned Passengers

FISCAL YEAR	MAINLINE	REGIONAL/ COMMUTER	TOTAL
Historical			
2007	3,606,129	304,398	3,910,527
2008	3,853,325	214,943	4,068,268
2009	3,722,812	148,875	3,871,687
2010	3,823,138	125,984	3,949,122
2011	3,916,851	100,270	4,017,121
2012	3,973,171	100,996	4,074,167
Forecast			
2013	4,050,764	102,968	4,153,732
2014	4,129,874	104,979	4,234,853
2015	5,966,074	205,079	6,171,153
2016	6,090,164	213,476	6,303,640
2017	6,183,631	222,026	6,405,657
2022	6,414,967	266,737	6,681,704
2027	6,503,851	314,683	6,818,534
2032	6,616,616	364,901	6,981,517
Compound Annual Growth Rate			
2012-2014	2.0%	2.0%	2.0%
2012-2015	14.5%	26.6%	14.8%
2015-2032	0.6%	3.4%	0.7%
2012-2032	2.6%	6.6%	2.7%

SOURCES: City of Dallas Department of Aviation; March 2013; Ricondo & Associates, Inc. (forecasts), March 2013.
PREPARED BY Ricondo & Associates, Inc., March 2013.

Exhibit 3-2: Historical and Forecast Enplaned Passengers



SOURCES: City of Dallas Department of Aviation; FAA, *Terminal Area Forecast Fiscal Years 2012 – 2040*, March 2013; Ricondo & Associates, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

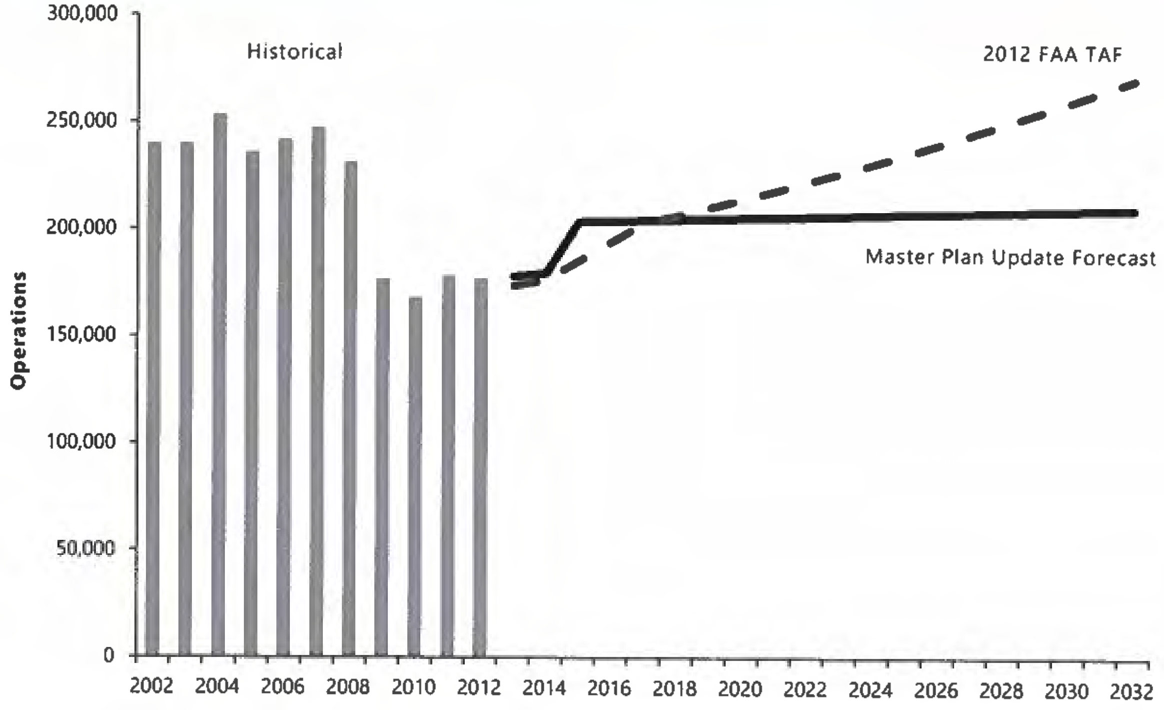
Table 3-23: Historical and Forecast Aircraft Operations

	PASSENGER AIRLINES							
FISCAL YEAR	MAINLINE	REGIONAL/ COMMUTER	TOTAL	ALL-CARGO AIRLINES	OTHER AIR TAXI	GENERAL AVIATION	MILITARY	TOTAL
Historical								
2002	83,944	7,652	91,596	52	35,647	110,399	2,038	239,732
2003	82,480	6,416	88,896	1,540	35,877	111,984	1,604	239,901
2004	82,996	5,262	88,258	1,601	40,156	121,474	1,953	253,442
2005	77,626	6,538	84,164	1,632	39,861	107,774	2,468	235,899
2006	80,526	11,988	92,514	1,734	37,719	107,220	2,803	241,990
2007	87,768	17,990	105,758	1,111	39,976	97,991	2,498	247,334
2008	91,734	16,760	108,494	1,260	40,572	78,767	2,255	231,348
2009	88,488	9,116	97,604	208	22,276	55,420	1,469	176,977
2010	85,318	6,758	92,076	88	21,325	53,795	1,089	168,373
2011	84,110	7,398	91,508	82	23,801	61,578	1,087	178,056
2012	84,232	9,502	93,734	94	25,936	55,807	1,496	177,067
Forecast								
2013	85,410	9,614	95,024	94	26,027	55,305	1,496	177,946
2014	86,879	9,614	96,493	94	26,118	55,379	1,496	179,580
2015	110,074	10,127	120,201	94	26,209	55,454	1,496	203,454
2016	110,074	10,351	120,425	94	26,301	55,529	1,496	203,845
2017	110,074	10,573	120,647	94	26,393	55,604	1,496	204,234
2022	110,088	11,641	121,729	94	26,858	55,980	1,496	206,157
2027	110,057	12,647	122,704	94	27,332	56,359	1,496	207,985
2032	110,060	13,562	123,622	94	27,813	56,741	1,496	209,766
Compound Annual Growth Rate								
2012-2014	1.6%	0.6%	1.5%	0.0%	0.4%	-0.4%	0.0%	0.7%
2012-2015	9.3%	2.1%	8.6%	0.0%	0.3%	-0.2%	0.0%	4.7%
2015-2032	0.0%	1.7%	0.2%	0.0%	0.4%	0.1%	0.0%	0.2%
2012-2032	1.3%	1.8%	1.4%	0.0%	0.3%	0.1%	0.0%	0.9%

SOURCES: City of Dallas Department of Aviation; FAA Air Traffic Activity Data System; U.S. DOT T-100 database, accessed March 2013; Ricondo & Associates, Inc. (forecasts), March 2013.

PREPARED BY: Ricondo & Associates, Inc., March 2013.

Exhibit 3-3: Historical and Forecast Aircraft Operations



SOURCES: City of Dallas Department of Aviation; FAA, *Terminal Area Forecast Fiscal Years 2012 - 2040*, March 2013; Ricondo & Associates, Inc., March 2013.

PREPARED BY: Ricondo & Associates, Inc., March 2013.

3.3.4.1 Air Carrier

To calculate the annual number of aircraft operations required to carry the forecast number of enplaned passengers at the Airport, assumptions were made regarding average load factors and numbers of seats per departure. The majority of the increase in aircraft operations results from changes in Southwest Airlines' activity over the planning period. As described above, Southwest Airlines in 2012 operated aircraft with an average of 136.4 seats per departure at a 73.9 percent load factor. As Southwest Airlines implements a new service profile at the Airport, its average number of aircraft seats per departure is expected to increase to 146.7 in 2015 with both the greater use of larger Boeing 737-800 aircraft having 175 seats and an increase in the average number of seats on its Boeing 737-700 and Boeing 737-300 fleet to 143. Additionally, it is expected that smaller Boeing 737-500 aircraft with 122 seats will be phased into retirement. The load factor for Southwest Airlines is forecast to be 80.4 percent in 2015 and 85.2 percent by 2032 (see Table 3-21). As the Airport is gate constrained, air carrier aircraft operations growth is tempered through the planning period, with the majority of growth in operations occurring by 2015. Air carrier aircraft operations are forecast to increase 28.2 percent between 2012 and 2015, or at a CAGR of 8.6 percent. However, from 2015 through 2032, air carrier aircraft operations are forecast to increase at a CAGR of 0.2 percent.

3.3.4.2 General Aviation, Other Air Taxi, Military, and Cargo Aircraft Operations

General aviation operations at DAL have been slowly decreasing as a percentage of overall Texas general aviation operations, as reported in the 2012 FAA TAF. The forecast of general aviation operations through 2032 at the Airport continues this trend, resulting in a CAGR of 0.1 percent through the planning period.

Other air taxi operations are forecast to increase at a CAGR of 0.3 percent, generally in line with the FAA TAF forecast for the Airport. Military aircraft operations are forecast to be constant at the 2012 level through the planning period, as are all-cargo aircraft operations.

3.3.5 BASED AIRCRAFT

The forecasts of based aircraft at the Airport are presented in **Table 3-24.** These forecasts are generally in line with the FAA TAF forecast for the Airport, with the exception of single-engine aircraft. These aircraft are expected to decrease at a CAGR of approximately 0.2 percent, more in line with the *FAA Aerospace Forecast* for the Airport, and recognizing that the increased commercial activity at the Airport may influence the shift of single-engine aircraft to surrounding airports because of airspace restrictions at Dallas Love Field.

3.3.6 FLEET MIX

Table 3-25 presents forecast aircraft operations for mainline and regional/commuter airline aircraft serving the Airport by aircraft category. As shown, it is expected that operations by regional/commuter aircraft at the Airport will increase and represent approximately 11.0 percent of total scheduled passenger airline operations in 2032. An upward trend in operations is forecast for the larger regional jet aircraft (over 50 seats). All operations by mainline airlines were assumed to be conducted using narrowbody aircraft and forecast to increase in the short term and then to remain stable over the long term. Operations by the Boeing 737-500 aircraft are projected to cease by 2017 as a result of Southwest Airlines' commitment to retire the aircraft from its fleet mix. Boeing 737-300 and 737-700 aircraft operations are forecast to decrease over the planning period. However, these decreases would be offset by forecast increased operations by the Boeing 737-800. As a result, the share of mainline airline operations using narrowbody aircraft is forecast to decrease from 89.8 percent in 2012 to 89.0 percent in 2032.

3.3.7 PEAK MONTH AND PEAK AVERAGE WEEKDAY OPERATIONS

The derivation of peak month and peak month average weekday operations is typically based on average percentages – the historical ratio of peak month activity to annual activity. The peak month for operations at the Airport has varied historically, but has mostly been October. October accounts for approximately 8.8 percent of annual operations at the Airport, as well as the highest average daily number of operations. Peak month, peak month average weekday, and peak hour of the peak month average weekday aircraft operations are presented in **Table 3-26**.

Table 3-24: Historical and Forecast Based Aircraft

FISCAL YEAR	SINGLE-ENGINE	MULTI-ENGINE	JET[2/]	HELICOPTER	TOTAL
Historical					
2002	16	30	472	7	525
2003	15	29	479	6	529
2004	11	62	522	7	602
2005	11	62	522	7	602
2006	20	24	577	6	627
2007	20	24	577	6	627
2008	32	53	649	6	740
2009	31	29	669	8	737
2010	31	29	669	8	737
2011	22	4	734	7	767
2012[1/]	22	4	745	7	778
Forecast					
2013	22	4	757	7	790
2014	22	4	769	8	803
2015	22	4	781	8	815
2016	22	4	793	8	827
2017	22	4	805	8	839
2022	22	4	869	9	904
2027	21	4	937	9	971
2032	21	4	1,010	9	1,044
Compound Annual Growth Rate					
2012-2014	0.0%	0.0%	1.6%	6.9%	1.6%
2012-2015	0.0%	0.0%	1.6%	4.6%	1.6%
2015-2032	-0.3%	0.0%	1.5%	0.7%	1.5%
2012-2032	-0.2%	0.0%	1.5%	1.3%	1.5%

NOTE:

1/ The 2012 number is also forecast.

2/ Figures are sourced from FAA TAF. Jet aircraft total likely includes a portion, if not all of Southwest's fleet.

SOURCES: FAA, *Terminal Area Forecast Fiscal Years 2012 – 2040*, March 2013; Ricondo & Associates, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-25: Projected Aircraft Fleet Mix

			OPERATIONS				
			HISTORICAL	FORECAST			
CATEGORY	REPRESENTATIVE TYPES	CAPACITY (SEATS)	2012	2017	2022	2027	2032
Regional Jet I	Cessna 208 CRJ-200/400 ERJ 135/145 Pilatus PC-12	9-50	7,948	1,923	1,434	758	200
Regional Jet II	CRJ-700/900 and Q400	51-76	1,590	8,641	10,194	11,989	13,362
Regional/Commuter Total			9,538	10,564	11,628	12,747	13,562
Regional/Commuter Percent of Airport Total			10.2%	8.8%	9.6%	10.4%	11.0%
Narrowbody I	Boeing 737-300/500	122-137	84,170	-	-	-	-
Narrowbody II	Boeing737-300/700	138-150	14	97,266	93,317	89,483	82,545
Narrowbody III	Boeing737-800	151-175	12	12,764	16,727	20,582	27,515
Mainline Total			84,196	110,030	110,044	110,065	110,060
Mainline Percent of Airport Total			89.8%	91.2%	90.4%	89.6%	89.0%
Airport Total			93,734	120,594	121,672	122,812	123,622

SOURCES: Innovata (historical); Ricondo & Associates, Inc. (projected), March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

Table 3-26: Peaking Profile of Aircraft Operations

	2012	2015	2020	2025	2032
Annual					
Mainline	84,326	110,168	110,194	110,462	110,154
Regional/Commuter	9,502	10,127	11,226	12,264	13,562
Other Air Taxi	25,936	26,209	26,671	27,141	27,813
General Aviation	55,807	55,454	55,829	56,207	56,741
Military	1,496	1,496	1,496	1,496	1,496
Total	177,067	203,454	205,146	207,570	209,766
Peak Month					
Mainline	7,149	9,340	9,342	9,365	9,339
Regional/Commuter	781	832	923	1,008	1,115
Other Air Taxi	1,983	2,004	2,039	2,075	2,127
General Aviation	5,422	5,388	5,424	5,461	5,513
Military	88	88	88	88	88
Total	15,423	17,652	17,816	17,997	18,182
Peak Month Average Weekday					
Mainline	247	322	322	323	322
Regional/Commuter	27	29	32	35	38
Other Air Taxi	74	75	76	77	79
General Aviation	179	178	179	180	182
Military	4	4	4	4	4
Total	531	608	613	619	625
Peak Hour					
Mainline	20	32	32	32	32
Regional/Commuter	2	3	3	3	4
Other Air Taxi	6	7	7	7	7
General Aviation	15	16	16	17	17
Military	0	0	0	0	0
Total	43	58	58	59	60

SOURCES: City of Dallas Department of Aviation; Ricondo & Associates, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

3.3.8 COMPARISONS WITH THE 2013 TAF

As shown on Exhibits 3-2 and 3-3 and as presented in **Table 3-27**, the Master Plan Update forecasts vary from the 2013 FAA *Terminal Area Forecast* by different magnitudes over the course of the planning period. This variation results, in large part, from the expectation of a network transformation by Southwest Airlines in the period immediately following the Wright Amendment repeal, as projected by Airport management. The FAA TAF reflects a more gradual increase in service. Assumed capacity limits on growth in the longer term and the use of larger aircraft are likely reasons for the divergence from the FAA TAF forecast of operations at the Airport. **Table 3-28** provides a summary of forecast metrics for selected years, in a format consistent with that described in Appendix B of the FAA guide titled *Forecasting Aviation Activity by Airport*.

Table 3-27: Master Plan Update and 2013 TAF Comparison (TAF 2013-2040 for DAL)

	YEAR	MASTER PLAN UPDATE FORECAST	FAA TAF	MASTER PLAN UPDATE/TAF (% DIFFERENCE)
Enplaned Passengers				
Base Year	2012	4,074,167	3,899,014	4.5%
Base Year + 5	2017	6,405,657	5,290,125	21.1%
Base Year + 10	2022	6,681,704	5,734,808	16.5%
Base Year + 15	2027	6,818,533	5,908,923	15.4%
Base Year + 20	2032	6,981,518	6,082,273	14.8%
Commercial Aircraft Operations				
Base Year	2012	119,764	119,764	0.0%
Base Year + 5	2017	147,134	146,386	0.5%
Base Year + 10	2022	148,681	164,503	-9.6%
Base Year + 15	2027	150,130	182,364	-17.7%
Base Year + 20	2032	151,529	201,910	-25.0%
Total Aircraft Operations				
Base Year	2012	177,067	177,067	0.0%
Base Year + 5	2017	204,234	204,607	-0.2%
Base Year + 10	2022	206,158	223,830	-7.9%
Base Year + 15	2027	207,985	242,818	-14.3%
Base Year + 20	2032	209,766	263,514	-20.4%

SOURCES: FAA *Terminal Area Forecast Fiscal Years 2013 – 2040*, March 2014; Ricondo & Associates, Inc., March 2014.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

Table 3-28: Master Plan Update Forecast Summary

							COMPOUND ANNUAL GROWTH RATES				
	BASE YEAR	BASE YEAR + 1	BASE YEAR + 5	BASE YEAR + 10	BASE YEAR + 15	BASE YEAR + 20	BASE YEAR + 1	BASE YEAR + 5	BASE YEAR + 10	BASE YEAR + 15	BASE YEAR + 20
BASE YEAR: 2012	2012	2013	2017	2022	2027	2032	2013	2017	2022	2027	2032
Enplaned Passengers											
Mainline (Air Carrier)	3,973,171	4,050,764	6,183,631	6,414,967	6,503,851	6,616,616	2.0%	9.2%	4.9%	3.3%	2.6%
Regional/Commuter	100,996	102,968	222,026	266,737	314,683	364,901	2.0%	17.1%	10.2%	7.9%	6.6%
Total Enplaned Passengers	**4,074,167**	**4,153,732**	**6,405,657**	**6,681,704**	**6,818,534**	**6,981,517**	**2.0%**	**9.5%**	**5.1%**	**3.5%**	**2.7%**
Aircraft Operations											
Itinerant											
Air Carrier	84,326	85,504	110,168	110,182	110,151	110,154	1.4%	5.5%	2.7%	1.8%	1.3%
Commuter/Air Taxi	35,438	35,641	38,499	38,499	39,979	41,375	0.6%	1.7%	0.8%	0.8%	0.8%
Total Commercial Aircraft Operations	**119,764**	**121,145**	**148,687**	**148,681**	**150,130**	**151,529**	**1.2%**	**4.4%**	**2.2%**	**1.5%**	**1.2%**
General Aviation	55,807	55,305	55,604	55,980	56,359	56,741	-0.9%	-0.1%	0.0%	0.1%	0.1%
Military	1,496	1,496	1,496	1,496	1,496	1,496	0.0%	0.0%	0.0%	0.0%	0.0%
Local											
General Aviation	-	-	-	-	-	-					
Military	-	-	-	-	-	-					
Total Aircraft Operations	**177,067**	**177,946**	**205,767**	**206,157**	**207,985**	**209,766**	**0.5%**	**3.0%**	**1.5%**	**1.1%**	**0.9%**
Instrument Operations (not developed)											
Peak Hour Operations	43	43	58	58	59	60					
Cargo/Mail (enplaned + deplaned tons) (not developed)											
Based Aircraft											
Single Engine (Nonjet)	22	23	24	26	30	35	4.5%	1.8%	1.7%	2.1%	2.3%
Multi-engine (Nonjet)	4	4	4	4	4	4	0.0%	0.0%	0.0%	0.0%	0.0%
Jet Engine	745	757	805	869	937	1,010	1.6%	1.6%	1.6%	1.5%	1.5%
Helicopter	7	7	8	9	9	9	0.0%	2.7%	2.5%	1.7%	1.3%
Other	-	-	-	-	-	-					
Total Based Aircraft	**778**	**791**	**841**	**908**	**980**	**1,058**	**1.7%**	**1.6%**	**1.6%**	**1.6%**	**1.5%**
Average Aircraft Size (number of seats)											
Mainline (Air Carrier)	136.4	134.7	146.7	147.9	149.0	151.0					
Regional/Commuter	46.0	46.0	62.0	66.0	71.0	75.0					
Average Enplaning Load Factor											
Mainline (Air Carrier)	73.9%	77.7%	83.3%	85.2%	85.2%	85.2%					
Regional/Commuter	70.0%	71.1%	68.0%	69.3%	70.5%	71.7%					
General Aviation Operations per Based Aircraft	71.7	69.9	66.1	61.7	57.5	53.6					

SOURCES: City of Dallas Department of Aviation; FAA *Terminal Area Forecast Fiscal Years 2012 – 2040*, March 2014; Ricondo & Associates, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2013.

4. Demand/Capacity Analysis and Requirements

Airside and landside facility requirements for Dallas Love Field are discussed in this section. Facility requirements for the planning activity levels (PALs) identified in Section 4.1 are based on several factors, including the relationship between demand and capacity for various Airport systems/facilities, deficiencies identified through comparison of existing conditions with applicable planning/design standards, and functional/operational deficiencies identified through discussions with Airport management, tenants, and users.

The methodologies used to determine facility requirements and capacities of various Airport systems, as described in this section, generally follow industry standards, with adjustments made, as appropriate, to reflect use characteristics specific to the Airport. Facility requirements were determined based on information presented in Sections 2 and 3, as well as any additional information that more accurately reflects existing or expected future conditions at the Airport.

Following the discussion of PALs, the remainder of this section discusses the requirements for functional Airport systems, as follows:

- **Airfield facilities:** Includes the runway and taxiway system, lighting, markings, navigational aids, and related safety and protection areas. The ability of the airfield system to accommodate forecast demand was evaluated in terms of runway capacity and design standards.
- **Passenger terminal facilities:** Includes the terminal building, where enplaned and deplaned passenger demand defines the need for various functional areas, such as ticketing, baggage claim, security screening, and holdrooms, among other building spaces.
- **Parking and access facilities:** Includes vehicular parking areas and on-Airport ground transportation and circulation systems, such as access roadways and terminal curbsides.
- **Taxicab and Commercial Vehicle Staging Areas:** Includes the taxi staging area and the commercial vehicle staging area.
- **Rental Car Facilities:** Includes the customer service area, rental car ready/return area, onsite vehicle storage area, and service site.
- **Tenant and support facilities:** Tenant facilities include FBO facilities; corporate aviation facilities; and maintenance, repair, and overhaul (MRO) facilities. Support facilities include Airport maintenance

facilities, ARFF facilities, and facilities related to aircraft fueling operations, provisioning, belly cargo, and GSE.

4.1 Planning Activity Levels

The Master Plan Update forecasts were adopted by the Department of Aviation during the Master Plan Update process and hereinafter are referred to as the Airport Forecast. Because of the disparity between the Airport Forecast and the FAA TAF for the Airport, PALs were derived to analyze the operational and facility requirements to accommodate demand at specific thresholds rather than specific calendar years. The use of PALs facilitates the analytical process associated with the demand/capacity analysis, facility requirements determination, and alternatives development and evaluation by reducing the demand scenarios to a finite number. PALs were defined to correspond with particular demand thresholds identified as part of the demand scenarios. The demand thresholds (and PALs) are expressed in terms of annual enplaned passengers and aircraft operations.

Typically, a single PAL is used to characterize both numbers of enplaned passengers and aircraft operations. However, because of the variance between the Airport Forecast and the 2013 FAA TAF for the Airport, Ricondo & Associates, Inc. (R&A) developed individual PALs for enplaned passengers and for aircraft operations. The activity variance resulted from an assumption made in the Airport Forecast for faster growth by Southwest Airlines upon expiration of Wright Amendment restrictions compared to the TAF. This accelerated growth in the Airport Forecast is the primary driver of both higher numbers of enplaned passengers and aircraft operations versus TAF numbers forecast for the Airport in 2015. However, the Airport Forecast also reflects the constraints of the terminal's 20-gate limit beyond 2015 while the TAF forecast is unconstrained by the operational limits of a 20-gate terminal. These differences result in higher growth rates in passenger airline aircraft operations forecast in the TAF throughout the balance of the planning period, leading to a greater number of enplaned passengers in the TAF compared with the Airport Forecast in the latter stages of the planning period.

The PALs for enplaned passengers and aircraft operations are set forth in **Table 4-1**. The use of PALs allows demand to trigger the implementation of specific improvements, rather than predicted calendar years. For instance, improvements linked to PAL O2 will be triggered when the number of annual aircraft operations reaches 210,000, which may happen in, earlier than, or later than 2032 (the end of the planning period for this Master Plan Update).

Exhibits 4-1 and **4-2** illustrate the variances in forecasts of enplaned passengers and aircraft operations through 2032. The demand/capacity analyses and requirements associated with each facility are based on the PALs identified.

Table 4-1: Planning Activity Levels

ENPLANED PASSENGERS

PLANNING ACTIVITY LEVEL	MILLION ANNUAL ENPLANED PASSENGERS	YEAR FORECAST	
		2013 TAF	MASTER PLAN UPDATE
PAL E1	5.5	2018	2014/2015
PAL E2	6.2	2032	2015
PAL E3	7.0	NA	2032

AIRCRAFT OPERATIONS

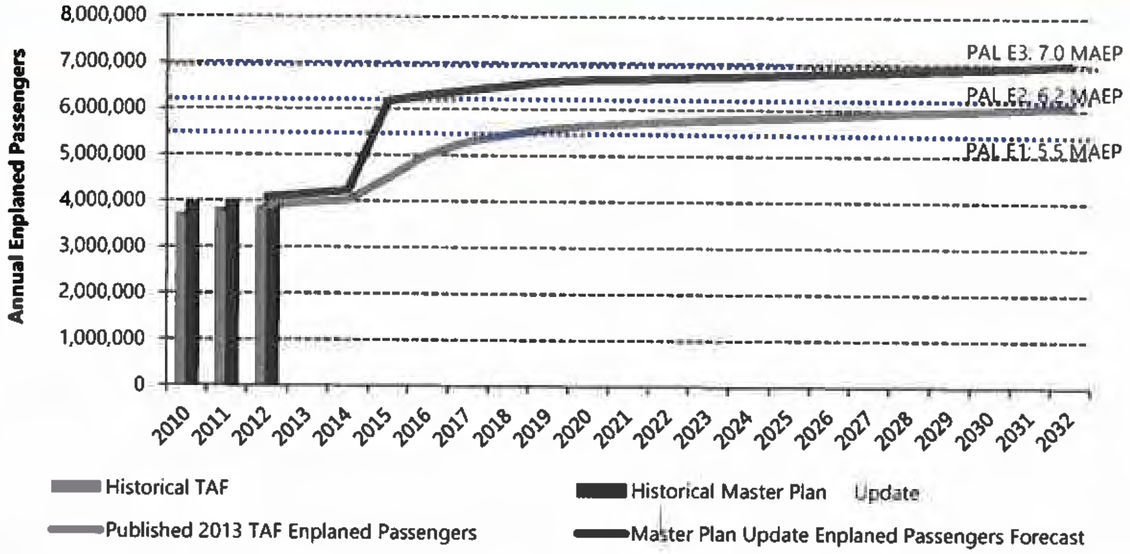
PLANNING ACTIVITY LEVEL	TOTAL ANNUAL OPERATIONS	YEAR FORECAST	
		2013 TAF	MASTER PLAN UPDATE
PAL O1	200,000	2016/2017	2015
PAL O2	210,000	2018/2019	2032
PAL O3	245,000	2027/2028	NA

NOTE: NA = Not Applicable

SOURCES: Federal Aviation Administration, *Terminal Area Forecast* 2012 2040, March 2013; Ricondo & Associates, Inc., June 2014.

PREPARED BY: Ricondo & Associates, Inc., June 2014.

Exhibit 4-1: Planning Activity Levels – Enplaned Passengers



NOTES:

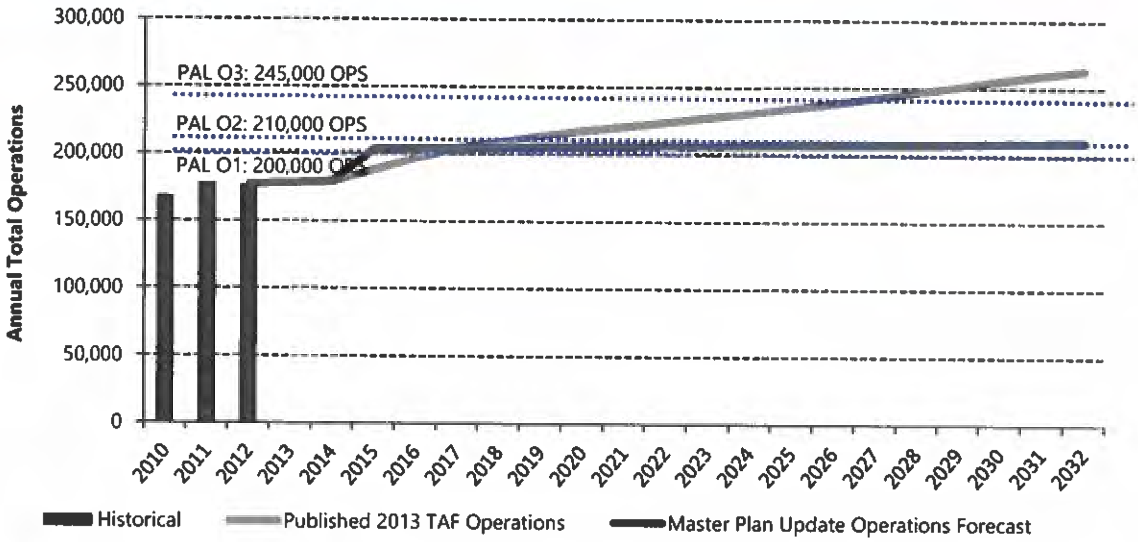
1/ MAEP = Million Annual Enplaned Passengers

2/ Two sets of historical data have been used for enplaned passengers because the historical TAF do not include non-revenue passengers and the historical Master Plan Update takes into account these passengers.

SOURCES: Federal Aviation Administration, *Terminal Area Forecast* 2012-2040, March 2013; City of Dallas Department of Aviation, March 2013; Ricondo & Associates, Inc., June 2014.

PREPARED BY: Ricondo & Associates, Inc., June 2014.

Exhibit 4-2: Planning Activity Levels – Aircraft Operations



NOTE: OPS = Operations

SOURCES: Federal Aviation Administration, *Terminal Area Forecast* 2012-2040, March 2013; Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., June 2014.

4.2 Airfield Facility Requirements

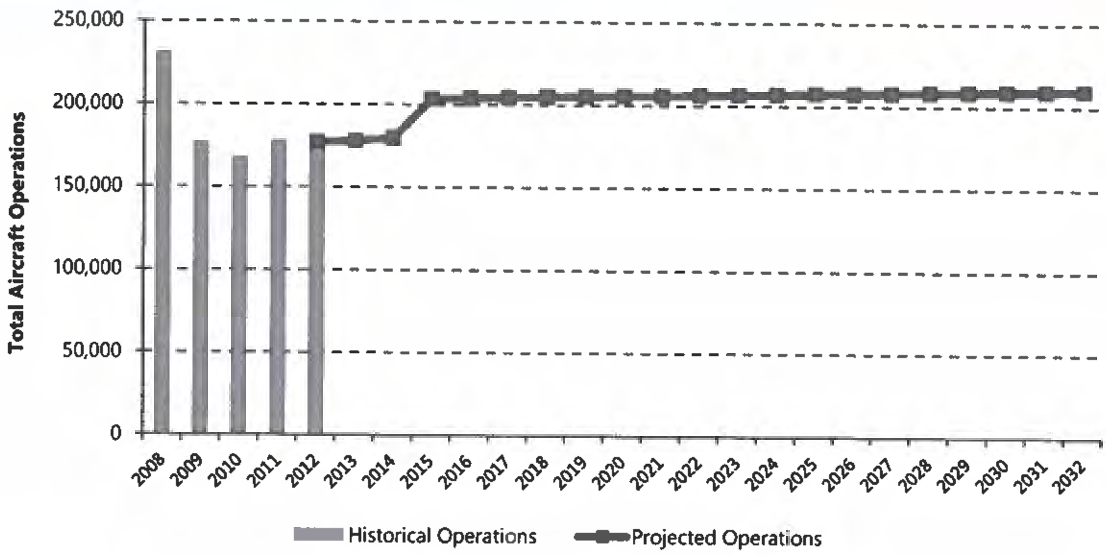
As described in the following subsections, the existing airfield facilities at the Airport were evaluated to determine whether they would be able to adequately accommodate forecast demand, and if they are appropriately sized and configured in accordance with FAA design standards.

4.2.1 AIRFIELD DEMAND/CAPACITY ANALYSIS

The purpose of the airfield demand/capacity analysis is to assess the ability of airfield facilities to accommodate existing and forecast aircraft operations. The analysis establishes the hourly throughput capacity, annual service volume (ASV), and estimated delay per aircraft operation. When compared with the operational demand associated with each PAL, these metrics are used to determine if the capacity of the airfield would be exceeded within the planning period (through 2032) and if airfield capacity enhancements would be required during the planning period.

Exhibit 4-3 shows forecast aircraft operations throughout the planning period, while Table 4-1, presented earlier, shows the relationship between forecast aircraft operations and the PALs.

Exhibit 4-3: Forecast Aircraft Operations



SOURCES: City of Dallas Department of Aviation, March 2013; Ricondo & Associates, Inc., May 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

As shown in Table 4-1, in accordance with the Airport Forecast prepared for this Master Plan Update, PAL O1 and PAL O2 represent the operational demand forecast to occur in 2015 and 2032, respectively. However, the FAA 2013 TAF forecasts annual aircraft operations at the Airport to number 263,514 in 2032, approximately 53,000 operations more than the forecast number of operations presented in this Master Plan Update at PAL O2. As the FAA recommends that Master Plan forecasts be within 10 percent of the TAF in the 5-year forecast, PAL O1 was established to correspond with 200,000 annual aircraft operations. PALs O2 and O3 correspond with 210,000 and 245,000 annual operations, respectively. In evaluating the ability of the airfield to accommodate this demand, airfield/runway capacity and aircraft delay were calculated using the methodologies set forth in FAA AC 150/5060-5 (Change 2), *Airport Capacity and Delay*.

Airfield capacity, sometimes referred to as throughput, is defined as the maximum number of aircraft operations that an airfield can accommodate during a specific period of time without incurring an unacceptable level of aircraft delay. Airfield capacity varies according to weather conditions, types of aircraft, airfield configuration, and ATC procedures. The number and location of runway exits and the share of touch-and-go operations also influence airfield capacity. Aircraft delay increases exponentially as the number of aircraft operations (demand) nears or exceeds airfield capacity under a specific operating condition. The following terms, as defined by the FAA, are used in describing the analyses conducted for the Master Plan Update:

- **Annual service volume:** As defined in the *Airport Capacity and Delay* advisory circular, ASV "is a reasonable estimate of an airport's annual capacity." In estimating ASV, the hourly, daily, and seasonal variations in aircraft demand associated with the airfield are considered, as well as the occurrence of low visibility and cloud ceiling heights in which ATC procedures are modified to maintain operational safety.

- **Average annual delay per operation:** This is an estimate of the average delay, expressed in minutes, that each aircraft operation would experience in a given year. Some aircraft operations, such as those occurring during peak demand hours, would likely experience higher delays while other operations, such as nighttime operations, may experience little or no delay. Average annual aircraft delay is associated with the runway component and does not include consideration of any gate, taxiway, or airspace delay.
- **Total annual hours of aircraft delay:** This is an estimate of the total hours of aircraft delay experienced annually at the Airport (i.e., the annual number of aircraft operations multiplied by the average annual delay per aircraft operation).

4.2.1.1 Factors Affecting Airfield Capacity

The capacity of an airfield system, including the runways and associated runway exits, is not constant over time. A variety of factors can affect airfield capacity at an airport, as discussed in the remainder of this subsection. These include:

- Airfield configuration
- Percentage of time the airport experiences poor weather conditions (i.e., low cloud ceilings or low visibility)
- Types of aircraft operating at the airport (aircraft fleet mix)
- Frequency of touch-and-go operations
- Runway use restrictions (airfield operating configurations)

Airfield Configuration

The number of runways, their orientation, the locations of runway intersections, and the lateral separation between parallel runways are primary factors affecting airfield capacity. The number, location, and type (e.g., angled, perpendicular) of runway exits also affect the capacity of the airfield.

Aircraft operations on intersecting runways are typically considered "dependent" operations. In-trail aircraft separation, or spacing, must be increased to allow adequate time for aircraft operations on the intersecting runway to occur safely. The amount of in-trail separation between aircraft is largely dependent on the type of operation (arrival/departure) and the distance between the runway intersection and the approach ends of the runways. As the distance between the end of the runway and the intersection increases, the amount of in-trail separation required may also increase because of the greater amount of time an aircraft requires to clear the runway intersection, thus allowing an operation on the intersecting runway to commence. As in-trail separations increase, airfield capacity decreases.

When an airfield configuration includes parallel runways, the lateral spacing between the runways also affects airfield capacity. Parallel runways with a lateral separation of 2,500 feet or more can operate as independent runways during visual meteorological conditions (VMC). These conditions enable aircraft to arrive or depart on each parallel runway simultaneously. As the separation between Runways 13R-31L and 13L-31R is 3,000 feet, simultaneous arrivals and simultaneous departures are independent operations in VMC.

During instrument meteorological conditions (IMC) in a radar-controlled environment, the minimum lateral separation between parallel runways is 2,500 feet for dependent arrivals. At this separation, simultaneous departures may occur independently in IMC. However, dependent staggered approaches to the parallel runways are typically conducted maintaining a minimum separation of 1.5-miles diagonally between successive aircraft on adjacent runways. Increasing the lateral separation of the runways to 4,300 feet or more would enable independent simultaneous arrivals and/or simultaneous departures or simultaneous arrivals and departures on the parallel runways during IMC, provided that both runways have instrument approach procedures. If the airport is equipped with a precision runway monitor, simultaneous arrivals and/or simultaneous departures can occur during IMC with a separation of 3,400 feet between parallel runways. As the separation between the two parallel runways at the Airport is approximately 3,000 feet, simultaneous departures are independent and simultaneous arrivals are dependent in IMC. These dependencies require an increase in in-trail aircraft separations, thus reducing airfield capacity.

Another factor affecting airfield capacity is the amount of time an aircraft occupies a runway. Runway occupancy time for arriving aircraft is a function of the number, type, and location of runway exits, as well as aircraft performance. Typically, lighter aircraft require shorter runway distances for landing and, therefore, have shorter runway occupancy times. However, if a runway exit is not available once the aircraft has decelerated to a speed that allows for safe maneuvering off the runway, airfield capacity is reduced because of the increased time the aircraft occupies the runway, delaying the subsequent arriving or departing aircraft operating on that runway.

Angled runway exits, when properly located along a runway, can be more effective at reducing runway occupancy times than 90-degree runway exits. Approximately located angled runway exits are typically aligned at 30 to 45 degrees relative to the runway orientation. This angle allows landing aircraft to exit more expeditiously than standard runway exits perpendicular to the runway. Angled exit taxiways result in lower runway occupancy times, increasing airfield capacity.

Weather Conditions

Airfield capacity can vary significantly depending on the weather conditions at an airport. Prevailing winds (direction and speed) dictate which runways can be used for aircraft arrivals and departures. Aircraft typically land and take off into the wind, and can accommodate a limited amount of crosswind and tailwind. If the maximum crosswind or tailwind is exceeded, the aircraft may not safely operate on that particular runway. Therefore, wind conditions may prevent the use of a higher-capacity runway operating configuration, thus increasing aircraft delays.

Other meteorological conditions affecting airfield capacity include cloud ceiling height and visibility. Low cloud ceilings and poor visibility conditions result in increased spacing between aircraft in the airspace surrounding the airport. These conditions may also restrict which runways can be used, as arrivals in these conditions require instrument landing systems.

Visual flight rules govern the procedures used to conduct flight operations in VMC and marginal VMC (MVMC). Similarly, instrument flight rules govern the procedures used to conduct flight operations in IMC. The criteria for establishing the two operating conditions are summarized in **Table 4-2**.

Table 4-2: Operating Conditions for Airfield Capacity and Aircraft Delay Analysis

	WEATHER CONDITIONS		
CLASSIFICATION	**VISIBILITY**		**CLOUD CEILING**
Visual Meteorological Conditions	Greater than or equal to 3 statute miles	and	Greater than or equal to 1,000 feet above ground level
Marginal Visual Meteorological Conditions	Between 3 and 5 statute miles	and/or	Between 1,000 feet and 3,000 feet above ground level
Instrument Meteorological Conditions	Less than 3 statute miles	and/or	Less than 1,000 feet above ground level

SOURCE: Federal Aviation Administration, Advisory Circular 150/5060-5 (Change 2), *Airport Capacity and Delay*, December 1, 1995.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

During IMC, in-trail separations for arrivals and departures are increased, thus reducing the hourly capacity of the airfield and limiting procedures for aircraft arrivals and departures on parallel runways.

Aircraft Fleet Mix

Aircraft fleet mix is an important factor in determining an airport's airfield capacity. As the diversity of approach speeds and aircraft weights increases, airfield capacity decreases because increased in-trail separation is required to avoid wake vortices or wake turbulence. Turbulence is created behind an aircraft as a result of its movement through the air. Heavier aircraft produce more severe wake turbulence than smaller aircraft. Although more prevalent during departures than arrivals, wake vortices are considered a significant safety hazard during any airborne operation.

To alleviate the hazards of wake vortices, aircraft are spaced according to the differences in air speed and weight. Lighter aircraft are more susceptible to wake vortices than heavy aircraft. Therefore, pilots of light aircraft are typically required to wait up to 2 minutes before operating on a runway following a heavy aircraft. This delay results in decreased airfield capacity. The greater the size and weight differential of the aircraft fleet using a specific runway, the greater the separation required between successive aircraft operations on that runway.

The FAA's *Airport Capacity and Delay* Advisory Circular incorporates a factor referred to as the "mix index" to account for aircraft fleet composition. The mix index is represented as a percentage to quantify the share of large aircraft in the fleet mix. To establish the mix index, aircraft are assigned to one of five classifications based on the maximum certificated takeoff weight (MTOW) of the aircraft. Based on the number of operations in each classification, a percentage is established to quantify the share of total aircraft operations by aircraft types that result in wake turbulence hazards. **Table 4-3** summarizes the weight classifications of the five aircraft categories considered in defining an airport's mix index.

Table 4-3: Aircraft Classifications for Establishing Aircraft Mix Index

AIRCRAFT CLASSIFICATION	MAXIMUM CERTIFICATED TAKEOFF WEIGHT (POUNDS)	REPRESENTATIVE AIRCRAFT
Small	12,500 or less	Piper P23, Cessna C-180, Cessna C-207, King Air
Small+	12,501 to 41,000	Lear 25, Cessna Citation, Grumman G-1
Large	41,001 to 300,000	Gulfstream IV, F-28, Dash 8, Boeing 737, Airbus A320
B757	N/A	Boeing 757-200/300
Heavy	300,001 or more	Airbus A300, Boeing 767, DC-10, Airbus A380, Boeing 747-8

NOTE: NA = Not applicable.

SOURCE: Federal Aviation Administration, Advisory Circular 150/5060-5 (Change 2), *Airport Capacity and Delay*, December 1, 1995.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

Touch-and-Go Operations

Touch-and-go operations are defined as operations by a single aircraft that touches down and departs without stopping on or exiting the runway. Pilots conducting touch-and-go operations are usually conducting training exercises and, thus, stay in the airport traffic pattern. Airfield capacity, in terms of the number of aircraft operations, typically increases as the level of touch-and-go operations increases because aircraft continually approach and depart without incurring significant runway occupancy time. A touch-and-go operation is counted as two operations: one arrival and one departure. However, continuous touch-and-go operations reduce the availability of the runway for other non-training operations or may impede aircraft operations on nearby or intersecting runways. Touch-and-go operations are not common at Dallas Love Field, where the majority of GA activity consists of corporate flights rather than training flights.

Airfield Operating Configurations

As previously discussed, the configuration of the runways can result in a variety of airfield operating configurations. Weather is a primary factor in dictating which operating configuration is used. However, other factors may influence the operating configuration, including the runway length required for departure and arrival and the proximity of obstructions (structures and terrain), other airports, and related airspace.

Aircraft performance characteristics may restrict operations on a runway. For departures, the available runway length must exceed the runway length required for the departing aircraft type. This required runway length includes that required for the takeoff ground roll, to clear an obstruction of a specified height (typically 35 feet above ground level [AGL]), and accelerate-stop distance (to accommodate an aborted takeoff roll). If the available runway length is not adequate, it would be necessary for the aircraft to depart on a runway that provides adequate departure length or reduce its payload. Similarly, the available landing distance on the runway must exceed the landing distance requirements prescribed for the aircraft type and pavement conditions. Otherwise, the aircraft would be required to land on a longer runway.

Aircraft departures may also be restricted by the presence of obstacles. These restrictions are based on the climb performance of the aircraft and the location of the obstacles relative to the departure route of the aircraft. Potential obstructions to the aircraft takeoff and initial departure climb are of particular importance. Aircraft operations conducted under Title 14, Code of Federal Regulations, Part 121 (14 CFR Part 121), *Operating Requirements: Domestic, Flag, and Supplemental Operations,* or under 14 CFR Part 135, *Operating Requirements: Commuter and On-Demand Operations and Rules Governing Persons on Board Such Aircraft,* are subject to the limitations defined by airport obstacle analysis. If an obstacle is identified that would not allow a departing aircraft to meet the minimum obstacle clearance requirements prescribed by the FAA, the departure would not be permitted, restricting the use of the runway and affecting the airfield's operating configuration.

Runway use may also be predicated on regional ATC procedures associated with nearby airports. Neighboring airports often require the shared use of navigational facilities and approach/departure fixes. Strict coordination is required between ATC facilities, and could restrict the capacity of the overall regional airspace system. In some instances, specific operating configurations at one airport may take precedence over the operating configurations at the other, thereby restricting the use of certain operating configurations at the airport that has lower priority. As Dallas Love Field is located 11 miles east of DFW, both airports operate as dictated by the Dallas-Fort Worth TRACON. DAL and DFW usually operate in the same directional flow, but a "reverse flow" situation sometimes occurs to avoid tailwinds at both airports. Although DFW is the larger airport, no constraining dependencies were identified by DAL ATC and, as such, DAL is considered to operate independently of DFW.

4.2.1.2 Existing Airfield Demand/Capacity and Delay Relationships

The estimated existing airfield capacity is expressed in terms of hourly capacity, and hourly capacity and ASV were used to evaluate PALs O1, O2, and O3. For each runway use configuration, hourly capacities were established for operations during VMC, MVMC, and IMC. Historical weather data obtained from the National Climatic Data Center were used to determine the annual runway use configuration during IMC, MVMC, and VMC. A weighted hourly capacity was then established based on the occurrence rate of each runway use configuration/weather condition and the respective hourly capacities. The weighted hourly capacity forms the basis for determining the airfield's ASV.

ASV represents an estimate of the annual number of aircraft operations the Airport can efficiently accommodate taking hourly, daily, and monthly operational patterns into consideration. The formula for calculating ASV consists of three variables: weighted hourly capacity, the ratio of annual demand to average daily demand in the peak month, and the ratio of average daily demand to average peak hour demand during the peak month. These variables are multiplied together to obtain the ASV for the Airport.

FAA AC 150/5060-5 presents the methodology for calculating hourly aircraft delays for a number of conditions that represent the seasonal and daily variations in demand, weather conditions, runway use, and capacity. It is assumed in the methodology that the variations in demand over the year can be characterized by a number of representative daily demands. Different weather conditions and runway uses, as well as hourly runway capacity parameters corresponding to these conditions and uses, are provided as variables in the calculation. Delays are established for each hour of the year using delay curves. The average annual delay per aircraft operation is computed by aggregating the estimated hourly delays.

4.2.1.3 Hourly Airfield Capacity

When hourly demand begins to reach hourly capacity, aircraft delays increase. These delays take the form of extended arrival traffic patterns and departure queue delays in VMC and MVMC, or holding patterns and flow control delays in IMC. As aircraft delays are most prevalent during peak demand periods, the hourly throughput of the airfield was compared with peak hour demand. Peak hour demand that meets or exceeds hourly capacity is likely to result in delays during the peak demand periods. The rate at which an airfield can "recover" from peak period delays depends on the operational profile of activity throughout the day.

4.2.1.4 Current Air Traffic Control Airfield Operating Configurations

In estimating the hourly capacity of the existing airfield, the various runway use configurations and their utilization rates, aircraft fleet mix projections, and probable weather conditions based on historical weather data were considered. As the aircraft fleet mix is expected to evolve throughout the planning period, the hourly capacities associated with existing (2012) operational demand, as well as those estimated for PALs O1, O2, and O3, were identified. These capacities were then compared to the projected peak hour demand to assist in identifying potential operational delays during peak demand periods.

To provide an understanding of the various airfield operating configurations used by ATC, the existing runway configuration at the Airport must be considered. As shown in Section 2, the airfield consists of two parallel runways, Runways 13L-31R and 13R-31L, and one crosswind runway, Runway 18-36, which is currently used as a taxiway. It should be noted that, in this runway demand/capacity analysis, Runway 18-36 is considered decommissioned and was not considered in the capacity calculations. The parallel runways have a lateral centerline-to-centerline separation of approximately 3,000 feet.

With overall lengths of 7,752 feet and 8,800 feet, respectively, Runways 13L-31R and 13R-31L can accommodate any aircraft identified in the current aircraft fleet serving the Airport. The parallel runways primarily accommodate air carrier, regional jet, and corporate general aviation operations.

Exhibit 4-4 shows the percentage of time that each runway operating configuration occurs at the Airport during VMC, MVMC, and IMC, as identified by ATC. The exhibit also shows the prevailing wind direction under which each airfield operating configuration is typically used. The occurrence rate (percent of time) of each operating configuration is based on historical weather observations for the 10-year period between January 1, 2003, and December 31, 2012.

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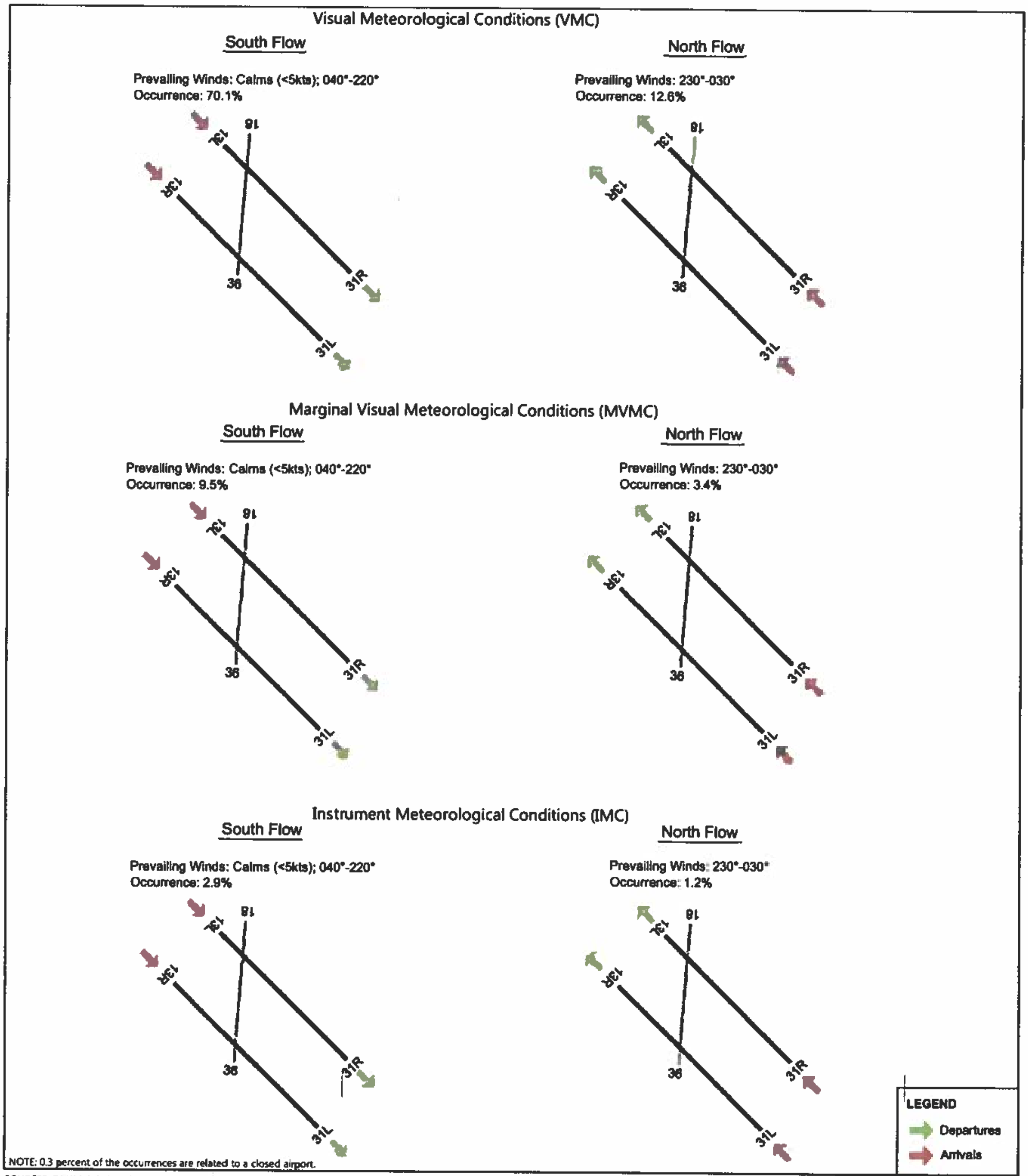

NOTE: 0.3 percent of the occurrences are related to a closed airport.

SOURCES: DMJM Aviation, *Dallas Love Field Airport Impact Analysis and Master Plan*, 2001, Ricondo & Associates, Inc., October 2013.
PREPARED BY: Ricondo & Associates, Inc., October 2013.

EXHIBIT 4-4

NORTH 0 Not to Scale

Runway Use Configurations under Various Weather Conditions

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As illustrated on Exhibit 4-4, two operating configurations are currently used during VMC, MVMC, and IMC. These operating configurations are briefly described below.

- **South Flow:** ATC has identified south flow as the preferred operating configuration at the Airport. This configuration currently yields the greatest airfield capacity, and produces limited airspace impacts with DFW operations.

  During VMC and MVMC, Runways 13L and 13R provide simultaneous arrival and departure capability in South Flow and all operations are independent. The south flow configuration during IMC is similar to its operation during VMC and MVMC. Both runways have a published instrument approach procedure and simultaneous arrivals and departures are permitted. However, arrivals are dependent (i.e., a minimum separation must be maintained between arrivals on both runways during IMC).

  The south flow operating configuration in VMC, MVMC, and IMC is typically used when the prevailing winds are reported from a heading of 040 degrees through 220 degrees. ATC also prefers to use this configuration during calm wind conditions (less than 5 knots) because it yields the greatest capacity and reduces interaction with DFW when DFW is operated in the South Flow configuration. During IMC, the instrument landing system approach procedure for Runway 13R requires a minimum cloud ceiling[1] of 200 feet AGL and a minimum visibility of ¾ mile, while the ILS approach procedure for Runway 13L requires a minimum cloud ceiling of 200 feet AGL and a minimum RVR of 1,800 feet. On that basis, it was estimated that the VMC, MVMC, and IMC South Flow operating configurations occur approximately 70.1 percent, 9.5 percent, and 2.9 percent of the time, respectively.

  It should be noted, however, that during south flow operations, aircraft arrivals on Runways 13R and 13L at DAL require coordination between DAL ATC and DFW ATC to provide adequate separation from DFW aircraft departures. Aircraft departures on DAL Runways 13R and 13L do not require coordination with DFW ATC.

- **North Flow:** When the prevailing winds are reported between 230 degrees and 030 degrees, the north flow operating configuration is used at DAL by ATC during VMC, MVMC, and IMC. During VMC and MVMC, simultaneous arrivals and departures can be accommodated on Runways 31R and 31L. During IMC, similar to the south flow configuration, arrivals are dependent and departures are independent in north flow. The Runway 31L ILS procedure provides the capability to serve aircraft arrivals with a cloud ceiling of 200 feet AGL or greater and an RVR of 1,800 feet, while the Runway 31R ILS procedure provides the capability to serve aircraft arrivals with a cloud ceiling of 200 feet AGL or greater and visibility of ½ mile. On that basis, it was estimated that the VMC, MVMC, and IMC north flow operating configurations occur approximately 12.6 percent, 3.4 percent, and 1.2 percent of the time, respectively.

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[1] The minimum cloud ceiling height for an ILS approach is relative to the touchdown zone elevation of the associated runway. This elevation is defined as the highest centerline elevation within the initial 3,000 feet of the landing portion of the runway.

Consistent with Exhibit 4-4, **Table 4-4** provides a summary of the historical occurrence rates associated with the various airfield operating configurations at the Airport.[2] As indicated, VMC, MVMC, and IMC had occurrence rates of 82.7 percent, 12.9 percent, and 4.1 percent, respectively. The remaining 0.3 percent consists of weather conditions in which the cloud ceiling and/or visibility minimums were below those prescribed for the current instrument approach procedures for the Airport, thus requiring that aircraft operations be discontinued until weather conditions improve.

Table 4-4: Historical Hourly Occurrence of Runway Use Configurations

RUNWAY USE CONFIGURATIONS	VMC	MVMC	IMC	CLOSED
South Flow	70.1%	9.5%	2.9%	NA
North Flow	12.6%	3.4%	1.2%	NA
Airport Closed	NA	NA	NA	0.3%
Total	**82.7%**	**12.9%**	**4.1%**	**0.3%**
			Total Observations:	100.0%

NOTE: NA = Not applicable.

SOURCES: National Climatic Data Center, DAL Surface Hourly Weather Observations (January 1, 2003 – December 31, 2012; 6:00 a.m. to 10:00 p.m.), September 2013; Ricondo & Associates, Inc., September 2013.

PREPARED BY: Ricondo & Associates, Inc., October 2013.

4.2.1.5 Aircraft Fleet Mix Assumptions

Table 4-5 summarizes the VMC/MVMC aircraft fleet mix composition serving the Airport in 2012, and the projected fleet mix throughout the planning period. The table also presents the resulting mix index that formed the basis for estimating the throughput of the airfield. The fleet mix data for 2012 were estimated by evaluating the fleet composition of air carrier, commuter, general aviation, and military aircraft operations. The 2012 fleet mix data were obtained from the DAL Airport Noise and Operations Monitoring System (ANOMS) database for January 1, 2012, through December 31, 2012. The fleet mix data for PALs O1, O2, and O3 were derived from the 2012 design day flight schedule and the forecast of total aircraft operations at each PAL. The increase in operations from one PAL to another was assumed to result from increases in corporate and commercial jet operations. The numbers of other types of aircraft operations were assumed to remain constant.

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[2] National Climatic Data Center, DAL Surface Hourly Weather Observations (January 1, 2003 – December 31, 2012; 6:00 a.m. to 10:00 pm), September 2013.

Table 4-5: Aircraft Fleet Mix Composition during Visual and Marginal Visual Meteorological Conditions

	SMALL	SMALL+	LARGE	BOEING 757	HEAVY	TOTAL	MIX INDEX 1/
2012	18.5%	18.9%	62.4%	0.1%	0.1%	100.0%	81.8%
PAL O1	17.0%	19.2%	63.6%	0.1%	0.1%	100.0%	83.3%
PAL O2	16.8%	19.2%	63.8%	0.1%	0.1%	100.0%	83.5%
PAL O3	15.3%	19.6%	64.9%	0.1%	0.1%	100.0%	85.0%

NOTE:

1/ Mix Index = (Percent of "Small+" Aircraft) + (Percent of Large Aircraft) + (2 * Percent of Boeing 757 Aircraft) + (3 * Percent of Heavy Aircraft).

SOURCES: Dallas Love Field, Airport Noise and Operations Monitoring System Database, January 1, 2012 - December 31, 2012 (accessed in September 2013); Ricondo & Associates, Inc., September 2013.
PREPARED BY: Ricondo & Associates, Inc., October 2013.

As shown in Table 4-5, the mix index associated with 2012 operations was estimated at 81.8 percent under VMC/MVMC. Only small variations in the fleet mix are anticipated throughout the planning period, resulting in a PAL O3 mix index of 85.0 percent.

Similarly, **Table 4-6** presents the IMC aircraft fleet mix composition serving the Airport in 2012 and the projected aircraft fleet mix at PALs O1, O2, and O3. The IMC aircraft fleet mix composition was derived from the VMC fleet mix composition, assuming a 50 percent reduction in small piston and turboprop aircraft operations during IMC. Accordingly, the IMC mix index is projected to increase from its 2012 level of 86.5 percent to 88.5 percent at PAL O3.

Table 4-6: Aircraft Fleet Mix Composition during Instrument Meteorological Conditions

	SMALL	SMALL+	LARGE	BOEING 757	HEAVY	TOTAL	MIX INDEX 1/
2012	13.8%	20.0%	66.0%	0.1%	0.1%	100.0%	86.5%
PAL O1	12.9%	20.2%	66.7%	0.1%	0.1%	100.0%	87.4%
PAL O2	12.7%	20.2%	66.9%	0.1%	0.1%	100.0%	87.6%
PAL O3	10.9%	20.5%	67.5%	0.1%	0.1%	99.1% 2/	88.5%

NOTES:

1/ Mix Index = (Percent of "Small+" Aircraft) + (Percent of Large Aircraft) + (2 * Percent of Boeing 757 Aircraft) + (3 * Percent of Heavy Aircraft).

2/ Because of rounding, the percentages do not add to 100 percent.

SOURCES: Dallas Love Field, Airport Noise and Operations Monitoring System Database, January 1, 2012 - December 31, 2012 (accessed in September 2013); Ricondo & Associates, Inc., September 2013.
PREPARED BY: Ricondo & Associates, Inc., October 2013.

4.2.1.6 Hourly Capacity

Table 4-7 presents the VMC/MVMC and IMC hourly capacity estimates for the operating configurations considered (existing airfield during South Flow and North Flow). It should be noted that, for the purpose of evaluating airfield capacity, the demand/capacity analysis was focused on the hourly capacity estimates for 50 percent arrivals and 50 percent departures. This split is reasonable for airfields, such as Dallas Love Field, that accommodate balanced and sustained activity at peak times.

Table 4-7: Existing and Projected Airfield Configuration Hourly Capacity

	VMC/MVMC		IMC	
SOUTH AND NORTH FLOW CONFIGURATIONS	**MIX INDEX**	**HOURLY CAPACITY (50% ARRIVALS)**	**MIX INDEX**	**HOURLY CAPACITY (50% ARRIVALS)**
Existing (2012)	81.8%	108	86.5%	83
PAL O1	83.3%	105	87.4%	83
PAL O2	83.5%	104	87.6%	84
PAL O3	85.0%	103	88.5%	85

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, December 1, 1995; Ricondo & Associates, Inc., October 2013.
PREPARED BY: Ricondo & Associates, Inc., October 2013.

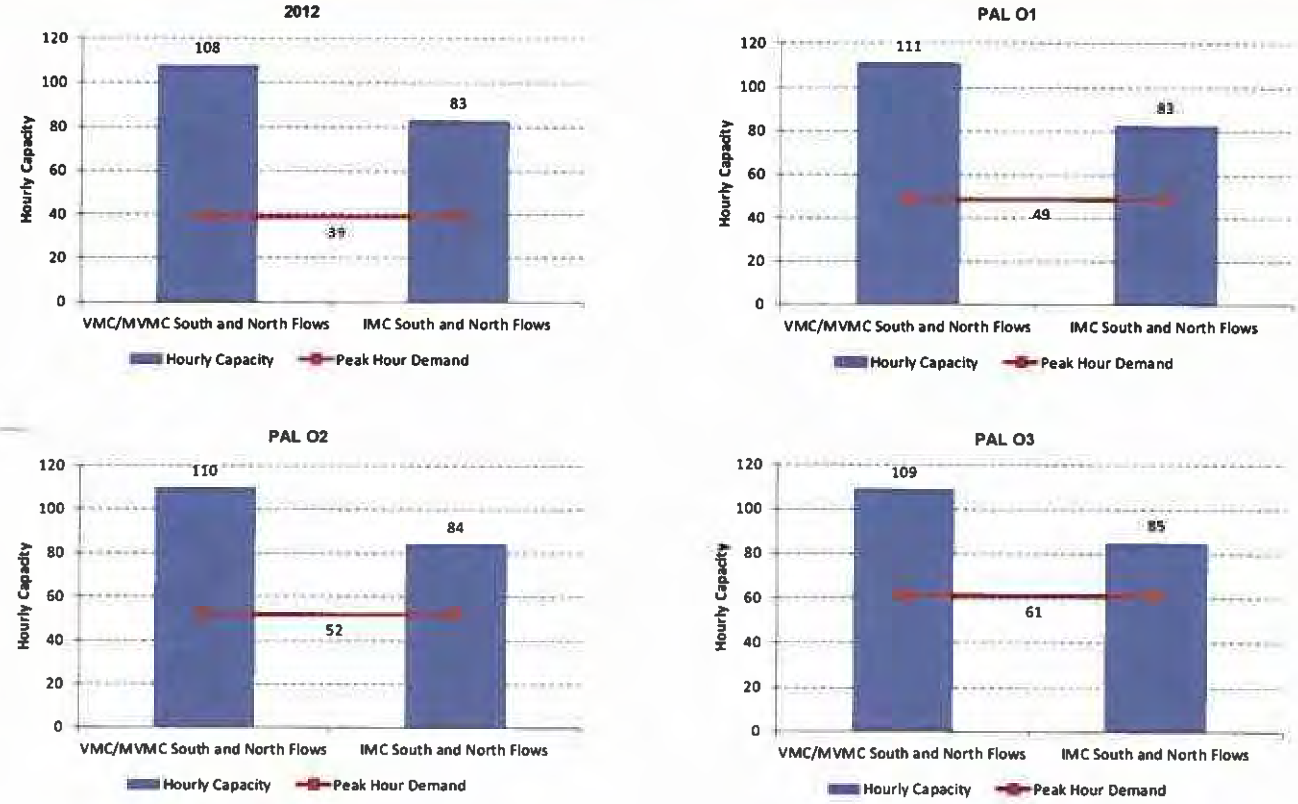
Assuming a 50 percent arrivals mix, the existing (2012) VMC/MVMC hourly capacity was 108 operations for South Flow and North Flow configurations. Although the mix index is projected to increase from 81.8 percent in 2012 to 85.0 percent at PAL O3, it would have a negligible effect on the airfield's hourly capacity.

As expected, the IMC hourly capacity is lower than the VMC/MVMC hourly capacity. This reduction is caused by a variety of factors, including (1) an increase in the mix index, (2) increased separation requirements between successive aircraft operations, and (3) the dependency of simultaneous arrivals on the parallel runways in IMC. Assuming a 50 percent arrivals mix, the IMC hourly capacity was 83 operations in 2012 for South Flow and North Flow operations. Similar to the results for VMC/MVMC conditions, the IMC hourly capacity is projected to remain relatively constant, numbering 85 operations at PAL O3, as the mix index increases from 86.5 percent to 88.5 percent.

4.2.1.7 Hourly Demand/Capacity Comparisons

Exhibit 4-5 presents a comparison of the hourly capacity estimates at the Airport associated with VMC/MVMC and IMC for 2012 and PALs O1, O2, and O3 assuming an arrivals mix of 50 percent. As shown on Exhibit 4-5, the peak hour aircraft demand is projected to increase from 39 operations in 2012 to 49, 52, and 61 operations at PALs O1, O2, and O3, respectively. The peak hour demand would not exceed the hourly airfield capacity in any of the runway operating configurations at any PAL considered in this analysis.

Exhibit 4-5: Hourly Airfield Demand/Capacity Comparison – Existing Airfield



NOTES:

1/ The peak hour demand is the average number of operations during the peak hour of the peak month.

2/ The analysis assumes 50 percent arrivals.

SOURCES. Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, December 1, 1995; Ricondo & Associates, Inc., October 2013
PREPARED BY: Ricondo & Associates, Inc., October 2013

Annual Service Volume

The peak hour airfield capacity for the Airport forms the basis for establishing the ASV of the current airfield. The ASV is then compared with the annual aircraft operational demand associated with PALs O1, O2, and O3. If annual demand exceeds the ASV of the airfield, delays would increase exponentially. To minimize aircraft delays, the FAA recommends that planning for additional airfield capacity commence when the airfield's annual demand reaches 60 to 75 percent of the ASV.[3] Identification of the demand level at which this would occur requires the quantification of annual demand expressed as a share (percent) of ASV. **Table 4-8** presents this comparison for the operational demand experienced in 2012, and for demand projected at PALs O1, O2, and O3. The table also presents annual demand expressed as a percentage of ASV, as well as estimated peak hour demand.

Table 4-8: Comparison of Annual Demand (Operations) and Annual Service Volume

	AIRFIELD CAPACITY AND DEMAND CHARACTERISTICS (NUMBER OF OPERATIONS)			
CAPACITY/DEMAND METRIC	**2012**	**PAL O1**	**PAL O2**	**PAL O3**
Estimated Peak Hour Demand	39	49	52	61
Annual Service Volume	404,000	366,000	364,000	364,000
Annual Demand	177,067	200,000	210,000	245,000
Annual Demand/Annual Service Volume	43.8%	54.6%	57.7%	67.3%

SOURCES: Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, December 1, 1995; Ricondo & Associates, Inc., November 2013.
PREPARED BY: Ricondo & Associates, Inc., November 2013.

As shown, the ASV at the Airport in 2012 was estimated at 404,000 operations, while actual annual demand was 177,067 operations. As a result, annual demand in 2012 accounted for 43.8 percent of the ASV. Annual demand is anticipated to be lower than 60 percent of the ASV at PALs O1 and O2; therefore, planning for additional airfield capacity is not anticipated to be required during the planning period for this Master Plan Update. At PAL O3, annual demand is anticipated to account for 67.3 percent of the ASV; therefore, planning for additional airfield capacity may be warranted between PALs O2 and O3.

Airfield Delay

For long-range planning, FAA AC 150/5060-5 uses a general demand versus capacity comparison to estimate average delay associated with an airfield. For purposes of this analysis, the ratio of annual demand to the airfield's ASV serves as the basis for developing these delay estimates. The delay estimates provide the basis for justifying capacity improvements, as they demonstrate the true operational consequences associated with

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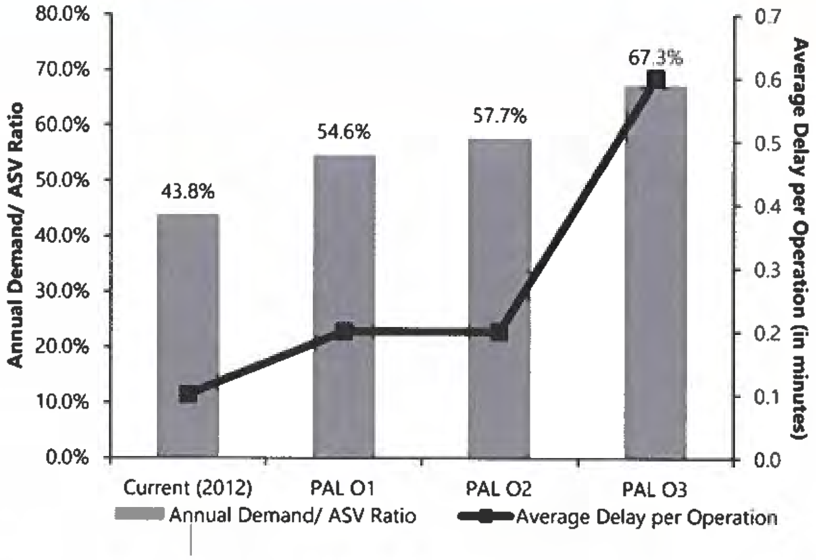
[3] Federal Aviation Administration, Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, December 4, 2000.

demand exceeding airfield capacity.

It should be noted that the delay estimates contained in AC 150/5060-5 reflect delays associated with runways only. Additional delays associated with local airspace constraints, aircraft taxiing operations, and gate occupancies are not considered. These other components of delay cannot be reasonably quantified without the use of advanced airfield and airspace simulation tools. As the delay estimates presented herein reflect delay associated with the runway components exclusively, the generally accepted maximum allowable delay per operation is 4.0 minutes. On that basis, airfield capacity enhancements should be implemented prior to reaching or exceeding this delay threshold.

Exhibit 4-6 graphically presents this relationship for demand forecast through PAL O3. The forecast increase in annual demand is compared with the ASV projections through PAL O3, and the resulting delay values, in terms of average delay per aircraft operation, are superimposed. As shown, the average aircraft delay experienced in 2012 was approximately 0.1 minute per operation, which is well below the FAA criterion for generally accepted delay of 4.0 minutes per operation (runway component only). As annual demand increases and the ASV decreases, the average delay per aircraft operation would increase to 0.6 minute per operation at PAL O3. Therefore, no additional airfield capacity would be required between 2012 and PAL O3.

Exhibit 4-6: Relationships of Demand, Capacity, and Delay



SOURCES: Federal Aviation Administration, Advisory Circular, 150/5060-5, *Airport Capacity and Delay*, December 1, 1995; Ricondo & Associates, Inc., December 2013

PREPARED BY: Ricondo & Associates, Inc., December 2013.

Existing Airfield Demand/Capacity Conclusions

The demand/capacity analysis for the airfield determined that the existing runway configuration is adequate to accommodate current and forecast operational demand at the Airport, even during peak demand periods. Average delay in 2012 was estimated to be 0.1 minute (6 seconds) per aircraft operation. This delay is expected to increase to nearly 0.6 minute (36 seconds) per aircraft operation at PAL O3. As DAL is a medium-hub airport, an average delay of 4.0 minutes per aircraft operation is typically the threshold of unacceptable delay throughout the airline industry. On that basis, the capacity of the existing airfield is adequate to accommodate forecast demand through PAL O3; therefore, no airfield capacity enhancements nor planning for additional airfield capacity are necessary within the planning period for this Master Plan Update.

4.2.2 AIRFIELD REQUIREMENTS

Although the airfield demand/capacity analysis concluded that the current airfield is adequate to accommodate operational demand forecast through the planning period, enhancements to the airfield may be warranted to ensure safe and efficient operations. The overall airfield was assessed to determine its ability to accommodate the projected aircraft fleet mix, while also complying with the FAA's airfield design standards. The following airfield components were assessed:

- **Runway system:** In addition to the physical configuration of the runways (pavement length and width), the various runway protection surfaces were reviewed. These protection areas include the RSA, ROFA, obstacle free zone (OFZ), and runway protection zone (RPZ).
- **Taxiway system:** The lateral separations from adjacent runways, taxiways, and taxilanes; pavement geometry; and taxiway OFAs were evaluated. Particular emphasis was placed on the FAA's latest guidelines intended to enhance situational awareness and reduce the potential for runway incursions.
- **Airfield lighting and signage systems:** Runway and taxiway edge lighting, approach lighting systems, visual approach guidance systems, and airfield signage were reviewed.

The airfield assessment was based on the airfield design standards prescribed under FAA AC 150/5300-13A (Change 1), *Airport Design*, as well as other supporting ACs and interim FAA guidance. Potential enhancements identified by ATC and Department of Aviation staff were also considered. However, the local airspace structure was not assessed to determine potential obstructions or hazards to air navigation.

4.2.2.1 Airfield Design Standards

The planning and design of an airport and its airfield facilities are predicated on the aircraft types using the airport. Airfield facilities must comply with planning and design standards, such as those set forth in FAA AC 150/5300-13A (Change 1), for runway and taxiway widths and clearances to ensure that the range of aircraft projected to operate at the Airport can be accommodated. These airfield standards are typically dictated by the physical and operational characteristics of the aircraft that operate at the airport in terms of wingspan, approach speed, weight, and configuration of the landing gear. To facilitate the appropriate correlation of airfield design standards with the physical and operational characteristics of the aircraft fleet, the FAA has established the design classifications discussed in the paragraphs below.

Airport Reference Code

The Airport Reference Code is used to relate airport design criteria to the operational and physical characteristics of the aircraft intended to operate at an airport, and is calculated based on specifications in AC 150/5300-13A. The ARC has two components: the first component, represented by a letter, is the Aircraft Approach Category, which is defined by aircraft approach speed,[4] as follows:

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

The second component of the ARC, represented by a Roman numeral, is the Airplane Design Group, which is determined by aircraft wingspan, as follows:

- **ADG I:** Wingspan less than 49 feet (e.g., Piper PA-48, Learjet 35).
- **ADG II:** Wingspan of 49 feet up to, but not including, 79 feet (e.g., Cessna Citation II, Saab 340).
- **ADG III:** Wingspan of 79 feet up to, but not including, 118 feet (e.g., Boeing 737, MD-80, Airbus A320 family).
- **ADG IV:** Wingspan of 118 feet up to, but not including, 171 feet (e.g., A300, Boeing 757, A310).
- **ADG V:** Wingspan of 171 feet up to, but not including, 214 feet (e.g., Boeing 747, Boeing 777, A330, A340).
- **ADG VI:** Wingspan of 214 feet up to, but not including, 262 feet (e.g., A380).

An aircraft's approach speed translates into time and distance factors, which identify criteria for runways and runway dimensional clearances. The aircraft's wingspan is indicative of an aircraft's weight and physical size. These factors dictate requirements for pavement strength and separation from other pavement or structures.

Runway Design Codes and Taxiway Design Groups

The FAA recently established a Runway Design Code (RDC) and a Taxiway Design Group (TDG), which establish the design standards for specific runways and taxiways, respectively. The RDC is described by the same parameters as the ARC (AAC and ADG) and serves to establish the same runway design criteria as the ARC. The TDG is a classification of aircraft based on the configuration of landing gear. The TDG is dependent on the width of the main landing gear and the distance from the cockpit to the main landing gear. Whereas

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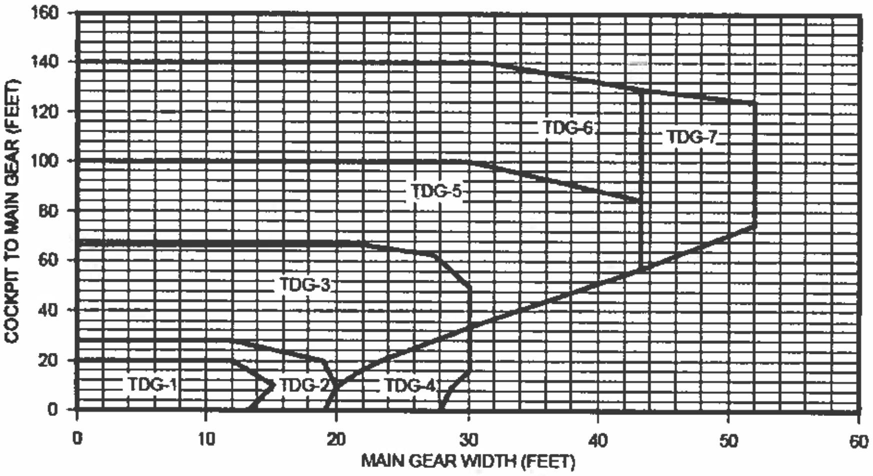
[4] AC 150/5300-13A, *Airport Design*, defines an aircraft's approach speed as 1.3 times its stall speed at that aircraft's maximum certificated landing weight.

the ADG establishes criteria for taxiway separations and OFA dimensions, the TDG determines taxiway pavement geometry. There are seven TDGs, which are described graphically on **Exhibit 4-7**.

Exhibit 4-7: Taxiway Design Groups



SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design* (Change 1), February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Dallas Love Field Application

The ARC for DAL is currently C-III, indicating that Runways 13L-31R and 13R-31L, their associated taxiways, and their safety areas should meet ARC C-III FAA design standards to adequately accommodate regular operations of aircraft with approach speeds between 121 and 141 knots and wingspans up to, but not including, 118 feet. The crosswind runway (Runway 18-36) is designated as RDC B-II, but is currently used as a taxiway. All taxiways, except Taxiways E, G, and W, which are classified as TDG 4, are designated TDG 5 and should meet TDG 5 FAA design standards. TDG 5 is the largest TDG associated with ADG III aircraft.

The Airport currently accommodates a wide variety of aircraft operations. Based and itinerant general aviation aircraft include small single-engine and multi-engine aircraft (ARCs A-I and B-I) and corporate turboprops and jets (ARCs B-II, C-I, and C-II). Most commercial operations are currently provided by air carrier jet aircraft, such as the Boeing 737-700, 737-300, and 737-500, which are all ARC C-III. Additionally, one Boeing 767 (ARC D-IV[5]) and two Boeing 757s (ARC D-IV[6]) are based at the Airport. Other large aircraft operate at the Airport infrequently and include some widebody aircraft, such as Boeing 747 (ARC D-V).

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[5] Applies to the version of the Boeing 767 with the highest ARC.

[6] Applies to the version of the Boeing 757 with the highest ARC.

As part of the Master Plan Update planning process, the current ARC for the Airport was re-evaluated pursuant to FAA guidance specifying that airport dimensional standards should be selected for the critical (or design) aircraft, defined as the most demanding aircraft, in terms of size and approach speed, that will make substantial use of the Airport during the planning period. According to FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport System (NPIAS)*, "substantial use" means either 500 or more annual itinerant operations or scheduled commercial service. The most demanding aircraft in terms of size and approach speed that is currently making substantial use of the Airport is the Boeing 737-700, which is ARC C-III. However, based on the recent orders of Boeing 737-800 aircraft by Southwest Airlines and on the long-term design day flight schedule developed for the Master Plan Update, the most demanding aircraft, in terms of design standards, projected to make substantial use of the Airport over the planning period is the Boeing 737-800, or equivalent (ARC D-III). Although other larger aircraft operate at DAL, such as the Boeing 757 and Boeing 767 (ARC D-IV for their most demanding versions), their operational demand is limited and projected to remain under 500 annual operations. Therefore, it is recommended that the Airport's ARC be changed from C-III to D-III to account for the projected increase in Boeing 737-800 operations over the planning period. To accommodate ARC D-IV aircraft without operational restrictions, the airfield would need to be configured to meet ARC D-IV dimensional and design standards. However, the limited number of operations of this aircraft type does not warrant an ARC change to D-IV. Therefore, in subsequent assessments of facility requirements, the current airfield's ability to comply with ARC D-III standards will be assessed and protection of the taxiway OFA requirements to support ARC D-IV aircraft will be considered along the typical taxiing routes used by ARC D-IV aircraft.

4.2.2.2 Runway System

The ability of the existing runway system at DAL to accommodate the projected aircraft fleet mix is discussed in this subsection. The runway system consists of the runway pavement, shoulders, blast pads, RSA, OFA, OFZ, and RPZ. As the City plans to permanently decommission Runway 18-36 and convert it to a taxiway, the evaluation of DAL's runway system was focused exclusively on Runways 13L-31R and 13R-31L.

Runway Length and Width

Runway 13L-31R is 7,752 feet long and Runway 13R-31L is 8,800 feet long. Based on current performance capabilities of the most common large aircraft operating at the Airport (Boeing 737-700/800), the current runway lengths are adequate to serve all domestic U.S. markets. If international service is initiated at DAL, extended range versions of these aircraft types have the capability to serve all of Central America, the Caribbean, and Canada when departing on Runway 13R-31L. The northern extents of South America, such as Colombia, Venezuela, and Ecuador, could be served nonstop with the Boeing 737-700 and Boeing 737-800 aircraft. Therefore, the extension of Runway 13L-31R or 13R-31L is not warranted to serve the current and potential destination markets from the Airport.

Runway Design Criteria

The FAA-recommended runway design criteria for RDC D-III and D-IV are presented in **Table 4-9**, along with existing runway characteristics at the Airport. With the exception of the blast pads associated with Runways 13L, 13R, and 31L, the existing runways at the Airport comply with recommended design criteria for RDC D-III and D-IV. Although there is no record of any modifications to design standards associated with the blast pads, they are respectively 15 feet, 3 feet, and 2 feet shorter than the minimum length of 200 feet prescribed in FAA's design standards for an RDC D-III runway.

Table 4-9: FAA Runway Design Criteria Compliance Summary

RUNWAY DESIGN ELEMENTS	CURRENT CONFIGURATION (FEET)	RDC D-III / D-IV DESIGN CRITERIA (FEET)
Runway Width	150	150
Runway Shoulder Width	25	25
Runway Blast Pad (width/length)		
Runway 13L	200 / 185	200 / 200
Runway 31R	200 / 197	200 / 200
Runway 13R	200 / 200	200 / 200
Runway 31L	198 / 200	200 / 200

NOTE: RDC = Runway Design Code.

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design* (Change 1), February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Lateral Runway Separation Criteria

As shown in **Table 4-10**, the lateral separations between the runways and their associated taxiways meet or exceed the lateral separation requirements for both ARC D-III and D-IV. The lateral separation between the runways and the adjacent apron areas is also adequate.

Table 4-10: FAA Lateral Runway Separation Compliance Summary

RUNWAY DESIGN ELEMENTS	CURRENT CONFIGURATION (FEET)	ARC D-III /D-IV (FEET)
Runway Centerline to Taxiway Centerline between:		
Runway 13R-31L and Taxiway C	400	400
Runway 13L-31R and Taxiway B	552 1/	400
Runway 13L-31R and Taxiway A	400	400
Aircraft Parking Area between:		
Runway 13L-31R and the Apron East of Taxiway A	550 2/	500
Runway 13L-31R and the Apron West of Taxiway B	645 3/	500

NOTES: ARC = Airport Reference Code.

1/ At the closest point on Taxiway B to Runway 13L-31R

2/ At the closest point on the western edge of the vehicle service road of the apron east of Taxiway A.

3/ At the closest point on the eastern edge of the vehicle service road of the apron west of Taxiway B.

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design* (Change 1), February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Pavement Strength

In accordance with FAA AC 150/5320-6D, *Airport Pavement Design and Evaluation*, the runway pavement must be able to support frequent operations of the aircraft types that currently operate at the Airport, as well as aircraft projected to operate at the Airport in future years. In general, runway pavement strength can be expressed in terms of its load-bearing capacity under single wheel, dual wheel, dual tandem wheel, and double dual tandem wheel loading. The aircraft landing gear type and configuration dictate how aircraft weight is distributed on the pavement and determine pavement response to loading. Examination of gear configuration, tire contact areas, and tire pressure indicates that pavement strength is related to aircraft MTOW.

The load bearing capacities of Runways 13L-31R and 13R-31L are 100,000 pounds for aircraft equipped with single wheel landing gear, 200,000 pounds for aircraft equipped with dual wheel landing gear, and 350,000 pounds for aircraft equipped with dual tandem wheel landing gear. Aircraft with single wheel landing gear projected to use the Airport on a regular basis include primarily single- and multi-engine GA aircraft, including some business jets. These aircraft generally have an MTOW of less than 60,000 pounds, which is less than the load bearing capacity of Runways 13R-31L and 13L-31R for single wheel landing gear.

The largest aircraft with dual wheel landing gear projected to use the Airport on a regular basis through the planning period is the Boeing 737 (or equivalent). This landing gear configuration is common for other narrowbody aircraft, such as all variants of the A319 and A320. Nearly all aircraft in this group have an MTOW of less than 200,000 pounds; both Runways 13R-31L and 13L-31R can support the pavement loading imposed by aircraft currently using and projected to use the runways throughout the planning period. No aircraft with dual tandem landing gear are projected to use the Airport on a regular basis through the planning period.

No enhancement of pavement strength should be required for either runway through the planning period, given the aircraft types projected to operate at the Airport. It should be noted that pavement design typically allows for aircraft weighing more than the design pavement strength to operate occasionally on the pavement. This is of particular importance for large fire-fighting tankers or other aircraft that occasionally use the Airport with weight and gear configurations that exceed the identified load bearing capacity of the runway.

4.2.3 RUNWAY PROTECTION AREA CRITERIA

The FAA's design standards for the various airfield safety and protection areas, as they relate to the Airport, are presented in this subsection. These areas were introduced in Section 2 and are illustrated on the Airport Layout Plan (ALP) set. Airfield safety and protection areas evaluated for the Airport include RSAs, ROFAs, OFZs and RPZs.

4.2.3.1 Runway Safety Areas

RSAs are rectangular areas centered on runway centerlines, which, under normal (dry) conditions, are capable of supporting the occasional passage of an aircraft without causing structural damage to the aircraft or injury to its occupants if an aircraft were to inadvertently leave the paved runway surface. To serve this function, the FAA requires RSAs to be (1) cleared and graded, (2) drained by grading or storm sewers to prevent water accumulation, (3) capable, under dry conditions, of supporting snow removal and ARFF equipment, and (4) free of objects, except those that need to be located in the RSA because of their function (e.g., approach lighting).

Based on FAA design criteria for RDC D-III, the RSAs for Runways 13L-31R and 13R-31L should be 500 feet wide (i.e., 250 feet on either side of the runway centerline) and extend 1,000 feet beyond the runway ends. These criteria are also applicable to runways with an RDC of D-IV. Currently, the RSAs for both runways meet the applicable design criteria.

4.2.3.2 Runway Object Free Areas

ROFAs are rectangular areas centered on runway centerlines that are required to be clear of objects protruding above the RSA edge elevation, with the exception of those objects that are essential to air navigation or aircraft ground maneuvering.

For ARC D-III runways (Runways 13L-31R and 13R-31L), ROFAs must be 800 feet wide (i.e., extending 400 feet on either side of the runway centerline) and extend 1,000 feet beyond the runway ends. The ROFA length beyond the end of the runway does not exceed the standard RSA length beyond the runway end. All runways at the Airport meet the ROFA design criteria. These criteria are also applicable to runways with an RDC of D-IV.

4.2.3.3 Obstacle Free Zones

An OFZ is a volume of airspace centered on a runway centerline below 150 feet above the established airport elevation that is required to be clear of all objects, except for frangible navigational aids that need to be located in the OFZ because of their function. The OFZ provides clearance protection for aircraft arrivals, departures, and missed approaches.

The OFZ is intended to protect an aircraft's transition from the ground to airborne operations (and vice versa). Airports with non-precision instrument approach procedures are only required to comply with the runway component of the OFZ criteria, while airports with precision instrument approach procedures or approach lighting systems are required to comply with additional requirements. FAA criteria prohibit taxiing, parked aircraft, and object penetrations within OFZs, except for frangible navigational aids with fixed locations. Applicable elements of the Airport's OFZ are described as follows:

- **Runway OFZ:** In general, the required runway OFZ is typically 400 feet wide for runways serving large aircraft, and all OFZs extend 200 feet beyond the runway ends. All runways at the Airport meet these runway OFZ design criteria.
- **Inner-approach OFZ:** The inner-approach OFZ is a volume of airspace centered on the approach area that applies only to runways equipped with approach lighting. Therefore, the inner-approach OFZ applies to Runways 13L, 31R, and 31L. The inner-approach begins 200 feet from the runway threshold and extends 200 feet beyond the last unit in the approach lighting system. It has the same width as the runway OFZ and rises at a slope of 50:1 away from the runway end. Any objects that penetrate the inner-approach OFZ are listed on the Airport Obstruction Chart.

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- **Inner-transitional OFZ:** The inner-transitional OFZ is a defined volume of airspace along the sides of the runway and inner-approach OFZ. It applies only to runways with lower than ¾ statute-mile approach visibility minimums. Runways 13L, 31R, and 31L have approaches with visibility minimums lower than ¾ statute mile. Therefore, these runways are subject to inner-transitional OFZ object clearance restrictions. Any objects that penetrate the inner-transitional OFZ are listed on the Airport Obstruction Chart.

Analysis of the runway OFZ, inner-approach OFZ, and inner-transitional OFZ, which constitute the OFZ, did not reveal any penetrations of the OFZ surfaces or other OFZ impacts. Therefore, the Airport currently meets the OFZ requirements for both ARC D-III and D-IV.

4.2.3.4 Runway Protection Zones

The RPZ is a trapezoidal area centered on the extended runway centerline. The length and width of the RPZ are contingent on the size of aircraft operating on the runway, as well as the type of approach (i.e., visual or instrument) and the available approach minimums. RPZs are designed to enhance the protection of people and property on the ground. To achieve this goal, the FAA recommends that the airport operator own or otherwise control the property in the RPZ. This area should be free of land uses that create glare and smoke. Additionally, the FAA recommends that airport operators keep the RPZs clear of incompatible land uses, specifically residences, fuel storage facilities, and places of public assembly (e.g., churches, schools, office buildings, and shopping centers). Typically, a single RPZ is associated with each runway end. However, the FAA has suggested that separate approach and departure RPZs be defined for any runway end with a displaced arrival threshold. Runways 13L and 13R have displaced thresholds of 400 feet and 490 feet, respectively. Therefore, both approach and departures RPZs were evaluated for these two runway ends.

The FAA provides dimensional criteria for RPZs that are based on the lowest runway approach visibility minimums and the AAC associated with each runway. Approach and departure RPZ dimensions, respectively, for each runway end are presented in **Table 4-11** and **Table 4-12**.

Table 4-11: Approach Runway Protection Zone Dimensions

RUNWAY	VISIBILITY MINUMUMS	INNER WIDTH (FEET)	OUTER WIDTH (FEET)	LENGTH (FEET)	DISTANCE FROM THRESHOLD (FEET)
13L	1,800 feet	1,000	1,750	2,500	200
31R	½ mile	1,000	1,750	2,500	200
13R	¾ mile	1,000	1,510	1,700	200
31L	1,800 feet	1,000	1,750	2,500	200

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design* (Change 1), February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 4-12: Departure Runway Protection Zone Dimensions

RUNWAY	VISIBILITY MINIMUMS	INNER WIDTH (FEET)	OUTER WIDTH (FEET)	LENGTH (FEET)	DISTANCE FROM THRESHOLD (FEET)
13L	1,800 feet	500	1,010	1,700	200
13R	¾ mile	500	1,010	1,700	200

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design* (Change 1), February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

Currently, the RPZs do not fall within the Airport property boundary and these areas have noncompatible land uses. As shown in **Table 4-13** and on **Exhibit 4-8**, commercial development is located within the boundaries of all four RPZs. Additionally, residential properties are located within the RPZs for Runways 13R and 31R, while some industrial land use is located within the RPZ for Runway 31L. In addition, several roads encroach on these RPZs. An avigation easement has been granted for the Runway 13R medium intensity approach lighting system with runway alignment indicator lights (MALSR), but most of the property within the RPZs is currently not controlled by the Department of Aviation. According to the FAA's *Memorandum regarding Interim Guidance on Land Uses within a Runway Protection Zone,*[7] public roads, residential areas, and buildings, such as industrial buildings, should not be located within an RPZ and the FAA recommends that "airport sponsors take all possible measures to protect against and remove or mitigate incompatible land uses."

Table 4-13: Roads and Area Uses Located within the Runway Protection Zones

RUNWAY END	ROADS ENCROACHING ON RPZ	USE OF AREA WITHIN RPZ
13L	Northwest Highway, Shorecrest Drive, Bachman Lake Park	Mostly commercial
31R	Airdrome Drive, Lemmon Avenue, and Mockingbird Lane	Residential and commercial
13R	Bachman Lake Park, Shorecrest Drive	Residential and commercial
31L	Mockingbird Lane, Herb Kelleher Way/Cedar Springs Road, Denton Drive	Mostly commercial and industrial

SOURCES: Google Earth Pro (accessed January 2014); AirOps, LLC, January 2014.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

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[7] Memorandum published by the FAA Office of Airport Planning and Programming on September 27, 2012.

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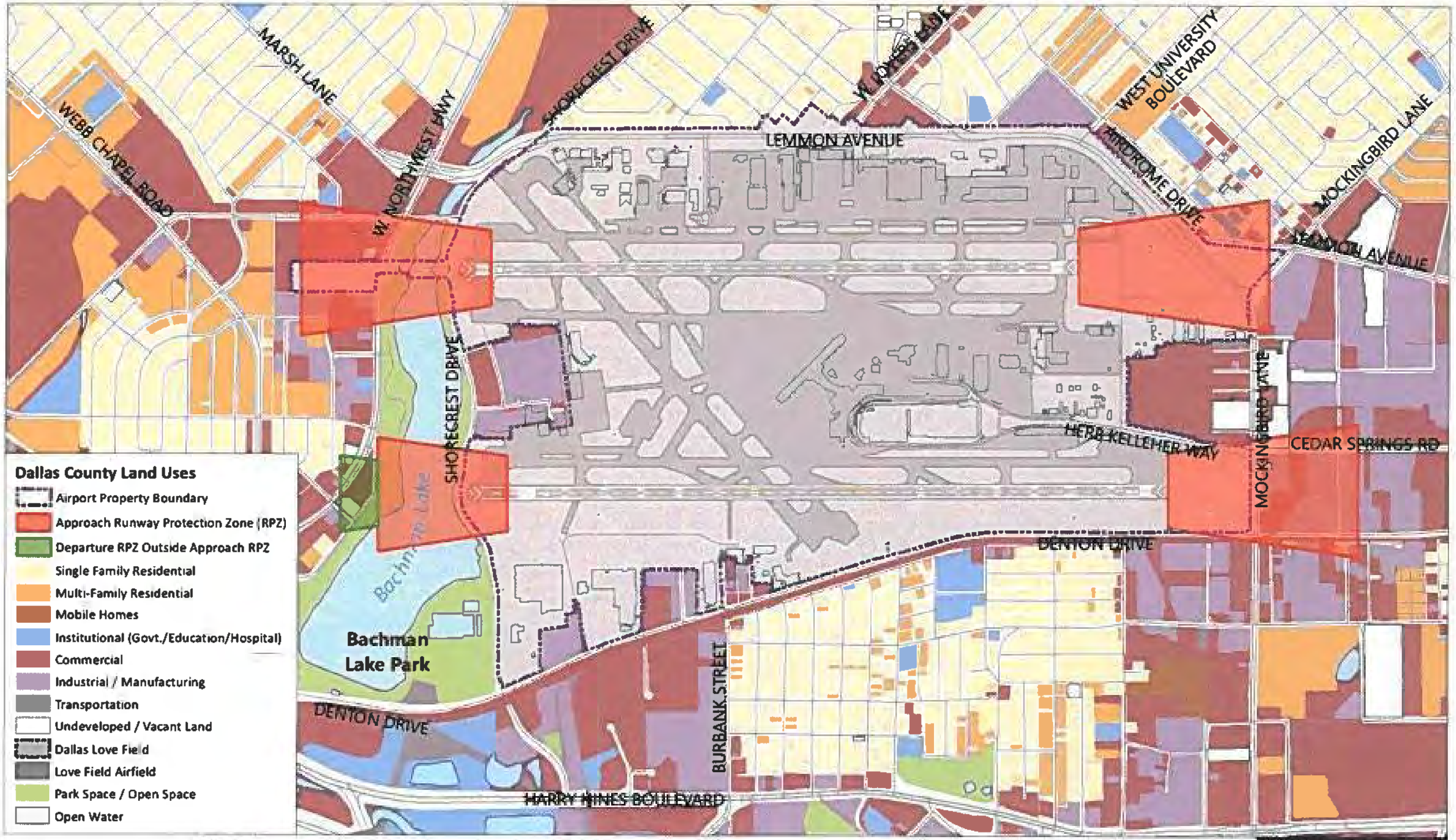

SOURCE: North Central Texas Council of Governments, GIS Clearinghouse, June 2010; City of Dallas, GIS Services, 2013 Certified Tax Parcel Coverage, accessed online: http://gis.dallascityhall.com/EnterpriseGIS, August 2014
PREPARED BY: Ricondo & Associates, Inc., January 2015.

EXHIBIT 4-8

NORTH 0 2,000 ft.

Developments within Runway Protection Zones

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4.2.4 TAXIWAY SYSTEM

This section documents the ability of the taxiway system at DAL to accommodate the existing and projected aircraft fleet mix. The airfield's taxiway system consists of the taxiway pavement shoulders, taxiway safety area, and taxiway OFA. A review of runway exit taxiways and other runway crossings to ensure compliance with the FAA's runway incursion mitigation initiatives set forth in AC 150-5300-13A is also discussed.

4.2.4.1 Taxiway Design Criteria

As previously discussed, taxiway pavement widths and fillet geometry standards are dictated by TDG standards. The most common aircraft operating at the Airport is the Boeing 737, which dictates TDG 3 standards. However, several other ADG III aircraft types operate at DAL and are classified as TDG 5. Among those aircraft, the MD-87 and MD-90 are classified as TDG 5. TDG 5 also applies to some ADG IV aircraft, including the Boeing 757 and Boeing 767, which are the two ADG IV aircraft based at the Airport. Therefore, this analysis was focused on TDG 5 design standards and evaluation of the existing airfield for compliance with those standards.

With the exception of Taxiways E, G, and W, which are 50 feet wide, all other taxiways at DAL are 75 feet wide and meet FAA width requirement for TDG 5. The lateral separation between the Taxiway P and Q centerlines of 152 feet meets ADG III standards, but is less than ADG IV requirements (lateral separation of 215 feet between parallel taxiways). All 75-foot-wide taxiways comply with TDG 5 edge safety margin requirements and shoulder requirements. Further analysis would be required to determine if all taxiways comply with TDG 5 pavement fillet requirements.

Taxiway protection and separation standards, such as the taxiway OFA and lateral separation to parallel taxiways/taxilanes, are based on ADG, not TDG. All 75-foot-wide taxiways at the Airport meet the requirements for ADG III: taxiway safety area width of 118 feet and the taxiway OFA width of 186 feet. ADG IV design standards for taxiway safety areas and taxiway OFAs are more demanding than ADG III standards. The width requirements for the taxiway safety area and taxiway OFA for ADG IV aircraft are 171 feet and 259 feet, respectively. With the exception of Taxiways P and Q, all taxiways at the Airport that comply with ADG III standards also comply with ADG IV standards. The limitation of Taxiway P results from the location of the remain overnight (RON) "B" area, with a boundary 93 feet from the Taxiway P centerline.

4.2.4.2 Runway Exit/Entrance Taxiways

FAA AC 150/5300-13A presents updated standards for taxiway/runway intersections to reduce the risk of runway incursions. The geometry of several taxiway intersections at the Airport does not comply with FAA design standards and needs to be improved to be in compliance. In particular, confusing and complex intersections should be avoided and taxiways should not lead directly from an apron to a runway. **Exhibit 4-9** presents the intersections that are not in compliance with FAA standards and **Table 4-14** lists these intersections and the reasons they are not compliant with FAA design standards.

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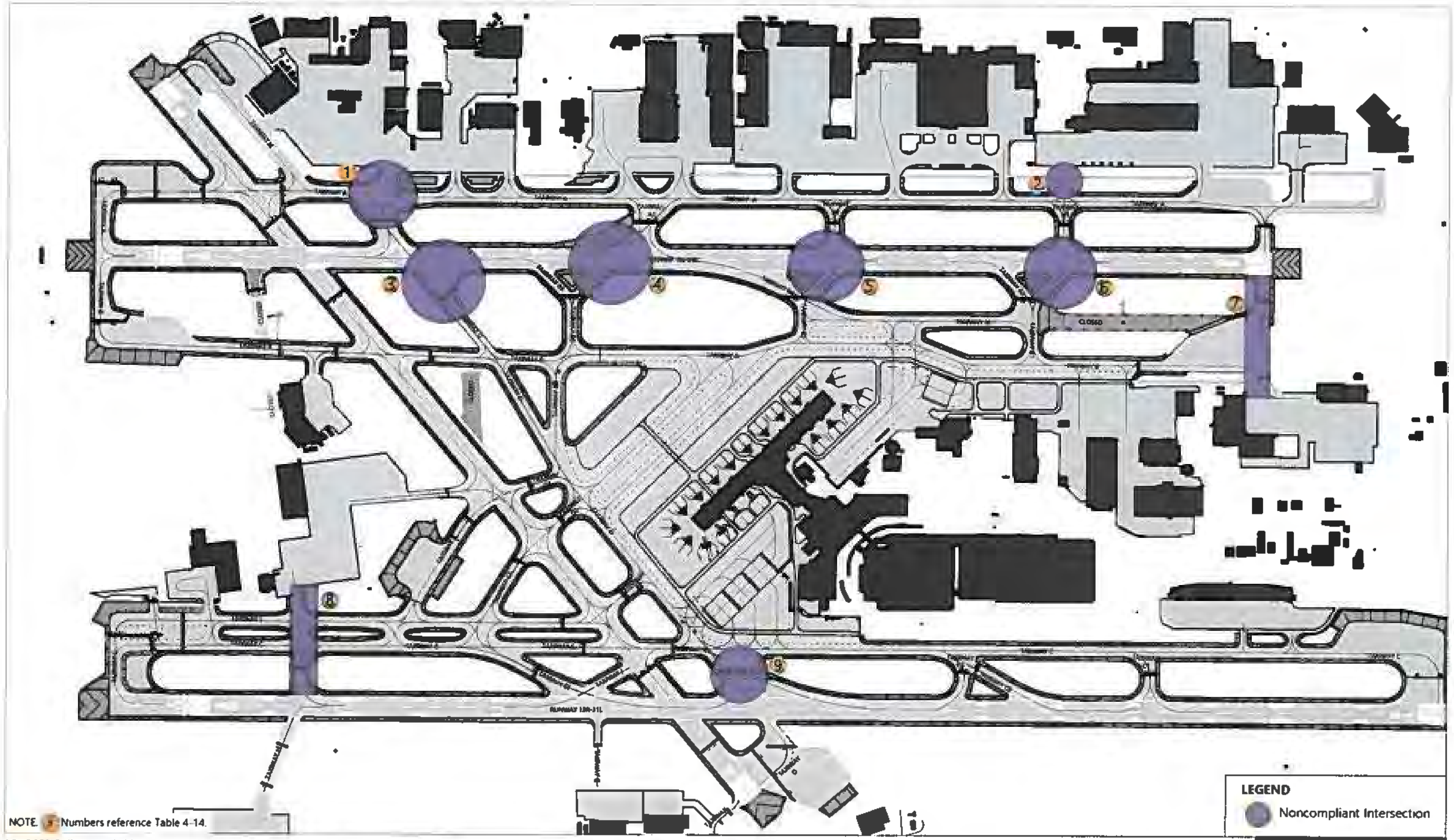

NOTE: Numbers reference Table 4-14.

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014
PREPARED BY: Ricondo & Associates, Inc., September 2014

NORTH 0 1,000 ft.

EXHIBIT 4-9

Noncompliant Intersections

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Table 4-14: Noncompliant Runway Exits

RUNWAY EXIT	LOCATION	WHY IS IT NONCOMPLIANT?
1	Taxiway D and Runway 13L-31R Intersection East of Runway 13L-31R	Direct access from apron to runway
2	Runway 13L-31R and Taxiway A1 Intersection	Direct access from apron to runway
3	Runway 13L-31R and Taxiway D Intersection West of Runway 13L-31R	Geometry limits pilot visibility.
4	Runway 13L-31R and Taxiways B5/A3 Intersection	Nonperpendicular runway crossing
5	Runway 13L-31R and Taxiways B3/A2 Intersection	Nonperpendicular runway crossing and runway crossing point in the middle third of the runway
6	Runway 13L-31R and Taxiways B1/A1 Intersection	Nonperpendicular runway crossing
7	Runway 13L-31R and Taxiway B Intersection	Direct access from GA apron to runway
8	Runway 13R-31L and Taxiway C6/H Intersection	Direct access from apron to runway
9	Runway 13R-31L and Taxiway D Intersection	Direct access from terminal apron to runway; crossing in the middle third of the runway

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A (Change 1), *Airport Design*, February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014

4.2.4.3 Runway Exit Analysis

To develop runway exit improvements, as discussed in Section 5, it is necessary to understand the current runway exits used to minimize the effects of the recommended improvements on aircraft operations.

The runway exit analysis was focused on the taxiways serving Runways 13L-31R and 13R-31L. The aircraft fleet mix associated with the two parallel runways differs. Approximately 63 percent of the GA tenant facilities are located northeast of Runway 13L-31R; therefore, a majority of GA aircraft operations at the Airport are accommodated on this runway. To determine the mix of aircraft using the various runway exits, operational data from the ANOMS were reviewed.

The purpose of this analysis was to determine if the existing runway exit locations are optimal to minimize runway occupancy times. The Runway Exit Design Interactive Model (REDIM) was used to consider specific airfield variables that affect the landing performance of aircraft, as well as important operational constraints (e.g., aircraft mix) that have a direct effect on exit locations and geometries.

Runway 13R-31L and Associated Exits

Runway 13R-31L primarily serves air carrier aircraft, as most GA facilities are located on the opposite side of the airfield. Aircraft landing on Runway 13R can exit at five locations: Taxiways J, D, C3, and C1 and at the end of the runway. Aircraft arriving on Runway 31L can also exit at five locations: Taxiways C2, D, C4, and C6 and at the end of the runway. Taxiway C1 is not considered an exit for aircraft arriving on Runway 31L because the taxiway is located less than 800 feet from the touchdown markings. Runway exits on Taxiways C2, C4, and D are classified as angled exits, as they are acute-angle runway exit taxiways that form a 30-degree angle with the runway centerline.

Runway 13L-31R and Associated Exits

Runway 13L-31R is the primary runway for GA traffic because of its proximity to GA facilities and FBOs located on the northeast side of the airfield. This runway is expected to continue to remain the primary runway for GA activity, while also continuing to serve air carrier aircraft.

Air carrier aircraft arriving on Runway 13L can exit at four locations to reach the gates located southwest of the runway: Taxiways B6, B4, and B2 and at the end of the runway. Taxiway D is located too close to the runway touchdown markings to be considered a runway exit. Taxiways B2 and B4 are the only angled exit taxiways available for arrivals on Runway 13L. To reach the GA facilities on the northeast side of the airfield, GA traffic can exit at four locations: Taxiways A3, A2, and A1 and at the end of the runway; all of these exits are right-angled.

Runway 31R has four exits for aircraft that require access to the midfield area: Taxiways B3, B5, and D and at the end of the runway. None of these are angled exit taxiways. Taxiway B1 is not considered an exit for aircraft arriving on Runway 31R given its distance from the runway touchdown markings. GA aircraft use four exits: Taxiways A2, A3, and D and at the end of the runway. None of these exits are high-speed exit taxiways.

Planning Considerations

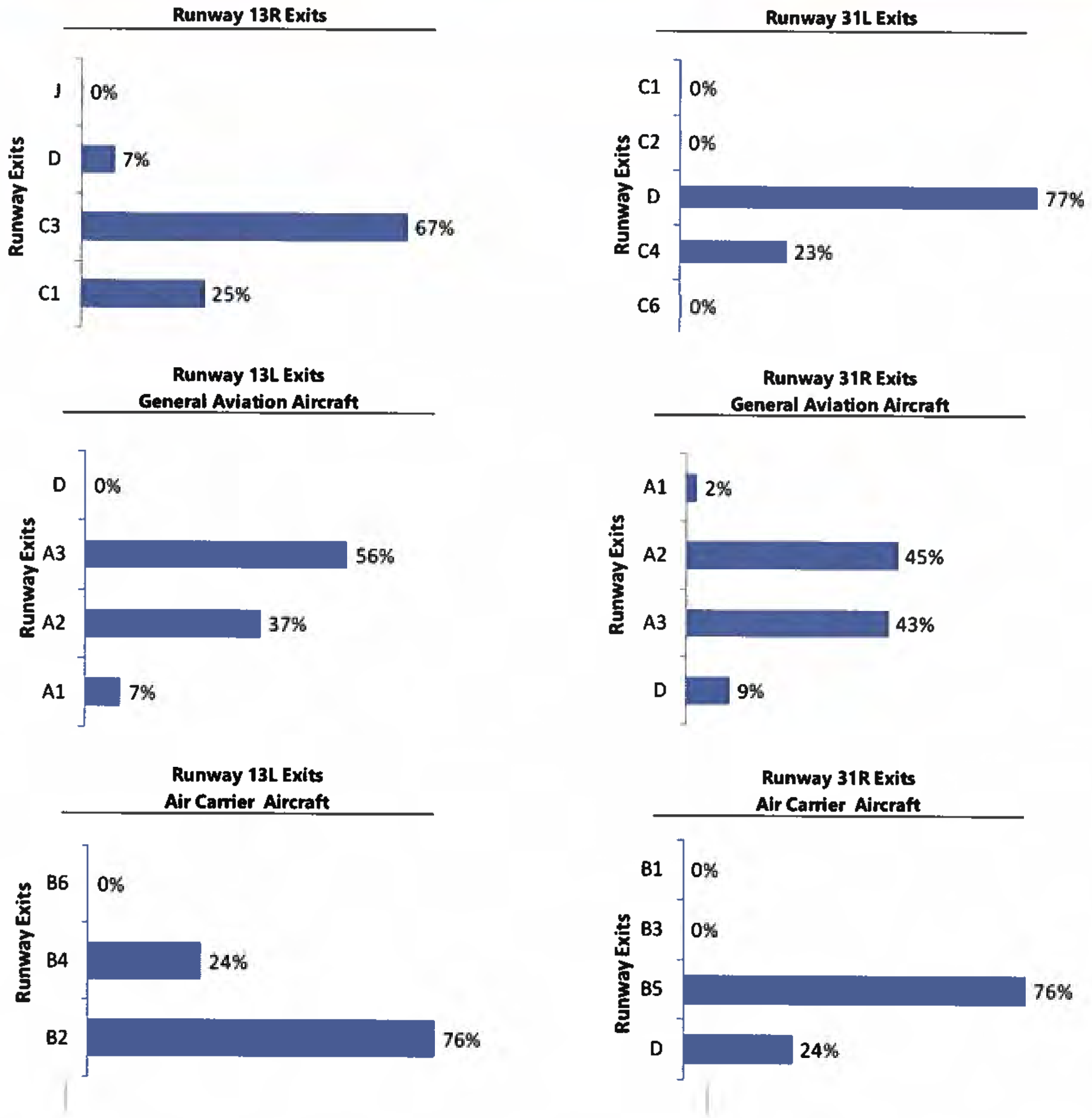
In the runway exit analysis, the following were considered:

- **Aircraft fleet mix:** The 2012 ANOMS database was used to determine the number and share of operations per aircraft type and the fleet mix using each runway. The same aircraft fleet mix was considered for Runways 13L and 31R; similarly, the same fleet mix was used for Runways 13R and 31L.
- **Wet pavement conditions:** In accordance with historical occurrences of precipitation at DAL, wet pavement conditions, which occur at least 10 percent of the time, were considered.
- **Runway 18-36**: This runway is considered decommissioned and its use as a taxiway for Runways 13L-31R and 13R-31L exits was not evaluated because the geometry and location of the runway intersections would not benefit arrivals on the parallel runways.

Results

Exhibit 4-10 shows the results of the analysis for each runway end. The results for air carrier aircraft and general aviation aircraft were combined for Runways 13R and 31L, as most aircraft exit the runways to the northeast side of the airfield onto Taxiway C or L. Separate analyses for landings on Runways 13L and 31R, however, are warranted, as most general aviation aircraft exit onto Taxiway A, while air carrier aircraft exit onto Taxiway B to access the terminal area.

Exhibit 4-10: Runway Exit Use Results



Runway 13R Exits

Runway 31L Exits

Runway 13L Exits General Aviation Aircraft

Runway 31R Exits General Aviation Aircraft

Runway 13L Exits Air Carrier Aircraft

Runway 31R Exits Air Carrier Aircraft

SOURCES: Runway Exit Design Interactive Model, March 2014; Airport Layout Plan Base Map, March 2014; Ricondo & Associates, Inc., March 2014
PREPARED BY: Ricondo & Associates, Inc., March 2014.

The results and conclusions of the runway exit analysis are summarized as follows:

- **Runway 13R:** Taxiway J is rarely used and could be closed. Most aircraft arriving on Runway 13R use Taxiways C3 and C1 to exit the runway.
- **Runway 31L:** Taxiways C2 and C6 are rarely used by aircraft arriving on Runway 31L. However, Taxiway C6 is the only taxiway leading to Taxiway H, which provides access for aircraft taxiing to the Southwest Airlines maintenance base; therefore, it must remain open. Most arrivals use Taxiway D.
- **Runway 13L:** It may be possible to further reduce runway occupancy times by reconfiguring Taxiway A3 as a high speed taxiway exit.
- **Runway 31R:** Taxiways A1 and B3 are rarely used by aircraft landing on Runway 31R, but Taxiways B5, A2, A3, and D are frequently used.

4.2.4.4 Other Taxiway Enhancements

Additionally, during discussions with DAL ATC representatives, it was suggested that the geometry of angled taxiway exits off Runway 13R be enhanced to reduce runway occupancy times and, therefore, increase the capacity of the runway.

4.2.5 AIRFIELD LIGHTING, MARKING AND SIGNAGE, AND NAVIGATIONAL AIDS

4.2.5.1 Airfield Lighting

Airfield lighting systems generally include runway lighting, taxiway/taxilane lighting, and airport identification lighting (beacon).

The MALSRs installed off the approach ends of Runways 13L, 31R, and 31L are appropriate to support the ILS precision instrument approaches published for these runways and no lighting improvements are necessary, except to maintain the effectiveness and efficiency of the systems through routine maintenance and technology upgrades, or to support any future airfield development. Runway 13R is not equipped with an approach lighting system, but is equipped with high intensity runway lights (HIRL) and runway centerline lights that make it usable at night. However, ATC representatives at the Airport suggested that the Runway 13R approach lighting be improved and that a MALSR be added to Runway 13R to enhance airfield flexibility and reliability at night and in poor weather conditions.

Existing taxiway/taxilane lighting is adequate to guide aircraft between runways and aircraft parking areas. Additionally, the rotating beacon located on top of the ATCT above the main terminal and within 5,000 feet of the runways provides an unobstructed beam sweep and is, therefore, appropriately positioned.

4.2.5.2 Airfield Marking and Signage

According to FAA AC 150/5340-1K, *Standards for Airport Markings*, Runway 13L, 13R, and 31L markings are appropriate for the designated ILS precision approach procedures and all markings are reported to be in good condition. All other markings on the airfield, such as Runway 31R markings, taxiway markings, hold position markings, and other required markings, comply with FAA guidance. According to FAA AC 150/5340-18, *Standards for Airport Sign Systems*, no signage deficiency has been identified. However, changes to the airfield marking and signage may be necessary to support future airfield improvements.

4.2.5.3 Navigational Aids

Navigational aids at the Airport include visual navigational aids, electronic navigational aids, and weather reporting equipment.

The lighted wind cones located at each end of Runways 13L-31R and 13R-31L, the PAPIs installed on the approach ends of the two runways, and the existing instrument approach procedures published for the Airport are appropriate and no issue has been reported. Therefore, no additional visual or electronic navigational aids should be required at the Airport through the planning period. Any future instrument approach procedures developed for the Airport will likely be based on satellite technology, which may not require the installation of physical equipment at the Airport.

Weather equipment installed on the airfield consists of an Automated Surface Observing System (ASOS)[8] located in the same equipment area as the Runway 13R glideslope antenna and a Low Level Windshear Alert System (LLWAS) located east of Runway 18-36 and north of Taxiway B. These two pieces of equipment meet siting standards and function properly. No additional weather reporting equipment is likely to be required through the planning period, except as required to upgrade or replace existing systems.

4.3 Passenger Terminal Facility Requirements

The methodologies used to program the individual areas of the passenger terminal were identified in the Love Field Modernization Program. The terminal facility requirements identified in the LFMP are assumed to be adequate to meet forecast demand based on the LFMP planning process and conclusions. Therefore, a traditional demand/capacity analysis of terminal facilities was determined to be unnecessary for the Master Plan Update. Also, given that the terminal is a new structure completed in October 2014, this section summarizes the way and the levels of demand for which the modernized terminal was initially planned. Each major area of the terminal building was programmed and designed based on a variety of studies, analyses, and simulation modeling runs. Legislative requirements set limits on the number of gates the terminal should ultimately include, thereby constraining terminal demand and affecting its future design. Airport space programming and design are typically predicated on numbers of enplaned passengers and/or aircraft operations derived for a peak hour, peak month average day, or annual basis. The space requirements for many other components of the terminal, such as the ticketing hall, baggage claim areas, security screening checkpoint, aircraft gates, and concessions space, are typically calculated from these numbers.

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[8] http://www.faa.gov/air_traffic/weather/asos/?airportId=KDAL.

4.3.1 TICKETING HALL

The ticketing hall space program was developed using the number of peak hour originating passengers from the activity forecasts. The number of originating passengers in the peak hour was adopted from the future flight schedule developed for the LFMP project, which was based on the TARPS. The LFMP documentation of the Ticketing Hall Simulation, included in **Appendix G**, discussed a potential 15 percent reduction in the ticketing hall space program from the original design for potential cost savings. To ensure that the potential reduction would not affect passenger level of service, in April 2010, TransSolutions conducted a simulation to determine the level of service for a variety of design options (also included in Appendix G). Ultimately, a reduction with a 'Modified Three Pod" design was recommended for the ticketing hall.

4.3.2 BAGGAGE CLAIM AREAS

Baggage claim areas, similar to the ticketing hall, aircraft gates, and concession space, are typically planned using the information from aviation activity forecasts. From this information, a design day activity analysis with peak 20-minute periods was derived and used to size baggage claim facilities. In the case of the new terminal at DAL, the TARPS and the projected 2014 flight schedule were used to develop baggage volumes. This information is set forth in the *Inline Checked Baggage Inspection System* design report prepared by Vic Thompson Company, dated April 15, 2011.

It should be noted that, because of the limit of 20 gates in the new terminal, the peak period of 20 minutes was modified to 10 minutes to size the required system and spaces as described in the above-mentioned report.

4.3.3 SECURITY SCREENING CHECKPOINT

The design of an SSCP can be complex as a result of several factors. These include defining sufficient space for the screening equipment, providing a sufficient number of SSCP lanes to minimize passenger waiting times, providing a adequate amount of queuing space, and including sufficient support space for supervisors and daily operations, such as break rooms. The guidance for designing SSCPs to meet these needs for airports nationwide (and specifically at DAL) is included in the TSA's *Checkpoint Design Guide* (CDG).[9] The SSCP at DAL was programmed and designed using CDG Revision 3.0, dated March 10, 2011.

Included in **Appendix H** is an extract of the results of the TSA's REGAL model of the SSCP. The model uses inputs determined by the number of checkpoint lanes available, the amount of security/scanning equipment used, the projected number of passengers per hour, and passenger wait time goals to achieve an output of average delay and to ultimately determine if the number of checkpoints is sufficient. For the model shown in Appendix H, 16 lanes and four explosives detection system (EDS) machines were used as inputs. The output was a weekly maximum average wait time of 10 minutes, 27 seconds.

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[9] Transportation Security Administration, Revision 4.0, August 29, 2012. Leo A Daly (Author) http://www.aci-na.org/sites/default/files/Checkpoint_Design_Guide_%28CDG%29_Rev_4_0.pdf

4.3.4 AIRCRAFT GATES

The number of required gates for the new terminal was developed from an analysis of previous Master Plan analyses and the Five Party Agreement TARPS. As previously noted, the Five Party Agreement and TARPS required the City of Dallas to reduce the number of gates available for commercial air service at DAL to no more than 20. The executive summary of the Five Party Agreement TARPS is included as **Appendix I**.

4.3.5 CONCESSIONS SPACE

Appendix J documents discussions regarding the programming of concessions space at DAL. In a memorandum issued by Unison Consulting to the Department of Aviation, dated January 12, 2009, the concessions space requirements for the LFMP are noted as 9.0 square feet for 1,000 annual enplaned passengers. According to Unison's analysis, the terminal would have adequately sized concessions in the near term; however, concessions spaces would be insufficient to meet long-term demand. Also included in Appendix J is an email from Gresham Smith and Partners noting agreement with the short-term concessions program, but expressing concern regarding the long-term approach.

4.4 Airport Parking Facility Requirements

Automobile parking for DAL passengers and other users of the Airport can be categorized as on-Airport and off-Airport. On-Airport facilities are managed by the Parking Company of America (PCA) under contract with the City. Off-Airport facilities are privately owned and operated. The City also maintains a cell phone waiting lot, as well as several parking facilities for employees at the Airport. **Exhibit 4-11** shows the various on-Airport public and employee parking facilities addressed in this Master Plan Update. Other parking facilities on Airport property are privately operated and managed by tenants and were not evaluated as part of the Master Plan Update parking analysis.

Space requirements for all on-Airport parking facilities maintained by the City are discussed in this section. Requirements were determined by estimating parking demand and rounding up to the nearest 10 spaces. Future requirements were determined by applying growth factors derived from forecast aviation activity. Requirements were compared to available capacity to identify surpluses and deficiencies. Design day requirements were estimated to correspond with spaces that would be needed to meet demand on a typical busy day. Peak day requirements were estimated to accommodate demand during very busy holiday periods or other special events. Some peak day demand could be accommodated in temporary overflow facilities that are only opened during peak periods rather than in more costly permanent facilities, as desired.

Exhibit 4-11: On-Airport Parking Facilities and Capacities

SOURCES: Google Earth Pro, March 2013; Ricondo & Associates, Inc., March 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013

4.4.1 ON-AIRPORT PUBLIC PARKING

Dallas Love Field has two garages that serve all public parking needs. Garage A, closest to the terminal entrance, contains 2,980 parking spaces and serves more short-term parkers. The rate charged in Garage A is incremental, up to a maximum of $17 per day. Garage B is immediately adjacent to Garage A, slightly further from the terminal, and serves more long-term parkers; it contains 4,000 parking spaces. The rate charged in Garage B is also incremental, up to a maximum of $13 per day.

A parking analysis was completed in 2008 based on 2006 data.[iii] The same methodology as used in the 2008 analysis was used in the Master Plan Update analysis, updating relevant data to appropriately reflect more current conditions.

[iii] Ricondo & Associates, Inc., *Dallas Love Field Public Parking Assessment*, Technical Memorandum issued to Roddy L. Boggus, Senior Vice President, Parsons Brinkerhoff, January 4, 2008.

4.4.1.1 Data Collection and Demand/Capacity Analysis

Prior to conducting the parking analysis, various parking data were obtained from the City, assuming calendar year 2012 as a base for estimating existing conditions. The 2012 data obtained included:

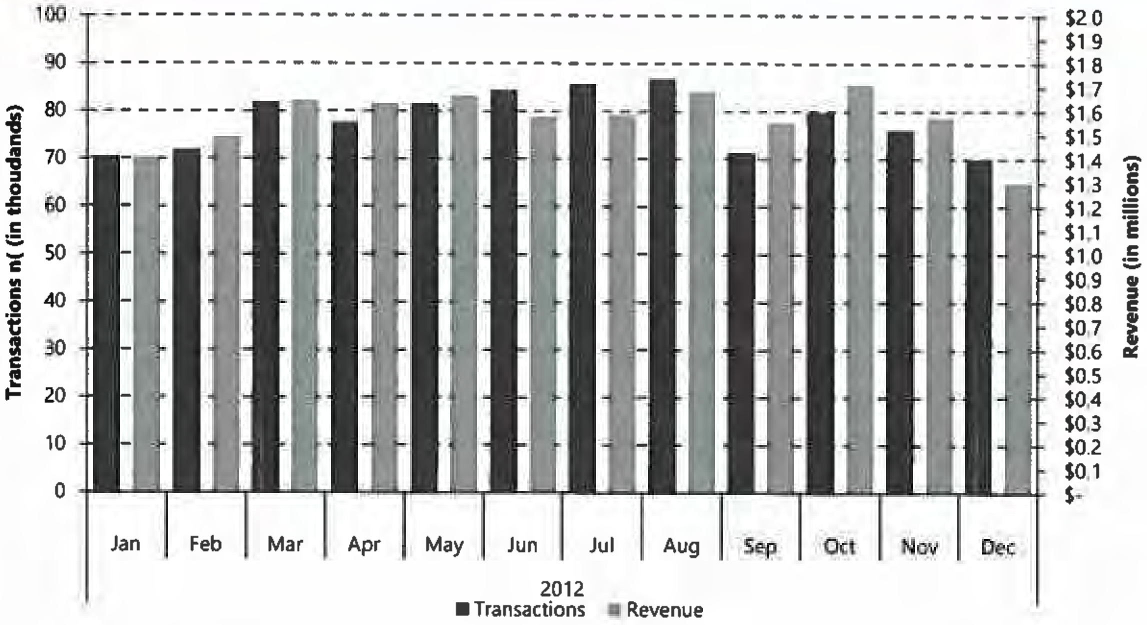
- Total parking spaces by facility
- Combined monthly total transactions and revenue collected by the parking revenue control system (PRCS) from TollTags and from other parking facility access modes (e.g., employee access cards)
- Daily TollTag transactions by facility
- Daily PRCS transactions by facility and parking duration
- Daily overnight occupancy counts by facility

Other qualitative and anecdotal information was obtained to supplement the quantitative data. The raw data were processed, analyzed, and organized to illustrate how the on-Airport public parking system operates, establish 2012 conditions and demand, and identify trends used to determine future requirements.

Transactions and Revenue

Exhibit 4-12 shows monthly transactions and revenue data for calendar year 2012, which indicate that October is the peak month for parking revenue. The data include all sources of transactions and revenue.

Exhibit 4-12: On-Airport Public Parking Transactions and Revenue



NOTE: Excludes TollTag data, which were not available.

SOURCES: Parking Company of America, April 2013; Ricondo & Associates, Inc., April 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

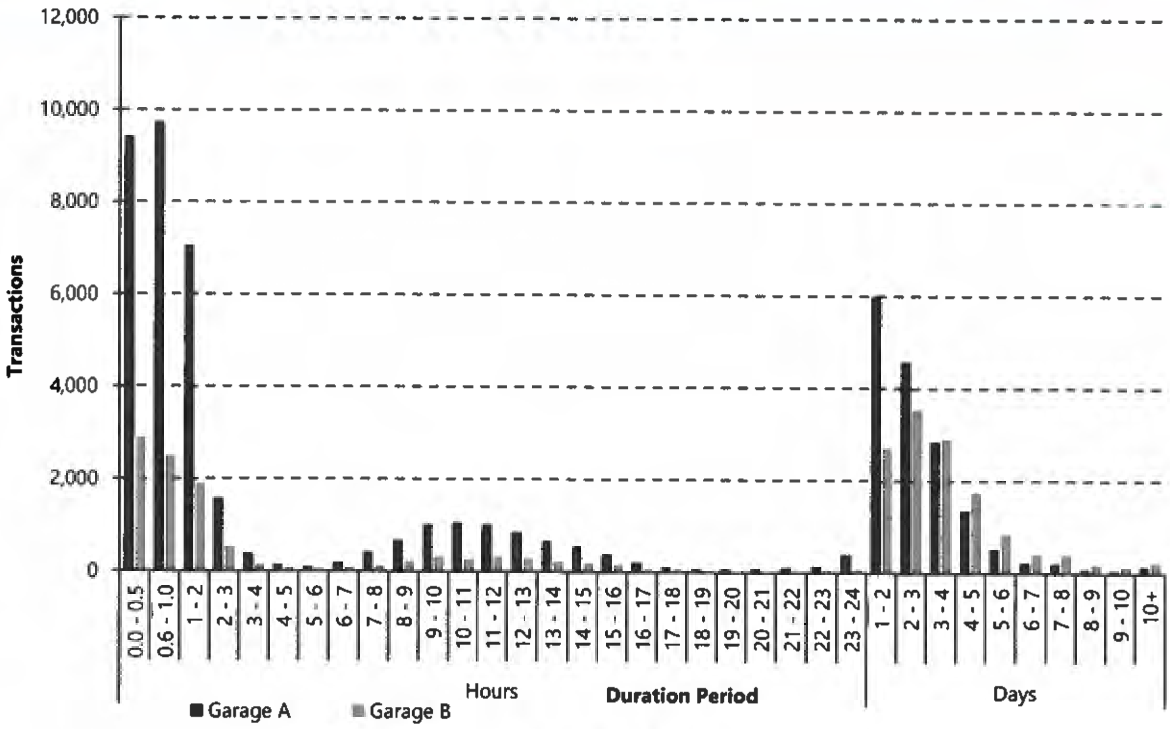
Duration Reports

Exhibit 4-13 shows transactions by duration for both garages. The operational differences between Garages A and B are most evident in these data. Garage A had more transactions for all parking durations up to 3 days. Garage B had more transactions for durations longer than 3 days.

The duration reports as received only provided data for transactions from PRCS ticket receipts and did not account for TollTag transactions, but it was assumed that the TollTag transaction profile would be similar to that produced by PRCS users.

Supplemental information provided by PCA indicated that, on typical busy days, Garage A fills to near capacity, causing staff to close it and forcing additional short-term parkers into Garage B. This may account for the significant number of short-duration (less than 3 hours) transactions occurring in Garage B. Also, more closures of Garage A occurred in October than in any other month of 2012 because of the high use of the garage without any holiday events, supporting the selection of October 2012 to represent typical busy demand.

Exhibit 4-13: On-Airport Parking Revenue Control System Transactions by Duration

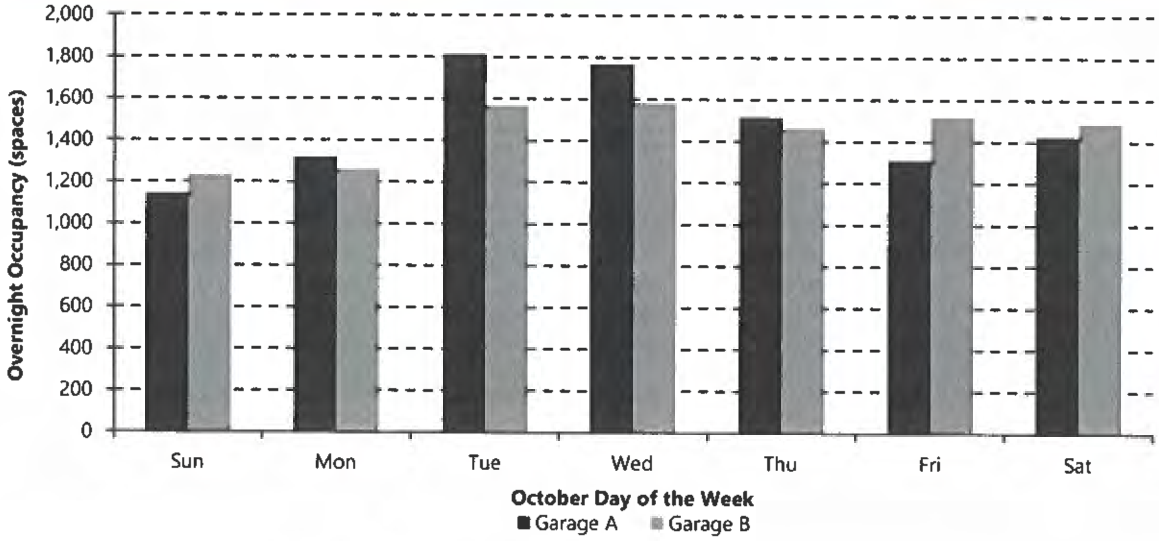


SOURCES: Parking Company of America, April 2013; Ricondo & Associates, Inc., April 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

Overnight Occupancy Counts

Exhibit 4-14 shows a weekly profile of daily overnight occupancy levels in Garages A and B in October 2012. These data represent non-short-term parkers (i.e., some portion of parkers staying more than 9 hours and all parkers staying longer than 1 day). The use of Garage A, which is potentially used by a higher proportion of business travelers, peaks in the middle of the week. The use of Garage B also peaks in the middle of the week, but is more sustained toward the end of the week and over the weekend than the use of Garage A, possibly because of a higher proportion of leisure traveler use.

Exhibit 4-14: On-Airport Public Parking Overnight Occupancy



SOURCES: Parking Company of America, April 2013; Ricondo & Associates, Inc., April 2013
PREPARED BY: Ricondo & Associates, Inc., May 2013.

4.4.1.2 Estimating 2012 Demand

Passenger activity at the Airport is largely business in nature and parking trends reflect this. It was known that the daily occupancies in Garages A and B reach their peaks in the middle of the week during the busy months of the year. At such times, Garage A fills completely and overflow demand is accommodated in Garage B, which becomes a little more than half-full. The significant number of customers parking for multiple days in Garage A is potentially due to the predominance of business travelers at the Airport. Demand in the garages does not reach capacity at other times during the year, including holidays, although demand in long-term Garage B is higher than in Garage A during holiday periods. This holiday profile could be attributed to a decrease in business travelers, but also to an increase in leisure travelers who are more sensitive to the cost of parking.

Daily peak occupancies can be analyzed to determine demand for parking spaces, but because daily peak occupancies were not available from the PRCS, another method was used to estimate demand. Transaction data from the October 2012 duration report were used as the basis for estimating demand.

Daily transaction and revenue data for October 2012 were used to calculate average transactions, peak transactions, and the surge in transactions from the average to the peak. The peak days in October 2012 for Garages A and B, respectively, had 39.1 percent and 37.5 percent more transactions than the average day. These data were used to adjust estimates of demand from the average to the busy day. **Table 4-15** summarizes the calculations used to estimate demand in Garages A and B. See **Appendix K** for a more detailed table supporting the summarized calculations in Table 4-15. The actual calculations supporting this table were based on the shortest duration periods possible (as reported in the raw data) to maintain fidelity. The numbers in the table were aggregated for reporting purposes.

Table 4-15: 2012 On-Airport Public Parking Space Demand

		GARAGE A			GARAGE B				
		TRANSACTIONS			TRANSACTIONS				
FROM	TO	MONTHLY [1/]	BUSY DAY	BUSY DAY DEMAND	MONTHLY [1/]	BUSY DAY	BUSY DAY DEMAND	TOTAL BUSY DAY DEMAND	DURATION DISTRIBUTION
0 hour	3 hours	9,645	433	179	3,000	133	147	326	6.7%
3 hours	24 hours	4,493	202	1,370	1,436	64	1,127	2,497	51.4%
24 hours	∞	9,090	408	1,061	6,763	300	972	2,033	41.9%
	Total	**23,228**		**2,610**	**11,199**		**2,246**	**4,856**	**100.0%**
% Full:				87.6%			56.2%		
Estimated Overnight:				1,811			1,583	3,394	
% Full:				60.8%			39.6%	48.6%	
Actual Overnight:				1,812			1,583	3,395	
% Full:				60.8%			39.6%	48.6%	
% Different from Estimated:				0.0%			0.0%	0.0%	
Capacity:				2,980			4,000	6,980	

NOTE:

1/ Parking revenue control system only.

SOURCES: City of Dallas, 2012; Ricondo & Associates, Inc., April 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

An estimated turnover rate for each duration period was calculated based on a few assumptions. For those periods longer than 1 day, the turnover rate is simply the inverse of the average number of days for that period (e.g., for the 2 to 3 day period, the turnover rate would be 1/2.5). For shorter periods, the turnover rate was calculated based on the average parking duration, the assumed number of busy operational Airport hours per day (17), and an additional calibration factor.

The number of October 2012 transactions was divided by the number of days in the month (31) and then increased by the average-to-peak-day surges to estimate the number of busy day transactions. Busy day

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demand was then calculated by dividing the estimated number of busy day transactions by the estimated turnover rate to determine the required number of spaces.

To validate the calculations, the statistics provided at the bottom of Table 4-15 were calculated and compared. The estimated overnight demand was the summation of the estimated busy day demand for durations longer than 1 day and 70 percent of the demand for durations between 10 and 24 hours. The actual overnight demand represents the average overnight occupancy recorded in October 2012. Calibration factors for each facility were adjusted so that the estimated overnight demand matched actual demand.

When comparing demand to capacity, a practical capacity was used. To account for the inability to completely fill a facility, a level of service factor was applied. It was assumed that Garage A would fill to 90 percent before it would have to be closed and that Garage B would be closed when its occupancy approached 95 percent. Such closures are a customer service feature that prevent customers from spending excessive time searching for the few remaining unoccupied spaces, assuming that users of Garage A require a slightly higher level of service than users of Garage B.

It is understood from information received from Airport staff that, on a typical busy day, Garage A fills (approaching 90 percent full, at which point it is closed) and overflow demand is accommodated in Garage B, which only reaches a little over half-full. These results are reflected in the estimated demand shown in Table 4-15 for each garage. These statistics verify that the estimates of demand are reasonable.

Prior to this analysis, some employees had been issued cards providing them access to Garage B. These employees were estimated to require almost 500 spaces in 2006. It was assumed for this analysis that these employees would be accommodated in a separate dedicated facility in the future and would no longer occupy spaces accessible to the public. For this reason, no employee demand was accounted for in this updated analysis.

4.4.1.3 Forecasting Future Demand and Requirements

The increase in originating passengers was used to estimate future parking requirements. The numbers of enplaned passengers in 2012 and forecast through 2032, as provided in the Airport activity forecasts, were used to calculate expected growth in public parking demand at the Airport. Exhibit 3-2 in the previous section depicts forecast changes in passenger activity.

Based on transaction data, total 2012 design day demand was estimated to be 4,856 spaces. Similarly, total overnight occupancy in 2012 was estimated to be 3,394 spaces (approximately 70 percent of design demand). The relationship between daily peak and overnight demand was assumed to be constant over the planning period and was applied to the maximum observed October 2012 overnight occupancy (3,818 spaces) to estimate a total peak day demand of 5,462 spaces. The level of service factors were then applied to design day demand and both design and peak day demands were rounded up to the nearest 10 spaces to estimate 2012 requirements, as shown in **Table 4-16**, highlighting a need for 5,240 spaces on the design day and 5,470 spaces on the peak day, both below the total capacity of 6,980 spaces.

Table 4-16: Forecast On-Airport Public Parking Space Requirements

	EXISTING (2012)			PAL E1	PAL E2	PAL E3
Enplaned Passengers (millions)	4.1			5.5	6.2	7.0
Originating Passengers (millions)	2.7			3.2	3.4	4.5
	CAPACITY	**DEMAND**	**REQUIREMENTS** [1/]	**REQUIREMENTS** [1/]		
DESIGN DAY [2/]						
Garage A	2,980	2,609	2,880	3,360	3,510	4,680
Garage B	4,000	2,246	2,360	2,760	2,890	3,840
Total	**6,980**	**4,855**	**5,240**	**6,612**	**6,400**	**8,520**
Surplus/(Deficit)			1,740	860	580	(1,540)
PEAK DAY						
Total	**6,980**	**5,462**	**5,470**	**6,380**	**6,680**	**8,900**
Surplus/(Deficit)			1,510	600	300	(1,920)

NOTES:

1/ Requirement rounded up to nearest 10 spaces.

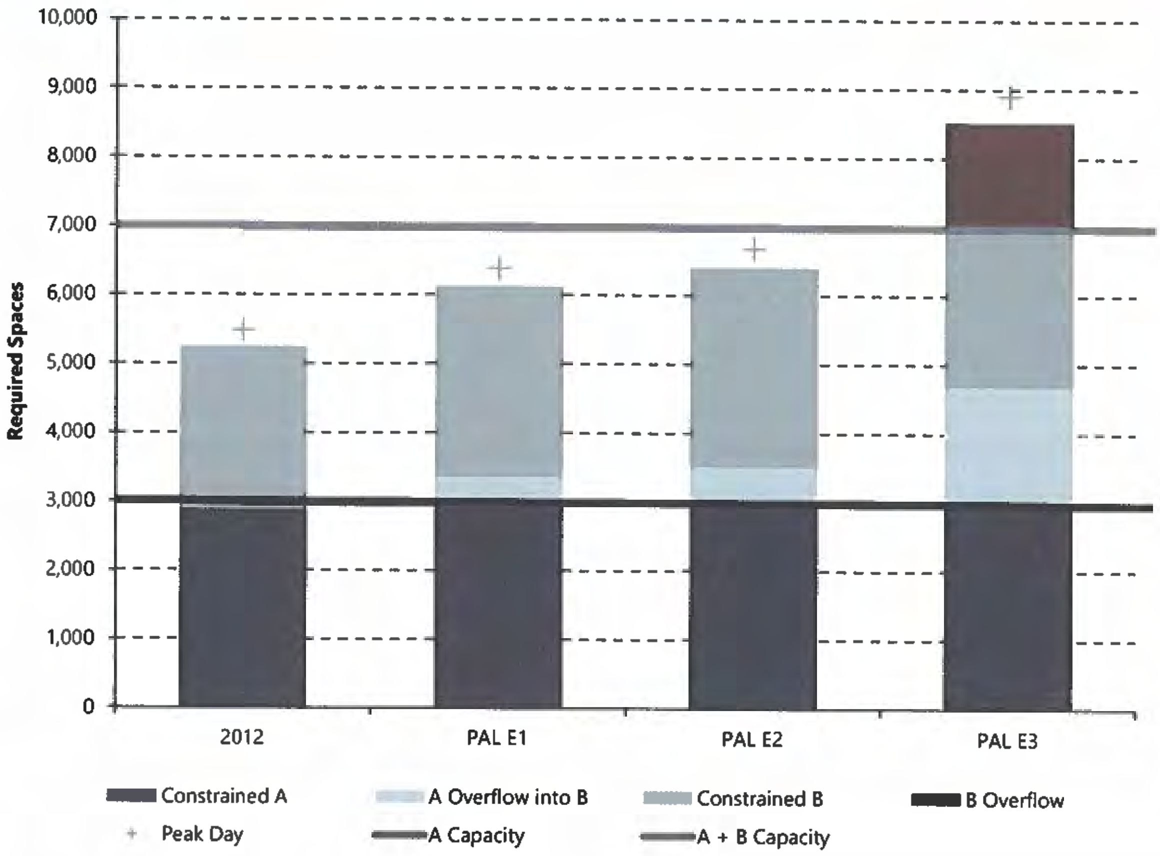
2/ Level of service factors of 10 percent and 5 percent were applied to Garages A and B, respectively.

SOURCE: Ricondo & Associates, Inc., April 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

Applying the proportional changes in passenger activity to the 2012 total design and peak day demand produced future total demand. Applying the same level of service factors and rounding as for 2012 requirements produced estimated future design and peak day requirements, as depicted on **Exhibit 4-15**.

As shown in Table 4-16, the existing garages would be unable to accommodate all demand on typically busy days at the activity levels forecast through the planning period. Capacity could be expected to be insufficient on typical busy and peak days between PAL E2 and PAL E3. By PAL E3, an additional 1,540 spaces could be required to consistently accommodate demand throughout the year. On the absolute peak day at PAL E3, 1,920 additional spaces would be required to accommodate all demand.

Exhibit 4-15: Forecast Public Parking Requirements



SOURCE: Ricondo & Associates, Inc., April 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

4.4.1.4 Conclusions

Garages A and B are more than sufficient to accommodate existing demand, but are not expected to be sufficient to accommodate future design day or peak day demand. One or both garages would need to be expanded or additional spaces provided to supplement the garages to accommodate parking demand forecast in this analysis. The timing of the need for new spaces will depend upon the rate at which demand increases, which is, in turn, dependent on the rate at which activity (specifically originating passenger activity) increases at the Airport. Future demand is also dependent on other factors, such as the split between different types of travel (i.e., business vs. leisure) and economic factors (e.g., parking rates, airfares) that may or may not change the profile of demand in the future.

In the interim, increasing the capacity of Garage A could increase revenues and potentially customer convenience by eliminating the overflow to the less expensive and remote Garage B. Increasing the capacity

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of Garage A for this purpose could also delay the need to increase the capacity of Garage B or build additional facilities as overall demand increases.

4.4.2 ON-AIRPORT EMPLOYEE PARKING

The On-Airport employee parking facilities maintained by the City and considered in this analysis are located in the terminal area, as depicted on Exhibit 4-11. Other on-Airport parking facilities not considered in this analysis are reserved for and managed by Airport tenants. Total on-Airport employee parking capacity is 497 spaces.

Estimated 2012 on-Airport employee parking demand was provided by the City, as determined through a survey of tenants and users requiring parking in Airport-operated facilities. These demands are summarized in **Table 4-17**.

Table 4-17: 2012 On-Airport Employee Parking Demand [1/]

TENANT	DEMAND (SPACES)
Department of Aviation	175
Department of Aviation Employee Parking	159
Communications Center	5
Badging	3
Additional	8
Federal Aviation Administration	55
Transportation Security Administration	42
Southwest Airlines	15
Other Airlines	40
Concessionaires	40
Other	70
Dallas Police Department	30
Taxicab Starters	5
Diamond Security	6
FOFM/AWO [2/]	4
Visitor	25
Total	437

NOTES:

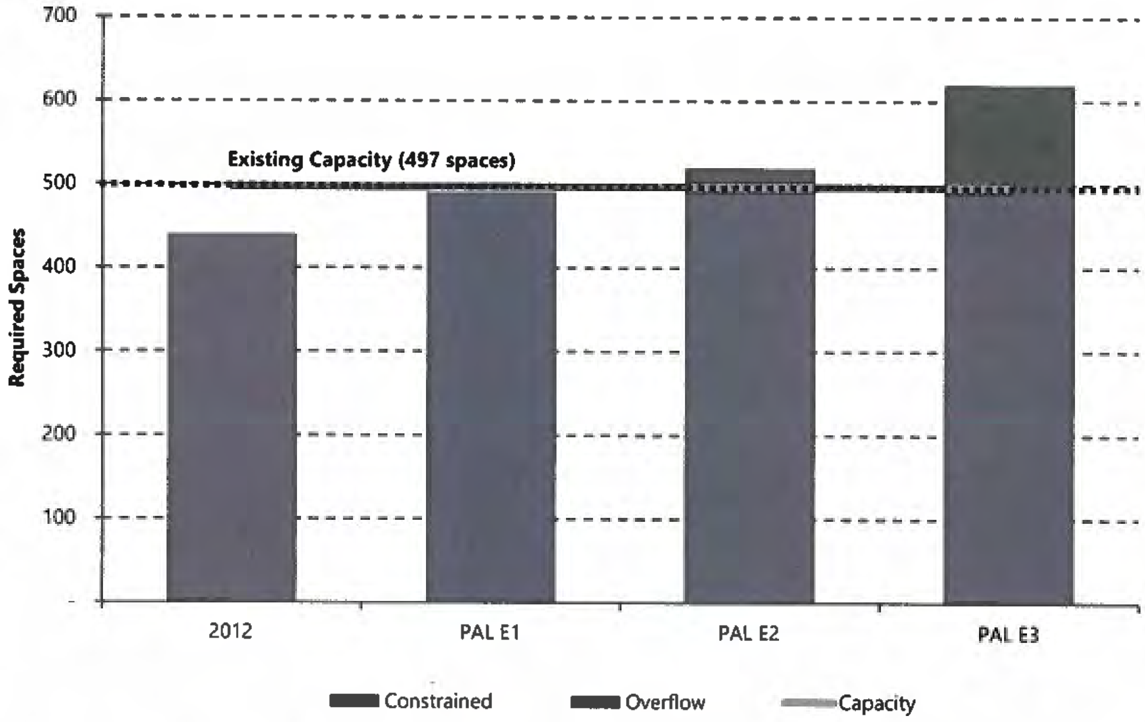
1/ Employee parking spaces are intended to encompass DOA provided parking only.

2/ Contract group providing weather staffing at the Airport.

SOURCE: City of Dallas, 2012.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

Changes in employee parking demand are caused by changes in staffing related, in part, to changes in passenger activity (e.g., concessionaires) and, in part, to changes in the number of aircraft operations (e.g., maintenance) at the Airport. For this reason, changes in employee parking demand were forecast based on the average change in rates of passenger activity and aircraft operations, as depicted in the previous section on Exhibits 3-2 and 3-3, respectively. Employee parking demands were converted to requirements by rounding up to the nearest 10 spaces. Forecast employee parking requirements are depicted on **Exhibit 4-16** and summarized in **Table 4-18**. As a result of the forecast increase in aviation activity at the Airport in 2015, an additional 123 employee spaces would be required by PAL E3.

Exhibit 4-16: Forecast Employee Parking Requirements



SOURCE: Ricondo & Associates, Inc., April 2013.
PREPARED BY: Ricondo & Associates, Inc., May 2013.

Table 4-18: Forecast On-Airport Employee Parking Space Requirements

YEAR	EXISTING (2012)	PAL E1	PAL E2	PAL E3
Enplaned Passengers (millions)	4.1	5.5	6.2	7.0
Originating Passengers (millions)	2.7	3.2	3.4	4.5
Aircraft Operations (thousands) [1]	177.9	187.9	203.8	209.9
Requirements [3]	**440**	**490**	**520**	**620**
Average Growth[2]	-	11.2%	6.6%	18.1%
Surplus/(Deficit)	57	7	(23)	(123)

NOTES:

1/ Aircraft operations are in alignment with the Airport Forecast and correlate to the number of enplanements

2/ From 2012

3/ Rounded up to the nearest 10 spaces.

SOURCE: Ricondo & Associates, Inc., April 2013
PREPARED BY: Ricondo & Associates, Inc., May 2013.

4.5 Airport Access Requirements

Ricondo & Associates, Inc., conducted a demand/capacity analysis for the Airport access and ground support system components at the Airport. This analysis included a review of previous demand/capacity analyses and incorporates the results of the forecasts prepared by R&A for the Master Plan Update.

4.5.1 NONTERMINAL AREA ROADWAYS

A demand/capacity and requirements analysis of the nonterminal area roadways was not conducted for the Landside Master Plan Section of the LFMP (December 2008). To conduct such an analysis, intersection turning movement counts and 7-day automatic traffic recorder (ATR) counts were collected along Mockingbird Lane by GRAM Traffic of North Texas, Inc., during February 2014.

Two 7-day, 24-hour ATRs were placed midblock at two locations on Mockingbird Lane between:

- Airdrome Drive and Cedar Springs Road/Herb Kelleher Way
- Cedar Springs Road/Herb Kelleher Way and Denton Drive

Exhibit 4-17 presents the rolling-hour counts for traffic heading northeast and southwest on Mockingbird Lane between Cedar Springs Road/Herb Kelleher Way and Airdrome Drive to the northeast, and **Exhibit 4-18** presents the rolling hour counts for traffic heading northeast and southwest on Mockingbird Lane between Cedar Springs Road/Herb Kelleher Way and Denton Drive to the southwest. The ATR data were collected from Thursday, February 20, 2014, through Wednesday, February 26, 2014. From both sets of data, it was determined that Mockingbird Lane serves not only as an access road to Dallas Love Field, but also as a commuter route for many local residents.

The a.m. peak traffic flow is primarily in the southwest direction on Mockingbird Lane, peaking at approximately 2,400 vehicles per hour between 7:30 a.m. and 8:30 a.m. on weekday mornings, with approximately 1,400 vehicles per hour in the nonpeak northeast direction during the same hour. Conversely, the traffic peak direction reverses during the p.m. peak hour (5:00 p.m. to 6:00 p.m.) with approximately 2,750 vehicles per hour in the northeast direction and approximately 1,350 vehicles per hour in the nonpeak southwest direction.

The intersection turning movement counts were collected on Friday, February 21, 2014, and Monday, February 24, 2014, during the a.m. peak (6:00 a.m. to 8:30 a.m.) and p.m. peak (4:30 p.m. to 8:00 p.m.) at the following intersections:

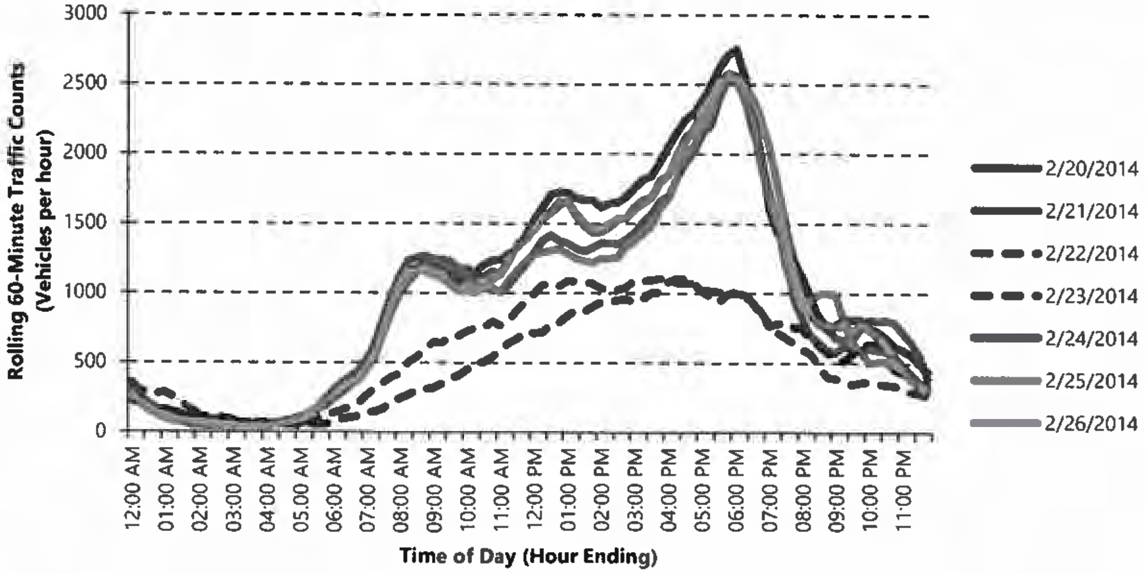
- Airdrome Drive at Lemmon Avenue
- Mockingbird Lane at Lemmon Avenue
- Mockingbird Lane at Airdrome Drive
- Mockingbird Lane at Cedar Springs Road/Herb Kelleher Way
- Mockingbird Lane at Denton Drive

From the ATR intersection turning movement counts, the a.m. and p.m. rolling 60-minute peak hours were identified for each intersection. The a.m. peak hour was identified as 7:30 a.m. to 8:30 a.m. and the p.m. peak hour was identified as 4:30 p.m. to 5:30 p.m. To analyze intersection demand/capacity performance, the peak hour turning movement counts, along with intersection geometry and signal phasing and timing, were input into Synchro® 7, traffic signal simulation and optimization software developed by Trafficware. The turning movement counts, as well as the intersection levels of service computed using Synchro® 7 and based on *Highway Capacity Manual* procedures, are presented on **Exhibits 4-19** and **4-20** for the a.m. and p.m. peak periods, respectively.

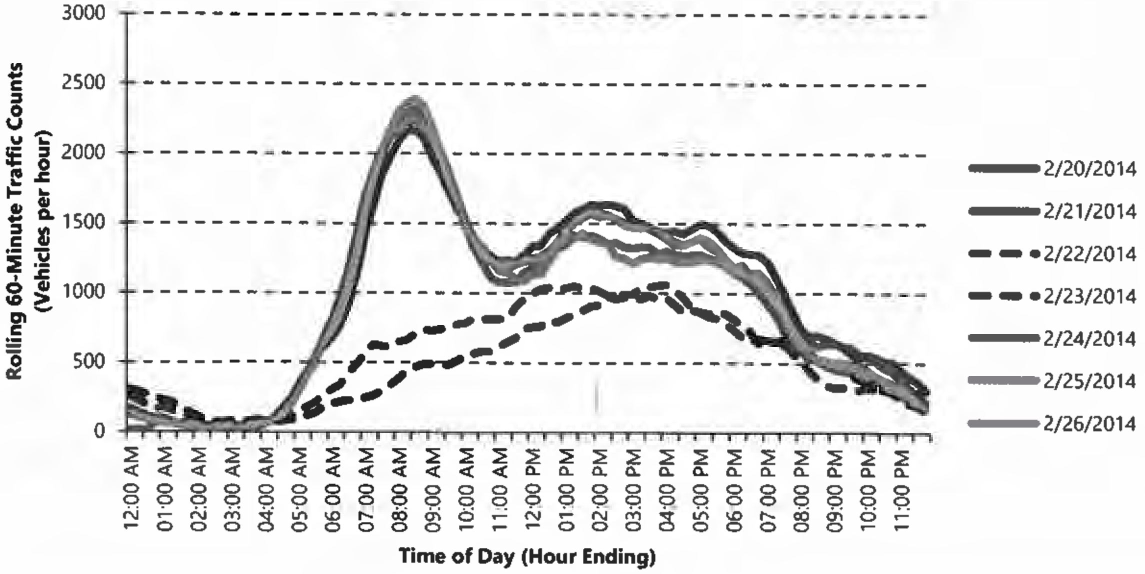
With traffic volumes for the nonterminal roadways identified for the data collection period in February 2014, the roadway volumes were then factored to baseline 2013 values based on passenger activity from the gated baseline airline schedule. Intersection levels of service were established for baseline 2013 volumes, and then a spreadsheet trip generation model was prepared to segment traffic by activity type (e.g., airline passenger traffic, other Airport traffic, and non-Airport background traffic). Different growth rates for all three traffic components were developed using the following assumptions:

Exhibit 4-17: 7-day Automatic Traffic Recorder Counts on Mockingbird Lane (Cedar Springs Road/Herb Kelleher Way and Airdrome Drive)

Northeast Bound Mockingbird Lane
Between Cedar Springs Road/Herb Kelleher Way and Airdrome Drive



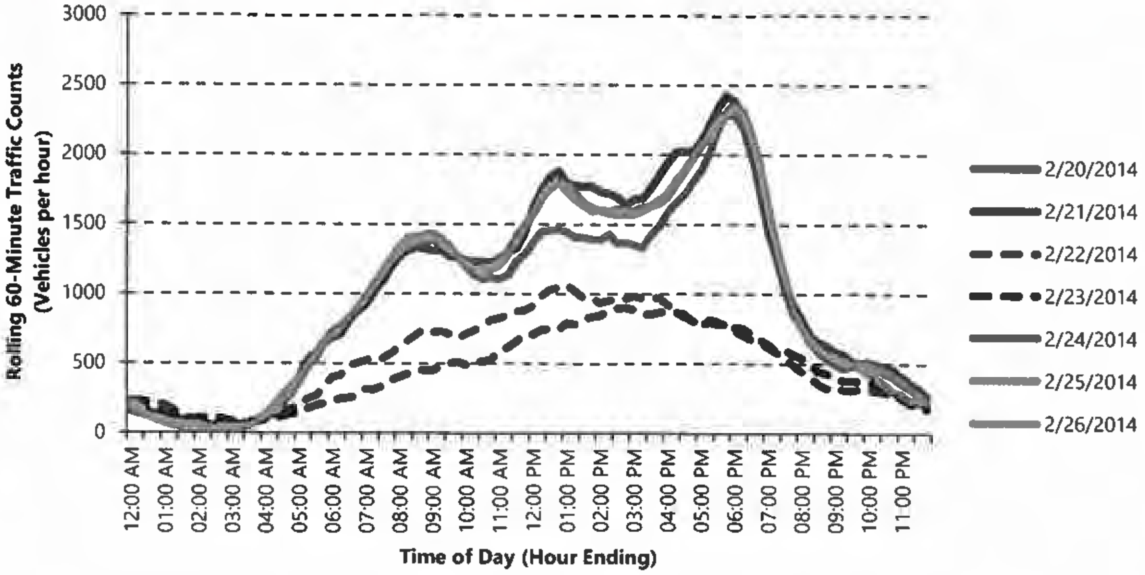
Southwest Bound Mockingbird Lane
Between Cedar Springs Road/Herb Kelleher Way and Airdrome Drive



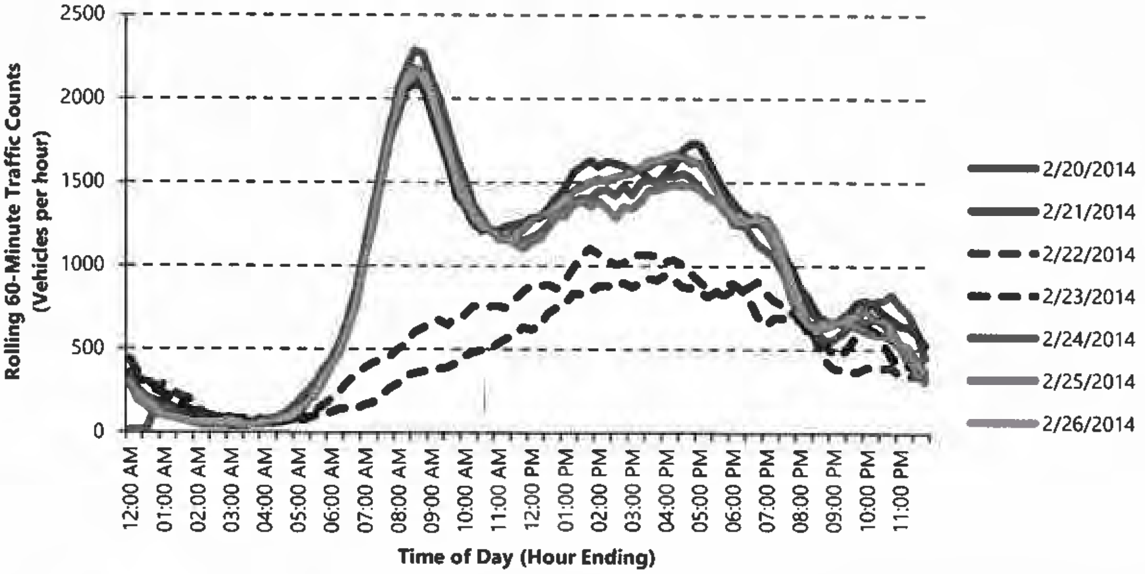
SOURCES: GRAM Traffic of North Texas, Inc., February 2014; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

Exhibit 4-18: 7-day Automatic Traffic Recorder Counts on Mockingbird Lane (Cedar Springs Road/Herb Kelleher Way and Denton Drive)

Northeast Bound Mockingbird Lane
Between Cedar Springs Road/Herb Kelleher Way and Denton Drive



Southwest Bound Mockingbird Lane
Between Cedar Springs Road/Herb Kelleher Way and Denton Drive



SOURCES: GRAM Traffic of North Texas, Inc., February 2014, Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

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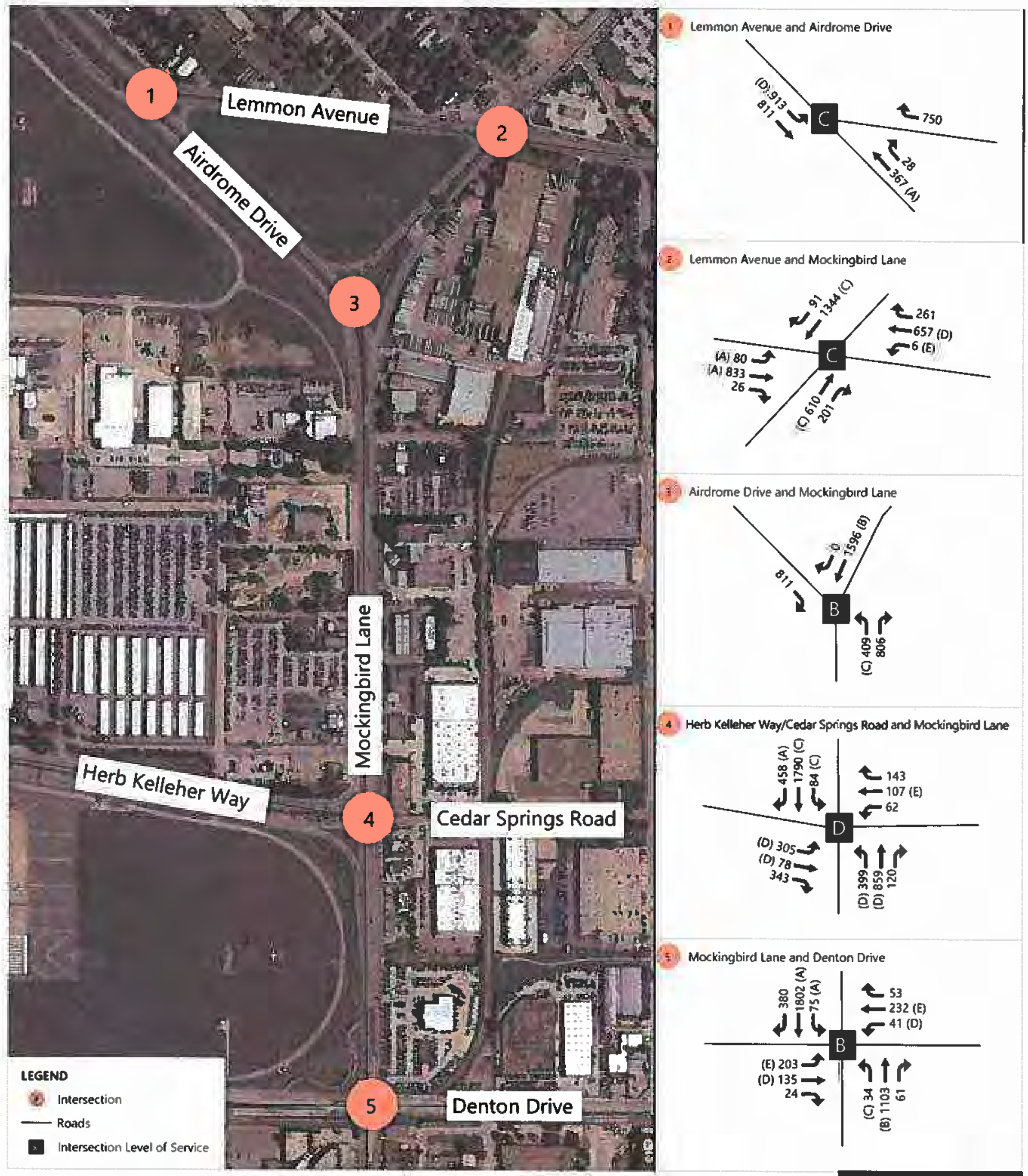

SOURCES Google Earth Pro, February 2014; GRAM Traffic of North Texas, Inc. February 2014; Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., April 2014

EXHIBIT 4-19

Turning Movement Counts and Intersection Level of Service
Existing a.m. Peak Hour

Drawing: N:\Love Field\03 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\new_Off_Airport_Intersections_ALL 8 SCENARIOS.dwg Layout: Baseline 2014 AM May 19, 2015, 5:37pm

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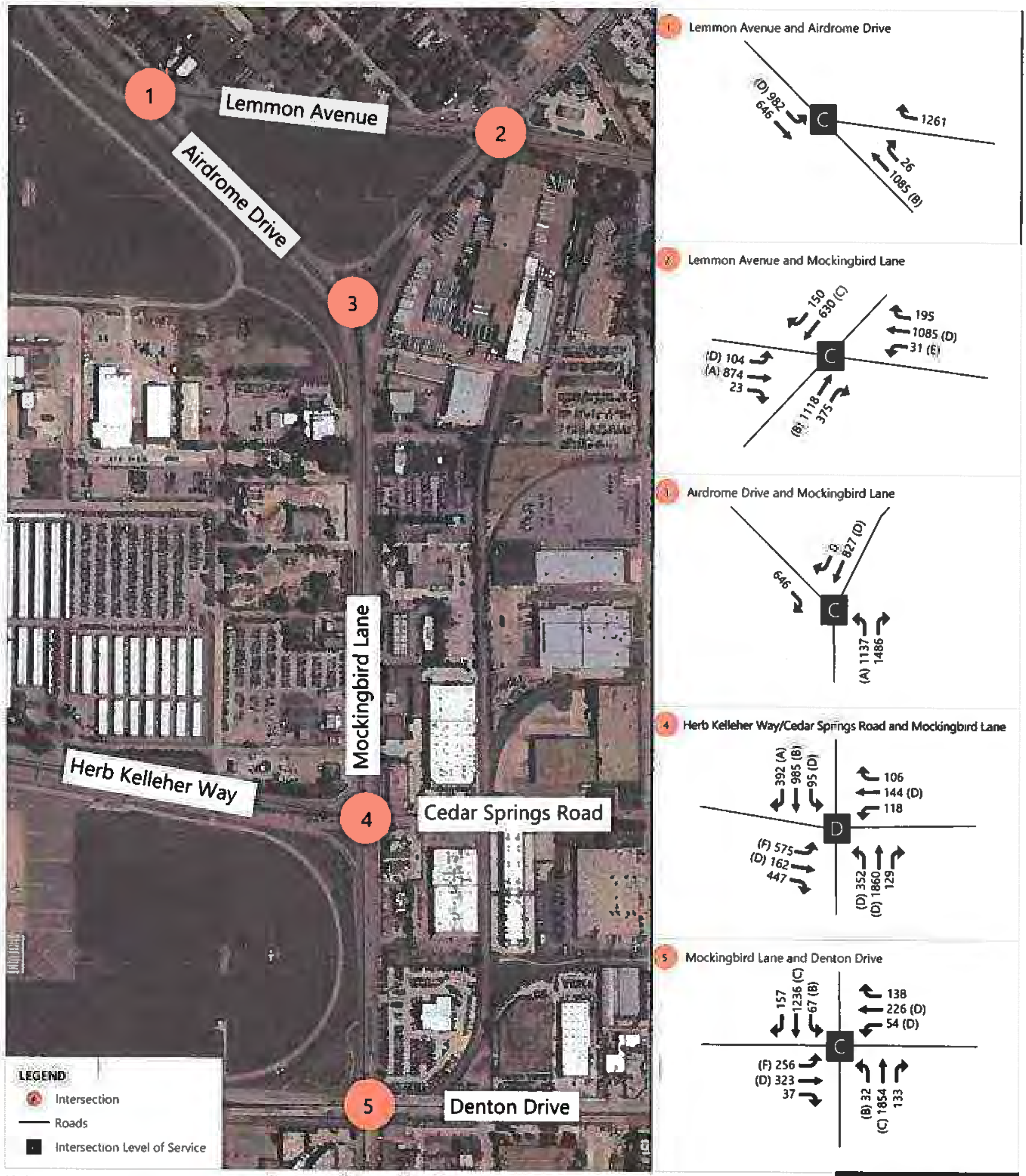

SOURCES Google Earth Pro February 2014; GRAM Traffic of North Texas, Inc. February 2014; Ricondo & Associates, Inc. April 2014
PREPARED BY Ricondo & Associates, Inc. April 2014

EXHIBIT 4-20

Turning Movement Counts and Intersection Level of Service
Existing p.m. Peak Hour

Drawing N:\Love Field\08 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\new_O1_Airport_Intersections_ALL_SCENARIOS.dwg Layout Baseline 2014 PM May 19, 2015, 5:40pm

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- Airline passenger traffic will increase based on increases in numbers of enplaned passengers at the various PALs.
- Other Airport service and employee traffic activity will increase in proportion to the blended averages of the growth rates for annual originating passengers and annual aircraft operations.
- Non-Airport background traffic will increase based on regional traffic growth rates, as reported by the North Central Texas Council of Governments (NCTCOG) model, and historical economic growth rate for Gross Metropolitan Product as reported for Dallas-Fort Worth-Arlington, Texas in *U.S. Metro Economies Outlook - Gross Metropolitan Product, and Critical Role of Transportation Infrastructure*, The United States Conference of Mayors, July 2012.

New intersection turning movement volumes based on the three growth rates for enplaned passengers at PAL E1, PAL E2, and PAL E3 were produced by the spreadsheet trip generation model. Each PAL scenario was then modeled in the Synchro® version 7 based on Highway Capacity Manual procedures. This traffic signal simulation and optimization program was used to determine the level of service at each intersection. The Highway Capacity Manual utilizes control delay as the measure of effectiveness for signalized intersections. Control delay represents the average amount of travel time per vehicle added to a trip as a result of the traffic signal. **Table 4-19** summarizes the LOS criteria for signalized intersections. The results of the PAL E1 a.m. peak hour scenario are presented on **Exhibit 4-21**. According to the model results, the additional traffic generated by the Airport would result in a minimum of one movement on each approach to the Cedar Springs Road/Herb Kelleher Way at Mockingbird Lane intersection being at Level of Service (LOS) E or worse, and the intersection as a whole operating at LOS E. Additionally, the left turn traffic on the eastbound Denton Drive approach at Mockingbird Lane would also decrease to LOS F. The PAL E1 p.m. peak hour scenario results are displayed on **Exhibit 4-22**. The outbound traffic at the Cedar Springs Road/Herb Kelleher Way and Mockingbird Lane intersection would increase beyond the left-turn capacity of the dual left-turn lanes, affecting this movement as well as degrading the other approaches. However, this intersection as a whole would still operate at an overall LOS D. The level of service at the intersection of Denton Drive at Mockingbird Lane would degrade to an overall LOS D at PAL E1.

Table 4-19: LOS Criteria for Signalized Intersections

LOS	CONTROL DELAY PER VEHICLE (SECONDS/VEHICLE)
A	**< 10**
B	**> 10-20**
C	**> 20-35**
D	**> 35-55**
E	**> 55-80**
F	**> 80**

SOURCE: Transportation Research Board, *Highway Capacity Manual*, 2010.
PREPARED BY: Ricondo & Associates, Inc., January 2015.

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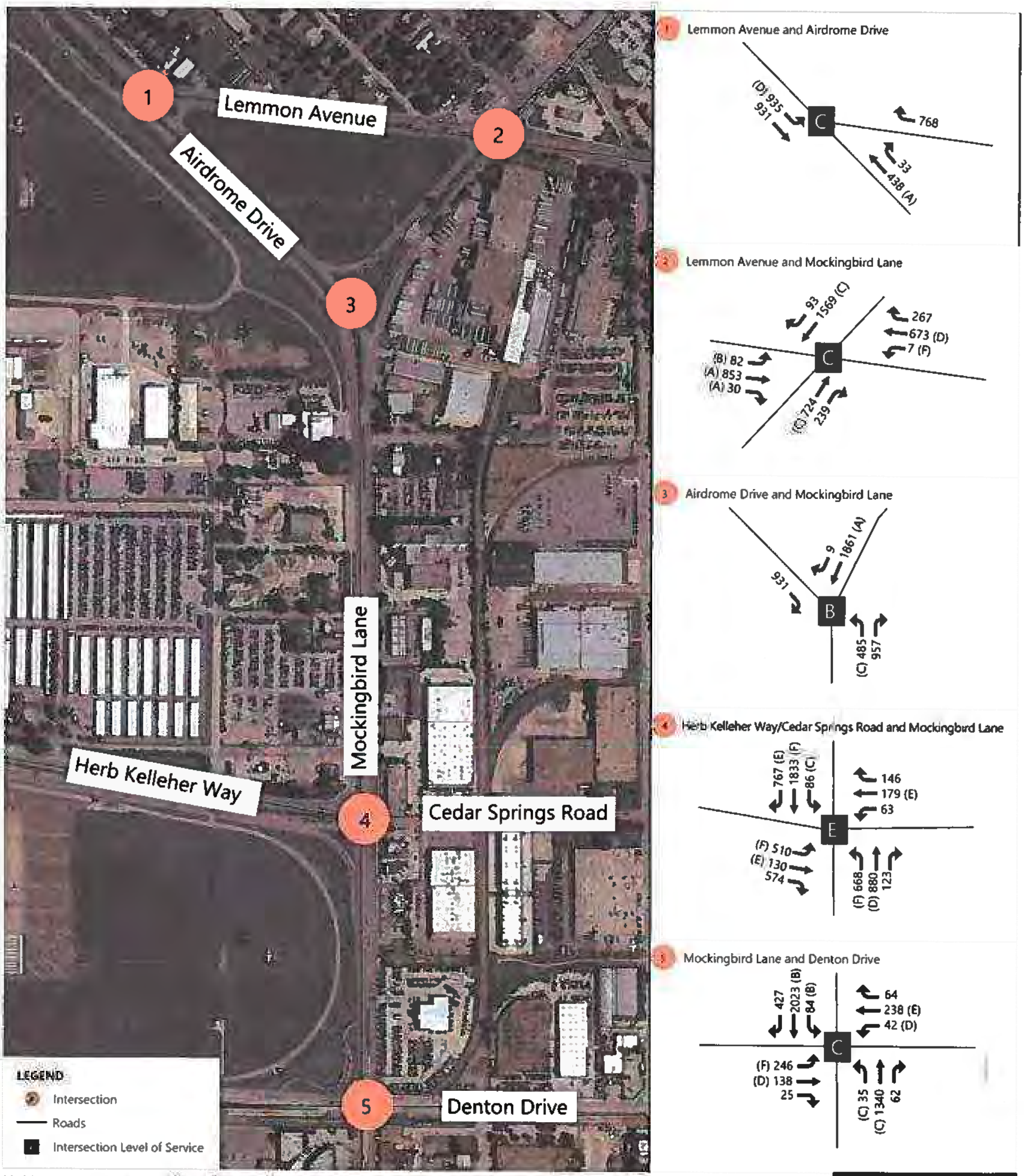

SOURCES: Google Earth Pro, February 2014; North Central Texas Council of Governments, December 2012; Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., April 2014

EXHIBIT 4-21

NORTH 0 600 ft.

Turning Movement Counts and Intersection Level of Service
PAL E1 a.m. Peak Hour

Drawing: N:\Love Field\08 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\new_Off_Airport_Intersections_ALL 8 SCENARIOS.dwg Layout: PAL E1 AM, May 19, 2015 5:41pm

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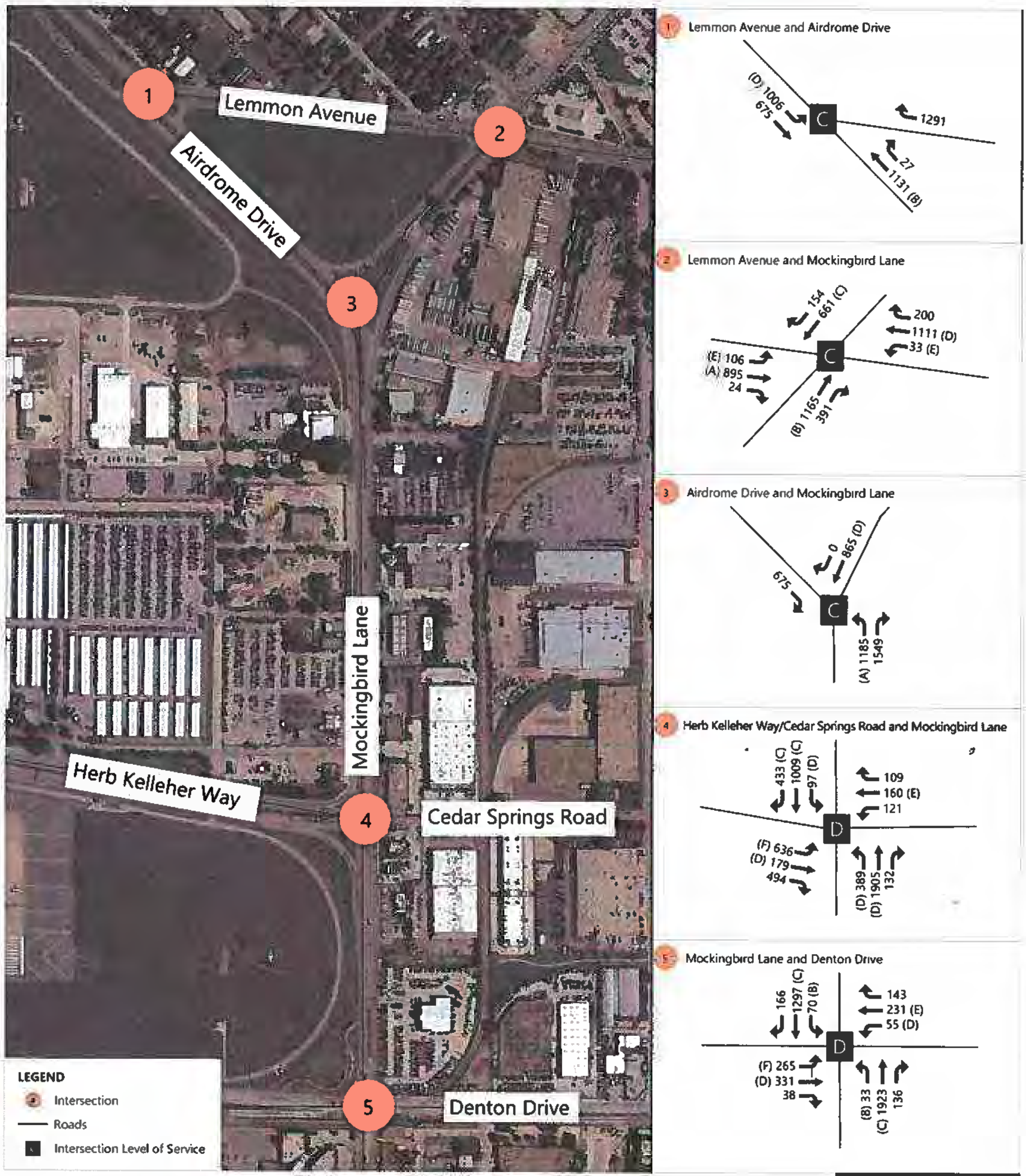

SOURCES Google Earth Pro, February 2014, North Central Texas Council of Governments, December 2012 Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., April 2014

EXHIBIT 4-22

NORTH 0 600 ft.

Turning Movement Counts and Intersection Level of Service
PAL E1 p.m. Peak Hour

Drawing: N:\Love Field\03 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\new_Off_Airport_Intersections_ALL 8 SCENARIOS.dwg Layout: PAL E1 PM_May 19, 2015, 5:41pm

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PAL E2, representing 6.2 million annual enplaned passengers in approximately 2016, traffic analysis results are presented on **Exhibit 4-23** and **Exhibit 4-24** for the a.m. and p.m. peak hours, respectively. During the a.m. peak hour, all approaches would have at least one movement at LOS F at the Cedar Springs Road/Herb Kelleher Way at Mockingbird Lane intersection, even though overall intersection performance would be at LOS E. During the p.m. peak hour, the level of service at the Cedar Springs Road/Herb Kelleher Way and Mockingbird Lane intersection would deteriorate from LOS D to an overall LOS E.

PAL E3, representing 7.0 million annual enplaned passengers in approximately 2032, traffic analysis results are presented on **Exhibit 4-25** and **Exhibit 4-26** for the a.m. and p.m. peak hours, respectively. With the Cedar Springs Road/Herb Kelleher Way at Mockingbird Lane intersection operating at LOS F, the intersection would not be able to accommodate the Airport traffic demand and heavy southbound commuter traffic. Therefore, traffic from the Cedar Springs Road/Herb Kelleher Way at Mockingbird Lane intersection would affect other intersections, and create gridlock during the a.m. peak hour. Similar traffic would occur during the p.m. peak hour, but the heavy Airport traffic and northbound commuter Mockingbird Lane traffic would be most heavily affected.

4.5.2 TERMINAL AREA ROADWAYS

Terminal area roadway demand/capacity and requirements were determined by evaluating curbside requirements, conducting a link-by-link analysis of on-Airport roadways from the terminal area to Mockingbird Lane, and analyzing the level of service at all major intersections on Airport property.

4.5.2.1 Data Collection

As the terminal roadway demand/capacity analysis is an update of the analysis conducted for the LFMP, only limited roadway network traffic counts were collected. To effectively recalibrate the roadway data collected in 2008 for the LFMP, new vehicle classification counts were collected on the inbound roadways at the start of the upper level and lower level roadways. These new classification counts were necessary because many of the curbside vehicle assignments have changed since implementation of the LFMP, but the remainder of the inbound roadway system has remained the same. The current terminal curbside configuration consists of the lower level roadway accommodating all commercial vehicle activity, while the upper level roadway is primarily used for departing passenger private vehicle dropoff and taxicab unloading, and arriving passenger private vehicle loading. The new classification counts reflect these changes in vehicle paths. The change in combined vehicle counts for the upper level and lower level peak hours for the inbound roadways enabled the inbound and outbound roadway link volumes to be factored up accordingly. The classification counts were collected on Monday, August 12, 2013, during the a.m. departures peak between 5:30 a.m. and 8:30 a.m., and on Thursday August 15, 2013, during the p.m. arrivals peak between 5:30 p.m. and 8:30 p.m. Garage A and Garage B entry traffic volumes were also collected during the classification counts and garage exit volumes for the same time periods were obtained from the PRCS database. It should be noted that the ticketing hall section of the new terminal was under construction during the data collection periods and the curbside in front of the ticketing hall was closed; however, passenger pickup via private vehicles was still accommodated at the upper level curbside directly in front of the main terminal building entrance at this time, and should have no effect on the route allocation and classification data collected.

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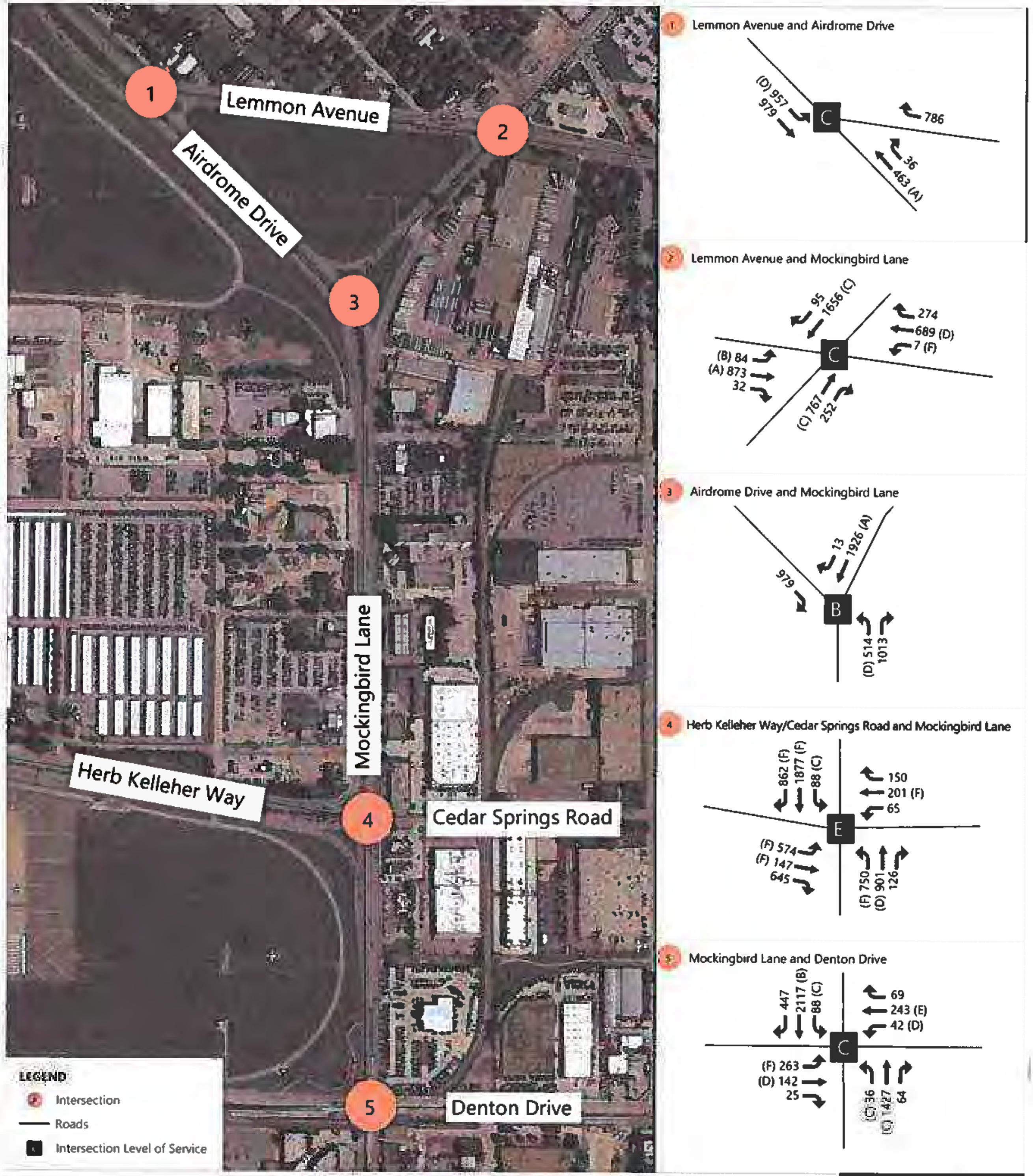

SOURCES Google Earth Pro February 2014, North Central Texas Council of Governments, December 2012, Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc. April 2014

EXHIBIT 4-23

Turning Movement Counts and Intersection Level of Service
PAL E2 a.m. Peak Hour

Drawing: N:\Love Field\08 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\new_Off_Airport_Intersections_ALL 8 SCENARIOS.dwg Layout: PAL E2 AM May 19, 2015 5:41pm

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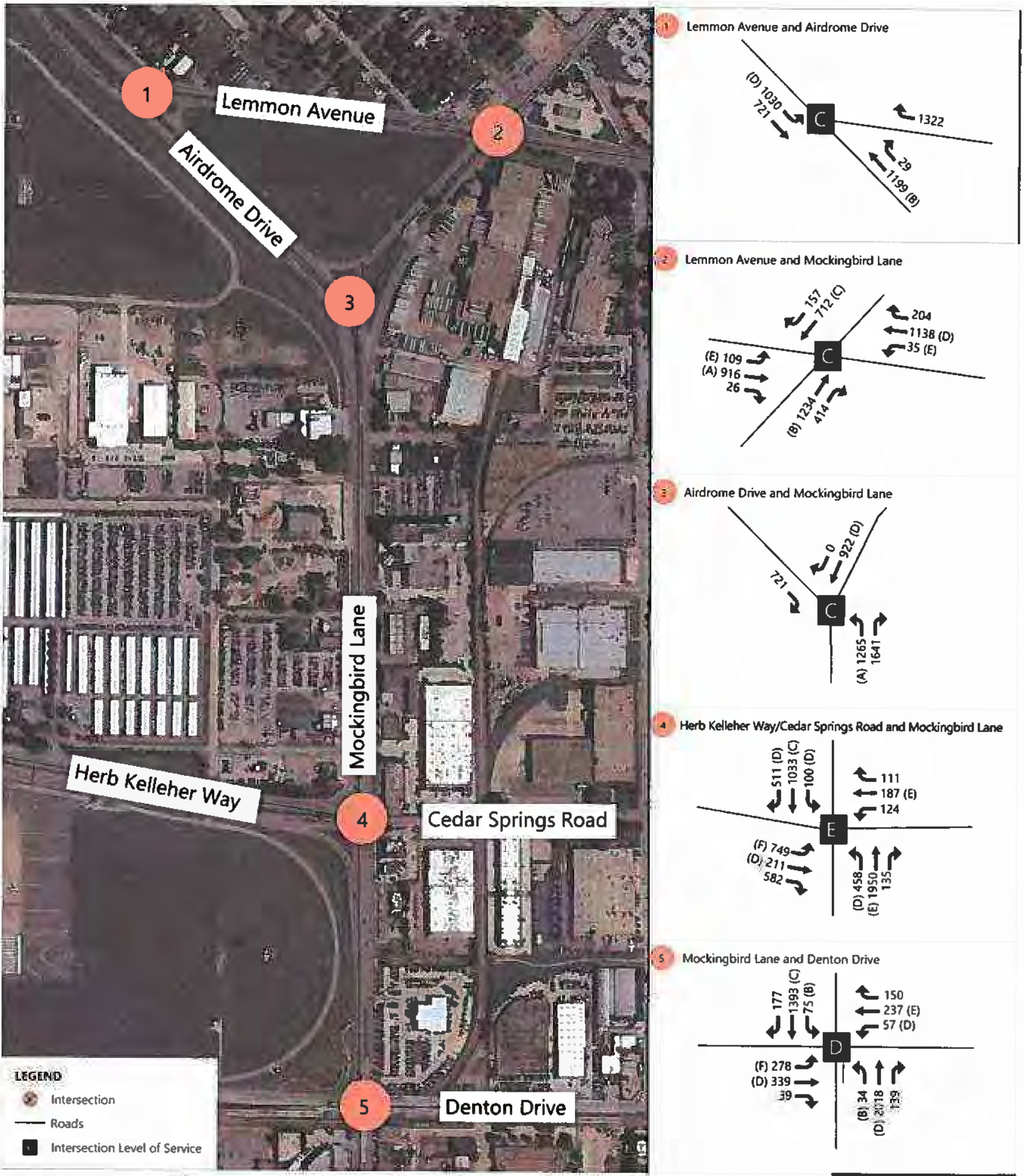

SOURCES Google Earth Pro, February 2014; North Central Texas Council of Governments, December 2012; Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., April 2014

EXHIBIT 4-24

NORTH 0 600 ft.

Turning Movement Counts and Intersection Level of Service PAL E2 p.m. Peak Hour

Drawing: N:\Love Field\03 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\new_Off_Airport_Intersections_ALL 8 SCENARIOS.dwg_Layout: PAL E2 PM_May 19, 2015 5:40pm

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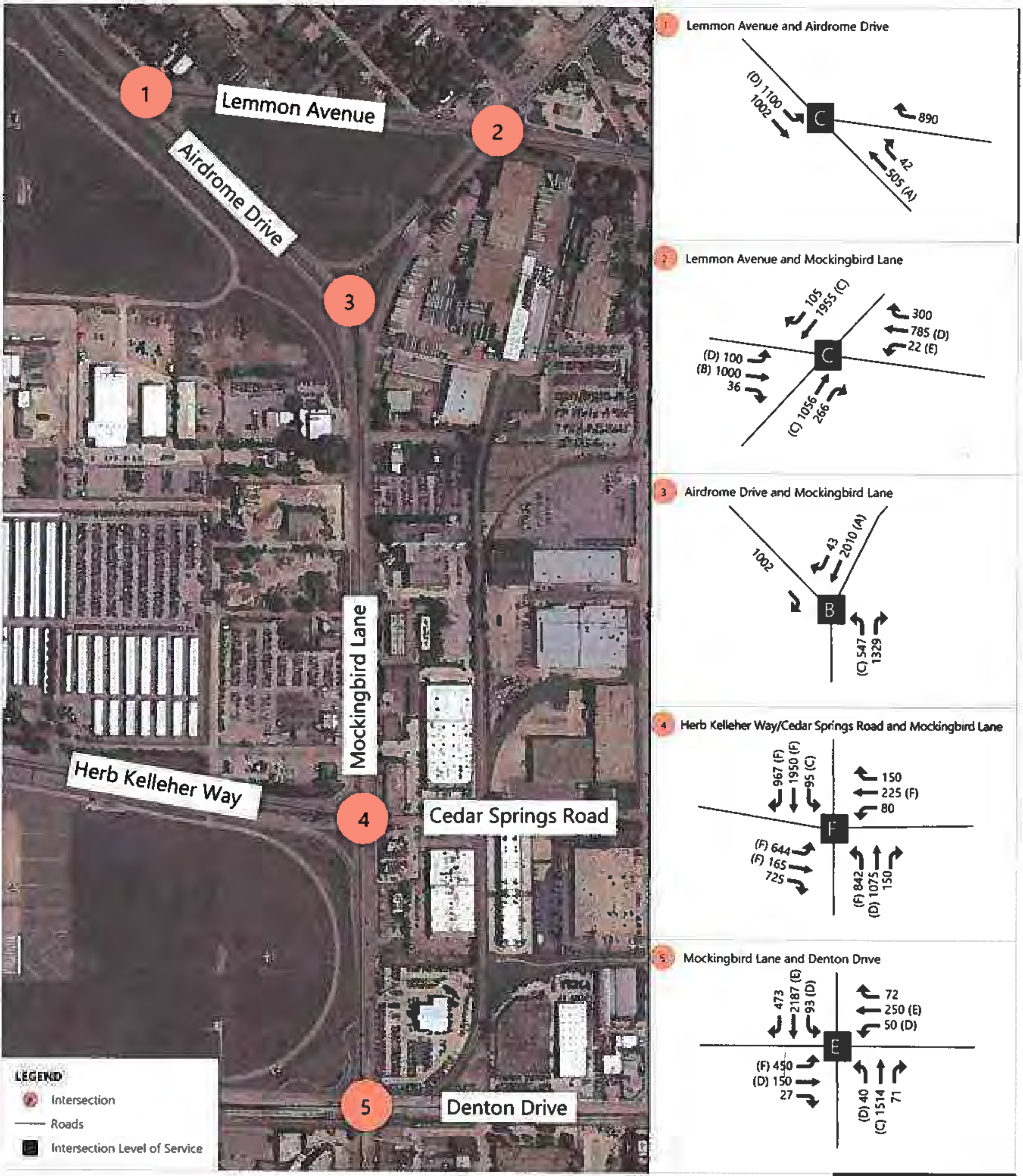

SOURCES Google Earth Pro, February 2014, North Central Texas Council of Governments, December 2012 Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., April 2014

EXHIBIT 4-25

NORTH
0
600 ft.

Turning Movement Counts and Intersection Level of Service
PAL E3 a.m. Peak Hour

Drawing: N:\Love Field\03 Master Plan Update 2013\02 Demand Capacity Analyses\05 CAD\new_Off_Airport_Intersections_ALL 8 SCENARIOS.dwg_Layout: PAL E3 AM_May 19, 2015, 5:44pm

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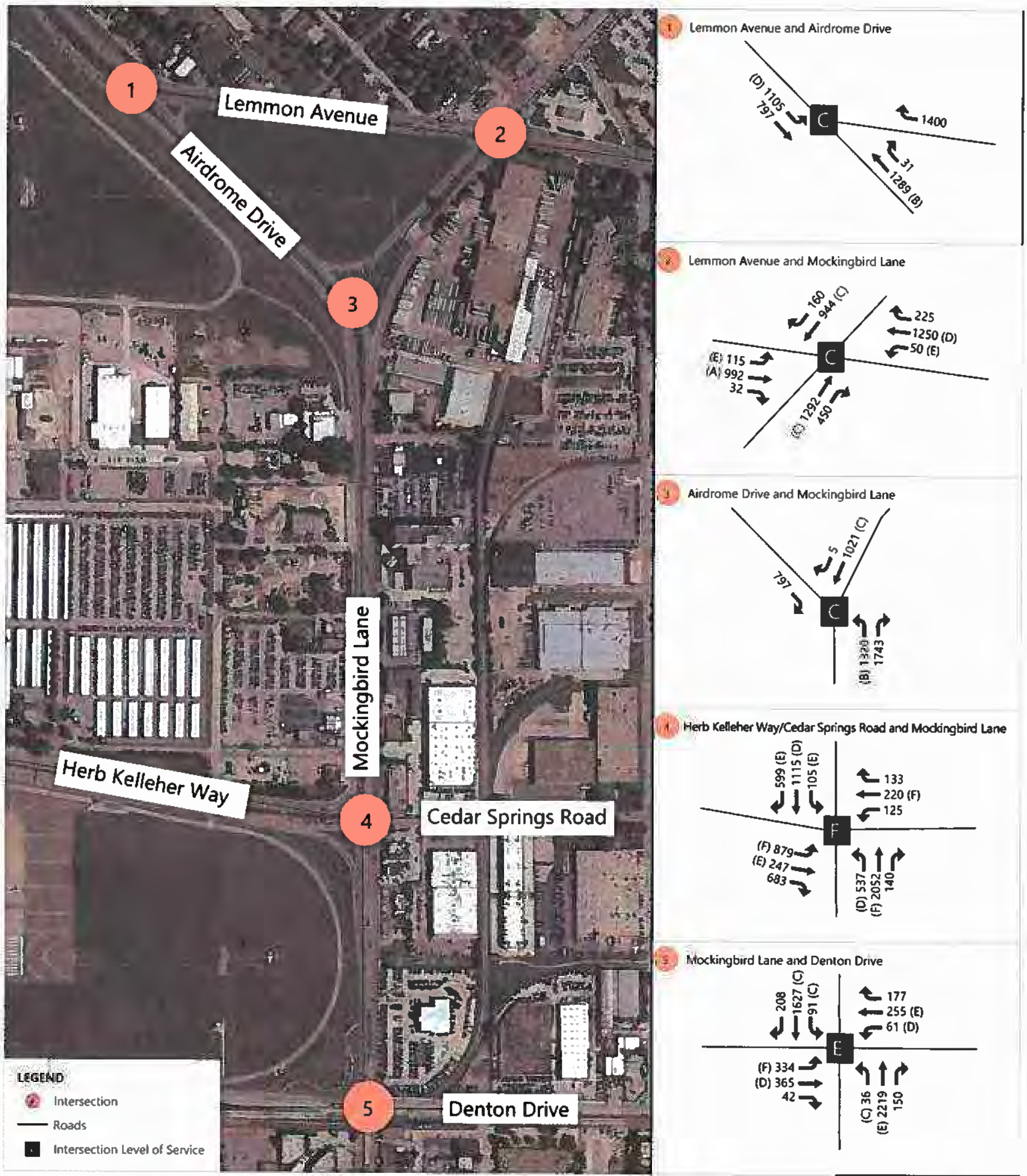

SOURCES: Google Earth Pro, February 2014. North Central Texas Council of Governments, December 2012. Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., April 2014

EXHIBIT 4-26

NORTH
0
600 ft

Turning Movement Counts and Intersection Level of Service
PAL E3 p.m. Peak Hour

Drawing: N:\Love Field\08 Master Plan Update 2013\02 Demand Capacity Analysis\05 CAD\new_Off_Airport_Intersections_ALL 8 SCENARIOS.dwg_Layout: PAL E3 PM_May 19, 2015, 5:44pm

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From the new classification counts, the a.m. peak hour occurred between 6:30 a.m. and 7:30 a.m. with a total of 979 vehicles entering the terminal area. The p.m. peak hour occurred between 6:00 p.m. and 7:00 p.m. with 971 vehicles entering the terminal area. The vehicle classification peak hour totals by vehicle mode are presented in **Table 4-20**.

Table 4-20: Vehicle Classification Summary

	A.M. PEAK (6:30 - 7:30 A.M.)		P.M. PEAK (6:00 - 7:00 P.M.)	
	NUMBER OF VEHICLES	PERCENT OF TOTAL	NUMBER OF VEHICLES	PERCENT OF TOTAL
UPPER LEVEL CURB				
Private Vehicles	356	83.6%	638	91.9%
Taxicabs	35	8.2%	39	5.6%
Hotel/Motel Shuttles	8	1.9%	0	0.0%
On-Airport Rental Car Shuttles	3	0.7%	4	0.6%
Shared Ride Vans	3	0.7%	1	0.1%
Limousines	14	3.3%	6	0.9%
Other	7	1.6%	6	0.9%
Upper Level Total	**426**	**100.0%**	**694**	**100.0%**
LOWER LEVEL CURB				
Private Vehicles	16	13.7%	70	36.3%
Taxicabs	2	1.7%	20	10.4%
Hotel/Motel Shuttles	2	1.7%	3	1.6%
Airport-operated Shuttles	89	76.1%	86	44.6%
Shared Ride Vans	2	1.7%	2	1.0%
Limousines	0	0.0%	5	2.6%
City Buses	3	2.6%	4	2.1%
Other	3	2.6%	3	1.6%
Lower Level Total	**117**	**100.0%**	**193**	**100.0%**
TERMINAL PARKING				
Valet	4	0.9%	0	0.0%
Garage A Entrance	278	63.8%	57	67.9%
Garage B Entrance	154	35.3%	27	32.1%
Parking Total	**436**	**100.0%**	**84**	**100.0%**
TERMINAL AREA TOTALS	**979**		**971**	

NOTE: Columns may not sum to 100 percent because of rounding.

SOURCE: Ricondo & Associates, Inc., August 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

4.5.2.2 Planning Activity Levels and Forecasts

From the updated curbside classification data collection, an on-Airport balanced roadway network of vehicle counts was developed. This vehicle roadway network represents the baseline 2013 vehicle counts. All roadway counts were then factored up to PAL E1, PAL E2, and PAL E3 based on the peak hour growth in numbers of arriving and departing passengers at the terminal curbsides. The growth factors between the 2013 baseline and the three PALs are presented in **Table 4-21** and were used for all on-Airport roadway demand/capacity and requirements analyses.

Table 4-21: Departures and Arrivals Peak Hour Passengers

		PAL E1		PAL E2		PAL E3	
	2013 PASSENGERS	PASSENGERS	PERCENT INCREASE	PASSENGERS	PERCENT INCREASE	PASSENGERS	PERCENT INCREASE
Departures Peak Hour	851	1,444	69.7%	1,626	91.1%	1,828	114.8%
Arrivals Peak Hour	1,391	1,537	10.5%	1,820	30.9%	2,143	54.0%

SOURCE: Ricondo & Associates, Inc., August 2013.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

4.5.2.3 Curbsides

Curbsides consist of two primary components that have measurable capacity: available curbside frontage for the loading and unloading of passengers to/from vehicles and throughput capacity of the adjacent travel lanes. The length of available curbside frontage for a given vehicle mode will affect passenger level of service and safety. Furthermore, crowded curbside frontage areas will directly affect the throughput of adjacent travel lanes. The curbside demand/capacity analysis was conducted for the 2013 baseline and PAL E1, PAL E2, and PAL E3 scenarios to determine the surplus/deficit of available curbside frontage and the throughput capacity of adjacent travel lanes.

The curbside spreadsheet model developed to estimate peak-hour terminal curbside requirements uses peak hour vehicle counts combined with average dwell times by vehicle mode to determine the linear length of curbside required. To account for nonuniform arrival rates and varying vehicle dwell times at the curbside during the peak hour, the model applies a statistical "surge" factor based on a Poisson arrivals distribution to estimate the maximum number of occupied parking spaces during the peak hour. The estimated space requirements are multiplied by the average length of one vehicle (including a buffer to represent the empty space between two parked vehicles) to determine the demand for curbside frontage in linear feet.

Curbside frontage demand is a theoretical measurement of the peak accumulation of vehicles waiting at the curbside if they were aligned nose-to-tail in a single queue. For existing conditions, a utilization factor can be derived, which is the calculated ratio of curbside demand in linear feet divided by the existing curbside length. The utilization factor provides an indication of the amount of double and triple parking that would result for a given level of demand, and the level of service associated with a given utilization rate recognizes that vehicles do not park uniformly along the curbside. For example, a very low utilization factor indicates that vehicles are easily accommodated along the inner curb without the need to double park. This utilization factor equates to an excellent level of service (e.g., LOS A). Conversely, a very high utilization factor equates to double and triple parking along the entire curbside, restricting vehicle movements and resulting in a poor level of service.

In this analysis, the upper level arrivals and departures curbsides accommodate private vehicles picking up and dropping off passengers in multiple lanes while the lower level curbsides are all assigned to commercial vehicle passenger loading/unloading, which is restricted to the lane directly adjacent to the curbside. **Table 4-22** describes the levels of service for various utilization ranges for multiple-lane passenger loading/unloading, which occurs on the upper level curbside used primarily by private vehicles.

For private vehicle curbsides with multiple-lane passenger loading/unloading, LOS C is generally a desirable condition during peak activity periods at major airports and DAL on most days of the year. LOS C represents an acceptable condition in which double parking is common, especially near terminal entrances, with some intermittent triple parking. LOS D conditions may be acceptable during peak seasonal periods.

Table 4-22: Level of Service and Utilization Ranges for Curbsides with Multiple-Lane Passenger Loading/Unloading

LOS	UTILIZATION RANGES	DESCRIPTION
A	0% - 90%	**Excellent**: Drivers experience no interference from pedestrians or other motorists
B	91% - 110%	**Very Good**: Relatively free-flow conditions with limited double parking
C	111% - 130%	**Good**: Double parking near doors is common with some intermittent triple parking
D	131% - 170%	**Fair**: Vehicle maneuverability is restricted due to frequent double/triple parking
E	171% - 200%	**Poor**: Significant delays and queues; double/triple parking throughout curbside
F	> 200%	**Failure**: Motorists unable to access/depart curbside; significant queuing along entry road

NOTE: Utilization is the ratio of curbside demand divided by available curbside length.

SOURCE: Ricondo & Associates, Inc., April 2014, based on information published in Airport Cooperative Research Program, ACRP Report 40, *Airport Curbside and Terminal Area Roadway Operations*, July 2010.

PREPARED BY: Ricondo & Associates, Inc., April 2014.

Table 4-23 describes the utilization ranges for single-lane passenger loading/unloading that typically occurs at curbsides that accommodate commercial vehicles. For commercial vehicle curbsides with single-lane passenger loading/unloading, LOS C is generally a desirable condition during peak activity periods at major airports and DAL for most days of the year. LOS D conditions may be acceptable during peak seasonal periods. Curbsides with single-lane loading are not considered to be operating at a poor level of service when all available curbside is being used (100 percent utilization). When a single lane is fully utilized, parked vehicles are still able to depart and access the curbside, and are not generally blocked by vehicles in a second parking lane. For curbsides with single-lane passenger loading/unloading, double or triple parking or queuing along 30 percent or more of the adjacent travel lane constitutes a failed level of service (i.e., LOS F).

Table 4-23: Level of Service and Utilization Ranges for Curbsides with Single-Lane Passenger Loading/Unloading

LOS	UTILIZATION RANGES	DESCRIPTION
A	0% - 70%	**Excellent:** Drivers experience no interference from pedestrians or other motorists
B	71% - 85%	**Very Good**: Relatively free-flow conditions with no double parking
C	86% - 100%	**Good**: Curbside utilization is approaching full capacity, but maneuverability is adequate
D	101% - 115%	**Fair**: Vehicle maneuverability is becoming restricted due to double parking or queuing
E	116% - 130%	**Poor**: Vehicle maneuverability is restricted due to double parking or queuing
F	> 130%	**Failure**: Delays and queues and/or double parking exceeds desired utilization

NOTE: Utilization is the ratio of curbside demand divided by available curbside length.

SOURCE: Ricondo & Associates, Inc., April 2014, based on information published in Airport Cooperative Research Program, ACRP Report 40, *Airport Curbside and Terminal Area Roadway Operations*, July 2010.

PREPARED BY: Ricondo & Associates, Inc., April 2014.

Table 4-24 provides a summary of the estimated demand and requirements for the upper level and lower level curbsides at DAL during the PAL E1, PAL E2, and PAL E3 a.m. peak hour. As shown in the table, the analysis was based on the assumption that 477 linear feet would be allocated for the departures curbside (passenger dropoff) and 318 linear feet would be allocated for the arrivals curbside (passenger pickup). In estimating the total amount of usable curb, an overlap area of approximately 162 feet was considered. This overlap area is the area between the arrivals curbside and the departures curbside. It was assumed that this area would be used for passenger dropoff during the departures peak hour and for passenger pickup during the arrivals peak hour. The functional upper level curbside would, therefore, consist of a total of 795 linear feet. As shown in the table, it is anticipated that the departures curbside would operate at LOS E at PALs E1 and E2 and at LOS F at PAL E3 during the a.m. peak hour, while the upper level arrivals and lower level commercial staging areas would operate at LOS A or LOS B during the same period. The level of service estimates for the upper level curbside were based on multiple-lane utilization, and the level of service for the lower level curbside was based on single-lane utilization, as described previously.

Table 4-24: Master Plan Curbside Allocations (a.m. Peak Hour)

		PAL E1		PAL E2		PAL E3	
A.M. PEAK	**CURB LENGTH AVAILABLE (FEET)**	**REQUIRED CURB LENGTH (FEET)**	**CURBSIDE LEVEL OF SERVICE**	**REQUIRED CURB LENGTH (FEET)**	**CURBSIDE LEVEL OF SERVICE**	**REQUIRED CURB LENGTH (FEET)**	**CURBSIDE LEVEL OF SERVICE**
				UPPER LEVEL			
Arrivals Curbside	318	100	A	100	A	125	A
Departures Curbside	477	840	E	915	E	990	F
				LOWER LEVEL			
Taxicabs	227	25	A	50	A	50	A
Limousines	92	30	A	30	A	30	A
Shared Ride/Door-to-Door Vehicles	80	30	A	30	A	30	A
Rental Car Shuttles	197	30	A	30	A	30	A
Hotel/Motel/Parking Shuttles Dropoff	244	120	A	150	A	180	B
Hotel/Motel/Parking Shuttles Pickup	192	60	A	60	A	60	A
Dallas Area Rapid Transit Buses	60	40	A	40	A	40	A
Lower Level Totals	**1,092**	**335**	**A**	**390**	**A**	**420**	**A**

SOURCE: Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

Table 4-25 provides a summary of the estimated demand and requirements for the upper level and lower level curbsides during the PAL E1, PAL E2, and PAL E3 p.m. peak hour. As shown in the table, the analysis was based on the assumption that 428 linear feet would be allocated for the departures curbside (passenger dropoff) and 367 feet would be allocated for the arrivals curbside (passenger pickup). The total amount of usable curbside, similar to the analysis of the upper level curbside, was assumed to include an approximate 162-foot overlap area between the arrivals and departures curbsides. Use of this area would be shared between arrivals and departures during the respective peak hours to accommodate curbside demand. It was assumed that 70 percent of the overlap area would be utilized by people accessing the departures curbside, and that 30 percent would be utilized by people accessing the arrivals curbside. As shown in the table, it is estimated that the departures curbside would operate at LOS D at PAL E1, LOS E at PAL E2, and LOS F at PAL E3 during the p.m. peak hour and the arrivals curbside would operate at LOS C at PAL E1 and at LOS D at PALs E2 and E3. The lower level commercial staging areas would operate at LOS A during the same period. The level of service estimates for the upper level curbside were based on multiple-lane utilization and the level of service for the lower level curbside was based on single-lane utilization, as previously discussed. Therefore, the capacity of the departure curbside needs to be improved to avoid severe congestion and delay during a.m. and p.m. peak hours. Because no additional linear curbside is planned for the recently renovated terminal area, operational curbside improvements are required to improve the efficiency of the upper level departures and arrivals areas. Potential improvements include: improved signage, additional pavement markings delineating the loading lanes and by-pass lanes, improved enforcement by police to reduce excessive dwell times and expansion/relocation of cellphone lots to reduce the number of recirculating vehicles.

Table 4-25: Master Plan Curbside Allocations (p.m. Peak Hour)

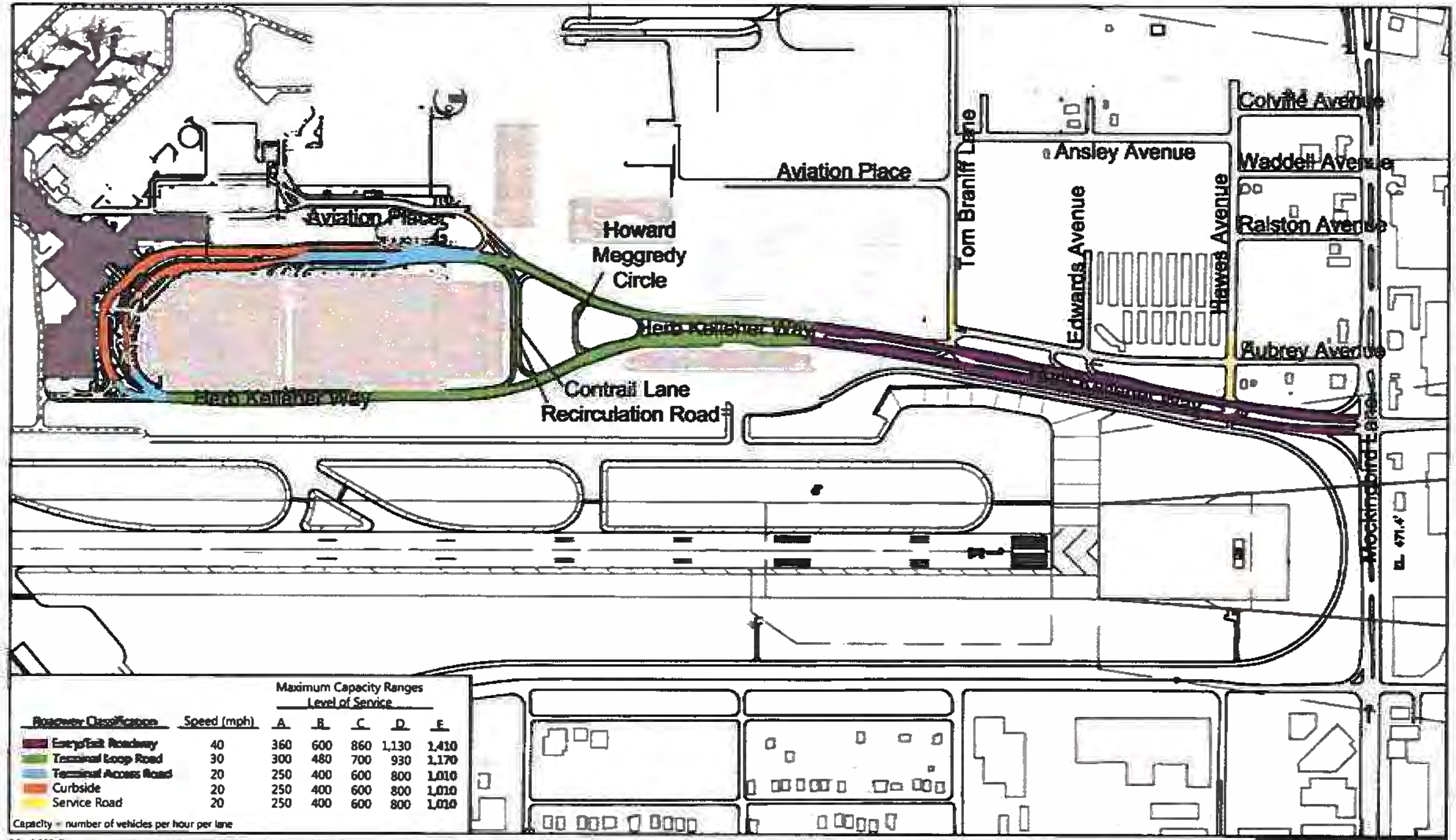
		PAL E1		PAL E2		PAL E3	
P.M. PEAK	CURB LENGTH AVAILABLE (FEET)	REQUIRED CURB LENGTH (FEET)	CURBSIDE LEVEL OF SERVICE	REQUIRED CURB LENGTH (FEET)	CURBSIDE LEVEL OF SERVICE	REQUIRED CURB LENGTH (FEET)	CURBSIDE LEVEL OF SERVICE
				UPPER LEVEL			
Arrivals Curbside	367	450	C	500	D	525	D
Departures Curbside	428	685	D	760	E	885	F
				LOWER LEVEL			
Taxicabs	227	100	A	100	A	100	A
Limousines	92	30	A	60	A	30	A
Shared Ride/Door-to-Door Vehicles	80	30	A	30	A	30	A
Rental Car Shuttles	197	60	A	60	A	60	A
Hotel/Motel/Parking Shuttles Drop-off	244	60	A	90	A	90	A
Hotel/Motel/Parking Shuttles Pickup	192	90	A	90	A	90	A
Dallas Area Rapid Transit Buses	60	40	A	40	A	40	A
Lower Level Totals	**1,092**	**410**	**A**	**470**	**A**	**440**	**A**

SOURCE: Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., April 2014

4.5.2.4 On-Airport Roadways

The on-Airport roadway demand/capacity analysis conducted for the Master Plan Update consisted of updating the trip generation and trip assignment model developed for the LFMP. This spreadsheet demand/capacity model was used to calculate the capacity of the roadway system on a link-by-link basis. The terminal area roadways are classified based on speed flow rate tables applicable to airport roads, as developed in conformance with the guidelines in Airport Cooperative Research Program (ACRP) Report 40, *Airport Curbside and Terminal Area Roadway Operations*. The capacity and level of service ranges for terminal area roadways are summarized on **Exhibit 4-27**. Roadways at Dallas Love Field range from entry/exit roadways with speeds of 30 miles per hour to curbside roadways with speeds below 20 miles per hour. For the ease of identifying links, each link was given a letter designation. **Exhibit 4-28** provides a map of the roadway links considered in this demand/capacity analysis.

The link-by-link demand/capacity analysis was conducted for PAL E1, PAL E2, and PAL E3 for both the a.m. and p.m. peak periods based on the growth factors for enplaned passengers provided earlier in Table 4-20. The resulting demand volumes and level of service for each link are presented in **Table 4-26**. LOS A represents the optimal operating condition, characterized by uninterrupted free flow operations. LOS F represents the worst operating condition, characterized by severe roadway congestion and delay. LOS C is generally a desirable operating condition for the design of new facilities; however, LOS D conditions may be acceptable at some larger airports such as DAL during peak periods. For purposes of analyzing existing facilities and the need to provide improvements, it was assumed that LOS D conditions would be the "trigger point" at which capacity enhancements or demand reduction measures would be implemented before LOS E or F conditions occur.



Roadway Classification	Speed (mph)	Maximum Capacity Ranges Level of Service A	B	C	D	E
Entry/Exit Roadway	40	360	600	860	1,130	1,410
Terminal Loop Road	30	300	480	700	930	1,170
Terminal Access Road	20	250	400	600	800	1,010
Curbside	20	250	400	600	800	1,010
Service Road	20	250	400	600	800	1,010

Capacity = number of vehicles per hour per lane

SOURCES: Transportation Research Board, ACRP Report 40, July 2010, Ricondo & Associates Inc. April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

EXHIBIT 4-27

Roadway Link Capacities

NORTH 0 NTS

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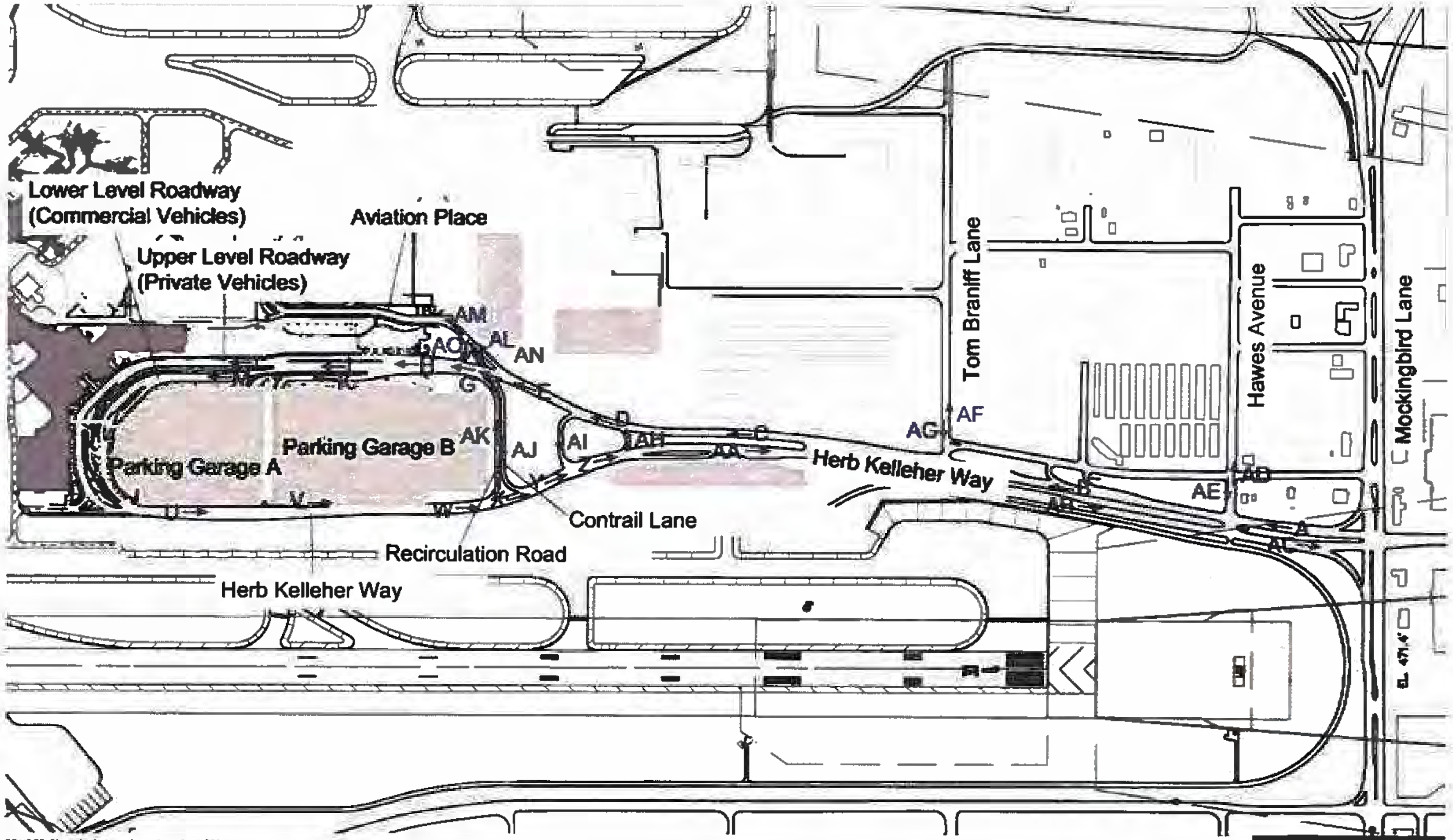

SOURCE: Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

EXHIBIT 4-28

Roadway Network Link Designations

NORTH 0 NTS

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Table 4-26: Terminal Area Roadway Demand/Capacity Analysis

LINK	LOCATION	NUMBER OF LANES	LINK SPEED	BASELINE CAPACITY		PAL E1				PAL E2				PAL E3			
						A.M. PEAK		P.M. PEAK		A.M. PEAK		P.M. PEAK		A.M. PEAK		P.M. PEAK	
				VEHICLES PER LANE PER HOUR	LINK CAPACITY (VEHICLES/ HOUR)	NUMBER OF VEHICLES	LEVEL OF SERVICE	NUMBER OF VEHICLES	LEVEL OF SERVICE	NUMBER OF VEHICLES	LEVEL OF SERVICE	NUMBER OF VEHICLES	LEVEL OF SERVICE	NUMBER OF VEHICLES	LEVEL OF SERVICE	NUMBER OF VEHICLES	LEVEL OF SERVICE
A	Herb Kelleher Way, Inbound between Mockingbird Lane and Hawes Avenue	4	40	1,410	5,640	1,852	B	1,064	A	2,085	B	1,260	A	2,344	B	1,483	B
B	Herb Kelleher Way, Inbound between Hawes Avenue and Tom Braniff Lane	4	40	1,410	5,640	1,842	B	1,058	A	2,075	B	1,253	A	2,332	B	1,475	B
C	Herb Kelleher Way, Inbound between Tom Braniff Lane and 2nd Recirculation Road	3	40	1,410	4,320	1,976	C	1,059	A	2,225	C	1,255	B	2,501	C	1,477	B
D	Herb Kelleher Way, Inbound between 2nd Recirculation Road and Outbound Recirculation Road	4	30	1,170	4,680	2,008	C	1,109	A	2,261	C	1,313	B	2,542	C	1,546	B
E	Herb Kelleher Way, Inbound between Outbound Recirculation Road and Aviation Place Exit	4	30	1,170	4,680	1,935	C	1,041	A	2,179	C	1,234	B	2,449	C	1,452	B
F	Herb Kelleher Way, Inbound between Aviation Place Exit and Aviation Place Outbound Road	3	30	1,170	3,510	1,626	C	1,006	B	1,831	C	1,192	B	2,058	C	1,403	B
G	Herb Kelleher Way, Inbound between Aviation Place Exit and Aviation Place Inbound to Terminal	4	30	1,170	4,680	1,660	B	1,073	A	1,869	B	1,272	B	2,101	C	1,497	B
H	Herb Kelleher Way, Inbound between Aviation Place Inbound and Terminal/Cell Phone Lot/Garage Split	6	20	1,010	6,060	1,660	B	1,073	A	1,869	B	1,272	A	2,101	B	1,497	A
I	Herb Kelleher Way, Inbound between Garages A and B Split and Upper/Lower Level Terminal Split	6	20	1,010	6,060	927	A	981	A	1,044	A	1,162	A	1,173	A	1,367	A
K	Entrances to Garages A and B	1	20	1,010	1,010	733	D	93	A	826	E	110	A	928	E	129	A
L	Upper Level Curbside (Private Vehicles)	4	20	1,010	4,040	726	A	767	A	818	A	909	A	920	A	1,070	B
M	Lower Level Curbside (Courtesy Vehicles)	2	20	1,010	2,020	200	A	213	A	226	A	252	A	254	A	297	A
U	Herb Kelleher Way, Outbound between Terminal Exit and Garages A and B Exit Road	3	30	1,170	3,510	927	B	981	B	1,044	B	1,162	B	1,173	B	1,367	B
V	Garages A and B Exit Road	2	30	1,170	2,340	46	A	412	A	52	A	488	A	58	A	574	A
W	Herb Kelleher Way, Outbound between Garages A and B Exit and 1st Recirculation Road	4	30	1,170	4,680	973	A	1,393	B	1,095	A	1,650	B	1,231	B	1,942	C
X	Herb Kelleher Way, Outbound between 1st Recirculation Road and Aviation Place	4	30	1,170	4,680	939	A	1,325	B	1,057	A	1,570	B	1,188	A	1,848	B
Y	Herb Kelleher Way, Outbound between Aviation Place and Outbound Recirculation Road	4	30	1,170	4,680	1,137	A	1,433	B	1,281	B	1,698	B	1,439	B	1,999	C
Z	Herb Kelleher Way, Outbound between Outbound Recirculation Road and 2nd Recirculation Road	4	30	1,170	4,680	1,210	B	1,501	B	1,363	B	1,778	B	1,532	B	2,093	C
AA	Herb Kelleher Way, Outbound between 2nd Recirculation Road and Tom Braniff Lane	3	40	1,410	4,230	1,178	B	1,451	B	1,327	B	1,719	B	1,491	B	2,023	C
AB	Herb Kelleher Way, Outbound between Tom Braniff Lane and Hawes Avenue	4	40	1,410	5,640	1,147	A	1,436	A	1,292	A	1,702	B	1,452	B	2,003	B
AC	Herb Kelleher Way, Outbound between Hawes Avenue and Mockingbird Lane	4	40	1,410	5,640	1,094	A	1,414	A	1,232	A	1,675	B	1,384	A	1,971	B
AD	Hawes Avenue, Northbound	1	30	1,170	1,170	74	A	114	A	85	A	131	A	103	A	160	A
AE	Hawes Avenue, Southbound	1	30	1,170	1,170	34	A	86	A	39	A	99	A	48	A	121	A
AF	Tom Braniff Lane, Northbound	1	20	1,010	1,010	51	A	96	A	59	A	110	A	71	A	134	A
AG	Tom Braniff Lane, Southbound	1	20	1,010	1,010	141	A	112	A	163	A	129	A	198	A	157	A
AH	2nd Recirculation Road	1	30	1,170	1,170	32	A	50	A	36	A	59	A	41	A	69	A
AI	Outbound Recirculation Road	1	30	1,170	1,170	73	A	67	A	82	A	80	A	92	A	94	A
AJ	Aviation Place, Outbound Adjacent to 1st Recirculation Road	1	20	1,010	1,010	199	A	108	A	224	A	128	A	251	B	151	A
AK	1st Recirculation Road	1	20	1,010	1,010	34	A	67	A	38	A	80	A	43	A	94	A
AL	Aviation Place, Northbound Exit Road	1	20	1,010	1,010	309	B	15	A	348	B	18	A	391	B	22	A
AM	Aviation Place, Southbound Prior to Intersection with Herb Kelleher Way	1	20	1,010	1,010	199	A	88	A	224	A	105	A	251	B	123	A
AN	Aviation Place, Southbound Outbound lanes through Intersection at Herb Kelleher Way	1	20	1,010	1,010	199	A	88	A	224	A	105	A	251	B	123	A
AO	Aviation Place, Inbound Exit toward Terminal	1	20	1,010	1,010	0	A	0	A	0	A	0	A	0	A	0	A

SOURCE: Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

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The a.m. peak resulted in the highest roadway volumes, with the single-lane ramp to the entrance to Garages A and B (Link K) experiencing LOS D at PAL E1, and LOS E at PALs E2 and E3. The p.m. peak link-by-link analysis did not produce any roadway deficiencies (LOS D or worse) at any PAL.

4.5.2.5 On-Airport Intersection Level-of-Service Analysis

Intersection level-of-service analysis provides a quantitative means of determining the operation of signalized and unsignalized intersections. This analysis was conducted at two signalized intersections: the Herb Kelleher Way with Aviation Place intersection and the Herb Kelleher Way with Tom Braniff Lane intersection. The intersection of Herb Kelleher Way and Hawes Avenue is a stop-controlled intersection that was analyzed using a different process. In all cases, Synchro® version 7 was used to analyze the intersections based on *Highway Capacity Manual* procedures.

The existing signal timings at the two signalized intersections were obtained from the City of Dallas, Department of Public Works and Transportation, and incorporated within a Synchro signal timing network model that was created to analyze the terminal area roadway and traffic signal network. **Table 4-27** presents the estimated vehicle delay, volume/capacity ratio (V/C), and level of service during the a.m. departures peak and the p.m. arrivals peak for the intersections at PAL E1, PAL E2, and PAL E3. It is anticipated that both signalized intersections would operate at LOS B or better through PAL E3.

As shown in the table, it is estimated that the stop-controlled intersection at Herb Kelleher Way and Hawes Avenue would operate at LOS B or better at PAL E1, but would deteriorate to LOS F at PAL E2, as left-turning vehicles traveling south on Hawes Avenue would have a difficult movement across four inbound lanes on Herb Kelleher Way onto outbound Herb Kelleher Way, which currently backs up past Hawes Avenue during peak periods. While it could be assumed that signalization would improve the level of service at this intersection, its proximity to the Cedar Springs Road/Herb Kelleher Way and Mockingbird Lane intersection, and the long queuing on outbound Cedar Springs Road/Herb Kelleher Way suggest that this intersection would operate better if reconfigured as a right turn-in/right turn-out for the inbound Cedar Springs Road/Herb Kelleher Way traffic.

Table 4-27: Intersection Level of Service Analysis

		HERB KELLEHER WAY AT AVIATION PLACE (SIGNALIZED)		HERB KELLEHER WAY AT TOM BRANIFF LANE (SIGNALIZED)		HERB KELLEHER WAY AT HAWES AVENUE (STOP-CONTROLLED)	
		DEPARTURES PEAK	ARRIVALS PEAK	DEPARTURES PEAK	ARRIVALS PEAK	DEPARTURES PEAK	ARRIVALS PEAK
PAL E1	Delay (seconds)	5.5	3.3	9.4	9.4	3.2	10.3
	V/C [1/]	0.53	0.31	0.53	0.33	0.89	1.28
	LOS [2/]	A	A	A	A	A	B
PAL E2	Delay (seconds)	6.1	3.5	9.6	9.1	7.4	23.6
	V/C [1/]	0.59	0.36	0.59	0.38	1.68	2.32
	LOS [2/]	A	A	A	A	F	F
PAL E3	Delay (seconds)	5.6	3.7	13.1	10.4	124.2	333.8
	V/C [1/]	0.67	0.43	0.68	0.46	5.70	7.44
	LOS [2/]	A	A	B	B	F	F

NOTES:

1/ V/C = Volume to capacity ratio; if this value is greater than 1.0, there is more traffic demand than the roadway can handle, and delays are imminent.

2/ Intersection level of service is a function of delay attributed to the traffic control device, either a traffic signal or a stop sign, and is expressed in seconds per vehicle based on the following criteria:

Signalized Intersection Level of Service

LOS	Control Delay (seconds/vehicle)
A	<10.0
B	>10.0 and < 20.0
C	>20.0 and < 35.0
D	>35.0 and < 55.0
E	>55.0 and < 80.0
F	>80.0

Stop Controlled Level of Service

LOS	Control Delay (seconds/vehicle)
A	<10.0
B	>10.0 and < 15.0
C	>15.0 and < 25.0
D	>25.0 and < 35.0
E	>35.0 and < 50.0
F	>50.0

SOURCES: Ricondo & Associates, Inc.; Transportation Research Board, *Highway Capacity Manual*, 2010.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

4.6 Taxicab and Commercial Vehicle Staging Area Requirements

Other ground transportation facilities considered for the Master Plan Update include the taxicab staging area and commercial vehicle staging area, as discussed below.

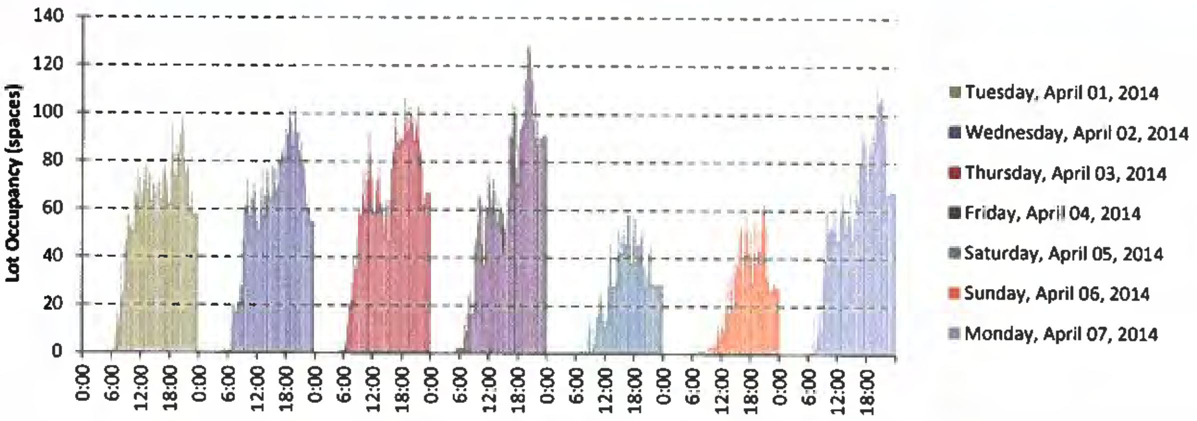
4.6.1 TAXICAB STAGING AREA

Only taxicabs with approved City of Dallas Department of Public Works and Transportation decals and North Texas Tollway Authority (NTTA) TollTag transponders are permitted to stage and load passengers at the Airport. The staging procedure requires taxicabs to process in sequence through the remote holding area, terminal staging/queuing area, and curbside loading area. All taxicab drivers must first check in at the remote holding area located at the old National/Alamo/Enterprise rental car site located between Tom Braniff Lane, Edwards Avenue, and Ansley Avenue. As taxicabs are needed at the terminal curbside loading area, the curbside taxicab starter calls for additional taxicabs from the terminal staging/queuing area located on the left-side lane of the lower level roadway adjacent to Garage A. The number of taxicabs requested by the starter is then released from the remote holding area to the terminal staging/queuing area. A maximum of nine taxicabs can be accommodated at the curbside loading area. The maximum capacity of the terminal staging/queuing area is approximately 12 taxicabs. The taxicab remote holding area (former rental car lot) has been restriped with linear taxicab queue lanes for taxicab staging, and has a marked capacity of 160 spaces, but would have a much higher capacity if the lot were to be cleared of some existing buildings and restriped for optimal taxicab staging. The ultimate capacity of the approximate 100,000-square-foot taxicab remote holding area has the potential to accommodate 225 to 275 taxicab spaces.

The curbside loading area, terminal staging/queuing area, and remote holding area are equipped with NTTA automated vehicle identification (AVI) receivers to monitor taxicab vehicle movements. The AVI data were obtained from the NTTA to process the daily demand profile for taxicabs and other commercial vehicles at Dallas Love Field.

The entry and exit AVI data from the NTTA were processed in 15-minute increments over a period of one week to develop a lot occupancy chart. **Exhibit 4-29** provides a summary of the estimated taxicab staging area occupancy for the week of April 1 through April 7, 2014. The taxicab staging area data indicate that taxicab demand is highest during weekdays, especially on Mondays and Fridays, and significantly lower on weekends. Taxicab demand by arriving passengers typically tends to be higher early in the week, as the demand is often driven by the arrival of out-of-town business travelers, and on Friday evening by out-of-town leisure travelers arriving for weekend visits or returning business travelers who elect not to use a private vehicle and park at the Airport.

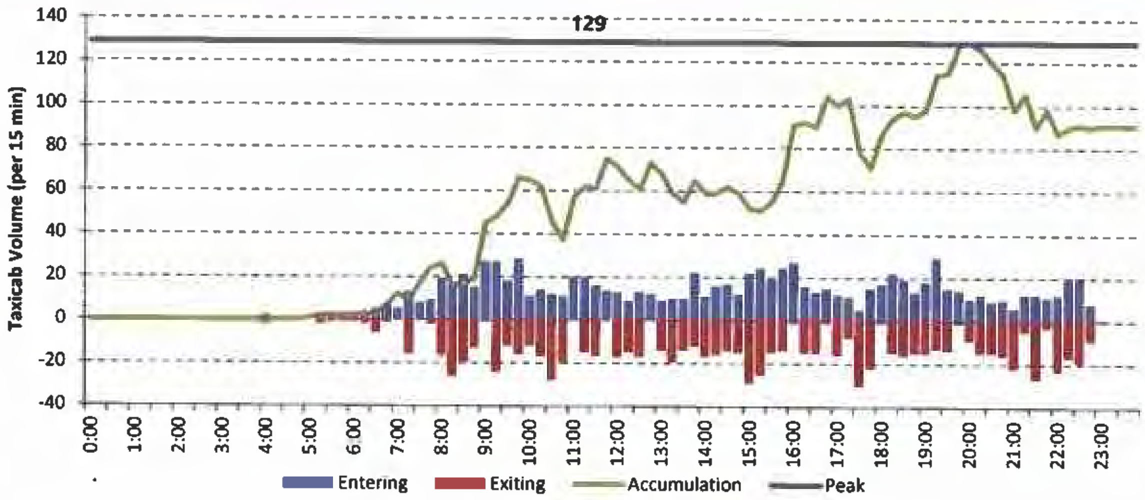
Exhibit 4-29: Existing Taxicab Staging Area Vehicle Occupancy



SOURCES: North Texas Tollway Authority, April 2014; Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

The bar graph presented on **Exhibit 4-30** shows a comparison of the taxicab staging area entries and exits to the taxicab staging area on the peak day, Friday, April 4, 2014; the line graph on the same exhibit illustrates the resulting taxicab accumulation within the staging area, which peaks at 129 taxicabs between 7:00 p.m. and 8:00 p.m. The overall accumulation total within the staging area provides an indication of actual staging area occupancy based on procedures followed by the taxicab starter. Consequently, the overall area accumulation over the course of the day typically includes an excess supply of taxicabs waiting in the lot for excessive periods.

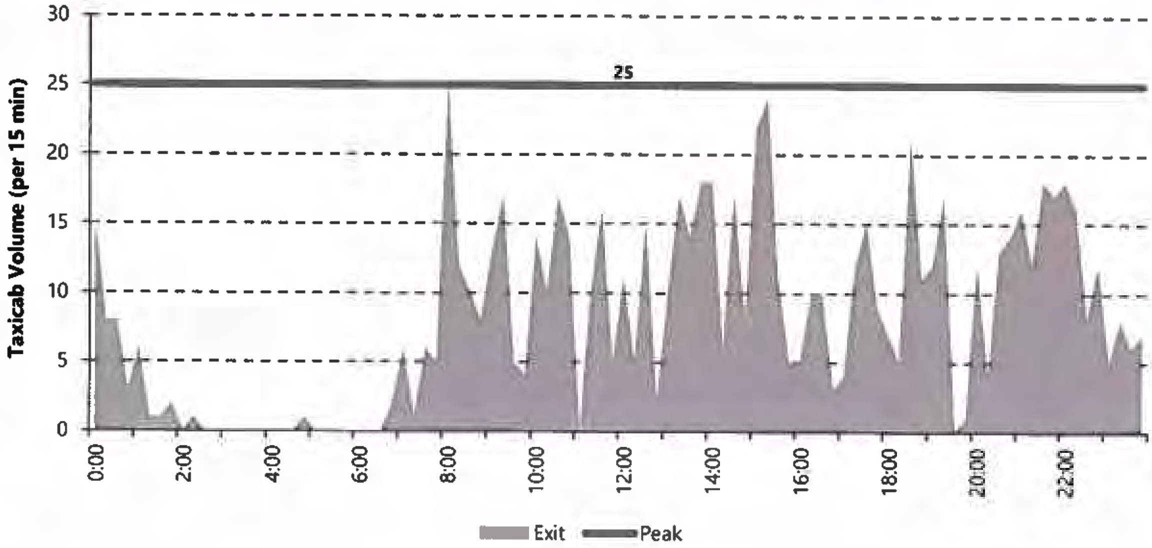
Exhibit 4-30: Comparison of Peak Day Taxicab Staging Area Vehicle Accumulation with Taxicab Entries and Exits



SOURCES: North Texas Tollway Authority, April 2014; Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

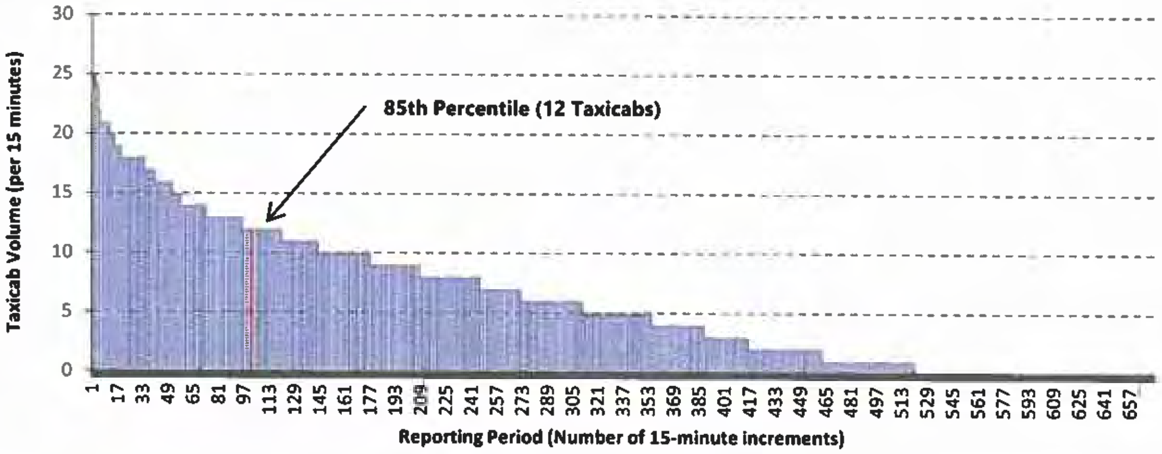
For purposes of estimating facility requirements for a taxicab staging area, it is important to balance overall demand with the number of taxicabs required to serve actual demand at curbside. This analysis was based on a review of the number of taxicabs dispatched from the taxicab staging area in 15-minute increments to serve arriving passengers at curbside. **Exhibit 4-31** shows that, except for a single 15-minute demand spike of 25 vehicles, the 15-minute demand for taxicabs at the terminal curbside exceeded 18 taxicabs during only four periods of the day. To understand the overall demand characteristics throughout the day, **Exhibit 4-32** was prepared to show the 15-minute demand for the week in decreasing order of magnitude. As shown on the exhibit, the 85th percentile taxicab demand was equal to 12 taxicabs, which represents approximately 41 percent of the overall peak 15-minute demand for 29 taxicabs at the arrivals curbside. It is important to note that the 15-minute demand for taxicabs represents an efficient operation where drivers dwell in the staging area for relatively short durations before being dispatched to the curbside.

Exhibit 4-31: Peak Day Taxicab Demand at Curbside



SOURCES. North Texas Tollway Authority, April 2014, Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

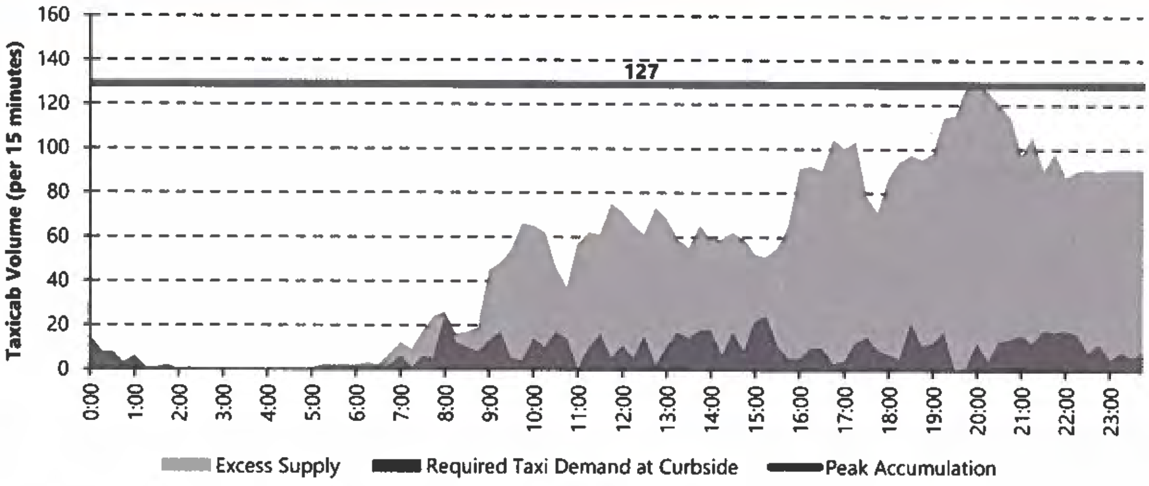
Exhibit 4-32: Taxicab Demand at Curbside in Decreasing Order of Magnitude for April 1 through April 7, 2014



SOURCES: North Texas Tollway Authority, April 2014, Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

Exhibit 4-33 illustrates the estimated excess supply of taxicabs dwelling in the staging area throughout the day, which is calculated as the difference between the total number of taxicabs in the staging area less the number of taxicabs needed to serve the demand for taxicabs at curbside. As shown on the exhibit, the excess supply is estimated to reach a maximum of 127 taxicabs between 7:45 and 8:00 p.m. Furthermore, the data suggest that the existing taxicab staging area capacity of approximately 160 taxicabs is sufficient to serve existing demand.

Exhibit 4-33: Comparison of Peak Day Taxicab Demand versus Excess Supply



SOURCES: North Texas Tollway Authority, April 2014, Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

Future taxicab staging area requirements were computed based on factoring the current peak day maximum 15-minute taxicab curbside demand plus a reasonable supply of additional taxicabs in the staging area. Both the curbside demand and additional supply values were assumed to be directly related to the increase in passenger activity, as well as possible changes in other factors, such as vehicle mode split. For purposes of this analysis, future taxicab demands and requirements were estimated using the following assumptions:

- Taxicab demand will increase at the same rate as forecast growth in the number of O&D passengers annual
- The proportion of airline passengers using taxicabs (i.e., mode split) in the future will remain the same as in the year 2012
- The taxicab operation will be managed to maintain a reasonable supply in the staging area as required to meet anticipated demand

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The taxicab companies have the ability to control the arrival or supply of taxicabs in the staging area to minimize excessive dwell times and the potential overflow of the staging area. However, it is important to acknowledge that minimizing supply to respond to curbside demand on a "just-in-time" basis is not a reasonable operating parameter. As a result, an excess supply of taxicabs beyond the immediate short-term demand is required to ensure that taxicabs are available to accommodate unanticipated surges and maintain an acceptable level of customer service. **Exhibit 4-34** illustrates the forecast growth in the peak 15-minute taxicab demand at the terminal based on the forecast growth in the number of O&D passengers provided in Section 3. However, because taxicab supply cannot be managed on a just-in-time basis, **Exhibit 4-35** was prepared to depict the additional supply needed to maintain a larger reserve within the staging area. The supply calculations depicted on the exhibit are provided in **Table 4-28**. The information in the table and on the exhibit illustrate the forecast peak 15-minute taxicab demand plus the additional taxicab supply that would be required to serve the peak demand occurring over 60, 90, and 120 minutes based on the assumption that all vehicles required to accommodate demand are queued within the staging area and that no additional supply would enter the area during that period.

The information on the exhibit illustrates the importance of managing the taxicab supply and the length of time drivers dwell in the staging area. For example, if a taxicab supply capable of accommodating either the peak 60- or 90-minute demand were staged in the area, it is estimated that the existing 160 space lot would be sufficient to meet demand through the end of the planning period for this Master Plan Update (2032). However, maintaining a supply of taxicabs to meet the 120-minute demand would exceed staging area capacity by 2017. The exhibit shows the importance of managing the supply of taxicabs in the lot to eliminate vehicle queuing and congestion that may exceed the capacity of the lot. The supply of taxicabs available in the staging area is assigned at the discretion of Airport management. Consideration should also be given to the additional 12 taxicabs that are routinely staged in the terminal staging/queuing area located on the left-side lane of the lower level roadway adjacent to Garage A.

4.6.2 COMMERCIAL VEHICLE STAGING AREA

There is no formal staging area on Airport property for commercial vehicles other than taxicabs. Rental car companies, off-airport parking companies and hotels all run their shuttles continuously between the airport curbside and their respective properties on a fixed schedule or headway and can stage their vehicles at their respective properties and have no need to stage on-airport other than the curbside. The remaining commercial vehicle modes;, shared ride vans, limousines, buses, and other courtesy shuttles, have no space to stage at the Airport. Peak day activity from the NTTA for the remaining commercial vehicles on the lower level, as reported by the AVI data in 15-minute increments, is presented on **Exhibit 4-36**. These data indicate that the activity of the other commercial vehicle modes is much less than that of taxicabs. Existing demand for limousines reached a maximum of eight per 15-minute period, while both shared ride and courtesy shuttles had maximum demands of six per 15-minute period, and typically only one to two buses were required per 15-minute period throughout the peak day. Since current and future level of activity of these remaining commercial vehicles is LOS B or better, the curbside staging appears adequate and off-airport staging of these commercial vehicles appears to be adequate as well, wherever their current staging location may be, as long as they do not stage in the cell phone lot or Spirit of Flight fountain areas.

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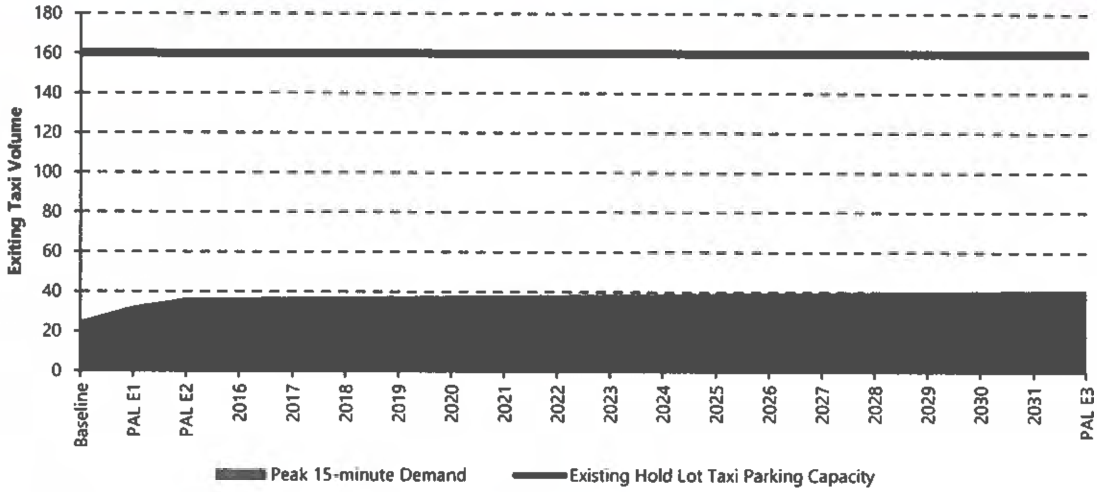
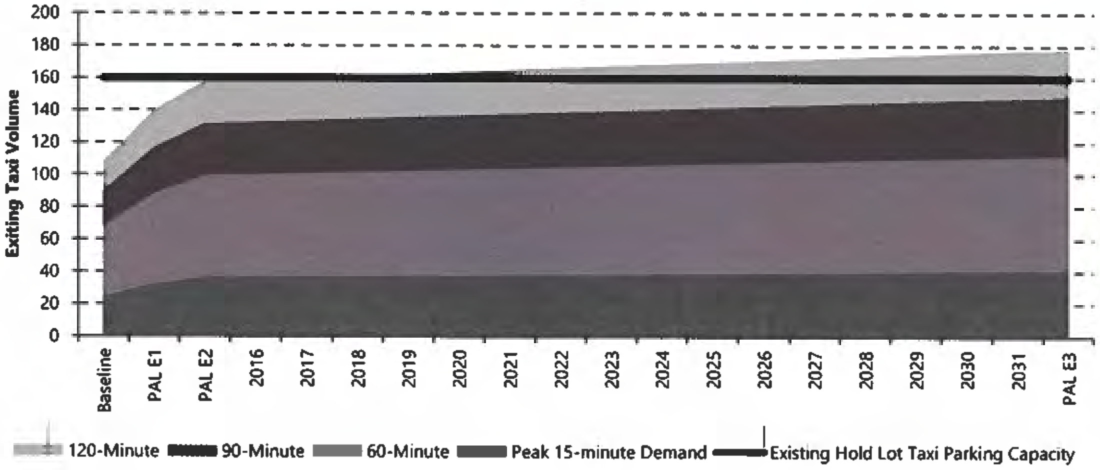
Exhibit 4-34: Forecast Peak Day Taxicab Demand at Curbside (Peak 15-Minute Supply)



NOTE: Future Demand based on forecast number of O&D passengers

SOURCE: Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

Exhibit 4-35: Forecast Peak Day Taxicab Demand for Alternative Levels of Supply



NOTE: Future Demand based on forecast number of O&D passengers

SOURCE: Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

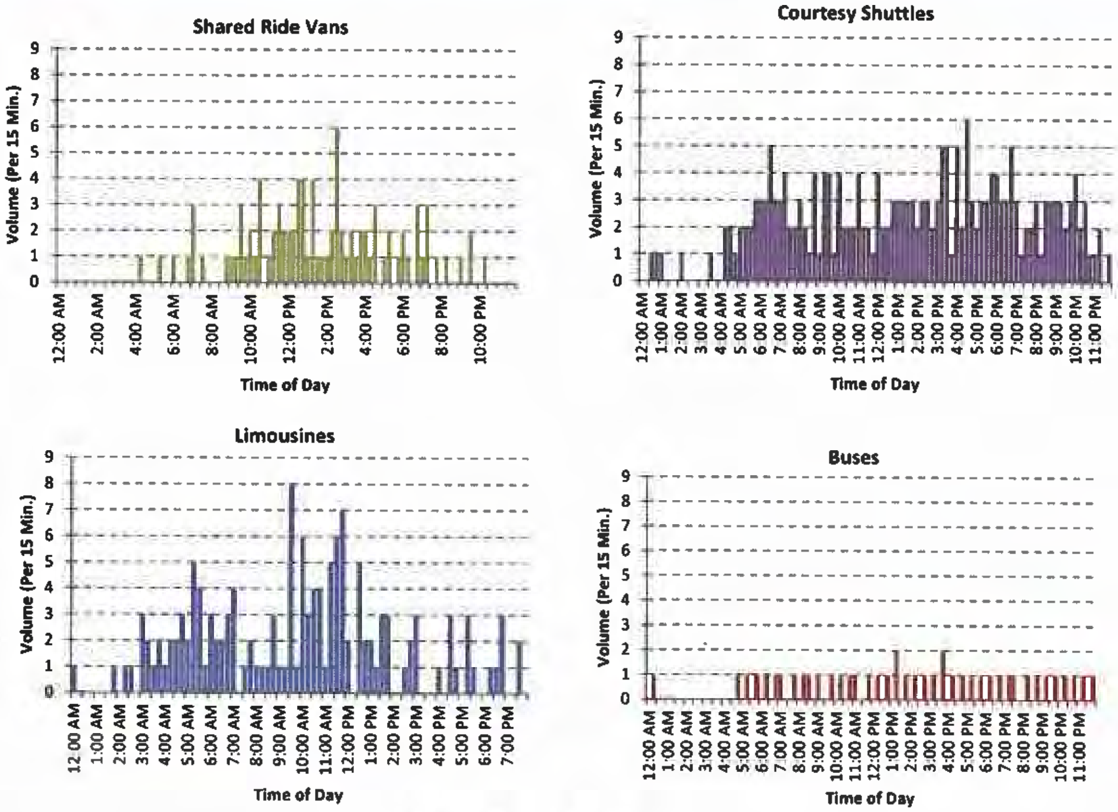
Table 4-28: Future Taxicab Staging Lot Occupancy – Peak 15-Minute Demand Period

YEAR	ANNUAL ENPLANED PASSENGERS	ANNUAL GROWTH RATE	PEAK 15-MINUTE DEMAND	STAGING LOT OCCUPANCY WITH ADDITIONAL SUPPLY		
				60-MINUTE	90-MINUTE	120-MINUTE
Baseline	4,245,996		25	68	90	108
2014 (PAL E1)	5,500,000	29.5%	32	88	117	140
2015 (PAL E2)	6,200,000	12.7%	37	99	131	158
2016	6,247,000	0.8%	37	100	132	159
2017	6,294,000	0.8%	37	101	133	160
2018	6,341,000	0.7%	37	102	134	161
2019	6,388,000	0.7%	38	102	135	162
2020	6,435,000	0.7%	38	103	136	164
2021	6,482,000	0.7%	38	104	137	165
2022	6,529,000	0.7%	38	105	138	166
2023	6,576,000	0.7%	39	105	139	167
2024	6,624,000	0.7%	39	106	140	168
2025	6,671,000	0.7%	39	107	141	170
2026	6,718,000	0.7%	40	108	142	171
2027	6,765,000	0.7%	40	108	143	172
2028	6,812,000	0.7%	40	109	144	173
2029	6,859,000	0.7%	40	110	145	174
2030	6,906,000	0.7%	41	111	146	176
2031	6,953,000	0.7%	41	111	147	177
2032 (PAL E3)	7,000,000	0.7%	41	112	148	178

NOTE: Capacity of existing taxicab staging area is approximately 160 taxicab queuing spaces in the remote holding area plus approximately 12 taxicab spaces in the terminal staging/queuing area adjacent to Garage A.

SOURCES: Federal Aviation Administration, *Terminal Area Forecast* 2012-2040, March 2013; Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

Exhibit 4-36: Peak Day Lower Level Commercial Vehicle Activity



SOURCES: North Texas Tollway Authority, April 2014; Ricondo & Associates, Inc., May 2014.
PREPARED BY: Ricondo & Associates, Inc., May 2014.

4.7 Rental Car Facility Requirements

Rental car companies representing nine national brands operate on Airport property in exclusive use leaseholds. Advantage, Alamo, Avis, Budget, Enterprise, Hertz, and National operate along the northeast side of Herb Kelleher Way. Dollar and Thrifty operate southeast of the terminals on the northwest side of West Mockingbird Lane, northeast of Herb Kelleher Way. Each company's leasehold includes a rental car ready/return area, vehicle storage parking area, employee parking area, fueling facilities, wash bays, light maintenance bays, administrative area, and vehicle stacking/staging spaces. All companies transport their customers between the terminal building and their facilities via shuttle bus.

Specific requirements for each of the following rental car facility components are discussed after the discussion on the methodology used to determine requirements:

- Customer Service Area
- Rental Car Ready/Return Area and Onsite Vehicle Storage Area
- Service Sites
  - Fueling Positions
  - Wash Bays
  - Vehicle Light Maintenance Bays
  - Vehicle Stacking/Staging Spaces

4.7.1 METHODOLOGY

The rental car facility requirements were developed using DAL-specific facility utilization rates based on hourly rental car transactions during a peak rental day. A peak rental day (based on individual company questionnaire responses) was selected as the design day because ready vehicles occupy more space than the same number of return vehicles and, therefore, represent the maximum space required during a peak period. R&A sent a questionnaire requesting hourly transaction information, as well as the size, configuration, and use of existing facilities to each of the nine on-Airport rental car companies in September 2013. All nine on-Airport companies returned a completed questionnaire. A summary of their responses is presented in **Table 4-29**. Planning hour activity was defined as the peak hour number of returns or rentals. For forecasting purposes, existing (2013), PAL E1, PAL E2, and PAL E3 demand was based on forecast growth in numbers of originating passengers.

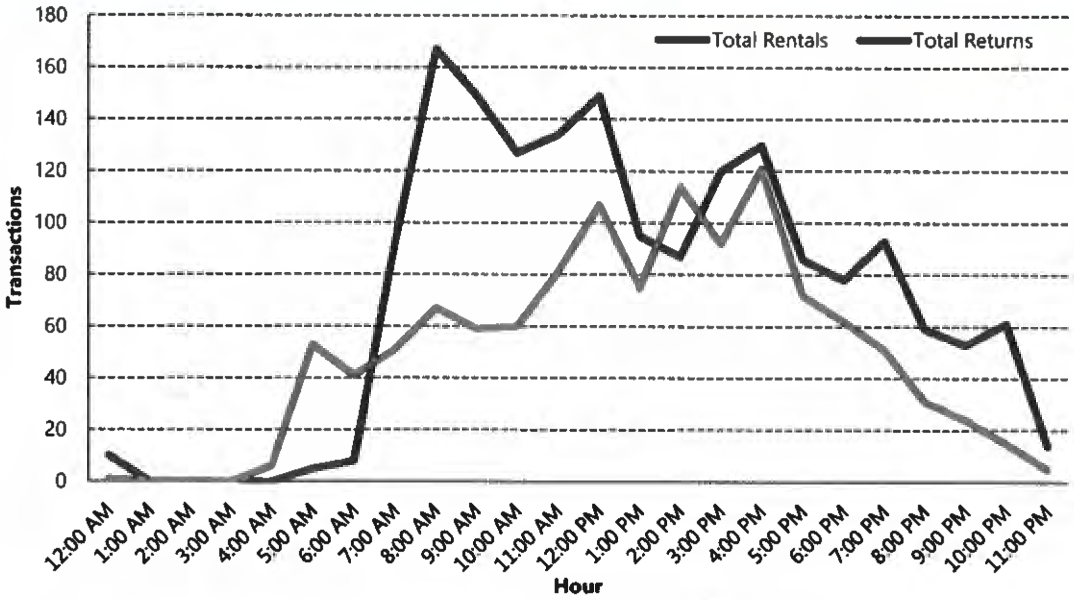
Exhibit 4-37 presents the hourly rentals and returns during the peak rental day, which was a Monday. It was assumed that rental car activity would increase at the same rate as the number of originating passengers. Therefore, existing (2013) requirements were determined based on the passenger forecasts completed in October 2013.

Table 4-29: Summary of Rental Car Company Questionnaire Responses

COMPONENT	HAVE (2013)	NEED (2013)	2015	2022	2032
Customer Service Area					
Regular Customer Service Positions	50	57	66	80	95
Kiosk Positions	5	6	10	19	24
Preferred Customer Service Positions	3	6	10	12	14
Ready/Return Area					
Regular Ready Spaces	506	723	907	1,172	1,487
Premium Ready Spaces	118	270	310	470	615
Total Ready Spaces	**624**	**993**	**1,217**	**1,642**	**2,102**
Return Spaces	332	473	553	740	915
Total Ready/Return Spaces	**956**	**1,466**	**1,770**	**2,382**	**3,017**
Service Area					
Vehicle Fueling Positions (nozzles)	24	32	42	58	74
Car Wash Bays	5	9	10	12	17
Vehicle Light Maintenance Bays	9	9	8	8	11
Administrative Area - Service Facility (square feet)	5,243	7,593	7,873	9,573	10,673
Overflow Vehicle Storage Spaces	606	1,406	1,610	2,015	2,370
Stacking/Staging Spaces	95	235	280	425	550
Employee Parking Spaces	72	153	193	255	330

SOURCE: Ricondo & Associates, Inc., January 2014.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

Exhibit 4-37: Peak Rental Car Day Transactions and Returns by Hour



SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

4.7.2 CUSTOMER SERVICE AREA

The customer service area is used to process arriving rental car customers. The required number of counter positions is the primary factor that determines the size of the customer service area. The peak rental day's peak hour number of rental car transactions at the customer service counter was used to determine customer service counter requirements.

During the peak rental day, the peak hour number of rental car transactions was 167. Of the 167 peak hour transactions, 57 percent, or 96, were regular counter transactions and 43 percent, or 71, were preferred area transactions. A preferred area is where the customer is able to bypass the customer service counter and proceed directly to the rental car ready area. Based on R&A experience at similar airports with rental car customer business/leisure splits that are similar to those of the Airport market, it was assumed that a typical rental car counter transaction takes approximately 10 minutes, which translates to six transactions per hour. With 96 regular counter transactions during the peak hour, six transactions per hour per position, and an assumed additional 30 percent surge factor, 21 regular customer service positions would be needed today. **Table 4-30** presents the customer service counter requirements for existing (2013) demand and for each PAL. Note that for each PAL, there would be a surplus of customer service positions.

Table 4-30: Customer Service Counter Requirements

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Customer Service Counter Position Requirements	21	28	32	36
Existing Customer Service Position Counters	50	50	50	50
Surplus/(Deficiency)	29	22	18	14

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

4.7.3 RENTAL CAR READY/RETURN AREA AND ONSITE VEHICLE STORAGE AREA

Customers pick up and return rental cars in the ready/return areas. Ready vehicles are parked in a 90-degree configuration with traffic lanes, similar to the configuration of a conventional public parking lot. Return vehicles are parked in a nose-to-tail configuration. As previously mentioned, the peak rental day at the Airport, Monday, was selected as the design day because ready vehicles occupy more space than the same number of return vehicles and would represent the maximum space required during a peak period. The key utilization rate, or hours of available parking capacity, used to determine ready and return space requirements was the peak hour number of rentals (167) and returns (121) and the number of hours of peak activity that the spaces would be required to accommodate during the peak rental day.

Rental car companies prefer to maintain a sufficient supply of ready spaces and vehicles to accommodate the planned number of vehicles to be rented during the next hour's expected transactions. In addition, rental car companies prefer to have additional ready spaces available in case unplanned operational challenges occur, such as delayed flights. When flights are delayed, delayed customers are added to the next hour's planned rentals, potentially creating a shortfall of available vehicles. To alleviate this potential shortfall and avoid customer delays, the rental car companies prefer to have a buffer of ready vehicles available to provide more than one hour of capacity.

Therefore, the rental car companies typically prefer to have 2 to 3 hours of capacity for rental car ready and return vehicles (i.e., spaces). According to responses regarding the number of existing spaces and transaction information collected from the questionnaire, the rental car companies at the Airport have approximately 3.7 hours of ready space capacity and 2.7 hours of return space capacity during peak periods. Based on this information, an average of 3.0 hours of rental car ready and return capacity was used to develop the facility requirements. **Table 4-31** presents the rental car ready/return area requirements for existing (2013) demand and for each PAL. Note that for each PAL, there would be a deficiency of ready/return spaces.

Table 4-31: Rental Car Ready/Return Area Requirements

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Ready Space Requirement	501	676	762	861
Return Space Requirement	363	490	552	624
Total Space Requirement	**864**	**1,166**	**1,314**	**1,485**
Existing Rental Car Ready/Return Spaces	956	956	956	956
Surplus/(Deficiency)	**92**	**(210)**	**(358)**	**(529)**

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

Also included in the vehicle space requirements is the onsite vehicle storage requirement during a peak week. This represents the number of spaces the rental car companies need to store vehicles that are not being rented or parked in a ready or return space. The utilization rate was calculated using the difference of rental and return transactions during the 2013 peak rental week, which, according to the questionnaire responses, nets 923 peak rentals and returns. It is assumed that ready/return spaces are not used to store vehicles. **Table 4-32** presents the onsite vehicle storage facility requirements for existing (2013) demand and for each PAL. Note that, for each PAL, there would be a deficiency of onsite vehicle storage spaces.

Table 4-32: Rental Car Onsite Vehicle Storage Facility Requirements

COMPONENT	EXISTING (2013)	PAL 1	PAL 2	PAL 3
Onsite Vehicle Storage Space Requirements	923	1,246	1,405	1,586
Existing Onsite Vehicle Storage Spaces	606	606	606	606
Surplus/(Deficiency)	**(317)**	**(640)**	**(799)**	**(980)**

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

Area required for exit booths was also calculated. Exit booths would house the personnel responsible for checking the credentials of the drivers of the rented vehicles exiting the facility. It was assumed that each booth could process 30 vehicles per hour, at approximately 2.0 minutes per vehicle. **Table 4-33** presents the exit booth requirements.

Table 4-33: Exit Booth Requirements

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Planning hour rentals	167	225	254	287
Vehicles Processed Per Hour	30	30	30	30
Total Exit Booths Required	**6**	**8**	**8**	**10**

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

Note: Some columns may not total due to rounding.

4.7.4 SERVICE SITES

The service sites are designed to accommodate vehicle support functions, such as fueling, washing, maintenance, and stacking/staging. After being processed through the service sites, the vehicle is parked in either a stacking space located at the service site, or in a ready space for the next customer. Parking (stacking/staging) lanes are provided for queuing vehicles at each stage of the process. Thus, vehicles may be staged in lanes waiting for fuel, staged in lanes after fueling waiting for washing, staged in lanes after washing waiting for an available ready stall, or parked in the onsite vehicle storage area.

4.7.4.1 Fueling Positions

The number of fueling positions required to accommodate future demand was based on the number of vehicles that can be fueled within the peak hour. The number of peak hour returns is 121. Assuming that 15 minutes are required to fuel one vehicle, 4 vehicles can be fueled per hour per position. This results in a requirement of 30 fueling positions for existing (2013) conditions and a forecast requirement of 52 fueling positions for PAL E3. **Table 4-34** presents the fueling position requirements for existing (2013) demand and for each PAL. Note that, for existing conditions and for each PAL, there is/would be a deficiency in fueling positions.

Table 4-34: Fueling Position Requirements

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Fueling Position Requirements	30	41	46	52
Existing Fueling Positions	24	24	24	24
Surplus/(Deficiency)	**(6)**	**(17)**	**(22)**	**(28)**

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

4.7.4.2 Wash Bays

The number of wash bays required to accommodate future demand was based on the number of vehicles that can be washed in the peak hour. The number of peak hour returns is 121. Assuming that 3 minutes are required to wash a vehicle, a metric of 17 vehicles washed per hour per wash bay was used to calculate the requirements. This results in a requirement of 7 wash bays for existing (2013) conditions and a forecast requirement of 12 wash bays at PAL E3. **Table 4-35** presents the wash bay requirements for existing (2013) demand and for each PAL. Note that, for existing conditions and each PAL, there is/would be a deficiency in wash bays.

Table 4-35: Wash Bay Requirements

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Wash Bay Facility Requirements	7	10	11	12
Existing Wash Bays	5	5	5	5
Surplus/(Deficiency)	**(2)**	**(5)**	**(6)**	**(7)**

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

4.7.4.3 Vehicle Light Maintenance Bays

Vehicle light maintenance bays are located adjacent to the wash bays. Maintenance bays and functions include vehicle lifts, parts storage, tool lockers, vehicle records storage, administrative support, employee break and locker areas, and employee parking area. Light maintenance bays are used to change oil, align wheels, or replace minor parts, such as interior, head, or tail lights. Requirements for employee administrative support and employee parking areas were also developed. Because of the often unscheduled nature of vehicle maintenance, no utilization rate was developed for the maintenance bays. Instead, the requirements for maintenance bays, administrative area, and employee parking area were developed by increasing the existing quantity by the passenger forecast rate. Based on the questionnaire responses, there were nine light maintenance bays at the Airport in 2013; therefore, this number was used as the baseline for facility requirements. Increasing the nine maintenance bays by the passenger forecast rate results in a requirement for 15 maintenance bays at PAL E3. **Table 4-36** presents the requirements for light maintenance bays, employee administrative area, and employee parking spaces for existing (2013) demand and for each PAL.

Table 4-36: Light Maintenance Bay Requirements

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Light Maintenance Bay Requirements	9	12	14	15
Administrative Area Requirements (square feet)	7,593	10,250	11,554	13,045
Employee Parking Requirements (spaces)	**153**	**207**	**233**	**263**

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

4.7.4.4 Vehicle Stacking/Staging Spaces

Overflow parking areas are provided near the service sites for the staging of clean vehicles for peak rental periods and for the stacking of return vehicles. A metric of 6 stalls per fueling nozzle (10 minutes per vehicle per hour) was used to calculate the requirements. The utilization rate used to size the stacking area is based on the number of required fueling positions in 2013 (30) multiplied by the aforementioned metric (6). This results in a requirement of 180 vehicle stacking spaces for existing (2013) conditions. Returned vehicles are positioned in the stacking areas prior to the fueling positions before being serviced. In some cases, clean vehicles may be stored in this area prior to being returned to a ready stall. Depending on the number of fueling positions on each fuel island, two, four, or six spaces would be provided on each island to stack clean or dirty vehicles (based on experience and an understanding of similar airport rental car facilities). **Table 4-37** presents the facility requirements for vehicle stacking and staging spaces for existing (2013) demand and for each PAL.

Table 4-37: Vehicle Stacking/Staging Space Requirements

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Vehicle Stacking Space Requirements	180	245	276	312
Existing Vehicle Stacking Spaces	95	95	95	95
Surplus/(Deficiency)	**(85)**	**(150)**	**(181)**	**(217)**

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

4.7.5 FACILITY REQUIREMENTS SUMMARY

A summary of the requirements for the rental car facility components described above is presented in **Table 4-38** for existing (2013) demand and for each PAL.

Table 4-38: Rental Car Facility Requirements Summary

COMPONENT	EXISTING (2013)	PAL E1	PAL E2	PAL E3
Customer Service Area				
Regular Customer Service Positions	21	28	32	36
Ready/Return Spaces and Onsite Vehicle Storage Area				
Ready Spaces	501	676	762	861
Return Spaces	363	490	552	624
Storage Spaces	923	1,246	1,405	1,586
Service Sites				
Fueling Positions	30	41	46	52
Wash Bays	7	10	11	12
Vehicle Light Maintenance Bays	9	12	14	15
Vehicle Stacking/Staging Spaces	180	245	276	312
Administrative Area Requirements (square feet)	7,593	10,250	11,554	13,045
Employee Parking Requirements (spaces)	153	207	233	263

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

A summary of the surplus or deficiency in the requirements for the rental car facility components described above is presented in **Table 4-39** for existing (2013) demand and for each PAL. Those components that would be operating at a deficiency are shown in parentheses.

Table 4-39: Requirements Surplus/(Deficiency) Summary

COMPONENT	EXISTING (2013)	PAL 1	PAL 2	PAL 3
Regular Customer Service Positions	29	22	18	14
Ready/Return Spaces and Onsite Vehicle Storage Area				
Total Ready/Return Spaces	92	(210)	(358)	(529)
Onsite Vehicle Storage Spaces	(317)	(640)	(799)	(980)
Service Sites				
Fueling Positions	(6)	(17)	(22)	(28)
Wash Bays	(2)	(5)	(6)	(7)
Vehicle Light Maintenance Bays	0	(3)	(5)	(6)
Vehicle Stacking/Staging Spaces	(85)	(150)	(181)	(217)

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.
PREPARED BY: Ricondo & Associates, Inc., January 2014.

A summary of the total requirements for each rental car facility component described above is presented in **Table 4-40** for existing (2013) demand and for each PAL. Also included in the total requirements summary is an allowance for circulation and landscaping, which were calculated as percentages of the total area.

Table 4-40 (1 of 2): Rental Car Facility Requirements Program – Total Area

	EXISTING (2013) SPACE PROGRAM			PAL E1 SPACE PROGRAM			PAL E2 SPACE PROGRAM			PAL E3 SPACE PROGRAM		
	QUANTITY	SQUARE FEET	TOTAL SQUARE FEET	QUANTITY	SQUARE FEET	TOTAL SQUARE FEET	QUANTITY	SQUARE FEET	TOTAL SQUARE FEET	QUANTITY	SQUARE FEET	TOTAL SQUARE FEEET
Customer Service Areas												
Counter Positions	21	300	6,200	28	300	8,400	32	300	9,500	36	300	10,700
Circulation (percent of total Customer Service Area)	25%		1,600	25%		2,100	25%		2,400	25%		2,700
Subtotal			**7,800**			**10,500**			**11,900**			**13,400**
Ready/Return/Storage Areas												
Ready Spaces	501	300	150,300	676	300	202,900	762	300	228,700	861	300	258,200
Return Spaces	363	200	72,600	490	200	98,000	552	200	110,500	624	200	124,700
Storage Spaces	923	170	156,900	1,246	170	211,800	1,405	170	238,800	1,586	170	269,600
Total Spaces	**1,787**			**2,412**			**2,719**			**3,070**		
Exit Booths	6	20	100	8	20	200	8	20	200	10	20	200
Circulation (percent of total Ready/Return/Storage Area)	20%		76,000	20%		102,600	20%		115,600	20%		130,500
Subtotal			**455,900**			**615,500**			**693,800**			**783,200**
Service Sites												
Fueling Positions	30	300	9,100	41	300	12,300	46	300	13,800	52	300	15,600
Wash Bays	7	2,000	14,200	10	2,000	19,200	11	2,000	21,700	12	2,000	24,500
Stacking and Staging Spaces	182	200	36,300	245	200	49,000	276	200	55,200	312	200	62,400
Vehicle Light Maintenance Bays	9	810	7,300	12	810	9,800	14	810	11,100	15	810	12,500
Administrative Area			7,593			10,250			11,554			13,045
Employee Parking Spaces	153	250	38,300	207	250	51,600	233	250	58,200	263	250	65,700

Table 4-40 (2 of 2): Rental Car Facility Requirements Program – Total Area

	EXISTING (2013) SPACE PROGRAM			PAL E1 SPACE PROGRAM			PAL E2 SPACE PROGRAM			PAL E3 SPACE PROGRAM		
	QUANTITY	SQUARE FEET	TOTAL SQUARE FEET	QUANTITY	SQUARE FEET	TOTAL SQUARE FEET	QUANTITY	SQUARE FEET	TOTAL SQUARE FEET	QUANTITY	SQUARE FEET	TOTAL SQUARE FEET
Circulation (percent of total Service Site area)	20%		22,600	20%		30,400	20%		34,300	20%		38,700
Subtotal			**135,393**			**182,550**			**205,854**			**232,445**
Small Market Entrant (2 percent of total area)			12,000			16,200			18,200			20,600
Total Facility (with small market entrant)			611,100			824,700			929,800			1,049,600
Landscaping/Circulation (15 percent of Total Facility area)			91,700			123,700			139,500			157,400
Total Requirement			**702,800** **(16 acres)**			**948,400** **(22 acres)**			**1,069,300** **(25 acres)**			**1,207,000** **(28 acres)**

NOTE: Some columns may not total due to rounding.

SOURCE: Ricondo & Associates, Inc., *Dallas Love Field Rental Car Industry Questionnaire*, October 2013.

PREPARED BY: Ricondo & Associates, Inc., January 2014.

4.8 Airport Tenant and Airport Support Facility Requirements

4.8.1 GENERAL AVIATION FACILITIES

This section presents the requirements for general aviation facilities, which include facilities dedicated to FBOs, corporate leased hangars, and MRO facilities. Currently, five FBOs operate at the Airport. In addition, four entities lease corporate hangars and seven tenants operate aircraft MRO/finish-out facilities.

The analyses documented in this section are organized by functional system. For clarity, each system was analyzed separately. Ultimately, however, the facility requirements for each system were combined to provide gross facility requirements for Airport tenant and support functions.

The PALs for aircraft operations described in Section 3 were used for these facilities. Growth rates were derived from numbers of annual based aircraft and aircraft operations. PALs, operations targets, and growth rates for based aircraft and aircraft operations are listed in **Table 4-41**.

Table 4-41: Planning Activity Levels and Growth Rates for Based Aircraft and Aircraft Operations

	ANNUAL AIRCRAFT OPERATIONS TARGET	ANTICIPATED YEAR OF ACHIEVEMENT 1/	BASED AIRCRAFT GROWTH RATE	AIRCRAFT OPERATIONS GROWTH RATE	BLENDED GROWTH RATE 2/
PAL O1	200,000	2015	4.5% 3/	13.0% 3/	10.4%
PAL O2	210,000	2032	21.9% 4/	3.0% 4/	8.7%
PAL O3	245,000	-	14.4% 5/	14.4% 5/	14.4%

NOTES:

1/ Based on the Master Plan Update forecasts presented in Section 3.

2/ A blended growth rate of 70 percent operations and 30 percent based aircraft was used.

3/ Growth rate between 2012 and PAL O1.

4/ Growth rate between PAL O1 and PAL O2.

5/ Growth rate between PAL O2 and PAL O3.

SOURCE: Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

To determine gross facility requirements, existing conditions were inventoried and used to form the baseline condition. Growth rates derived for each PAL were applied across the functional areas for each tenant to determine facility requirements. A growth rate was established for PAL O1 and tenant interviews were conducted to determine immediate needs given the aviation activity forecast for 2015. Tenants provided a range of near-term needs, such as individual hangars, increases in ramp space, and the need for additional passenger vehicle parking. Facility requirements for PAL O2 and PAL O3 were calculated using a mix of based aircraft and operations growth to accommodate forecast growth in aviation activity.

The methodologies used to determine demand/capacity relationships and facility requirements are in accordance with industry standards, with planning factors adjusted, as appropriate, to reflect actual Airport use characteristics. In calculating demand/capacity, the information presented in the inventory section of this Master Plan Update (Section 2) was used, along with any additional information, inclusive of tenant interviews or planning/expansion data provided by facility operators, that more accurately reflects existing or future conditions. This approach ensured that demand calculations would be sensitive to the specific requirements at the Airport, and reflective of industry standard practices.

The tables in the subsections below account for the following functional area requirements:

- **Buildings:** Building requirements were limited to hangar space with space allowed for offices and administrative facilities located within the hangar footprint. No additional support buildings or administrative offices, outside of the envelope of the hangar footprint, were considered as part of the building requirements.
- **Apron Areas:** These areas are considered suitable for aircraft parking and storage, maintenance, and the guided or towed movement of aircraft. These areas do not include taxilanes or other Airport movement areas.
- **Automobile Parking:** These areas include parking lots, entrance and exit areas, and circulation space for personal or tenant vehicles.
- **Vacant/Open Areas:** The gross facility requirements include consideration for general landscaping, grassed areas, and other pervious or impervious areas that facilitate storage and treatment of stormwater runoff. These areas may include drainage swales, small retention areas, and sidewalks.

4.8.1.1 Fixed Base Operator Requirements

For the purposes of this analysis, a facility was classified as an FBO facility if aircraft handling, parking, storage, fueling, and maintenance for both based and itinerant aircraft were available. Existing FBO facilities are depicted on **Exhibit 4-38.** A list of current FBOs at the Airport and their respective functional areas are listed in **Table 4-42.**

FBO facilities typically service more aircraft operations than MRO or corporate aviation facilities. FBO tenant telephone interviews were conducted in July 2013 as part of a Department of Aviation Tenant Community Outreach study to determine if their facilities were adequate to satisfy existing and future operational demand at PAL O1. Responses to these interviews were mixed, ranging from "adequate space today with little perceived need to expand" to "an immediate need to expand given constrained facilities." As FBOs serve both itinerant and based aircraft, a blended growth rate of both operations and based aircraft was used to calculate facility requirements at PAL O2 and PAL O3 (see Table 4-40). The resulting facility requirements are presented in **Table 4-43.**

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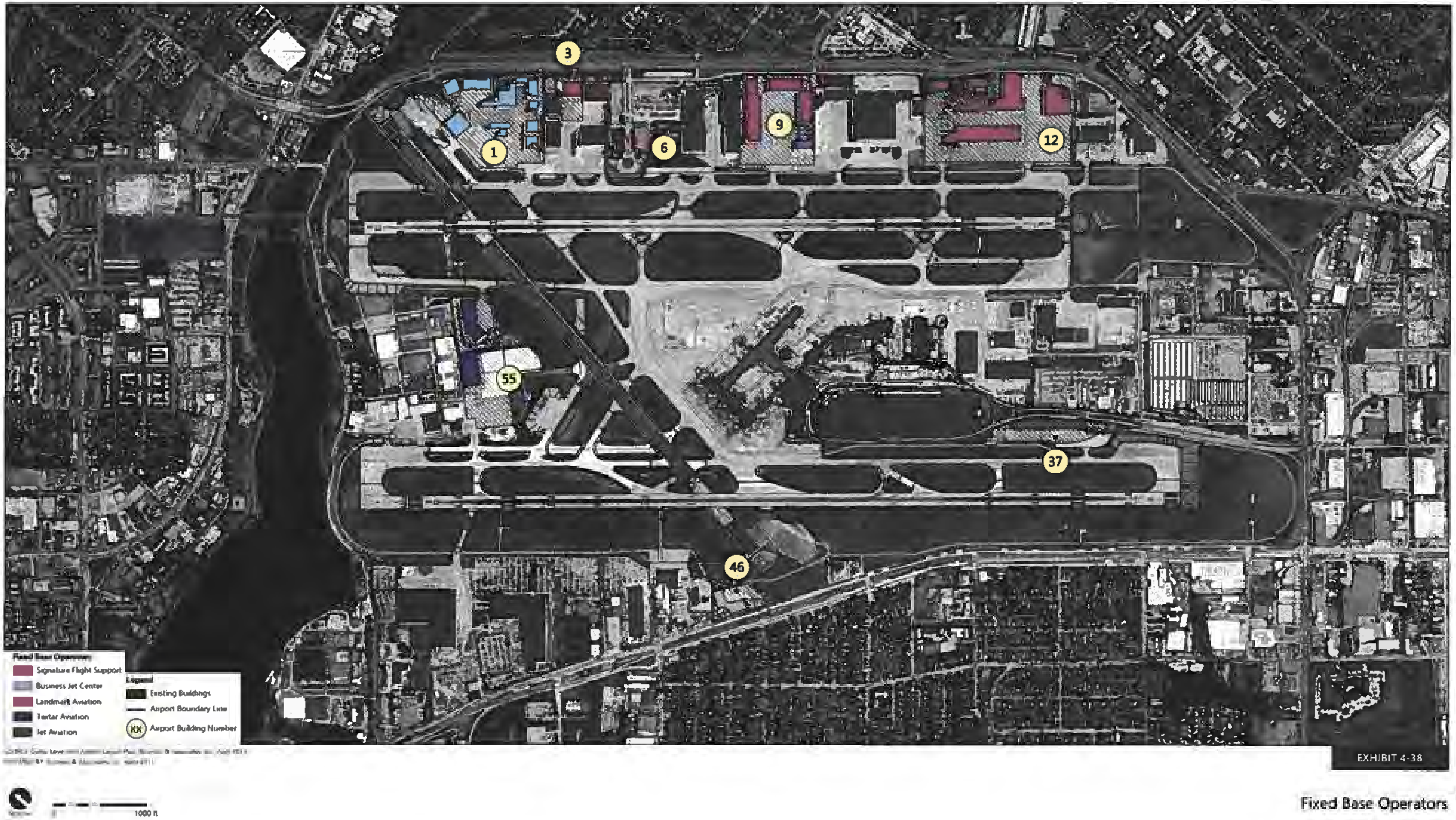

EXHIBIT 4-38

SOURCE: Dallas Love Field Airport Layout Plan, Ricondo & Associates, Inc., April 2011.
PREPARED BY: Ricondo & Associates, Inc., April 2011.

Fixed Base Operators

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Airport Master Plan Update
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Table 4-42: Existing Fixed Base Operators and Their Functional Areas (in square feet)

	BUILDING AREA	APRON AREA	AUTOMOBILE PARKING AND CIRCULATION AREA	TOTAL FUNCTIONAL AREA
BUSINESS JET CENTER				
Business Jet Center Facilities Lease 1	218,000	690,000	161,000	1,069,000
Business Jet Center Facilities Lease 2	43,000	69,000	43,000	155,000
Subtotal (Business Jet Center) 1/	**261,000**	**759,000**	**204,000**	**1,224,000**
SIGNATURE FLIGHT SUPPORT				
Signature Flight Support Hangar Lease 1	26,000	59,000	67,000	151,000
Signature Flight Support Hangars Lease 2	191,000	486,000	106,000	783,000
Signature Flight Support Hangars Lease DalFort Fueling	344,000	783,000	322,000	1,449,000
Subtotal (Signature Flight Support) 2/	**561,000**	**1,328,000**	**495,000**	**2,383,000**
OTHER FBOs				
Landmark Aviation	33,000	160,000	10,000	203,000
Jet Aviation	76,000	155,000	30,000	261,000
Textar Aviation	112,000	397,000	171,000	679,000
TOTAL	**1,043,000**	**2,799,000**	**910,000**	**4,750,000**

NOTES:

1/ Business Jet Center holds leases for two facilities on Airport. One is located in the northwest corner of the airfield, and one is located along Denton Drive, south of the Runway 36 end.

2/ Signature Flight Support maintains buildings in three areas to the west and one to the east of the DalFort facility and one hangar located in the northwest corner of the airfield, adjacent to Business Jet Center facilities.

SOURCES: Dallas Love Field records, June 2013 (Leasehold and AutoCAD base map); Fixed Base Operator Tenant Telephone Interviews, July 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

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Table 4-43: Fixed Base Operator Gross Facility Requirements (in square feet, except as noted)

	EXISTING AREA (2013)	REQUIREMENTS PAL O1	REQUIREMENTS PAL O2	REQUIREMENTS PAL O3
Hangars	1,043,000	1,133,000	1,229,000	1,407,000
Aprons	2,799,000	3,019,000	3,281,000	3,752,000
Automobile Parking and Circulation	910,000	919,000	999,000	1,141,000
Subtotal (Functional Areas)	**4,752,000**	**5,071,000**	**5,509,000**	**6,300,000**
Vacant/Open Areas	593,000	626,000	666,000	726,000
Subtotal	**5,345,000**	**5,697,000**	**6,175,000**	**7,026,000**
Subtotal (acres)	**122.7**	**130.8**	**141.8**	**161.3**
Cumulative Net Increase	-	6.20%	13.40%	23.90%
Surplus/(Deficiency)	-	**-352,000**	**-830,000**	**-1,681,000**
Surplus/(Deficiency) (acres)	-	**-8.1**	**-19.1**	**-38.6**

SOURCES: Dallas Love Field records, June 2013 (Leasehold and AutoCAD base map); Fixed Base Operator Tenant Telephone Interviews, July 2013; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

4.8.1.2 Corporate Aviation Facilities

Corporate aviation at the Airport relates to tenants with aircraft storage (including open hangar space) and light maintenance capability. These tenants do not typically service aircraft requiring major repairs or refurbishing. **Table 4-44** identifies the tenants and existing corporate aviation functional areas. **Exhibit 4-39** depicts the existing corporate hangar areas at the Airport.

Table 4-44: Existing Corporate Hangar Facilities (in square feet)

	BUILDING AREA	APRON AREA	AUTOMOBILE PARKING AND CIRCULATION AREA	TOTAL FUNCTIONAL AREA
Trinity Industries	15,000	89,000	16,000	121,000
Reeves Street, LLC Hangar	38,000	98,000	19,000	155,000
MLT Development Co.	25,000	50,000	45,000	120,000
Holly Frontier Aviation	17,000	64,000	24,000	104,000
Total	**95,000**	**301,000**	**104,000**	**500,000**

SOURCES: Dallas Love Field records, June 2013 (Leasehold and AutoCAD base map); Corporate Tenant Telephone Interviews, January 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

EXHIBIT 4-35

SOURCE: Dallas Love Field [illegible]

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Corporate Aviation Hangars

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Operations at corporate hangar facilities are generally limited to aircraft parking and storage, light maintenance, and on-demand fueling. Additionally, a lower number of aircraft access corporate hangar facilities than FBO or MRO facilities. Therefore, based aircraft growth rates were applied to estimate future facility requirements. During the tenant interviews, no increase in near-term capacity was requested by corporate hangar operators. Corporate hangar gross facility requirements are listed in **Table 4-45.**

Table 4-45: Corporate Hangar Gross Facility Requirements (in square feet, except as noted)

	EXISTING (2013)	PAL O1	PAL O2	PAL O3
Hangars	95,000	95,000	118,000	132,000
Aprons	301,000	301,000	367,000	420,000
Automobile Parking and Circulation	104,000	104,000	127,000	145,000
Subtotal (Functional Areas)	500,000	500,000	612,000	697,000
Vacant/Open Areas	50,000	50,000	61,200	69,700
Subtotal	**550,000**	**550,000**	**673,200**	**766,700**
Subtotal (acres)	**12.6**	**12.6**	**15.5**	**17.6**
Cumulative Net Increase	-	0.00%	22.40%	39.40%
Surplus/(Deficiency)		**0**	**-123,200**	**-216,700**
Surplus/(Deficiency) (acres)		**0**	**-2.8**	**-5**

SOURCES: Dallas Love Field records, June 2013 (Leasehold and AutoCAD base map); Corporate Tenant Telephone Interviews, January 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

4.8.1.3 Maintenance, Repair, and Overhaul Facilities

Major and recurring aircraft maintenance and aircraft testing are typically performed at MRO facilities, which include facilities in which complete interior finishing is performed on aircraft prior to delivery to a customer. Other MRO operators test equipment and conduct field checks. These facilities typically accommodate fewer recurring aircraft patronage than FBO facilities, as little day-to-day aircraft servicing is performed. The MRO facilities at the Airport are clustered in the north-central and eastern portions of the airfield. Existing MRO facilities are depicted on **Exhibit 4-40**. Existing functional areas for these facilities are listed in **Table 4-46**.

As aircraft typically remain at MRO facilities for scheduled maintenance and regularly occurring light maintenance, the need for maintenance facilities can be tied to a mix of airport arrivals and departures and based aircraft. The blended growth rate presented in Table 4-40 was used to calculate requirements for MRO facilities. **Table 4-47** presents the existing (2013) and PAL O1, O2, and O3 facility requirements for maintenance, repair, and overhaul facilities.

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Table 4-46: Existing Maintenance, Repair, and Overhaul Facilities (in square feet)

	BUILDING AREA	APRON AREA	AUTOMOBILE PARKING AND CIRCULATION AREA	TOTAL FUNCTIONAL AREA
Learjet Inc.	**20,000**	**90,000**	**12,000**	**122,000**
Raytheon Aircraft Services Lease 1	42,000	70,000	44,000	156,000
Raytheon Aircraft Services Lease 2	112,000	129,000	46,000	287,000
Subtotal (Raytheon Aircraft Services)	**154,000**	**199,000**	**90,000**	**443,000**
Associated Air Center Facilities Lease 1	156,000	165,000	130,000	451,000
Associated Air Center Facilities Lease 2	72,000	89,000	181,000	342,000
Subtotal (Associated Air Center)	**228,000**	**254,000**	**311,000**	**793,000**
Gulfstream Aerospace Services Hangar Lease 1	50,000	58,000	77,000	185,000
Gulfstream Aerospace Services Hangars Lease 2	212,000	492,000	60,000	765,000
Subtotal (Gulfstream Aerospace Services)	**262,000**	**550,000**	**137,000**	**950,000**
Bombardier Aerospace Services Lease 1	41,000	75,000	40,000	156,000
Bombardier Aerospace Services Lease 2	91,000	125,000	92,000	308,000
Subtotal (Bombardier Aerospace Services)	**132,000**	**200,000**	**132,000**	**464,000**
Total	**796,000**	**1,293,000**	**682,000**	**2,772,000**

SOURCES: Dallas Love Field records, June 2013 (Leasehold and AutoCAD base map); Maintenance, Repair and Overhaul (MRO) Tenant Telephone Interviews, January 2013.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 4-47: Maintenance, Repair, and Overhaul Gross Facility Requirements (in square feet, except as noted)

	EXISTING (2013)	PAL 01	PAL 02	PAL 03
Hangars	796,000	796,000	972,000	1,111,000
Aprons	1,293,000	1,293,000	1,576,000	1,804,000
Automobile Parking and Circulation	682,000	682,000	833,000	951,000
Subtotal (Functional Areas)	**2,771,000**	**2,771,000**	**3,381,000**	**3,866,000**
Vacant/Open Areas	277,100	277,100	338,100	386,600
Subtotal	**3,048,100**	**3,048,100**	**3,719,100**	**4,252,600**
Subtotal (acres)	70.0	70.0	85.4	97.6
Cumulative Net Increase	-	0.0%	22.0%	39.5%
Surplus/(Deficiency)	**-**	**0**	**(671,000)**	**(1,204,500)**
Surplus/(Deficiency) (acres)	**-**	**0.0**	**(15.4)**	**(27.7)**

SOURCES: Dallas Love Field records, June 2013 (Leasehold and AutoCAD base map); Maintenance, Repair, and Overhaul Tenant Telephone Interviews, January 2013; Ricondo & Associates, Inc., February 2014.

PREPARED BY: Ricondo & Associates, Inc., February 2014.

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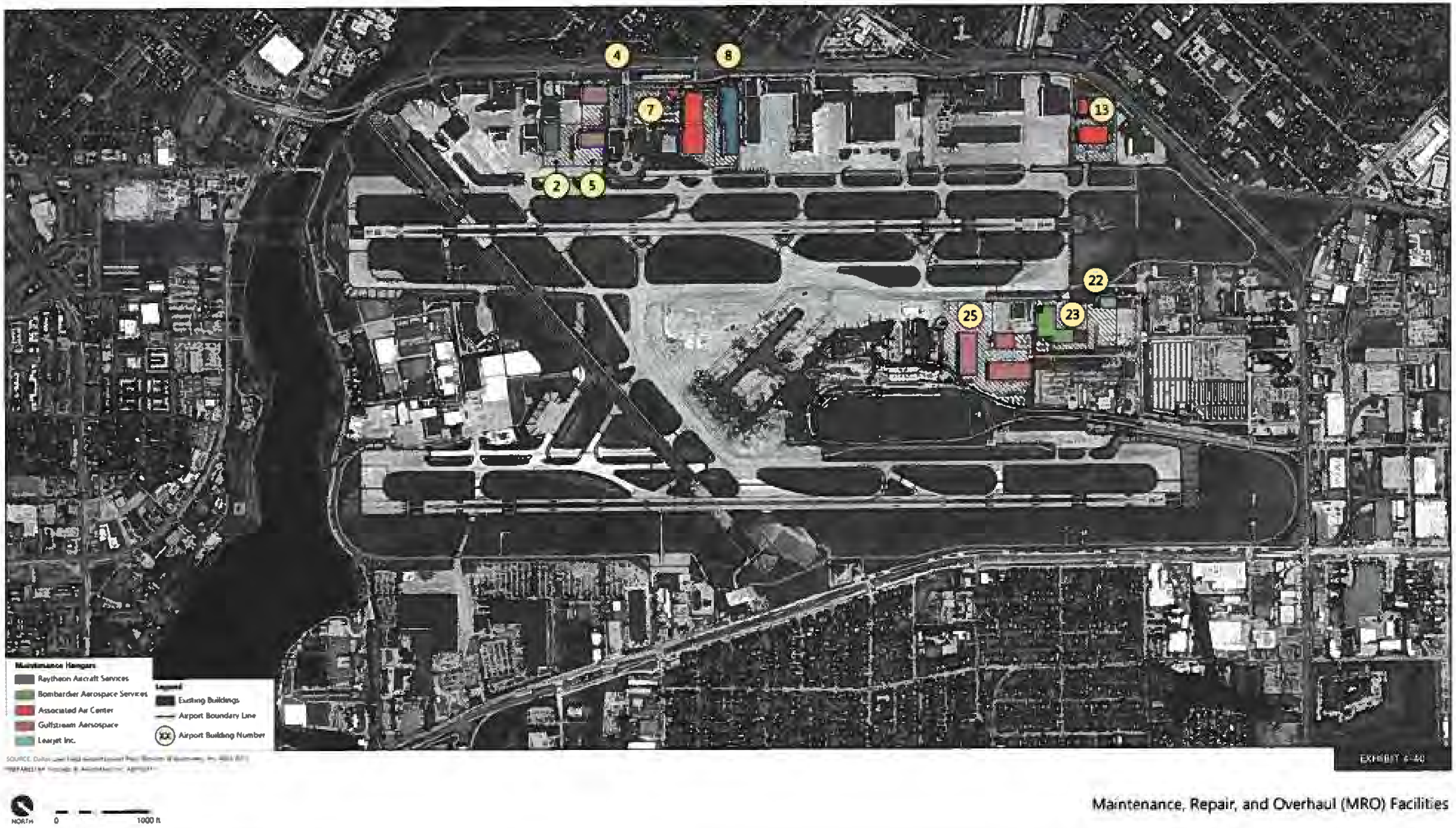

EXHIBIT 4-40

Maintenance, Repair, and Overhaul (MRO) Facilities

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4.8.1.4 Summary and Conclusions

Gross facility requirements for FBO, MRO, and corporate hangar areas are presented in **Table 4-48**. The table summarizes the gross facility requirements for general aviation facilities through PAL O3.

Table 4-48: Total Gross Facility Requirements (in square feet, except as noted)

		REQUIREMENTS		
	EXISTING AREAS (2013)	**PAL O1**	**PAL O2**	**PAL O3**
Hangars	1,934,000	2,024,000	2,319,000	2,650,000
Aprons	4,393,000	4,613,000	5,224,000	5,976,000
Automobile Parking and Circulation	1,696,000	1,705,000	1,959,000	2,237,000
Subtotal (Functional Areas)	**8,023,000**	**8,342,000**	**9,502,000**	**10,863,000**
Vacant/Open Areas	882,700	834,200	950,200	1,086,300
Subtotal	**8,905,700**	**9,176,200**	**10,452,200**	**11,949,300**
Subtotal (acres)	204.4	210.7	239.9	274.3
Cumulative Net Increase	NA	3.0%	17.2%	34%
Surplus/(Deficiency)	NA	**(270,500)**	**(1,546,500)**	**(3,043,600)**
Surplus/(Deficiency) (acres)	NA	**(6.2)**	**(35.5)**	**(69.9)**

NA = Not Applicable

SOURCE: Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

The overall land area required to support FBO, MRO, and corporate hangars is forecast to increase from approximately 204 acres in 2013 to approximately 211 total acres at PAL O1 (a net increase of 7 acres) to approximately 240 acres at PAL O2 (a net increase of 29 acres from PAL O1 and 35.5 acres from existing) and to approximately 274 acres at PAL O3 (a net increase of 34 acres from PAL O2 and approximately 70 acres from existing).

4.8.2 AIRPORT AND AIRLINE SUPPORT FACILITIES

Airport support facilities include Airport administration and maintenance buildings and ARFF facilities. Airline support facilities accommodate GSE maintenance, belly cargo handling, provisioning, and aircraft fuel farm facilities. The belly cargo, provisioning, and fuel farm facilities at Dallas Love Field are primarily operated by Southwest Airlines.

Other support facilities include those facilities not dedicated to serving the needs of aircraft operators. These facilities include an aeronautical museum, a Dallas Police Department's K-9 training area, and the DalFort site. Indication that these facilities do not require expansion over the planning period was provided by Department of Aviation staff. Therefore, these facilities were not considered in this analysis. An Environmental Assessment is currently being prepared for the DalFort facility and future use of the site will be determined following completion of this Master Plan Update.

4.8.2.1 Airport Maintenance Complex

The Airport maintenance complex is located on the northeast side of the airfield, immediately north of the off-airport parking lots. The existing complex was recently constructed and is designed to accommodate some additional growth. Airport staff indicated that no additional expansion of this facility was required over the planning horizon.

4.8.2.2 Aircraft Fueling Operations

Fueling operations at the Airport are split, with Southwest Airlines fueling aircraft from a dedicated fuel farm on the south side of the Airport while the other airlines serving the Airport are serviced by various other fueling facilities. Current Southwest Airlines fueling facilities consist of three 420,000 gallon tanks, for a total capacity of 1,260,000 gallons.

Conversations with Southwest Airlines representatives identified no current need for fuel farm expansion. As no monthly or annual fuel flowage reports were provided to assess demand, no expansion of the fuel farm is recommended over the planning period. However, adjacent properties are currently undeveloped and may be able to accommodate future growth should the need arise.

On-Airport fueling facilities are located on individual leaseholds and fuel a mix of general aviation aircraft and passenger airline aircraft. Tenant telephone interviews were conducted to assess the need for expanded fuel facilities. The existing facilities were deemed adequate to meet existing and anticipated future needs. **Table 4-49** lists the existing on-Airport fuel tanks and their capacities. If additional capacity is requested, further analysis should be conducted to determine the need and location for the added capacity.

Table 4-49: On-Airport Fueling Facilities

FACILITY	NUMBER OF TANKS	TOTAL GALLONS
Landmark Aviation	3	36,000
Business Jet Center	3	76,000
Ambassador Aviation (formerly Dallas Aircraft Services)	3	21,000
Jet Aviation	9	114,000
Jet Center of Dallas	2	25,000
MLT Development Co. (North Fuel Farm)	6	110,000
Signature Flight Support	17	433,000
Business Jet Access (formerly TXI Aviation)	3	25,000
Total	**46**	**840,000**

SOURCES: Dallas Love Field records, June 2013 (Fuel tank counts and capacities); Fixed Base Operator Tenant Telephone Interviews, January 2013.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

4.8.2.3 Aircraft Rescue and Firefighting Facilities

Operators of airports with daily scheduled airline service are required to provide ARFF services. The required number of firefighting vehicles and amounts of extinguishing agents are determined by the standards prescribed in 14 CFR Part 139, and are based on the length of the aircraft (expressed in relation to ADG), and the number of average daily departures by the most demanding aircraft that serves the airport. Air carrier aircraft are grouped as follows into ARFF indices:

- Index A: Aircraft less than 90 feet long (e.g., Beech 1900D and CRJ200)
- Index B: Aircraft at least 90 feet long, but less than 126 feet long (e.g., ERJ 145 and Boeing 737-300)
- Index C: Aircraft at least 126 feet long, but less than 159 feet long (e.g., Boeing 757-200 and MD-88)
- Index D: Aircraft at least 159 feet long , but less than 200 feet long (e.g., Boeing 757-300 and Airbus A330-200)
- Index E: Aircraft at least 200 feet long (e.g., Airbus A340-600 and Boeing 747-200)

Currently, the Airport has two ARFF stations that house a variety of rescue and firefighting equipment. One station is located on the east side of the airfield, adjacent to Mockingbird Lane, southeast of the Runway 31R end. The second station is located on the west side of the airfield, north of Taxiway L and west of Taxiway C6. No facility modification or expansion requirements were identified by Airport or Fire Department staff.

4.8.2.4 Provisioning, Belly Cargo, and Ground Support Equipment

Existing provisioning, belly cargo, and GSE facilities are housed at General Use Building #1 (GUB-1). This building is subdivided into three approximately equal and separate sections, one for each function. GUB-1 is approximately 55,250 square feet in area with 18 total truck docks and approximately 281 vehicle parking spaces and is depicted on **Exhibit 4-41**.

None of the current airlines serving the Airport has identified an immediate need for additional facilities to support their belly cargo or provisioning storage requirements. Southwest Airlines did, however, indicate a desire to expand the GUB or add a facility similar to the existing GUB to accommodate expanded operations if necessary. Expansion alternatives are discussed in the following section of this Master Plan Update.

4.5.2.5 Summary

Airport and airline support facilities are estimated to be sufficient through the planning period, with the exception of the need for 50,000 square feet of additional space as identified by the Department of Aviation for airline general use purposes.

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SOURCE: Dallas Love Field Airport Engineering Department, January 2014
PREPARED BY: Ricondo & Associates, Inc., January 2014

EXHIBIT 4-41

General Use Building

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5. Alternatives

Alternatives were developed to meet the operational and facility requirements that would support forecast aviation activity at the Airport throughout the planning period. These alternatives were then evaluated to identify the preferred alternative for development giving consideration to many factors such as cost, safety, efficiency and level of service.

5.1 Airfield Alternatives

Alternatives that address the airfield requirements presented in Section 4 were developed and evaluated. As the current runway system is adequate to accommodate the aircraft operational demand associated with all three PALs, these alternatives do not include new runways or the extension of existing runways. However, these alternatives do include the planned decommissioning of Runway 18-36. Therefore, the airfield alternatives described herein were primarily focused on the following:

- Airfield modifications associated with the decommissioning of Runway 18-36
- Airfield modifications necessary to mitigate runway incursions and comply with the current airfield design standards in FAA AC 150/5300-13A (Change 1), *Airport Design*
- Taxiway pavement fillet modifications necessary to allow right turns from Taxiway C4 onto Taxiway C
- Airfield modifications that would enable the development of a bypass taxiway at the Runway 31L threshold
- Potential relocation of the Runway 31R glideslope antenna to eliminate its encroachment on Taxiway M.
- Potential extension of Taxiway M to reach Runway 13L threshold.

5.1.1 CROSSFIELD TAXIWAY MODIFICATIONS - RUNWAY 18-36 DECOMMISSIONED

In January 2015, the Department of Aviation submitted a formal request to the FAA to permanently decommission Runway 18-36, which has been closed as a runway, but used as a taxiway since April 2011. The EA for the decommissioning of Runway 18-36, initiated in 2014, was approved by the FAA in February 2015 with the issuance of a Finding of No Significant Impact (FONSI). However, to maintain a complete project record, all alternatives were included in the Master Plan Update alternatives analysis discussed herein. The airfield capacity analyses resulted in the conclusion that the planned decommissioning of the runway would not compromise the ability of the airfield to accommodate operational demand associated with the three

PALs. In fact, it was determined that conducting aircraft operations on Runway 18-36 actually degrades the hourly capacity of the airfield because of the runway's intersection with the parallel runways.

As Runway 18-36 is permanently decommissioned, reconfiguration of the midfield taxiway infrastructure between Runways 13L-31R and 13R-31L becomes possible. Although converting Runway 18-36 to a permanent taxiway would be a low-cost approach, a full reconfiguration of the taxiway infrastructure would reduce aircraft taxiing distances while maximizing the amount of Airport property that would become available for other development. Five alternatives for reconfiguring the midfield taxiway system were considered based on Runway 18-36 being decommissioned.

It should be noted that, under all five alternatives, the portions of Runway 18-36 that extend north of Taxiway A and south of Taxiway J would be removed or abandoned and the portion of Runway 18-36 between Taxiways A and B would be reconfigured as runway exits supporting arrivals on Runway 31R. The proposed runway exit reconfigurations are depicted on **Exhibit 5-1**. The five alternatives described below address reconfiguration of the portion of Runway 18-36 between Taxiways B and L.

5.1.1.1 Alternative 1 – Runway 18-36 Partially Converted to a Taxiway

As illustrated on **Exhibit 5-2,** Alternative 1 reflects the partial conversion of Runway 18-36 to a midfield taxiway. For consistency with the existing airfield, the converted taxiway would be 75 feet wide, with 25-foot shoulders. No additional pavement would be required, but the installation of new edge lights, centerline lights, and airfield guidance signs would be necessary. The excess pavement and lighting could be removed or abandoned. The resulting net increase in property that would become available for future development would be minimal.

5.1.1.2 Alternative 2 – Dual ADG III Parallel Crossfield Taxiway System

As shown on **Exhibit 5-3**, Alternative 2 consists of dual ADG III parallel taxiways with a lateral centerline-to-centerline separation of 152 feet. Approximately 28 acres would become available for future airfield development, including approximately 13 acres adjacent to the terminal apron that could be used for RON parking and GSE storage/staging and 15 acres north of the crossfield taxiways that could be used for other airfield facility development.

5.1.1.3 Alternative 3 - Dual ADG III Parallel Crossfield Taxiway System with Centralized Deicing Pad

As shown on **Exhibit 5-4**, Alternative 3 consists of dual parallel taxiways to accommodate ADG III and smaller aircraft, with a centerline-to-centerline separation of 379 feet to enable development of a deicing pad or to accommodate RON/hardstand aircraft parking between the dual parallel taxiways. As the taxiways are designed to accommodate ADG III or smaller aircraft, larger aircraft may not be able to access the deicing pad or RON/hardstand positions without specific taxiing restrictions. Two 20-foot-wide service roads are located outside of each taxiway OFA, allowing a 153-foot-wide deicing pad/RON parking area to accommodate ADG III aircraft. An additional area of approximately 25 acres would become available for future development, including approximately 11 acres adjacent to the terminal apron that could be used for RON parking or GSE storage/staging and 13 acres north of the crossfield taxiways that could be used for other airfield facility development.

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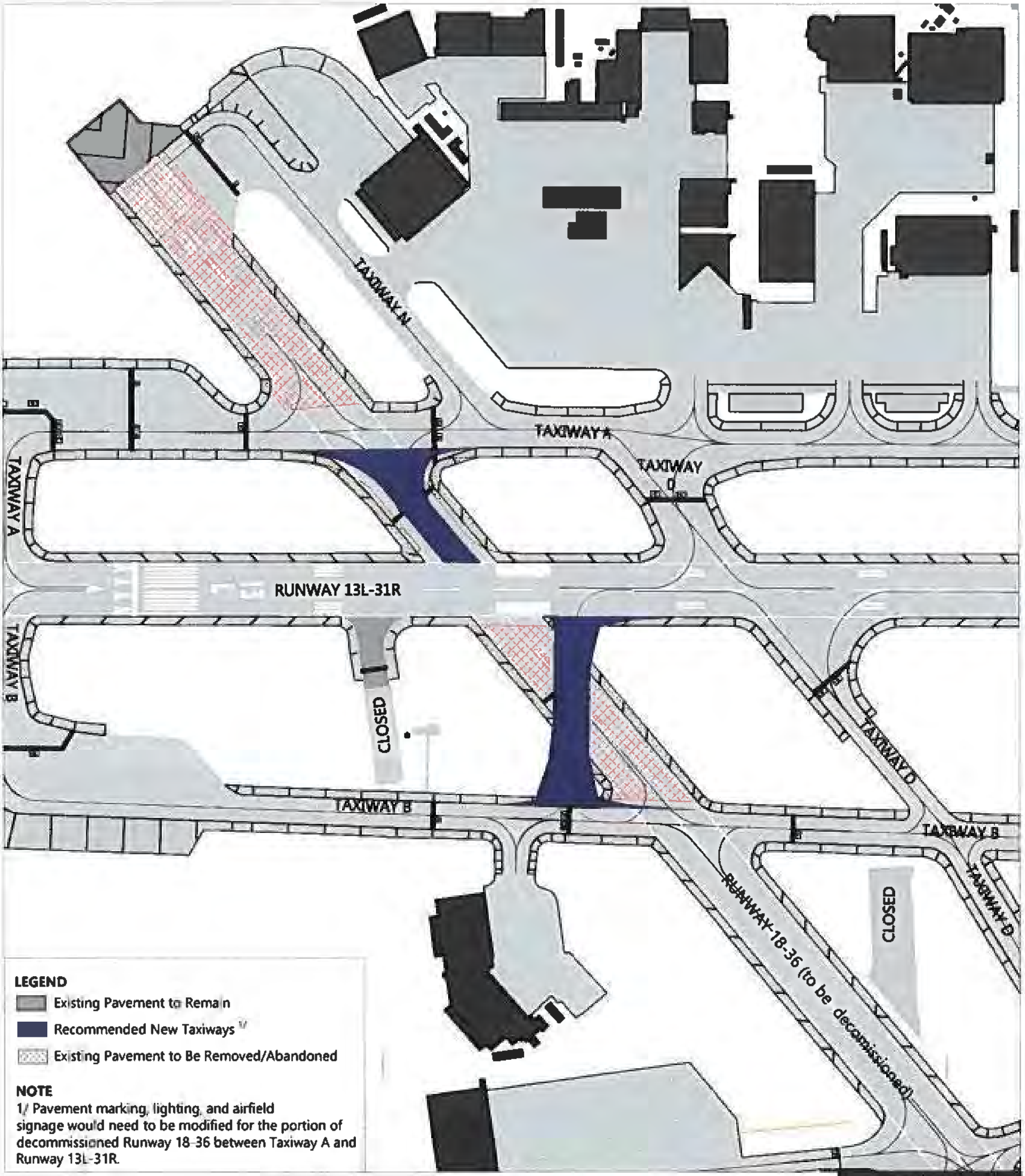

LEGEND

▨ Existing Pavement to Remain

■ Recommended New Taxiways [1/]

▧ Existing Pavement to Be Removed/Abandoned

NOTE

1/ Pavement marking, lighting, and airfield signage would need to be modified for the portion of decommissioned Runway 18-36 between Taxiway A and Runway 13L-31R.

SOURCES: Dallas Love Field Airport Layout Plan 2001; Ricondo & Associates, Inc. February 2014

PREPARED BY: Ricondo & Associates, Inc. September 2014

EXHIBIT 5-1

Recommended Runway 13L-31R Exit Reconfigurations

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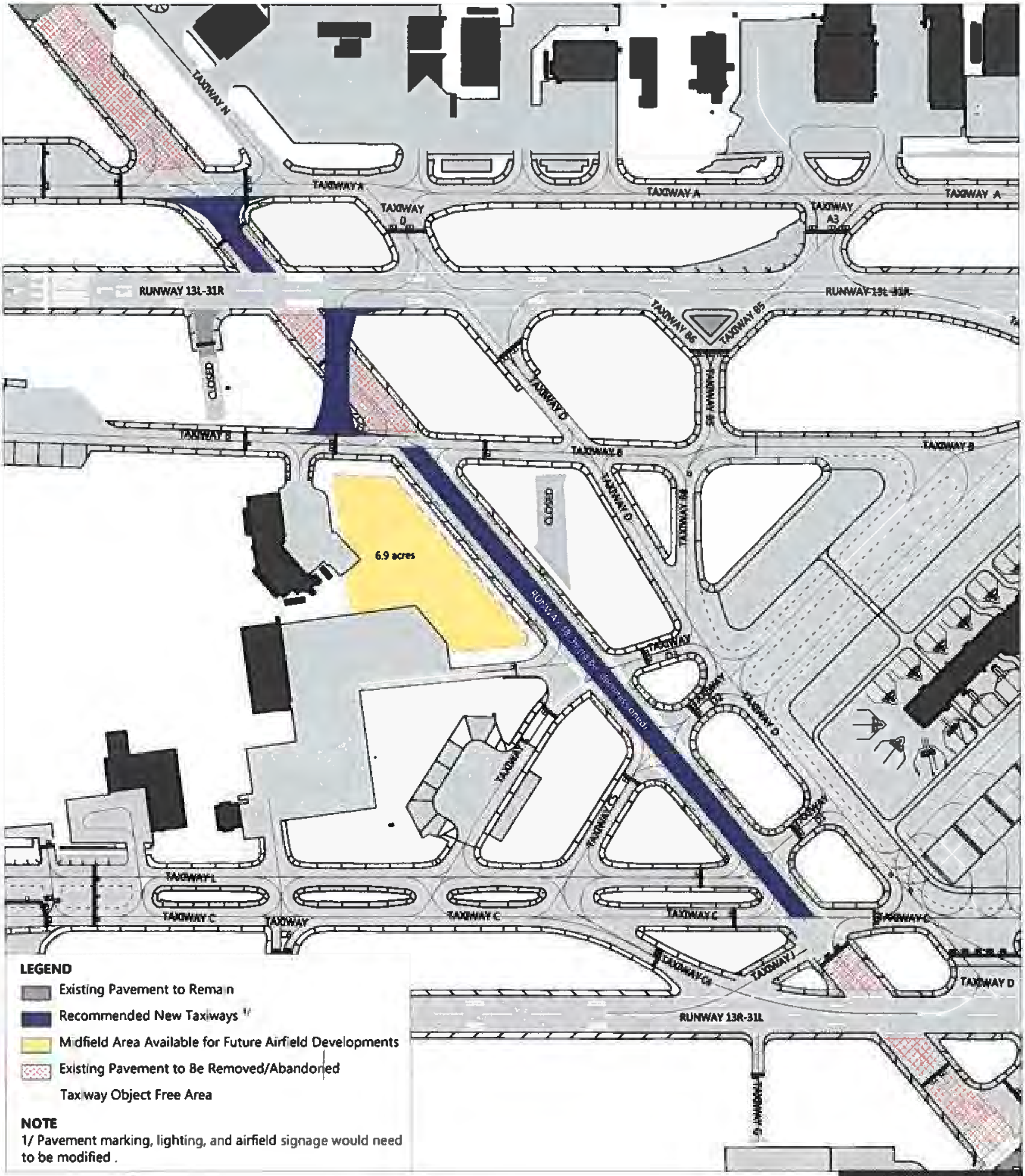


LEGEND

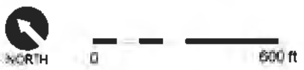
- ▨ Existing Pavement to Remain
- ■ Recommended New Taxiways [1/]
- 🟨 Midfield Area Available for Future Airfield Developments
- ▨ Existing Pavement to Be Removed/Abandoned
- Taxiway Object Free Area

NOTE

1/ Pavement marking, lighting, and airfield signage would need to be modified.

SOURCES: Dallas Love Field Airport Layout Plan, 2001. Ricondo & Associates, Inc. February 2014
PREPARED BY: Ricondo & Associates, Inc. September 2014

EXHIBIT 5-2



Crossfield Taxiway Alternative 1
Decommissioned Runway 18-36 Partially Converted To a Taxiway

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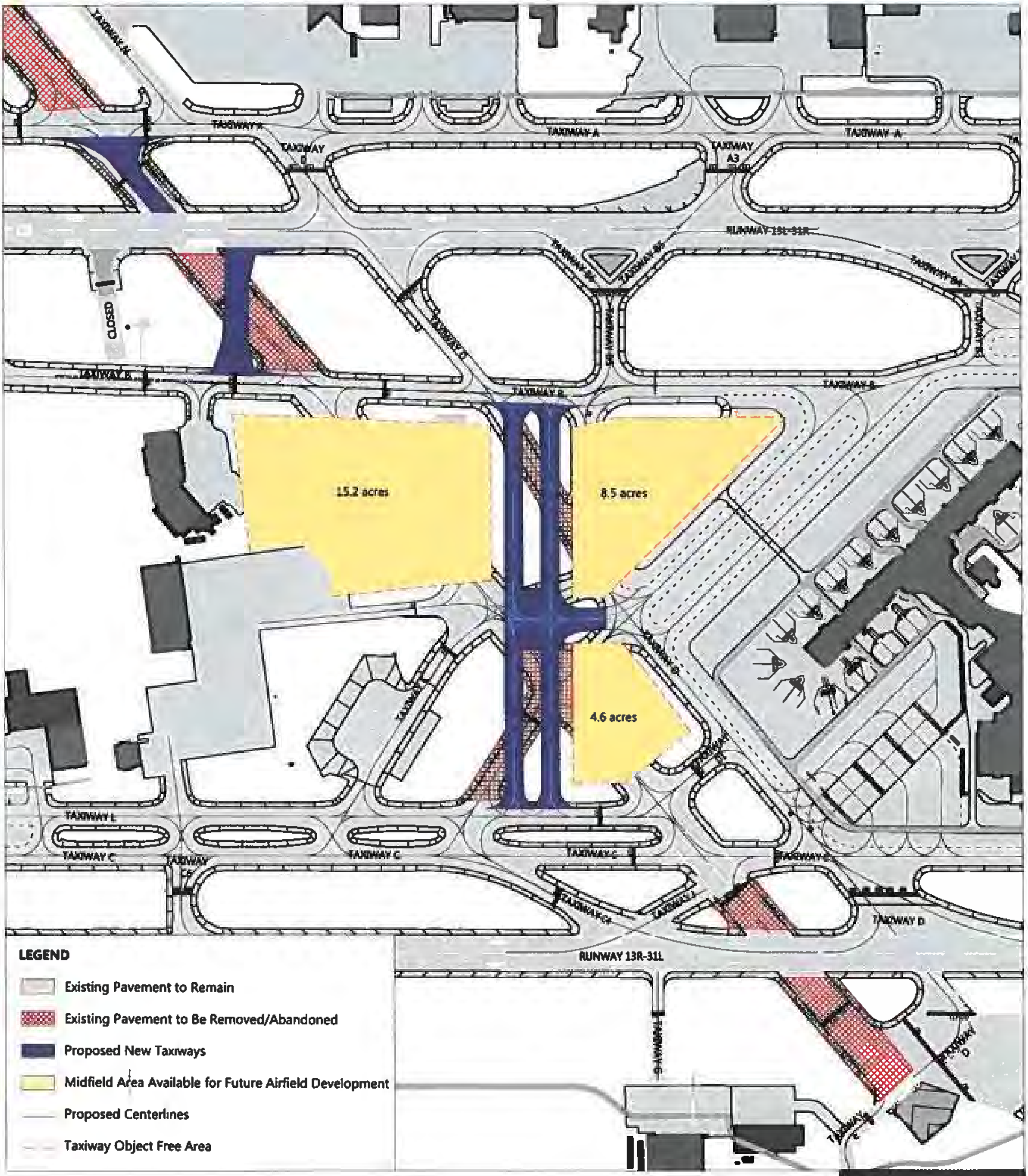

SOURCES: Dallas Love Field Airport Layout Plan, 2001, Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014

EXHIBIT 5-3

NORTH 0 600 ft.

Crossfield Taxiway Alternative 2
Dual ADG III Parallel Taxiway System

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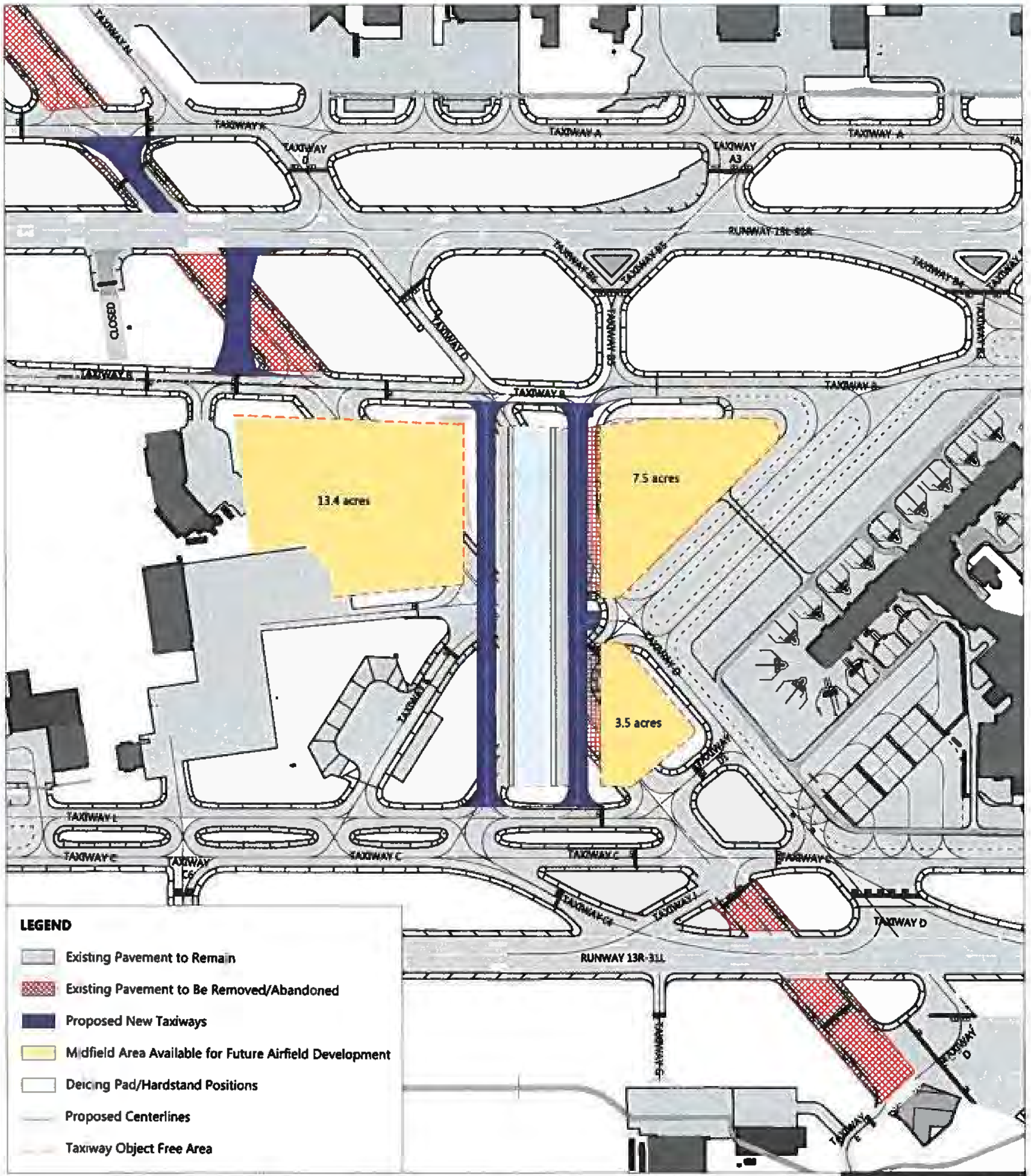

SOURCES: Dallas Love Field Airport Layout Plan, 2001 | Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-4

Crossfield Taxiway Alternative 3
Dual ADG III Parallel Taxiway System with Centralized Deicing Pad

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5.1.1.4 Alternative 4 - Dual ADG IV Parallel Crossfield Taxiway System

As shown on **Exhibit 5-5**, Alternative 4 consists of dual parallel taxiways that would accommodate ADG IV and smaller aircraft. The lateral centerline-to-centerline separation between the two taxiways would be 215 feet. An area of approximately 25 acres would become available for future development, including approximately 10 acres adjacent to the terminal apron that could be used for RON parking or GSE storage/staging and 15 acres north of the crossfield taxiways that could be used for other airfield facility development.

5.1.1.5 Alternative 5 - Dual ADG IV Parallel Crossfield Taxiway System with Centralized Deicing Pad

As shown on **Exhibit 5-6**, Alternative 5 consists of dual parallel taxiways with a centerline-to-centerline separation of 460 feet, which would be able to accommodate ADG IV or smaller aircraft. A 160-foot-wide area between the two taxiways would be preserved for deicing activities or RON/hardstand positions. Most ADG IV aircraft, such as the Boeing 757-200 and the Boeing 767-200, which are based at the Airport, are less than 160 feet long and could use the centralized deicing pad. Similar to Alternative 2, two 20-foot-wide service roads would be located outside of each taxiway OFA and could be used for deicing vehicles.

An area of approximately 20 acres would become available for future facility development, including more than 7 acres adjacent to the terminal apron that could be used for GSE staging/storage and RON parking and more than 12 acres north of the crossfield taxiways that could be used for other airfield facility development.

5.1.1.6 Alternatives Comparison and Recommendation

Alternatives 2 through 5 provide dual taxiways as a crossfield connection between Taxiways B and L immediately west of the terminal apron. To minimize the potential for runway incursions, the crossfield taxiways would terminate at Taxiways B and L.

With the exception of the removal or abandonment of portions of Runway 18-36, Alternative 1 would use most of the existing taxiway network, thereby minimizing construction costs. Alternatives 2, 3, 4, and 5, however, would require decommissioning the portion of Taxiway B5 southwest of Taxiway B, as well as Taxiways C5, D3, and P, and a significant portion of Taxiway D. In addition, the proposed alignments of the crossfield taxiways under Alternatives 2 through 5 would be to the west of existing Taxiway B5, avoiding a direct access to Runway 13L-31R and potential aircraft incursions onto that runway.

Table 5-1 provides a comparison of the five crossfield taxiway modification alternatives described above.

To optimize airfield capacity and flexibility and provide opportunities for future development, midfield dual parallel taxiways perpendicular to Runways 13L-31R and 13R-31L are recommended. These dual parallel taxiways would also provide areas that can be used for future aircraft parking, terminal development, or other airfield development. However, it is recommended that Runway 18-36 continue to be used as a taxiway as a near-term solution until operational demand warrants future facility development or the existing pavements associated with Runway 18-36 and Taxiway D reach the end of their useful lives.

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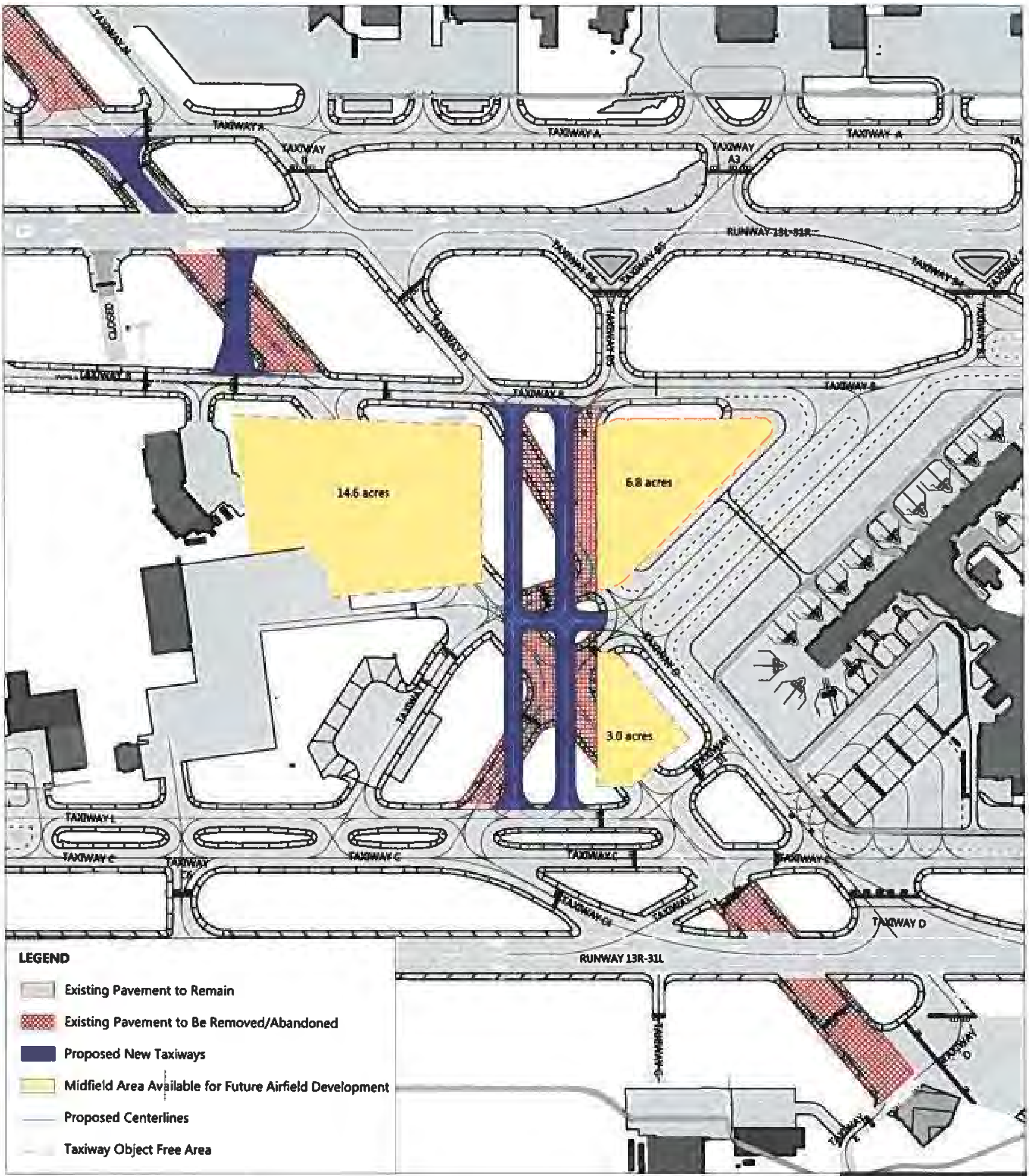

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

NORTH 0 600 ft.

EXHIBIT 5-5

Crossfield Taxiway Alternative 4
Dual ADG IV Parallel Taxiway System

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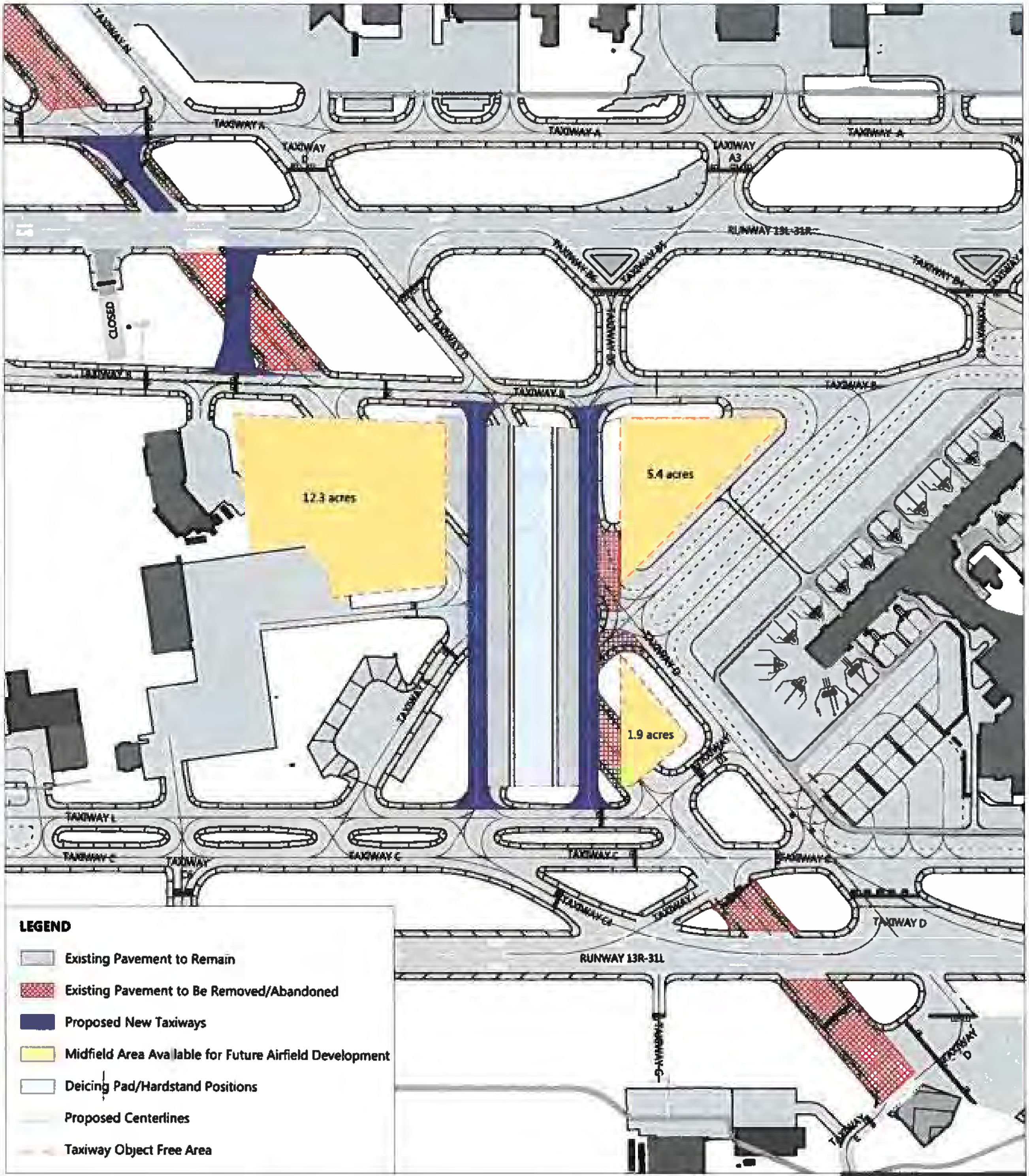

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-6

NORTH 0 600 ft.

Crossfield Taxiway Alternative 5
Dual ADG IV Parallel Taxiway System with Centralized Deicing Pad

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Table 5-1: Comparison of Crossfield Taxiway Modification Alternatives

	ALTERNATIVES				
CRITERIA	**1**	**2**	**3**	**4**	**5**
Relative Cost	Low	Moderate	High	Moderate	High
Aircraft Allowed on Dual Parallel Taxiways	N/A	ADG III	ADG III	ADG IV	ADG IV
Area Available for Deicing Pad/Remain Overnight Parking Positions	No	No	Yes	No	Yes
Approximate Area Available for Future Airfield Facility Development (acres)	7	29	25	25	20
Recommendation [1]	Preferred for interim use	Preferred as ultimate configuration	No	No	No

NOTES: N/A = Not Applicable

1/ Recommended only if Runway 18-36 is decommissioned.

SOURCE: Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

Following an evaluation and discussions with Airport staff, it was determined that the current deicing and hardstand positions are adequate to accommodate current (2013) demand, but aircraft hardstand parking requirements are anticipated to increase during the planning period. The midfield area that would become available on each side of the crossfield taxiways in Alternatives 2 and 4 is estimated to be sufficient to accommodate future development, including additional hardstand positions. Additionally, airfield projects compliant with ADG III design standards are eligible for FAA funding. Therefore, Alternative 2 was identified as the preferred crossfield taxiway alternative in the long term, while Alternative 1 is preferred in the near term.

5.1.2 RUNWAY INCURSION MITIGATION MEASURES

As described in Section 4, FAA AC 150/5300-13A, *Airport Design* (Change 1), incorporates guidance for reducing the risk of runway incursions related to airfield configuration. Among the eight planning strategies for mitigating runway incursion risks set forth by the FAA, the following strategies relate to deficiencies of the current DAL airfield:

- Avoid wide expanses of pavement, particularly for entrance and exit taxiways.
- Avoid high energy intersections within the center of the runway. Runway crossings should be limited to the first or last third of a runway, while crossings in the middle third of a runway should be avoided.
- Acute angle runway exits should not be used for aircraft crossings. Runway crossing points should be perpendicular to the runway centerline to increase pilot visibility.
- Direct runway access from an apron area is not recommended.

The following subsections describe the airfield modifications that would mitigate the deficiencies of the airfield areas at DAL that are not in conformance with FAA guidance.

5.1.2.1 Modifications to Taxiway D Crossing of Runway 13R-31L

In addition to providing access to the south end of Runway 18-36, Taxiway D crosses Runway 13R-31L, providing access to the Business Jet Center facility on the west side of the airfield. The intersection of Runway 13R-31L and Taxiway D deviates from the FAA's runway incursion prevention guidance in four ways:

- With an overall pavement width of 340 feet at the Runway 13R-31L hold position marking, Taxiway D is considered a wide expanse of pavement that could inhibit a pilot's situational awareness on the airfield.
- The intersection of the runway and the taxiway occurs in the middle third of the runway, thereby resulting in a high-energy intersection.
- The taxiway intersects the Runway 13R-31L centerline at an acute angle.
- Completion of the centralized deicing pad on the west terminal apron would result in direct access from the terminal ramp area to the runway.

To mitigate the potential incursion risk for the Taxiway D crossing of Runway 13R-31L, two alternatives were identified. **Exhibit 5-7** illustrates Taxiway D modifications if Runway 18-36 were to remain operational, and **Exhibit 5-8** illustrates Taxiway D modifications if Runway 18-36 were decommissioned. With the exception of eliminating the crossing in the middle third of Runway 13R-31L, both alternatives would mitigate the other three runway incursion risks and the revised taxiway orientation would enhance pilot visibility at a high-energy point. Given that there is no parallel taxiway along the southwest side of Runway 13R-31L, it is not feasible to relocate the crossing point away from the middle third of the runway. Furthermore, the number of aircraft that actually use this crossing point is low, regardless of whether Runway 18-36 remains operational or not. Under both alternatives, Taxiway D would be converted to a 90-degree exit for arrivals on Runways 13R and 31L.

Taxiway D Modifications with Runway 18-36 Operational

If Runway 18-36 remains operational, the centerline of Taxiway D between Runways 13R-31L and 18-36 would be realigned to intersect Runway 13R-31L at a right angle. In addition, the section of Taxiway D between Taxiway C and Runway 13R-31L would be closed and a new 90-degree exit taxiway would be constructed south of Taxiway D. The new exit would be aligned with the realigned centerline of Taxiway D west of Runway 13R-31L for perpendicular runway crossings, maximizing pilot visibility. The centerline of the new exit would not be aligned with the deicing pad markings, mitigating the availability of direct access from the terminal ramp area to the runway. As shown on Exhibit 5-7, the existing pavement connecting Runway 13R-31L with the holding pad east of the Runway 36 threshold would be removed or abandoned and access to that holding pad would be provided via the new pavement.

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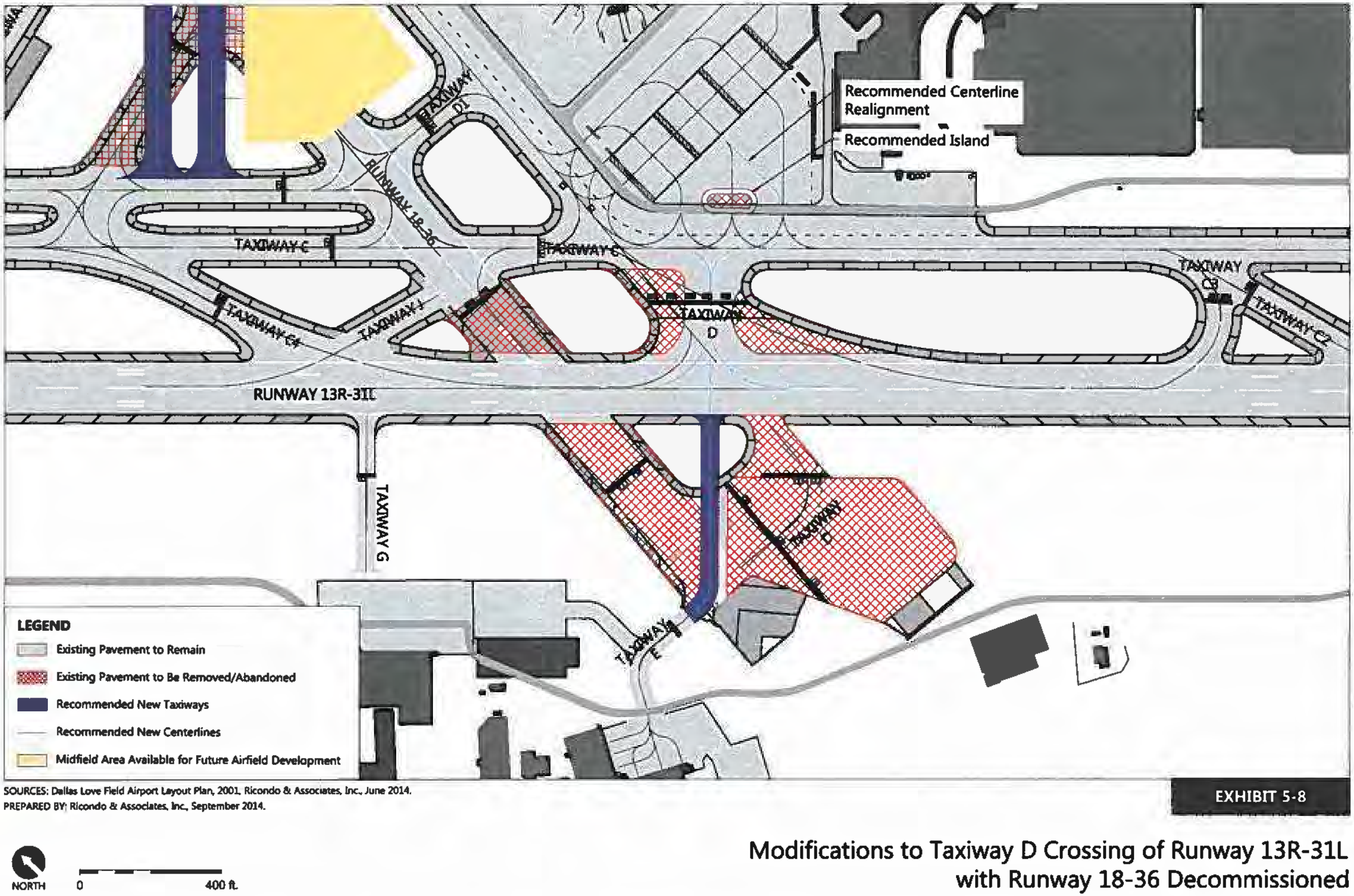

SOURCES: Dallas Love Field Airport Layout Plan, 2001. Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-8

Modifications to Taxiway D Crossing of Runway 13R-31L with Runway 18-36 Decommissioned

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Taxiway D Modifications with Runway 18-36 Decommissioned

Upon the decommissioning of Runway 18-36, the section of Taxiway D south of Runway 13R-31L would only provide access to the Business Jet Center facility to the west of the Runway 36 threshold. Therefore, reconfiguring this portion of the taxiway should be considered once Runway 18-36 is decommissioned. It is recommended that Taxiway D be closed south of Runway 13R-31L and that a new connector taxiway be constructed perpendicular to the runway to provide access to the Business Jet Center facility (as illustrated on Exhibit 5-8). This reconfigured taxiway would connect with Taxiway E and have the same width as Taxiway E (50 feet).

Upon realignment of the Taxiway D centerline, it is recommended that an island be developed south of the middle position of the future deicing pad and that the taxilane leading to Taxiway C be realigned to avoid direct access from the deicing pad to Runway 13R-31L (see Exhibit 5-8). The island would also limit the wide expanses of pavement in this area.

5.1.2.2 Modifications to Taxiway D Crossing of Runway 13L-31R

The crossing of Runway 13L-31R via Taxiway D deviates from the FAA's runway incursion prevention guidance in two ways:

- The taxiway bisects the Runway 13L-31R centerline at an acute angle.
- The intersection of Taxiway D with Taxiway A is adjacent to one of the exits from the general aviation apron area, thereby resulting in direct access from this apron to the runway.

Whether or not Runway 18-36 is decommissioned, reconfiguration of the Taxiway D crossing at its intersection with Runway 13L-31R is warranted. **Exhibit 5-9** illustrates the recommended reconfiguration that would mitigate both deviations. The recommended placement of the perpendicular taxiway crossing would be in the northern third of the runway and would also be north of the ultimate location of the recommended crossfield parallel taxiways under Alternatives 2, 3, 4, and 5 described in Section 5.1.1. This location would provide the ability to implement the other crossfield parallel taxiway modifications without requiring relocation of this new crossing.

5.1.2.3 Modifications to Taxiways B1 and B3 Crossing of Runway 13L-31R

Currently, Taxiways B1 and B3 are primarily used to cross Runway 13L-31R. Because the taxiways do not intersect the runway at a right angle, pilot visibility is reduced and the risk of runway incursion is increased. According to FAA design standards, acute angle runway exits should not be used as runway crossing points. As Taxiways B1 and B3 are too close to the Runway 31R threshold to serve as runway exits and are located outside the middle third of the runway, they are intended to be exclusively used for Runway 13L-31R crossings. It is recommended that these taxiways be realigned with Taxiways A1 and A2, respectively, and perpendicular to the runway to minimize the potential for runway incursions. **Exhibit 5-10** depicts the reconfiguration of the two taxiways.

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SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014

NORTH 0 400 ft.

EXHIBIT 5-9

Modifications to Taxiway D Crossing of Runway 13L-31R

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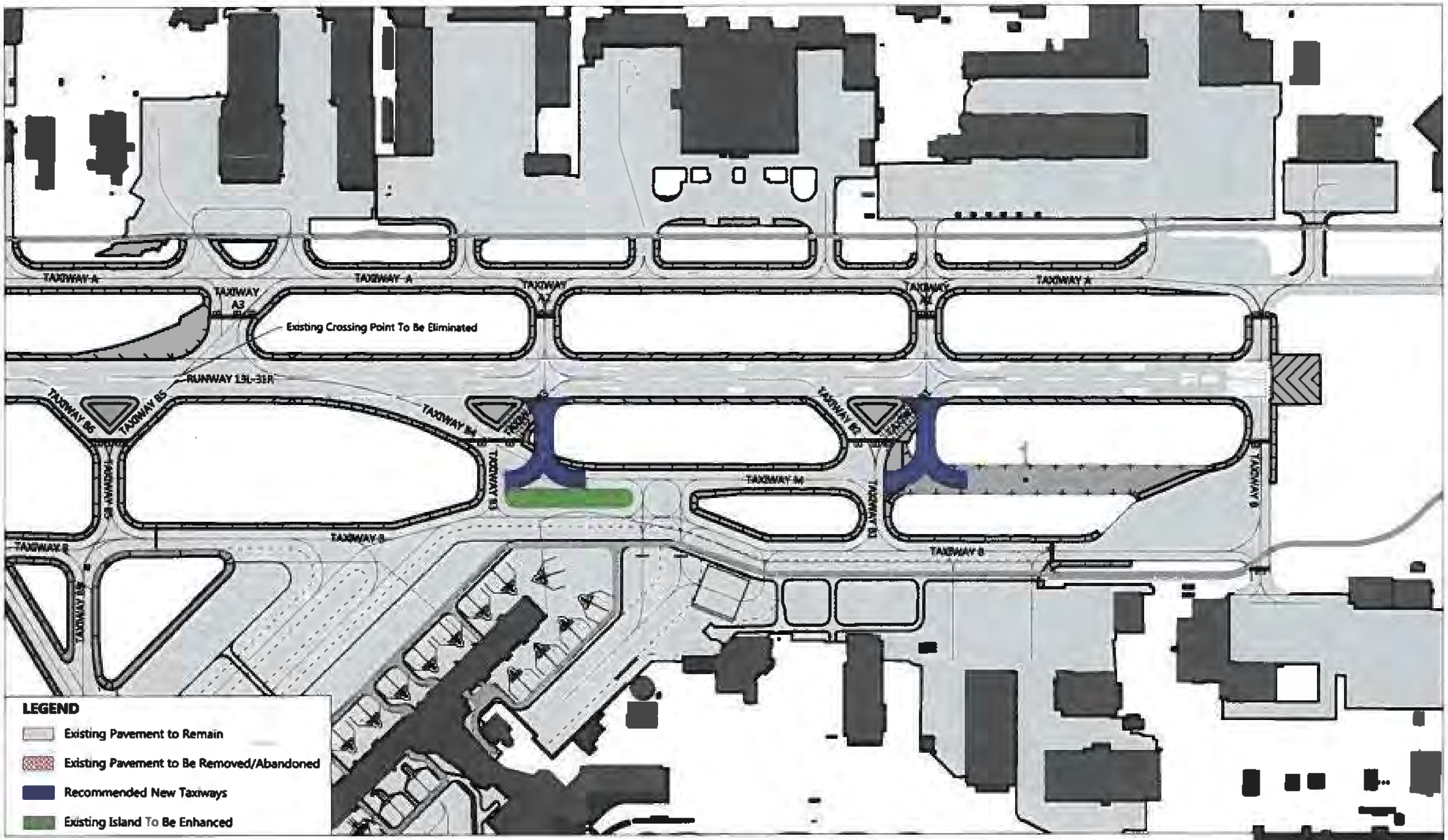

SOURCES: Dallas Love Field Airport Layout Plan, 2001, Ricondo & Associates, Inc., June 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014

EXHIBIT 5-10

NORTH 0 600 ft.

Modifications to Taxiways B1 and B3 Crossing of Runway 13L-31R

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Taxiway B1

As shown on Exhibit 5-10, realigned Taxiway B1 would connect Runway 13L-31R with Taxiway M and the Taxiway B1 OFA would remain outside the glideslope and PAPI located between the southern section of Taxiway M and Runway 13L-31R.

Taxiway B3

The realigned Taxiway B3, shown on Exhibit 5-10, would allow aircraft to cross Runway 13L-31R at a right angle in the first third of the runway. To avoid a straight access from the GA apron to the runway and be in conformance with FAA guidance, it is recommended that the existing island located southwest of Taxiway B3, currently indicated by dashed markings, be enhanced by the removal of unnecessary pavement.

5.1.2.4 Reconfiguration of Taxiways B5 and B6

Whether or not Runway 18-36 is decommissioned, Taxiway B6 and the section of Taxiway B5 between Runway 13L-31R and Taxiway B should be reconfigured for the following reasons:

- The Y shape is not recommended by FAA design standards.
- The angled crossing of Runway 13L-31R on Taxiways B5 and A3 increases the risk of runway incursion at a high-energy point (nonperpendicular crossings are not recommended).

Therefore, reconfiguring Taxiways B5 and B6 in conformance with FAA design standards would reduce the risk of runway incursions and increase pilot situational awareness, eliminating a complex intersection.

5.1.2.5 Modifications to Other Direct Apron-to-Runway Access Points

Whether or not Runway 18-36 is decommissioned, several other taxiways at DAL do not conform with FAA design standards because they currently provide direct access from an apron area to a runway. **Exhibits 5-11** and **5-12** and **Table 5-2** present the modifications recommended for the remaining taxiways that currently lead directly from an apron to a runway. For all intersection locations listed in Table 5-2, the alignment of the taxiways/taxilanes would be mitigated by relocating the access points away from the associated apron areas.

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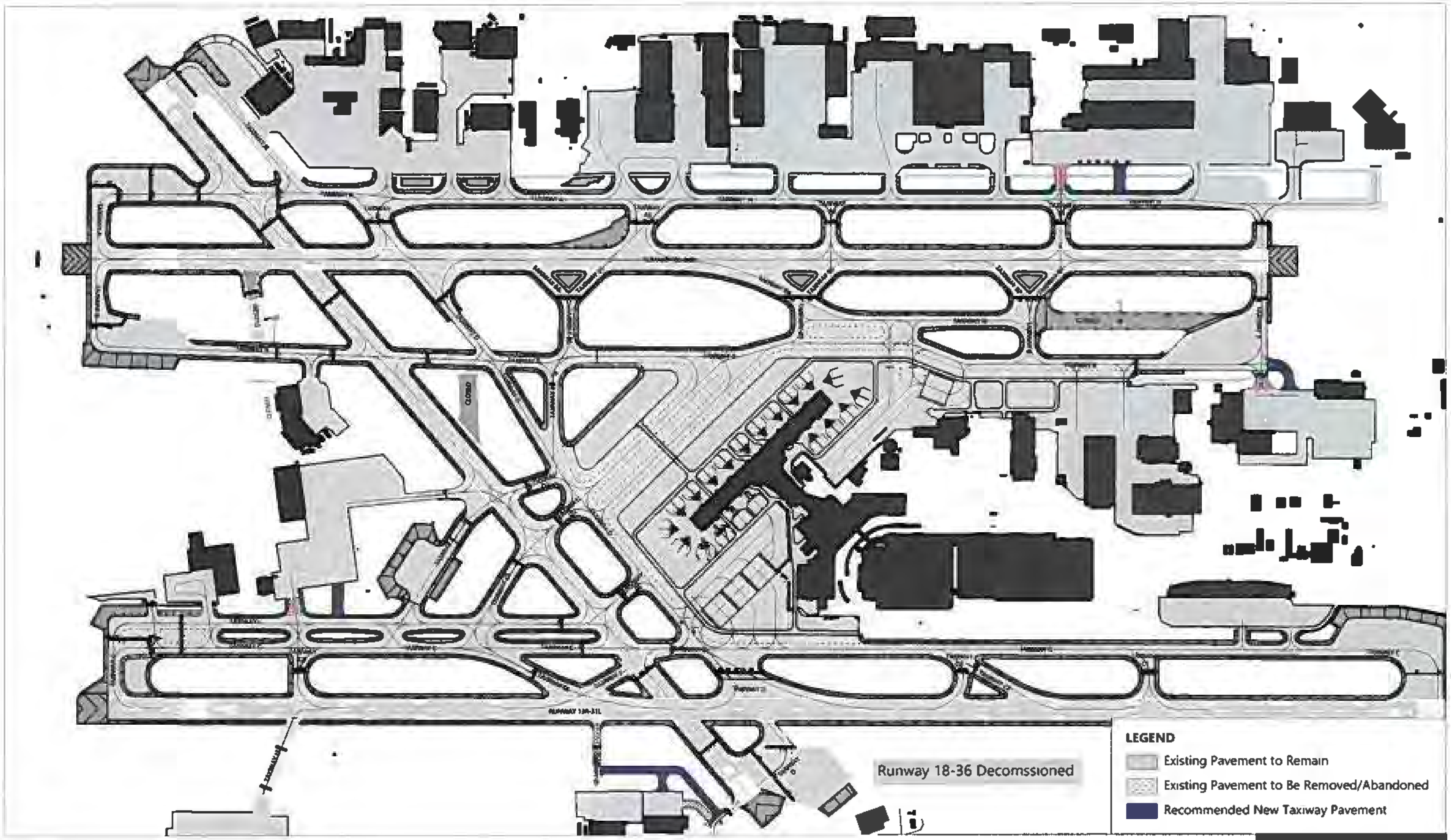

LEGEND

- ▨ Existing Pavement to Remain
- ▨ Existing Pavement to Be Removed/Abandoned
- ■ Recommended New Taxiway Pavement

SOURCES: Dallas Love Field Airport Layout Plan, 2001. Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014

NORTH 0 1,000 ft

EXHIBIT 5-11

Modifications to Other Direct Apron-to-Runway Access Points
Runway 18-36 Operational

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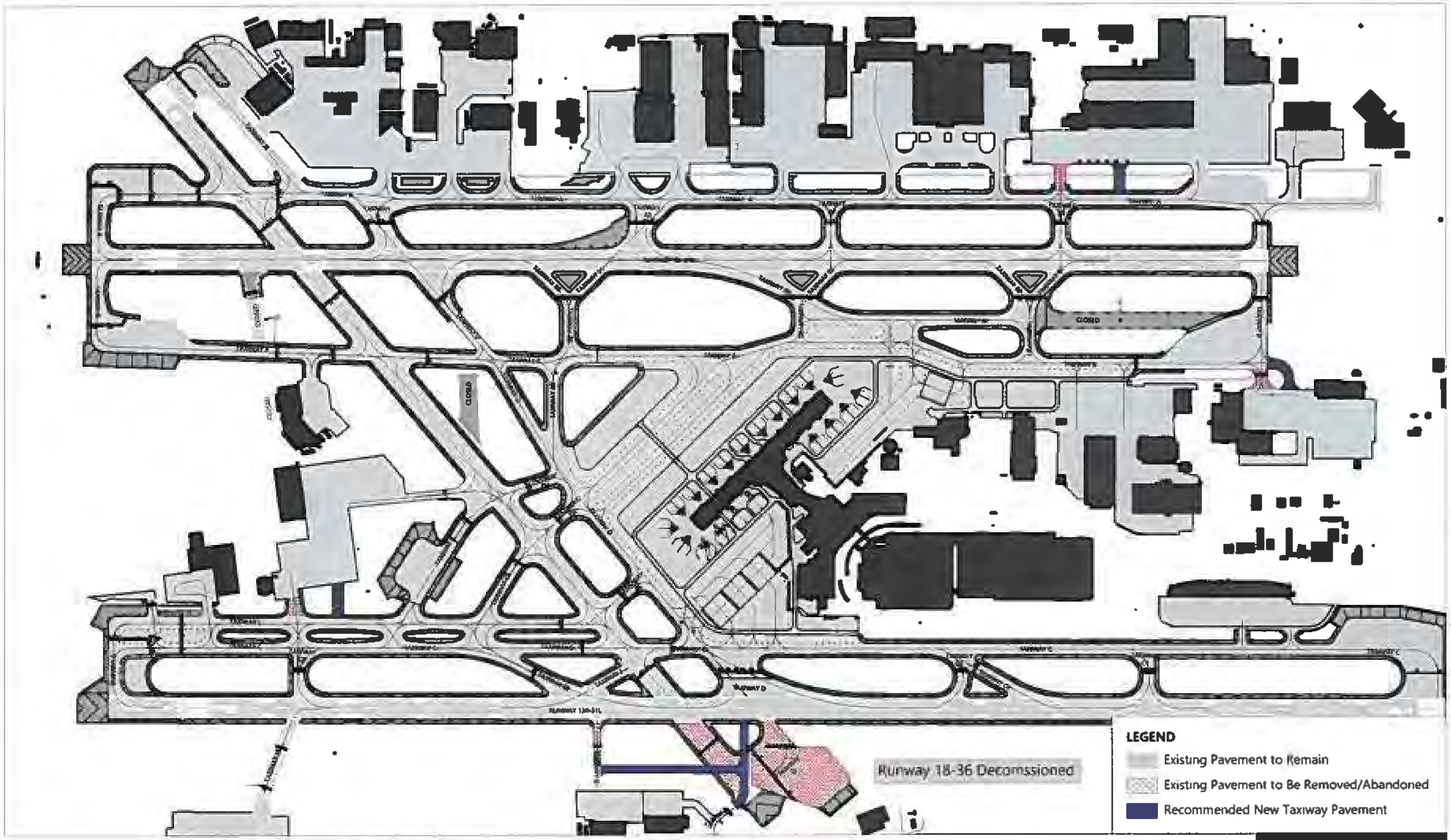

SOURCES. Dallas Love Field Airport Layout Plan, 2001 Ricondo & Associates, Inc., February 2014
PREPARED BY Ricondo & Associates, Inc September 2014

NORTH 0 1,000 ft

EXHIBIT 5-12

Modifications to Other Direct Apron-to-Runway Access Points
Runway 18-36 Decomissioned

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Table 5-2: Recommended Modifications to Other Direct Apron-to-Runway Access Points

INTERSECTION LOCATION	RECOMMENDED MODIFICATION FOR FAA COMPLIANCE
Runway 13L-31R and Taxiway A1 intersection (from Signature Flight Support)	Close the taxiway connector between Taxiway A and the apron and construct a new taxiway connector 385 feet to the south. This new connector would not be aligned with Taxiway A1 and would not provide direct access to the runway.
Runway 13L-31R and Taxiway B intersection (from LearJet TX, Trinity Industries, and Bombardier Aerospace Services)	Close the taxiway connector and construct a new connector slightly to the south so that it does not provide direct access to the runway.
Runway 13R-31L and Taxiway C6 intersection (from Textar and ExxonMobil)	Close the taxiway connector between Taxiway L and the northeast apron and construct a new taxiway connector 280 feet to the south to eliminate the direct access from the apron to the runway.
Taxiway G and Runway 13R-31L	Close Taxiway G and construct a new 50-foot-wide taxiway parallel to Runway 13R-31L. • If Runway 18-36 is decommissioned, the new taxiway would intersect Taxiway D. • If Runway 18-36 remains operational, the new taxiway would connect with Taxiway E, west of the Runway 36 threshold.

SOURCES: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design* (Change 1), February 26, 2014; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., February 2014.

5.1.2.6 Taxiway J Closure

Whether or not Runway 18-36 is decommissioned, it is recommended that Taxiway J be closed. Taxiway J currently connects Runways 13R-31L and 18-36 and its geometry could result in incursions on Runway 18-36. Removing this high-speed exit taxiway would reduce the risk of runway incursions and would not significantly affect arrivals on Runway 13R, as a very limited number of aircraft use that exit taxiway, which is located less than 1,500 feet from the Runway 13R touchdown zone. Additionally, with the recommended closure of Taxiway G, the use of Taxiway J would be even more limited.

5.1.3 TAXIWAY PAVEMENT FILLET MODIFICATIONS

According to discussions with Airport staff, it was determined that the pavement fillet at the intersection of Taxiways C4 and C limit aircraft turning movements. Of particular concern is that aircraft landing on Runway 31L cannot exit the runway via Taxiway C4 and turn right onto Taxiway C. No other pavement geometry deficiencies were identified.

Taxiway C4 is one of the two high-speed exits available for aircraft arriving on Runway 31L. Currently, no centerline marking exists for a right turn onto Taxiway C from Taxiway C4 because the pavement fillet is inadequate to allow aircraft to safely make this maneuver. However, ATC reported that some business jets exiting on Taxiway C4 turn right on Taxiway C to access the Jet Aviation facilities south of the passenger terminal. As the result of inadequate pavement fillets at this intersection, larger business jets that cannot make the turn often use outer parallel Taxiway L instead, increasing taxiing distance and travel times to the Jet Aviation ramp.

To enable aircraft exiting Runway 31L via Taxiway C4 to access Taxiway C, modifications of the pavement geometry at this intersection is recommended to comply with the FAA's fillet design criteria. As previously discussed in Section 4, new taxiway improvements are recommended to comply with TDG 5 to reduce the risk of large aircraft mistakenly using taxiways designed for small aircraft. **Exhibit 5-13** illustrates the additional taxiway pavement and shoulders required to enable TDG 5 aircraft to make right turns onto Taxiway C from Taxiway C4.

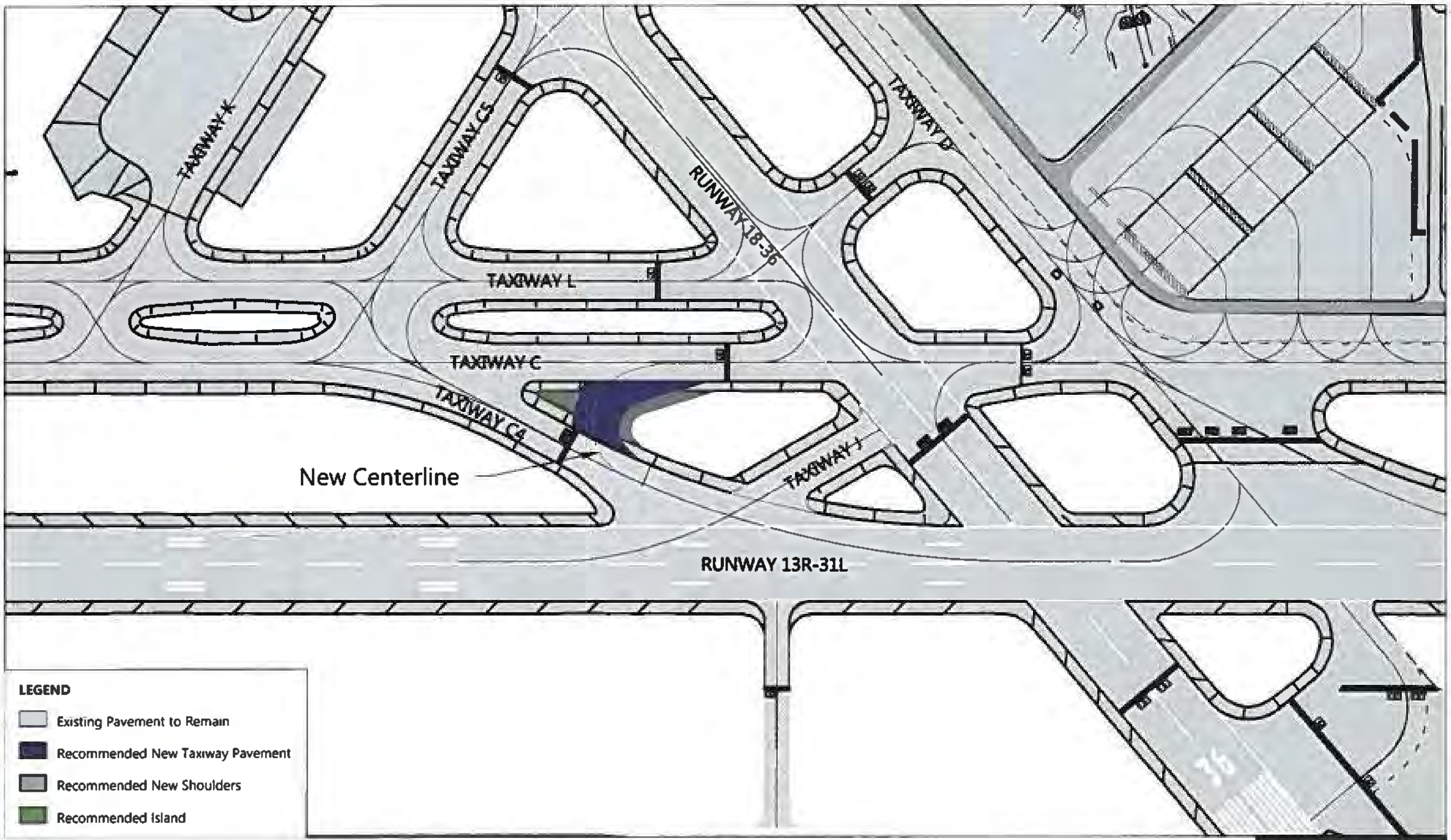
5.1.4 RUNWAY 31L BYPASS TAXIWAY MODIFICATIONS

The wide area of pavement east of the Runway 31L threshold needs to be modified to comply with FAA design standards. To provide more ATC flexibility in sequencing departures, it is recommended that a perpendicular bypass taxiway be constructed parallel to the portion of Taxiway C intersecting Runway 13R-31L. This bypass taxiway would enable one TDG 4 aircraft to bypass another TDG 4 aircraft. TDG 5 aircraft would not be allowed to bypass other aircraft because of the pavement width in this area. It is recommended that the island be painted and marked appropriately. TDG 4 includes all Boeing 737 versions and the Airbus A320 family of aircraft except the Airbus A321 with sharklets (the Airbus equivalent of winglets). The recommended reconfiguration and centerline marking are depicted on **Exhibit 5-14**.

5.1.5 RUNWAY 31R GLIDESLOPE AND RUNWAY VISUAL RANGE RELOCATION ALTERNATIVES

The glideslope serving Runway 31R ILS Category I approaches is currently located 400 feet laterally from the Runway 13L-31R centerline, placing it directly on the centerline of Taxiway M. The RVR, which indicates the visibility on Runway 13L-31R, is located 80 feet from the Taxiway M centerline. As a result, the southernmost portion of Taxiway M is closed and Taxiway B is the only taxiway available to access the Runway 31R threshold from the south side of the airfield. Air carrier aircraft and general aviation aircraft taxiing from facilities located between the parallel runways currently use Taxiway B to depart from Runway 31R in North Flow. Reopening Taxiway M would enable ATC to form two departure queues, thereby enhancing the ability to sequence aircraft for departures from Runway 31R. Alternatives to relocate the glideslope and reopen Taxiway M were evaluated.

The glideslope equipment includes the mast, antenna, and shelter. In accordance with FAA Order 6750.16E, *Siting Criteria for Instrument Landing Systems*, the equipment "must be located on a longitudinal reference line that is parallel to the runway centerline and at a lateral distance as determined by applying the obstacle-free zone (OFZ) criteria." Additionally, the FAA Order states that "the antenna mast, for non-frangible systems, must be located outside the OFZ, must be located outside the runway safety area (RSA), and must be located within 650 feet from runway centerline. The glideslope should be optimally located outside the object free area (OFA), but ultimately determined by site analysis." The RVR consists of one antenna and the processing equipment next to it and needs to be located along the runway and close to its edge to report accurate visibility distances. Based on these requirements, four alternatives were considered for relocating the glideslope and the RVR.



SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; Dallas Love Field Airport Layout Plan, 2001. Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014

EXHIBIT 5-13

Taxiway C4 Pavement Fillet Modifications

NORTH 0 300 ft.

Drawing: P:\Dallas Airport System~On-Call Planning 2012-2014\0 Master Plan\7 6 Development Alternatives\Airfield\CAD\Airfield Improvements\Ex5-13 Taxiway C4 Taxiway C Fillet.dwg_Layout: 5-12 Mar 25, 2015 9:26am

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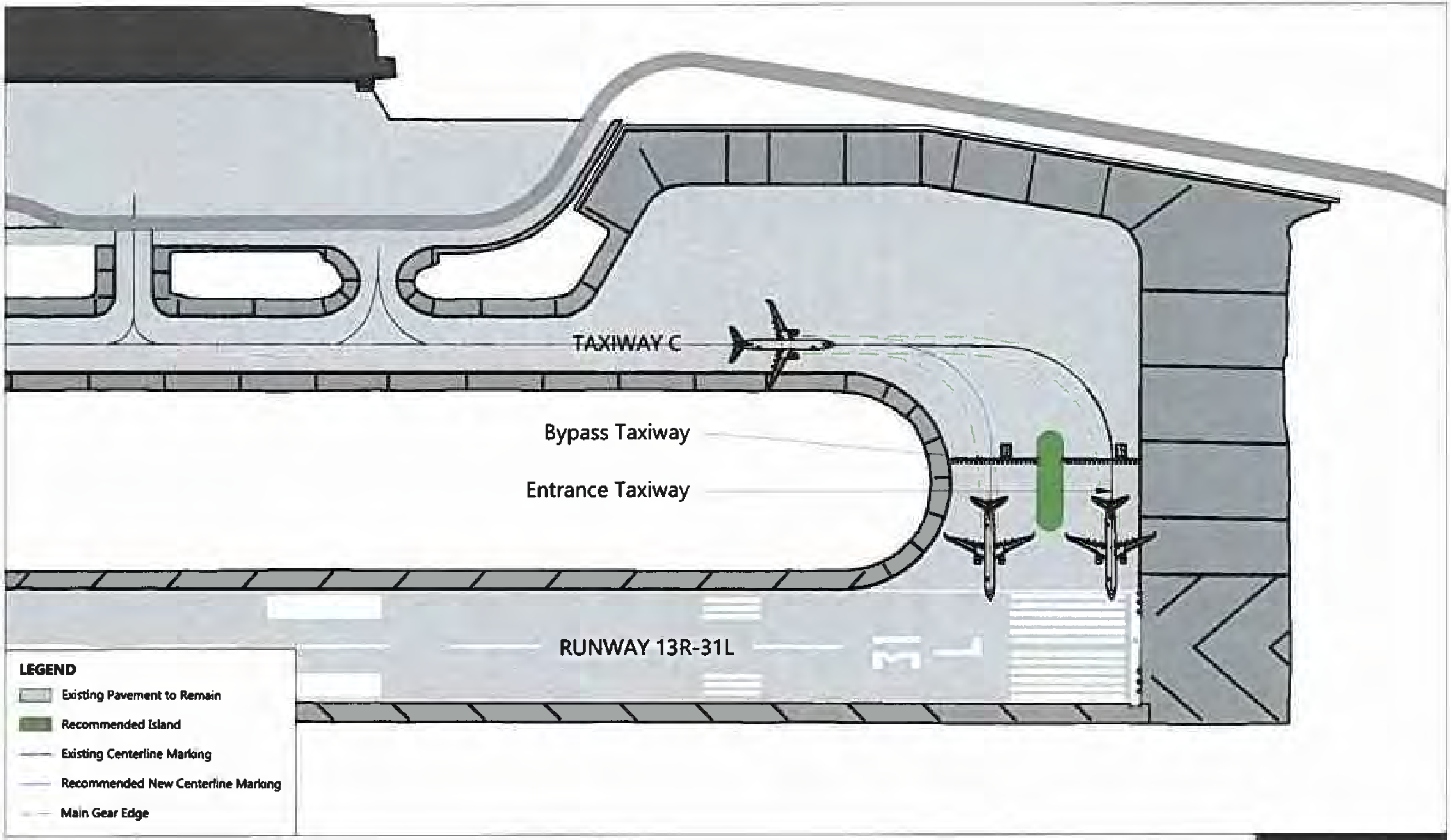

SOURCES. Dallas Love Field Airport Layout Plan, 2001 Ricondo & Associates, Inc June 2014
PREPARED BY Ricondo & Associates, Inc., September 2014

NORTH 0 200 ft

EXHIBIT 5-14

Runway 31L Bypass Taxiway

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For all alternatives, the only variable is the lateral separation between the Runway 13L-31R centerline and the component of the glideslope and the RVR closest to the runway. In addition, under these four alternatives, relocation of the glideslope and RVR facilities was considered, as Taxiway M can only be reopened if all components of the existing facilities are relocated.

5.1.5.1 Alternative 1 - No Changes

As shown on **Exhibit 5-15,** Alternative 1 consists of no changes to the location of the Runway 31R glideslope and RVR equipment. This alternative was considered because the need to increase the departure capacity in North Flow is not immediate. Under this alternative, the glideslope and the RVR equipment would remain in their current locations and the southern portion of Taxiway M would remain closed. This configuration may affect aircraft traffic in north flow and decrease airfield capacity further as operational demand increases. According to the forecasts presented in Section 3 of this Master Plan Update, the increase in operations would mainly be attributed to an increase in operations by air carrier aircraft. Therefore, in north flow, aircraft traffic from the terminal area would intensify, departure queues on Taxiway B would lengthen, and congestion may occur on Taxiway B.

5.1.5.2 Alternative 2 – Relocate Glideslope and RVR 405 Feet Northeast of the Runway 13L-31R Centerline

Under this alternative, the glideslope would be relocated northeast of the Runway 31R threshold. To be outside of the OFA, the glideslope would be located 405 feet from the runway centerline and, as a result, would be on Taxiway A. The RVR would be relocated next to the glideslope, at the same distance from the runway centerline as the glideslope, and outside of the glideslope critical area (see **Exhibit 5-16**). The glideslope and RVR relocation on Taxiway A would result in the closure of a section of Taxiway A, which is the only taxiway that provides access to the Runway 31R threshold from the northeast side of the Airport. To depart from Runway 31R, general aviation aircraft movements originating from facilities northeast of Runway 13L-31R would need to cross the runway and taxi on Taxiway B or M, which would be reopened. This alternative would comply with FAA Order 6750-16E, but would significantly affect general aviation aircraft operations and increase runway crossings, reducing runway capacity and increasing the potential for runway incursions or surface incidents.

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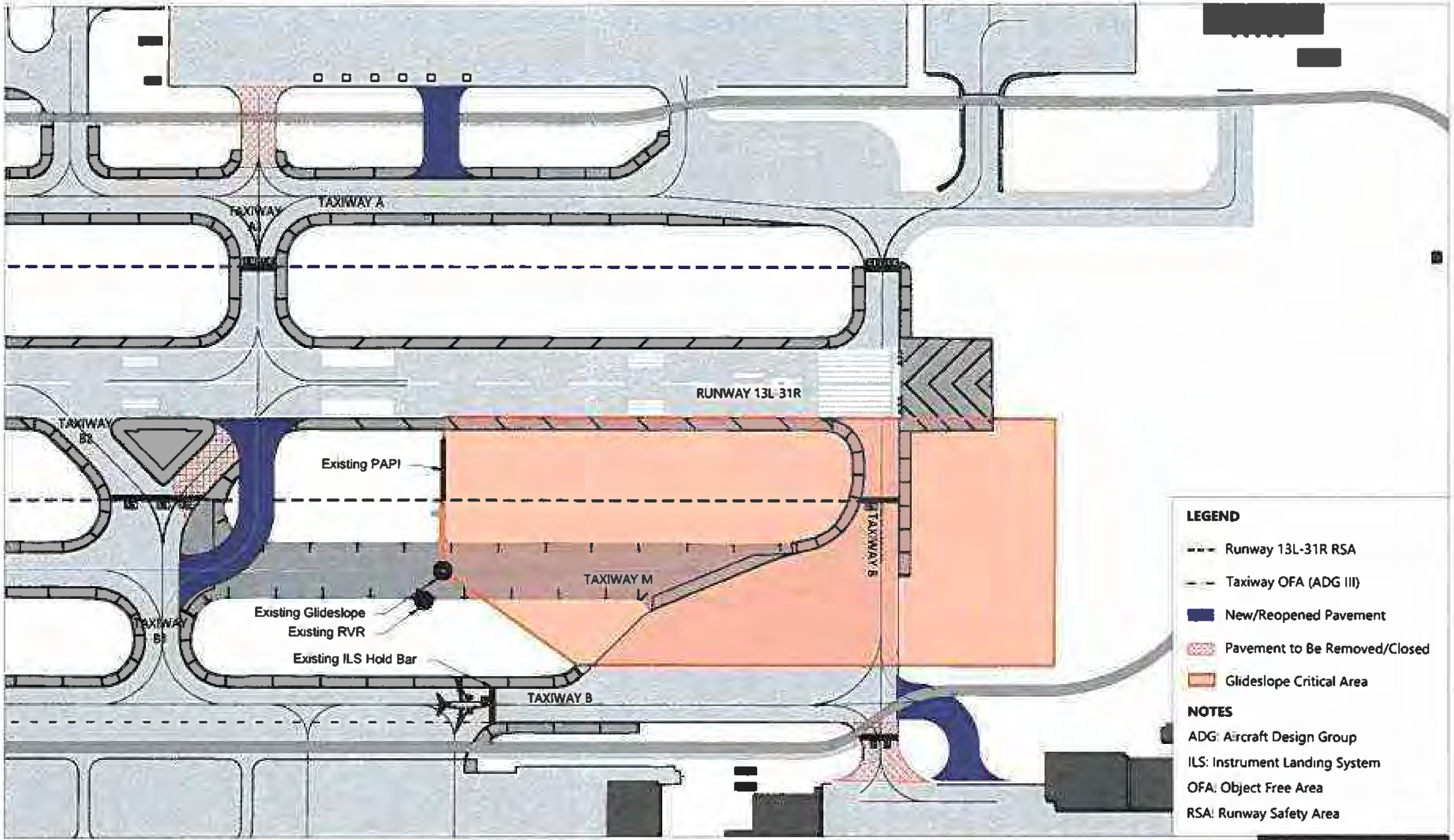
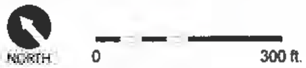


SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014, FAA Order 6750.16E, May 2014, Dallas Love Field Airport Layout Plan, 2001, Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-15

Runway 31R Glideslope and RVR Relocation - Alternative 1
No Changes



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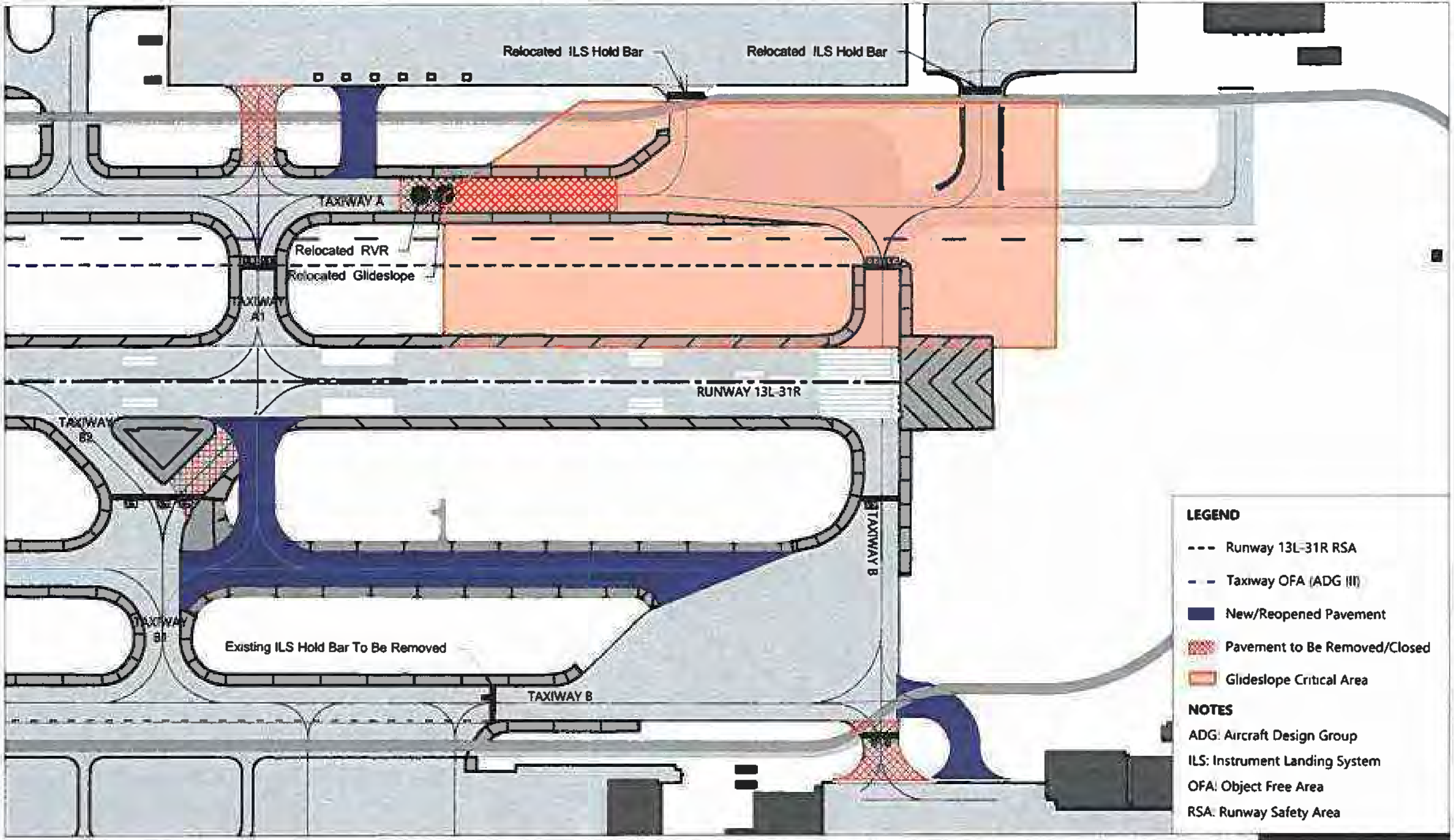

SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; FAA Order 6750.16E, May 2014, Dallas Love Field Airport Layout Plan, 2001, Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014

EXHIBIT 5-16

Runway 31R Glideslope and RVR Relocation - Alternative 2
Relocate Glideslope and RVR 405 Feet Northeast of Runway 13L-31R Centerline

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5.1.5.3 Alternative 3 – Relocate Glideslope and RVR 268 Feet Southwest of the Runway 13L-31R Centerline

Under this alternative, the entire glideslope (including the mast, antenna, and shelter) would remain southwest of the runway, but would be relocated 268 feet from the runway centerline, outside of the RSA and OFZ, outside of the Taxiway M OFA (provided that Taxiway M is restricted to use by ADG III or smaller aircraft), but inside the runway OFA. The RVR would be relocated next to the glideslope, at the same distance from the runway centerline as the glideslope and outside of the glideslope critical area (as shown on **Exhibit 5-17**). With an overall height of 48 feet above mean sea level (MSL), the existing glideslope antenna would not exceed the height limitation associated with the Runway 13L-31R inner transitional OFZ. As the RVR antenna height is lower than that of the glideslope antenna, it would also be lower than the Runway 13L-31R inner transitional OFZ. The PAPI serving Runway 31R approaches, and located in the Runway 31R RSA, would not affect relocation of the glideslope, as the PAPI and glideslope would remain aligned perpendicular to the runway and the glideslope would be outside the RSA. Under this alternative, the layout of the Runway 31R glideslope, RVR, and PAPI would be similar to the layout of the navigational aids for Runway 13R, which is also equipped with a Category I ILS. In that case, the glideslope and RVR are located outside the Runway 13R RSA and OFZ, but inside the Runway 13R-31L OFA, and the PAPI is aligned with the glideslope.

This relocation would enable reopening of the southern portion of Taxiway M to ADG III or smaller aircraft and improve air traffic flow for departures on Runway 31R, providing ATC with more flexibility to sequence departures in north flow. Aircraft on Taxiway M would have to hold outside the glideslope critical area to avoid glideslope signal interference. In addition, this alternative would not affect general aviation aircraft traffic northeast of Runway 13L-31R.

5.1.5.4 Alternative 4 – Relocate Glideslope and RVR 268 Feet Northeast of the Runway 13L-31R Centerline

This alternative consists of relocating the entire glideslope northeast of Runway 13L-31R and 268 feet from the runway centerline (see **Exhibit 5-18**). At this location, the glideslope would be inside the runway OFA, but outside the RSA, the OFZ, and the Taxiway A OFA (provided that Taxiway A is restricted to ADG III or smaller aircraft). The RVR would be relocated next to the glideslope, at the same distance from the runway centerline as the glideslope and outside of the glideslope critical area. Similar to Alternative 3, with an overall height of 48 feet above MSL, the existing glideslope antenna and RVR antenna would not exceed the height limitation associated with the Runway 13L-31R inner transitional OFZ. This relocation would enable the southern portion of Taxiway M to be used by ADG III and ADG IV aircraft and improve air carrier aircraft traffic in orth flow. During peak times, the relocated glideslope could affect general aviation aircraft movements originating from the northern area of the Airport, as these aircraft would have to hold outside of the glideslope critical area to prevent signal interference.

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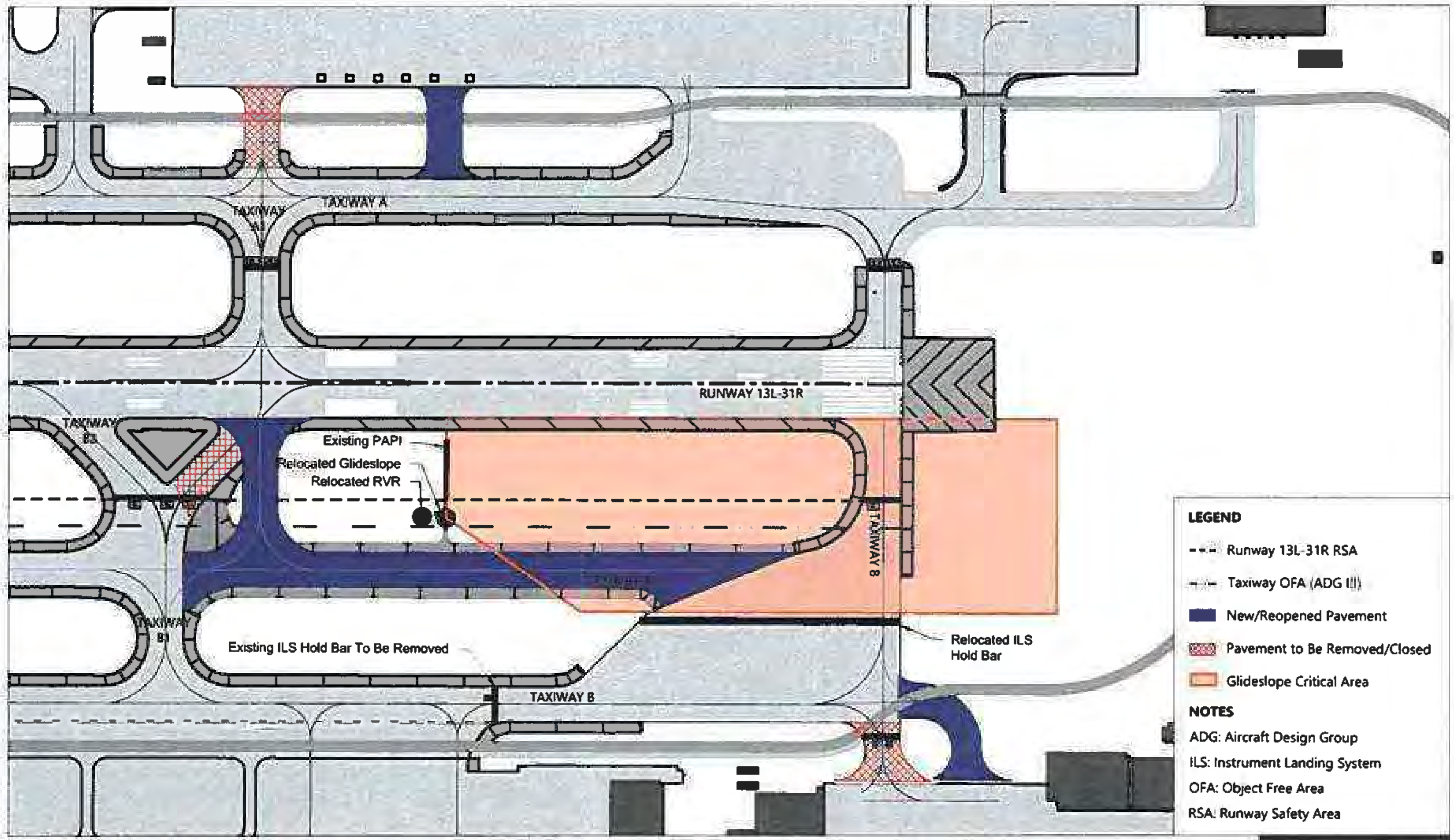

SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; FAA Order 6750.16E, May 2014; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-17

NORTH

0 300 ft.

Runway 31R Glideslope and RVR Relocation - Alternative 3
Relocate Glideslope and RVR 268 feet Southwest of Runway 13L-31R Centerline

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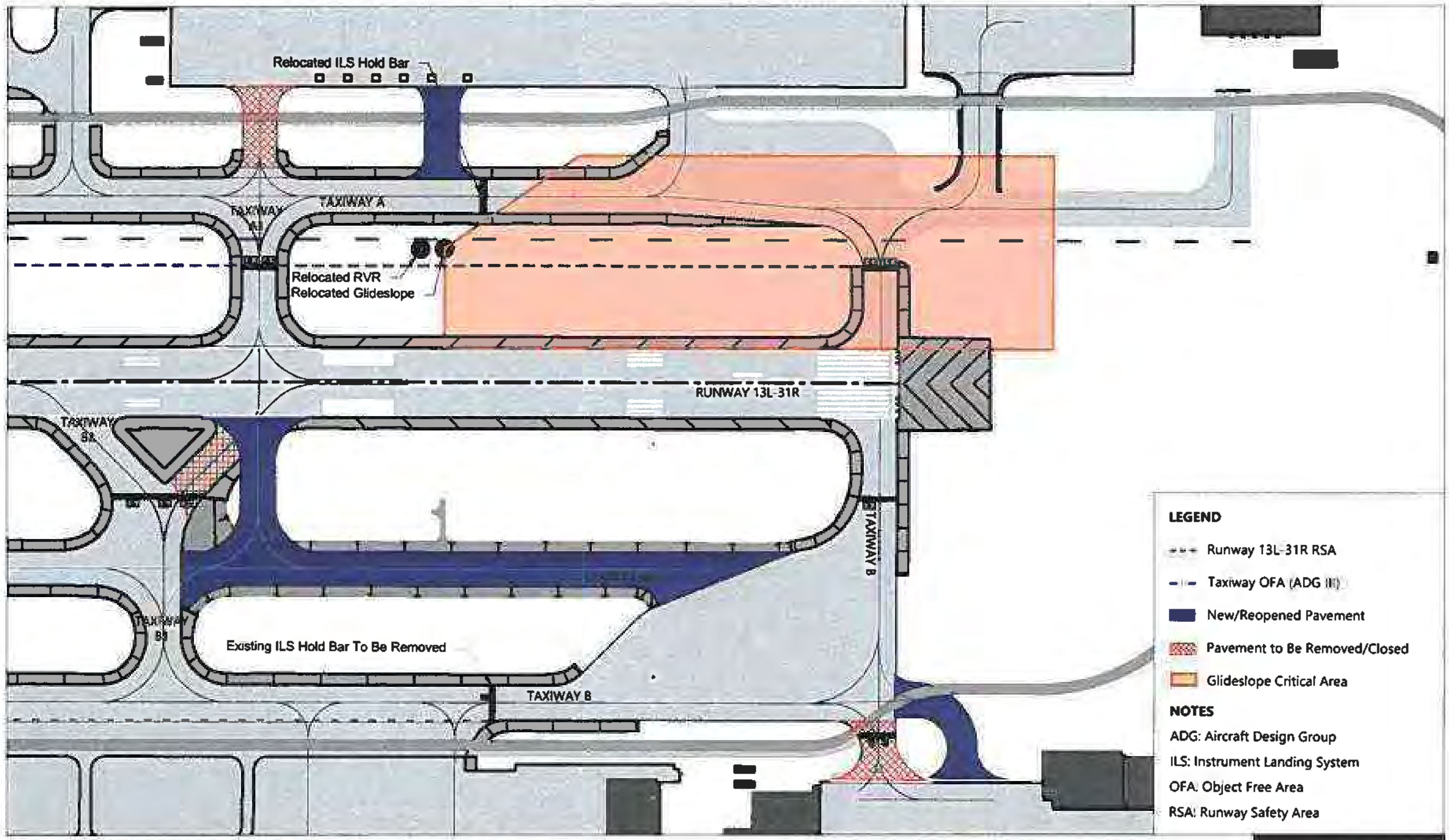

SOURCES: FAA Advisory Circular 150/5300-13A (Change 1), February 2014; FAA Order 6750.16E, May 2014; Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-18

NORTH 0 300 ft.

Runway 31R Glideslope and RVR Relocation - Alternative 4
Relocate Glideslope and RVR 268 Feet Northeast of Runway 13L-31R Centerline

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5.1.5.5 Comparison of Runway 31R Glideslope and RVR Relocation Alternatives

Table 5-3 presents a comparison of the four alternatives for relocating the Runway 31R glideslope and RVR.

Table 5-3: Comparison of Runway 31R Glideslope and RVR Relocation Alternatives

CRITERIA	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Glideslope Facility and RVR to Be Relocated	No	Yes	Yes	Yes
Lateral Separation Between The Glideslope and Runway 13L-31R Centerline	400 feet (existing)	405 feet (northeast)	268 feet (southwest)	268 feet (northeast)
Glideslope Inside The Runway OFA	No	No	Yes	Yes
Taxiway M Operational	No	Yes	Yes, but with restrictions	Yes
Largest Aircraft Allowed on Taxiway M	None	ADG IV	ADG III	ADG IV
Effect on Other Taxiways	None	Yes: a section of Taxiway A would be closed	No	Yes: glideslope critical area would encroach on Taxiway A

SOURCE: Ricondo & Associates, Inc., April 2014.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

Because the current placement of the Runway 31R glideslope requires the closure of the southern portion of Taxiway M, the ability to circumvent the glideslope via Taxiway B provides ATC limited ability to sequence aircraft for departures. Given that the airfield is currently operating at approximately 45 percent of its hourly capacity during IMC, the operational constraint of not having the full length of Taxiway M available is not significant at this time. However, as operational demand is forecast to increase in the future, the taxiway circulation constraints associated with the current placement of the Runway 31R glideslope and RVR will become significant. Therefore, it is recommended that Alternative 3 be incorporated in the future ALP for DAL. For capital improvement planning purposes, the recommended relocation of the Runway 31R glideslope and RVR would be implemented no sooner than PAL O2.

Relocation of the Runway 31R glideslope and RVR equipment would allow aircraft to operate on the full length of Taxiway M. As the navigational aid equipment is required to remain outside of the RSA, the glideslope antenna and associated equipment shelter and the RVR antenna would restrict operations on the portion of Taxiway M south of Taxiway B1 to ADG III aircraft. In addition, to allow pilots to access Runway 31R via Taxiway M, relocating the glideslope closer to the runway centerline would also allow for relocation of the ILS critical area boundaries closer to the departure threshold, thereby increasing departure capacity during IMC. Relocating the glideslope would also increase the area available for aircraft queuing on Taxiway B.

The electrical work required to relocate the glideslope equipment would be similar under Alternatives 2, 3, and 4. Implementation of preferred Alternative 3 might result in slight cost and time savings compared with Alternatives 2 and 4, as the electrical power and communications infrastructure are already onsite.

5.1.6 TAXIWAY M EXTENSION

In January 2015, Kimley Horn completed a pavement condition evaluation study for DAL, the *Dallas Love Field Airfield Pavement Evaluation*, which concluded that the Taxiway B pavement is in poor condition, thus nearing the end of its useful life. The full length of this taxiway is predicted to require full reconstruction within the next 5 years. To minimize operational impacts during construction, it is recommended that Taxiway M first be extended the entire length of the Runway 13L-31R. With the current separation of 400 feet between the taxiway and the Runway 13L-31R centerline, ADG IV aircraft could operate simultaneously on the runway and on Taxiway M.

As illustrated on **Exhibit 5-19**, the portion of Taxiway B between Taxiways B5 and P would be rehabilitated and a new portion of Taxiway B would be constructed between Taxiway B5 and the Runway 13L threshold after Taxiway M has been extended, providing two parallel taxiways the full length of Runway 13L-31R. The parallel taxiways would be separated by 152 feet, allowing two ADG III aircraft to taxi simultaneously and improving traffic flows of aircraft taxiing around the terminal. However, because the glideslope serving Runway 13L is currently located 400 feet from the Runway 13L-31R centerline, it would need to be relocated outside the new Taxiway M OFA and consequently inside the Runway 13L-31R OFA, similar to the recommended relocation of the glideslope serving Runway 31R. As the glideslope cannot be relocated within the runway RSA, the portion of Taxiway M between Runway 18-36 and the Runway 13L threshold would be restricted to ADG III aircraft. For simplification purposes, it is recommended that the entire length of extended Taxiway M be restricted to ADG III aircraft. Larger aircraft would use Taxiway B and no simultaneous operations would be allowed on Taxiway M.

5.1.7 VEHICLE SERVICE ROAD REALIGNMENT

Airfield vehicle service roads (VSRs) are usually configured to allow service vehicles to access portions of the airfield while minimizing time spent on taxiways, therefore reducing the risk of incursions or incidents and improving traffic flows on the airfield. VSRs must be located outside RSAs and outside taxiway OFAs. Several deficiencies have been identified at DAL. They include:

- Noncompliant separation between Taxiway B and the existing VSR south of the terminal area
- Noncompliant separation between the Runway 13L threshold and the current VSR surrounding this runway end
- Discontinuity of the VSR west of Runway 18-36

Recommended changes, including the realignment and construction of portions of the VSR system at the Airport, are included with the preferred development alternative.

5.1.8 PREFERRED DEVELOPMENT ALTERNATIVES

The City has prepared an EA for the potential decommissioning of Runway 18-36. Because the FONSI had not been issued at the time the airfield alternatives were evaluated, two "preferred" airfield development alternatives were identified, one reflecting the future airfield configuration if Runway 18-36 remains operational, and the other reflecting the future airfield if Runway 18-36 is decommissioned.

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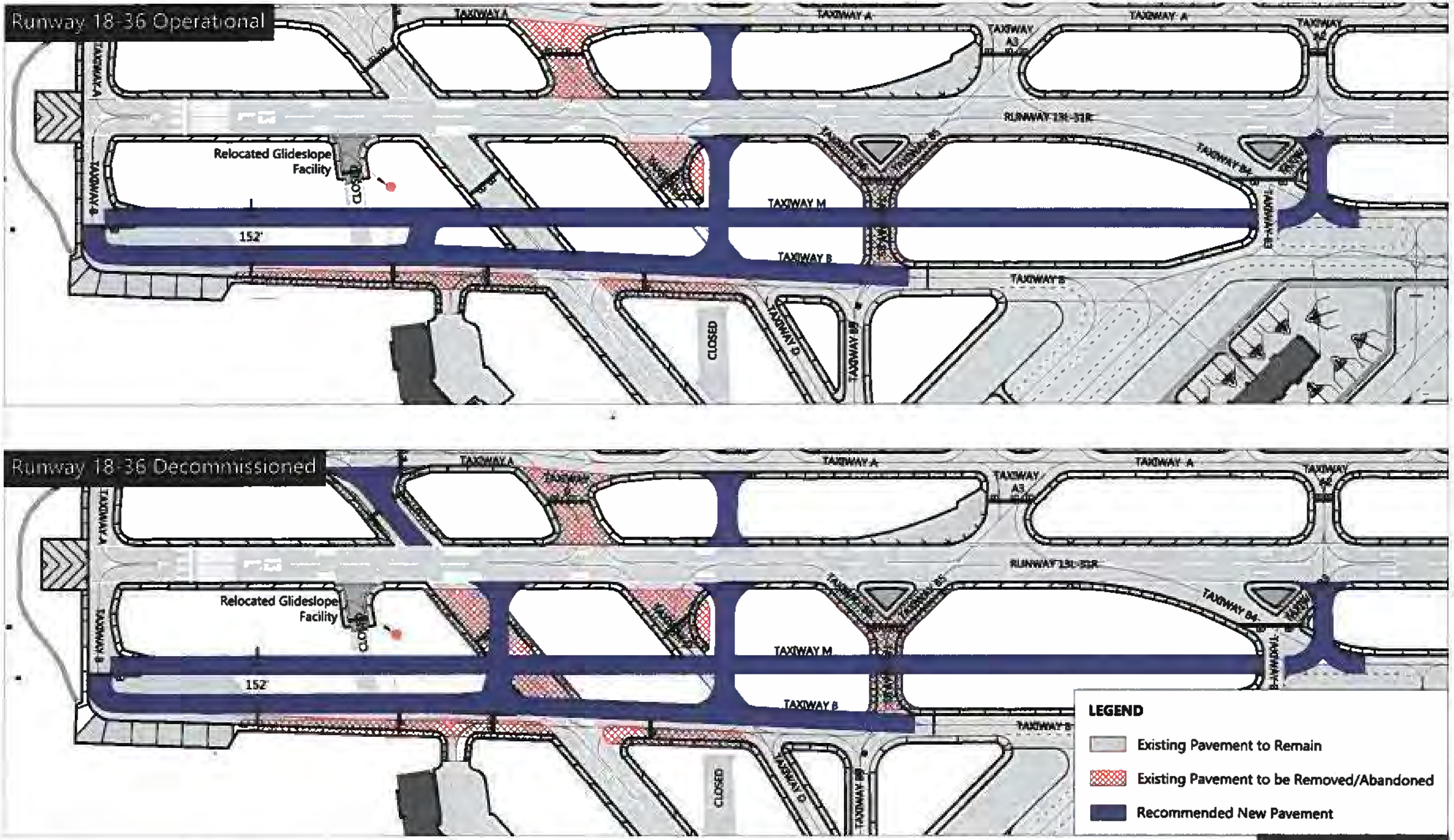

SOURCES: Dallas Love Field Airport Layout Plan, 2001. Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014

NORTH 0 600 ft.

EXHIBIT 5-19

Taxiway M Extension

Drawing: P:\Dallas Airport System\~On-Call Planning 2012-2014\07 Master Plan\7 6 Development Alternatives\Airfield\CAD\Airfield Improvements\Ex5-19 Taxiway M Extension Only.dwg_Layout: 5 19-Revised Mar 25, 2015, 11:01am

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5.1.8.1 Preferred Alternative 1 – Runway 18-36 Operational

Exhibit 5-20 illustrates the preferred alternative encompassing the airfield modifications that would be implemented if Runway 18-36 remains operational. The recommended improvements would include:

- Reconfigure the Taxiway D crossing of Runway 13L-31R between Taxiways A and B.
- Relocate apron access to Signature Flight Support facilities (Taxiway A1) to the south.
- Relocate the Runway 13L glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.
- Decommission Taxiways B5 and B6 between Runway 13L-31R and Taxiway B.
- Reconfigure Taxiways B1 and B3 to allow perpendicular crossings of Runway 13L-31R.
- Relocate the Runway 31R glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.
- Extend Taxiway M.
- Reopen the southernmost portion of Taxiway M.
- Realign Taxiway B.
- Construct/realign the airfield vehicle service road.
- Relocate apron access to Learjet TX, Trinity Industries, and Business Jet Center facilities (Taxiway B) to the south.
- Decommission the portion of Taxiway C6 between Taxiway L and the apron and construct a new taxiway connector south of the existing connector.
- Reconfigure Taxiway C4 pavement geometry to allow aircraft to exit Runway 31L and turn directly onto Taxiway C.
- Reconfigure the Taxiway D crossing of Runway 13R-31L between Taxiway C and the Runway 36 threshold.
- Develop a bypass taxiway for use by two TDG 4 aircraft at the Runway 31L threshold.
- Close Taxiway G and construct a new taxiway parallel to Runway 13R-31L.

5.1.8.2 Preferred Alternative 2 – Runway 18-36 Decommissioned

Exhibit 5-21 illustrates the preferred alternative encompassing the airfield modifications that would be implemented if Runway 18-36 is decommissioned. The recommended improvements would include:

- Reconfigure the portion of Runway 18-36 between Taxiways A and B to the Runway 31R exits.
- Reconfigure the Taxiway D crossing of Runway 13L-31R between Taxiways A and B.
- Relocate apron access to Signature Flight Support facilities (Taxiway A1) to the south.
- Relocate the Runway 13L glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.

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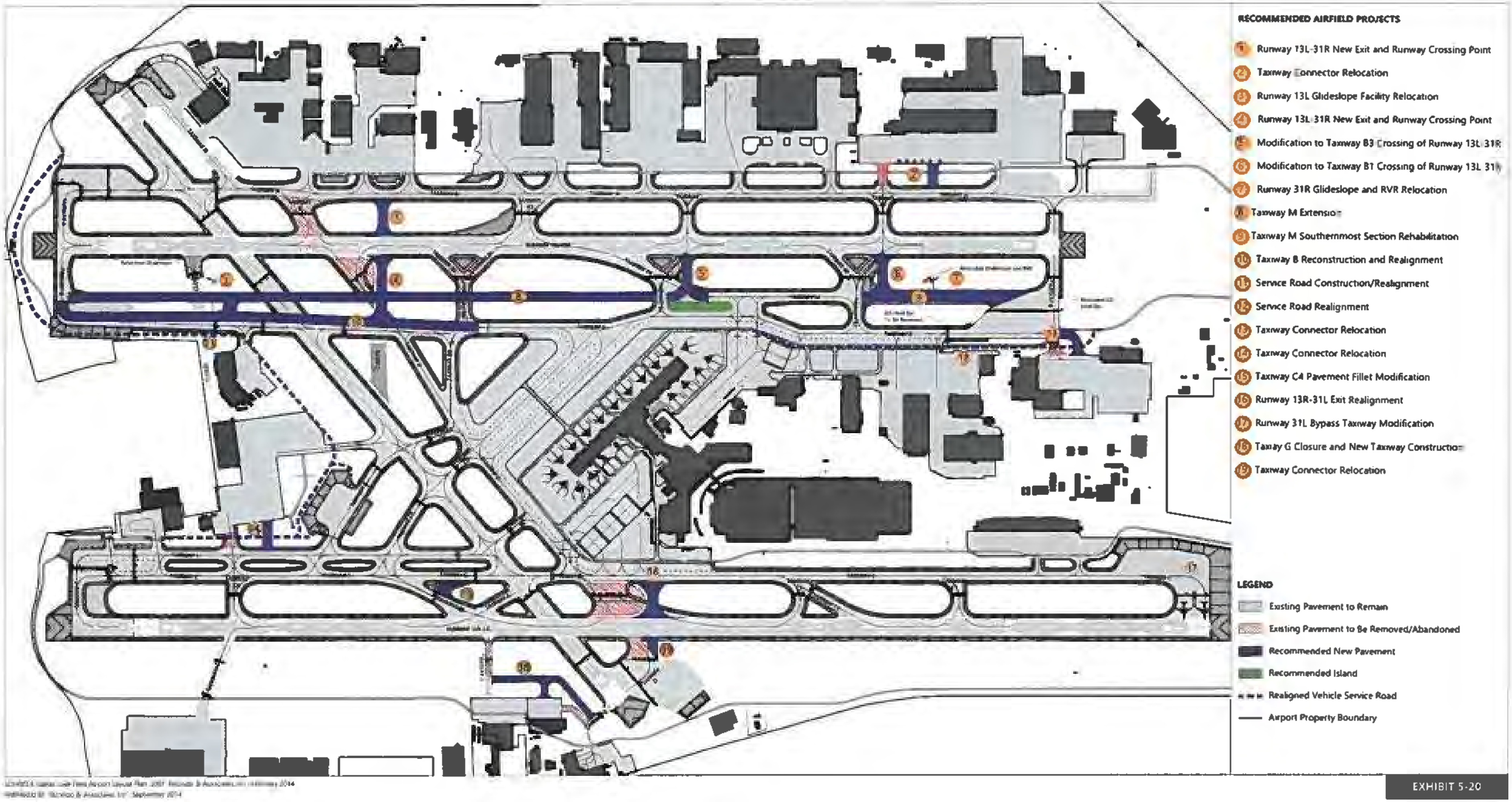

SOURCE: Dallas Love Field Airport Layout Plan 2007, Ricondo & Associates, Inc., February 2014
PREPARED BY: Ricondo & Associates, Inc., September 2014

NORTH 0 750 ft

EXHIBIT 5-20

Preferred Alternative 1 - Runway 18-36 Operational

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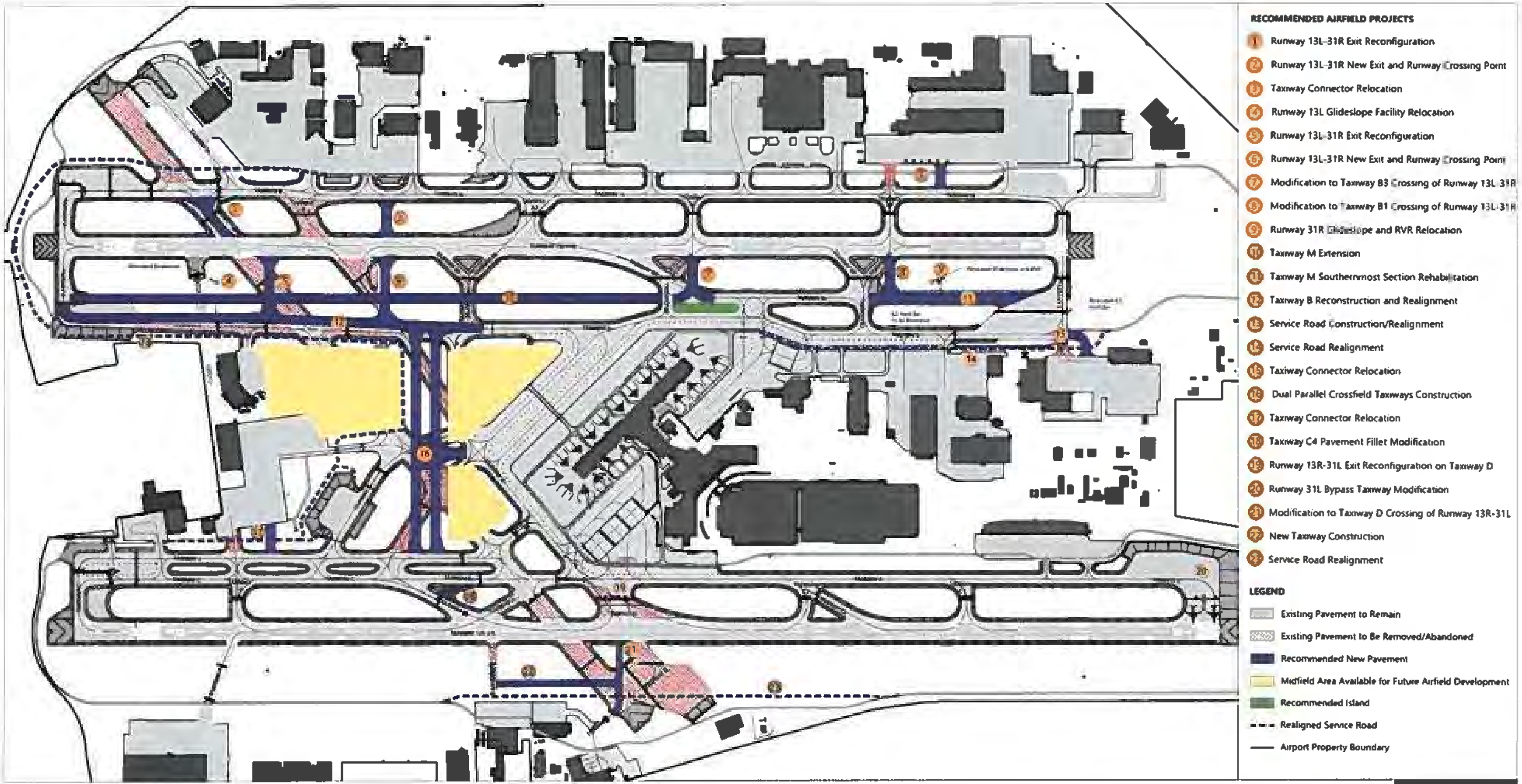

SOURCES: Dallas Love Field Airport Layout Plan, 2001; Ricondo & Associates, Inc., February 2014.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

EXHIBIT 5-21

Preferred Alternative 2 - Runway 18-36 Decommissioned

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- Decommission Taxiways B5 and B6 between Runway 13L-31R and Taxiway B.
- Reconfigure Taxiways B1 and B3 to allow perpendicular crossings of Runway 13L-31R.
- Relocate the Runway 31R glideslope and RVR antenna inboard, to a lateral separation of 268 feet from the Runway 13L-31R centerline.
- Extend Taxiway M.
- Reopen the southernmost portion of Taxiway M.
- Realign Taxiway B.
- Construct/realign the airfield vehicle service road.
- Relocate apron access to Learjet TX, Trinity Industries, and Business Jet Center facilities (Taxiway B) to the south.
- Construct a dual parallel crossfield taxiway system between Taxiways B and L.
- Decommission the portion of Taxiway C6 between Taxiway L and the apron and construct a new taxiway connector south of the existing connector.
- Reconfigure the Taxiway C4 pavement geometry to allow aircraft to exit Runway 31L and turn directly onto Taxiway C.
- Reconfigure the Taxiway D crossing of Runway 13R-31L between Taxiway C and the Runway 36 threshold.
- Develop a bypass taxiway for use by two TDG 4 aircraft at the Runway 31L threshold.
- Close Taxiway G and construct a new taxiway parallel to Runway 13R-31L.

The recommended dual parallel taxiways would modify the ARFF vehicle emergency route to reach Runway 13L-31R, but emergency response times would continue to meet FAA requirements. According to simulation modeling, the ARFF emergency vehicle would be able to reach the midpoint of Runway 13L-31R in less than 3 minutes and the Runway 31R threshold in less than 4 minutes. An ARFF station closer to the dual parallel taxiways would be ideal to reduce response times and increase emergency routing efficiency. However, relocating the ARFF station is not required as the estimated response times comply with FAA standards. Additionally, response times could be reduced if an ARFF VSR were developed to connect Runway 13L-31R and Taxiway B between Taxiways B5 and B4. A detailed analysis would be necessary to determine the optimized location and geometry of the ARFF road. This road, if constructed, would be limited to ARFF vehicles and unavailable to other vehicles.

5.2 Landside Development Alternatives

5.2.1 ON-AIRPORT PARKING AND RENTAL CAR CONCEPT ALTERNATIVES

On-Airport parking and rental car concept alternatives were developed together, as parking and rental car facilities can be designed to share a new multipurpose facility. The demand day public parking requirement at PAL E3 is 2,020 new parking spaces and 1,490 total employee parking spaces. The rental car facility requirements at PAL E3 are 17.9 acres for ready/return/storage areas and 5.3 acres for structured rental car quick turnaround (QTA)/service area. The alternatives address as much of the requirements as possible near the terminal area, with any remaining requirements assumed to be accommodated on-airport and potentially off-airport land areas further from the terminal.

Three families of concept alternatives were developed:

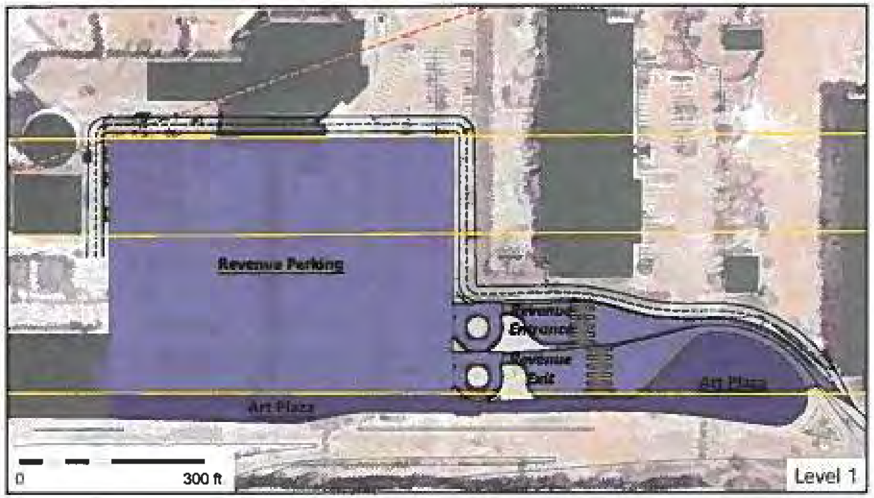
- Concept Alternative 1 consists of the construction of a new facility for revenue parking only with rental car facilities accommodated at another location.
- Concept Alternative 2 combines revenue parking and a full consolidated rental car facility (CRCF), which would include light maintenance and vehicle storage onsite.
- Concept Alternative 3 combines revenue parking and the CRCF, but light maintenance and vehicle storage would be located at separate location resulting in a split operation configuration.

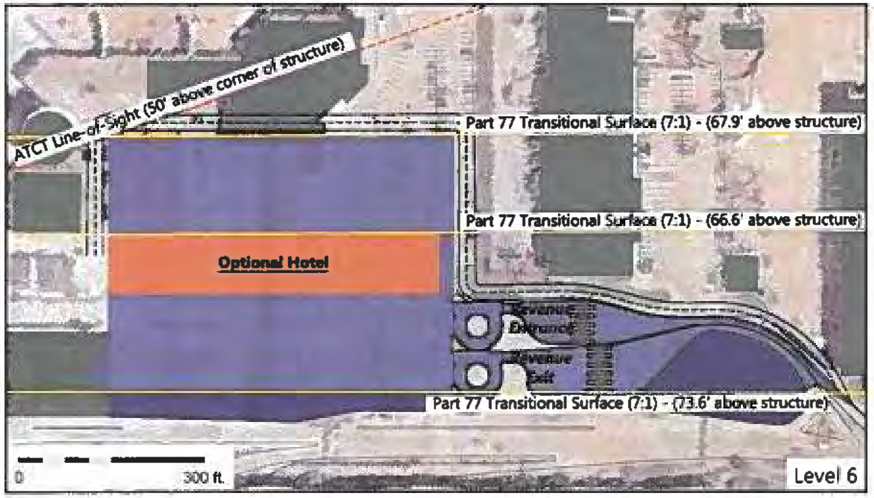
In all three concept alternatives, the flexibility for development of an optional 200-room hotel would be accommodated.

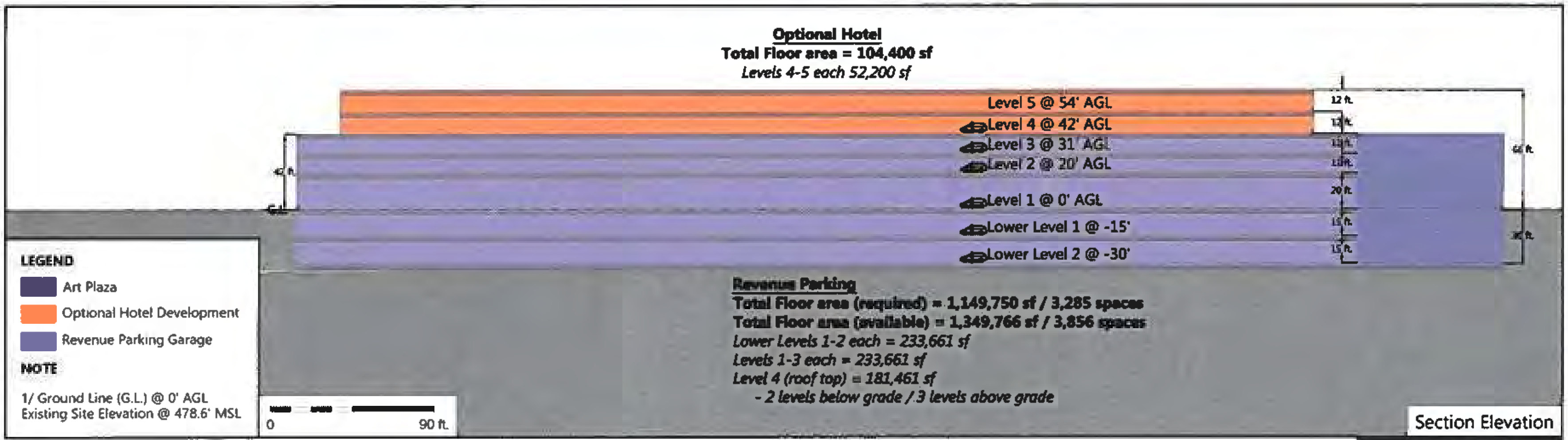
Concept Alternative 1A is presented on **Exhibit 5-22**, and consists of a public parking garage that would provide 3,856 revenue parking spaces. The Concept Alternative 1A garage would be located east of the main terminal building in a separate structure adjacent to the ticketing hall. This alternative also provides for the optional development of a 200-room hotel on the top of the proposed garage. Concept Alternative 1B is presented on **Exhibit 5-23**, and is similar to Concept Alternative 1A, but the optional hotel would not be located on the top of the public parking garage, but in one of three optional stand-alone hotel locations adjacent to the revenue parking garage on the west, north, or east side of the parking structure. With both Concepts in the Concept Alternative 1 family, the rental car facilities would either be accommodated at a new CRCF at the existing rental car location on Herb Kelleher Way just north of Tom Braniff Lane, or accommodated at current individual facilities with growth accommodated onsite in in the new CRFC mentioned. This configuration is presented on **Exhibit 5-24**.

The Concept Alternative 2 family of alternatives consists of a new joint-use structure adjacent to the ticketing hall, with dedicated levels for rental car ready/return vehicles, light maintenance, and QTA rental car operations; dedicated levels for public parking (1,800 revenue spaces); and an optional 200-room rooftop hotel. All rental car operations would be contained within the joint-use structure, eventually requiring an additional offsite lot(s) for heavy maintenance and overflow rental car vehicle storage. The only difference between the two alternatives is that Concept Alternative 2A, shown on **Exhibit 2-25**, has QTA fueling inside the garage, while Concept Alternative 2B, shown on **Exhibit 2-26**, has QTA fueling outside the garage.

With the Concept Alternative 3 family of alternatives, the maintenance and storage component of the rental car operation would be located at a surface lot off Herb Kelleher Way near Tom Braniff Lane. **Exhibit 2-27** shows the locations of the split operation sites. Similar to Concept Alternative 2, Concept Alternative 3 has revenue parking for 1,800 spaces on the upper levels of the parking garage, and the lower levels would be configured for rental car customer service, QTA, and rental car ready/return operations, with onsite vehicle fueling. Concept Alternative 3A, shown on **Exhibit 2-28**, has QTA fueling inside the garage while Concept Alternative 3B, shown on **Exhibit 2-29**, has QTA fueling outside the garage.







Optional Hotel
Total Floor area = 104,400 sf
Levels 4-5 each 52,200 sf

Revenue Parking
Total Floor area (required) = 1,149,750 sf / 3,285 spaces
Total Floor area (available) = 1,349,766 sf / 3,856 spaces
Lower Levels 1-2 each = 233,661 sf
Levels 1-3 each = 233,661 sf
Level 4 (roof top) = 181,461 sf
- 2 levels below grade / 3 levels above grade

LEGEND
- 🟪 Art Plaza
- 🟧 Optional Hotel Development
- 🟪 Revenue Parking Garage

NOTE

1/ Ground Line (G.L.) @ 0' AGL
Existing Site Elevation @ 478.6' MSL

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., November 2014

EXHIBIT 5-22

Parking Concept Alternative 1A

NORTH 0 See Drawing

Drawing: Z:\Love Field\Landside\CRCF Parking Concept\A_Parking_CRCF Hotel Concept_2014-06-13.dwg Layout: Exhibit 5-22 Plotted: May 22, 2015, 09:17AM

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SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013, Google Earth Pro 2014; Terra Metrics, April / 2011
PREPARED BY: Ricondo & Associates, Inc., July 2014.

EXHIBIT 5-23

NORTH 0 150 ft

Parking Concept Alterative 1B

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Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\D_Concepts_Parking_CRCF_Hotel Concept_2014-07-24.dwg Layout: 8.5x11L Plotted: May 22, 2015, 09:20AM

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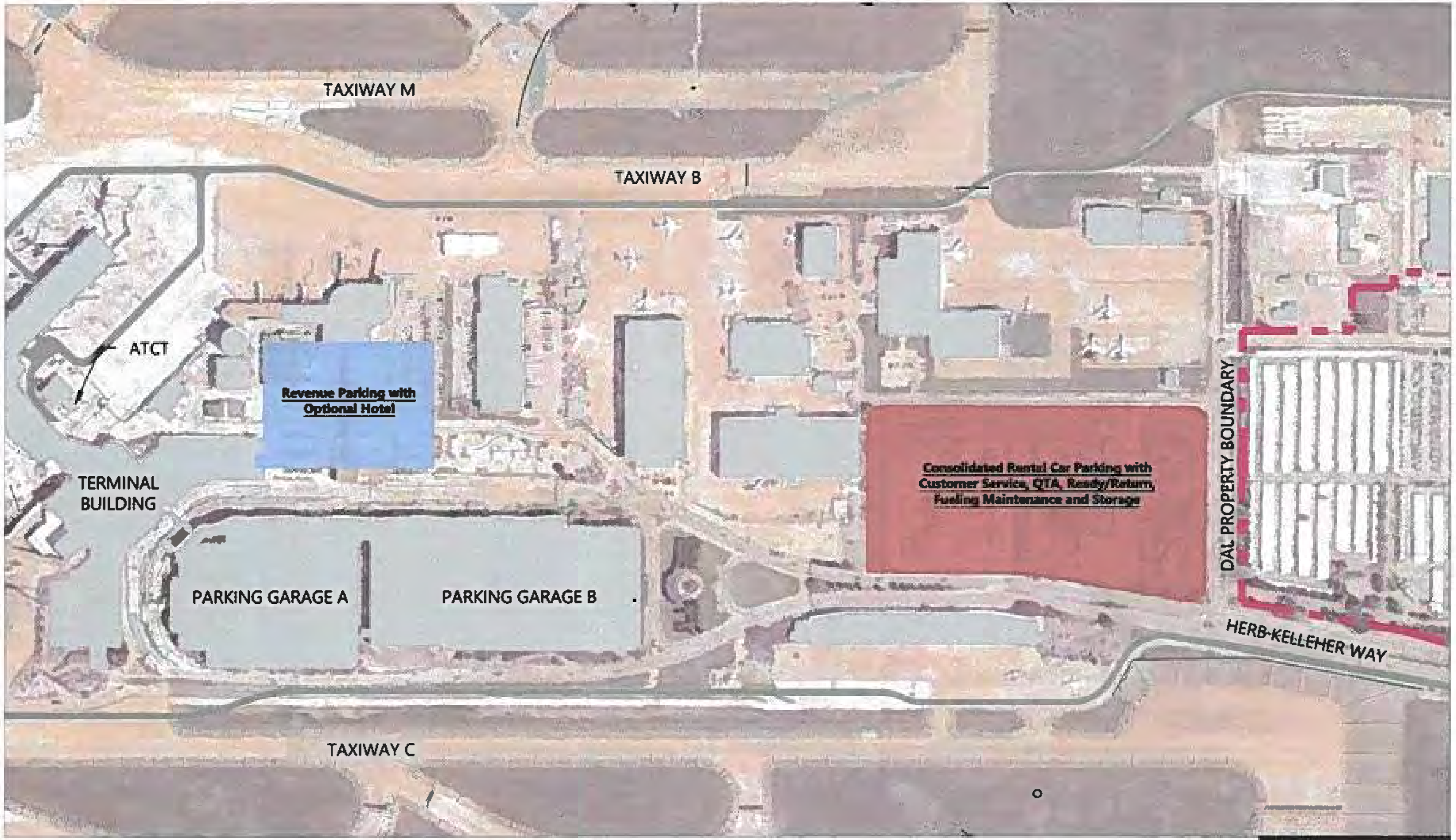

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc. December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013
PREPARED BY: Ricondo & Associates, Inc. November 2014

EXHIBIT 5-24

NORTH 0 500'

Concept Alternatives 1A and 1B Overview and Rental Car Facility Location

Drawing: Z:\Love Field\Landside\CRCF Parking Concept\C-3_Sites_CRCF_Hotel Concept_20150423.dwg Layout: Exhibit 5-24 Plotted: May 14, 2015 03:43PM

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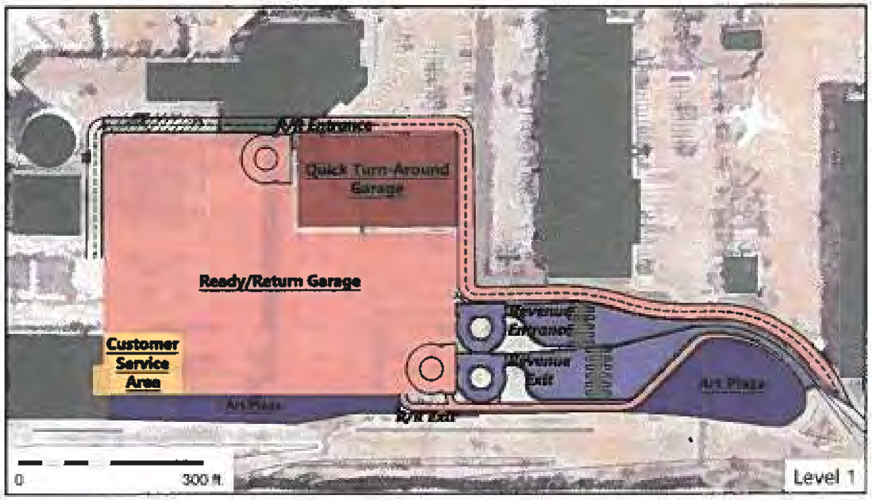

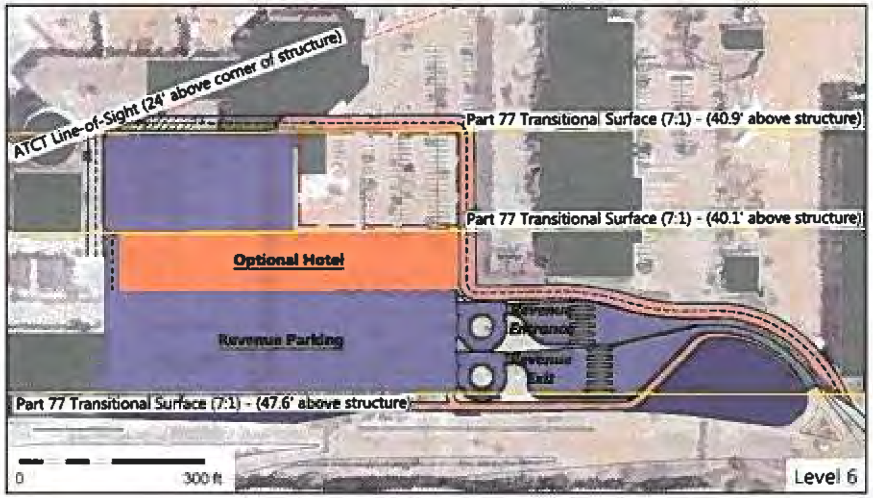

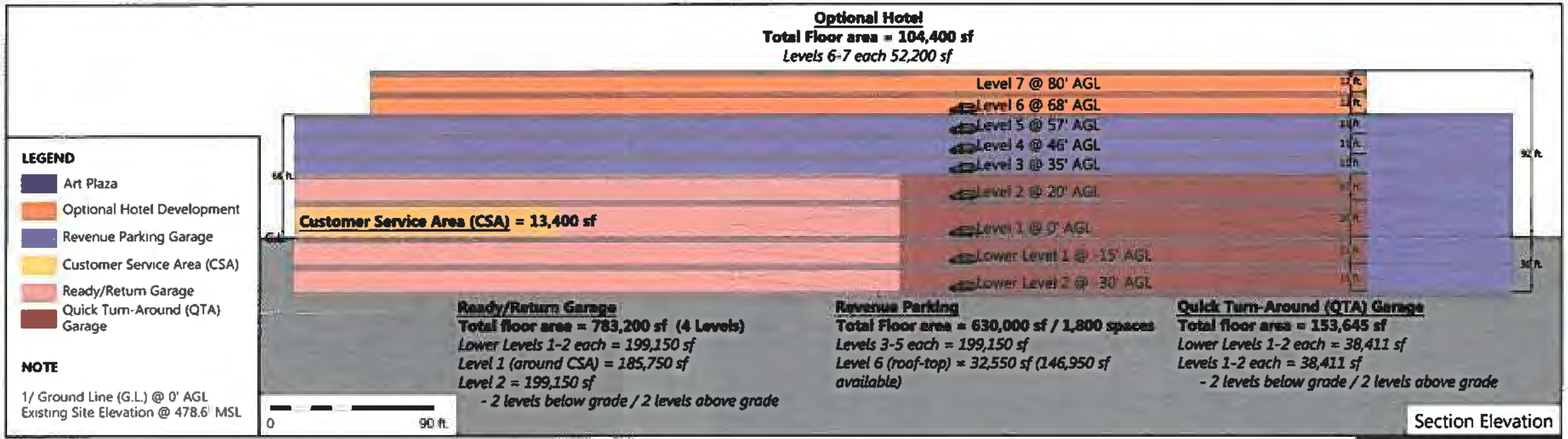

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc. December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013
PREPARED BY: Ricondo & Associates, Inc., November 2014

EXHIBIT 5-25

NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Preferred Concept Alternative 2A

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\B-1_Parking_CRCF_Hotel Concept_20150423.dwg Layout: Exhibit 5-25 Plotted: May 22, 2015, 09:33AM

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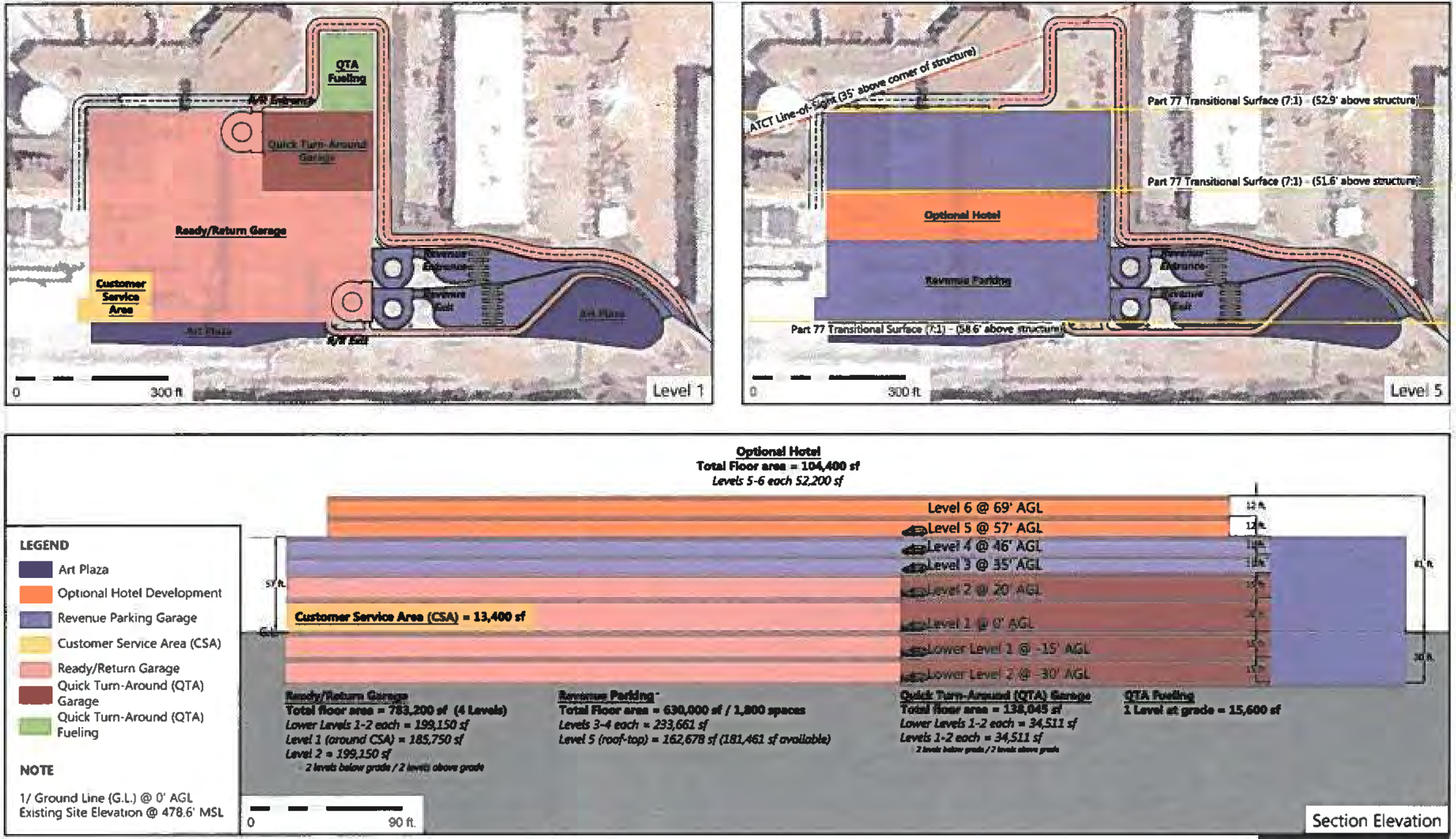

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013
PREPARED BY: Ricondo & Associates, Inc., June 2014

EXHIBIT 5-26

NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Preferred Concept Alternative 2B

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\B-2 Parking_CRCF_Hotel Concept_20150423.dwg Layout: 8.5x11L Plotted: May 22, 2015, 09:38AM

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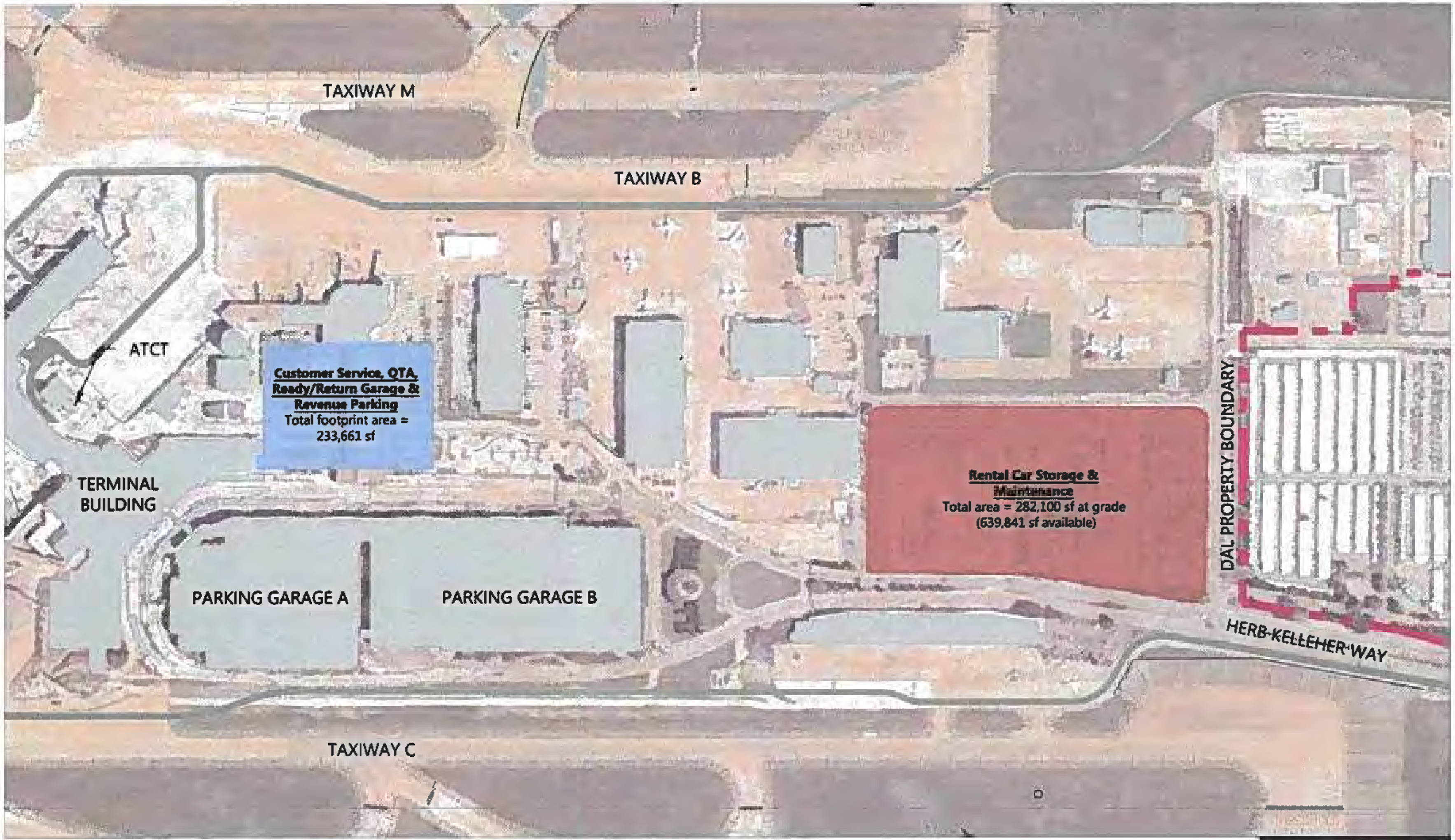

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013

PREPARED BY: Ricondo & Associates, Inc., November 2014.

EXHIBIT 5-27

NORTH 0 500'

Parking/Consolidated Rental Car Facility Concept Alternatives 3A and 3B with Split Operation

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\C-3_Sites_CRCF_Hotel Concept_20150423.dwg Layout: Exhibit 5-27 Plotted: May 14, 2015, 03:50PM

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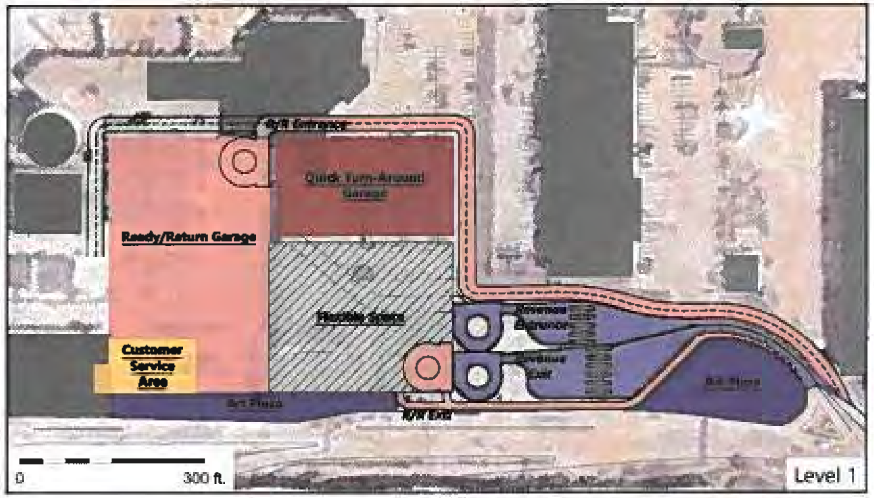

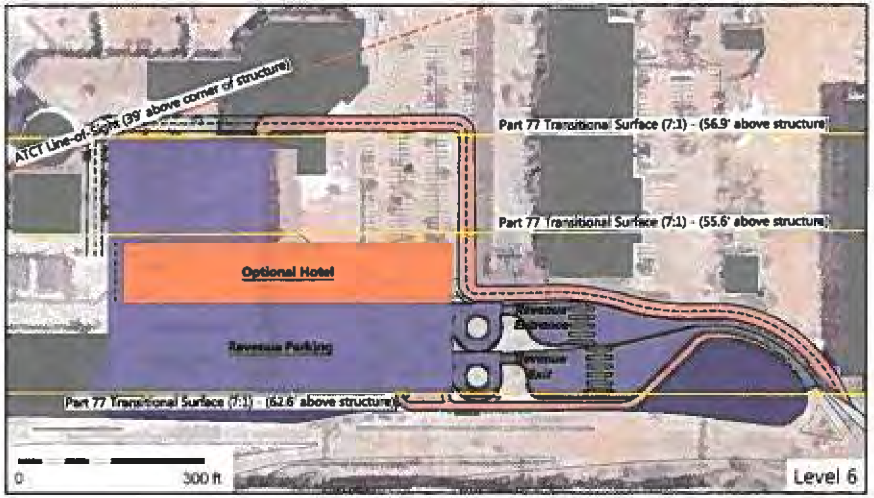

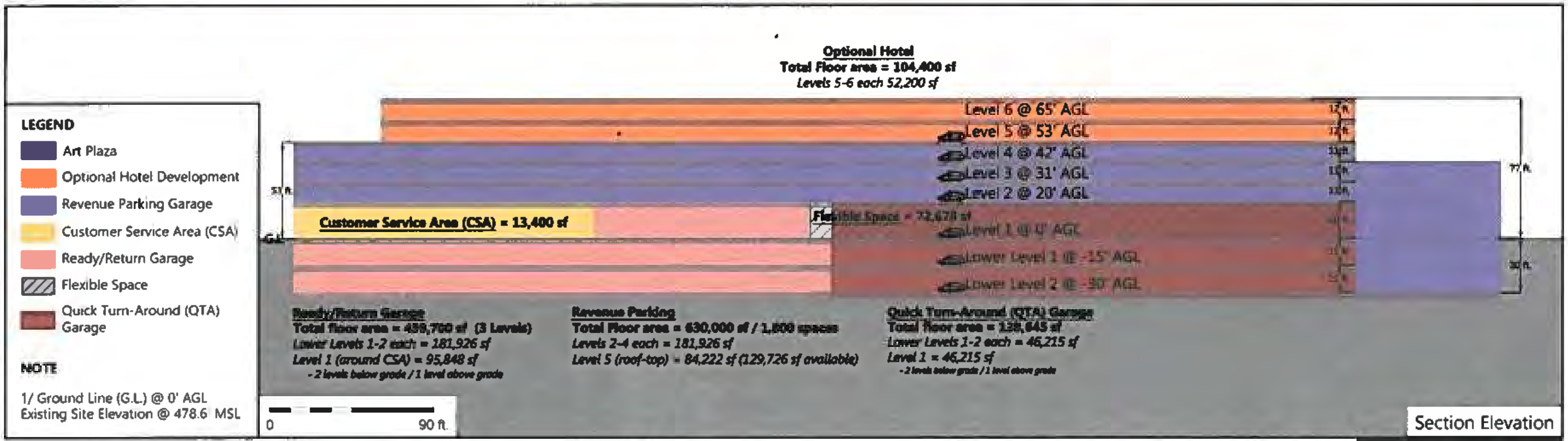

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., June 2014.

EXHIBIT 5-28

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NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Concept Alternative 3A, Split Operation

Drawing: Z:\Love Field\Landside\CRCF Parking Concepts\C-1 Parking CRCF Hotel Concept_20150423.dwg Layout: 8.5x11L Plotted: May 22, 2015 09:39AM

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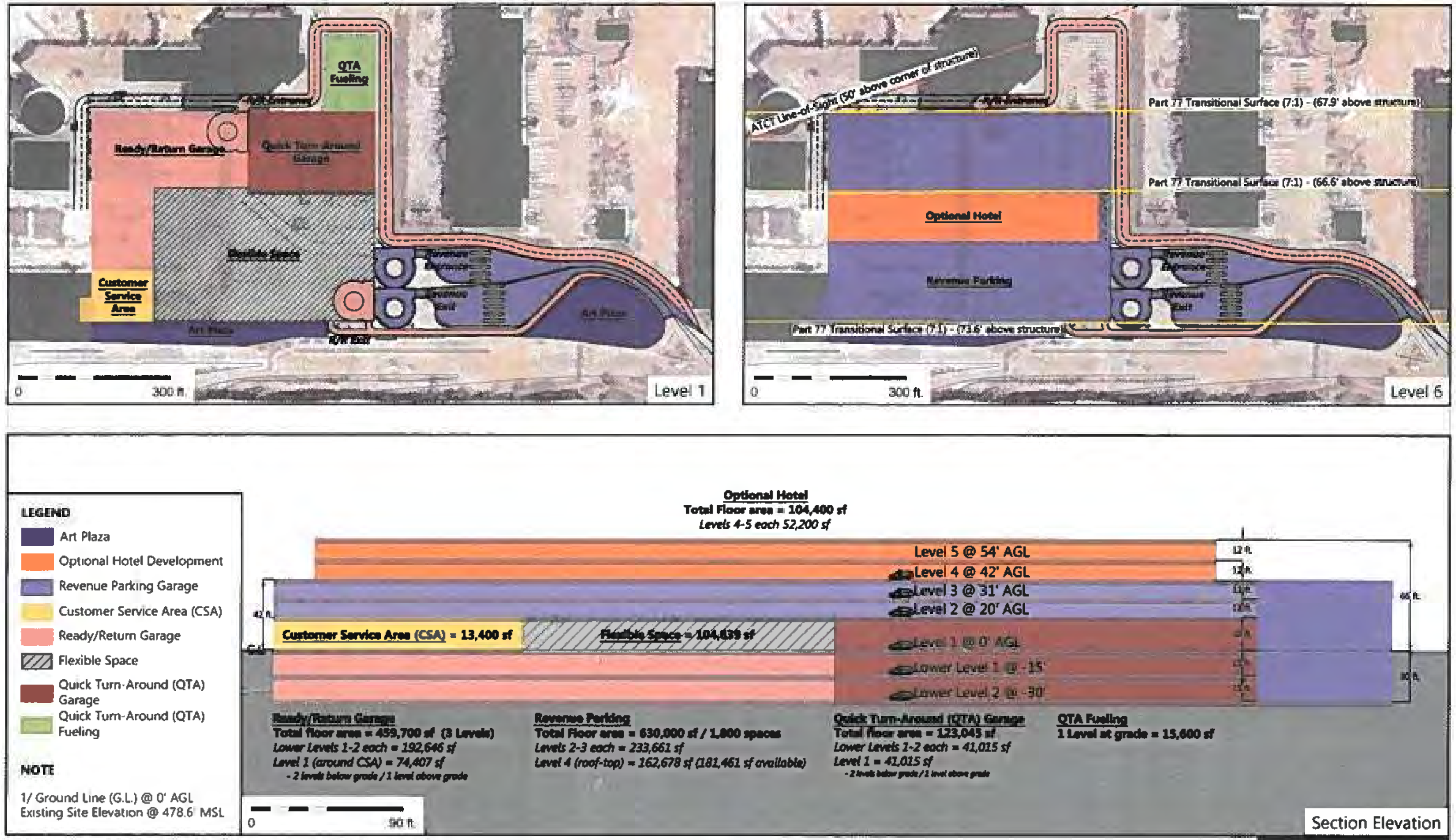

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014, Terra Metrics, April 2 2013
PREPARED BY: Ricondo & Associates, Inc., June 2014.

EXHIBIT 5-29

NORTH 0 See Drawing

Parking/Consolidated Rental Car Facility Concept Alternative 3B, Split Operation

Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\C-2_Parking_CRCF_Hotel Concept_20150423.dwg Layout: 8.5x11L Plotted: May 22, 2015 09:43AM

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Of the three alternative families, Option 1 was selected as the option that most closely aligned with the Department of Aviation's priorities. Of the two alternatives in this family Option 1B was identified as preferred as the optional hotel development would be better accommodated on a surface site rather having to design the parking structure to accommodate a potential future hotel development.

5.2.2 AIRPORT ACCESS ALTERNATIVES

5.2.2.1 Non-Terminal Area Roadways

The results of the demand/capacity analysis for the off-Airport roadways and intersections during the a.m. and p.m. peak hours indicated that, at PAL E3, the intersection of Mockingbird Lane at Cedar Springs Road/Herb Kelleher Way would perform at LOS F and that the intersection of Mockingbird Lane at Denton Drive would operate at LOS E. The combination of growing Airport traffic with heavy background commuter traffic on Mockingbird Lane led to the development of three new off-Airport roadway and intersection alternatives. These alternatives are presented on **Exhibit 5-30** (Alternative 1), **Exhibit 5-31** (Alternative 2), and **Exhibit 5-32** (Alternative 3) and are described below.

Alternative 1 – Conventional Urban Diamond Interchange

Alternative 1 consists of a compressed conventional urban diamond interchange at the affected intersection. This alternative would grade-separate the heavy through traffic on Mockingbird Lane in a tunnel under the at-grade diamond portion of the intersection serving Cedar Springs Road/Herb Kelleher Way through traffic and all associated turning movements. The two-lane northbound and two-lane southbound through movements on Mockingbird Lane would be depressed under Cedar Springs Road/Herb Kelleher Way so as not to encroach on the FAA *U.S. Standard for Terminal Instrument Procedures* (TERPS) and 14 CFR Part 77, *Objects Affecting Navigable Airspace*, surfaces near the end of Runway 31L. Upgrades to the Denton Drive and Mockingbird Lane intersection would include the addition of a second left turn lane on eastbound Denton Drive and an additional southbound continuous right turn lane on Mockingbird Lane between Cedar Springs Road/Herb Kelleher Way and Denton Drive. This alternative was analyzed to improve the peak hour level of service from LOS F at both intersections at PAL E3 to LOS C at the compressed conventional urban diamond intersection at Cedar Springs Road/Herb Kelleher Way, and LOS D at the Denton Drive intersection

Alternative 2 – Diverging Diamond Interchange

Alternative 2 consists of the same improvements at Denton Drive as Alternative 1, but the Cedar Springs Road/Herb Kelleher Way intersection would be reconfigured as a diverging diamond interchange. Similar to Alternative 1, northbound and southbound through traffic would be depressed in a tunnel under Cedar Springs Road/Herb Kelleher Way and all associated turning movements would be controlled by the two at-grade diverging diamond intersections. The diverging diamond is based on the concept that the conflict between left-turning traffic and oncoming through traffic could be eliminated if the traffic is switched to the opposite side of the roadway. This would result in signals providing maximum efficiency, fewer conflict points, and more traffic better served with improved safety and less congestion. The outbound Airport traffic heading south onto Mockingbird Lane would take a "free right" turn to the south as it would at a typical diamond interchange.

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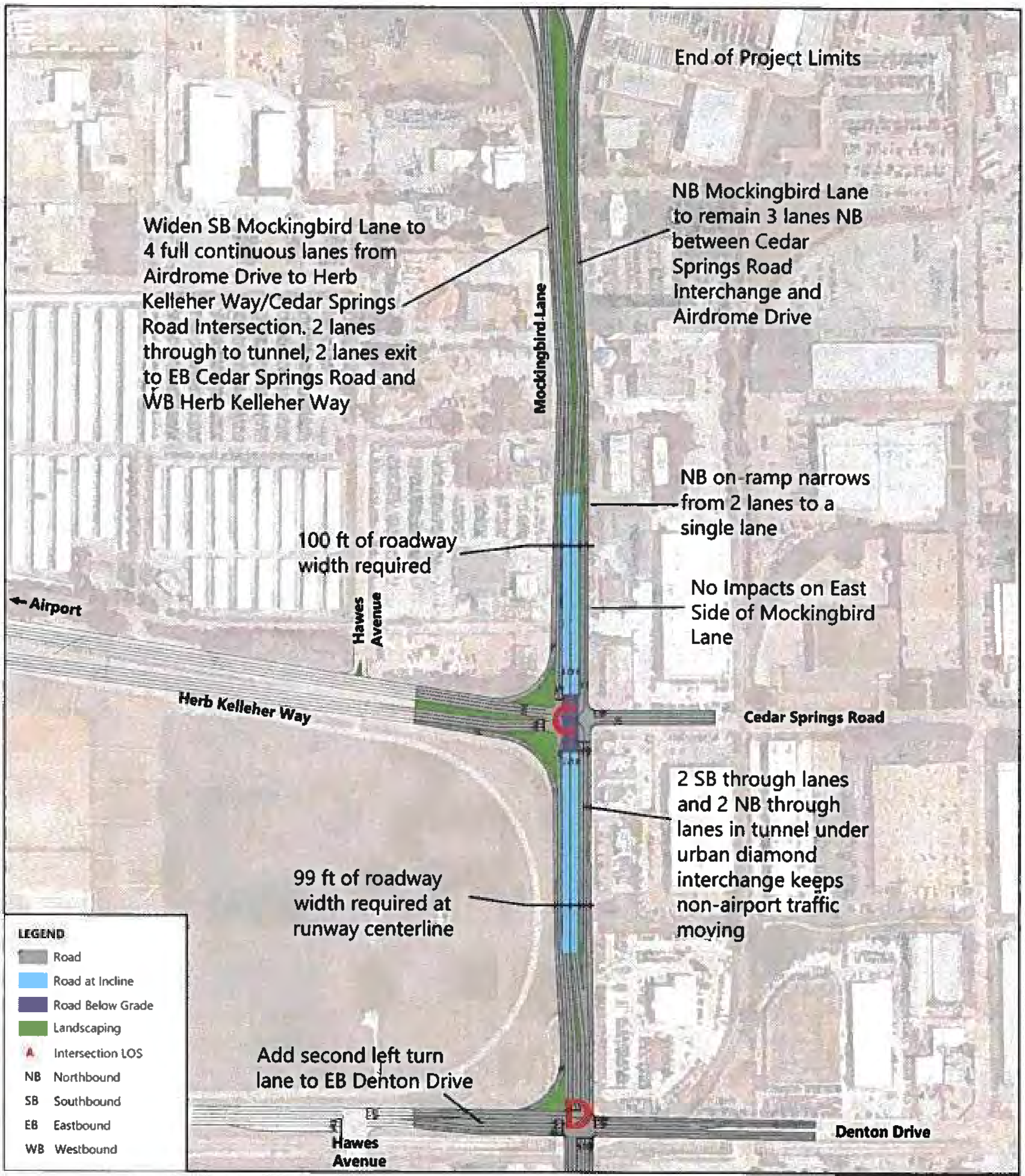

SOURCE: Google Earth Pro, February 2014; Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., March 2015

EXHIBIT 5-30

NORTH
0 400 ft

Mockingbird Lane-Cedar Springs Road/Herb Kelleher Way Intersection
Conventional Urban Diamond Interchange-Alternative 1

Drawing: N:\Love Field\03 Master Plan Update 2013\03 Alternatives\02 CAD\Mockingbird_CedarSpring_Alternatives_v8(10ft).dwg_Layout: Alt 1 Preferred May 20, 2015, 10:25am

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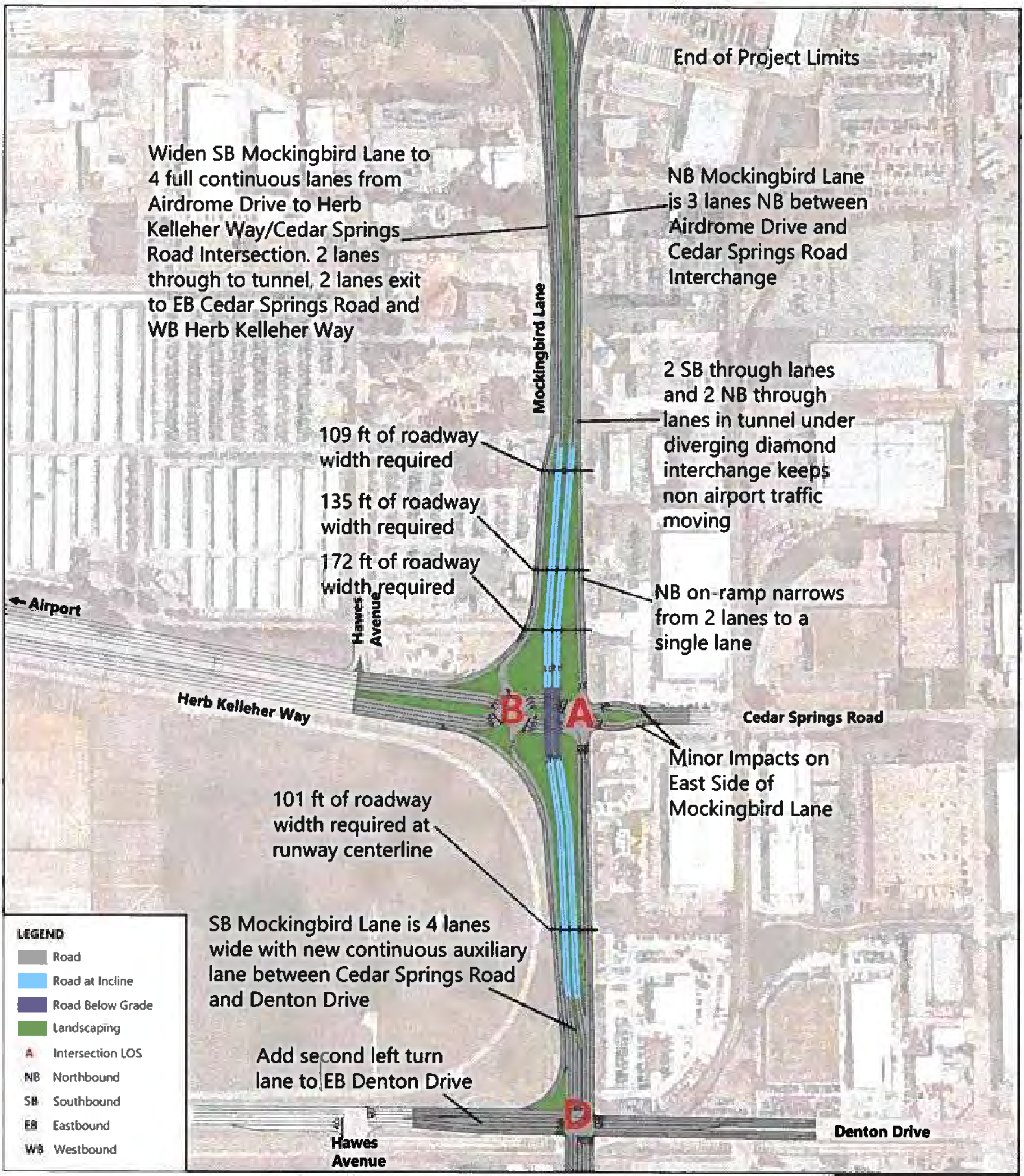

End of Project Limits

Widen SB Mockingbird Lane to 4 full continuous lanes from Airdrome Drive to Herb Kelleher Way/Cedar Springs Road Intersection. 2 lanes through to tunnel, 2 lanes exit to EB Cedar Springs Road and WB Herb Kelleher Way

NB Mockingbird Lane is 3 lanes NB between Airdrome Drive and Cedar Springs Road Interchange

2 SB through lanes and 2 NB through lanes in tunnel under diverging diamond interchange keeps non airport traffic moving

109 ft of roadway width required

135 ft of roadway width required

172 ft of roadway width required

NB on-ramp narrows from 2 lanes to a single lane

Minor Impacts on East Side of Mockingbird Lane

101 ft of roadway width required at runway centerline

SB Mockingbird Lane is 4 lanes wide with new continuous auxiliary lane between Cedar Springs Road and Denton Drive

Add second left turn lane to EB Denton Drive

SOURCE Google Earth Pro, February 2014, Ricondo & Associates, Inc., April 2014
PREPARED BY Ricondo & Associates, Inc. March 2015

EXHIBIT 5-31

NORTH 0 400 ft

Mockingbird Lane-Cedar Springs Road/Herb Kelleher Way Intersection Diverging Diamond Interchange-Alternative 2

Drawing: N:\Love Field\03 Master Plan Update 2013\03 Alternatives\02 CAD\Mockingbird_CedarSpring_Alternatives_v8(10ft).dwg_Layout: Alt 2_May 20, 2015, 10:26am

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SOURCE: Google Earth Pro, February 2014; Ricondo & Associates, Inc., April 2014
PREPARED BY: Ricondo & Associates, Inc., March 2015

EXHIBIT 5-32

NORTH

0 400 ft.

Mockingbird Lane-Cedar Springs Road/Herb Kelleher Way Intersection Direct Ramp Interchange-Alternative 3

Drawing: N:\Love Field\03 Master Plan Update 2013\03 Alternatives\02 CAD\Mockingbird_CedarSpring_Alternatives_v8(10ft).dwg_Layout: Alt 3_May 20, 2015, 10:26am

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The remaining outbound stream of Airport vehicles would cross over to the left side of the roadway, making it possible to also make a "free left" turn to access Mockingbird Lane heading north. The remaining traffic, continuing eastbound on Cedar Springs Road/Herb Kelleher Way, would then cross back to the normal right side of road. The "free left" turns could greatly reduce congestion, increase capacity, and reduce conflict points. Although unconventional, the diverging diamond intersections at Cedar Springs Road/Herb Kelleher Way would improve traffic flows compared with the conventional urban diamond interchange because of the low volume of east-west through movements on Cedar Springs Road/Herb Kelleher Way, and the very high volume of "free left" turning traffic. The resulting peak hour level of service at PAL E3 with the diverging diamond intersection was determined to be LOS B at the two-phase signal closest to the Airport, and LOS A at the two-phase signal on the east side of the interchange. The signal at Denton Drive would be the same as in Alternative 1 at LOS D.

Alternative 3 – Direct Ramp Interchange

Alternative 3 consists of a direct ramp interchange at Cedar Springs Road/Herb Kelleher Way with the same improvements at Denton Drive as in the first two alternatives. The two direct ramps added in this alternative would be single lane tunnels that would remove the two busiest left-turn movements from the existing intersection. The northbound left turn into the Airport would be tunneled under the intersection, as would the outbound left-turn movement to northbound Mockingbird Lane. Intersection analysis determined that this alternative would result in improving the Cedar Springs Road intersection to LOS B, and the same LOS D results as in the other alternatives at the Denton Drive intersection.

Preferred Alternative

Upon review with Airport management and staff, Alternative 1 was selected as the preferred alternative. Reasons for preferring this alternative provided by Airport staff include the least amount of tunneling as Airport management and staff are unsure of the locations of underground utility and obstructions in the interchange area. Alternative also consists of a more conventional roadway design that requires less right-of-way, and does not requires vehicles to perform a double crisscross pattern in which vehicles are switched onto the wrong side of the road. Finally, Alternative 3 appears to be the most costly alternative due to all the tunnels and new traffic signals that would be required.

5.2.2.2 Terminal Area Roadways and Intersections

The demand/capacity analysis of the existing terminal area roadways showed that only one roadway section would operate at a level of service worse than LOS D by PAL E3 during the peak hour. The single lane ramp (Link K in Table 4-25) from the inbound roadway toward the entrances of Garage A and Garage B was projected to accommodate 928 vehicles during the a.m. peak hour, resulting in a link LOS E. By PAL E3, a new public parking garage would be needed to accommodate the Airport wide parking capacity deficit. Therefore, the projected demand for the Garage A and Garage B entrances would be reduced, as some parking demand would be directed toward a new public parking location, as shown on **Exhibit 5-33**.

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SOURCES: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014, Terra Metrics, April 2 2014

PREPARED BY: Ricondo & Associates, Inc., June 2014

NORTH 0 300 ft

EXHIBIT 5-33

Redistributed Traffic at Aviation Place and Herb Kelleher Way at PAL E3

Drawing: N:\Love Field\08 Master Plan Update 2013\04 CRCF-Parking-Hotel\CAD\$Parking_CRCF_Hotel Concept_2014-06-13\$Parking_CRCF_Hotel Concept_2014-06-13_GCW.dwg Layout: Ex 5-26 Plotted: May 19, 2015, 06:49PM

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Other alternatives developed to address intersection capacity would require reconfiguring the intersection at Herb Kelleher Way and Hawes Avenue. The intersection today is free flowing on Herb Kelleher Way with a stop-controlled approach on Hawes Avenue. The exiting traffic from Hawes Avenue experiences two major traffic engineering problems; Hawes Avenue has long approach delays as there are insufficient gaps (breaks in traffic between vehicles) on westbound Herb Kelleher Way, and the queues from the intersection of Cedar Springs Road/Herb Kelleher Way and Mockingbird Lane routinely back up past the Hawes Avenue intersection. In addition to the traffic on the Hawes Avenue approach, the left-turning eastbound approach on Herb Kelleher Way onto Hawes Avenue experiences LOS F delays caused by insufficient gaps across four lanes of inbound Airport traffic. It is recommended that the center median on Herb Kelleher Way be closed and that the access/egress to/from Hawes Avenue be converted to right-turn-in and right-turn-out traffic only. The lane configuration for this intersection is depicted in all three alternatives presented on Exhibits 5-30 through 5-32.

The existing intersection of Aviation Place and Herb Kelleher Way was previously evaluated and summarized in Section 4. In the analysis of this intersection, straight line traffic growth was assumed based on existing traffic patterns, resulting in the two-phase traffic signal at this intersection projected to operate at LOS A during the a.m. and p.m. peak hours through PAL E3. As the Department of Aviation is considering the construction of a new on-Airport public parking/rental car/hotel development, as previously discussed, additional intersection and link demand/capacity analysis was conducted to evaluate each of the two busiest conceptual alternatives discussed in Section 5.2.1. Exhibit 5-33 presents the redistributed a.m. and p.m. traffic volumes at the intersection and the resulting intersection LOS for PAL E3 demand. From the analysis, it was determined that the existing intersection would degrade to LOS C in the a.m. and p.m. peak hours. The Department of Aviation also requested an evaluation of the possibility of a grade-separated outbound lane from Aviation Place over inbound Herb Kelleher Way. Cross-section and plan views of this concept are presented on **Exhibit 5-34**. Depending on the steepness of the roadway grade, the lengths of approach ramps to the bridge over Herb Kelleher Way could range from as short as 220 feet to more than 440 feet, affecting weaving distances and stopping sight distances for drivers.

A slope of 6 percent or less is desirable. Addition of the bridge could eliminate the need for a signal at Aviation Place if all future outbound Aviation Place traffic is given access to the up-and-over bridge, but the benefit provided by the signal metering traffic flow to the curbside area would be lost, therefore losing the ability to meter curbside demand in controlled groups of traffic. Additional analysis and evaluation of the feasibility and potential benefit of constructing an Aviation Place grade-separated crossing of Herb Kelleher Way will be necessary once the design of the future public parking structure adjacent to the ticketing hall is complete. The facility design will influence the traffic characteristics that are relevant to the construction of this grade-separated crossing.

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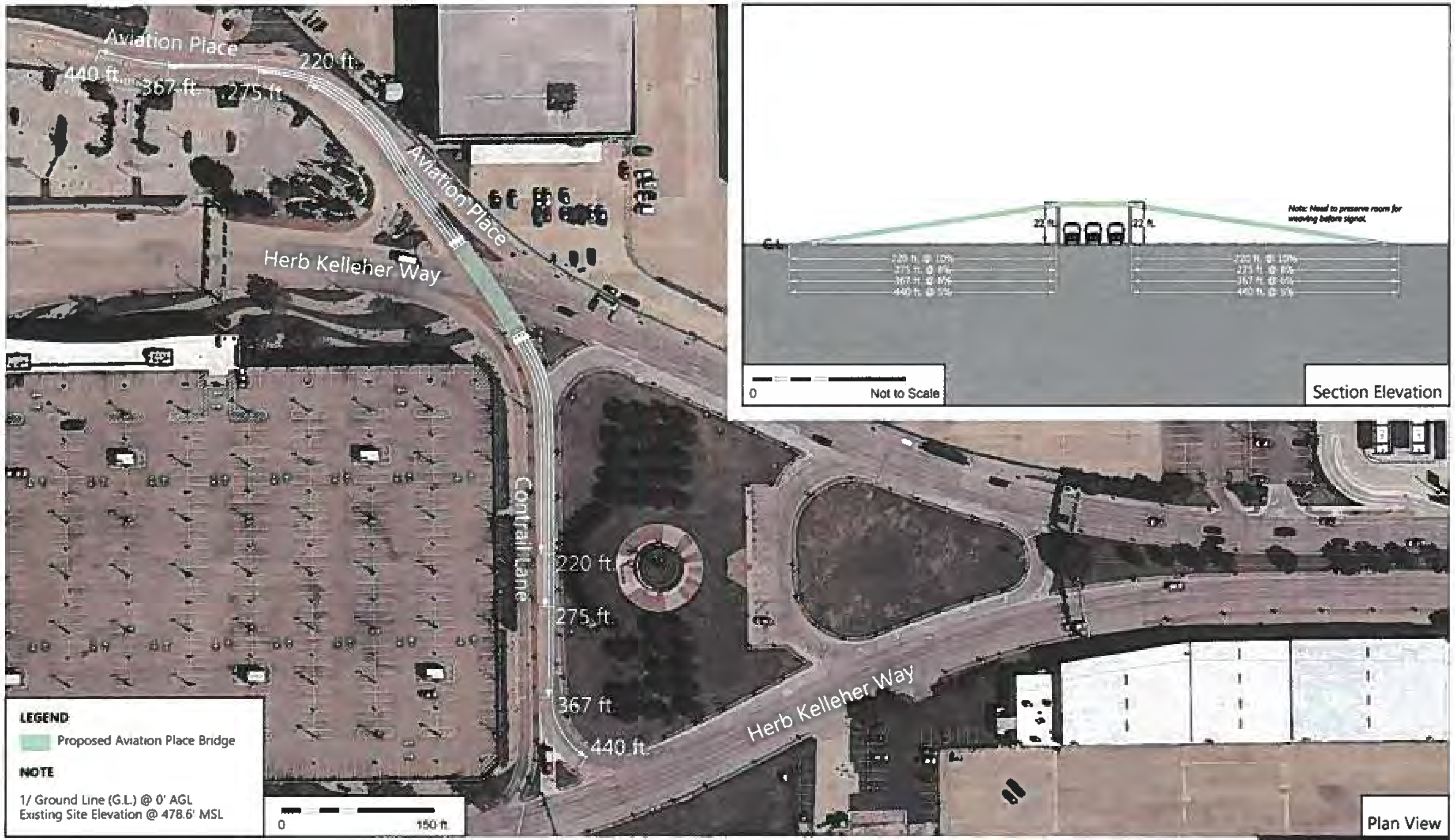

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013; Google Earth Pro 2014; Terra Metrics, April 2 2013.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

EXHIBIT 5-34

Outbound Aviation Place Bridge

NORTH 0 See Drawing

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Drawing: Z:\Love Field\Landside\CRCF_Parking Concept\Aviation Place Bridge_Parking_CRCF_Hotel Concept_2014-07-17.dwg Layout: Ex 5-34 Plotted: May 22, 2015, 10:00AM

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5.3 General Aviation Development Alternatives

This section presents the development alternatives for GA facilities, which include FBO facilities, corporate hangar space, and aircraft MRO facilities. The alternatives were developed to explore opportunities to accommodate forecast demand, and resulting facility requirements defined for each PAL. Given the uncertainties associated with the future operation of Runway 18-36 at the time the alternatives were developed, alternatives with and without Runway 18-36 were explored.

A FONSI was issued by the FAA following its review of the EA of the DalFort facility in October 2014. Thus, it is possible that the hangar and apron parking areas could be used to meet some of the tenant facility requirements discussed in this section. The alternatives described in this section include the use of the DalFort facility as a potential area for development.

Because of the physical constraints of the Airport, no surplus land is available within the current Airport property boundary to support the expansion of GA facilities. Furthermore, existing development, infrastructure, and natural limitations surrounding the Airport make it infeasible to acquire additional property to support facility development. If Runway 18-36 is decommissioned, however, the property immediately north of Taxiway N and east of Taxiway A would become available for future GA facility development. As shown on **Exhibit 5-35**, a total of 13 acres of Airport property would then be available for future GA facility development. Upon reconfiguring the midfield taxiway system to include dual parallel crossfield taxiways, an additional parcel of 15 acres would also become available for future facility development. Because of restricted landside access to this parcel and its proximity to the terminal core, the Department of Aviation has elected to preserve this 15-acre parcel for future terminal support functions.

The Department of Aviation plans to use the 13 acres that would become available if Runway 18-36 is decommissioned, as well as the DalFort structure, to support GA demand. It is recognized that this space is limited; therefore, the Department of Aviation prefers to accommodate additional GA demand within the Dallas Airport System, which includes, in addition to DAL, Dallas Executive Airport, located less than 12 miles from Dallas Love Field, which may be able to accommodate additional GA growth.

Table 5-4 summarizes the GA facility requirements derived for each PAL for operations. As no surplus Airport property exists for future GA facility development, the existing Airport property is not adequate to accommodate all of the facility needs to support future growth. If Runway 18-36 is decommissioned, however, the facility requirements projected for PAL O1, and a portion of the PAL O2 requirements, could be accommodated at Dallas Love Field. Therefore, the identification of GA development alternatives focused on maximizing the availability of GA facilities within the constraints of the existing Airport property boundary, noting that GA facilities requirements in excess of those that could be accommodated at Dallas Love Field could still be accommodated within the Dallas Airport System at Dallas Executive Airport.

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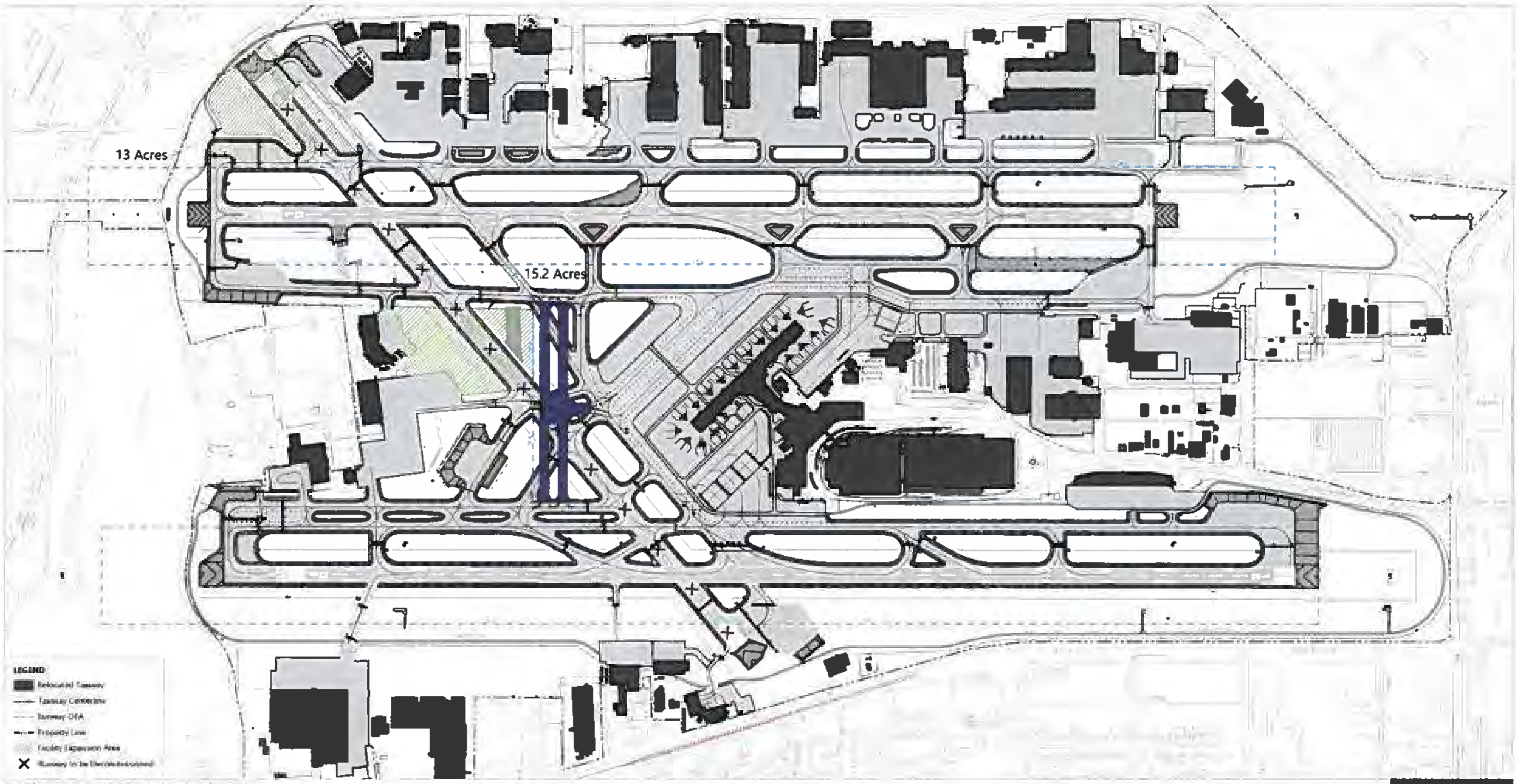

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December [illegible]
PREPARED BY: Ricondo & Associates, Inc., December [illegible]

EXHIBIT 5-35

Potential General Aviation Expansion Areas

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Table 5-4: General Aviation Land Requirements Summary (in gross acres)

PLANNING ACTIVITY LEVEL	FIXED BASE OPERATORS	CORPORATE/ MAINTENANCE	TOTAL
PAL O1	8.1	0.0	8.1
PAL O2	19.1	18.2	37.3
PAL O3	38.6	32.6	71.2

SOURCE: Ricondo & Associates, Inc., January 2014.
PREPARED BY: Ricondo & Associates, Inc., January 2014

The GA development alternatives identified were focused on facilities on the northeast side of the airfield. Two distinct development strategies were explored, as follows:

- **North Corner Alternatives:** These development alternatives reflect a variety of hangar configurations within the 13-acre tract that would become available with the decommissioning of Runway 18-36. Existing GA facilities would either remain in their current configurations or be replaced in-kind. These alternatives would support facility requirements through PAL O2 if the DalFort facility is available for development.
- **Lemmon Avenue Redevelopment Alternatives:** Existing GA facilities along Lemmon Avenue are becoming outdated. Many of the hangars and apron areas are not sized to accommodate some of the larger corporate jets in the current GA fleet at the Airport. Furthermore, corporate GA activity is anticipated to be the catalyst for growth in GA demand in the future. With the exception of the DalFort facility, the redevelopment alternatives address opportunities for systematically replacing all of the GA facilities along Taxiway A. These alternatives also include separate concepts for redevelopment with Runway 18-36 both operational and decommissioned.

The following subsections describe the range of additive and redevelopment alternatives that would improve the capacity and/or operational efficiency of the GA facilities. Each alternative is presented graphically with a brief description of its physical characteristics and operational capabilities/constraints. The alternatives were evaluated with the two airfield configurations (with Runway 18-36 operational and decommissioned).

5.3.1 North Corner Alternatives

As shown on **Exhibit 5-36**, the 13-acre tract that would become available if Runway 18-36 is decommissioned is bordered by Taxiway A and its associated hold bay, Shorecrest Drive, and Lemmon Avenue. The Department of Aviation is in the process of constructing an airside service road adjacent to the Taxiway A OFA. The terrain within the 13-acre tract is relatively flat; however, it drops off along the northern boundary of the tract. As a result, Shorecrest Drive is approximately 20 feet below the existing ground elevation of the potential development site.

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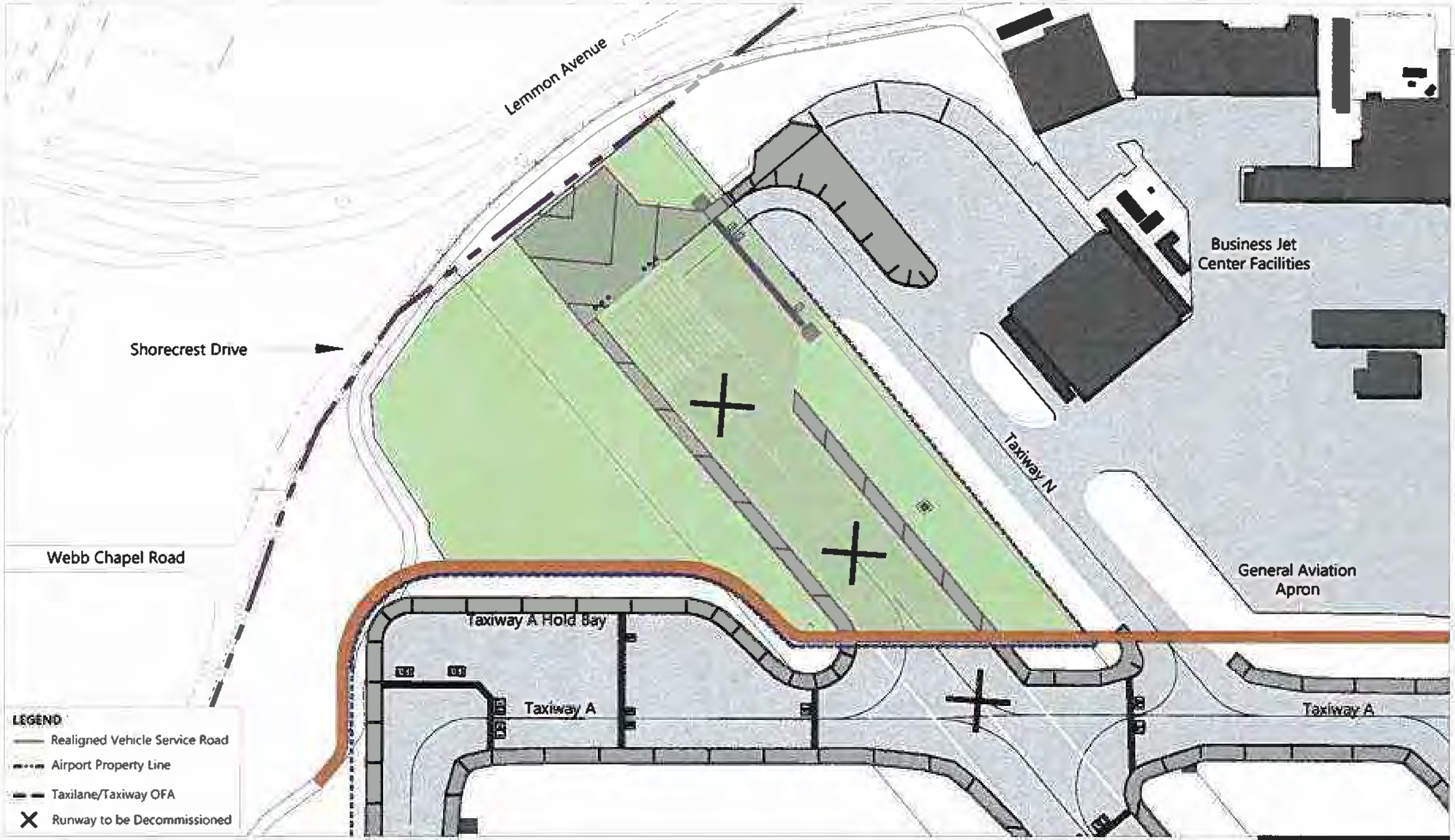

SOURCE DAL Airport Layout Plan, 2001, Ricondo & Associates, Inc., December 2013
PREPARED BY Ricondo & Associates, Inc., March 2014

NORTH 0 250 ft.

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EXHIBIT 5-36

North Corner Development Area with Runway 18-36 Decommissioned

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A total of six North Corner alternatives were developed. Each alternative includes landside parking and access roads, and hangar and apron areas for aircraft storage. For comparison purposes, the following planning considerations were applied to each alternative:

- Airside access associated with all six alternatives would be via Taxiway A, with existing Taxiway N converted to a taxilane to serve as a primary expanded GA facility access point. All taxilanes would be configured to ADG III design standards and jet blast deflectors would protect vehicular parking, access roads, parked aircraft, and other structures.
- Landside access for these alternatives would connect to either Shorecrest Drive or Lemmon Avenue. A potential connection point would be adjacent to the Shorecrest Drive and Webb Chapel Road intersection.
- For aircraft parking and storage, priority was given to aircraft storage/maintenance hangars. A standard hangar configuration with a building depth of 150 feet is depicted on the exhibits. Each hangar would be configured with adequate apron area to allow unimpeded access to the hangar bays. Surplus apron areas that could accommodate aircraft parking positions are also identified.
- Jet blast fences would provide protection for taxiing aircraft on neighboring taxiways from jet blast caused by breakaway thrust from parked aircraft when in a power-out maneuver. Blast fences would also be provided for neighboring buildings and existing aircraft parking areas to protect them from jet blast from aircraft taxiing on Taxiway N to the new ramp areas.

5.3.1.1 North Corner General Aviation Facility Layout - Alternative 1A

Alternative 1A, depicted on **Exhibit 5-37**, consists of the following facilities:

- Four 30,000-square-foot hangars with adjacent 23,600-square-foot vehicle parking areas
- 413,500 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road.

5.3.1.2 North Corner General Aviation Facility Layout - Alternative 1B

Alternative 1B, depicted on **Exhibit 5-38,** consists of the following facilities:

- Five 30,000-square-foot hangars with adjacent 43,500-square-foot vehicle parking areas
- 302,200 square feet of apron area and access taxilane
- Five additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Lemmon Avenue

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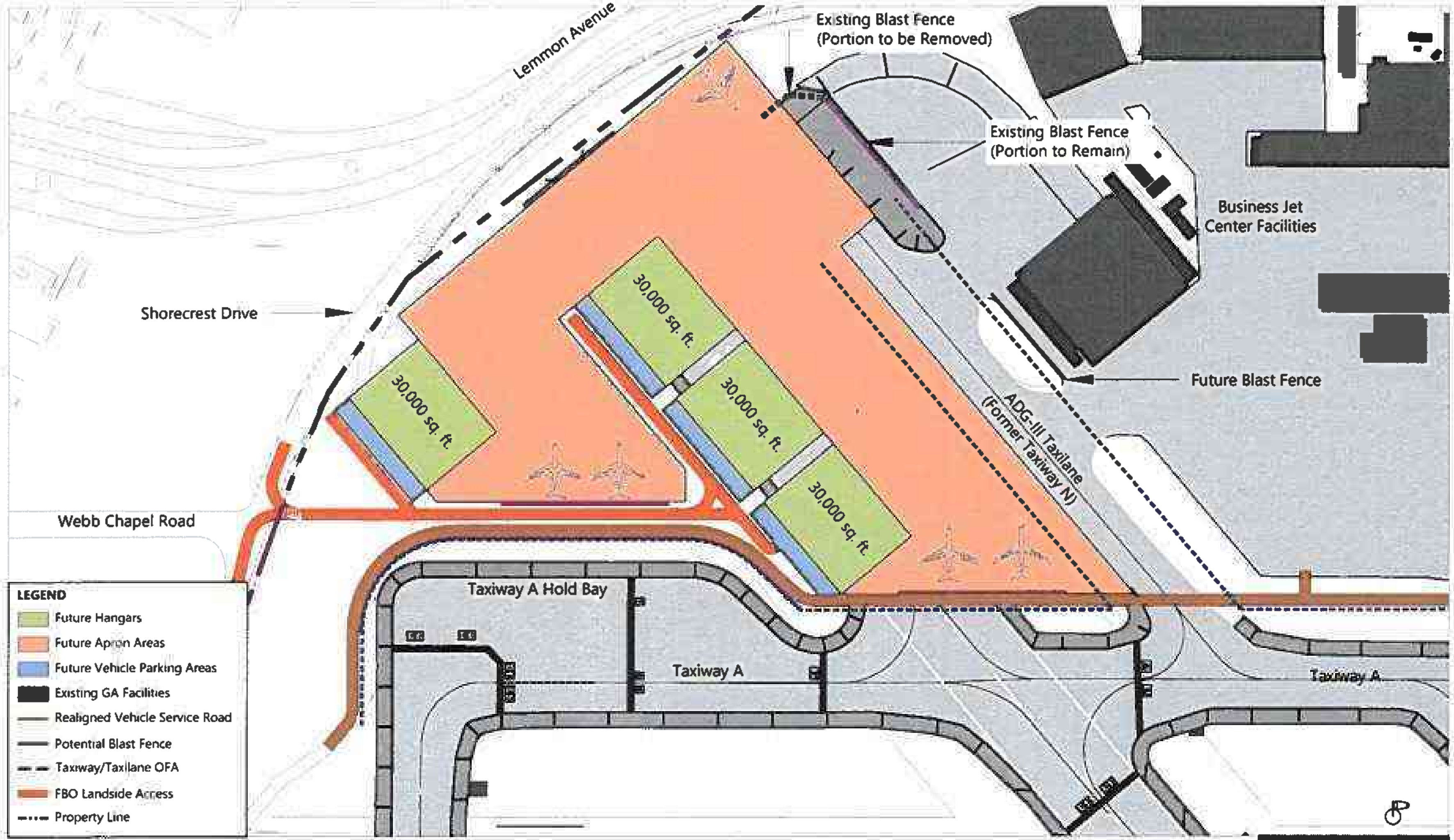

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013
PREPARED BY: Ricondo & Associates, Inc., March 2014

EXHIBIT 5-37

North Corner General Aviation Facility Layout Alternative 1A

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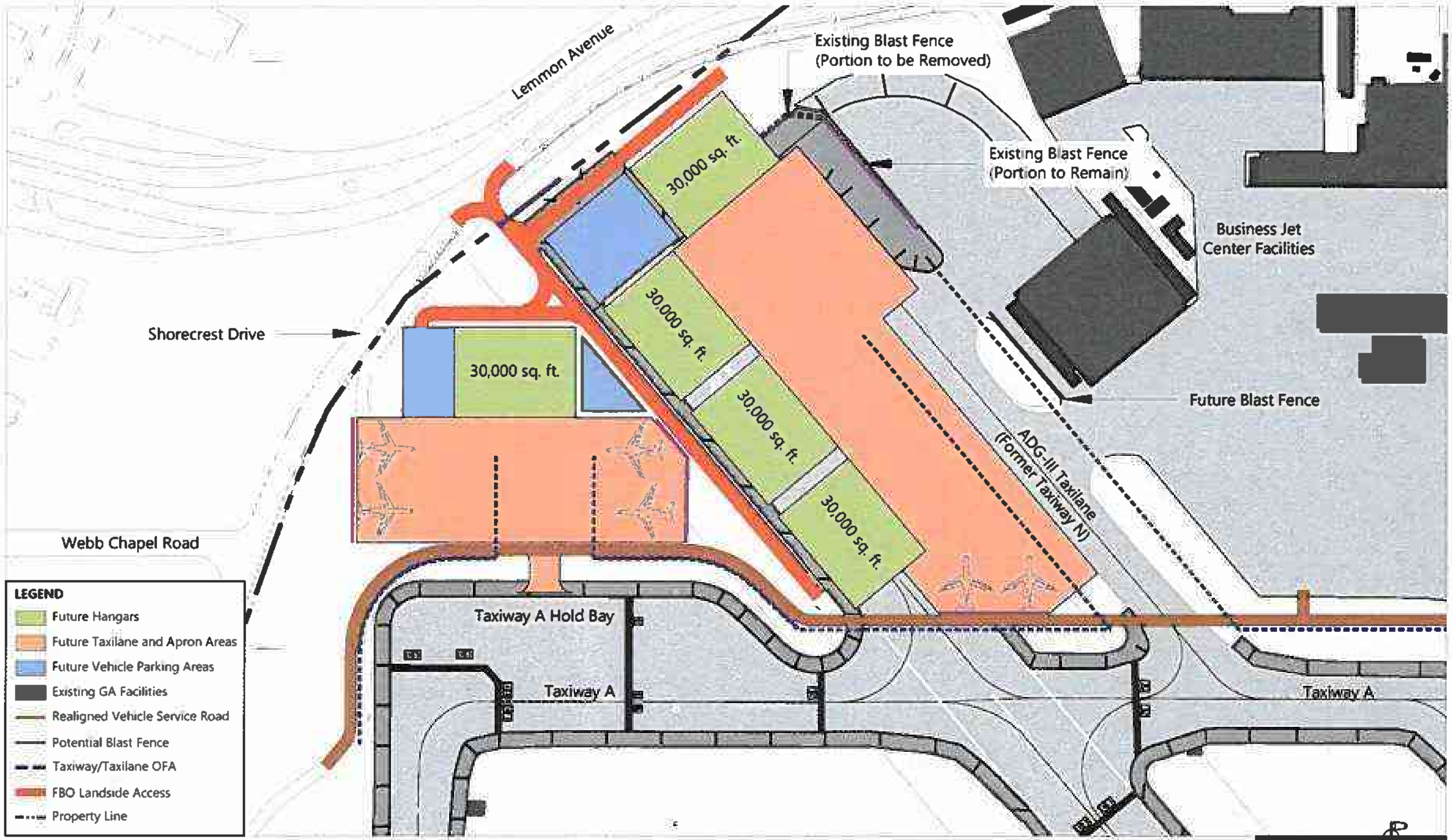

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013
PREPARED BY: Ricondo & Associates, Inc., March 2014

EXHIBIT 5-38

North Corner General Aviation Facility Layout Alternative 1B

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5.3.1.3 North Corner General Aviation Facility Layout - Alternative 1C

Alternative 1C, depicted on **Exhibit 5-39**, would provide the most hangar space, and consists of the following facilities:

- Seven 30,000-square-foot hangars with adjacent 62,400-square-foot vehicle parking areas
- 321,300 square feet of apron area and access taxilane
- Three additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Lemmon Avenue

The existing Business Jet Center hangar would require relocation to allow for an eastward bend in the centerline of Taxiway N (converted to a taxilane under this alternative). This relocation would optimize the ramp area on the west and integrate four of the future hangars with the existing GA apron.

5.3.1.4 North Corner General Aviation Facility Layout - Alternative 1D

Alternative 1D, depicted on **Exhibit 5-40**, includes a perimeter hangar location concept, and consists of the following facilities:

- Five 30,000-square-foot hangars with adjacent 42,200-square-foot vehicle parking areas
- 371,300 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road

5.3.1.5 North Corner General Aviation Facility Layout - Alternative 1E

Alternative 1E, depicted on **Exhibit 5-41**, consists of the following facilities:

- Six 30,000-square-foot hangars with adjacent 39,000-square-foot vehicle parking areas
- 355,200 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road

Alternative 1E is similar to Alternative 1C in that the hangar expansion would occur linearly, although the hangar orientation would be east-west. In this alternative, four 30,000-square-foot hangars and two 37,500-square-foot hangars would be provided, with an aircraft parking area along the north side of the ramp along Shorecrest Drive. Landside access would be provided from the intersection of Shorecrest Drive and Webb Chapel Road, with access to the easternmost hangars provided via Shorecrest Drive. Dedicated vehicle parking areas for all hangars would be provided along their respective entrance roads. Blast protection would be necessary between the ramp and Taxiway A entrance roads, with additional protection provided between the taxilane and the Business Jet Center hangar.

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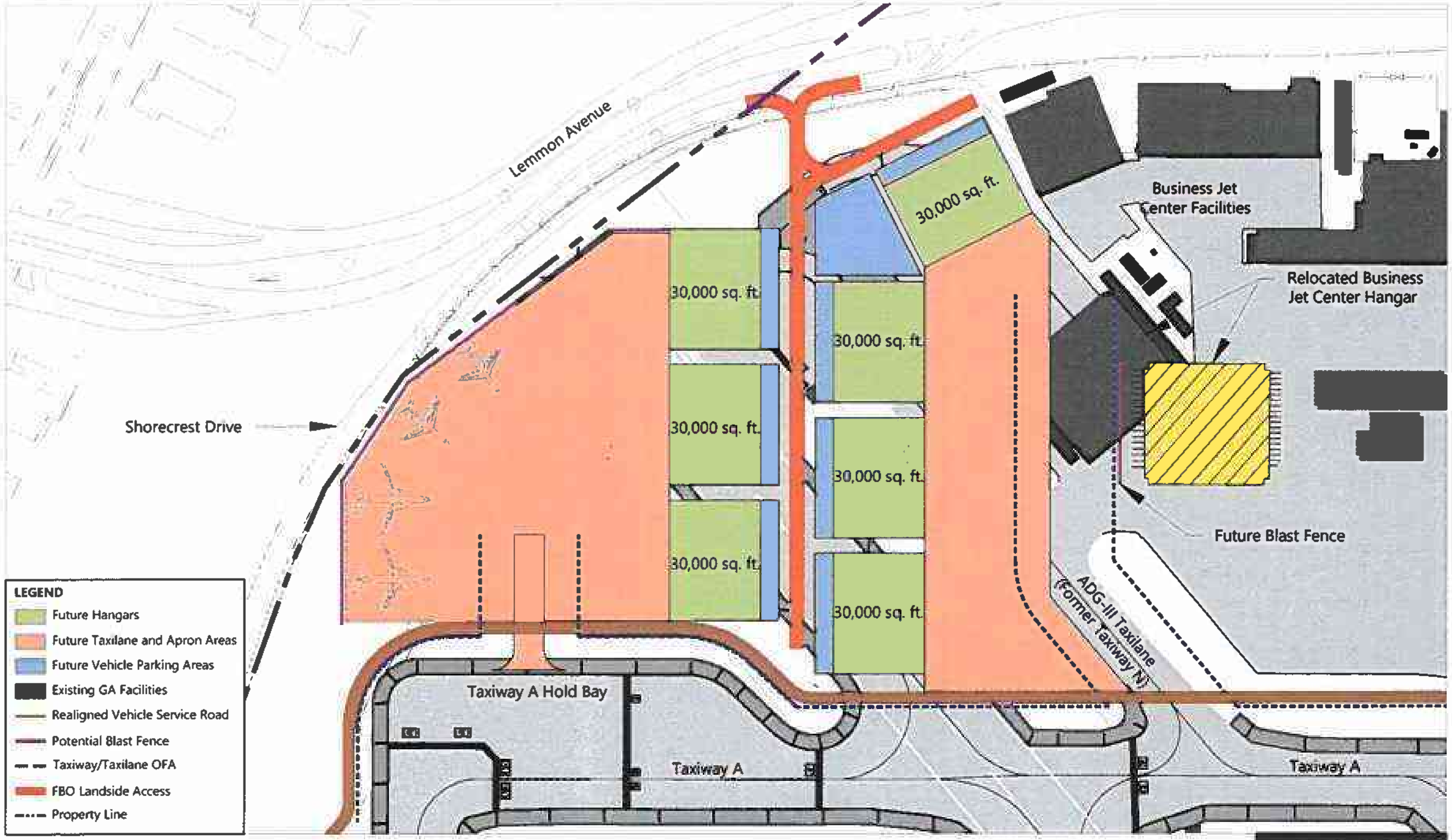

SOURCE: DAL Airport Layout Plan, 2001; Ricondo & Associates, Inc., December 2013.
PREPARED BY: Ricondo & Associates, Inc., March 2014.

EXHIBIT 5-39

NORTH 0 250 ft.

North Corner General Aviation Facility Layout Alternative 1C

Drawing: Z:\Love Field\2013 Master Plan Update\5 - Tenant Alternatives\GA Facility Layouts.dwg, Layout: Option 1C, May 18, 2015, 10:08am

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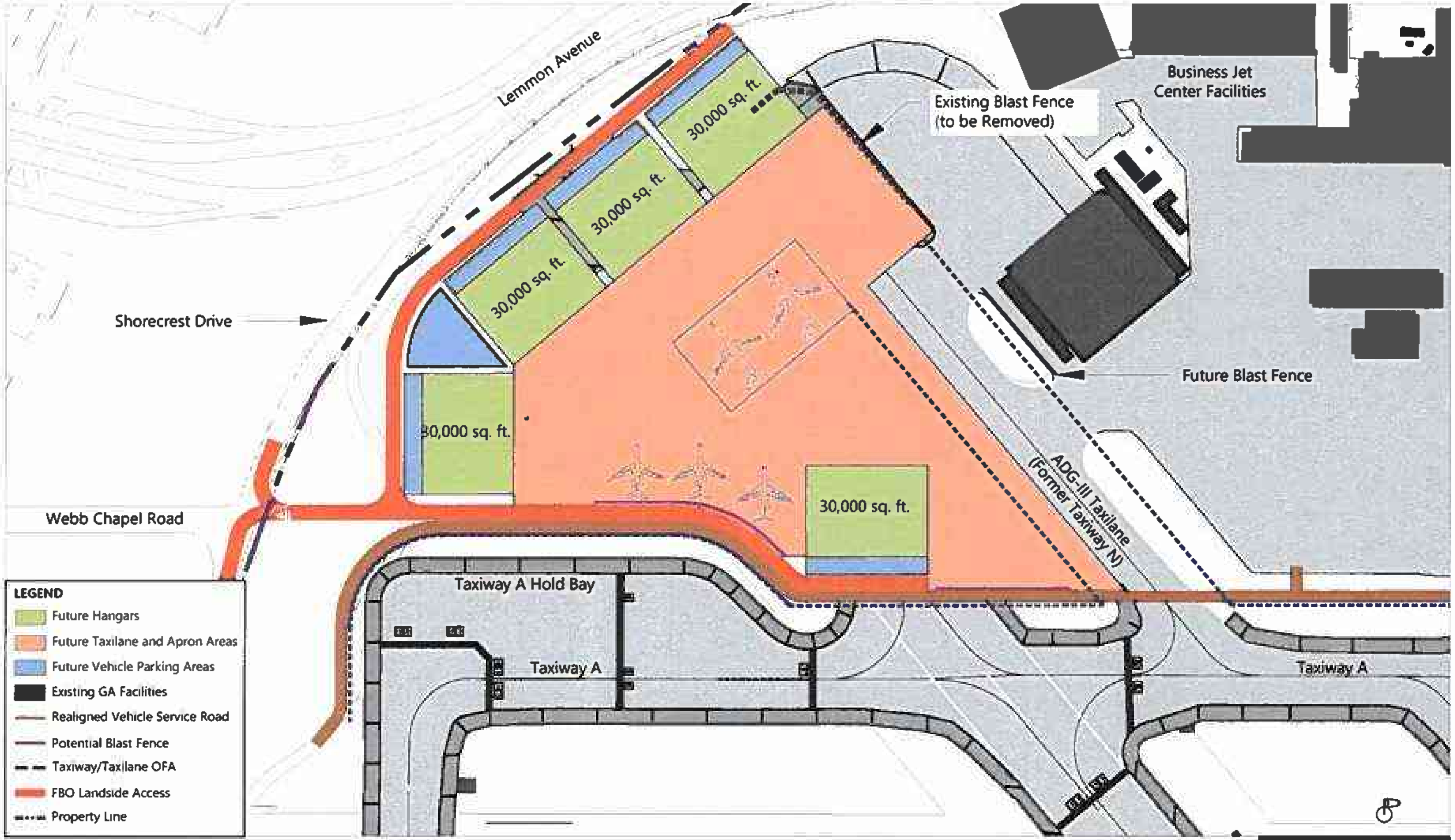

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013
PREPARED BY: Ricondo & Associates, Inc., March 2014

EXHIBIT 5-40

NORTH 0 250 ft

North Corner General Aviation Facility Layout Alternative 1D

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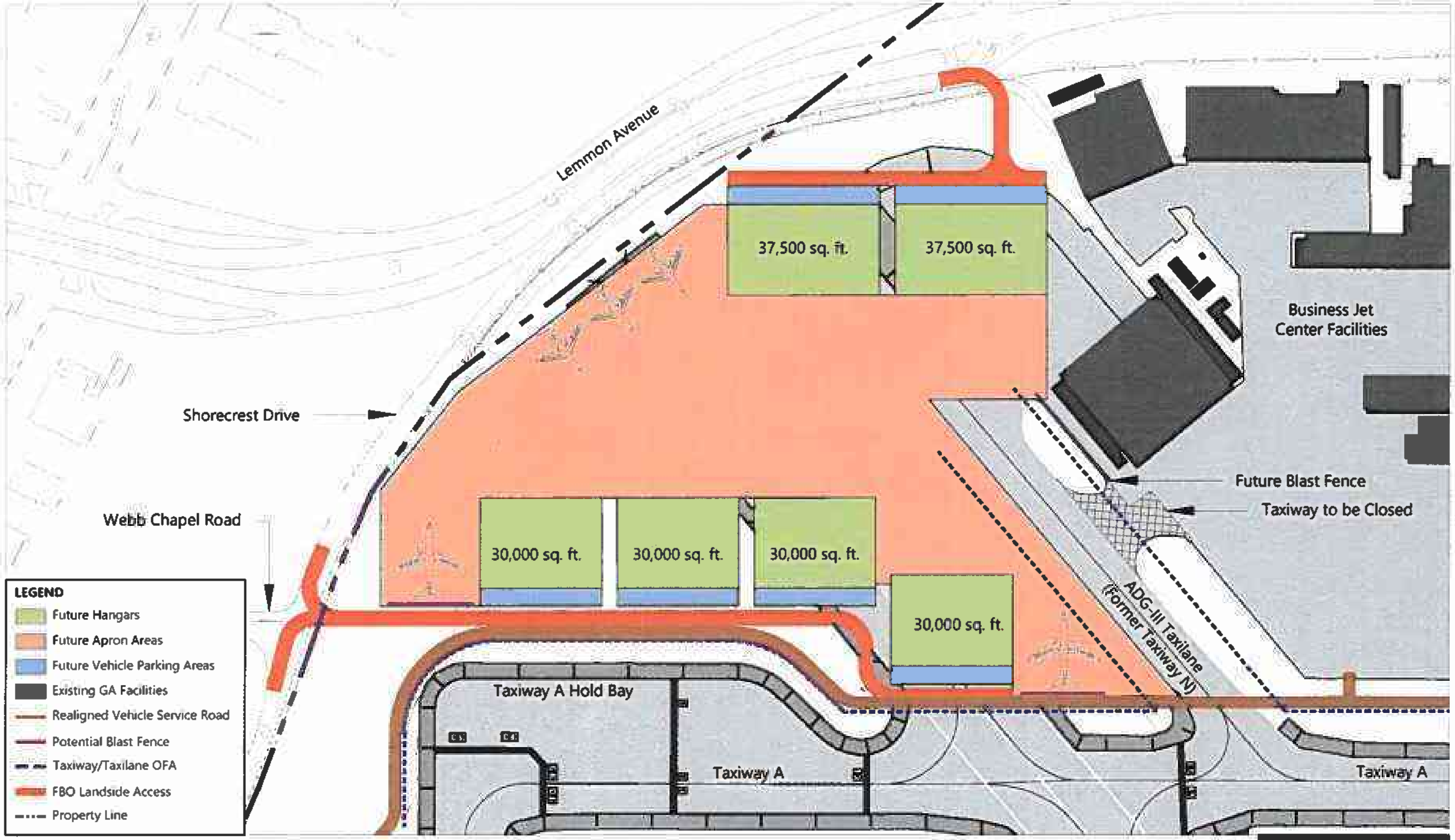

SOURCE DAL Airport Layout Plan, 2001, Ricondo & Associates, Inc., December 2013.
PREPARED BY Ricondo & Associates, Inc., March 2014

EXHIBIT 5-41

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North Corner General Aviation Facility Layout Alternative 1E

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Under this alternative, the ramp entrance taxiway located south of the Business Jet Center hangar would have to be closed because of jet blast caused by aircraft movements from Taxiway N.

5.3.1.6 North Corner General Aviation Facility Layout - Alternative 1F

Alternative 1F, depicted on **Exhibit 5-42**, was developed to mitigate the need for ingress and egress via the Taxiway A hold bay. This alternative consists of the following facilities:

- Five 30,000-square-foot hangars with adjacent 39,800-square-foot vehicle parking areas
- 286,800 square feet of apron area and access taxilane
- Four additional blast fence segments to protect vehicles from aircraft taxiing and turning movements
- Landside access at the intersection of Shorecrest Drive and Webb Chapel Road

5.3.1.7 North Corner Alternatives Summary

In the evaluation of the additive alternatives for the North Corner development, hangar space, ramp area, and landside facilities were considered, as were ease of access, potential constructability, and effects on existing facilities. Alternatives 1C and 1E would provide for the greatest amount of hangar space and parking area available for landside vehicles. Other alternatives, such as Alternatives 1A and 1D, would provide for slightly more ramp area for aircraft movement and storage. Although Alternative 1C would provide for the greatest amount of hangar space and landside facilities, access from the Taxiway A hold bay was determined to be a detriment, along with required relocation of the Business Jet Center hangar.

Alternative 1E was selected as the preferred alternative for the North Corner development area. The layout of the hangars and parking area would provide for efficient use of the 13 acres available for both landside and airside operations and for potential expansion to the full eastside redevelopment (Alternative 2A, discussed in the following subsection). Dedicated parking areas for passenger vehicles, as well as on-apron aircraft parking and storage areas, also enhance the functionality of this alternative.

While facility expansion in the North Corner development area would be sufficient for expansion through PAL O1, the Airport will not have the development area necessary to accommodate anticipated GA facility needs at PAL O2 and PAL O3. It should be noted that Dallas Executive Airport may have available areas to accommodate future GA demand in the region. If the operations planning metrics are met, deficiencies of 34.0 acres and 65.2 acres, respectively, would occur at PAL O2 and PAL O3. Similarly, if Runway 18-36 is not decommissioned, the facilities anticipated to be accommodated in the North Corner development area may also have to be accommodated at Dallas Executive Airport.

Tables 5-5 through **5-7** present the North Corner development alternatives along with the surplus or deficiency of functional areas under each alternative.

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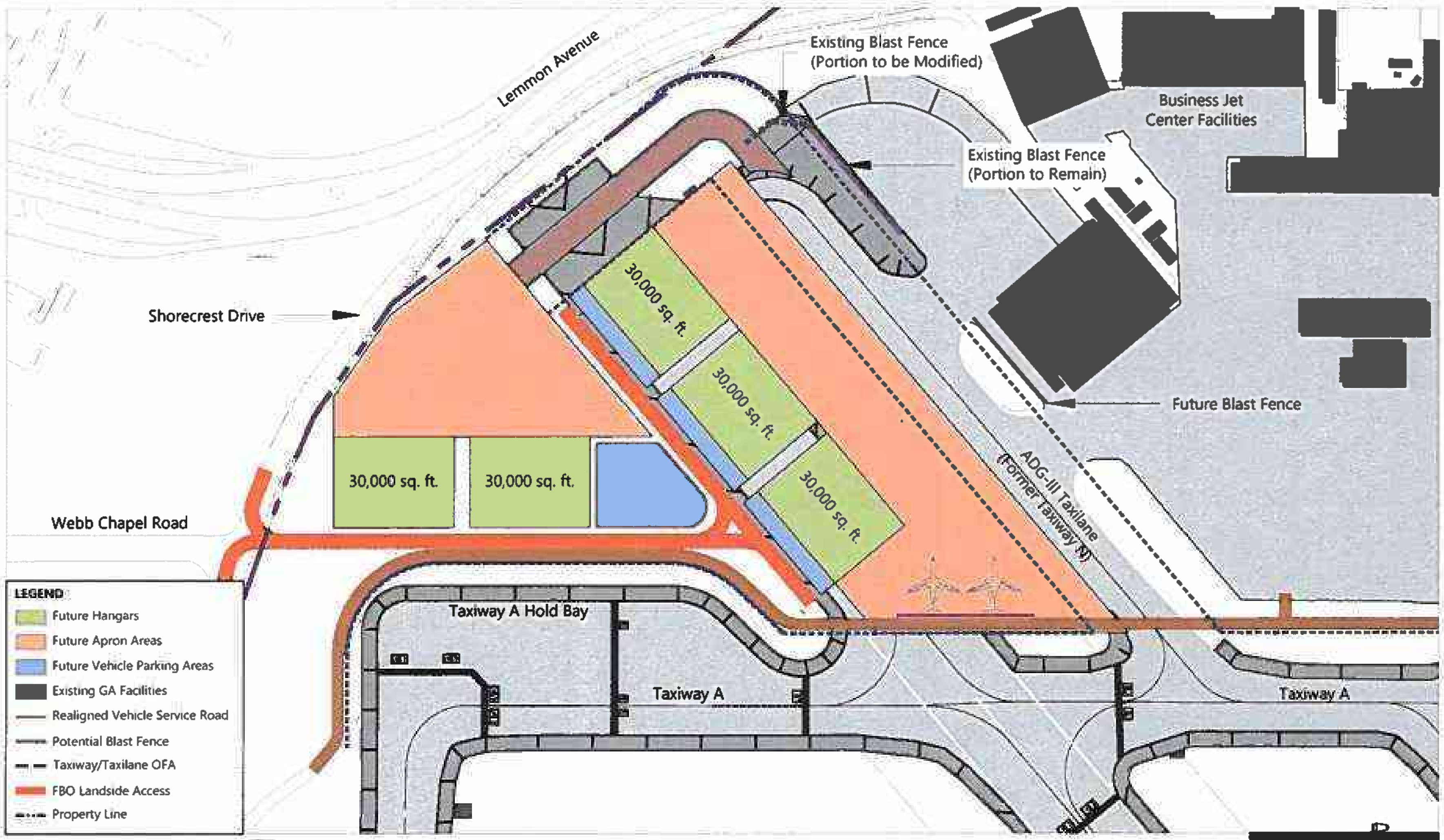

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013
PREPARED BY: Ricondo & Associates, Inc., March 2014

EXHIBIT 5-42

NORTH 0 250 ft

North Corner General Aviation Facility Layout Alternative 1F

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Table 5-5: General Aviation Hangar Area Summary (in square feet)

	ALTERNATIVE	PAL 01	PAL 02	PAL 03
	Additional Hangar Area Required	90,000	385,000	716,000
	Proposed Hangar Area		**Surplus/Deficiency**	
1A	120,000	30,000	-265,000	-596,000
1B	150,000	60,000	-235,000	-566,000
1C	210,000	120,000	-175,000	-506,000
1D	150,000	60,000	-235,000	-566,000
1E	195,000	105,000	-190,000	-521,000
1F	150,000	60,000	-235,000	-566,000

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.

SOURCE: Ricondo & Associates, Inc., July 2014.

PREPARED BY: Ricondo & Associates, Inc., July 2014.

Table 5-6: General Aviation Apron Area Summary (in square feet)

	ALTERNATIVE	PAL 01	PAL 02	PAL 03
	Additional Apron Area Required	220,000	831,000	1,583,000
	Proposed Apron Area		**Surplus/Deficiency**	
1A	413,000	193,000	-417,000	-1,170,000
1B	302,000	82,000	-529,000	-1,281,000
1C	321,000	101,000	-510,000	-1,262,000
1D	371,000	151,300	-460,000	-1,212,000
1E	355,000	135,000	-476,000	-1,228,000
1F	287,000	67,000	-544,000	-1,296,000

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.

SOURCE: Ricondo & Associates, Inc., July 2014.

PREPARED BY: Ricondo & Associates, Inc., July 2014.

Table 5-7: General Aviation Parking and Landside Area Summary (in square feet)

ALTERNATIVE		PAL O1	PAL O2	PAL O3
Additional Parking and Landside Area Required		9,000	263,000	541,000
	Proposed Parking and Landside Area		**Surplus/Deficiency**	
1A	24,000	15,000	-239,000	-517,000
1B	44,000	35,000	-219,000	-497,000
1C	62,000	53,000	-201,000	-479,000
1D	42,000	33,000	-221,000	-499,000
1E	39,000	30,000	-224,000	-502,000
1F	40,000	31,000	-223,000	-501,000

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.

SOURCE: Ricondo & Associates, Inc., July 2014.

PREPARED BY: Ricondo & Associates, Inc., July 2014.

5.3.2 Lemmon Avenue Redevelopment Alternatives

Alternatives to consolidate facilities on the existing GA ramp were explored to simplify ramp maneuverability and hangar access. The consolidation of facilities would allow some open landside areas to be used for retail or other nonaeronautical revenue-generating functions. For the purposes of this analysis, it was assumed that the DalFort facility would not be affected by the redevelopment alternatives, although it may be available to accommodate some GA facility requirements. The alternatives discussed in the following subsections are based on the assumption that North Corner development Alternative 1E would be constructed to accommodate some GA facility requirements; therefore, Alternative 1E was incorporated into the full GA ramp redevelopment alternatives. Alternatives for redevelopment of the GA ramp with Runway 18-36 operational and decommissioned are presented in the following subsections.

5.3.2.1 Lemmon Avenue Redevelopment Alternatives 2A and 2B

Lemmon Avenue redevelopment Alternatives 2A and 2B incorporate consolidated hangars in parallel and U-shaped arrangements. These arrangements would create efficiencies for aircraft movements and parking on the apron. Additionally, such hangar configurations would maximize ramp space while providing dedicated aircraft parking areas in front of tenant hangars. **Exhibit 5-43** depicts the Alternative 2A layout concept with Runway 18-36 decommissioned, and **Exhibit 5-44** depicts the Alternative 2B layout concept with Runway 18-36 remaining operational.

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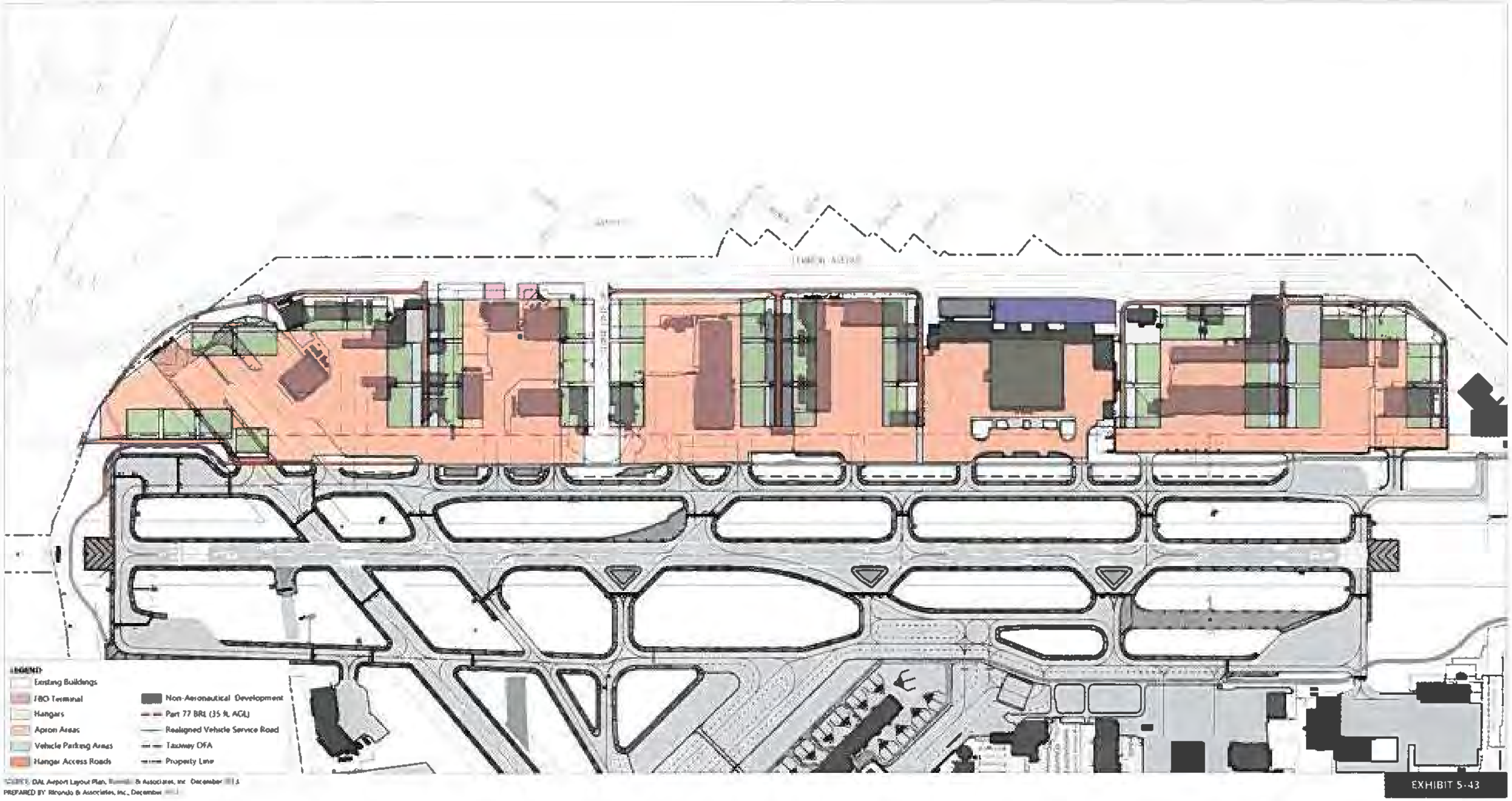

SOURCE: DAL Airport Layout Plan, [illegible] & Associates, Inc. December [illegible]
PREPARED BY: Ricondo & Associates, Inc., December [illegible]

EXHIBIT 5-43

Lemmon Avenue Redevelopment Alternative 2A with Runway 18-36 Decommissioned

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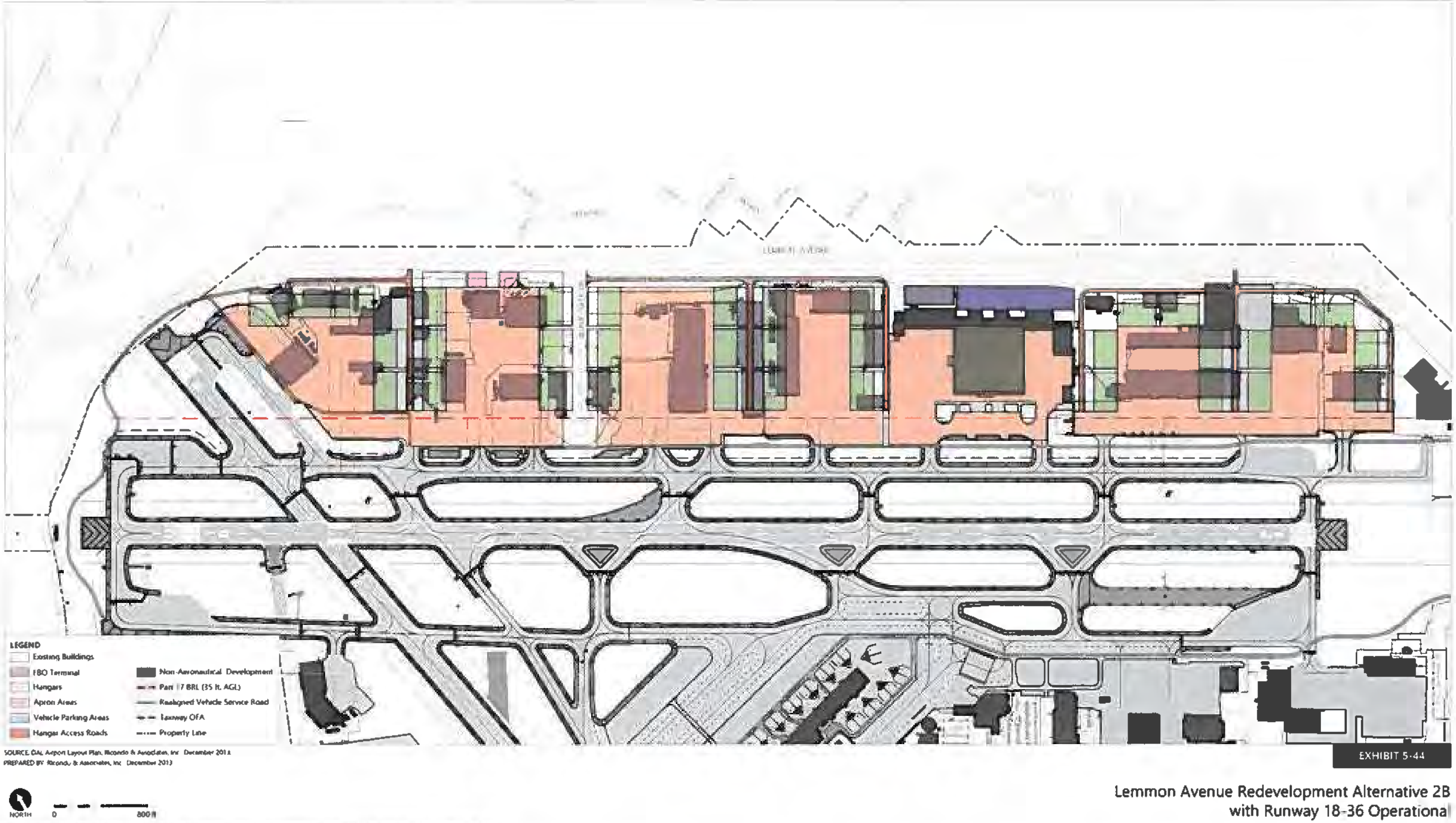

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc. December 2014
PREPARED BY: Ricondo & Associates, Inc. December 2013

EXHIBIT 5-44

Lemmon Avenue Redevelopment Alternative 2B with Runway 18-36 Operational

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Alternative 2A would provide for 4 30,000-square-foot hangars and 36 37,500-square-foot hangars to be constructed, with the additional hangar area provided at the DalFort facility, while Alternative 2B would provide for 35 37,500-square-foot hangars. In addition to the hangars, two FBO facilities would be located along the east side of the ramp, accessible from Lemmon Avenue. Signature Flight Support currently operates a terminal for general aviation purposes, as well as hangars for aircraft storage and maintenance. These redevelopment alternatives incorporate demolition and relocation of all FBO and dedicated parking facilities.

Landside access would be provided via connections with Lemmon Avenue to the east and via George Coker Circle. Each hangar would have a dedicated vehicle parking area, accessible from the access roads along the back side of each hangar.

5.3.2.2 Lemmon Avenue Redevelopment - Alternative 3A and 3B

Alternatives 3A and 3B incorporate a similar hangar arrangement as Alternatives 2A and 2B; however, hangars would be provided at the east end of the realigned ramp to maximize hangar space and ramp efficiency while providing space for nonaeronautical development between the GA ramp and Lemmon Avenue. Approximately 135 feet of depth would be reserved for nonaeronautical development, reducing the availability of land for GA ramp, hangar, and landside facilities development. **Exhibit 5-45** depicts the Alternative 3A layout with Runway 18-36 decommissioned, and **Exhibit 5-46** depicts the Alternative 3B layout with Runway 18-36 remaining operational.

Alternative 3A provides 4 30,000-square-foot hangars and 34 37,500-square-foot hangars, with the additional hangar area to be provided at the DalFort facility. Alternative 3B provides 33 37,500-square-foot hangars, also relying on the DalFort facility to accommodate a portion of the hangar demand. The U-shaped hangar arrangement, similar to Alternatives 2A and 2B, would allow for ramp and aircraft parking efficiency, while maximizing hangar space by locating two hangars at the east end of the ramp. In addition to the hangars, three GA terminals would be provided on the west side of the GA ramps, with dedicated parking facilities and space for aircraft to load and offload passengers.

Landside access would be provided via roadway connections with Lemmon Avenue and Shorecrest Drive. These access roads run between the areas identified for retail and non-aeronautical uses and would alleviate some traffic backup that could occur on Lemmon Avenue by diverting retail traffic and hangar traffic onto the access road. In addition to the access roads, a bike path and sidewalk would be provided along the west side of Lemmon Avenue.

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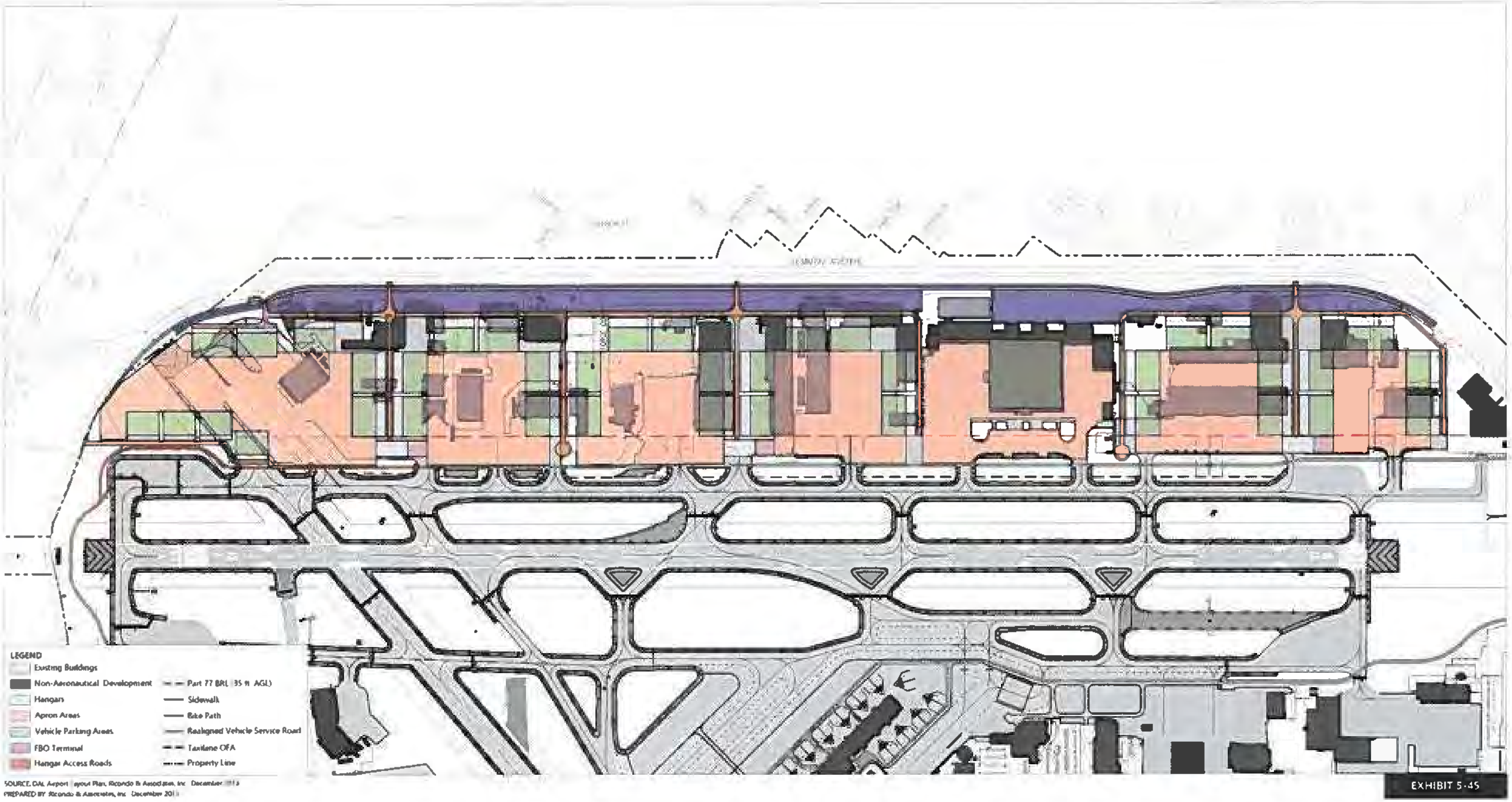

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013
PREPARED BY: Ricondo & Associates, Inc., December 2013

EXHIBIT 5-45

Lemmon Avenue Redevelopment Alternative 3A with Runway 18-36 Decommissioned

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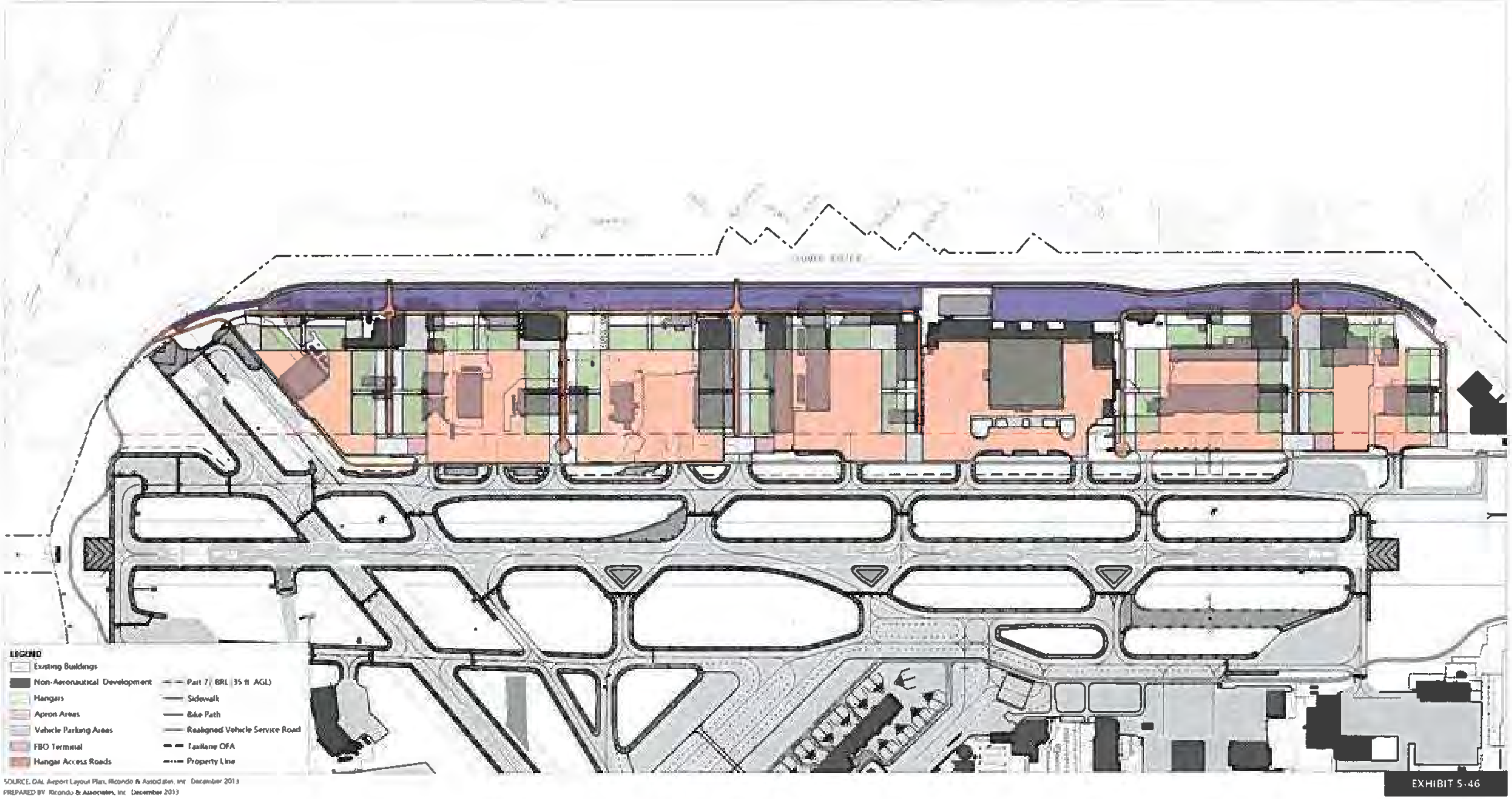

EXHIBIT 5-46

SOURCE: DAL Airport Layout Plan, Ricondo & Associates, Inc., December 2013
PREPARED BY: Ricondo & Associates, Inc., December 2013

Lemmon Avenue Redevelopment Alternative 3B with Runway 18-36 Operational

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5.3.2.3 Lemmon Avenue Redevelopment Alternatives Summary

Full redevelopment of the east side of the Airport, including nearly all GA facilities located east of Taxiway A, would increase the efficiency of aircraft maneuvering and storage; however, the reduced hangar and ramp space allocation may not meet the needs identified for PAL O1 if the DalFort facility is not available to accommodate demand. The addition of nonaeronautical development under Alternative 3B would further reduce the availability of space to accommodate aeronautical uses and reduce space allocation for current and future aeronautical tenants. Alternative 2A would provide the largest hangar and apron areas, increase efficiency, and could be combined with North Corner Alternative 1E, discussed previously. Therefore, Lemmon Avenue redevelopment Alternative 2A was selected as the preferred alternative if full redevelopment of the east side of the Airport is desired. Similarly, if nonaeronautical development is desired at the Airport, Alternative 3A would serve as the preferred alternative.

Tables 5-8 through **5-10** present the GA redevelopment alternatives, along with the surplus or deficiency of functional areas under each alternative.

Table 5-8: General Aviation Hangar Area (in square feet)

ALTERNATIVE	HANGAR SPACE	PAL O1	PAL O2	PAL O3
2A	2,168,943	144,943	-150,057	-481,057
2B	1,866,500	-157,500	-452,500	-783,500
3A	2,101,443	77,443	-217,557	-548,557
3B	1,434,943	-589,057	-884,057	-1,215,057

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.

SOURCE: Ricondo & Associates, Inc., July 2014.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

Table 5-9: General Aviation Apron and Aircraft Parking Areas (in square feet)

ALTERNATIVE	APRON SPACE	PAL O1	PAL O2	PAL O3	AIRCRAFT PARKING AREAS
2A	5,443,221	830,221	219,221	-532,779	1,146,221
2B	4,977,491	364,491	-246,509	-998,509	1,228,310
3A	4,574,777	-38,223	-649,223	-1,401,223	1,161,274
3B	4,045,580	-567,420	-1,178,420	-1,930,420	1,121,880

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.

SOURCE: Ricondo & Associates, Inc., July 2014.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

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Table 5-10: General Aviation Vehicle Parking and Landside Area (in square feet)

ALTERNATIVE	VEHICLE PARKING SPACE	PAL 01	PAL 02	PAL 03
2A	1,029,945	-675,055	-929,055	-1,207,055
2B	1,205,403	-499,597	-753,597	-1,031,597
3A	1,005,350	-699,650	-953,650	-1,231,650
3B	1,180,808	-524,192	-778,192	-1,056,192

NOTE: Negative values listed in the above table signify a deficiency; positive values signify a surplus.
SOURCE: Ricondo & Associates, Inc., July 2014.
PREPARED BY: Ricondo & Associates, Inc., July 2014.

5.4 Support Facility Alternatives

Airport support facilities include the fuel farm, General Use Building #1, and Airport maintenance facilities. The Airport maintenance facilities, GUB-1, and the Southwest Airlines fuel farm capacities and areas were presented in Section 4.8.2.

Through conversations with Airport management and staff and other stakeholders, it was determined that an expansion area should be reserved for GUB-1. The recommended location is immediately north of the existing GUB-1. It was further determined that no expansion to Airport support facilities would be required through the planning period. Southwest Airlines operates the fuel farm and does not anticipate any need for tank expansion over the planning period. The Airport maintenance facility was recently expanded and is expected to have sufficient capacity to accommodate anticipated Airport expansion needs through the planning period.

6. Public Outreach

As part of the public outreach program for the Master Plan Update, three events were held. The three sets of Master Plan Update public outreach events are discussed in this section. The first set of outreach events consisted of a set of meetings held in fall 2012 as part of the Department of Aviation's Good Neighbor Plan (GNP) initiative. This initiative consisted of a series of 10 meetings held to engage residents and businesses in the communities surrounding the Airport and to seek their input regarding the areas surrounding the Airport perimeter. The second set of public outreach events consisted of two open houses held in July 2014. These open houses were intended to inform the public of the Master Plan Update process, findings, and proposed alternatives. The third set of public outreach events also consisted of two open houses held in March 2015. The objective was to present the final Master Plan Update to the public, including the final recommended alternatives and the finance plan, which were not presented at the previous outreach events.

6.1 Good Neighbor Plan Initiative and Public Outreach Event #1

As part of the Master Plan Update, an initiative was developed to enhance the physical and economic development of Dallas Love Field and its bordering neighborhoods. The GNP initiative included a public involvement program intended to incorporate community input into the decisions made regarding development and improvements around Dallas Love Field. Community input was to be incorporated into the alternatives and integrated into the Master Plan Update.

Creation of the GNP initiative was largely inspired by the Downtown Dallas 360 Plan — a long-term plan to bring new life to the downtown Dallas districts and to enhance street and landscaping features. Three overarching goals of the Downtown Dallas 360 Plan were used as a foundation for the GNP initiative. The three overarching goals were to create:

- An exciting urban experience
- A balanced transportation system
- An inclusive environment

6.1.1 PUBLIC INVOLVEMENT PROGRAM

A public involvement program was established to facilitate education and awareness of the Master Plan Update and the GNP initiative among neighborhood stakeholders, the public and non-government agencies. The goal of the public involvement program was to inform, educate, and actively involve the neighborhoods bordering Dallas Love Field in the Master Plan Update process and to obtain their input to gain a better understanding of their wants and concerns.

Input from key stakeholders was important throughout the planning process for the GNP initiative, as well as the Master Plan Update. To include stakeholders that could be affected by the GNP initiative, a comprehensive database of key stakeholders was compiled, including representatives of residents and neighborhood associations, businesses and business associations, Airport tenants, nonprofit entities (hospitals, libraries, religious centers, etc.), educational institutions, surrounding cities, Dallas County, government agencies, and public officials.

The public involvement program for the GNP initiative was conducted between July and November 2012 and included the following:

- Development of a public involvement plan and project branding
- Creation of a stakeholder database
- Development of marketing materials, including website, newsletter, and stakeholder presentations
- Facilitation of 10 public meetings with participation by residents and business representatives from neighborhoods bordering the Airport

6.1.1.1 Stakeholder Zones

The stakeholders for the GNP initiative were separated into four zones (north, east, south, and west). These zones were established to guide public involvement and prioritize the types of development and improvement projects important for each zone. The zones and their focus areas are illustrated on **Exhibit 6-1**. The manner in which the public meetings were divided into zones to better identify the needs of each independent zone is described in the following subsection.

6.1.1.2 Outreach Methods

Ten stakeholder meetings were held, including meetings with residents, businesses, and tenants. The following outreach methods were used for these meetings:

- **Residential meetings**: The stakeholders residing within the specific zone for each meeting were notified via bilingual door hangers. In addition, telephone calls were made by the consultant team and emails were sent to homeowners, select key community representatives, neighborhood association representatives, and crime watch groups.
- **Business and Airport tenant meetings**: Business and Airport tenant stakeholders were notified via letters, emails, and telephone calls.

Additionally, bilingual flyers were posted in relevantly located apartment complexes, libraries, and recreation centers prior to each meeting. Public meeting times, dates, and locations were also listed on the Good Neighbor Plan website: http://www.goodneighborplan.com.

SOURCES: North Central Texas Council of Governments, GIS Clearinghouse, June 2010; ESRI Database (Aerial Imagery), 2011
PREPARED BY: Ricondo & Associates, Inc. November 2014

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EXHIBIT 6-1

Good Neighbor Plan Initiative
Focus Areas and Stakeholder Zones

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As the Master Plan Update was being completed, the GNP initiative website was accessed to gain additional information about the Master Plan Update and projects stemming from the GNP initiative, as the website contained information provided at the public involvement meetings, including meeting schedules and PowerPoint presentations, as well as the GNP newsletter.

The first edition of the GNP newsletter was distributed at each meeting in both English and Spanish. The newsletter included an overview of the GNP initiative and contact information. Comment cards were made available at the meetings for attendees to either take home and mail in, or complete and leave with the Airport representatives. Meeting attendees were also provided with a business card listing the website address, contact information, and a schedule of meetings. Stakeholders were able to request additional information or submit comments and questions through the website, email, or a designated telephone number.

6.1.2 PUBLIC MEETINGS

Each of the 10 public meetings was segmented into two parts, beginning with a presentation of the GNP initiative and its overarching goals and concluding with breakout sessions and a joint session to discuss the results.

6.1.2.1 Schedule

The 10 public meetings consisted of separate residential and business stakeholder meetings for each of the four zones to accommodate different interests and concerns. Because of the size of the residential area in east zone, two residential meetings were held in that zone. A separate meeting was also held to address the needs of Airport tenants from all zones. The schedule of meetings and numbers of attendees are provided in **Table 6-1**. The sign-in sheets for each meeting, as well as a compiled list of attendees, are on record with the City of Dallas Department of Aviation.

Table 6-1: Good Neighbor Plan Initiative Public Meeting Attendance

MEETING DATE	MEETING	NUMBER OF ATTENDEES
10/09/12	East Zone Residential Meeting (North) Shorecrest Estates, Cochran Chapel	14
10/16/12	East Zone Business Meeting	9
10/16/12	East Zone Residential Meeting (South) North Park	38
10/18/12	Dallas Love Field Tenants Meeting	30
10/23/12	South Zone Business Meeting	10
10/25/12	South Zone Residential Meeting	2
10/30/12	West Zone Business Meeting	6
11/08/12	West Zone Residential Meeting	34
11/13/12	North Zone Residential Meeting	6
11/15/12	North Zone Business Meeting	7
	TOTAL	156

SOURCE: City of Dallas Department of Aviation, Public Meetings Attendance Sheets, October 9, 2012, through November 15, 2012.
PREPARED BY: Ricondo & Associates, Inc., September 2014.

6.1.2.2 Presentation

The first part of each meeting included a PowerPoint presentation. The presentation included information about the public involvement program, the background of Dallas Love Field, an overview of the GNP initiative, and possible development and improvement opportunities in the zone specific to the meeting audience. **Appendix L** provides the development and improvement opportunities in all four zones.

6.1.2.3 Breakout Sessions

The second part of each meeting included breakout sessions. The purpose of the breakout sessions was to gain an understanding of the priorities of each stakeholder group. Each meeting attendee was asked to place eight dots on an activity board under the categories in which he or she would like to see developments or improvements. Attendees were asked to place their dots under the categories they considered to be of the highest priority. They were told they could place one dot in each category, all eight in one category, or any other combination they wished. The eight categories included are shown on **Exhibit 6-2** and described below.

Exhibit 6-2: Breakout Sessions Activity Board

SOURCE K Strategies Group, October 2012
PREPARED BY: K Strategies Group, December 2012

Transit Connections

- Description: Access to Airport and neighborhoods via rail or bus
- Examples: Direct shuttle from Dallas Love Field to DART rail station, benches/shelters at bus stations

Transit-oriented Development

- Description: Development around transit stations
- Examples: Retail, office, or living space around transit stations (i.e., Mockingbird Station)

Pedestrian Connections

- Description: Sidewalks, crosswalks, pedestrian bridges
- Example: Specific areas where neighborhoods need improved connections to Dallas Love Field or surrounding communities

Landscaping and Streetscaping

- Description: Trees, plants, wayfinding signs, public art, monuments
- Example: Landscaping improvements around Bachman Lake

Public and Open Spaces

- Description: Hiking and biking trails, walking/running paths
- Examples: Public parks, dog parks, improved trails

Retail Spaces

- Description: Restaurants, stores, commercial strip centers
- Examples: Sidewalk cafes, boutique shops, freestanding stores

Office Spaces

- Description: Small office buildings (low-level)
- Example: Midscale office buildings to increase economic development

Buffers (Visual and Physical)

- Description: Buffers around Dallas Love Field to separate the view of the Airport from the neighborhoods
- Examples: Large trees, berms, fences, decorative walls

The results of each meeting were discussed with the participants and an open discussion was facilitated. The top three priorities resulting from each meeting are listed in **Table 6-2**. A full summary of the breakout session results from each of the 10 meetings is presented in **Table 6-3**.

Table 6-2: Summary of Priorities from the Public Meetings for the Good Neighbor Plan Initiative

MEETING DATE	MEETING	NUMBER OF ATTENDEES	TOP THREE PRIORITIES
10/09/12	East Zone Residential Meeting (North) Shorecrest Estates, Cochran Chapel	14	Landscaping and Streetscaping Buffers (Visual and Physical) Public and Open Spaces
10/16/12	East Zone Business Meeting	9	Landscaping and Streetscaping Transit Connections Retail Spaces
10/16/12	East Zone Residential Meeting (South) North Park	38	Buffers (Visual and Physical) Pedestrian Connections Landscaping and Streetscaping
10/18/12	Dallas Love Field Tenants Meeting	30	Landscaping and Streetscaping Transit Connections Retail Spaces
10/23/12	South Zone Business Meeting	10	Landscaping and Streetscaping Office Spaces Buffers (Visual and Physical)
10/25/12	South Zone Residential Meeting	2	Landscaping and Streetscaping Pedestrian Connections Buffers (Visual and Physical)
10/30/12	West Zone Business Meeting	6	Landscaping and Streetscaping Office Spaces Retail Spaces
11/08/12	West Zone Residential Meeting	34	Pedestrian Connections Landscaping and Streetscaping Retail Spaces
11/13/12	North Zone Residential Meeting	6	Landscaping and Streetscaping Pedestrian Connections Transit Connections
11/15/12	North Zone Business Meeting	7	Landscaping and Streetscaping Pedestrian Connections Public and Open Spaces
	TOTAL	**156**	

SOURCE: City of Dallas Department of Aviation, Public Meeting Breakout Sessions, October 9, 2012, through November 15, 2012
PREPARED BY: K Strategies Group, December 2012.

Table 6-3: Good Neighbor Plan Initiative Public Meeting Summary of Breakout Session Results

MEETING	TRANSIT CONNECTIONS	TRANSIT-ORIENTED DEVELOPMENT	PEDESTRIAN CONNECTIONS	LANDSCAPING AND STREETSCAPING	PUBLIC AND OPEN SPACES	RETAIL SPACES	OFFICE SPACES	BUFFERS (VISUAL AND PHYSICAL)
East Zone Residential (North)	4	6	16	**26**	**18**	7	0	**26**
East Zone Business	**10**	0	6	**11**	6	**9**	0	3
East Zone Residential (South)	17	6	**31**	**27**	21	7	5	**32**
Airport Tenants	**27**	10	17	**30**	19	**22**	3	18
South Zone Business	4	8	5	**14**	3	8	**11**	**11**
South Zone Residential	0	0	**3**	**3**	0	0	0	**2**
West Zone Business[1/]	0	0	0	**0**	0	**0**	**0**	0
West Zone Residential	15	6	**43**	**35**	31	**35**	2	27
North Zone Residential	**6**	5	**6**	**8**	4	1	0	1
North Zone Business	2	2	**7**	**8**	**7**	5	4	5
TOTAL[2/]	85	43	**134**	**162**	109	94	25	**125**

NOTES:

The red numbers indicate the top three priorities at each meeting. The bold black numbers indicate the top three overall priorities.

1/ No priority rating was completed at this meeting because all meeting attendees were from the same company. The categories were discussed, and the top three priorities were determined to be landscaping and streetscaping, office spaces, and retail spaces.

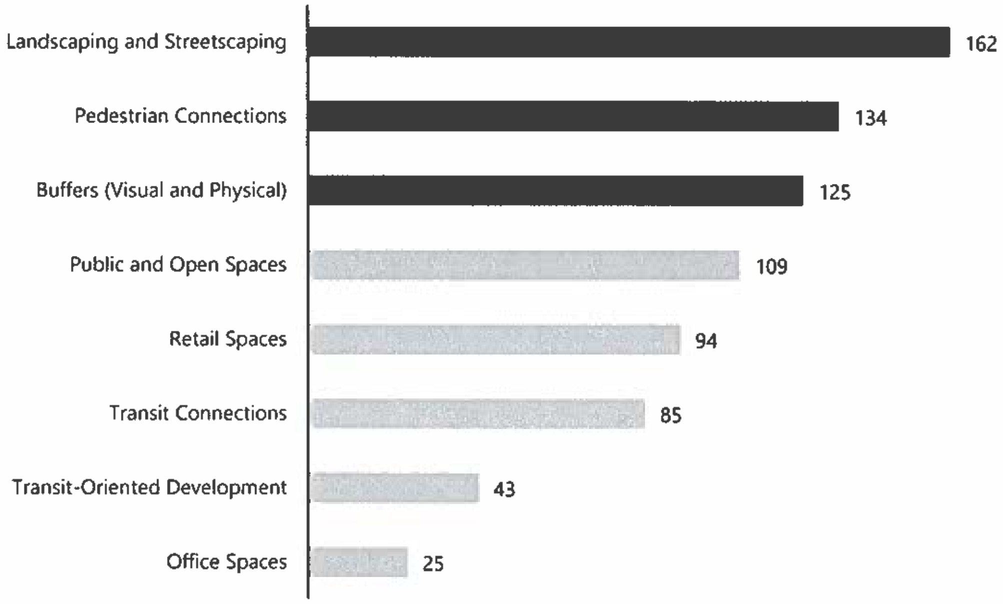
2/ Not all attendees chose to participate in the breakout sessions. Totals may exceed the number of attendees in cases where attendees concentrated their activity board dots on fewer than eight separate priorities.

SOURCE: City of Dallas Department of Aviation, Public Meeting Breakout Sessions, October 9, 2012, through November 15, 2012.
PREPARED BY: K Strategies Group, December 2012.

Once all meeting attendees who wished to participate placed their maximum of eight dots on the activity board, the discussion portion of the breakout session proceeded. Beginning with the categories that received the most dots and continuing through the categories that received the fewest dots, attendees were asked to provide input on their wants and concerns regarding each category. The overarching comments regarding what residents and businesses wanted or did not want in each category are listed below in the order of priority indicated by the meeting attendees.

Overall, input received at the 10 meetings indicated that the top three priorities were landscaping and streetscaping, pedestrian connections, and buffers (visual and physical) around the Airport (**Exhibit 6-3**).

Exhibit 6-3: Overall Breakout Session Results



SOURCES: K Strategies Group, December 2012; City of Dallas Department of Aviation, Public Meeting Breakout Sessions, October 9, 2012, through November 15, 2012.
PREPARED BY: Ricondo & Associates, Inc., October 2014.

Landscaping and Streetscaping (162 dots)

- Consistent landscaping on all sides of the Airport with plants native to Texas
- Additional directional signage around the Airport
- Traffic control around the Airport

Pedestrian Connections (134 dots)

- Consistent sidewalks on all sides of the Airport
- Connections to Bachman Lake from other neighborhoods
- Pedestrian bridges to cross busy roads around the Airport

Buffers (Visual and Physical) (125 dots)

- Replace chain link fence with a more attractive option
- No walls around the Airport
- Natural buffers such as trees to limit noise and pollution

Public and Open Spaces (109 dots)

- Increased safety around Bachman Lake
- Bike access around the Airport and access to Bachman Lake
- Construction of a dog park
- Area designated for watching airplanes take off and land

Retail Spaces (94 dots)

- Small boutique stores rather than large chains
- Sitdown restaurants
- Grocery store along Denton Drive
- Easily accessible stores and restaurants via bike or walking trails
- Renovate retail spaces along Northwest Highway

Transit Connections (85 dots)

- Connection from the DART rail stations directly to Dallas Love Field via shuttle or people mover

Transit-oriented Development (43 dots)

- Mixed-use developments similar to Mockingbird Station

Office Spaces (25 dots)e

- No large office spaces along Denton Drive or Lemmon Avenue
- Renovate and create new office spaces along Mockingbird Lane

Photographs taken during the 10 public meetings are provided in **Appendix M.**

6.1.2.4 Comments Received

Comment cards were distributed to meeting attendees at all 10 public meetings for the Good Neighbor Plan initiative. Attendees were requested to return them at the end of the meeting. The comments received as well as the responses are noted in **Table 6-4**.

Table 6-4 (1 of 5): Public Comments Database

DATE	METHOD BY WHICH COMMENT WAS RECEIVED	COMMENT	RESPONSE
October 9, 2012	East Zone Residential Meeting (North) – Comment Card	I am new to the community. I am from California. This meeting is really new to me. I would like to hear more about Love Field Airport. Please keep me informed about your meetings. The new look for the Airport looks great.	Email sent with website information. (October 25, 2012)
October 9, 2012	East Zone Residential Meeting (North) – Comment Card	Thank you inviting us to the planning stage instead of after the fact.	Noted in meeting summary.
October 10, 2012	Email	When will the public hearing schedule be announced to the stakeholders that was unveiled at the T&E committee on Monday? Will the airport tenants remain on October 18?	Email sent with website information. (October 12, 2012)
October 10, 2012	Telephone	I would like more information on the plan and what I missed in last night's meeting. I would also like a copy of the meeting minutes."	Called and spoke to Mr. Weldon and obtained email address to send website link. (October 25, 2012)
October 10, 2012	Telephone	I would like more information on what was discussed at last night's meeting.	Sent email with website information and link to PowerPoint presentation. (October 25, 2012)

Table 6-4 (2 of 5): Public Comments Database

DATE	METHOD BY WHICH COMMENT WAS RECEIVED	COMMENT	RESPONSE
October 10, 2012	Email	I live very close to Love and I would appreciate any information you can send me that details your development and/or improvement plans for the airport and surrounding area. Thank you.	Email sent explaining that there are currently; no plans for any specific property. During this phase of the project, we are creating awareness of the Good Neighbor Plan initiative and obtaining the public's input on what types of development and improvement projects the stakeholders would like to see in their community. This information will be included within the Master Plan Update alternatives. The website link was provided. (October 25, 2012)
October 11, 2012	Email	I want to know what was discussed last night? Will the airport's plan involve using our property as part of the redevelopment plan? If so, when will this take place?	Email sent with the website location www.goodneighborplan.com, which contains information such as background, presentations, the current newsletter, and a list of upcoming meetings. During this phase of the project, we are creating awareness of the project and obtaining the public's input on what types of development and improvement projects they would like to see in their community. This information will be compiled, analyzed, and integrated into the Master Plan Update. There are currently no plans to purchase or acquire any property. (October 25, 2012)
October 11, 2012	Telephone	We at Kimley-Horn & Associates are interested in coming to your public meetings. I just wanted to get some more information about them and what the Good Neighbor Plan entails."	K Strategies Group called and gave additional information about the upcoming meetings. (October 11, 2012) Respondent later attended the October 23, 2012, South Zone Business meeting.

Table (3 of 5): Public Comments Database

DATE	METHOD BY WHICH COMMENT WAS RECEIVED	COMMENT	RESPONSE
October 16, 2012	East Zone Business Meeting – Comment Card	In what ways does Love Field support outreach efforts and if so, how can more partnerships be established in regards to this zone (east)?	Emailed response advising that the team is currently conducting public meetings and individual stakeholder meetings, and preparing newsletters and website information to get the word out about the initiative. The wants and needs derived from the stakeholder (residents and businesses) engagement will be included with the development of alternatives in the Master Plan Update. A further outreach effort will be held to identify the proposed plan. The website location (www.goodneighborplan.com) was included in the email. The website provides presentations, a copy of the current newsletter, and a list of upcoming meetings. (October 25, 2012)
October 16, 2012	East Zone Business Meeting – Comment Card	I appreciate this forum to express our needs and desires. I personally hope for better streetscaping and signage for businesses, like mine, that are currently hidden in the Airport.	The comment has been addressed in Section 6.2.1.1, Roadway Landscaping and Signage.
October 16, 2012	East Zone Residential Meeting (South) – Comment Card	Need better bus connections, i.e., Midway bus to go all the way down Midway Road to 635 and beyond as before (recently disconnected that route). Need more retail in area, i.e., another grocery store.	Although bus connections were not a high priority among stakeholders, the comment has been noted in the meeting summary. The comment regarding more retail has been addressed by nonaeronautical land uses provided in Section 5.3.2 Lemmon Avenue Redevelopment Alternatives
October 18, 2012	Telephone	Wants more information on meetings and meeting schedule.	Emailed website information and meeting schedule. (October 18, 2012)
October 18, 2012	Telephone	Will you all be buying the area? Some people were saying you were so I wanted to ask because I'm putting a lot of work into my house and I wanted to know before I continue.	Left voicemail stating there is no intent to purchase any property at this time and left website information. (October 25, 2012)

Table (4 of 5): Public Comments Database

DATE	METHOD BY WHICH COMMENT WAS RECEIVED	COMMENT	RESPONSE
October 22, 2012	Telephone	Requested more information on meetings and meeting schedule.	Called and obtained email address to send the website link. (October 25, 2012)
November 5, 2012	Website	I sit on the committee at Cathedral of Hope that is designing a "Urban Park" on the grounds of the church. We are wanting to take the surrounding land that is part of the campus and make it more environmental. Such as adding a garden that local schools may come to. With the intent of helping children learn about the environment. Also making a *(sic)* environment that is welcoming to all. Being a neighbor to Love Field we were wondering if your committee would be willing to help our committee in making this a reality! Please contact me I would Love to introduce you to our clergy who are heading this project. We are at the end of the runway, but we send blessings to each and every flight!!	Forwarded the City of Dallas Department of Aviation's contact information to discuss further. (November 12, 2012)
November 8, 2012	West Zone Residential Meeting – Comment Card	"For my peace of mind, please assure me the City of Dallas has no plans of obtaining Love Field West for any future expansions of Love Field Airport. Thank you."	Emailed advising there are no current plans to purchase the Love Field West property and that we are in the very early planning phases for the GNP. Advised that options and alternatives will be presented to the public in spring 2013.
November 8, 2012	West Zone Residential Meeting – Comment Card	"Excellent!!"	Noted in meeting summary.
November 8, 2012	West Zone Residential Meeting – Comment Card	"Interested in development on Burbank Street. Traffic congestion and 18-wheelers enter our property from loading docks."	Noted in meeting summary. The area defined is outside of the designated study area.
November 8, 2012	West Zone Residential Meeting – Comment Card	"No apartments near our neighborhood on the west side of the Airport."	Noted in meeting summary.

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Table 6-4 (5 of 5): Public Comments Database

DATE	METHOD BY WHICH COMMENT WAS RECEIVED	COMMENT	RESPONSE
November 8, 2012	West Zone Residential Meeting – Comment Card	"Overall, good plan. It will be an improvement over what we have now. People will get used to it. Most people will love it!"	Noted in meeting summary.
November 8, 2012	West Zone Residential Meeting – Comment Card	"Safety is a high priority both in neighborhood and along Denton Drive. Another is neighborhood access to the Burbank DART Station which has no parking features."	Safety addressed in Master Plan Update Section 6.2.1. Aesthetics and Safety. DART access via pedestrian connections addressed in Master Plan Update Section 6.2.2, Pedestrian Connections.
November 13, 2012	North Zone Residential Meeting – Comment Card	"Exert your influence with other City departments to promote positive retail. Right now, we are "scary" on NW Highway. Bachman Recreation Center is also an asset to utilize and promote"	Noted in meeting summary.
November 13, 2012	North Zone Residential Meeting – Comment Card	"Pedestrian access everywhere possible." "DART: Shuttle to Love Field"	Pedestrian access addressed in Master Plan Update Section 6.2.2, Pedestrian Connections. DART's Bus Route 524 operates between Dallas Love Field and Inwood/Love Field Station.
November 15, 2012	North Zone Business Meeting – Comment Card	"Great presentation. Looking forward to positive action."	Noted in meeting summary.
November 15, 2012	North Zone Business Meeting – Comment Card	"Very happy to be at the meeting and hear about the plans."	Noted in meeting summary.
November 26, 2012	Website	"Just wanted to stay in touch, to keep informed of progress in our community. Thank you for forming the Good Neighbor Plan! I'm anxious to learn of more improvements in the area."	Emailed informing that we will add contact information to our stakeholder database and that the second phase of the project should begin around spring 2013. Advised to visit the GNP website for additional information.

SOURCE: K Strategies Group, December 2012.
PREPARED BY: Ricondo & Associates, Inc., October 2014.

6.1.3 CONCLUSION

The Good Neighbor Plan initiative meetings were completed in November 2012. After all comments from the public meetings, comment cards, emails, and telephone calls were compiled, trends in stakeholder priorities became apparent, with the neighborhoods focusing on consistent landscaping and signage, increased pedestrian connections and safety, and the creation of a more visually appealing buffer around the Airport with landscaping and new fencing.

Alternatives were developed to help achieve the desired results. The alternatives were presented during the second set of public outreach events for the Master Plan Update in July 2014, as described in Section 6.2 below.

6.2 Good Neighbor Plan – Master Plan Update Alternatives Development

Master Plan Update alternatives were developed that would help address stakeholder concerns through improvements around the perimeter of the Airport. Eventual implementation will need to be coordinated through City agencies. The alternatives suggested include improvements related to aesthetics and safety, which would be implemented along roadways, as well as in Airport buffer areas, and pedestrian connections along primary pedestrian corridors, which would create safe, aesthetically pleasing routes between destinations surrounding the Airport and neighboring communities.

6.2.1 AESTHETICS AND SAFETY

In most of the 10 meetings held in 2012, aesthetics and safety were raised as potential areas for improvement. These topics were addressed throughout concept development for the Master Plan Update, as described below.

6.2.1.1 Roadway Landscaping and Signage

Aesthetics around the Airport would be improved through landscaping along the roadway corridors surrounding the Airport. Street trees located in the medians and parkway buffers between the roadway and sidewalk would not only beautify areas surrounding the Airport, but provide a needed safety buffer for residential neighborhoods and pedestrian routes. **Exhibits 6-4** and **6-5** provide conceptual renderings of Lemmon Avenue and Airdrome Drive, respectively, incorporating aesthetic and safety improvements. The Lemmon Avenue corridor improvements would include trees and landscaping along the median, landscaped parkway buffers, ornamental signage for businesses, and consistent wayfinding signage for the Airport. Safety enhancements would include the parkway buffers, as well as high visibility pedestrian crossings and sidewalks, as discussed in Section 6.2.1.2. Lighting along pedestrian paths would also provide enhanced nighttime safety in these areas. Airdrome Drive and Mockingbird Lane improvements would include parkway buffers with landscaping and connected sidewalks and crosswalks. Airdrome Drive and Mockingbird Lane improvements would include enhanced landscaping and roadway buffers.

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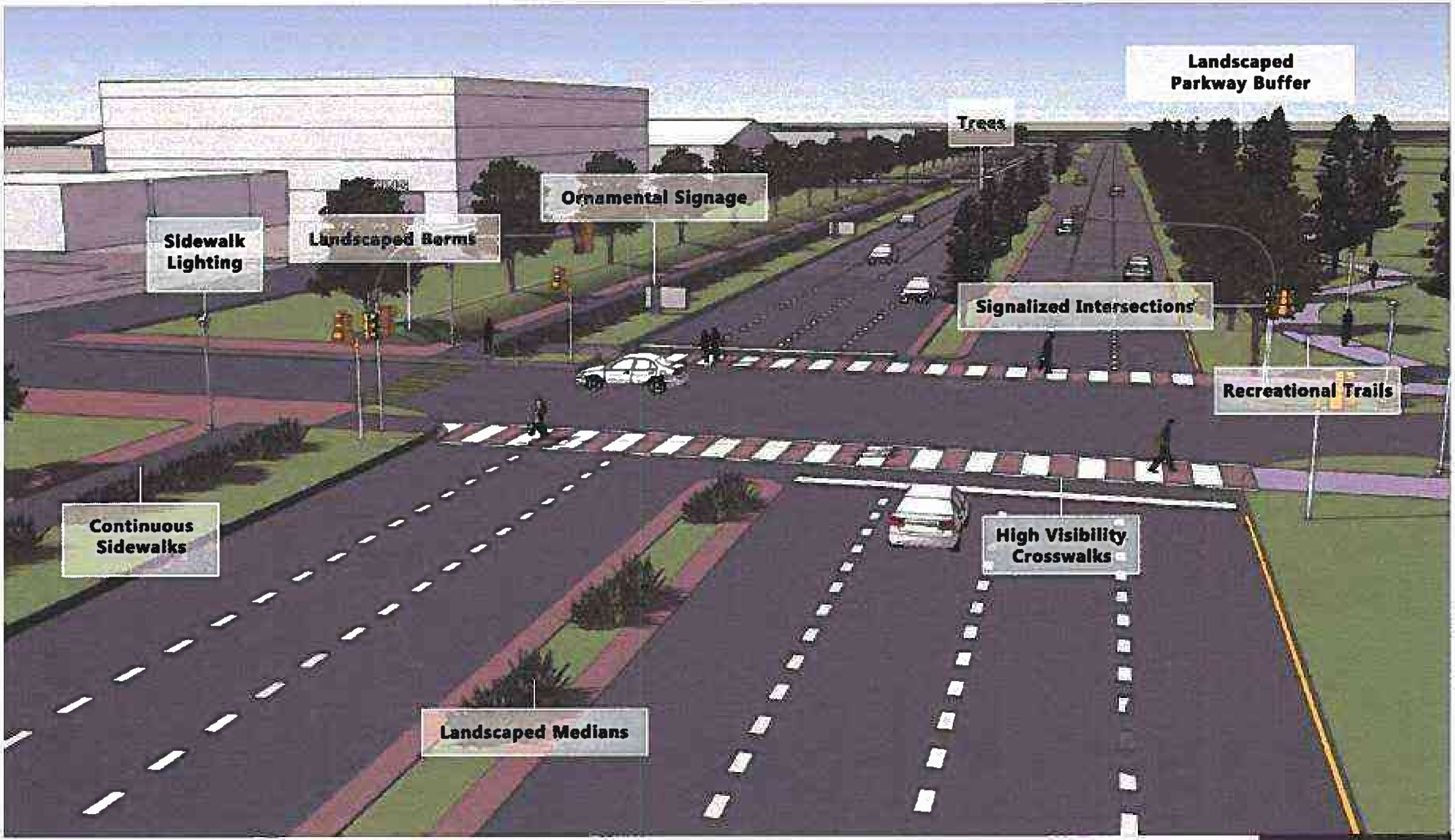

SOURCE: Ricondo & Associates, Inc., September 2014
PREPARED BY: Ricondo & Associates, Inc., November 2014

EXHIBIT 6-4

Lemmon Avenue Conceptual Improvements

NORTH
0
Not to Scale

Drawing: Z:\Love Field\Master Plan Inventory\7.4 Public Outreach\CAD\Conceptual Renderings_20140910.dwg Layout: Ex 6-4 Lemmon Plotted: May 14, 2015, 02:24PM

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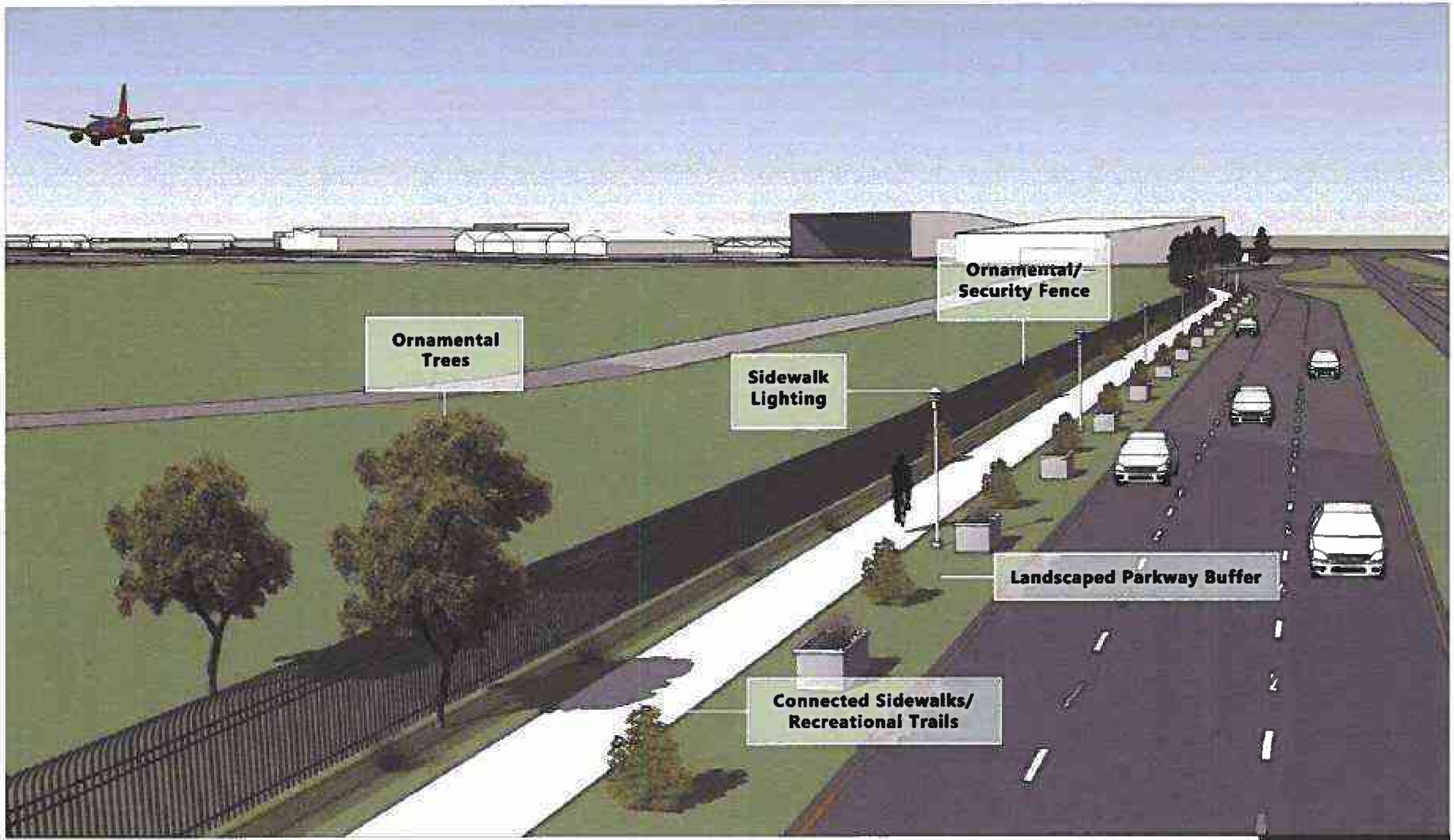

SOURCE: Ricondo & Associates, Inc., September 2014
PREPARED BY: Ricondo & Associates, Inc., November 2014

EXHIBIT 6-5

Airdrome Drive Conceptual Improvements

NORTH 0 Not to Scale

Drawing: Z:\Love Field\Master Plan inventory\7.4 Public Outreach\CAD\Conceptual Renderings_20140910.dwg Layout: Ex 6-5 Airdrome Plotted: May 14, 2015, 02:26PM

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6.2.1.2 Airport Landscaping and Fencing

In addition to roadway improvements, landscaping and fencing would be improved in certain areas along the Airport property boundary. Along Airdrome Drive and Mockingbird Lane, Airport improvements would include landscaping enhancements and improved security fencing that would also be an aesthetic upgrade. Landscaping improvements would be considered where allowable under applicable Airport safety regulations and guidelines. Exhibit 6-5 illustrates Airport landscaping and fencing improvements along Airdrome Drive.

6.2.2 PEDESTRIAN CONNECTIONS

In addition to aesthetic improvements to roadways, pedestrian connections were a priority during Master Plan Update alternatives development. Pedestrian connections in areas surrounding the Airport were a chief concern among stakeholders during the public outreach events. Pedestrian connections in each of the stakeholder zones surrounding the Airport can also aid in creating a safer environment for surrounding communities. The land uses in these areas are largely residential and commercial and these areas have the greatest need for safe, convenient passage for residents. Concepts for creating and improving pedestrian connections include:

- Continuous sidewalks
- Connected recreational paths
- High-visibility crosswalks
- Signalized intersections
- Sidewalk lighting
- Roadway buffers

Pedestrian connections would be implemented to create a network of safe passages for residents and visitors that stretches from Bachman Lake recreational trails in the northern stakeholder zone, along Lemmon Avenue to Airdrome Drive, then to Mockingbird Lane, and eventually connecting with the Love Field entrance along Cedar Springs Road/Herb Kelleher Way. Along the western edge of the Airport, pedestrian connection concepts include continuous sidewalks on Denton Drive that would link Mockingbird Lane sidewalks to the south with the Bachman Lake trails to the north. The network of trails and sidewalks would allow pedestrian and recreational access from surrounding neighborhoods to Bachman Lake Park, Midway Manor Park, the Frontiers of Flight Museum, Dallas Love Field and Airport FBOs and businesses, as well as convenient access to the commercial areas along Lemmon Avenue and Mockingbird Lane. To the west, pedestrian connections along Denton Drive would provide access from Mockingbird Lane and Bachman Lake to residential neighborhoods west of the Airport, as well as the DART Burbank Station for the green and orange lines and businesses along Denton Drive.

Along Lemmon Avenue, intersections were prioritized for safe pedestrian connections. **Exhibit 6-6** illustrates the intersections along Lemmon Avenue at Shorecrest Drive, Lovers Lane, and University Boulevard that are prioritized for pedestrian connections. This exhibit also lists conceptual improvements for these intersections to increase pedestrian safety and connect with surrounding pedestrian routes. The conceptual improvements include a recreational path that would connect with existing Bachman Lake recreational trails, travel southeast along the northeastern side of Lemmon Avenue to Lovers Lane, where the path would cross Lemmon Avenue and connect with a recreational path and sidewalk that would extend around the Airport to the Airport entrance at Mockingbird Lane and Cedar Springs Road/Herb Kelleher Way.

6.3 Master Plan Update Public Outreach Event #2

On July 10, 2014, two public open houses related to the Master Plan Update were held to seek input for the future development of the Airport. The Master Plan Update process, demand/capacity findings, conceptual alternatives, and future steps were displayed for the attendees. The information presented was made available at www.goodneighborplan.com, which can also be accessed through www.dallas-lovefield.com for those unable to attend the open houses.

The open houses were held at the Frontiers of Flight Museum on Airport property. The first open house was held between 1 p.m. and 3 p.m. and the second open house was held between 5 p.m. and 7 p.m. In total, 91 attendees added their names to the sign-in sheet; 41 attendees signed in for the first open house and 50 attendees signed in for the second open house. The sign-in sheets are on record with the City of Dallas Department of Aviation.

The City representatives present at both open houses included the following:

- Mark Duebner, Director of Aviation (City of Dallas)
- Lana Furra, Assistant Director of Aviation (City of Dallas)
- Michelle Gonzalez, Senior Budget Analyst (City of Dallas)
- Robin Dickens, Senior Program Manager (City of Dallas)
- Rozalind Dickerson, Tenant Liaison (City of Dallas)
- Master Plan Update Consultant Team (10 members)

Shorecrest Drive, Lovers Lane, & University Boulevard

Development Options:

- Traffic Signal
- High Visibility Crosswalk
- Flashing Lights
- Bridge
- Tunnel

SOURCE: Ricondo & Associates, Inc., DAL Airport Layout Plan, September 2014
PREPARED BY: Ricondo & Associates, Inc., November 2014

Lemmon Avenue Prioritized Pedestrian Intersections

Airport Master Plan Update
Public Outreach

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6.3.1 OUTREACH METHODS

Several forms of notification were used to inform the public of the Master Plan Update open houses, including information on the time, date and location of the open houses. These included:

- Emailed flyers to 224 stakeholders on June 12, 2014, and again on July 9, 2014
- Printed flyers in English and Spanish delivered to eight local recreation centers and libraries for distribution on June 13, 2014
- Advertisements in English and Spanish published in the *Dallas Morning News* on Sunday, June 15, 2014
- Door hangers distributed to 10,000 residents around Dallas Love Field on June 26, 2014

6.3.2 OPEN HOUSE FORMAT

No formal presentation was made at the open houses. Display boards were placed along the main corridor on the second floor of the Frontiers of Flight Museum providing information to attendees about the results, planning activities, and requirements for future development of the Master Plan Update. City representatives were available to respond to questions and comments throughout the open houses.

Handouts of the information included on the display boards were made available in both English and Spanish. The handout is provided in **Appendix N**.

6.3.3 COMMENTS RECEIVED

Comment forms were also distributed to open house attendees for immediate response or for attendees to take home and mail back. Attendees were informed that comments could also be submitted by email to Lovefieldmasterplan@Dallascityhall.com or on the website www.dallas-lovefield.com.

Four comment forms focusing on the three topics listed below were returned at the end of the open houses. No other comments were received within the 30-day comment period. **Table 6-5** identifies a summary of the three comments and their responses.

Table 6-5: Comments Received at Master Plan Update Public Outreach Event #2

COMMENT	RESPONSE
Noise from engine maintenance operators heard along Lemmon Avenue	Telephone call to follow up on concern. No action needed in Master Plan Update. Commenter added to the Love Field Environmental Advisory Committee (LFEAC) email list.
Purpose of military airplane taking off from Love Field several times a day every day	Telephone call to explain aircraft type and use. No action needed in Master Plan Update.
Request for information on noise issues south of Love Field	Commenters were added to the LFEAC email list. No action needed in Master Plan Update.

SOURCES: City of Dallas Department of Aviation, Comment Cards received at the Open Houses on July 10 2014; Ricondo & Associates, Inc., August 2014.
PREPARED BY: Ricondo & Associates, Inc., October 2014.

6.4 Master Plan Update Public Outreach Event #3

On March 19, 2015, two public open houses were held to discuss the DAL Master Plan Update and gather comments from the community. The Master Plan Update process, demand/capacity findings, preferred alternatives, and financial plans were displayed for attendees. The information presented was made available at www.goodneighborplan.com, which can also be accessed through www.dallas-lovefield.com for those unable to attend the open houses.

The open houses were held at the Frontiers of Flight Museum on Airport property. The first open house was held between 1 p.m. and 3 p.m. and the second open house was held between 5 p.m. and 7:30 p.m. In total, 16 attendees added their names to the sign-in sheet; 15 attendees signed in for the first open house and 1 attendee signed in for the second open house. The sign-in sheets are on record with the City of Dallas Department of Aviation.

The City representatives present at the open houses included the following:

- Mark Duebner, Director of Aviation (City of Dallas)
- Lana Furra, Assistant Director of Aviation (City of Dallas)
- Robin Dickens, Senior Program Manager (City of Dallas)
- Rozalind Dickerson, Tenant Liaison (City of Dallas)
- Master Plan Update Consultant Team (9 members)

6.4.1 OUTREACH METHODS

Several forms of notification were used to inform the public of the Master Plan Update open houses, including information on the time, date, and location of the open houses. These included:

- Advertisements in English and Spanish published in the *Dallas Morning News* on Wednesday, February 18, 2015
- Advertisements in English and Spanish on DallasNews.com from February 18 through 24, 2015
- Advertisements in Spanish in *Al Dia* on February 21, 2015, and again between March 11 and March 14, 2015
- Open house flyers and notices sent to Dallas Love Field tenants via email on March 6, 2015

6.4.2 OPEN HOUSE FORMAT

No formal presentation was made at the open houses. Display boards were placed along the main corridor on the second floor of the Frontiers of Flight Museum, providing information to attendees about the results, planning activities, and requirements for future development of the Master Plan Update. City representatives were available to respond to questions and comments throughout the open houses.

Handouts of the information included on the display boards were made available. The handout is provided in **Appendix O.** The display boards were also offered to attendees in digital format via email.

6.4.3 COMMENTS RECEIVED

Comment forms were also distributed to open house attendees for immediate response or for attendees to take home and mail back. Attendees were informed that comments could also be submitted by email to Lovefieldmasterplan@Dallascityhall.com, at the website www.Dallas-LoveField.com, or by mail using the pre-addressed comment cards.

One comment form focusing on the topics listed below was returned at the end of the open house. No other comments were received within the 30-day comment period. **Table 6-6** identifies the comments received and the response.

Table 6-6: Comments Received at Master Plan Update Public Outreach Event #3

COMMENT	RESPONSE
The hold short line at Runway 13L on Taxiway Alpha should be relocated and split from the ILS hold line.	The hold lines have been evaluated and it appears that a new hold line has been recently painted. The new marking should remove the confusion and fix the issue described.
If the Runway 31R ILS/glide slope shack is moved from the closed portion of Taxiway Mike, consider the effect on the variance that the arrivals will receive since the location is within 1,000 feet of the holding area for Runway 31R on Taxiway B.	If the glideslope and RVR facilities are relocated, the ILS hold bars will be relocated in accordance with the critical areas to avoid signal interference.

SOURCES: City of Dallas Department of Aviation, Comment Cards received at the Open Houses on March 19, 2015; Ricondo & Associates, Inc., April 2015.
PREPARED BY: Ricondo & Associates, Inc., October 2014.

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7. Land Use

7.1 Land Uses on Airport and in the Vicinity

Existing land use plans and policies that affect development in the vicinity of the Airport are summarized in this section. Land use plans that apply to the area surrounding the Airport include:

- *2006 ForwardDallas! Comprehensive Plan*, City of Dallas, 2009
- *The Stemmons Corridor – Southwestern Medical District Area Plan*, City of Dallas, 2010
- *The Maple-Mockingbird Project Plan and Reinvestment Zone Financing Plan*, City of Dallas, 2009
- City of Dallas Community and Redevelopment Plans

7.1.1 ON-AIRPORT LAND USES

The Airport is located on 1,256 acres of land approximately 4 miles north of the Dallas Central Business District and is the only commercial service airport within Dallas City limits. Airfield facilities consist of two parallel runways and one crosswind runway, along with associated taxiways and support facilities, including the ATCT, ARFF station, and GA facilities. Specific Airport facilities and areas include:

- **Parallel Runway 13R-31L**: (8,800 feet long) and associated taxiway system
- **Parallel Runway 13L-31R**: (7,752 feet long) and associated taxiway system
- **Crosswind Runway 18-36**: (6,147 feet long) and associated taxiway system
- **Main Terminal Area:** The area between Runways 13L-31R and 13R-31L is primarily occupied by the Airport terminal building, aircraft gates, and aircraft parking areas, along with associated commercial aviation facilities. Two large parking garages are adjacent to the terminal building at the center of the Herb Kelleher Way terminal loop.
- **Southeastern Central Area:** The area southeast of the Central Terminal Area between Runways 13L-31R and 13R-31L is occupied by business and FBO facilities for GA aircraft and commercial rental car facilities.
- **Northwestern Central Area:** The area northwest of the Central Terminal Area between parallel Runways 13L-31R and 13R-31L is occupied by business and industrial land uses.
- **Northeastern Side:** The area northeast of Runway 13L-31R is primarily occupied by business and FBO facilities for GA aircraft located along Lemmon Avenue.

- **South/Southwestern Side:** The area southwest of Runway 13R-31L is occupied by Southwest Airlines' corporate headquarters and aviation and training facilities, as well as other business and FBO facilities for GA aircraft. DART Green and Orange Line light rail routes and the DART Burbank Station are located on the south side along Denton Drive, outside the Airport property boundary.

7.1.2 SURROUNDING LAND USES AND ZONING

Land in the vicinity of the Airport is densely developed, as the Airport is located within 4 miles of downtown Dallas.

7.1.2.1 2005 Land Use

Exhibit 7-1 illustrates 2005 land use in the Airport vicinity, as obtained from the NCTCOG Geographic Information System (GIS) online database.[1] At the time of the Master Plan Update initiated the 2005 Land Use map was the most current. Land uses shown on the exhibit generally mirror existing (2013) land uses in the areas surrounding the Airport, as described below.

7.1.2.2 2013 (Existing) Land Use

Exhibit 7-2 illustrates 2013 (existing) land uses in the Airport vicinity, as obtained from the City of Dallas, Tax Parcel coverage online database.[2] Generally, Exhibit 7-2 shows land uses continuing from 2005 land uses. Particularly, residential land uses continue in areas throughout the Airport vicinity. Some single-family residential land uses northeast and southwest of the Airport are now shown as multifamily residential uses. In comparison with the 2005 land use, the existing (2013) land use in the vicinity of the Airport demonstrates increased commercial uses, particularly to the south, east, and northwest, interspersed among industrial uses. Although Exhibits 7-1 and 7-2 show that selected industrial parcels may have changed to commercial uses between 2005 and 2013, some of the differences may be attributed to the different land use designations between the NCTCOG and City of Dallas data sources. Additionally, areas such as Bachman Lake Park and open water to the east were classified as park space/open space in 2005, and are classified as institutional in the 2013 City of Dallas land use data.

Northeast of the Airport

The predominant land use northeast of the Airport consists of single-family residential neighborhoods along with some commercial parcels. Greenway Parks, Bluffview, and Bachman Hollow are the three residential neighborhoods immediately adjacent to the Airport's northeastern boundary. Commercial uses northeast of the Airport consist of automobile dealerships, public storage spaces, and various other small commercial developments.

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[1] North Central Texas Council of Governments, *GIS Clearinghouse*, June 2010.

[2] City of Dallas, GIS Services, *2013 Certified Tax Parcel Coverage*, http://gis.dallascityhall.com/EnterpriseGIS (accessed August 2014).

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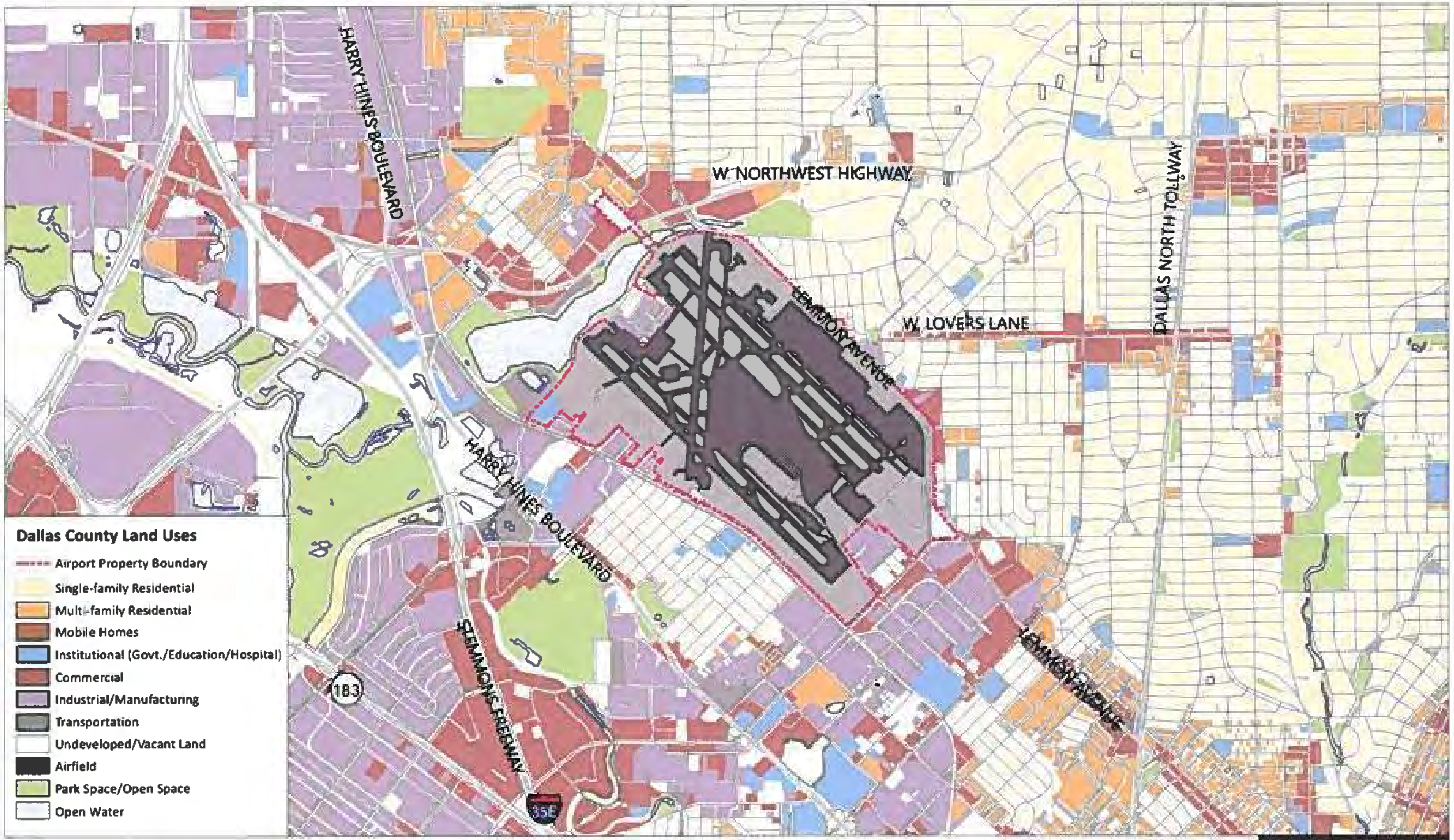

SOURCE: North Central Texas Council of Governments, Geographic Information System Clearinghouse, June 2010.
PREPARED BY: Ricondo & Associates, Inc., November 2014

EXHIBIT 7-1

2005 Land Use In the Airport Vicinity

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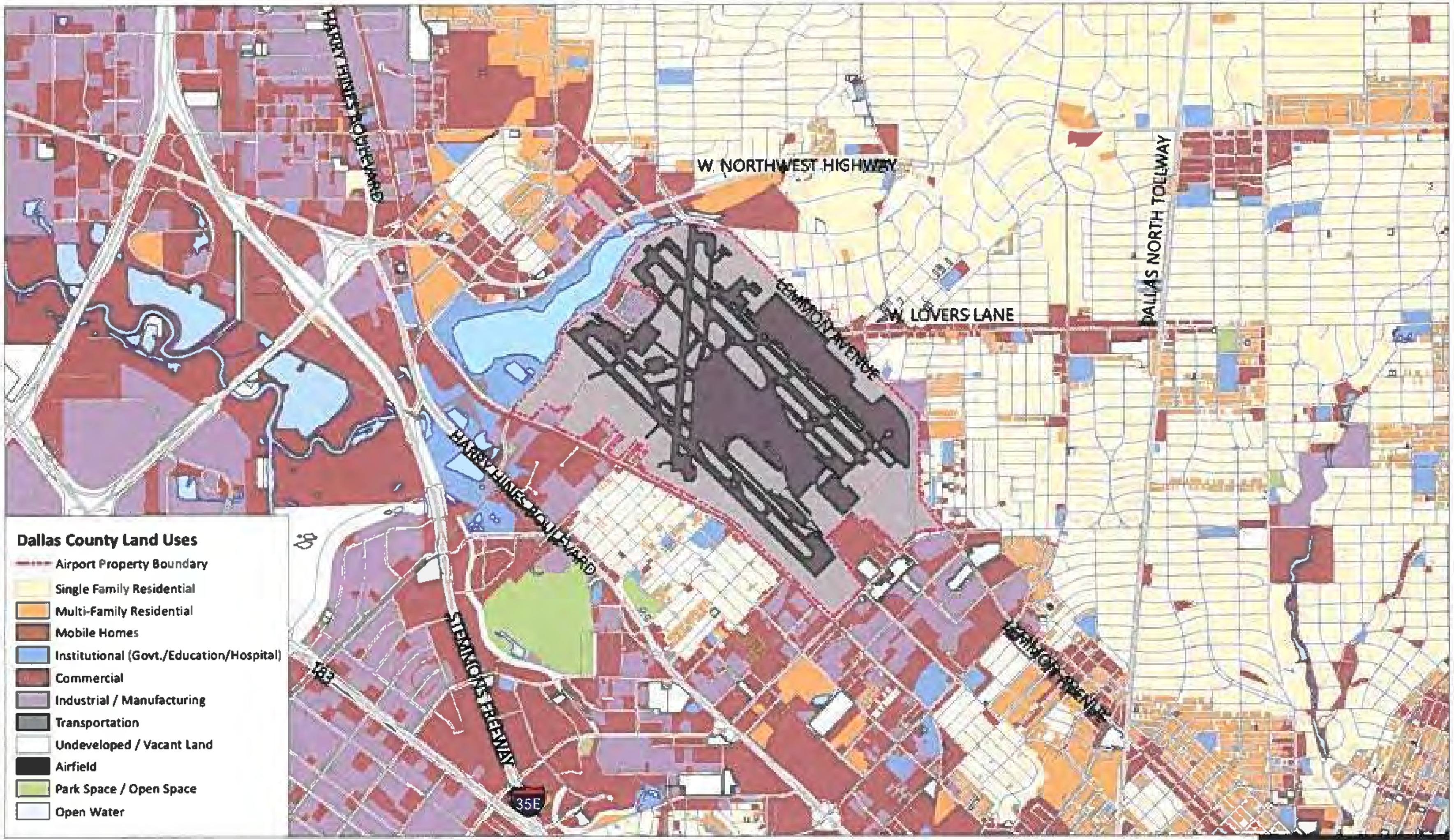

EXHIBIT 7-2

SOURCES: North Central Texas Council of Governments, GIS Clearinghouse, June 2010; City of Dallas, Geographic Information Services, 2013 Certified Tax Parcel Coverage, accessed online http://gis.dallascityhall.com/EnterpriseGIS, accessed August 2014.
PREPARED BY: Ricondo & Associates, Inc., November 2014

2013 (Existing) Land Use In the Airport Vicinity

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Northwest of the Airport

Bachman Lake and Bachman Lake Park are the predominant land uses immediately northwest of the Airport. A small area to the northwest is developed in industrial (mostly aviation-related) and single-family residential uses. Beyond Bachman Lake is a mix of land uses, including a commercial corridor, multifamily and single-family residential developments, and a small area of industrial development.

Southwest of the Airport

The area southwest of the Airport is mostly developed in single-family residential uses, with commercial and industrial areas surrounding the residential development. A small area in the central portion of the residential development is designated as institutional use. These institutional-use parcels are home to Our Lady of Perpetual Help Catholic (elementary) School and Obadiah Knight Elementary School. Beyond the residential and institutional areas is a mix of public park space, a commercial corridor, and industrial space along Harry Hines Boulevard.

South of the Airport

Portions of the City of Dallas *Vision and Policy Plan: Stemmons Corridor – Southwestern Medical District Area Plan* (the Stemmons Corridor Plan) and the *Maple-Mockingbird Project Plan & Reinvestment Zone Financing Plan* (the Maple-Mockingbird Plan) include areas along Mockingbird Lane immediately adjacent to the Airport. Existing land use in these areas consists of industrial and commercial uses adjacent to the Airport, with multifamily residential, commercial, and institutional uses beyond the industrial district. The Southwestern Medical Center, a large University of Texas medical campus, is located approximately 0.5 mile south-southwest of the Airport. The Stemmons Corridor Plan maintains a mix of uses in this district and plans to enhance access to public park space and public transportation.

Southeast of the Airport

Land southeast of the Airport is dominated by industrial uses with a mix of commercial developments along Mockingbird Lane and Lemmon Avenue. Beyond the industrial and commercial developments are several parcels developed in institutional land uses, including the Thomas J. Rusk Middle School, Weichsel Park, and Maple Lawn Elementary School. These institutional land uses are surrounded by a variety of residential and commercial uses, the DART Orange and Green Lines, and the DART Inwood/Love Field Station at Inwood Road.

East of the Airport

East of the Airport along Lemmon Avenue is a small corridor of commercial land uses with predominantly residential uses beyond. The K. B. Polk Center for Academically Talented and Gifted students and a public park are also located in this area, designated as institutional land uses.

7.1.2.3 Existing Zoning

City of Dallas zoning is planned and mapped by the City's Department of Sustainable Development and Construction. The Airport is currently zoned as Industrial Research. Generally, zoning in the immediate areas surrounding the Airport tends to be Multi-family and Single-family Residential or Industrial, which is consistent with the current land use in these areas. Several areas in the immediate vicinity of the Airport are zoned as Planned Development District. Specific stipulations and requirements particular to each district pertain to this zoning designation. These specific designations vary in development intensity, mix of uses, and types of uses allowed.

A discussion of the compatibility of the Airport with sensitive land uses in areas that have the potential to be affected by aircraft noise is provided in Section 9.2.2 of this Master Plan Update. The sensitive land uses within 1 mile of the Airport property boundary, specifically schools, religious institutions, and healthcare facilities, are listed in that section.

7.2 Future Land Use

Future on-Airport land use was evaluated as part of the Master Plan Update preferred alternative. The preferred alternative would result in negligible changes to land use and the communities surrounding the Airport. The following projects associated with the preferred alternative would affect land use:

- Roadway Improvements
- Land Use/FBO Redevelopment along Lemmon Avenue

Land use/FBO redevelopment along Lemmon Avenue would be confined to Airport property and would be anticipated to minimally affect the surrounding communities. However, some roadway improvements would occur beyond Airport property and have minor impacts on the surrounding community. **Exhibit 7-3** illustrates areas where changes in land use would occur at the Airport and in the vicinity as a result of implementing the Master Plan Update preferred alternative.

7.2.1 ROADWAY IMPROVEMENTS

Primary roadway improvements would be implemented along Mockingbird Lane between Airdrome Drive and Denton Drive. Improvements are recommended for several roadways, including Mockingbird Lane, Airdrome Drive, Cedar Springs Road/Herb Kelleher Way, and Lemmon Avenue, to accommodate forecast Airport activity. The roadway improvements along Mockingbird Lane would result in four full continuous lanes from Airdrome Drive to Cedar Springs Road/Herb Kelleher Way, northbound and southbound lanes being tunneled below grade for through traffic, and an additional left turn lane at Denton Drive. Simulated traffic patterns for future conditions under the preferred alternative demonstrate improvement at the two intersections along Mockingbird Lane that exhibited poor-to-failing future traffic conditions without the recommended improvements (see Section 5.2.2 for the traffic analysis and Section 9.4.2 for additional traffic-related socioeconomic impact analysis).

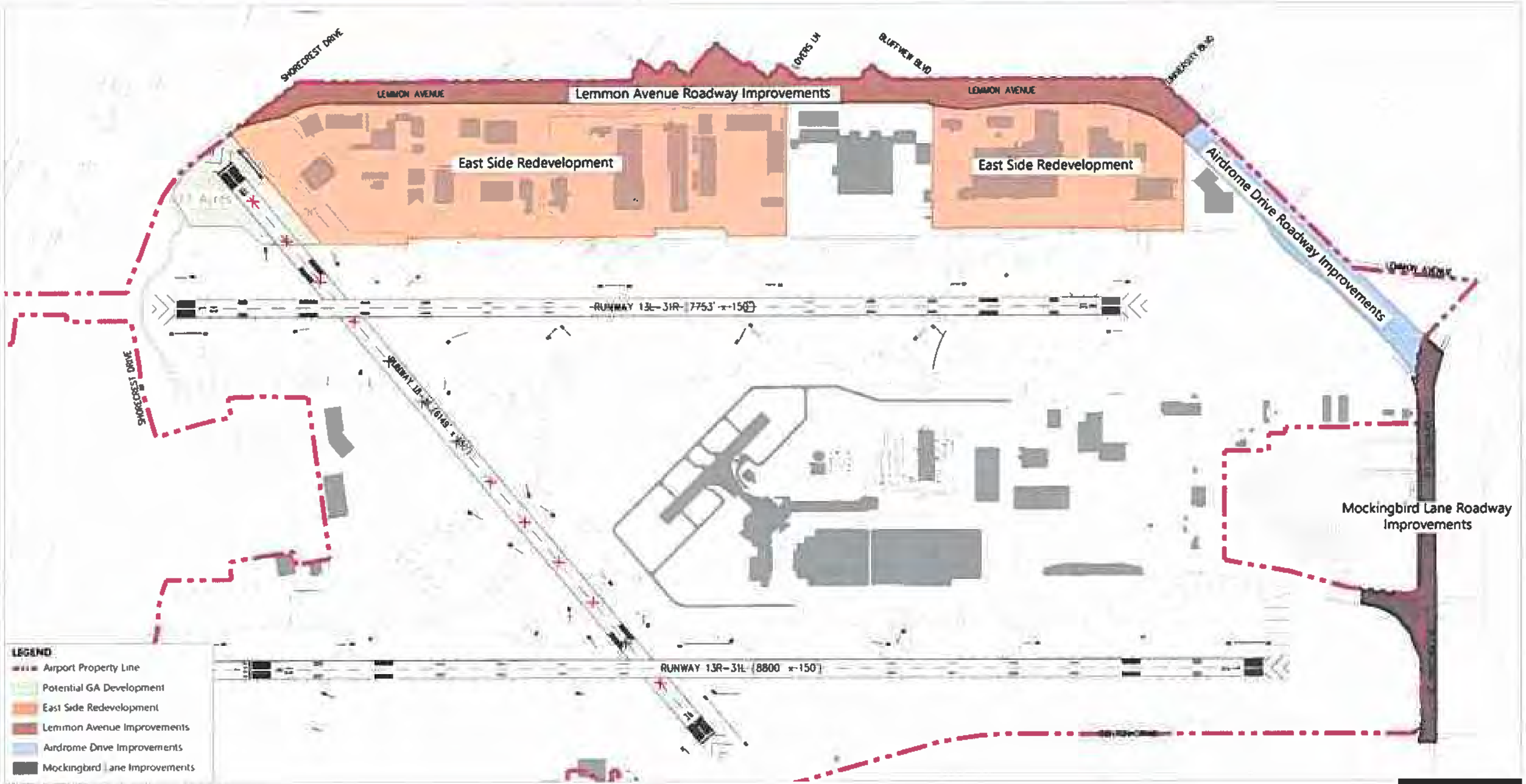

EXHIBIT 7-3

Preferred Alternative Land Use in the Airport Vicinity

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The preferred alternative would not disrupt the larger neighborhood developments around the Airport. The roadway improvements on Mockingbird Lane, Airdrome Drive, and Cedar Springs Road/Herb Kelleher Way would occur along corridors that are primarily commercial/industrial in use. The preferred alternative roadway improvements would result in temporary construction-related noise and traffic. The roadway improvements would alleviate traffic congestion in surrounding communities and improve the roadway aesthetics. Minor roadway construction along Lemmon Avenue and Airdrome Drive would occur on Airport property, adjacent to residential uses, but would be temporary. Additionally, these roadway improvements would provide aesthetic improvements and provide a buffer between the Airport and residential areas along the northeast side of the Airport. Aesthetic/buffer improvements considered under the preferred alternative include landscaped berms, continuous sidewalks, ornamental signage, landscaped parkways and medians, street trees, high visibility sidewalks, ornamental/security fencing, and recreation trails. No residences or businesses would be removed or relocated as a result of the Master Plan Update improvements. No residents would be displaced as a result of the Master Plan Update improvements.

7.2.2 LAND USE/FIXED BASE OPERATOR REDEVELOPMENT

Airport redevelopment was considered under two alternatives: Runway 18-36 remaining operational and Runway 18-36 decommissioned. In developing the Master Plan Update preferred alternative, the permanent decommissioning and closure of Runway 18-36 was assumed.[3] Under this assumption, the property immediately north of Taxiway N and east of Taxiway A would become available for future GA facility development and 13 additional acres of Airport property would become available for future facility development. Additionally, upon reconfiguration of the midfield taxiway system to include a dual parallel crossfield taxiway, an additional 15 acres would become available for future facility development. As a result of landside access restrictions to this 15-acre parcel, however, the City has elected to preserve the parcel for future terminal support functions. The preferred alternative would result in development of the northernmost corner of the Airport.

As no other development space is available at the Airport and the existing GA facilities along Lemmon Avenue are reaching the ends of their useful lives, the preferred alternative would include systematically replacing all GA facilities along Taxiway A. Specific analysis and descriptions of the Master Plan Update alternatives and the preferred alternative are provided in Section 5.3.

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[3] In accordance with the February 2015 FONSI issued by the FAA on the Environmental Assessment of the Runway 18-36 decommissioning

7.2.2.1 Runway 18-36 Area Development

Under the preferred alternative, GA facility development would occur in the area immediately north of Taxiway N and east of Taxiway A, with aircraft parking along the north side of the ramp along Shorecrest Drive. Implementation of the preferred alternative would convert these 13 acres from runway and RSA space to GA facilities. Landside access would be provided from the intersection of Shorecrest Drive and Webb Chapel Road, with access to the easternmost development provided from Shorecrest Drive. Dedicated parking areas for all hangars would be provided along their respective entrance roads. Blast protection would be necessary between the ramp and Taxiway A entrance roads, with additional protection provided between the taxilane and the Business Jet Center hangar.

7.2.2.2 Lemmon Avenue Redevelopment

Lemmon Avenue redevelopment under the preferred alternative would result in a consolidated hangar area in parallel and U-shaped arrangements between Lemmon Avenue and Taxiway A. This arrangement would create efficiencies for aircraft movements and parking on the apron. Additionally, the recommended hangar configurations would maximize ramp space while providing dedicated aircraft parking areas in front of tenant hangars. In addition to the hangars, two terminal buildings are planned along the east side of the ramp, accessible from Lemmon Avenue. Landside access would be provided by connections to Lemmon Avenue to the east and from George Coker Circle. Each hangar is planned to have a dedicated parking area, accessible from the access roads along the back of each hangar. While this area would be redeveloped, the primary land uses would remain consistent with existing uses.

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8. Funding Plan

This section presents a potential funding plan for implementing the CIP projects recommended in the Master Plan Update, along with an assessment of the ability of the Airport sponsor (i.e., the City) to fund the recommended projects associated with the preferred alternatives. These projects are designed to maintain the Airport and provide the required improvements and facilities from FY 2015 through FY 2024.

The actual implementation schedule for the various construction projects recommended in the Master Plan Update will be influenced, in part, by demand, funding availability, priorities of the City, and other relevant factors, and may not correspond precisely to the schedule described in this section. For purposes of the illustrative financial analysis, a specific implementation schedule was assumed. However, it should be noted that this schedule and the resulting financial analysis are intended only to demonstrate financial feasibility. Actual funding strategies for each project will be determined nearer to the time of project implementation.

In general, the financial analysis for the Master Plan Update was conducted as follows:

- The Airport's existing financial structure was examined and applicable financial information obtained.
- A list of proposed capital development projects was compiled, including estimated project construction costs and construction start and end dates.
- Potential funding sources were identified and the potential availability of funding from those sources was analyzed, as applicable.
- Debt service was estimated for projects requiring the use of future bond proceeds.
- Amortization was estimated for Airport cash expenditures.
- Projections of operation and maintenance (O&M) expenses and nonairline revenues were developed.
- Airline revenues and rates and charges were projected to enable an assessment of the effect of the potential funding plan on key financial metrics, such as airline rates and charges, cost per enplaned passenger (CPE), and debt service coverage.

8.1 Airport Financial Structure

The City of Dallas owns and operates the Airport through its Department of Aviation. In addition, the City owns Dallas Executive Airport and the Dallas Heliport. The City also manages numerous tenant facilities at DAL, provides a safe and efficient airport for the operation of aircraft, promotes the development of Airport property for aviation and related commercial services, obtains and administers FAA grants, and ensures the compatibility of proposed developments within and around the Airport with federal, State, and local standards. The City/Airport operates on a fiscal year basis, with years ending September 30. Within the Department of Aviation, the Finance and Administration Division is responsible for finance, budget, and human resources functions, including the development and administration of budgets and the collection of revenues, among other tasks. The Department of Aviation manages and operates the Airport Revenue Fund, an enterprise fund of the City. The Airport Revenue Fund is used to account for services provided to the general public using the Dallas Airport System, and its costs are recovered primarily through user rentals, fees, and charges (e.g., landing fees, building and ground rentals, parking fees, concession fees).

The Airport Use and Lease Agreement (the Airline Agreement) dictates the business and operational relationship between the City and the airlines that execute the Airline Agreement (the Signatory Airlines) and defines the terms under which those airlines operate at and use the Airport. The City and Southwest Airlines (the busiest airline serving the Airport in terms of numbers of enplaned passengers and aircraft operations) executed an amended agreement on February 13, 2009, effective retroactively as of October 1, 2008. The term of Southwest's Amended Agreement extends through September 30, 2028.

For purposes of calculating airline rates and charges, Airport-related revenues and costs are allocated to various cost centers, defined in the Airline Agreement, as follows:

- **Administration**: The Administration cost center includes administrative and overhead costs of operating, maintaining, and administering the Airport not directly chargeable to one of the other Airport cost centers.
- **Airfield**: The Airfield cost center includes runways, taxiways, taxilanes, and apron areas (other than the Apron Area and other leased apron areas), navigational aids, hazard designation and warning devices, airfield security roads and fencing, blast fencing, lighting, avigation easements, and safety areas for aircraft landing, taking off, and taxiing.
- **Apron Area**: The Apron Area cost center includes the new aircraft apron pavement and associated hydrant fueling system serving the terminal building. The Apron Area also includes preferential use aircraft parking positions, aircraft RON parking areas, and associated taxilanes.
- **Other Buildings & Areas**: The Other Buildings & Areas cost center includes other buildings and ground areas of the Airport leased or available for lease to other Airport tenants and users, as they now exist or as they may be modified or expanded from time to time.
- **Parking & Ground Transportation Area**: The Parking & Ground Transportation Area cost center includes the public automobile parking structures and surface parking areas accommodating public automobile parking and ground transportation, as they now exist or as they may be modified or expanded from time to time.
- **Terminal Building**: The Terminal Building cost center includes the passenger terminal complex.
- **Terminal Roadways**: The Terminal Roadways cost center includes the terminal access roadway (Cedar Springs Road/Herb Kelleher Way/) and the terminal loop roadways and curbsides serving the terminal building, as they now exist or as they may be modified or expanded from time to time.

8.2 Capital Improvement Program – Projects and Funding Plan

Section 5 of this Master Plan Update presents an evaluation of alternative development projects culminating in the selection of the preferred alternatives to satisfy short- and long-term Airport capital development requirements. Projects that could be initiated within the initial 10-year planning period of the Master Plan Update consist of the CIP projects that are the subject of this financial analysis.

8.2.1 PROJECTS

Table 8-1 presents the projects included in the Master Plan Update CIP expected to be implemented through FY 2024, including estimated costs. The total estimated cost of the 10-year CIP in escalated dollars is $514.2 million. The CIP consists of Airfield Modification Projects and Landside Development Projects. Recognizing the conceptual nature of a master plan, implementation of these capital development projects would occur only after further refinement through advanced planning and programming and engineering and architectural analyses. Therefore, the estimated CIP costs developed for purposes of this funding plan must be viewed as preliminary, reflecting a master plan level of detail subject to refinement in subsequent implementation phases.

8.2.1.1 Airfield Modification Projects

Airfield Modification Projects are estimated to total approximately $275.7 million and, with the exception of Projects #17 through #24, generally consist of pavement reconstruction and modification, as described in a report describing an airfield pavement evaluation.[1] Estimated costs were escalated from 2014 dollars at an annual rate of 4 percent to the midpoint of construction and include construction contingencies, construction administration, and engineering/design services. For most of these projects, it was assumed that design would occur in one fiscal year, with construction occurring in the following fiscal year. The implementation schedule for Projects #1 through #7 was provided by one of the City's engineering consultants. The implementation schedule for the remaining projects was determined based on funding availability, with projects generally assumed to be implemented in the latter half of the initial 10-year planning period. The estimated cost and implementation schedule for Project #17 was provided by another of the City's engineering consultants. The estimated costs and implementation schedules for Projects #18 and #19 were obtained from the Airport's 5-year CIP. The estimated costs and implementation schedules for Projects #20 through #24 were obtained from the *Electrical Systems Conditions Inventory and Assessment.*

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[1] Kimley-Horn Associates, *Dallas Love Field Airfield Pavement Evaluation*, November 2014.

[2] Parsons Brinkerhoff, Dallas Love Field Electrical Systems Conditions Inventory and Assessment, - Final Airfield Report, December 2013.

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Table 8-1 (1 of 2): Capital Improvement Program Estimated Costs and Annual Expenditures

For Fiscal Years Ending September 30

PROJECT #	PROJECT DESCRIPTION	START	END	ESTIMATED COSTS [1]	ESTIMATED ANNUAL PROJECT EXPENDITURES 2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Airfield Modification Projects [2]														
1	Runway 18-36 Midfield Taxiway Conversion	2015	2016	$8,475,000	$834,000	$7,641,000	$-	$-	$-	$-	$-	$-	$-	$-
2	Runway 18-36 Reconstruction of Taxiway Crossings	2015	2015	$2,402,000	$2,402,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
3	Taxiway B Reconstruction - Taxiway B4 to Taxiway B2 (incl. Taxiway B3/B4)	2015	2016	$12,334,000	$1,213,000	$11,121,000	$-	$-	$-	$-	$-	$-	$-	$-
4	Taxiway B Reconstruction - Taxiway B2 to Runway 31R (incl. Taxiway B1/B2)	2016	2017	$15,318,000	$-	$1,507,000	$13,811,000	$-	$-	$-	$-	$-	$-	$-
5	Taxiway B Reconstruction - Runway 13L to Runway 18-36	2018	2019	$10,703,000	$-	$-	$-	$1,053,000	$9,650,000	$-	$-	$-	$-	$-
6	Taxiway B Reconstruction - Runway 18-36 to Taxiway B3 (incl. Taxiway D, B5, B6)	2019	2020	$22,491,000	$-	$-	$-	$-	$1,817,000	$20,674,000	$-	$-	$-	$-
7	Taxiway C Reconstruction - Taxiway D to Taxiway C2/C3 (incl. Taxiway C2/C3)	2017	2018	$12,822,000	$-	$-	$1,261,000	$11,561,000	$-	$-	$-	$-	$-	$-
8	Taxiway C Reconstruction - West End of Taxiway C to West of Taxiway C4 (incl. Runway 13R Hold Apron)	2019	2020	$16,284,000	$-	$-	$-	$-	$1,316,000	$14,968,000	$-	$-	$-	$-
9	Taxiway C Reconstruction - Taxiway C2 to East End of Taxiway C (incl. Runway 31L Hold Apron)	2020	2021	$17,430,000	$-	$-	$-	$-	$-	$1,362,000	$16,068,000	$-	$-	$-
10	Taxiway A Reconstruction - Taxiway D to East End of Taxiway A (incl. Taxiway A Hold Apron, and Taxiway A3, A2, A1)	2020	2021	$35,651,000	$-	$-	$-	$-	$-	$2,785,000	$32,866,000	$-	$-	$-
11	Taxiway M Reconstruction - Taxiway B3 to Taxiway B (incl. Runway 31R Hold Apron)	2021	2022	$20,633,000	$-	$-	$-	$-	$-	$-	$1,559,000	$19,074,000	$-	$-
12	Taxiway K Reconstruction - Taxiway L to Runway 18-36 (incl. Run Up Apron)	2021	2022	$8,513,000	$-	$-	$-	$-	$-	$-	$643,000	$7,870,000	$-	$-
13	Runway 13R-31L Keel Reconstruction (incl. Taxiway C2/C3)	2022	2023	$42,872,000	$-	$-	$-	$-	$-	$-	$-	$3,131,000	$39,741,000	$-
14	Misc. Taxiway Improvements within Runway 13R-31L RSA (Incl. Taxiway A3/A)	2023	2023	$2,813,000	$-	$-	$-	$-	$-	$-	$-	$-	$2,813,000	$-
15	Runway 18-36 Taxiway Conversion (Taxiway A to Runway 13L) and Taxiway D	2024	2024	$7,484,000	$-	$-	$-	$-	$-	$-	$-	$-	$-	$7,484,000
16	Miscellaneous Taxilane and Apron Improvements	2020	2024	$28,136,000	$-	$-	$-	$-	$-	$5,627,000	$5,627,000	$5,627,000	$5,627,000	$5,628,000
17	Relocate Runway 31R Glideslope, RVR and PAPI	2016	2018	$932,000	$-	$348,000	$465,000	$119,000	$-	$-	$-	$-	$-	$-
18	Airport Perimeter Roads Rehabilitation, Sections 1 and 2 [3]	2016	2016	$4,000,000	$-	$4,000,000	$-	$-	$-	$-	$-	$-	$-	$-
19	Security Controls Enhancements [3]	2015	2016	$2,050,000	$225,000	$1,825,000	$-	$-	$-	$-	$-	$-	$-	$-
20	2015 Ongoing Cable Replacement, Phase 1 [4]	2015	2015	$660,000	$660,000	$-	$-	$-	$-	$-	$-	$-	$-	$-
21	2016 Drainage Efficiency Improvements, Phase 1 [4]	2016	2016	$970,000	$-	$970,000	$-	$-	$-	$-	$-	$-	$-	$-
22	2017 Drainage Efficiency Improvements, Phase 2 [4]	2017	2017	$1,000,000	$-	$-	$1,000,000	$-	$-	$-	$-	$-	$-	$-
23	2018 Runway LED HIRL, Centerline and TDZ Upgrades [4]	2018	2018	$1,100,000	$-	$-	$-	$1,100,000	$-	$-	$-	$-	$-	$-
24	2020 Ongoing Cable Replacement, Phase 2 [4]	2020	2020	$675,000	$-	$-	$-	$-	$-	$675,000	$-	$-	$-	$-
Total Airfield Modification Projects				**$275,748,000**	**$5,334,000**	**$27,412,000**	**$16,537,000**	**$13,833,000**	**$12,783,000**	**$46,091,000**	**$56,763,000**	**$35,702,000**	**$48,181,000**	**$13,112,000**

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Table 8-1 (2 of 2): Capital Improvement Program Estimated Costs and Annual Expenditures (2 of 2)

For Fiscal Years Ending September 30

PROJECT #	PROJECT DESCRIPTION	START	END	ESTIMATED COSTS [1/]	ESTIMATED ANNUAL PROJECT EXPENDITURES									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Landside Development Projects [5/]														
25	Aviation Place Bridge	2020	2022	$6,174,000	$-	$-	$-	$-	$-	$1,621,000	$3,892,000	$661,000	$-	$-
26	Parking Garage	2020	2022	$100,000,000	$-	$100,000,000	$-	$-	$-	$-	$-	$-	$-	$-
27	General Aviation Facilities	2022	2023	$81,553,000	$-	$-	$-	$-	$-	$-	$-	$34,798,000	$46,755,000	$-
28	Mockingbird Lane Cedar Springs Road/Herb Kelleher Way Intersection	2018	2020	$38,120,000	$-	$-	$-	$9,514,000	$22,847,000	$5,759,000	$-	$-	$-	$-
29	Herb Kelleher Way Lighting/Streetscape, Phase 1 [4/]	2015	2015	$2,000,000	$2,000 000	$-	$-	$-	$-	$-	$-	$-	$-	$-
30	Herb Kelleher Way Lighting/Streetscape, Phase 2 [4/]	2016	2016	$4,700,000	$-	$4,700,000	$-	$-	$-	$-	$-	$-	$-	$-
31	Herb Kelleher Way Lighting/Streetscape, Phase 3 [4/]	2017	2017	$900,000	$-	$-	$900,000	$-	$-	$-	$-	$-	$-	$-
32	Correct Deficient Lighting in Parking Garage A, Covered Areas [4/]	2018	2018	$800,000	$-	$-	$-	$800,000	$-	$-	$-	$-	$-	$-
33	Parking Garage A & B Lighting Efficiency Improvement [4/]	2019	2019	$4,200,000	$-	$-	$-	$-	$4,200,000	$-	$-	$-	$-	$-
34	Valet Parking Lot Lighting Improvement [4/]	2020	2020	$20,000	$-	$-	$-	$-	$-	$20,000	$-	$-	$-	$-
35	Airfield Maintenance Facility Parking Lot Lighting Improvement [4/]	2020	2020	$20,000	$-	$-	$-	$-	$-	$20,000	$-	$-	$-	$-
Total Landside Development Projects				**$238,487,000**	**$2,000,000**	**$104,700,000**	**$900,000**	**$10,314,000**	**$27,047,000**	**$7,420,000**	**$3,892,000**	**$35,459,000**	**$46,755,000**	-
Total Capital Improvement Program				**$514,235,000**	**$7,334,000**	**$132,112,000**	**$17,437,000**	**$24,147,000**	**$39,830,000**	**$53,511,000**	**$60,655,000**	**$71,161,000**	**$94,936,000**	**$13,112,000**

NOTES: HIRL = High Intensity Runway Lights LED = Light-emitting Diode; PAPI = Precision Approach Path Indicator, RSA = Runway Safety Area, RVR = Runway Visual Range.

[1/] Estimated costs are for Master Plan Update purposes only and include escalation from 2014 dollars to the midpoint of construction at an annual rate of 4 percent, as applicable.

[2/] Estimated costs for Airfield Modification Projects were developed by Kimley-Horn Associates, November 2014, except for Project #17 (glideslope relocation), for which the cost was developed by Parsons Brinckerhoff, December 2014 The implementation schedules for Projects #1, #2, #3, #4, #5, #6, and #7 were provided by Kimley-Horn Associates. The implementation schedules for all other Airfield Modification Projects were provided by Ricondo & Associates, Inc., based on funding availability. The implementation schedule for Project #17 (glideslope relocation) was provided by Parsons Brinckerhoff

[3/] The implementation schedules and estimated costs for Projects #18 and #19 are from the Airport's 5 Year CIP as submitted by the City to the Federal Aviation Administration in April 2014.

[4/] The implementation schedules and estimated costs for Projects #20 through #24 and Projects 29 through 35 are from the *Electrical Systems Inventory and Conditions* Assessment-Final Airfield Report December 2013 and *Electrical Systems Inventory and Conditions* Assessment *Final Landside Report* Parsons Brinkerhoff, September 2014

[5/] The implementation schedules and estimated costs for Landside Development Projects were prepared by Parsons Brinckerhoff, December 2014.

SOURCES. Ricondo & Associates, Inc., March 2015 and the sources noted in the footnotes above
PREPAREDY BY Ricondo & Associates, Inc., March 2015.

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8.2.1.2 Landside Development Projects

The Landside Development Projects are estimated to cost approximately $238.5 million (escalated from 2014 dollars at an annual rate of 4 percent to the midpoint of construction). Cost estimates and implementation schedules for these projects were provided by one of the City's engineering consultants and include construction contingencies, construction administration, and engineering/design services. Landside Development Projects encompass approximately $12.6 million of improvements included in the Airport's Recommended Electrical System CIP. Key Landside Development Projects include the following:

- **Aviation Place Bridge**: This project would elevate Aviation Place via a one-lane vehicular bridge over Herb Kelleher Way to improve the traffic flow and level of service on Herb Kelleher Way. The one-lane bridge would have a 16-foot drive lane with two 10-foot shoulders. This width would allow for the potential to expand to two lanes at some point in the future if needed. In addition, signalization at the existing intersection of Aviation Place and Herb Kelleher Way would be eliminated.
- **Parking Garage**: This project consists of a new parking garage to be located east of the terminal complex and just north of Garage B. Initial planning for this facility is ongoing and anticipated to accommodate PAL E3 demand.
- **General Aviation Facilities**: This project consists of four 30,000-square-foot aircraft hangars, each assumed to contain 3,000 square feet of office space, and two 37,500-square-foot aircraft hangars, each assumed to contain 5,000 square feet of office space. Each hangar is estimated to include supporting parking spaces at the rear. The location of the development would be north of Taxiway A and west of Taxiway N. This project would also include realignment of the airfield perimeter road with the addition of three blast fences, two new access roads (one off Shorecrest Drive and one at Webb Chapel Road), associated traffic lighting, apron paving, apron lighting, airfield pavement and associated airfield electrical demolition, and associated drainage improvements for the site. This project would not be funded by the Airport enterprise, but by other funds.
- **Mockingbird Lane – Cedar Springs Road/Herb Kelleher Way Intersection**: This project consists of the construction of a four-lane depressed vehicular corridor at Mockingbird Lane, under Cedar Springs Road/Herb Kelleher Way, for a new urban interchange that would improve traffic flow and level of service at the intersection.

8.2.2 CAPITAL IMPROVEMENT PROGRAM FUNDING PLAN

Airport development is often funded by a combination of public and private sources. Most sponsors of airports similar in size to DAL have a variety of available funding sources and mechanisms to fund capital projects. The funding plan presented herein does not represent a final plan of finance for the CIP projects. Additional actions would be needed prior to the use of some of these funding sources for specific projects. It was assumed that the costs of these projects will ultimately be funded by a combination of sources, such as federal Airport Improvement Program (AIP) grants, passenger facility charge (PFC) revenues, Airport funds, proceeds from the issuance of airport revenue bonds, and other/third-party funds. **Table 8-2** presents the estimated funding sources for the CIP projects. Each potential funding source is described in the following subsections.

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Table 8-2 (1 of 2): Capital Improvement Program Funding Sources (1 of 2)

PROJECT #	PROJECT DESCRIPTION	ESTIMATED COSTS	ESTIMATED FUNDING SOURCES					
			AIP ENTITLEMENT GRANTS	AIP DISCRETIONARY GRANTS	PFC REVENUES	AIRPORT FUNDS	REVENUE BOND PROCEEDS	OTHER FUNDS
Airfield Modification Projects								
1	Runway 18-36 Midfield Taxiway Conversion	$8,475,000	$900,000	$-	$7,575,000	$-	$-	$-
2	Runway 18-36 Reconstruction of Taxiway Crossings	$2,402,000	$900,000	$-	$1,502,000	$-	$-	$-
3	Taxiway B Reconstruction - Taxiway B4 to Taxiway B2 (incl. Taxiway B3/B4)	$12,334,000	$-	$-	$-	$12,334,000	$-	$-
4	Taxiway B Reconstruction - Taxiway B2 to Runway 31R (incl. Taxiway B1/B2)	$15,318,000	$1,400,000	$-	$-	$13,918,000	$-	$-
5	Taxiway B Reconstruction - Runway 13L to Runway 18-36	$10,703,000	$2,400,000	$5,250,000	$3,053,000	$-	$-	$-
6	Taxiway B Reconstruction - Runway 18-36 to Taxiway B3 (incl. Taxiway D, B5, B6)	$22,491,000	$2,400,000		$2,450,000	$17,641,000	$-	$-
7	Taxiway C Reconstruction - Taxiway D to Taxiway C2/C3 (incl. Taxiway C2/C3)	$12,822,000	$2,300,000	$3,750,000	$-	$6,772,000	$-	$-
8	Taxiway C Reconstruction - West End of Taxiway C to West of Taxiway C4 (incl. Runway 13R Hold Apron)	$16,284,000	$-	$-	$16,284,000	$-	$-	$-
9	Taxiway C Reconstruction - Taxiway C2 to East End of Taxiway C (incl. Runway 31L Hold Apron)	$17,430,000	$2,400,000	$-	$15,030,000	$-	$-	$-
10	Taxiway A Reconstruction - Taxiway D to East End of Taxiway A (incl. Taxiway A Hold Apron, and Taxiway A3, A2, A1)	$35,651,000	$-	$-	$-	$-	$35,651,000	
11	Taxiway M Reconstruction - Taxiway B3 to Taxiway B (incl. Runway 31R Hold Apron)	$20,633,000	$2,400,000	$-	$18,233,000	$-	$-	$-
12	Taxiway K Reconstruction - Taxiway L to Runway 18-36 (incl. Run-Up Apron)	$8,513,000	$-	$-	$-	$8,513,000	$-	$-
13	Runway 13R-31L Keel Reconstruction (incl. Taxiway C2/C3)	$42,872,000	$2,400,000	$-	$38,472,000	$2,000,000	$-	$-
14	Misc. Taxiway Improvements within Runway 13R-31L RSA (incl. Taxiway A3/A)	$2,813,000	$-	$-	$-	$2,813,000	$-	$-
15	Runway 18-36 Taxiway Conversion (Taxiway A to Runway 13L) and Taxiway D	$7,484,000	$2,400,000	$-	$5,084,000	$-	$-	$-
16	Miscellaneous Taxilane and Apron Improvements	$28,136,000	$-	$-	$28,136,000	$-	$-	$-
17	Relocate Runway 31R Glideslope, RVR and PAPI	$932,000	$-	$-	$932,000	$-	$-	$-
18	Airport Perimeter Road Rehabilitation, Sections 1 and 2	$4,000,000	$-	$-	$4,000,000	$-	$-	$-
19	Security Controls Enhancements	$2,050,000	$-	$-	$2,050,000	$-	$-	$-
20	2015 Ongoing Cable Replacement, Phase 1	$660,000	$-	$-	$-	$660,000	$-	$-
21	2016 Drainage Efficiency Improvements, Phase 1	$970,000	$-	$-	$-	$970,000	$-	$-
22	2017 Drainage Efficiency Improvements, Phase 2	$1,000,000	$-	$-	$-	$1,000,000	$-	$-
23	2018 Runway LED High Intensity Runway Lighting, Centerline and Touchdown Zone Upgrades	$1,100,000	$-	$-	$-	$1,100,000	$-	$-
24	2020 Ongoing Cable Replacement, Phase 2	$675,000	$-	$-	$-	$675,000	$-	$-
Total Airfield Modification Projects		**$275,748,000**	**$19,900,000**	**$9,000,000**	**$142,801,000**	**$68,396,000**	**$35,651,000**	**$-**

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Table 8-2 (2 of 2): Capital Improvement Program Funding Sources (2 of 2)

PROJECT #	PROJECT DESCRIPTION	ESTIMATED COSTS 1/	ESTIMATED FUNDING SOURCES AIP ENTITLEMENT GRANTS	AIP DISCRETIONARY GRANTS	PFC REVENUES	AIRPORT FUNDS	REVENUE BOND PROCEEDS	OTHER FUNDS
Landside Development Projects								
25	Aviation Place Bridge	$6,174,000	$-	$-	$-	$6,174,000	$-	$-
26	Parking Garage	$100,000,000	$-	$-	$-		$100,000,000	$
27	General Aviation Facilities	$81,553,000	$-	$-	$-	$32,756,000	$-	$48,797,000
28	Mockingbird Lane-Cedar Springs Road Intersection	$38,120,000	$-	$-	$-	$4,681,000	$	$33,439,000
29	Cedar Springs Road Lighting/Streetscape, Phase 1	$2,000,000	$-	$-	$-	$2,000,000	$-	$-
30	Cedar Springs Road Lighting/Streetscape, Phase 2	$4,700,000	$-	$-	$-	$4,700,000	$	$
31	Cedar Springs Road Lighting/Streetscape, Phase 3	$900,000	$-	$-	$-	$900,000	$-	$-
32	Correct Deficient Lighting in Parking Garage A Covered Areas	$800,000	$-	$-	$-	$800,000	$	$-
33	Parking Garage A & B Lighting Efficient Improvement	$4,200,000	$-	$-	$-	$4,200,000	$-	$-
34	Valet Parking Lot Lighting Improvement	$20,000	$-	$-	$-	$20,000	$-	$-
35	Airfield Maintenance Facility Parking Lot Lighting Improvement	$20,000				$20,000		
Total Landside Development Projects		**$238,487,000**	**$-**	**$-**	**$-**	**$56,251,000**	**$100,000,000**	**$82,236,000**
Total Capital Improvement Program		**$514,235,000**	**$19,900,000**	**$9,000,000**	**$142,801,000**	**$124,647,000**	**$135,651,000**	**$82,236,000**

NOTES:

AIP = Airport Improvement Program, LED = Light-emitting Diode; PAPI = Precision Approach Path Indicator PFC = Passenger Facility Charge, RSA = Runway Safety Area; RVR = Runway Visual Range.

1/ Estimated costs are for Master Plan Update purposes only and include escalation from 2014 dollars to the midpoint of construction at an annual rate of 4 percent, as applicable

SOURCE: Ricondo & Associates, Inc., November 2015

PREPAREDY BY Ricondo & Associates, Inc., November 2015.

8.2.2.1 Federal Grants

The Airport and Airway Improvement Act of 1982 authorizes funding of the federal AIP from the Airport and Airway Trust Fund for nationwide airport development, airport planning, and noise compatibility planning and programs. The Airport and Airway Trust Fund is funded through user taxes on airfares, air freight, and aviation fuel.

On February 15, 2012, President Obama signed into law the FAA Modernization and Reform Act of 2012, which reauthorized FAA AIP funding for airport projects. Under this current reauthorization, the AIP was extended for 4 federal fiscal years, through September 30, 2015. The authorized funding levels for AIP investment were established at $3.35 billion each year. For purposes of this analysis, it was assumed that the AIP would continue to be funded throughout the planning period at a level of at least $3.2 billion per year.

The FAA distributes grants under the AIP to airport operators in two ways: entitlement grants and discretionary grants. Entitlement grants are distributed based on the number of enplaned passengers served at airports on an annual basis. Discretionary grants are distributed for individual projects based on funding availability and the priority of projects at airports nationwide. AIP grants may be used to fund eligible land acquisition, noise mitigation, airfield improvements, airport roadways, and safety and security systems and equipment. Generally, only those projects that do not generate revenues are eligible for AIP grant funding.

AIP grant eligibility is generally assumed to be 75 percent for eligible projects at medium-hub airports, such as DAL. All of the Airfield Modification Projects in the CIP are likely be eligible for AIP funding. However, entitlement grants available to the Airport in any given year are established by a formula set forth in the FAA AIP Handbook.[2] Entitlement grants for the Airport were projected based on the following AIP formula using the enplaned passenger forecasts provided in Section 3 of this Master Plan Update:

- $15.60 for each of the first 50,000 enplaned passengers
- $10.40 for each of the next 50,000 enplaned passengers
- $5.20 for each of the next 400,000 enplaned passengers
- $1.30 for each of the next 500,000 enplaned passengers
- $1.00 for each enplaned passenger beyond 1.0 million enplaned passengers

For a given year, the entitlement formula is based on numbers of enplaned passengers from 2 years prior. For example, when calculating entitlement grants for 2015, the formula applies to numbers of enplaned passengers in 2013. The amount of entitlement grants for large- and medium-hub airports where a passenger facility charge (PFC) is collected is reduced based on the PFC collection level approved for the airport. The PFC level currently authorized for DAL is $4.50 per eligible enplaned passenger. Therefore, AIP entitlement grants would be reduced by 75 percent. Annual AIP entitlement grants available to fund CIP projects at the Airport through the initial 10-year planning period are presented in **Table 8-3**.

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[2] Federal Aviation Administration, Order 5100.38D, *Airport Improvement Program Handbook*, September 30, 2014.

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Table 8-3: Projected Airport Improvement Program Entitlement Grants for Dallas Love Field

For Fiscal Years Ending September 30

	FORECAST ENPLANED PASSENGERS		AIP ENTITLEMENT GRANTS			
FISCAL YEAR	FISCAL YEAR	ENPLANED PASSENGERS	TOTAL (CALCULATED) 1/	ADJUSTED 2/	FOR LFMP 3/	REMAINING 4/
2015	2013	4,194,079	$7,200,000	$1,800,000	$900,000	$900,000
2016	2014	4,216,000	$7,200,000	$1,800,000	$900,000	$900,000
2017	2015	6,171,153	$9,200,000	$2,300,000	$900,000	$1,400,000
2018	2016	6,303,640	$9,300,000	$2,300,000	$-	$2,300,000
2019	2017	6,405,657	$9,400,000	$2,400,000	$-	$2,400,000
2020	2018	6,502,792	$9,500,000	$2,400,000	$-	$2,400,000
2021	2019	6,602,748	$9,600,000	$2,400,000	$-	$2,400,000
2022	2020	6,637,379	$9,700,000	$2,400,000	$-	$2,400,000
2023	2021	6,655,755	$9,700,000	$2,400,000	$-	$2,400,000
2024	2022	6,681,704	$9,700,000	$2,400,000	$-	$2,400,000
Total			**$90,500,000**	**$22,600,000**	**$2,700,000**	**$19,900,000**

NOTES:

AIP = Airport Improvement Program; LFMP = Love Field Modernization Program.

1/ Total AIP entitlement grants calculated using the methodology set forth in Federal Aviation Administration Order 5100.38D, *Airport Improvement Program Handbook*, September 30, 2014.

2/ Calculated entitlement grants reduced by 75 percent because a $4.50 passenger facility charge is collected at the Airport.

3/ Entitlement grants are provided to help pay for improvements related to the LFMP.

4/ Remaining entitlement grants are available for use on eligible Capital Improvement Program projects.

SOURCE: Ricondo & Associates, Inc., November 2015.
PREPAREDY BY: Ricondo & Associates, Inc., November 2015.

As shown in Table 8-3, $900,000 of projected AIP entitlement grants would be dedicated through FY 2017 for use on LFMP projects, including apron rehabilitation and fuel system costs. In total, approximately $20 million of AIP entitlement grants are projected to be available for funding eligible CIP projects through FY 2024. Table 8-2 shows the estimated uses of these funds.

Discretionary grants (annual and multiyear commitments through FAA Letters of Intent [LOIs]) are distributed by each FAA region on the basis of availability and project priorities. Discretionary grants are generally made immediately available to fund project costs, while LOI grants are distributed to an airport sponsor over a number of years at defined annual funding levels. For example, an LOI grant was issued to the City for the Airport in relation to the LFMP. Through the LOI grant, the City receives approximately $7 million per year in

AIP grant funds. Approximately $56.3 million of the LFMP apron and fuel system costs are being funded through an LOI. LOI proceeds in FY 2015 through FY 2017 will be used to pay principal on debt service for bonds issued to finance a portion of the LFMP. As shown in Table 8-2, approximately $9 million of AIP discretionary funds were assumed to be available to partially fund two taxiway reconstruction projects. These funds were also shown in the Airport's 5-year CIP that was submitted to the FAA on April 30, 2014. For purposes of this analysis, it was conservatively assumed that additional AIP discretionary grant funds would not be obtained for funding CIP projects. However, it is likely (and recommended) that the City will request discretionary grant funds for one or more eligible projects.

8.2.2.2 Passenger Facility Charge Revenues

Since 1991, the collection of a PFC at the nation's airports has been authorized under Title 14 of the Code of Federal Regulations, Part 158, and the PFC Program has been administered by the FAA. PFCs are collected from qualified passengers to fund eligible airport projects. Since April 1, 2001, a PFC of up to $4.50 per qualified enplaned passenger can be imposed by an airport operator in the United States. The City previously collected a $3.00 PFC at DAL. Since February 1, 2010, the City has collected a $4.50 PFC (less $0.11 airline collection fee) from qualified enplaned passengers at DAL.

PFC revenues may be used on a "pay-as-you-go" basis or leveraged to pay debt service on bonds or other debt used to pay for PFC-eligible projects. The City is currently committed to using $10 million of PFC revenues each year to pay debt service on bonds issued for the LFMP. Because airport sponsors may use PFC revenues for the local matching share of AIP grants, PFCs can help airport sponsors implement AIP-financed projects sooner than they would be able to do otherwise. Although the FAA is required to approve the collection of a PFC and the use of PFC revenues, the PFC Program permits local collection of PFC revenues through the airlines operating at airports and provides more flexibility to airport sponsors than the AIP funding. PFCs may be used for any AIP-eligible project, although PFC eligibility is generally broader than AIP eligibility.

As of September 2014, the FAA has approved two PFC applications for the Airport, with a combined authority for the City to impose and use approximately $360 million of PFC revenues to fund recently completed and future improvements at the Airport. This amount includes approximately $270 million leveraged to pay debt service on LFMP bonds, as mentioned above. As of September 2014, the City has yet to collect approximately $283 million of this PFC authority. For purposes of this financial analysis, it was assumed that the City will continue to apply for, collect, and use PFCs at a level of $4.50 per qualified enplaned passenger throughout the planning period.

Projected PFC revenues based on the enplaned passenger forecasts presented in Section 3 are shown in **Table 8-4**. As shown, beginning in FY 2016, the only existing obligation for which PFC revenues are to be used is $10 million per year for debt service on the LFMP bonds. All remaining PFC revenues were assumed to be available for use on CIP projects. The PFC balance would be nearly used in its entirety by FY 2023, in part because it was assumed in the estimated funding plan that PFC revenues will be used to fund a significant portion of the construction costs related to keel reconstruction of Runway 13R-31L (CIP Project #13). In total, approximately $142.8 million of PFC revenues are estimated to be used to fund CIP projects, as shown in Table 8-2.

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Table 8-4: Projected Passenger Facility Charge Revenues

For Fiscal Years Ending September 30

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
PFC Collections											
Enplaned passengers		6,171,15[illegible]	6,303,640	6,405,657	6,502,792	6,602,748	6,637,379	6,655,755	6,681,704	6,707,693	6,726,460
PFC level		$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50
Less: airline collection fee		(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
		$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39
Percent of passengers paying a PFC 1/		85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Enplaned passengers paying a PFC		5,245,000	5,358,000	5,445,000	5,527,000	5,612,000	5,642,000	5,657,000	5,679,000	5,702,000	5,717,000
PFC collections from airlines		$23,026,000	$23,522,000	$23,904,000	$24,264,000	$24,637,000	$24,768,000	$24,834,000	$24,931,000	$25,032,000	$25,098,000
Application of PFC Revenues											
Beginning balance	[A]	$16,046,000	$9,080,000	$9,878,000	$23,652,000	$37,354,000	$49,544,000	$40,809,000	$35,553,000	$27,684,000	$25,000
PFC collections		$23,026,000	$23,522,000	$23,904,000	$24,264,000	$24,637,000	$24,768,000	$24,834,000	$24,931,000	$25,032,000	$25,098,000
PFC interest income 2/		251,000	190,000	335,000	610,000	869,000	904,000	764,000	632,000	277,000	45,000
PFC revenues	[B]	$23,277,000	$23,712,000	$24,239,000	$24,874,000	$25,506,000	$25,672,000	$25,598,000	$25,563,000	$25,309,000	$25,143,000
Use of PFC Revenues											
PFC Application #3		$26,802,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000
PFC Application #4		880,000									
Future PFC applications (Master Plan CIP Projects)		2,561,000	12,914,000	465,000	1,172,000	3,316,000	24,407,000	20,854,000	23,432,000	42,968,000	10,712,000
Annual expenditures	[C]	$30,243,000	$22,914,000	$10,465,000	$11,172,000	$13,316,000	$34,407,000	$30,854,000	$33,432,000	$52,968,000	$20,712,000
Ending balance	**[A]+[B]-[C]**	**$9,080,000**	**$9,878,000**	**$23,652,000**	**$37,354,000**	**$49,544,000**	**$40,809,000**	**$35,553,000**	**$27,684,000**	**$25,000**	**$4,456,000**

NOTES:

CIP = Capital Improvement Program, PFC = Passenger Facility Charge.

1/ Only those passengers paying for an airline ticket are charged a PFC for that ticket. Therefore, in any given year, the percentage of passengers paying a PFC may not equal 100 percent. The assumption that 85 percent of passengers enplaned at the Airport pay a PFC is believed to be reasonable based on historical Airport PFC collections data, as well as generally accepted industry PFC revenue projection practices for airports of similar size.

2/ Interest was calculated at an assumed annual rate of 2.0 percent.

SOURCE: Ricondo & Associates, Inc., December 2014
PREPARED BY: Ricondo & Associates, Inc., March 2015.

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8.2.2.3 Airport Funds

The Airline Agreement specifies the application of net revenues generated by the Dallas Airport System and how those revenues may be used to fund capital projects. Generally speaking, revenues remaining after the payment of O&M expenses, outstanding debt service, and transfers to other accounts, as applicable, are deposited into the City's Aviation Capital Fund. Revenues in this fund may be used to fund capital improvement projects at the Airport. See Section 8.5 for additional information, including the projected availability and use of Aviation Capital Fund monies. For purposes of this analysis, revenues available in the Aviation Capital Fund are identified as Airport funds and are essentially treated as cash.

As shown in Table 8-2, CIP project costs totaling approximately $124.6 million were assumed to be funded with Airport funds through the planning period. These funds are primarily to be used to pay remaining costs of the Airfield Modification Projects after maximizing the use of AIP grants and PFC revenues. With regard to the Landside Development Projects, Airport funds were assumed to be the primary funding source for the Aviation Place Bridge project, as well as the portion of the General Aviation Facilities project that is not eligible for tenant funding, and engineering design costs associated with the Mockingbird Lane– Cedar Springs Road /Herb Kelleher Way Intersection project.

Airport funds expended on capital improvement projects are amortized and included in the airline rate base, as applicable, as defined in the Airline Agreement. **Table 8-5** presents projected amortization by cost center based on the assumed use of Airport funds through the initial 10-year planning period. Existing amortization by cost center (associated with the LFMP, as well as other previous non-Master Plan Update CIP cash expenditures) was added to amortization associated with the Master Plan Update CIP.

Amortization is a function of the amount of amortizable cash expended on a project, the expected useful life of the project, and an amortization rate. With regard to useful life, Airfield Modification Projects were assumed to have a useful life of 20 years, and Landside Development Projects were assumed to have a useful life of 25 years. The amortization rate used by the Department of Aviation for a given Fiscal Year is based on the Bond Buyer Revenue Bond Index[3] as of September 30 of the prior Fiscal Year. For FY 2015, this rate is 4.78 percent. For purposes of this analysis, this rate was used for the duration of the initial 10-year planning period.

8.2.2.4 Revenue Bond Proceeds

For purposes of this financial analysis and funding plan, proceeds from the issuance of General Airport Revenue Bonds (GARBs) were assumed to fund the proposed parking garage, as well as a taxiway reconstruction project. In total, approximately $135.7 million of CIP project costs are assumed to be funded with GARB proceeds. **Table 8-6** presents projected debt service by cost center through the initial 10-year planning period.

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[3] The Bond Buyer Revenue Bond Index consists of 25 various revenue bonds that mature in 30 years. The average rating on these bonds is roughly equivalent to Moody's A1 and Standard & Poor's A-plus ratings; available at: http://www.bondbuyer.com/marketstatistics/search_bbi.htm

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Table 8-5: Projected Amortization by Cost Center

For Fiscal Years Ending September 30

	ACTUAL	ESTIMATED	PROJECTED									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Existing Amortization (through FY 2014) [1]												
Airfield	$1,282,000	$1,965,000	$1,882,000	$1,882,000	$1,822,000	$1,801,000	$1,801,000	$1,681,000	$1,681,000	$1,600,000	$1,600,000	$1,600,000
Apron Area	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000
Terminal Building	$222,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000
Parking & Ground Transportation Area	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$21,000	$21,000	$-	$
Terminal Roadways	$154,000	$154,000	$154,000	$154,000	$154,000	$154,000	$154,000	$42,000	$14,000	$14,000	$14,000	$14,000
Other Buildings & Areas	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$175,000	$175,000
Total Existing Amortization	**$1,973,000**	**$3,282,000**	**$3,199,000**	**$3,199,000**	**$3,139,000**	**$3,118,000**	**$3,118,000**	**$2,886,000**	**$2,835,000**	**$2,754,000**	**$2,683,000**	**$2,683,000**
Master Plan Update Projects (FY 2015 - FY 2024) [2]												
Airfield	$-	$-	$-	$52,000	$1,100,000	$2,275,000	$2,894,000	$2,894,000	$4,337,000	$4,337,000	$5,007,000	$5,386,000
Apron Area	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Terminal Building	$-	$-	$-	$	$	$	$	$-	$-	$-	$-	$-
Parking & Ground Transportation Area	$-	$-	$-	$-	$-	$-	$56,000	$347,000	$350,000	$350,000	$350,000	$350,000
Terminal Roadways	$-	$-	$-	$139,000	$465,000	$527,000	$527,000	$527,000	$852,000	$852,000	$1,281,000	$1,281,000
Other Buildings & Areas	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$2,273,000
Total Amortization from Master Plan Update Projects	**$-**	**$-**	**$-**	**$191,000**	**$1,565,000**	**$2,802,000**	**$3,477,000**	**$3,768,000**	**$5,539,000**	**$5,539,000**	**$6,638,000**	**$9,290,000**
Total Amortization by Cost Center												
Airfield	$1,282,000	$1,965,000	$1,882,000	$1,934,000	$2,922,000	$4,076,000	$4,695,000	$4,575,000	$6,018,000	$5,937,000	$6,607,000	$6,986,000
Apron Area	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000
Terminal Building	$222,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000
Parking & Ground Transportation Area	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$100,000	$391,000	$371,000	$371,000	$350,000	$350,000
Terminal Roadways	$154,000	$154,000	$154,000	$293,000	$619,000	$681,000	$681,000	$569,000	$866,000	$866,000	$1,295,000	$1,295,000
Other Buildings & Areas	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$225,000	$175,000	$2,448,000
Total Projected Amortization	**$1,973,000**	**$3,282,000**	**$3,199,000**	**$3,390,000**	**$4,704,000**	**$5,920,000**	**$6,595,000**	**$6,654,000**	**$8,374,000**	**$8,293,000**	**$9,321,000**	**$11,973,000**

NOTES

1/ Includes amortization on projects associated with the Love Field Modernization Program, as well as other projects completed prior to FY 2015.

2/ Useful life for Master Plan Update Airfield Modification Projects was assumed to be 20 years, useful life for Master Plan Update Landside Development Projects was assumed to be 25 years. The assumed amortization rate for Master Plan Update projects was 4.78 percent, based on the Bond Buyer Revenue Bond Index as of September 30 2014, available at http://www.bondbuyer.com/marketstatistics/search_bbi.htm

SOURCE Ricondo & Associates, Inc. November 2015

PREPAREDY BY Ricondo & Associates, Inc. November 2015

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Table 8-6: Projected Debt Service

For Fiscal Years Ending September 30

		ACTUAL	ESTIMATED	PROJECTED									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Love Field Modernization Program Bonds Debt Service													
Series 2010		$8,181,192	$16,275,000	$16,275,000	$16,275,000	$16,275,000	$16,275,000	$16,275,000	$16,275,000	$16,275,000	$16,275,000	$16,275,000	$16,275,000
Series 2012		$10,165,000	$	$13,709,750	$13,710,250	$13,713,250	$13,712,750	$13,713,000	$13,713,000	$13,711,000	$13,712,000	$13,709,750	$13,713,250
less: PFCs revenues available for debt service		$(5,000,000)	$(5,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)	$(10,000,000)
less: LOI grant payments		$(10,165,000)	$	$(6,990,000)	$(7,340,000)	$(7,710,000)	$-	$-	$-	$	$-	$-	$-
Net Existing Debt Service	**[A]**	**$3,181,192**	**$11,275,000**	**$12,994,750**	**$12,645,250**	**$12,278,250**	**$19,988,000**	**$19,988,000**	**$19,988,000**	**$19,986,000**	**$19,987,000**	**$19,984,750**	**$19,988,250**
Future GARBs for Master Plan Update Projects													
Parking Garage		$-	$	$-	$	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$9,292,800
Airfield Projects		$-	$-	$-	$-	$-	$-	$-	$-	$-	$3,621,120	$3,621,120	$3,621,120
Roadway Projects		$-	$-	$-	$-	$-	$-	$	$-	$	$	$-	$-
Other Projects		$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Net Master Plan Update Debt Service	**[B]**	$	$-	$-	$-	**$9,292,800**	**$9,292,800**	**$9,292,800**	**$9,292,800**	**$9,292,800**	**$12,913,920**	**$12,913,920**	**$12,913,920**
Net Debt Service	**[A]+[B]**	**$3,181,192**	**$11,275,000**	**$12,994,750**	**$12,645,250**	**$21,571,050**	**$29,280,800**	**$29,280,800**	**$29,280,800**	**$29,278,800**	**$32,900,920**	**$32,898,670**	**$32,902,170**
Debt Service by Cost Center													
Airfield		$34,271	$121,464	$139,991	$136,226	$132,272	$215,328	$215,328	$215,328	$215,307	$3,836,438	$3,836,413	$3,836,451
Apron Area		$509,635	$1,806,283	$2,081,791	$2,025,800	$9,550,217	$15,546,982	$15,546,982	$15,546,982	$15,545,426	$15,546,204	$15,544,454	$15,547,177
Terminal Building		$2,474,382	$8,769,873	$10,107,522	$9,835,675	$1,967,006	$3,202,127	$3,202,127	$3,202,127	$3,201,806	$3,201,967	$3,201,606	$3,202,167
Parking & Ground Transportation Area		$154,601	$547,947	$631,524	$614,539	$9,889,503	$10,264,184	$10,264,184	$10,264,184	$10,264,087	$10,264,136	$10,264,026	$10,264,196
Terminal Roadways		$-	$-	$-	$-	$-	$-	$	$-	$-	$	$-	$-
Other Buildings & Areas		$8,304	$29,433	$33,923	$33,010	$32,052	$52,178	$52,178	$52,178	$52,173	$52,176	$52,170	$52,179
Net Projected Debt Service		**$3,181,193**	**$11,275,000**	**$12,994,751**	**$12,645,250**	**$21,571,050**	**$29,280,800**	**$29,280,800**	**$29,280,800**	**$29,278,800**	**$32,900,920**	**$32,898,970**	**$32,902,170**

NOTES: LOI = Letter of Intent; PFC = Passenger Facility Charge; values may not sum to totals due to rounding.

SOURCES: City of Dallas, Department of Aviation, August 2014 (existing debt service); Ricondo & Associates, Inc., March 2015 (future debt service for Master Plan Update projects)
PREPARED BY: Ricondo & Associates, Inc., November 2015.

Existing debt service is associated with two series of bonds issued to partially fund the LFMP. In 2010, the Love Field Airport Modernization Corporation (LFAMC) issued the Series 2010 Bonds in the amount of $310.0 million to fund approximately $268.0 million of LFMP project costs. Debt service (principal plus interest) on the Series 2010 Bonds extends through 2040. In 2012, the LFAMC issued the Series 2012 Bonds in the amount of $146.3 million to fund approximately $136.0 million of LFMP project costs. Debt service on the Series 2012 Bonds extends through 2028. Annual debt service on these bonds is reduced through the leveraging of $10 million of PFC revenues each year used to pay debt service, as well as the application of LOI grant payments, as previously discussed.

The Series 2010 and Series 2012 Bonds were both issued as Special Facility Revenue Bonds under an agreement between the City and Southwest Airlines, whereby the payment of principal and interest on the bonds is unconditionally guaranteed by Southwest Airlines. Pursuant to the Revenue Credit Agreement in the Airline Agreement, net revenues of the Dallas Airport System are transferred to Southwest Airlines to reimburse the airline for its LFMP bond debt service payments.

Future debt service associated with the Master Plan Update projects was calculated based on an assumed interest rate of 7.00 percent, a bond term of 30 years, and a debt service reserve funding investment rate of 4.00 percent. The resulting annual debt service is approximately $9.3 million beginning in FY 2017, increasing to approximately $12.9 million beginning in FY 2022.

As described in Section 5 of this Master Plan Update, future recommended development projects include construction of a consolidated rental car facility within the planning period. Rental car facilities are often funded, at least in part, through customer facility charges (CFCs), charged as a fee per transaction day. Similar to PFCs, CFCs can be used on a pay-as-you-go basis or leveraged to pay eligible debt service. The City currently does not charge a CFC, but it is expected to do so in the future. Further planning will be required to determine the location, size, cost, and implementation schedule of the CRCF. It is anticipated that special facility bond proceeds will represent a significant portion of the funding for the CRCF. It is further assumed that some combination of CFC revenues and/or other rental car-related revenues will be available to pay the associated debt service and other costs. As the funding source(s) for any future CRCF are not expected to include sources that affect the funding of other CIP projects at the Airport, omission of the CRCF from this financial analysis is not material to the overall feasibility of the CIP funding plan.

8.2.2.5 Other Sources of Funding

Other sources of funding were identified for certain Master Plan Update CIP projects, as follows:

- Tenant/developer funding of approximately $49 million was assumed to cover the cost of hangar facilities associated with the General Aviation Facilities project.
- For the Mockingbird Lane– Cedar Springs Road/Herb Kelleher Way Intersection project, it was assumed that the City of Dallas would fund approximately $33.4 million (88 percent) of total project costs through funds other than Airport funds. Airport funds were assumed to be used for engineering/design costs, accounting for the remaining $4.7 million of estimated project costs.

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8.3 Operation and Maintenance Expenses

O&M expenses for the Airport (and the Dallas Airport System) are defined as all reasonable and necessary expenses, paid or accrued, for operating, maintaining, repairing, and administering the Airport. These expenses are tracked at a departmental level, including Administration, ARFF, Operations, Field Maintenance, Security, Custodial, Terminal Maintenance, Parking Area, Executive Airport, Heliport, and Other. Within each department, O&M expenses are further categorized as follows:

- **Personnel Services**: Includes personnel expenses, such as salaries and wages and fringe benefits.
- **Supplies**: Includes utilities (e.g., electricity, fuel, water, and sewer), laundry and cleaning, buildings, streets and roads, and other related expenses.
- **Contractual Services**: Includes security services, repair and maintenance of buildings, miscellaneous special services, property insurance, and other related expenses.
- **Equipment**: Includes automobiles and trucks, furniture, tools, computers, and other related expenses.

For purposes of calculating airline rates and charges, O&M expenses are allocated to cost centers. Each departmental and O&M expense category is allocated to cost centers based on percentages provided by the Department of Aviation. O&M expenses allocated to the indirect Administration cost center are re-allocated to each of the direct cost centers based on calculated percentages.

O&M expenses were projected through a review of O&M expenses for each of the four categories above by cost center for Actual FY 2013, Estimated FY 2014, and Budget FY 2015. Based on this review, personnel services were assumed to increase at an annual rate of 6 percent, supplies were assumed to increase at an annual rate of 5 percent, contractual services and equipment were assumed to increase at an annual rate of 4 percent, and reimbursements were assumed to remain constant at approximately $6.5 million, based on the FY 2015 Budget. Increases in all O&M expense categories were projected from the FY 2015 Budget, as provided by the Department of Aviation. It is expected that, as certain CIP projects are completed, associated O&M expenses could change accordingly. Construction of new facilities may increase future O&M expenses, while reconstructed pavement (for example) may require less maintenance, thereby reducing future O&M expenses. For purposes of this financial analysis, no changes to future O&M expenses were assumed as the result of implementation of the anticipated CIP projects.

Table 8-7 presents projections of O&M expenses for the Dallas Airport System by expense category and cost center. O&M expenses for Actual FY 2013, Estimated FY 2014, and Budget FY 2015 are also included for reference. As shown, total O&M expenses for the Dallas Airport System are projected to increase from approximately $60.1 million in FY 2015 to approximately $94.0 million in FY 2024, reflecting a compound annual growth rate of 5.1 percent over that period.

Table 8-7: Projected Operation and Maintenance Expenses for the Dallas Airport System

For Fiscal Years Ending September 30

	ACTUAL	ESTIMATED	BUDGET	PROJECTED									CAGR
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	FY 2015 – FY 2024
Expense Category													
Personnel Services	$11,744,000	$12,132,000	$14,016,000	$14,859,000	$15,751,000	$16,695,000	$17,697,000	$18,758,000	$19,884,000	$21,077,000	$22,542,000	$23,894,000	6.1%
Supplies	$6,531,000	$7,394,000	$7,397,000	$7,765,000	$8,154,000	$8,563,000	$8,990,000	$9,441,000	$9,912,000	$10,406,000	$11,227,000	$11,787,000	5.3%
Contractual Services	$37,094,000	$31,354,000	$44,238,000	$46,007,000	$47,849,000	$49,764,000	$51,756,000	$53,826,000	$55,979,000	$58,220,000	$61,049,000	$63,492,000	4.1%
Equipment	$675,000	$668,000	$941,000	$977,000	$1,017,000	$1,059,000	$1,102,000	$1,146,000	$1,191,000	$1,239,000	$1,290,000	$1,341,000	4.0%
Reimbursements	$(6,969,000)	$(6,331,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	$(6,491,000)	0.0%
Total Expenses by Category	**$49,075,000**	**$45,217,000**	**$60,101,000**	**$63,117,000**	**$66,280,000**	**$69,590,000**	**$73,054,000**	**$76,680,000**	**$80,475,000**	**$84,451,000**	**$89,617,000**	**$94,023,000**	**5.1%**
Total DAL O&M Expenses by Cost Center													
Airfield	Not available for FY 2013	$14,739,000	$18,812,000	$19,726,000	$20,774,000	$21,965,000	$23,105,000	$24,271,000	$25,587,000	$27,081,000	$28,444,000	$29,892,000	5.3%
Terminal Building		$15,462,000	$18,245,000	$19,167,000	$20,107,000	$21,074,000	$22,113,000	$23,207,000	$24,331,000	$25,484,000	$26,686,000	$27,991,000	4.9%
Parking & Ground Transportation Area		$4,912,000	$9,926,000	$10,474,000	$10,999,000	$11,486,000	$12,058,000	$12,669,000	$13,247,000	$13,786,000	$15,557,000	$16,313,000	5.7%
Terminal Roadways		$2,846,000	$3,726,000	$3,901,000	$4,082,000	$4,271,000	$4,469,000	$4,674,000	$4,889,000	$5,113,000	$5,338,000	$5,580,000	4.6%
Other Buildings & Areas		$2,067,000	$3,011,000	$3,174,000	$3,329,000	$3,479,000	$3,654,000	$3,847,000	$4,035,000	$4,214,000	$4,424,000	$4,653,000	5.0%
Total DAL O&M Expenses		**$40,026,000**	**$53,720,000**	**$56,442,000**	**$59,291,000**	**$62,275,000**	**$65,399,000**	**$68,668,000**	**$72,089,000**	**$75,678,000**	**$80,449,000**	**$84,429,000**	**5.2%**
Executive Airport		$4,647,000	$5,807,000	$6,078,000	$6,362,000	$6,660,000	$6,970,000	$7,295,000	$7,635,000	$7,989,000	$8,348,000	$8,737,000	4.6%
Heliport		$544,000	$574,000	$597,000	$627,000	$655,000	$685,000	$717,000	$751,000	$784,000	$820,000	$857,000	4.6%
Total Dallas Airport System O&M Expenses		**$45,217,000**	**$60,101,000**	**$63,117,000**	**$66,280,000**	**$69,590,000**	**$73,054,000**	**$76,680,000**	**$80,475,000**	**$84,451,000**	**$89,617,000**	**$94,023,000**	**5.1%**

NOTES: CAGR = Compound Annual Growth Rate; DAL = Dallas Love Field; O&M = Operation and Maintenance.

SOURCES: City of Dallas, Department of Aviation, August 2014 (Actual FY 2013, Estimated FY 2014, Budget FY 2015); Ricondo & Associates, Inc., November 2015 (projections)

PREPAREDY BY: Ricondo & Associates, Inc., November 2015

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8.4 Airport Revenues – Nonairline and Airline

8.4.1 NONAIRLINE REVENUES

Nonairline revenues include those revenues obtained from sources other than airline rentals, fees, and charges for operating at the Airport. However, as specified in the rate-setting methodologies defined in the Airline Agreement, nonairline revenues affect airline rates and, therefore, airline revenues. Nonairline revenues are reported separately for Dallas Love Field and Dallas Executive Airport. The Department of Aviation provided nonairline revenue data for Actual FY 2013, Estimated FY 2014, and Budget FY 2015.

Projections of future nonairline revenues were developed based on a review of historical/budget data, the effects of inflation, the forecast growth in numbers of aircraft operations and enplaned passengers at the Airport, and the anticipated increases in revenue from implementation of certain Master Plan Update CIP projects. Projections for all nonairline revenue categories were based on the FY 2015 Budget, as provided by the Department of Aviation. **Table 8-8** presents projected nonairline revenues for the Airport, as well as for the Dallas Airport System in total. A description of each nonairline revenue category shown in Table 8-8, as well as how revenues were projected (from FY 2015 through FY 2024) for each category, follows:

- **Fuel Flowage Fees**: Fuel flowage fees at the Airport result from a fuel surcharge assessed on aircraft fueling activities. These fees/revenues are projected to increase 1.5 percent annually, reflecting the forecast growth in numbers of based aircraft at the Airport (see Section 3).
- **On-Airport Rentals**: Includes nonairline terminal building rentals. These rental revenues are projected to increase 2.0 percent annually based on growth from Actual FY 2013 to Budget FY 2015.
- **Field Rentals**: Includes revenues from rental car services and support facilities, FBO leases, federal agencies, and other entities/tenants that lease land at the Airport. These rental revenues are projected based on growth from Actual FY 2013 to Budget FY 2015. Revenues from rental car services and support facilities are projected to increase 2.0 percent annually. Other field rentals are projected to increase 3.5 percent annually.
- **Other Terminal Revenue**: Includes electricity reimbursement and miscellaneous rental revenues. These revenues were assumed to be constant at $1.162 million per year through the planning period.
- **Concessions Revenue**: Includes revenue from rental cars and ground transportation, automobile parking, food and beverage, news and gifts, and advertising and other concessions. With the exception of advertising and other concessions, concessions revenues are generally tied to passenger traffic at the Airport. For each of these categories, annual growth was projected by calculating a revenue-per-enplaned-passenger factor for Budget FY 2015 and increasing that factor at a rate of 2.5 percent annually through FY 2024 (3.75 percent annually for rental car revenues). An additional 1.0 percent increase in the revenue-per-enplaned-passenger factor was included for automobile parking in FY 2017 to reflect additional revenues that may be realized as a result of the opening of the planned parking garage. Advertising and other concessions revenues (baggage carts, valet services, etc.) were assumed to increase 3.0 percent annually, based on growth from Actual FY 2013 to Budget FY 2015.

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Table 8-8: Projected Nonairline Revenues for the Dallas Airport System

For Fiscal Years Ending September 30

		ACTUAL	ESTIMATED	BUDGET	PROJECTED								
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Dallas Love Field													
Fuel flowage fees	[A]	$1,171,971	$1,062,573	$1,171,255	$1,189,000	$1,207,000	$1,225,000	$1,243,000	$1,262,000	$1,281,000	$1,300,000	$1,320,000	$1,340,000
On-Airport rentals	[B]	$ -	$91,413	$93,125	$95,000	$97,000	$99,000	$101,000	$103,000	$105,000	$107,000	$109,000	$111,000
Field rentals	[C]	$	$7,464,097	$8,096,662	$8,380,000	$8,673,000	$8,977,000	$9,291,000	$9,616,000	$9,953,000	$10,301,000	$10,662,000	$11,035,000
Other terminal revenue	[D]	$8,569,352	$1,159,847	$1,161,559	$1,162,000	$1,162,000	$1,162,000	$1,162,000	$1,162,000	$1,162,000	$1,162,000	$1,162,000	$1,162,000
Concessions													
Rental cars and ground transportation		$7,526,911	$7,664,148	$8,713,993	$9,233,000	$9,732,000	$10,248,000	$10,795,000	$11,256,000	$11,708,000	$12,192,000	$12,696,000	$13,207,000
Automobile parking		$15,792,941	$15,792,941	$20,085,123	$21,029,000	$22,118,000	$23,014,000	$23,952,000	$24,680,000	$25,367,000	$26,102,000	$26,859,000	$27,607,000
Food and beverage		$4,840,681	$3,687,512	$5,495,812	$5,754,000	$5,993,000	$6,236,000	$6,491,000	$6,688,000	$6,874,000	$7,073,000	$7,278,000	$7,481,000
News and gifts		$1,628,080	$2,064,852	$2,792,319	$2,924,000	$3,045,000	$3,169,000	$3,298,000	$3,398,000	$3,493,000	$3,594,000	$3,698,000	$3,801,000
Advertising and other concessions		$1,250,823	$1,649,986	$1,718,957	$1,770,000	$1,823,000	$1,877,000	$1,934,000	$1,992,000	$2,052,000	$2,113,000	$2,177,000	$2,242,000
Total Concessions Revenue	[E]	**$31,039,436**	**$30,859,439**	**$38,806,204**	**$40,710,000**	**$42,711,000**	**$44,544,000**	**$46,470,000**	**$48,014,000**	**$49,494,000**	**$51,074,000**	**$52,708,000**	**$54,338,000**
CAGR FY 2015 – FY 2024		3.8%											
Other Nonairline Revenue		$1,616,462	$936,793	$776,473	$841,000	$854,000	$868,000	$882,000	$897,000	$912,000	$927,000	$943,000	$959,000
Total Dallas Love Field Nonairline Revenue	[A]+[B]+ [C]+[D]+[E]	**$42,397,221**	**$41,574,162**	**$50,105,278**	**$52,377,000**	**$54,704,000**	**$56,875,000**	**$59,149,000**	**$61,054,000**	**$62,907,000**	**$64,871,000**	**$66,904,000**	**$68,945,000**
CAGR FY 2015 – FY 2024		3.6%											
Dallas Executive Airport													
Fuel flowage fees		$54,376	$64,376	$64,376	$66,000	$68,000	$70,000	$72,000	$74,000	$76,000	$78,000	$80,000	$82,000
On and off airport rentals		$1,311,771	$643,896	$650,388	$670,000	$690,000	$711,000	$732,000	$754,000	$777,000	$800,000	$824,000	$849,000
Concessions		$7,532	$18,883	$8,838	$10,000	$11,000	$12,000	$13,000	$14,000	$15,000	$17,000	$19,000	$21,000
Total Dallas Executive Airport		**$1,373,679**	**$727,155**	**$723,602**	**$746,000**	**$769,000**	**$793,000**	**$817,000**	**$842,000**	**$868,000**	**$895,000**	**$923,000**	**$952,000**
Total Dallas Airport System Nonairline Revenues		**$43,770,900**	**$42,301,317**	**$50,828,880**	**$53,123,000**	**$55,473,000**	**$57,668,000**	**$59,966,000**	**$61,896,000**	**$63,775,000**	**$65,766,000**	**$67,827,000**	**$69,897,000**
CAGR FY 2015 – FY 2024		3.6%											

NOTE: CAGR = Compound Annual Growth Rate

SOURCES: City of Dallas, Department of Aviation, August 2014 (Actual FY 2013, Estimated FY 2014, Budget FY 2015); Ricondo & Associates, Inc., March 2015 (projections).
PREPAREDY BY: Ricondo & Associates, Inc., March 2015.

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- **Other Nonairline Revenue**: Includes security charges, service charges, tenant parking, cable installation, copy service sales, and late payments. These revenues were assumed to remain constant at FY 2015 Budget levels through FY 2024.
- **Dallas Executive Airport**: Includes fuel flowage fees, on- and off-airport rentals, and concessions. Fuel flowage fees and on- and off-airport rentals were assumed to increase 3.0 percent annually through FY 2024. Concessions revenue is low, but exhibited strong growth between FY 2013 and FY 2014. These revenues were assumed to increase 10.0 percent annually through FY 2024.

Total Dallas Airport System nonairline revenues are projected to increase from approximately $50.8 million in FY 2015 to approximately $69.9 million in FY 2024, reflecting a CAGR of 3.6 percent over that period.

8.4.2 AIRLINE REVENUES

The remaining revenues generated at the Airport include terminal rentals and landing/apron fees payable by the airlines operating at the Airport. This section summarizes the calculation of airline rates and charges, as defined in the Airline Agreement.

8.4.2.1 Terminal Building Rental Rates

The Terminal Building rental rate calculation is Terminal Building cost center residual. Terminal Building costs include allocable direct and indirect O&M expenses, debt service, and amortization; annual replenishment of the O&M Reserve Account; required deposits to the Emergency Repair and Replacement Reserve Fund, GARB Debt Service Reserve Fund, and/or the LFMP Debt Service Reserve Fund (as necessary to restore those funds to their required balances) allocable to the Terminal Building; and 50 percent of the net deficit in the Terminal Roadways cost center.

The Annual Terminal Building Requirement is calculated by subtracting 75 percent of all concessions revenues, 100 percent of nonairline terminal building space rentals, other ancillary terminal building revenues, allocable interest income, and the allocable portion of 75 percent of the net revenues generated in the Parking & Ground Transportation Area cost center credited to offset the Annual Airfield Requirement and the Annual Terminal Building Requirement.

The annual Terminal Building rental rate is determined by dividing the Annual Terminal Building Requirement by the total post-LFMP airline leased space to determine the average Terminal Building rental rate for the Fiscal Year. A schedule of rental rates by type of space was developed by applying various weighting criteria, as defined in the Airline Agreement. The total airline rented space and weighted airline space in the Terminal Building was assumed to be constant (equal to FY 2015 space) throughout the planning period. **Table 8-9** presents projected Terminal Building rental rates and revenue at the Airport through FY 2024. As shown, the required Terminal Building rental rate is projected to increase from $53.62 per square foot in FY 2015 to $132.93 per square foot in FY 2024. A substantial increase in the rental rate would occur in FY 2017, when revenue sharing from the Parking & Ground Transportation Area cost center decreases significantly because of debt service associated with the proposed parking garage. Airline Terminal Building rental revenues are projected to increase from $12.1 million in FY 2015 to $30.0 million in FY 2024, reflecting a CAGR of 10.6 percent.

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Table 8-9: Projected Terminal Building Rental Revenues and Rates

Fiscal Years Ending September 30

	ESTIMATED	PROJECTED									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
TERMINAL BUILDING REQUIREMENT											
Operation and Maintenance Expenses	$15,462,000	$18,245,000	$19,167,000	$20,107,000	$21,074,000	$22,113,000	$23,207,000	$24,331,000	$25,484,000	$26,686,000	$27,991,000
Deposit to O&M Reserve Fund	-	$632,000	$180,000	$187,000	$194,000	$202,000	$211,000	$220,000	$227,000	$291,000	$248,000
Debt Service Requirements - LFMP Bonds	$8,769,873	$10,107,522	$9,835,675	$9,550,217	$15,546,982	$15,546,982	$15,546,982	$15,545,426	$15,546,204	$15,544,454	$15,547,177
Amortization of DAL Funded Assets	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000	$848,000
Terminal Building share of Terminal Roadways deficit	$1,772,000	$2,300,000	$2,416,000	$2,661,000	$2,974,000	$3,073,000	$3,121,000	$3,377,000	$3,490,000	$3,822,000	$3,939,000
	$26,851,873	$32,132,522	$32,446,675	$33,353,217	$40,636,982	$41,782,982	$42,933,982	$44,321,426	$45,595,204	$47,191,454	$48,573,177
LESS:											
Pre-LFMP airline space rentals	$919,000	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Concession revenues	$5,202,250	$7,140,000	$7,466,750	$7,776,000	$8,091,250	$8,421,250	$8,687,000	$8,942,250	$9,212,500	$9,491,750	$9,769,250
Other Terminal Building nonairline revenues	$1,380,000	$1,442,000	$1,457,000	$1,459,000	$1,461,000	$1,463,000	$1,465,000	$1,467,000	$1,469,000	$1,471,000	$1,473,000
Interest income allocable to the Terminal Building	$20,000	$19,000	$20,000	$20,000	$20,000	$21,000	$21,000	$21,000	$21,000	$21,000	$22,000
	$7,521,250	$8,601,000	$8,943,750	$9,255,000	$9,572,250	$9,905,250	$10,173,000	$10,430,250	$10,702,500	$10,983,750	$11,264,250
Revenue Sharing - Parking & Ground Transportation Area	$12,161,000	$11,423,000	$12,416,000	$6,068,000	$6,243,000	$6,806,000	$6,978,000	$7,217,000	$7,639,000	$6,964,000	$7,291,000
	$19,682,250	$20,024,000	$21,359,750	$15,323,000	$15,815,250	$16,711,250	$17,151,000	$17,647,250	$18,341,500	$17,947,750	$18,555,250
Net requirement = Terminal Building rental revenue required	**$7,169,623**	**$12,108,522**	**$11,086,925**	**$18,030,217**	**$24,821,732**	**$25,071,732**	**$25,782,982**	**$26,674,176**	**$27,253,704**	**$29,243,704**	**$30,017,927**
Airline rented space (square feet)	117,316	225,822	225,822	225,822	225,822	225,822	225,822	225,822	225,822	225,822	225,822
Required Terminal Building rental rates (per square foot)	**$61.11**	**$53.62**	**$49.10**	**$79.84**	**$109.92**	**$111.02**	**$114.17**	**$118.12**	**$120.69**	**$129.50**	**$132.93**
Weighted Airline Space (square feet)	73,559	153,555	153,555	153,555	153,555	153,555	153,555	153,555	153,555	153,555	153,555
Category I Rental Rate: Ticket Counter/Airline Ticketing/Queuing/Holdrooms	$97.47	$78.85	$72.20	$117.42	$161.65	$163.28	$167.91	$173.71	$177.48	$190.44	$195.49
Category II Rental Rate: Baggage Claim/Other Offices	$73.10	$59.14	$54.15	$88.06	$121.24	$122.46	$125.93	$130.28	$133.11	$142.83	$146.61
Category III Rental Rate: Operations and Other Support/Baggage Makeup	$48.73	$39.43	$36.10	$58.71	$80.82	$81.64	$83.95	$86.86	$88.74	$95.22	$97.74
Category IV Rental Rate: Stairwells/Canopy (unenclosed)	$24.37	$19.71	$18.05	$29.35	$40.41	$40.82	$41.98	$43.43	$44.37	$47.61	$48.87

NOTE: DAL = Dallas Love Field; LFMP = Love Field Modernization Program; O&M = Operation and Maintenance

SOURCES: City of Dallas, Department of Aviation, August 2014 (Estimated FY 2014); Ricondo & Associates, Inc., November 2015 (projections); Airport Use and Lease Agreement (calculation methodology)

PREPARED BY: Ricondo & Associates, Inc., November 2015

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8.4.2.2 Apron Fees

The apron fee calculation is Apron Area cost center residual. Apron Area costs include allocable direct and indirect O&M expenses, debt service, and amortization; and annual replenishment of the O&M Reserve Account and required deposits to the Emergency Repair and Replacement Reserve Fund, the GARB Debt Service Reserve Fund, and/or the LFMP Debt Service Reserve Fund allocable to the Apron Area.

From total Apron Area costs, the Annual Apron Area Requirement is calculated by subtracting apron fees charged to nonsignatory airline users of the Apron Area and other ancillary Apron Area revenues, as well as allocable interest income.

The Annual Apron Area Requirement is determined by dividing the annual Apron Area Requirement by the total number of preferential use aircraft parking positions. It was assumed that 20 preferential use aircraft parking/gate positions will be available through the planning period.

Table 8-10 presents projected apron fees and revenues at the Airport through FY 2024. As shown, the required annual apron fee per gate is projected to increase from $199,690 in FY 2015 to $311,108 in FY 2024. Airline apron fee revenues are projected to increase from $4.0 million in FY 2015 to $6.2 million in FY 2024, reflecting a CAGR of 5.0 percent.

8.4.2.3 Landing Fee Rate

The landing fee rate calculation is Airfield cost center residual. Airfield costs include allocable direct and indirect O&M expenses, debt service, and amortization; and annual replenishment of the O&M Reserve Account and required deposits to the Emergency Repair and Replacement Reserve Fund, the GARB Debt Service Reserve Fund, and/or the LFMP Debt Service Reserve Fund allocable to the Airfield.

From total Airfield costs, the Annual Airfield Requirement is calculated by subtracting general aviation fuel flowage fees, nonsignatory airline landing fees, other ancillary costs, allocable interest income, and the allocable portion of 75 percent of the net revenues generated in the Parking & Ground Transportation Area cost center credited to offset the Annual Airfield Requirement and the Annual Terminal Building Requirement.

The Annual Airfield Requirement is determined by dividing the Airfield cost center requirement by the total landed weight of all Signatory Airlines.

Table 8-10 also presents projected landing fee rates and revenues at the Airport through FY 2024. As shown, the required landing fee rate per 1,000 pound units of landed weight is projected to increase from $2.48 in FY 2015 to $4.81 in FY 2024. Airline landing fee revenues are projected to increase from $18.5 million in FY 2015 to $36.5 million in FY 2024, reflecting a CAGR of 7.9 percent.

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Table 8-10: Projected Apron and Landing Fee Revenues and Rates

Fiscal Years Ending September 30

	ESTIMATED	PROJECTED									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
APRON AREA REQUIREMENT											
Operation and maintenance expenses	$1,474,000	$1,881,000	$1,973,000	$2,077,000	$2,197,000	$2,311,000	$2,427,000	$2,559,000	$2,708,000	$2,844,000	$2,989,000
Percent of Airfield O&M expenses	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Debt Service Requirements--LFMP Bonds	$1,806,283	$2,081,791	$2,025,800	$1,967,006	$3,202,127	$3,202,127	$3,202,127	$3,201,806	$3,201,967	$3,201,606	$3,202,167
Amortization of DAL-funded assets	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000	$46,000
	$3,326,283	$4,008,791	$4,044,800	$4,090,006	$5,445,127	$5,559,127	$5,675,127	$5,806,806	$5,955,967	$6,091,606	$6,237,167
Less:											
Remain overnight aircraft parking charges ($75 x 200)	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
Net requirement = apron fee revenue required	**$3,311,283**	**$3,993,791**	**$4,029,800**	**$4,075,006**	**$5,430,127**	**$5,544,127**	**$5,660,127**	**$5,791,806**	**$5,940,967**	**$6,076,606**	**$6,222,167**
Number of gates	12	20	20	20	20	20	20	20	20	20	20
Required apron fee per gate	**$275,940**	**$199,690**	**$201,490**	**$203,750**	**$271,506**	**$277,206**	**$283,006**	**$289,590**	**$297,048**	**$303,830**	**$311,108**
AIRFIELD REQUIREMENT											
Operation and maintenance expenses	$14,739,000	$18,812,000	$19,726,000	$20,774,000	$21,965,000	$23,105,000	$24,271,000	$25,587,000	$27,081,000	$28,444,000	$29,892,000
less: O&M expenses reallocated to the Apron Area cost center	$(1,474,000)	$(1,881,000)	$(1,973,000)	$(2,077,000)	$(2,197,000)	$(2,311,000)	$(2,427,000)	$(2,559,000)	$(2,708,000)	$(2,84,,000)	$(2,989,000)
Deposit to O&M Reserve Fund	-	$844,995	$236,000	$252,000	$272,000	$287,000	$300,000	$320,000	$347,000	$452,000	$387,000
Debt Service Requirements--LFMP Bonds	$121,464	$139,991	$136,226	$132,272	$215,328	$215,328	$215,328	$215,307	$215,318	$215,293	$215,331
Debt Service Requirements—Future GARBs	-	-	-	-	-	-	-	-	$3,621,120	$3,621,120	$3,621,120
Amortization of DAL-funded assets	$1,965,000	$1,882,000	$1,934,000	$2,922,000	$4,076,000	$4,696,000	$4,575,000	$6,018,000	$5,937,000	$6,607,000	$6,986,000
	$15,351,464	$19,797,986	$20,059,226	$22,003,272	$24,331,328	$25,992,328	$26,934,328	$29,581,307	$34,493,438	$36,495,413	$38,112,451
Less:											
Nonairline revenues	$1,211,423	$1,310,054	$1,329,650	$1,361,760	$1,396,572	$1,426,225	$1,451,732	$1,489,680	$1,544,273	$1,578,261	$1,609,526
Interest income allocable to the Airfield	$24,000	$25,000	$26,000	$27,000	$28,000	$29,000	$30,000	$31,000	$33,000	$33,000	$34,000
	$1,235,423	$1,335,054	$1,355,650	$1,388,760	$1,424,572	$1,455,225	$1,481,732	$1,520,680	$1,577,273	$1,611,261	$1,643,526
Net requirement = landing fee revenue required	**$14,116,042**	**$18,462,932**	**$18,703,575**	**$20,614,512**	**$22,906,756**	**$24,537,103**	**$25,452,597**	**$28,060,626**	**$32,916,165**	**$34,884,152**	**$36,468,925**
Landed weight (in 1,000 pound units)	$5,326,000	$7,445,902	$7,457,333	$7,469,866	$7,487,158	$7,509,950	$7,523,018	$7,540,763	$7,556,718	$7,574,751	$7,587,909
Required landing fee rate (per 1,000 pound unit)	**$2.65**	**$2.48**	**$2.51**	**$2.76**	**$3.06**	**$3.27**	**$3.38**	**$3.72**	**$4.36**	**$4.61**	**$4.81**

NOTE: GARBs = General Airport Revenue Bonds; DAL = Dallas Love Field; O&M = Operation and Maintenance; LFMP = Love Field Modernization Program.

SOURCES: City of Dallas, Department of Aviation, August 2014 (Estimated FY 2014); Ricondo & Associates, Inc., November 2015 (projections); Airport Use and Lease Agreement (calculation methodology).
PREPAREDY BY: Ricondo & Associates, Inc., November 2015

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8.5 Application of Revenues and Key Financial Metrics

Pursuant to the Airline Agreement, Dallas Airport System revenues are to be deposited into the Aviation Revenue Fund and applied to the following funds and accounts in the following order of priority:

- **O&M Account**: To pay operation and maintenance expenses for cost-center-specific items.
- **O&M Reserve Account**: The required deposit to this account represents the amount necessary to maintain a balance equal to 3 months, or 25 percent, of the current annual operating budget for the Dallas Airport System.
- **GARB Debt Service Fund**: To pay GARB debt service on any bonds, notes, or debt instruments that may be issued from time to time by the City to fund Dallas Airport System capital improvements.
- **GARB Debt Service Reserve Fund**: To fund or restore the GARB Debt Service Fund established in support of GARBs.
- **Southwest Holding Account**: To reimburse Southwest Airlines for LFMP debt service payments made by Southwest Airlines.
- **Emergency Repair and Replacement Reserve Fund**: To replenish the balance in this fund to $5 million.
- **Aviation Capital Fund**: All remaining revenues are to be deposited into the Aviation Capital Fund to be used to pay the net costs of Dallas Airport System capital improvements and for any other lawful purposes of the Dallas Airport System, subject to a cap of $30 million.

Table 8-11 presents the application of revenues in accordance with the Airline Agreement. The bottom section of the table shows deposits to the Aviation Capital Fund, as well as withdrawals from the fund to pay project costs, as described in Section 8.2.2.3. As shown, under the assumed funding plan for the Master Plan Update CIP, Airport funds are to be used in such a way that the Aviation Capital Fund never exceeds the $30 million cap, nor does it operate under a negative balance in any given year.

Table 8-12 presents a summary of airline rentals, fees, and charges, as well as the projected CPE and debt service coverage. Airline CPE is projected to increase from $5.60 in FY 2015 to $10.81 in FY 2024, reflecting a CAGR of 7.6 percent. Net revenues are projected to be sufficient to pay assumed debt service associated with future bonds beginning in FY 2017, with a coverage ratio of over 3.30x estimated debt service. A minimum coverage ratio of 1.25x debt service is required in accordance with the Bond Ordinance.

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Table 8-11: Application of Revenues for the Dallas Airport System

For Fiscal Years Ending September 30

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
					PROJECTED						
Total Dallas Airport System Revenues [1]	[A]	**$85,725,299**	**$87,283,951**	**$98,549,495**	**$111,201,187**	**$115,507,187**	**$119,188,437**	**$124,718,290**	**$132,331,109**	**$138,500,724**	**$143,008,545**
Operation and Maintenance Expenses											
Dallas Love Field		$43,164,000	$45,171,000	$47,275,000	$49,478,000	$51,786,000	$54,202,000	$56,732,000	$59,386,000	$63,166,000	$66,125,000
Dallas Executive Airport and Heliport		$5,675,000	$5,927,000	$6,194,000	$6,473,000	$6,764,000	$7,069,000	$7,388,000	$7,721,000	$8,071,000	$8,436,000
Departmental overhead		$11,262,000	$12,019,000	$12,811,000	$13,639,000	$14,504,000	$15,409,000	$16,355,000	$17,344,000	$18,380,000	$19,462,000
	[B]	$60,101,000	$63,117,000	$66,280,000	$69,590,000	$73,054,000	$76,680,000	$80,475,000	$84,451,000	$89,617,000	$94,023,000
Deposit to O&M Reserve Account	[C]	$2,658,995	$754,000	$791,000	$828,000	$866,000	$906,000	$949,000	$994,000	$1,291,000	$1,102,000
Net Revenues	[D]=[A]-[B]-[C]	**$22,965,304**	**$23,412,951**	**$31,478,495**	**$40,783,187**	**$41,587,187**	**$41,602,437**	**$43,294,290**	**$46,886,109**	**$47,592,724**	**$47,963,545**
Debt Service											
Future Bonds		$-	$-	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$12,913,920	$12,913,920	$12,913,920
	[E]	$-	$-	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$12,913,920	$12,913,920	$12,913,920
Remaining Net Revenues	[F]=[D]-[E]	**$22,965,304**	**$23,412,951**	**$22,185,695**	**$31,490,387**	**$32,294,387**	**$32,309,637**	**$34,001,490**	**$33,972,189**	**$34,678,804**	**$35,049,625**
Transfer to Southwest Holding Account under Revenue Credit Agreement	[G]	$12,994,750	$12,645,250	$12,278,250	$19,988,000	$19,988,000	$19,988,000	$19,986,000	$19,987,000	$19,984,750	$19,988,250
Replenishment of Emergency Repair and Replacement Reserve Fund	[H]	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Balance = Transfer to Aviation Capital Fund	[I]=[F]-[G]-[H]	**$9,971,000**	**$10,768,000**	**$9,907,000**	**$11,502,000**	**$12,306,000**	**$12,322,000**	**$14,015,000**	**$13,985,000**	**$14,694,000**	**$15,061,000**
Aviation Capital Fund											
Beginning balance		$16,172,000	$22,270,000	$14,740,000	$9,075,000	$11,998,000	$15,481,000	$8,936,000	$18,416,000	$7,893,000	$995,000
Transfer in	[I]	$9,971,000	$10,768,000	$9,907,000	$11,502,000	$12,306,000	$12,322,000	$14,015,000	$13,985,000	$14,694,000	$15,061,000
Use of funds for capital projects		$(3,873,000)	$(18,298,000)	$(15,572,000)	$(8,579,000)	$(8,823,000)	$(18,867,000)	$(4,535,000)	$(24,508,000)	$(21,592,000)	$-
Ending balance		**$22,270,000**	**$14,740,000**	**$9,075,000**	**$11,998,000**	**$15,481,000**	**$8,936,000**	**$18,416,000**	**$7,893,000**	**$995,000**	**$16,056,000**

NOTES: LFMP = Love Field Modernization Program, O&M = Operation and Maintenance.

[1] Includes landing fee revenues, apron fee revenues, terminal building rental revenues, nonairline revenues, and Dallas Executive Airport and Heliport revenues.

SOURCES: Ricondo & Associates, Inc., November 2015 (projections); Airline Use and Lease Agreement (calculation methodology).
PREPARED BY: Ricondo & Associates, Inc., November 2015.

Table 8-12: Summary of Key Financial Metrics

For Fiscal Years Ending September 30

	ESTIMATED	PROJECTED									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Airline Rates and Fees											
Average Terminal Building Rental rate (per square foot)	$61.11	$53.62	$49.10	$79.84	$109.92	$111.02	$114.17	$118.12	$120.69	$129.50	$132.93
Category I: Ticket Counter/Airline Ticketing/Queuing/Holdrooms	$97.47	$78.85	$72.20	$117.42	$161.65	$163.28	$167.91	$173.71	$177.48	$190.44	$195.49
Category II: Baggage Claim/Other Offices	$73.10	$59.14	$54.15	$88.06	$121.24	$122.46	$125.93	$130.28	$133.11	$142.83	$146.61
Category III: Operations and Other Support/Baggage Makeup	$48.73	$39.43	$36.10	$58.71	$80.82	$81.64	$83.95	$86.86	$88.74	$95.22	$97.74
Category IV: Stairwells/Canopy (unenclosed)	$24.37	$19.71	$18.05	$29.35	$40.41	$40.82	$41.98	$43.43	$44.37	$47.61	$48.87
Apron fee (per gate)	$275,940	$199,690	$201,490	$203,750	$271,506	$277,206	$283,006	$289,590	$297,048	$303,830	$311,108
Landing fee rate (per 1,000 pounds of landed weight)	$2.65	$2.48	$2.51	$2.76	$3.06	$3.27	$3.38	$3.72	$4.36	$4.61	$4.81
Cost per Enplaned Passenger											
Airline Revenues											
Terminal Building rentals	$8,088,623	$12,108,522	$11,086,925	$18,030,217	$23,821,732	$25,071,732	$25,782,982	$26,674,176	$27,253,704	$29,243,704	$30,017,927
Landing fees	$14,116,042	$18,462,932	$18,703,575	$20,614,512	$22,906,756	$24,537,103	$25,452,597	$28,060,626	$32,916,165	$34,884,152	$36,468,925
Apron fees	$3,326,283	$3,993,791	$4,029,800	$4,075,006	$5,430,127	$5,544,127	$5,660,127	$5,791,806	$5,940,967	$6,076,606	$6,222,167
Total	$25,530,948	$34,565,245	$33,820,301	$42,719,734	$53,158,615	$55,152,962	$56,895,706	$60,526,609	$66,110,835	$70,204,462	$72,709,019
Enplaned passengers	4,216,000	6,171,153	6,303,640	6,405,657	6,502,792	6,602,748	6,637,379	6,655,755	6,681,704	6,707,693	6,726,460
Airline cost per enplaned passenger	**$6.06**	**$5.60**	**$5.37**	**$6.67**	**$8.17**	**$8.35**	**$8.57**	**$9.09**	**$9.89**	**$10.47**	**$10.81**
Airline cost per net enplaned passenger [1/]	**$7.15**	**$6.61**	**$6.33**	**$7.87**	**$9.65**	**$9.86**	**$10.12**	**$10.73**	**$11.68**	**$12.35**	**$12.76**
Debt Service Coverage											
Net revenues	$22,833,370	$22,965,304	$23,412,951	$31,478,495	$40,783,187	$41,587,187	$41,602,437	$43,294,290	$46,958,109	$47,592,724	$47,963,545
GARB debt service	$	$	$-	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$9,292,800	$12,913,920	$12,913,920	$12,913,920
Coverage ratio (1.25x required)				**3.39**	**4.39**	**4.48**	**4.48**	**4.66**	**3.63**	**3.69**	**3.71**

NOTES: GARB = General Airport Revenue Bonds

1/ The calculation of airline cost per net enplaned passenger reflects the subtraction of an assumed 25 percent of nonrevenue passengers from the enplaned passenger denominator.

SOURCES: City of Dallas, Department of Aviation, August 2014 (Estimated FY 2014); Ricondo & Associates, Inc November 2015 (projections)
PREPAREDY BY Ricondo & Associates, Inc. November 2015

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8.6 Conclusion

The financial analysis presented in this section was conducted to show a feasible funding plan for implementing the Master Plan Update CIP. Based on analyses of forecast activity at the Airport, in addition to projected revenues and expenses, and the Master Plan Update CIP for FY 2015 through FY 2024, it appears that the City has adequate resources to meet the funding requirements for implementing the CIP. The City has access to various sources of funding, which include a mix of FAA funding, PFC revenues, Airport funds, and, perhaps most importantly, the ability to issue long-term debt in the form of GARBs. The airline rates and overall airline CPE remain reasonable over the initial 10-year planning period, showing expected significant increases only upon the issuance of revenue bonds. Debt service coverage is projected to be significantly above the minimum 1.25 times debt service (in accordance with the Bond Ordinance) throughout the initial 10-year planning period.

As implementation of the CIP progresses, Airport/City staff should continually assess the financial feasibility of each project included in the CIP. Future considerations regarding funding of the CIP include the following:

- **Enplaned passenger/traffic growth**: As applicable, the funding plan was developed and analyzed on the basis of the aviation activity forecasts developed for the Airport (see Section 3). Actual year-to-year numbers of enplaned passengers and aircraft operations will likely vary from the forecasts. Significant changes in numbers of enplaned passengers and aircraft operations may affect revenues and expenses, as well as PFC revenues and AIP grants.
- **Availability of AIP funds**: In developing the estimated funding plan for implementing the CIP, it was assumed that the FAA will continue to authorize and appropriate AIP grants for eligible projects. Because the level of authorized and appropriated AIP grant funds may vary from year to year, alternative funding sources may need to be identified if grants cannot be obtained for certain eligible projects. Conversely, the City should take full advantage of all available AIP grants, including potential discretionary grants. In developing the funding plan, a limited amount of discretionary grant funds was assumed. Because of the nature of many of the airfield-related CIP projects, it is likely that high-priority projects could compete favorably for any discretionary grants that may be available. Obtaining such grant funding may reduce the need for PFC revenues and/or Airport cash funding for certain projects, thereby allowing those funds to be used for other projects.
- **Potential increase in maximum PFC level**: Airport industry groups have requested that federal PFC regulations be amended to increase the maximum PFC level from the current $4.50 per eligible enplaned passenger. Although the FAA reauthorization bill enacted in February 2012 did not address this issue, it is possible that future reauthorization legislation will address it, with increasing industry pressure to raise the maximum PFC level. In developing the financial projections and the funding plan reflected in this section, it was assumed that the current $4.50 PFC in effect at the Airport will remain in effect for the entire planning period. If federal PFC regulations are amended and the maximum PFC level is increased, the City may choose to apply to the FAA for authorization to impose a higher PFC at the Airport.

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9. Environmental Overview

An environmental overview was conducted for the Airport and adjacent areas as part of the Master Plan Update to provide a general overview of the potential environmental consequences of the recommended development. An environmental overview differs from an EA or an Environmental Impact Statement (EIS) in the depth of analysis. This environmental overview, which discusses the environmental resource categories identified in FAA Orders 1050.1E, *Environmental Impacts: Policies and Procedures,*[1] and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions,*[2] is intended to provide decision-makers with an understanding of potential issues that could result from implementation of the preferred alternatives in the Master Plan Update. As discussed previously, major Airport development projects are recommended for implementation throughout the 20-year planning period. In general, these projects consist of taxiway reconfiguration, glideslope relocation, terminal area development, roadway reconfiguration, parking garage construction, potential hotel development, and land use/FBO redevelopment along Lemmon Avenue.

The environmental overview focuses only on the environmental effects that could result from implementation of the preferred development alternative presented in this Master Plan Update, rather than also discussing a "no action" alternative, as would be included in an EA or EIS. Existing conditions for each environmental resource category are documented in this section and, in general terms, the potential effects that may result from implementation of the full buildout of the preferred development alternative are identified. Interim stages of development will likely result in different environmental effects; however, interim stages were not assessed in the environmental overview. Detailed analyses of potential environmental consequences and associated mitigation measures related to the preferred alternative and other alternatives considered will be conducted pursuant to NEPA subsequent to publication of this Master Plan Update.

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[1] Federal Aviation Administration, Order 1050.1E, *Environmental Impacts: Policies and Procedures*, Change 1, effective March 20, 2006.

[2] Federal Aviation Administration, Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, effective April 28, 2006.

9.1 Aircraft Noise

9.1.1 GENERAL CHARACTERISTICS OF AIRCRAFT NOISE

Aircraft noise originates from both the engines and the airframe of an aircraft, but the engines are, by far, the most significant source of aircraft noise. Jet aircraft operations at the Airport are the primary source of noise disturbance in the Airport vicinity.

Loudness, measured in decibels (dB), is the most commonly used metric to describe noise. The A-weighted decibel (dBA) is used in aircraft noise analyses because it most closely associates sound frequencies with the sensitivity of the human ear.

Some common sounds on the dBA scale are listed in **Table 9-1**. As shown in the table, the relative perceived loudness of a sound doubles for each increase of 10 dBA, although a 10 dBA change corresponds to a factor of 10 in relative sound energy. Generally, sounds with differences of 2 dBA or less are not perceived to be noticeably different by most listeners. A noise event produced by a jet aircraft flyover is usually characterized by a buildup to a peak noise level as the aircraft approaches, and then a decrease in the noise level through a series of lesser peaks or pulses after the aircraft passes.

Table 9-1: Common Sounds on the A-Weighted Decibel Scale

SOUND	SOUND LEVEL (dBA)	RELATIVE LOUDNESS (APPROXIMATE dBA)	RELATIVE SOUND ENERGY
Rock music, with amplifier	120	64	1,000,000
Thunder, snowmobile (operator)	110	32	100,000
Boiler shop, power mower	100	16	10,000
Orchestral crescendo at 25 feet, noisy kitchen	90	8	1,000
Busy street	80	4	100
Interior of department store	70	2	10
Ordinary conversation, 3 feet away	60	1	1
Quiet automobiles at low speed	50	1/2	.1
Average office	40	1/4	.01
City residence	30	1/8	.001
Quiet country residence	20	1/16	.0001
Rustle of leaves	10	1/32	.00001
Threshold of hearing	0	1/64	.000001

SOURCE: U.S. Department of Housing and Urban Development, *Aircraft Noise Impact—Planning Guidelines for Local Agencies*, 1972.
PREPARED BY: Ricondo & Associates, Inc., August 2014.

The FAA has developed specific guidance and requirements for the assessment of aircraft noise to comply with NEPA requirements. The methodology to be used in conducting aircraft noise analyses is established in FAA Order 1050.1E. The FAA has determined that the cumulative noise exposure of individuals resulting from aircraft noise must be established in terms of the annual day-night average sound level (DNL) metric.

The Noise Control Program for the Airport was officially adopted by the Dallas City Council in December 1981 to provide a voluntary noise abatement and mitigation program that could be implemented over time. To balance the operating needs of the Airport with the needs of surrounding communities, the City adopted the *Dallas Love Field Policies*. These policies recognize Love Field's importance to the Dallas community at large and also establish a noise reduction goal aimed at minimizing the effects of aircraft operations at the Airport on surrounding neighborhoods.

Some of the most effective measures, among others, in the Noise Control Program include:

- **Noise Abatement Advisory Committee**: Members of this committee meet quarterly to review Airport operations, the effectiveness of the overall noise abatement procedures, incidents of non-compliance, records of noise complaints, and potential adjustments or improvements to the Noise Control Program.
- **Noise Monitoring and Flight Tracking System**: The Department of Aviation has installed 13 permanent noise monitors in key locations around the Airport. These monitors have the ability to collect noise, runway use, and flight track information for every aircraft arrival and departure at the Airport. The data are stored and can be referenced at any time for reporting purposes.
- **Noise Complaint Hotline**: Aircraft-related noise disturbances can be reported 24 hours a day to Department of Aviation Operations personnel. The disturbance is recorded and an investigation is initiated at that time. Aircraft operators that may have caused the disturbance are contacted and encouraged to comply with all voluntary noise abatement procedures in effect at the Airport.
- **Noise Abatement Information**: Noise abatement information provided to pilots and Airport users is a key to the effectiveness of the Noise Control Program. The Department of Aviation has installed signs at the runway ends informing pilots to follow noise abatement procedures. In addition to airfield signs, the Department of Aviation has published an information package that is updated and distributed on a regular basis to FBOs and pilots.
- **Nighttime Preferential Runway Use**: The Department of Aviation has adopted a policy that encourages the pilots of turbojet aircraft and all other aircraft weighing more than 12,500 pounds to use Runway 13R-31L. Nighttime hours are between 10:00 p.m. and 7:00 a.m.
- **Trinity Departure for Nighttime Operations on Runway 13R**: This voluntary procedure allows the use of a river route departure for turbojet aircraft and aircraft weighing more than 12,500 pounds when air traffic flow is to the south. ATC requests the use of Runway 13R for departures when traffic flows and safety conditions permit.
- **Noise Abatement Departure Profile**: This voluntary measure allows all departing aircraft to use a noise abatement departure profile to achieve a higher altitude more quickly and reduce takeoff noise over nearby residential areas.

- **Engine Run-up Restriction**: All engine maintenance run-ups are prohibited between 12:00 a.m. (midnight) and 6:00 a.m. The Department of Aviation has installed video recorders to monitor engine run-up areas during nighttime hours.
- **Prohibition of Training Flights**: No training flights are allowed at the Airport between 10:00 p.m. and 7:00 a.m.

The presence of sensitive noise receptors (residential uses, schools, hospitals, etc.) in proximity to the Airport was reviewed. A list of sensitive noise receptors is provided in Section 9.2. The Department of Aviation conducted noise analyses in 2001 for the updated Airport Master Plan, and in 2006 to assess impacts from the repeal of the Wright Amendment, as described below.

9.1.2 AIRCRAFT NOISE ANALYSIS METHODOLOGY

The methodology for analyzing aircraft noise consisted of: (1) the use of noise descriptors developed for aircraft noise analyses, (2) the use of a computer model to estimate aircraft noise levels, and (3) development of basic data and assumptions as input to the computer model.

9.1.2.1 Noise Descriptors

Following extensive research into the characteristics of aircraft noise and human response to that noise, a standard system of descriptors was developed. These descriptors, as used in this aircraft noise analysis, are as follows:

- **A-Weighted Sound Pressure Level (dBA)**: dBA is a frequency-weighted sound level (in decibels) that correlates with the way sound is heard by the human ear.
- **Maximum Noise Level (Lmax)**: Lmax is the maximum, or peak, sound level during a noise event. The Lmax metric accounts only for the instantaneous peak intensity of the sound, and not for the duration of the event. Some sound level meters measure the maximum, or Lmax, level of aircraft noise events.
- **Sound Exposure Level (SEL)**: SEL is a time-integrated measure, expressed in decibels, of the sound energy of a single noise event. The sound level is integrated over the period that the level exceeds a threshold (normally 65 dBA for aircraft noise events). Therefore, SEL accounts for the duration of the sound. SELs for aircraft noise events depend on the location of the aircraft, the type of operation (landing, takeoff, or overflight), and the type of aircraft.
- **A-weighted Day-Night Average Sound Level (DNL)**: DNL is expressed in dBA and represents the average A-weighted sound level over a 24-hour period. For each hour during the nighttime period (10:00 p.m. to 7:00 a.m.), the average sound levels are increased by a 10 decibel weighting penalty (equivalent to a tenfold increase in aircraft operations) before the 24 hour average is computed. This weighting penalty accounts for the more intrusive nature of noise during nighttime and early morning hours.

DNL, as used in the aircraft noise analysis for this environmental overview, is expressed as an A-weighted average noise level on the basis of annual aircraft operations during a calendar year. To calculate the DNL at a specific location, SELs for that location are determined for each aircraft operation (landing or takeoff). The

SEL for each operation is then adjusted to reflect the duration of the operation and arrive at a "partial" DNL for the operation. The partial DNLs are then added logarithmically with the appropriate penalty for those operations occurring during nighttime hours to determine the total aircraft noise exposure for the calendar year.

DNL is used to describe the existing and predicted cumulative aircraft noise exposure for communities in airport environs in most of the United States, and to estimate the effects of airport operations on land use compatibility. DNL has been widely accepted as the best available method to describe aircraft noise exposure and is the noise descriptor required by all federal agencies, including the FAA, for use in aircraft noise exposure analyses and noise compatibility planning.

9.1.2.2 Integrated Noise Model

The Integrated Noise Model (INM) is an FAA computer model used to develop aircraft noise exposure maps, and is the accepted industry standard, state-of-the-art tool for determining the total effect of aircraft noise at and around airports. Version 7.0d of the INM was used for the Master Plan Update noise analysis.

The noise data contained in the INM aircraft database include a representation of commercial, general aviation, and military aircraft powered by turbojet, turbofan, or propeller-driven engines, and reflect average aircraft operating conditions at an average airport. The database contains the following information for each aircraft: (1) a set of departure profiles for each applicable trip length, (2) a set of approach parameters, and (3) SEL versus distance curves for several thrust settings.

The INM uses the aircraft characteristics combined with conditions specific to an airport, such as runway geometry, runway use flight tracks, etc., to create noise exposure contours based on the DNL noise descriptor.

9.1.2.3 DNL and Noise Exposure Ranges

DNL 75, 70, and 65 were used as the criterion levels for the aircraft noise analysis. Three specific ranges of noise exposure were estimated and analyzed: (1) DNL 75+, (2) DNL 70 to 75, and (3) DNL 65 to 70. Areas exposed to DNL 75+ are considered to experience "severe" aircraft noise conditions, while areas exposed to DNL 65 to 75 are considered to experience "significant" aircraft noise conditions.

9.1.2.4 Noise Exposure Maps

Noise exposure contours are lines on a map that connect points of equal DNLs. For example, a contour may be drawn to connect all points with a DNL of 70; another may be drawn to connect all points with a DNL of 65, and so forth. Generally, noise exposure contours are plotted at 5-dBA intervals. For this environmental overview, noise exposure contours were plotted for DNL 75, 70, 65, and 60. DNL 60 contours have been included on the noise exposure maps for context and reference for this noise level.

9.1.3 2001 DALLAS LOVE FIELD AIRPORT IMPACT ANALYSIS/MASTER PLAN

For the 2001 *Dallas Love Field Airport Impact Analysis/Master Plan*, a noise impact analysis was conducted using the INM and actual data from the Airport noise monitoring system. Noise contours and peak period data were developed to determine the impacts associated with the growth scenario considered and the required related facility development.

According to the 2001 noise analysis, the population exposed to DNL 65 was projected to decrease from nearly 27,000 people in 1998 to 23,000 people in 2010 because of new, quieter aircraft that were scheduled to replace older models, along with voluntary noise control program.

9.1.4 2006 DALLAS LOVE FIELD IMPACT ANALYSIS UPDATE

Following the opening of DFW in 1974, airline service at Love Field was limited under the restrictions of the Wright/Shelby Amendments, as previously discussed. These federal regulations restricted flights and destinations served from Dallas Love Field to protect DFW from nearby competition. These restrictions were gradually phased out and a complete repeal of the Wright/Shelby Amendments was completed in October 2014.

The noise analysis conducted for the 2006 *Dallas Love Field Impact Analysis Update* included an assessment of the impacts that would occur under the expected future air service in the absence of the restrictions in the Wright/Shelby Amendments, and those impacts were compared with the results of the *Dallas Love Field Airport Impact Analysis/Master Plan* published in 2001.

The 2006 noise analysis determined the following:

- The level of noise resulting from the 20-Gate No Wright Amendment scenario decreased from that estimated for the 2001 Airport Master Plan 32-Gate scenario, while the level of noise resulting from the 32-Gate No Wright Amendment scenario increased. **Table 9-2** summarizes the inputs and comparative results from the computer modeling of each scenario.
- The DNL 65 noise exposure contour for the 20-Gate No Wright Amendment scenario is approximately 4.3 percent smaller than the DNL 65 noise exposure contour for the 2001 Master Plan 32-Gate scenario, and would affect approximately 3,800 fewer people.
- The DNL 65 noise exposure contour for the 32-Gate No Wright Amendment scenario is approximately 4.0 percent larger than the DNL 65 noise exposure contour for the 2001 Master Plan 32-Gate scenario, and would affect approximately 4,350 additional people.

In each of the No Wright Amendment scenarios, the 2001 Master Plan 32-Gate regional jet fleet mix was replaced for the most part by standard air carrier jets. These aircraft are larger and have a louder noise footprint than the Canadair Regional Jet (CRJ), Embraer 135, and Embraer 145 aircraft assumed in the 2001 Master Plan analysis. Furthermore, some of the standard jets were assumed to depart at heavier takeoff weights to serve more distant nonstop destinations than were possible under the Wright/Shelby Amendments.

Table 9-2: Comparison of Area and Population for Various Noise Impact Scenarios

NOISE EXPOSURE LEVEL	32 GATES 2001 MASTER PLAN SQUARE MILES	32 GATES 2001 MASTER PLAN AFFECTED POPULATION	20 GATES NO WRIGHT AMENDMENT SQUARE MILES	20 GATES NO WRIGHT AMENDMENT AFFECTED POPULATION	32 GATES NO WRIGHT AMENDMENT SQUARE MILES	32 GATES NO WRIGHT AMENDMENT AFFECTED POPULATION
DNL 65 and Higher	4.6	24,872	4.4	21,045	4.8	29,219
DNL 70 and Higher	1.9	2,686	1.8	2,620	2	2,655
DNL 75 and Higher	0.9	-	0.8	-	0.9	-

NOTE: DNL = Day-Night Average Sound Level, expressed in A-weighted decibels.

SOURCE: City of Dallas, *Dallas Love Field Impact Analysis – In the Absence of the Wright Amendment*, May 2006.
PREPARED BY: Ricondo & Associates, Inc., April 2014.

9.1.5 2013 DALLAS LOVE FIELD NOISE EXPOSURE CONTOURS

The Department of Aviation analyzed 2013 aircraft operations at DAL to prepare noise exposure contours. The 2013 noise exposure contours reflect the effect of operations during the entire calendar year. Total operations were obtained from the FAA ATADS. **Table 9-3** lists 2013 operations data used to develop the noise exposure contours. The 2013 contours were developed using the latest available version of the FAA INM (Version 7.0d) and a data preprocessor called RealContours™. RealContours™ converts every usable 2013 radar flight track into input for the INM, ensuring that the modeling includes runway closures, deviations from flight tracks, changes in flight schedules, and deviations from average runway use. This process resulted in the modeling of more than 150,000 flight tracks to develop the 2013 noise exposure contours.[3]

Table 9-3: 2013 Modeled Average Daily FAA Category Operations

FAA OPERATIONAL CATEGORY	2013 OPERATIONS FAA AIR TRAFFIC ACTIVITY DATA SYSTEM	2013 OPERATIONS AVERAGE ANNUAL DAY MODELED OPERATIONS
Air Carrier	88,028	242.39
Air Taxi	33,302	91.24
General Aviation	55,122	152.45
Military	965	-
Total	**177,417**	**486.07**

NOTES: Columns may not add to totals shown because of rounding. Average annual day air carrier and air taxi include the military counts. The 965 annual military operations from ATADS were distributed over the air carrier and general aviation group totals with a 46% to 54% split respectively.

SOURCE: HMMH, Inc., *Dallas Love Field, 2013 Day-Night Average Sound Level Contours*, July 29, 2014.
PREPARED BY: Ricondo & Associates, Inc., August 2014.

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[3] HMMH, Inc., *Dallas Love Field, 2013 Day-Night Average Sound Level Contours*, July 29, 2014.

These contours were used in conjunction with 2010 U.S. Census data to estimate the number of people that reside within the area exposed to DNL 65, between the area exposed to DNL 60 and DNL 65, between the area exposed to DNL 65 and DNL 70, between the area exposed to DNL 70 and DNL 75, and within the area exposed to DNL 75 and higher.

Results of the 2013 DNL noise exposure analysis show that a total area of 6.01 square miles is exposed to DNL 60, which includes a total of 30,049 residents. The area exposed to DNL 65 consists of approximately 2.17 square miles, which includes a population of 3,091 (see **Table 9-4**). The 2013 noise exposure contours are illustrated over the Dallas Love Field vicinity land use on **Exhibit 9-1**.

Table 9-4: Estimated Area and Population Exposed to Aircraft Noise

	(2010 US CENSUS DATA)	
DNL (DBA)	**AREA (SQUARE MILES)**	**POPULATION**
60-65	3.84	26,958
>65	2.17	3,091
65-70	1.37	3,088
70-75	0.42	3
>75	0.38	0

SOURCES: HMMH, Inc., *Dallas Love Field, 2013 Day-Night Average Sound Level Contours*, July 29, 2014; U.S. Decennial Census, 2010.
PREPARED BY: Ricondo & Associates, Inc., August 2014.

9.1.5.1 Comparison of 1998, 2000, 2006, and 2013 Noise Exposure Contours

The overall land area and population exposed to Airport-related aircraft noise exposure decreased significantly between 1998 and 2013. **Exhibit 9-2** presents a comparison of the 2013 noise exposure contours with the 1998, 2000, and 2006 noise exposure contours[4, 5] for the same DNL 60 through DNL 75 range. The 1998 and 2000 contours were developed as part of the noise analysis for the 2001 Master Plan. Noise levels decreased notably in nearly all areas between 1998 and 2013. Since 2006, decreases between 4 and 5 dBA have been recorded for aircraft departures in areas directly off the end and along the side of all runways and decreases between 2 and 3 dBA have been recorded for aircraft arrivals in the extended runway centerline regions following runway centerlines.[6, 7]

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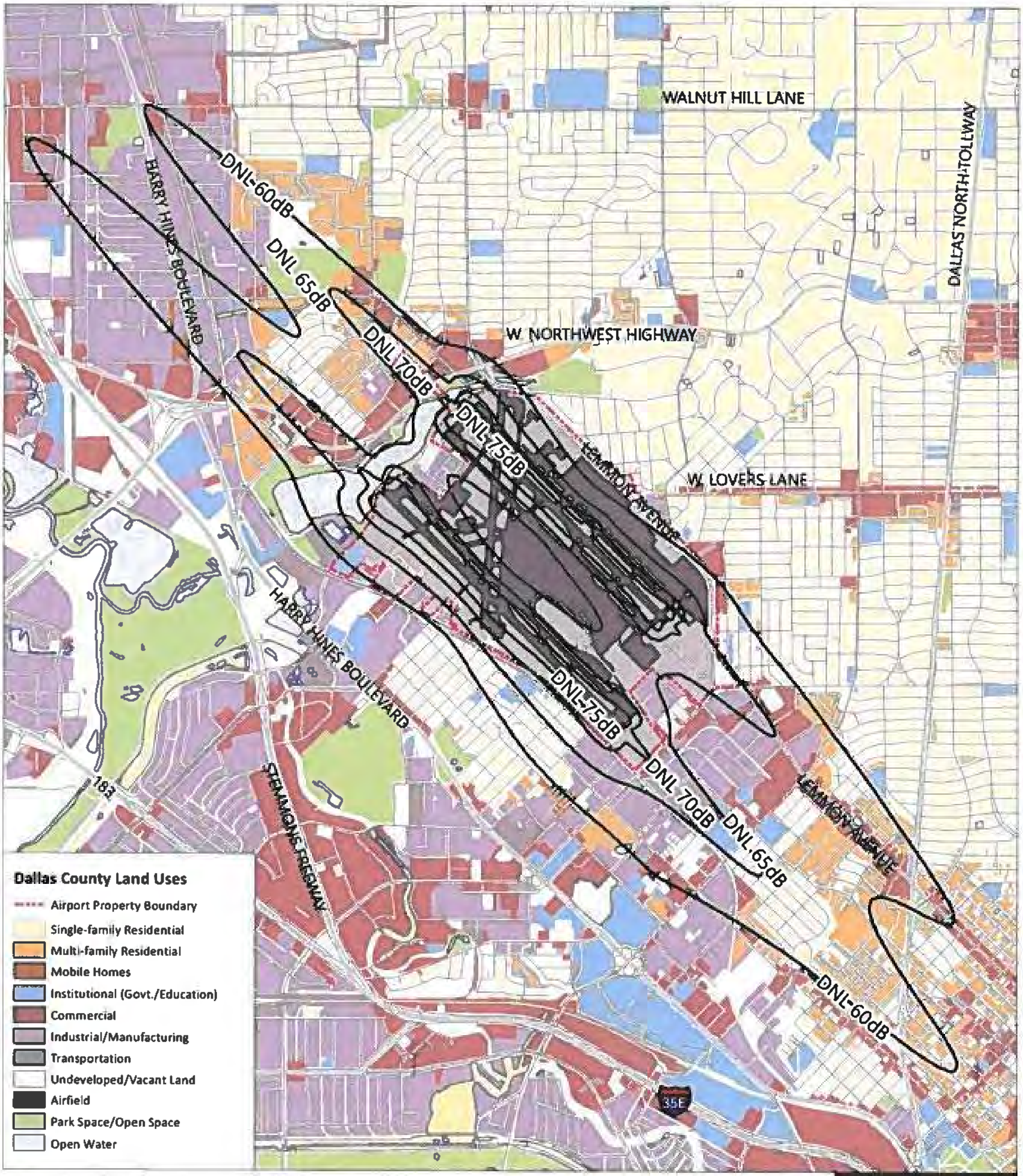
[4] City of Dallas, Department of Aviation, *Dallas Love Field Impact Analysis Update – In the Absence of the Wright Amendment*, May 31, 2006.

[5] City of Dallas, Department of Aviation, *Dallas Love Field Airport Impact Analysis/Master Plan*, March 2001.

[6] HMMH, Inc., *Dallas Love Field, 2013 Day-Night Average Sound Level Contours*, July 29, 2014.

[7] City of Dallas, Department of Aviation, *Dallas Love Field Airport Impact Analysis/Master Plan*, March 2001.



NOTES dB = Decibels; DNL = Day-night average sound level, in A-weighted decibels
SOURCES North Central Texas Council of Governments, GIS Clearinghouse, June 2010; HMMH Inc Dallas Love Field 2013 Day Night Average Sound Level Contours, July 2014
PREPARED BY Ricondo & Associates, Inc November 2014

EXHIBIT 9-1

2013 Noise Exposure in the Airport Vicinity

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NOTES: dB = Decibels; DNL = Day-night average sound level, in A-weighted decibels

SOURCES: Ricondo & Associates, Inc., DAL Airport Layout Plan, December 2013; City of Dallas, Department of Aviation, *Airport Impact Analysis/Master Plan*, March 2001; HMMH, Inc. Dallas Love Field 2013 Day-Night Average Sound Level Contours, July 2014; ESRI Database (Aerial Imagery), 2011

PREPARED BY: Ricondo & Associates, Inc., November 2014

EXHIBIT 9-2

NORTH 0 3,500 ft.

Noise Exposure Contour Comparison (1998-2013)

Drawing: Z:\Love Field\Master Plan Inventory\Environmental Overview\CAD\DAL_EO_9-2_Noise_20140812.dwg Layout: 5x11L Plotted: May 14, 2015 11:40AM

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The estimated land area within each 5 dBA noise exposure interval is summarized in **Table 9-5**; between 1998 and 2013, the areas exposed to noise higher than DNL 65 decreased 64 percent, from 6.06 square miles to 2.17 square miles. The estimated population (based on 2000 and 2010 U.S. Census data) within each 5 dBA noise exposure interval is summarized in **Table 9-6**. Between 1998 and 2013, the population exposed to noise higher than DNL 65 decreased 89 percent, from 27,698 to 3,091. Between 2006 and 2013, the population exposed to DNL 65 and higher decreased 82 percent, from 16,798 to 3,091. The proportionally larger decrease in population compared with the area exposed to aircraft noise resulted from a reduction in operations (the 2006 noise contours reflect 784 annual average day operations and the 2013 noise contours reflect 486 annual average day operations), improvements in aircraft performance, and quieter engine technology of the modern aircraft fleet. With the reduced area exposed to aircraft noise in residential areas, the population exposed to aircraft noise also decreased.[8]

Table 9-5: Estimated Land Area within Noise Exposure Contours (in square miles)

DNL (dBA)	1998	2000	2006	2013
60-65	7.18	6.29	5.71	3.84
>65	6.06	5.57	4.19	2.17
65-70	3.27	2.89	2.68	1.37
70-75	1.55	1.40	1.08	0.42
>75	0.56	1.25	0.43	0.38

NOTE: Airport property is included in the land areas shown in the table (1.93 square miles.)

SOURCES: City of Dallas, Department of Aviation, *Dallas Love Field Airport Impact Analysis/Master Plan*, March 2001; HMMH, Inc., *Dallas Love Field, 2013 Day-Night Average Sound Level Contours*, July 29, 2014.

PREPARED BY: Ricondo & Associates, Inc., August 2014.

Table 9-6: Estimated Population within Noise Exposure Contours

	(2010 US CENSUS DATA)			
DNL (dBA)	1998	2000	2006	2013
60-65	32,088	34,836	42,603	26,958
>65	27,698	27,329	16,798	3,091
65-70	24,785	26,029	15,858	3,088
70-75	2,660	1,214	936	3
>75	253	86	4	0

SOURCES: City of Dallas, Department of Aviation, *Dallas Love Field Airport Impact Analysis/Master Plan*, March 2001; HMMH, Inc., *Dallas Love Field, 2013 Day-Night Average Sound Level Contours*, July 29, 2014; U.S. Decennial Census, 2010.

PREPARED BY: Ricondo & Associates, Inc., August 2014.

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[8] HMMH, Inc., *Dallas Love Field, 2013 Day-Night Average Sound Level Contours*, July 29, 2014.

9.2 Compatible Land Use

Existing land use plans and policies that affect development in the vicinity of the Airport are described in Section 7 and summarized below. Refer to Section 7 for detailed on-Airport and off-Airport land use information.

9.2.1 ON-AIRPORT LAND USES

The Airport is located on 1,256 acres of land approximately 4 miles north of the Dallas Central Business District, and is the only commercial airport that operates within Dallas City limits. Airfield facilities consist of two parallel runways and one crosswind runway, along with associated taxiways and support facilities, including the ATCT, the ARFF station, and general aviation facilities.

9.2.2 SURROUNDING LAND USES AND LAND USE PLANS

Land in the vicinity of the Airport is densely developed, as the Airport is located within 4 miles of downtown Dallas. **Table 9-7** lists suggested land use compatibility guidelines as they relate to aircraft noise exposure. The primary land uses immediately surrounding the Airport are shown on Exhibit 9-1. The predominant land use north of the Airport consists of single-family residential neighborhoods along with some commercial parcels. Bachman Lake and Bachman Lake Park are the predominant land uses immediately northwest of the Airport. The area southwest of the Airport is mostly developed in single-family residential uses, with industrial areas surrounding the residential development. Existing land use south of the Airport consists of industrial and commercial uses adjacent to the Airport, with multifamily residential, commercial, and institutional uses beyond the industrial district. Land use southeast of the Airport is dominated by industrial uses with a mix of commercial developments along Mockingbird Lane and Lemmon Avenue. East of the Airport along Lemmon Avenue is a small corridor of commercial uses with predominantly residential uses beyond.

Table 9-8 lists the sensitive land uses within 1.0 mile of the Airport boundary, specifically schools, religious institutions, and healthcare facilities.

As shown in Table 9-8, 62 sensitive land uses are located within 1.0 mile of the Airport boundary. Of these land uses, 13 are schools, 30 are religious institutions, 6 are healthcare facilities, and 13 are parks. The following eight sensitive land uses are located within the area exposed to DNL 65 and higher in 2013: Obadiah Knight Elementary School, Thomas J Rusk Middle School, Bethany Missionary Baptist Church, El Buen Samaritano Methodist Church, United in Christ Baptist Church, Weichsel Park, Overlake Park, and Bachman Lake Park.

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Table 9-7: Suggested Land Use Compatibility Guidelines in Aircraft Noise Exposure Areas

LAND USE	DNL 65 TO 70	DNL 70 TO 75	DNL 75+
Residential			
Residential Other than Mobile Homes and Transient Lodgings	NLR required[1/]	NLR required[1/]	Incompatible
Mobile Homes	Incompatible	Incompatible	Incompatible
Transient Lodgings	NLR required[1/]	NLR required[1/]	Incompatible
Public Use			
Schools, Hospitals, and Nursing Homes	NLR required[1/]	NLR required[1/]	Incompatible
Churches, Auditoriums, and Concert Halls	NLR required[1/]	NLR required[1/]	Incompatible
Governmental Services	Compatible	NLR required	NLR required
Transportation	Compatible	Compatible[2/]	Compatible[2/]
Parking	Compatible	Compatible[2/]	Compatible[2/]
Commercial Use			
Offices, Businesses, and Professional	NLR required	NLR required	NLR required[2/]
Wholesale and Retail—Building Materials, Hardware, and Farm Equipment	Compatible	Compatible[2/]	Compatible[2/]
Retail Trade—General	NLR required	NLR required	NLR required
Utilities	Compatible	Compatible[2/]	Compatible[2/]
Communication	NLR required	NLR required	NLR required
Manufacturing and Production			
Manufacturing—General	Compatible	Compatible[2/]	Compatible[2/]
Photographic and Optical	Compatible	NLR required	NLR required
Agriculture (Except Livestock) and Forestry	Compatible	Compatible	Compatible
Livestock Farming and Breeding	Compatible	Compatible	Incompatible
Mining and Fishing Resources Production and Extraction	Compatible	Compatible	Compatible
Recreational			
Outdoor Sports Arenas and Spectator Sports	Compatible[3/]	Compatible[3/]	Incompatible
Outdoor Music Shells, Amphitheaters	Incompatible	Incompatible	Incompatible
Nature Exhibits and Zoos	Compatible	Incompatible	Incompatible
Amusements, Parks, Resorts, and Camps	Compatible	Compatible	Incompatible
Golf Courses, Riding Stables, and Water Recreation	Compatible	Compatible	Incompatible

NOTES:

DNL= Day-night average sound level, in A-weighted decibels.

Compatible= Generally, no special noise attenuating materials are required to achieve an interior noise level of DNL 45 in habitable spaces, or the activity (whether indoors or outdoors) would not be subject to a significant adverse effect by the outdoor noise level.

Incompatible= Generally, the land use, whether in a structure or an outdoor activity, is considered to be incompatible with the outdoor noise level even if special attenuating materials were to be used in the construction of the building.

NLR = Noise Level Reduction. NLR is used to denote the total amount of noise transmission loss in decibels required to reduce an exterior noise level in habitable interior spaces to DNL 45. In most places, typical building construction automatically provides an NLR of 20 decibels. Therefore, if a structure is located in an area exposed to aircraft noise of DNL 65, the interior noise level would be about DNL 45. If the structure is located in an area exposed to aircraft noise of DNL 70, the interior noise level would be about DNL 50, so an additional NLR of 5 decibels would be required if not afforded by the normal construction. This NLR can be achieved through the use of noise attenuating materials in the construction of the structure.

1/ The land use is generally incompatible with aircraft noise and should only be permitted in areas of infill in existing neighborhoods or where the community determines that the use must be allowed.

2/ NLR required in offices or other areas with noise-sensitive activities.

3/ Provided that special sound reinforcement systems are installed.

SOURCE: Ricondo & Associates, Inc., January 2000, as derived from the U.S. Department of Transportation, Federal Aviation Administration, Federal Aviation Regulations Part 150, *Airport Noise Compatibility Planning*, Code of Federal Regulations, Title 14, Chapter I, Subchapter I, Part 150, Table 1, January 18, 1985, as amended.

PREPARED BY: Ricondo & Associates, Inc., August 2014.

Table 9-8 (1 of 2): Sensitive Land Uses within One Mile of the Airport Boundary

NUMBER	CATEGORY	NAME	ADDRESS	WITHIN DNL 65
1	School	Henry W Longfellow Career Exploration Academy	5314 Boaz Street	No
2	School	Julian T Saldivar Elementary School	9510 Brockbank Drive	No
3	School	K. B. Polk Center for Academically Talented and Gifted	6911 Victoria Avenue	No
4	School	Maple Lawn Elementary School	3120 Inwood Road	No
5	School	Oak Hill Academy	9407 Midway Road	No
6	School	Obadiah Knight Elementary School	2615 Anson Road	Yes
7	School	Onesimo Hernandez Elementary School	5555 Maple Avenue	No
8	School	Our Lady of Perpetual Help School	7625 Cortland Avenue	No
9	School	Providence Christian School of Texas	5002 W. Lovers Lane	No
10	School	Stephen C. Foster Elementary School	3700 Clover Lane	No
11	School	Sudie L. Williams Elementary School	4518 Pomona Road	No
12	School	Thomas J. Rusk Middle School	2929 Inwood Road	Yes
13	School	Williams Preparatory School	1750 Viceroy Road	No
14	Religious Institution	Bethany Missionary Baptist Church	6710 Webster Street	Yes
15	Religious Institution	Cathedral of Hope	5738 Cedar Springs Road	No
16	Religious Institution	Cathedral of Hope	5910 Cedar Springs Road	No
17	Religious Institution	Central Christian Church	4711 Westside Drive	No
18	Religious Institution	Church of God - Love Field	2634 Langdon Avenue	No
19	Religious Institution	Church of Jesus Christ of Latter Day Saints	9509 Midway Road	No
20	Religious Institution	Coaches Outreach Ministry	2621 W. Mockingbird Lane	No
21	Religious Institution	El Buen Samaritano Methodist Church	2903 Cherrywood Avenue	Yes
22	Religious Institution	Faith Tabernacle Church	7523 Thurston Street	No
23	Religious Institution	Gilford Avenue Missionary Baptist	2146 Gilford Street	No
24	Religious Institution	Greater Zion Baptist Church	4751 Hopkins Avenue	No
25	Religious Institution	Holy Spirit Association for the Unification of World Christianity	1922 Anson Road	No
26	Religious Institution	Iglesia de Cristo	2145 Empire Central	No
27	Religious Institution	Jehovah's Witnesses	5308 W. Mockingbird Lane	No
28	Religious Institution	Knights Chapel Methodist Church	6615 Tyree Street	No
29	Religious Institution	Korean Dallas Christian Service	2829 W. Northwest Highway	No
30	Religious Institution	Macedonia Missionary Church	6635 Roper Street	No
31	Religious Institution	Migration Refugee Service	5415 Maple Avenue #414	No
32	Religious Institution	North Park Church of God	6533 Victoria Avenue	No
33	Religious Institution	North Park CME Church	6725 Tyree Street	No

Table 9-8 (2 of 2): Sensitive Land Uses within One Mile of the Airport Boundary

NUMBER	CATEGORY	NAME	SCHOOL ADDRESS	WITHIN 65dB DNL?
34	Religious Institution	North Park Missionary Baptist Church	6927 Roper Street	No
35	Religious Institution	Our Lady of Perpetual Help Church	7617 Cortland Avenue	No
36	Religious Institution	River of Life Church	5202 Wateka Drive	No
37	Religious Institution	St. Luke's Baptist Church	6702 Victoria Avenue	No
38	Religious Institution	St. Luke's Love Field United	2408 Gilford Street	No
39	Religious Institution	St. Thomas the Apostle Church	6525 Inwood Road	No
40	Religious Institution	Templo El Redentor	8519 Craighill Avenue	No
41	Religious Institution	United in Christ Baptist Church	7715 Denton Drive	Yes
42	Religious Institution	University Church of Christ	6540 Victoria Avenue	No
43	Religious Institution	Whitlow Missionary Baptist Church	3810 Thedford Avenue	No
44	Healthcare Facility	Center for Bio-Behavioral/Doctors Directory	5909 Harry Hines Boulevard	No
45	Healthcare Facility	Dallas Rehabilitation Institute	2124 Research Row	No
46	Healthcare Facility	Life Care Hospital of North Texas	6161 Harry Hines Boulevard	No
47	Healthcare Facility	Pine Creek Medical Center	9032 Harry Hines Boulevard	No
48	Healthcare Facility	St. Paul University Hospital	5909 Harry Hines Boulevard	No
49	Healthcare Facility	Texas Serenity Metroplex	2708 Inwood Road	No
50	Park	Weichsel Park	5700 Cedar Springs Road	Yes
51	Park	Cherrywood Park	Cedar Springs Road	No
52	Park	Overlake Park	Overlake Drive	Yes
53	Park	Midway Manor Park	Lemmon Avenue	No
54	Park	Bluff View Park	Pomona Road	No
55	Park	Field-Frazier Park	Bluff View Boulevard	No
56	Park	Grauwyler Park	Harry Hines Boulevard	No
57	Park	K.B. Polk Park	Thedford Avenue	No
58	Park	Fishing Hole Lake	Storey Lane	No
59	Park	Hines (Elm Fork) Park	2200 Walnut Hill Lane	No
60	Park	Elm Fork Greenbelt	Stemmons Freeway	No
61	Park	Bachman Creek Greenbelt	Shorecrest Drive	No
62	Park	Bachman Lake Park	3500 Northwest Highway	Yes

SOURCES: City of Dallas Schools, www.nces.ed.gov (accessed April 2013); Google Earth Pro, 2013; North Central Texas Council of Governments, Geographical Information System Clearinghouse, June 2010; Ricondo & Associates, Inc., April 2013.

PREPARED BY: Ricondo & Associates, Inc., April 2014.

9.3 Demographics and Socioeconomic Profile

Socioeconomics encompasses the activities and resources associated with the everyday human environment, particularly related to population centers, their demographics, and the economic activities generated. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was enacted in 1994. The purpose of this Executive Order is to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, tribal, and local programs and policies. Environmental justice concerns must be considered for populations in the vicinity of a proposed project funded by the federal government.

A series of census tracts in the immediate vicinity of the Airport was identified for socioeconomic analysis. **Exhibit 9-3** depicts these census tracts in relation to Airport property. The tables that follow the exhibit provide information on the communities surrounding the Airport. The Airport and adjacent tracts include Census Tracts 4.06, 71.02, 73.02, and 9801.

The population of these census tracts is predominantly white (46.2 percent), with Hispanics or Latinos accounting for the next largest ethnic group (see **Table 9-9**).[9] A mix of median household incomes, ranging from $38,419 for Census Tract 4.06 to $131,477 for Census Tract 73.02, is represented in the tracts of interest (see **Table 9-10**). No data are provided for Census Tract 9801 because it consists mainly of Airport property, on which there are no residences.

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[9] This calculation is representative of "race alone or in combination with another race" of the total population (U.S. Census, 2010).

SOURCES: North Central Texas Council of Governments, 2010 U.S. Census Tracts, http://www.nctcog.org/index.asp (accessed online: June 4, 2012); ESRI Online Database, (Aerial Imagery), 2011.
PREPARED BY: Ricondo & Associates, Inc., November 2014

EXHIBIT 9-3

NORTH

0 2,600 ft

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U.S. Census Tracts (2010)

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Table 9-9: Demographic and Socioeconomic Data

	DALLAS COUNTY		CITY OF DALLAS		AIRPORT AND ADJACENT CENSUS TRACTS	
	ESTIMATE	PERCENT	ESTIMATE	PERCENT	ESTIMATE	PERCENT
Race [1/]						
Total Population	2,379,214	100.0%	1,207,202	100.0%	19,000	100.0%
White	1,409,404	59.2%	692,090	57.3%	8,774	46.2%
Black or African American	546,901	23.0%	307,333	25.5%	3,056	16.1%
American Indian and Alaska Native	31,054	1.3%	13,242	1.1%	845	4.4%
Asian	133,477	5.6%	39,062	3.2%	863	4.5%
Native Hawaiian and Other Pacific Islander	2,773	0.1%	1,042	0.1%	9	<0.1%
Some Other Race	317,014	13.3%	180,639	15.0%	6,767	35.6%
Hispanic or Latino and Race						
Total Population	2,379,214	100.0%	1,207,202	100.0%	19,000	100.0%
Hispanic or Latino (of any race)	908,199	38.2%	507,405	42.0%	10,249	53.9%
Not Hispanic or Latino	1,471,015	61.8%	699,797	58.0%	8,751	46.1%
Median Household Income	$49,159	NA	$42,436	NA	See Table 9-10	
Persons below Poverty Level	18.8%	NA	23.6%	NA	See Table 9-10	

NOTES: NA = NOT AVAILABLE

1/ This calculation is representative of "race alone or in combination with another race" of the total population. Some respondents may identify with more than one race; therefore, total percentages could exceed 100 percent.

SOURCE: U.S. Department of Commerce, Bureau of the Census, *2008-2012 American Community Survey 5-Year Estimates*, http://factfinder.census.gov (accessed February 26, 2014).

PREPARED BY: Ricondo & Associates, Inc., February 2014.

Table 9-10: Income Data by Census Tract

CENSUS TRACT	MEDIAN HOUSEHOLD INCOME	PERCENT OF POPULATION BELOW THE POVERTY LEVEL [1/]
4.06	$38,419	32.2%
71.02	$52,253	19.7%
73.02	$131,477	11.6%
9801 [2/]	NA	NA

NOTES: NA = NOT AVAILABLE.

1/ Poverty level is $10,890 for one person and an additional $3,820 for each additional family member in the lower 48 contiguous United States and Washington, D.C., according to the U.S. Department of Health and Human Services, 2011.

2/ Census Tract 9801 consists mainly of Airport property, which includes no residences. Thus, median income and percent of population below the poverty level are not available.

SOURCE: U.S. Department of Commerce, Bureau of the Census, *2008-2012 American Community Survey 5-Year Estimates*, http://factfinder.census.gov (accessed: February 26, 2014).

PREPARED BY: Ricondo & Associates, Inc., February 2014.

9.4 Social Impacts

Aviation-related development affects not only the natural environment, but also the human environment. Therefore, consideration of social impacts is required to determine the potential effects of Airport development on the human environment. The types of social impacts that generally result from airport development are:

- Relocation of residences and/or businesses
- Surface traffic patterns
- Disruption of established communities
- Disruption of orderly, planned development
- Creation of an appreciable change in employment
- Roadway noise

Potential impacts from implementation of the preferred alternative on the social categories listed above are discussed in Section 9.19.1.

9.4.1 DEMOGRAPHICS AND SOCIOECONOMIC STATUS

Table 9-9 presents the general demographics of Dallas County and the City of Dallas as well as a comparison of these areas to the Airport and adjacent U.S. Census tracts. Table 9-10 lists the income data for the U.S. Census tracts surrounding the Airport.

9.4.2 SURFACE TRAFFIC PATTERNS

9.4.2.1 Existing Traffic

The traffic analysis for the Airport Master Plan Update, conducted in 2014, included a level-of-service analysis of intersections along Airdrome Drive, Lemmon Avenue, Mockingbird Lane, Cedar Springs Road/Herb Kelleher Way, and Denton Drive. These intersections were monitored during peak morning and afternoon hours. Traffic conditions are described in further detail in Section 4. Level-of-service definitions for roadway traffic are provided in **Table 9-11**. The threshold of acceptable roadway level-of-service during peak periods at most airports is typically LOS D or better.

Table 9-11: Traffic Level of Service Definitions

LOS	**A**	**B**	**C**	**D**	**E**	**F**
CONDITION	**Excellent**	**Very good**	**Good**	**Fair**	**Poor**	**Failure**
DESCRIPTION	Traffic is free flowing, with low volumes and high speeds	Drivers have reasonable freedom to select their speed and lane of operation	Drivers become restricted in their ability to select their speed or to change lanes	Drivers have little freedom to maneuver and driving comfort levels are low	Roadway is operating at or near capacity	Forced flow operations where excessive roadway queuing develops

SOURCE: Ricondo & Associates, Inc., based on information published in Transportation Research Board, *Highway Capacity Manual*, 2010.
PREPARED BY: Ricondo & Associates, Inc., August 2014.

- Lemmon Avenue and Airdrome Drive intersection:
  - a.m. peak: LOS C
  - p.m. peak: LOS C
- Lemmon Avenue and Mockingbird Lane intersection:
  - a.m. peak: LOS C
  - p.m. peak: LOS C
- Airdrome Drive and Mockingbird Lane intersection:
  - a.m. peak: LOS B
  - p.m. peak: LOS C
- Mockingbird Lane and Cedar Springs Road/Herb Kelleher Way intersection:
  - a.m. peak: LOS D
  - p.m. peak: LOS D
- Mockingbird Lane and Denton Drive intersection:
  - a.m. peak: LOS B
  - p.m. peak: LOS C

Existing (2014) traffic conditions near the Airport range from "very good" to "fair" (at the intersection of Mockingbird Lane and Cedar Springs Road/Herb Kelleher Way). This intersection provides access to the Airport Main Terminal area and exhibits the greatest level of congestion in the area surrounding the Airport.

9.5 Air Quality

9.5.1 REGULATORY REQUIREMENTS

The federal Clean Air Act, as amended, requires individual states to identify general geographic areas where the National Ambient Air Quality Standards are not met for any of seven criteria pollutants.[10] The U.S. EPA has designated such areas as nonattainment areas. A state with a nonattainment area must prepare a State Implementation Plan (SIP) that details the programs and requirements that the state will implement to attain the NAAQS by the deadlines specified in the Clean Air Act Amendments of 1990 and subsequent rules promulgated by the U.S. EPA. In Texas, the TCEQ is responsible for formulating and maintaining the SIP.

The CAAA require federal agencies to ensure that their actions conform to the appropriate SIP. Conformity is defined as demonstrating that a project or action conforms to the SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. The U.S. EPA has approved conformity regulations in the Texas SIP, which are codified in the Texas regulations at Title 30, Part 1, Chapter 101, Subchapter A, §101.30.

Generally, to comply with the requirements of the general conformity regulations, two criteria must be met. It must be shown that: (1) total direct and indirect pollutant emissions[11] resulting from a project in a nonattainment area or a maintenance area (i.e., an area that has been redesignated from nonattainment to attainment) are accounted for in a SIP, or it must be shown that they would be below *de minimis*[12] emissions levels established for the nonattainment or maintenance area, and (2) pollutant emissions from the project would not be regionally significant (i.e., the project would not contribute 10 percent or more of the region's total emissions of a criteria pollutant). If it is determined through an emissions inventory that the direct and indirect pollutant emissions from a project would be below *de minimis* levels and not "regionally significant," no further air quality analysis is required and the project is presumed to conform with the applicable SIP. If a project's emissions would equal or exceed the annual *de minimis* levels, or be regionally significant, a positive conformity determination/NAAQS assessment is required, including requisite pollutant dispersion analyses.

NAAQS have been established for the following seven air contaminants or criteria pollutants:

- Carbon monoxide
- Lead
- Nitrogen dioxide

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[10] The criteria pollutants include carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter and particulate matter less than 2.5 microns in diameter and sulfur dioxide.

[11] Total direct and indirect pollutant emissions are the sum of the emissions increases and decreases associated with a proposed project, or the "net" change in emissions anticipated to occur as a result of a proposed project [40 CFR 93.152].

[12] Emissions are so small as to be negligible or insignificant. If a project/action has *de minimis* emissions, a conformity determination/ NAAQS assessment pursuant to the CAAA is not required [40 CFR 93.153c].

- Ozone
- Sulfur dioxide
- Particulate matter and fine particulates

The primary standards were established at levels sufficient to protect public health with a satisfactory margin of safety. The regulation and management of ambient (i.e., "outdoor") air quality conditions in Dallas County are the combined responsibility of federal, State, and local governmental agencies.

On the federal level, the U.S. EPA establishes the guiding principles and policies for protecting air quality throughout the nation. Relevant to this assessment, the U.S. EPA is also responsible for promulgating the NAAQS, approving the SIP, and regulating aircraft emissions.

On the State level, the Texas SIP helps ensure that federal air quality requirements and guidelines are met. The Texas Emissions Reduction Program monitors air quality and regulates mobile sources of emissions (i.e., on-road and off-road motor vehicles and equipment). The TCEQ operates 11 permanent ambient air quality monitoring sites scattered throughout the Dallas-Fort Worth TCEQ Region as part of its ongoing State and local air quality monitoring programs.[13] The closest of these air quality monitoring stations is approximately 1.3 miles southwest of the Airport in Dallas. No air quality monitoring stations are located directly on, or adjacent to, the Airport.

9.5.2 ATTAINMENT/NONATTAINMENT STATUS

The Airport is located in the City of Dallas, which is currently designated as a moderate nonattainment area for ozone (8-hour).[14] The emissions inventories described below assess how Airport operations and project construction would affect the attainment/nonattainment status of NAAQS criteria pollutants.

9.5.2.1 Emissions Inventory – Operational Emissions

An operational emissions inventory is conducted to assess air quality impacts caused by changes in airport activity levels. A substantial change in the number, type, or operating patterns of aircraft, GSE vehicles, point sources (including boilers and fuel tanks), and passenger vehicles caused by an airport improvement project warrants an operational emissions analysis. If, through the operational emissions inventory process, it is determined that project-related emissions (direct and indirect) do not exceed applicable *de minimis* thresholds, then no further air quality analysis is required. If project-related emissions are equal to or greater than the *de minimis* thresholds, an NAAQS assessment may be required (see below). The model approved by the FAA and the U.S. EPA for conducting operational emissions inventories for airports is the Emissions and Dispersion Modeling System (EDMS).

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[13] State of Texas, Texas Commission on Environmental Quality, Geographical Texas Air Monitoring online mapping database. http://www.tceq.texas.gov/airquality/monops/sites/mon_sites.html (accessed June 21, 2012).

[14] U.S. Environmental Protection Agency, *Criteria Pollutant Reports*, http://www.epa.gov/air/oaqps/greenbk/multipol.html (accessed August 23, 2012).

The recommended projects in the Master Plan Update preferred alternative would not increase Airport capacity and would not result in an increase in Airport operations. Any change in operating patterns of aircraft, GSE vehicles, point sources, and passenger vehicles would be less than significant and, therefore, not require an operational emissions analysis.

9.5.2.2 Emissions Inventory – Construction Emissions

A construction emissions inventory quantifies the temporary emissions caused by construction and/or demolition activities. Typical sources of construction-related emissions include non-road equipment (backhoes, drilling rigs, mixers, etc.), on-road equipment (dump trucks, concrete trucks, etc.), and construction employee vehicle traffic.

NAAQS Assessment - Hot Spot Analysis

If a project has the potential to adversely affect air quality at roadway intersections on an airport or in the airport environs by significantly increasing traffic, a hot spot analysis is typically conducted to determine if project-related emissions of carbon monoxide caused by motor vehicles would cause or contribute to an exceedance of the NAAQS. The common protocol for a hot spot analysis is to select the intersections with the highest traffic volumes and the lowest level-of-service rating for modeling. Hot spot modeling is typically conducted using the Mobile 5b emissions model and the CAL3QHC dispersion model. The Master Plan Update preferred alternative would not increase Airport capacity or operations; therefore, hot spot analysis would not be required.

NAAQS Assessment - General

If a general NAAQS assessment is required, "build" and "no-build" emissions would be inventoried for each reasonable alternative. Emissions for the proposed build case would then be translated into pollutant concentration estimates using a dispersion model (typically EDMS for airport analyses). Once the dispersion modeling has been performed, pollutant concentration estimates from the dispersion model would be added to background concentrations and compared to the NAAQS. If concentrations do not exceed the NAAQS, an air quality certificate would be obtained from the Governor of Texas, and the NAAQS assessment would be complete. If pollutant concentrations exceed the NAAQS, emissions must be mitigated or offset, or the project redesigned to reduce emissions. The Master Plan Update preferred alternative would not increase Airport capacity or operations; therefore, a general NAAQS assessment would not be required. Construction activities related to the preferred alternative would result in a temporary increase in emissions; the construction phases of these projects would be assessed on a project-by-project basis in accordance with NEPA protocol.

9.6 Water Quality

The regional hydrogeologic gradient of the Airport is presumed to flow toward the south-southwest. However, the actual hydrogeologic gradient may be affected by local influences, such as the topography of the bedrock geology, underground structures, and other variables.

A major aquifer is defined as one that yields large quantities of water in a comparatively large area of the state. The designated major aquifer in this region of Texas is the Trinity Group Aquifer, which serves all or part of 56 Texas counties. The aquifer generally consists of the Paluxy, Glen Rose, and Travis Peak Formations. These Cretaceous-age rocks extend over a large area of north and central Texas and consist primarily of sand with interbedded clays, limestone, dolomite, gravel, and conglomerates. These strata were deposited in fluvial, deltaic, strandplain, and shallow marine environments. Saturated thickness of the water-bearing units ranges from approximately 100 feet in the outcrop area to a maximum of 1,200 feet near the downdip limit of the fresh to slightly saline water. Water quality from the Trinity Group Aquifer is acceptable for most municipal and industrial purposes.[15]

A minor aquifer is defined as one that yields large quantities of water in small areas or relatively small quantities of water in large areas of the state. The designated minor aquifer in this area of Texas is the Woodbine Aquifer, which consists of sands, clays, sandstones, shales, and limestones. The saturated thickness of the water-bearing sand and sandstone beds reaches a maximum of about 600 feet in the downdip areas to the east. Fresh, good quality water is produced from wells in or near the outcrop area of the Woodbine Aquifer. Water quality deteriorates rapidly downdip from the outcrop, with total dissolved solids, sodium, chloride, and bicarbonate concentrations increasing. The Woodbine Aquifer furnishes municipal, industrial, and small irrigation water supplies to several counties in the area.[16] The outcrop area for both the Trinity Group and Woodbine Aquifers encompasses the Dallas metropolitan area. Important aquifer recharge occurs within an aquifer outcrop area via surface infiltration of precipitation.

9.6.1 GROUNDWATER

The *Drinking Water Survey Report* cited below documents that no private drinking water wells exist within the 0.5-mile search radius, and that the City of Dallas Water Utilities Department provides drinking water to properties within the entire 0.5-mile search radius. A 0.5-mile-radius records search and 500-foot and 0.25-mile receptor surveys did not locate any private drinking water wells.[17]

The City of Dallas currently receives water from the following area reservoirs: Lake Ray Hubbard, Lake Lewisville, Lake Grapevine, Lake Ray Roberts, and Lake Tawakoni. Because of its poor quality, groundwater underlying the Airport is not used for drinking, irrigation, or industrial supply purposes. The City of Dallas approved a *Municipal Setting Designation Ordinance* in 2005, which restricts the use of groundwater in areas

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[15] Benchmark Environmental Consultants, *Phase I Environmental Site Assessment, City of Dallas, DalFort Aerospace and Former Legend Terminal, 7701 and 7777 Lemmon Avenue, Dallas, Dallas County, Texas,* November 17, 2008.

[16] Ibid.

[17] Farmer & Associates, Inc., *Drinking Water Survey Report, Former DalFort Aerospace/Legend Airlines Terminal , 7701-7777 Lemmon Avenue, Dallas (Dallas County), Texas 75235,* June 16, 2009.

designated as contaminated for potable water by ordinance/restrictive covenant.[18] The City of Dallas Department of is in the process of obtaining a Municipal Setting Designation for the entire Airport.

9.6.2 SURFACE WATER

Surface water in the vicinity of the Airport consists primarily of Bachman Lake to the northwest. Rainfall on runways, taxiways, and industrial and commercial sites comes in contact with a multitude of pollutants. These pollutants dissolve in the runoff or are absorbed by soil particles and are quickly transported by gravity flow through the network of concrete channels and underground pipes that are part of the Airport storm drain conveyance systems. These systems ultimately discharge the polluted runoff, without treatment, directly to the City storm water system, Bachman Lake, or nearby streams and drainage channels. Pollutants typically found in the Airport runoff include sediment, nutrients (e.g., fertilizers), oxygen-demanding substances (e.g., decaying vegetation), bacteria, heavy metals, synthetic organics (e.g., fuels, oils, solvents, lubricants), pesticides, and other toxic substances.

Authorization for storm water discharges from the Airport is required under the TPDES permit. The requirement is based on the Airport's Standard Industrial Classification code. The TPDES permit provides authorization for point source discharges of storm water associated with industrial activity and certain non-storm water discharges to surface water. The permit contains effluent limitations and requirements applicable to all industrial activities covered under the TPDES permit.

In addition to the pollutants contributed by storm water or wet weather flows, dry weather runoff can also seriously degrade the quality of the receiving water. Dry weather flows conveyed by the storm water conveyance system, which can be substantial, consist of flows from groundwater infiltration and accidental, improper, or illegal discharges to the storm water conveyance system. Common examples of the latter are illegally disposed used motor oil and antifreeze. These pollutants can severely degrade the beneficial uses of receiving surface waters.

9.7 Department of Transportation Act, Section 4(f) Properties

Section 4(f) of the U.S. Department of Transportation Act of 1966, which was recodified and renumbered as Section 303(c), dictates that, for any program or project undertaken or approved by the U.S. DOT, impacts on the use of any publicly owned land of a public park; recreation area; wildlife and waterfowl refuge of national, state, or local significance; or land from a historic site of national, state, or local significance must be considered. The Act prohibits the Secretary of Transportation from approving actions that would result in use of these properties for transportation purposes unless no prudent and feasible alternative exists and all efforts have been made to minimize impacts.

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[18] City of Dallas, Office of Environmental Quality, *Municipal Setting Designation Ordinance*, http://www.dallascityhall.com/oeq/msd.html (accessed June 7, 2012).

A number of parks and other recreational areas are located near the Airport. Recreational resources were identified based on a review of City parks maps. Midway Manor Park is located northeast of Runway 13L-31R on Airport property, but is maintained by the City of Dallas Park and Recreation Department. This park is a small neighborhood park that includes an outdoor basketball court. Other public parks northeast of the Airport include Field Frazier Park and Bluff View Park, which serve the neighborhoods of this area. Bachman Lake Park is immediately adjacent to the northwestern Airport property boundary and is the largest park in the vicinity of the Airport. This park encompasses all of Bachman Lake with scenic recreational trails surrounding the lake shore. Bachman Lake Park is home to the Dallas Rowing Club, which uses Bachman Lake for training and rowing events. East of Bachman Lake is the Bachman Creek Greenbelt, owned and maintained by the Dallas Park and Recreation Department. Other parks in the vicinity of the Airport include Grauwyler Park to the southwest, which offers athletic fields, a recreational center, and the Grauwyler Park Library. Weichsel Park is located south-southwest of the Airport and is associated with the Thomas J. Rusk Middle School. East of the Airport is Polk Park, a small neighborhood park associated with the K. B. Polk Center for Academically Talented and Gifted. All public parks and lands in the vicinity of the Airport are operated and maintained by the Dallas Park and Recreation Department.

9.8 Historic, Architectural, Archaeological, and Cultural Resources

Numerous laws and regulations require that possible effects on historic, architectural, archaeological, and cultural resources be considered during the planning and execution of federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the federal agency proposing the actions, and prescribe the relationships among involved agencies. NEPA directs federal agencies to assess the environmental impacts of their proposed actions, including impacts to historic and cultural resources. In addition to NEPA, the primary laws that pertain to the treatment of historic, architectural, archaeological, and cultural resources during environmental analyses are the National Historic Preservation Act (NHPA) (particularly Sections 106 and 110), the Archaeological Resources Protection Act, the American Indian Religious Freedom Act, and the Native American Graves Protection and Repatriation Act.

Section 106 of the NHPA requires that federal agencies consider whether their activities could affect historic properties through consultation with the State Historic Preservation Officer (SHPO). A historic property is defined as any prehistoric or historic district site, building, structure, or object listed in, or eligible for listing in, the National Register of Historic Places.

Properties that are either listed in or eligible for listing in the NRHP are provided the same measure of protection under Section 106 of the NHPA. If an undertaking has the potential to affect historic properties, then the federal agency, in consultation with the SHPO, defines an Area of Potential Effect (APE).

The Texas Historical Commission's *Historic Sites Atlas* was consulted for the presence of previously designated or identified historic properties in and around the Airport, including NRHP properties, State Archaeological Landmarks, and Official Texas Historical Markers, which include Recorded Texas Historic Landmarks, historic cemetery markers, thematic markers, and 1936 Centennial Markers. The records search found no previously designated historic properties located within the vicinity of the Airport.

However, the EA for redevelopment of the DalFort site required a historic structures survey at the former DalFort Aerospace facilities located on Lemmon Avenue. Through consultation among the FAA, the THC, and the National Park Service, the 1958 Operations and Maintenance Building on the DalFort site was determined eligible for listing in the NRHP, as indicated by the Keeper of the NHRP in May 2013. The OMB is significant under NRHP Criterion A at the local level of significance for its historical association with aviation development in Dallas. The OMB is also significant under NRHP Criterion C at the local level of significance as a notable example of the Midcentury Modern style (a style that was prevalent in the Dallas area during the 1950s) designed by nationally prominent architects William Pereira and Charles Luckman and overseen by locally prominent architect Mark Lemmon. Character-defining features include a wall of windows, flared roofs, and the use of concrete, glass, and steel. The National Park Service determined that the building retains sufficient integrity to convey its historic and architectural significance and is, therefore, eligible for listing in the NRHP.

9.9 Biotic Communities

According to the U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Dallas County, Texas,* the soil located at and surrounding the Airport is classified as Urban Land. The Urban Land map unit consists of extensively built-up areas where 75 percent or more of the surface is covered with buildings and pavement. The soils in these areas have been altered or covered during urban development; therefore, it was not feasible to identify and separate them in mapping.

The habitat surrounding and including the Airport supports a limited number of biological resources because much of the area is already extensively developed. The entire area within the Airport boundary is developed or disturbed in some manner, with no native vegetation existing on the site. According to the U.S. FWS Critical Habitat Portal, no critical habitat can be found within Dallas County.[19] Because of the lack of habitat and the developed condition of the Airport and vicinity, no threatened or endangered species are present or known in the area.

9.10 Wetlands

The U.S. Army Corps of Engineers' *Wetland Delineation Manual* defines wetland areas that have positive indicators for hydrophytic vegetation, wetland hydrology, and hydric soils as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal

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[19] U.S. Fish and Wildlife Service, Critical Habitat Portal, http://criticalhabitat.fws.gov/crithab/ (accessed July 30, 2012).

circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The U.S. ACE typically takes jurisdiction over wetlands only when they lie within or adjacent to navigable waters, or tributaries of such waters where those tributaries bear an ordinary high water mark. An ordinary high water mark is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, presence of litter or debris, or other appropriate means that consider the characteristics of the surrounding areas."

The Airport is highly developed (i.e., buildings, paved surfaces, ornamental landscaping) and contains few areas with the potential to support wetlands. Virtually all areas that would be affected by implementation of the preferred alternative consist of bare earth, paved surfaces, structures, or ornamental (low habitat value) landscaping.

According to the U.S. FWS National Wetlands Inventory online wetland mapper, no wetlands or waters of the United States exist within the Airport boundary.[20] The body of water nearest the Airport is Bachman Lake, located along the northwest boundary of the Airport. The nearest designated wetlands are within Bachman Creek, located just north/northeast of the Airport boundary, adjacent to Bachman Lake.[21]

9.11 Floodplains

Executive Order 11988 was enacted to avoid, to the extent possible, long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practical alternative. The Order was issued in furtherance of NEPA, the National Flood Insurance Act of 1968, and the Flood Disaster Act of 1973. Floodplains are defined as lowland and flat areas adjoining waters that are subject to a 1.0 percent or greater chance of flooding in any given year, i.e., a 100-year flood event.

The Airport lies outside the 100-year flood zone, as delineated on FEMA maps.[22] The Airport is located within Flood Zone X (area of minimal flood hazard, depicted on Flood Insurance Rate Maps as above the 500-year flood level).

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[20] U.S. Fish and Wildlife Service, National Wetlands Inventory – Interactive Map, http://www.fws.gov/wetlands/Data/Mapper.html (accessed August 18, 2014).

[21] *ibid*

[22] U.S. Department of Homeland Security, Federal Emergency Management Agency, Flood Insurance Rate Map Panel FM48113C0330J, https://msc.fema.gov/portal (accessed August 2014).

9.12 Coastal Areas

The Coastal Barrier Resources Act of 1982 prohibits federal financial assistance for development within the Coastal Barrier Resources System, which contains undeveloped coastal barriers along the Atlantic and Gulf Coasts and the Great Lakes. The Coastal Zone Management Act of 1972 ensures effective management, beneficial use, protection, and development of the coastal zone. Coastal Zone Management Programs, prepared by states according to guidelines issued by the National Oceanic and Atmospheric Administration, are designed to address issues affecting coastal areas. Coastal resources are identified in accordance with the Coastal Public Lands Management Act of 1973 ("Management of Coastal Public Land," *Texas Natural Resources Code*, Chapter 33 *et seq.*). This Act, which is consistent with the federal Coastal Zone Management Act, contains the State's adopted policies with regard to the protection of coastal resources.

The nearest coastal zone to the Airport is the Gulf of Mexico, over 200 miles to the southeast. No other coastal zones are located on or near the Airport.

Coastal barriers are narrow islands or margins along the Texas Gulf Coast with active dunes (or structures built to replace them). These barriers are managed in Texas to prevent beach erosion. The Airport is not located on a coastal barrier. Therefore, projects at the Airport would not affect coastal barriers.

9.13 Wild and Scenic Rivers

The U.S. Department of the Interior designates certain waterways as Wild and Scenic Rivers to protect the most beautiful and unspoiled rivers in the nation under the Wild and Scenic Rivers Act, approved by the U.S. Congress in 1968. As of 2012, the Wild and Scenic Rivers system consisted of 12,598 miles of 203 protected rivers in 39 states and Puerto Rico.[23] These rivers are designated because of their beauty, historic and natural sources, aquatic and wildlife habitats, and geological values. The Rio Grande at Big Bend National Park is the only designated Wild and Scenic River in Texas, approximately 370 miles southwest of Dallas. Therefore, the Master Plan Update preferred alternative would not affect a wild and scenic river.

9.14 Farmland

The preservation of prime farmland is a priority goal for the U.S. Department of Agriculture, and the effects on prime farmland of projects with federal support must be assessed. The Airport is located primarily in a developed commercial and industrial area of Dallas. No farmland is located at or in the vicinity of the Airport.

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[23] National Wild and Scenic Rivers System, http://www.rivers.gov/national-system.php (accessed August 8, 2014)

No impacts to farmland would occur as a result of implementation of the Master Plan Update preferred alternative.

9.15 Energy Supply and Natural Resources

The Airport is not an energy-producing location, nor does it produce mineral resources. The effects of Airport development on energy and natural resources are generally related to the amount of energy required for stationary facilities (i.e., terminal building cooling or heating equipment, electrical lighting for building interiors and the airfield, and approach or radar control systems), and the movement of aircraft and GSE vehicles. The prime concern would be if future Airport growth were to result in a shortage of energy or place a strain on existing energy suppliers to serve the Airport at the highest level of efficiency. The Master Plan Update preferred alternative would not significantly increase the need for energy or other natural resources. Construction of the Master Plan Update preferred alternative would likely result in an increased demand for energy and natural resources. However, the energy demand resulting from construction activities would be temporary and would not create a significant resource demand for the region. The Airport's energy and natural resource providers are projected to be able to meet the future energy requirements for the Airport.

9.15.1 ELECTRICITY

Oncor Electric Delivery is the sole provider of electricity to the Airport. Oncor provides electrical power to the City of Dallas Department of Aviation and to all on- and off-Airport customers. At its current capability, Oncor is projected to be able to provide electrical power for the Airport and Airport tenants for more than the next 100 years without adding new power generation sources. As part of the Master Plan Update and the Love Field Modernization Program, the Department of Aviation coordinated with Oncor regarding near- and long-term electricity demands.

9.15.2 PETROLEUM-BASED FUELS

The Airport is a major consumer of petroleum-based fuels for aircraft and GSE. The Airport fuel suppliers were contacted regarding future fuel demand by the airlines and FBOs at the Airport. Using annual Airport activity forecasts, the fuel suppliers were asked if this growth and demand for more fuel would limit their ability to provide adequate quantities of fuel to maintain a normal operation of aircraft and GSE. Each supplier, based on current supply, reserves, and production and the current availability of fuel statistics, indicated that supplies would more than adequately meet future customer demand.

9.16 Light Emissions and Visual Impacts

The primary sources of light emissions from airports are the FAA-required lighting for security, obstruction clearance, and navigation. An analysis of the impacts of light emissions on the surrounding environment is required when proposed projects include the introduction of new lighting that may affect residential or other sensitive land uses. It is also important to consider the potential impacts of the proposed improvements on the visual character of the surrounding area.

According to the FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*,[24], a significant environmental impact occurs when light emissions or visual impacts cause an annoyance to the people typically located in residential areas in the surrounding environs of a proposed project.

If nighttime construction activities are deemed necessary for the preferred alternative, mitigation measures would be established prior to project implementation and enforced to ensure that no impacts from light emissions would occur to sensitive receptors in the Airport vicinity. Therefore, light emissions are not expected to be a concern at the Airport.

9.17 Hazardous Materials and Solid Waste

Four primary statutes have been passed governing the handling and disposal of hazardous materials, chemicals, substances, and wastes. The two statutes most applicable to airport projects are the Resource Conservation and Recovery Act (RCRA) (as amended by the Federal Facilities Compliance Act of 1992) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended (commonly referred to as Superfund). The RCRA governs the generation, treatment, storage, and disposal of hazardous wastes. The CERCLA provides for cleanup of any release of a hazardous substance (excluding petroleum) in the environment.

9.17.1 HAZARDOUS MATERIALS

Hazardous materials are regulated by a number of federal laws and statutes, most of which are promulgated by the U.S. EPA. These include the RCRA and CERCLA, as mentioned above, in addition to the CAAA, the Clean Water Act, the Safe Drinking Water Act, the Hazardous Materials Transportation Act, and the Emergency Planning and Community Right to Know Act.

Together, these laws guide and govern the storage, use, and transportation of hazardous and other regulated materials from their time of origin to their ultimate disposal. The recovery and cleanup of environmental contamination resulting from the accidental or unlawful release of these materials and substances are also governed by these laws.

In Texas, hazardous materials include substances or materials, including mixtures and solutions, that the TCEQ has identified as hazardous or dangerous wastes and that the U.S. EPA has designated for special consideration under the Toxic Substances Control Act, the CAAA, or the Clean Water Act, as defined under Section 101 (14) of the CERCLA, as well as hazardous waste under the RCRA. Hazardous materials also include constituents of petroleum products, marine pollutants, or elevated temperature materials that have been

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[24] Federal Aviation Administration, Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, effective April 28, 2006.

determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce.

Locally, the City of Dallas Office of Environmental Quality oversees environmental issues within Dallas. Fuel tanks are handled in accordance with International Fire Code regulations. Importantly, no sites or facilities at the Airport or in the immediate vicinity are listed on the federal "Superfund" National Priorities List.

In 2008, an environmental database search was conducted for the redevelopment of the DalFort site at the Airport by Environmental Data Resources, Inc., which included the Airport and Airport vicinity. A number of sites and facilities located on, or adjacent to, Airport property are known, or have the potential, to contain environmental contamination of the soil and/or groundwater. Identification of these sites was based on documents and other sources of information from previous environmental reports on the DalFort site; an electronic search of federal, State, and local agency databases; and an in-field survey of existing conditions. From this literature search, six individual sites (five on Airport and one off Airport) were identified, as presented in **Table 9-12**.

Of the on-Airport listings in Table 9-12, only the DalFort site is known to have outstanding hazardous materials issues. This site is currently undergoing environmental investigations in coordination with the TCEQ and OEQ prior to redevelopment plans that are not part of the Master Plan Update preferred alternative. Additionally, the terminal building is undergoing a NEPA assessment that is also separate from the Master Plan Update. The Sewell Village Cadillac site is adjacent to the northeastern Airport property boundary, along Lemmon Avenue. This site is listed as a TCEQ Voluntary Cleanup Program and has a completed status; therefore, it is unlikely to have any effect on the preferred alternative.

Several database listings shown in Table 9-12 are located along Lemmon Avenue within areas that could be included in land use/FBO redevelopment along Lemmon Avenue as part of the preferred alternative. Potential hazardous materials issues may arise during construction phases of preferred alternative projects. However, project-specific NEPA and environmental investigations would occur prior to any construction. Additionally, should any hazardous materials be encountered during construction phases of the preferred alternative projects, treatment, storage, transportation, and disposal of any such materials would occur in accordance with all applicable local, State, and federal regulations. Therefore, hazardous materials are not anticipated to affect implementation of the Master Plan Update preferred alternative.

Table 9-12: Environmental Database Listings for Properties Adjacent to or near the Area of Potential Effect

COMPANY	ADDRESS	DATABASE LISTING	SUMMARY OF LISTING
Signature Flight Support	7515 Lemmon Avenue, Building J	RCRA-CESQG[1/]	Conditionally exempt, no violations.
		TCEQ-LPST[2/]	November 1989: leaking incident, contaminated soils. Status: closed.
Dallas Airmotive, Inc.	7515 Lemmon Avenue, Hangar L	RCRA-NonGen[3/]	Conditionally exempt, no violations.
Signature Flight Support Regional Maintenance Center	7511 Lemmon Avenue, Hangar C	RCRA-CESQG	Conditionally exempt, no violations.
Signature Flight Support	8001 Lemmon Avenue	RCRA-CESQG	Conditionally exempt, one minor violation found.
		TCEQ-PST[4/]	Currently nine 20,000 gallon tanks containing either gasoline or jet fuel.
		TCEQ-LPST	October 1993: leaking incident, contaminated soils. Corrective action plan issued.
DalFort Terminal	8036-7440 Aviation Place	TCEQ-VCP[5/]	This facility is classified as a maintenance aircraft fueling facility. The contaminant was reported as hydrocarbons. Currently in the investigation phase.
Sewell Village Cadillac	4350 West University Boulevard	TCEQ-VCP	Soils and groundwater are reported to be contaminated with total petroleum hydrocarbons. A Voluntary Cleanup Program has been completed for this facility.

NOTES:

1/ RCRA-CESQG: Resource Conservation and Recovery Act - Conditionally Exempt Small Quantity Generators

2/ TCEQ-LPST: Texas Commission on Environmental Quality - Leaking Petroleum Storage Tank database

3/ RCRA-NonGen: Resource Conservation and Recovery Act - Nongenerators

4/ TCEQ-PST: Texas Commission on Environmental Quality - Petroleum Storage Tank

5/ TCEQ-VCP: Texas Commission on Environmental Quality - Voluntary Cleanup Program

SOURCES: QORE, Inc., Draft Report, *Phase I Environmental Site Assessment and Additional Services, DalFort Aerospace, 7701 Lemmon Avenue, Dallas, Dallas County, Texas 75209*, August 2003; Benchmark Environmental Consultants, *Phase I Environmental Site Assessment, City of Dallas, DalFort Aerospace and Former Legend Terminal, 7701 and 7777 Lemmon Avenue, Dallas, Dallas County, Texas*, November 17, 2008.

PREPARED BY: Ricondo & Associates, Inc., August 2014

9.17.2 SOLID WASTE

The City of Dallas Sanitation Services provides solid waste disposal services throughout the metropolitan area. One landfill and three waste transfer stations are located within the City of Dallas, the closest of which is the northwest (Bachman) transfer station, located approximately 1,000 feet west-northwest of the Airport. The McCommas Bluff Landfill is more than 11 miles south-southeast of the Airport at 5100 Youngblood Road. With an overall area of 1,029 acres, the McCommas Bluff Landfill only accepts municipal solid waste and nonhazardous industrial waste. The landfill is not permitted for, nor does it accept, hazardous waste. As of a 2010 report from the City of Dallas, the McCommas Bluff Landfill had a remaining capacity of 104 million cubic yards.[25] Wastes designated as hazardous or special waste must be handled, transported, and disposed of at licensed facilities in accordance with all federal, State, and local regulations. The TCEQ provides assistance for permitting and regulation of these wastes.

9.18 Environmental Review Process

Most projects specific to master plans require environmental review under NEPA because the FAA is required to undertake an action, such as approving federal funding, approving the use of PFCs to fund the project, or including the project on an ALP. As such, the FAA action related to most airport projects is approval, rather than actual implementation, of the project.

NEPA requires federal agencies to prepare environmental documentation that discloses to decision-makers and the interested public a clear, accurate description of potential environmental effects resulting from proposed federal actions and reasonable alternatives to those actions. Through NEPA, the U.S. Congress directed federal agencies to integrate environmental factors into their planning and decision-making processes and to encourage and facilitate public involvement in decisions that affect the quality of the human environment. Therefore, in making its decisions, the FAA, as a federal agency, is required to consider the environmental impacts of recommended master plan projects.

The level of environmental documentation required for any master plan project, also referred to as the proposed action in the environmental documentation, depends on the type of project, the potential environmental effects of the project, and the type of environmental resources that may be affected. The three levels of environmental documents that comply with NEPA are:

- **Categorical Exclusion (CatEx)**: A decision that the proposed action has no effect on the environment and does not require additional environmental review. FAA Order 1050.1E contains a list of projects that normally do not require additional environmental review (i.e., are eligible for a CatEx) as long as no extraordinary circumstances are involved.

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[25] City of Dallas, Sanitation Services, *Green Energy from McCommas Bluff Landfill*, February 2010.

- **Environmental Assessment**: A document that presents analyses of various environmental effects used to determine whether any effects are significant enough to warrant preparation of an EIS. When environmental effects cannot be mitigated below a level of significance, further analysis is required and an EIS is prepared. When no significant effects are found, the FAA issues a FONSI.
- **Environmental Impact Statement**: A document that presents detailed analysis of various environmental impacts of a proposed action. The EIS process provides for full public disclosure of significant environmental impacts and practicable alternatives that avoid or minimize adverse impacts. The responsible FAA official uses a Final EIS as the primary reference and basis to prepare a Record of Decision (ROD) for the approving FAA official's signature. The ROD provides the public with the approving FAA official's rationale for approving or not approving a proposed action. It also references the environmental documents prepared for or used to support the proposed action as well as the Final EIS.[26]

Detailed analysis would be required pursuant to NEPA and FAA guidance following completion of the Master Plan Update. It is also important to note that the scale or specific aspects of each alternative discussed in Section 5 as part of the Master Plan Update preferred alternative can change significantly in the design phase and would need further screening of the environmental impact categories to determine the appropriate NEPA documentation that would be required. Thus, the timeframe of each project in the Master Plan Update preferred alternative would depend on demand-driven factors and Airport and FAA funding, in addition to implementation of the environmental review and NEPA process.

9.19 Potential Environmental Consequences

This section of the environmental overview focuses on environmental impact categories with the potential to be affected by implementation of the Master Plan Update preferred alternative including airfield modifications, general aviation development, and support facility improvements. **Table 9-13** shows the potential impacts related to each of the environmental categories discussed in this section.

Projects associated with the Master Plan Update preferred alternative would be confined to the airfield, within the Airport Main Terminal area, or located on specific surrounding roadways. Environmental impact categories DOT Act, Section 4(f) properties, biotic communities, wetlands, floodplains, coastal areas, and wild and scenic rivers were determined to be absent from the Airport and Airport vicinity. Therefore, there would be no impacts in these categories from implementation of the preferred alternative.

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[26] Federal Aviation Administration, Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, effective April 28, 2006.

Table 9-13: Potential Environmental Impacts

ENVIRONMENTAL IMPACT CATEGORY (APPLICABLE SECTION IN THIS MASTER PLAN UPDATE)	POTENTIAL IMPACT
Aircraft Noise (Section 9.1)	None
Compatible Land Use (Section 9.2)	None
Demographics and Socioeconomic Profile (Section 9.3)	None
Social Impacts (Section 9.4)	Less than Significant Impacts
Air Quality (Section 9.5)	Less than Significant Impacts
Water Quality (Section 9.6)	Less than Significant Impacts
Department of Transportation Act, Section 4(f) Properties (Section 9.7)	None
Historic, Architectural, Archaeological, and Cultural Resources (Section 9.8)	None
Biotic Communities (Section 9.9)	None
Wetlands (Section 9.10)	None
Floodplains (Section 9.11)	None
Coastal Areas (Section 9.12)	None
Wild and Scenic Rivers (Section 9.13)	None
Farmland (Section 9.14)	None
Energy Supply and Natural Resources (Section 9.15)	Less than Significant Impacts
Light Emissions and Visual Impacts (Section 9.16)	None
Hazardous Materials and Solid Waste (Section 9.17)	Less than Significant Impacts

SOURCE: Ricondo & Associates, Inc., August 2014.
PREPARED BY: Ricondo & Associates, Inc., August 2014.

As the Master Plan Update preferred alternative would not include changes to Airport capacity or operations, it is unlikely that aircraft noise, compatible land use, or induced socioeconomic impacts would be affected by implementation of the preferred alternative. Because the preferred alternative would not increase Airport capacity or operations, its implementation would not likely result in an impact on historic, architectural, archaeological, and cultural resources or light emissions and visual impacts. Construction activities and phased implementation of the preferred alternative would follow best management practices (BMPs) in place at the Airport and would not affect these categories.

The remaining environmental impact categories were determined to have less than significant impacts, as described below.

9.19.1 SOCIAL IMPACTS

9.19.1.1 Relocation of Residences and/or Businesses

Improvements associated with the Master Plan Update preferred alternative would primarily be located on Airport property, with additional improvements along Lemmon Avenue, Airdrome Drive, Mockingbird Lane, and Cedar Springs Road/Herb Kelleher Way. No residences or businesses would be removed or relocated as a result of the Master Plan Update projects. No residents would be displaced as a result of the Master Plan Update projects.

9.19.1.2 Surface Traffic Patterns

Traffic Patterns for Future Conditions (PAL E3)

Projected traffic patterns at the Airport under PAL E3 growth conditions show several intersections operating at decreased levels of service during peak a.m. and p.m. periods. Particularly, the Airport entrance at the intersection of Mockingbird Lane and Cedar Springs Road/Herb Kelleher Way would perform at LOS F (decreasing from a current LOS D), which equates to a failed condition. Additionally, projections for the Mockingbird Lane and Denton Drive intersection show decreased levels of service during peak periods, operating at LOS E (decreasing from current a.m. peak of LOS B and p.m. peak of LOS C).

- Lemmon Avenue and Airdrome Drive intersection:
  - a.m. peak: LOS C
  - p.m. peak: LOS C
- Lemmon Avenue and Mockingbird Lane intersection:
  - a.m. peak: LOS C
  - p.m. peak: LOS C
- Airdrome Drive and Mockingbird Lane intersection:
  - a.m. peak: LOS B
  - p.m. peak: LOS C
- Mockingbird Lane and Cedar Springs Road/Herb Kelleher Way intersection:
  - a.m. peak: LOS F
  - p.m. peak: LOS F
- Mockingbird Lane and Denton Drive intersection:
  - a.m. peak: LOS E
  - p.m. peak: LOS E

Traffic Patterns for Future Conditions (PAL E3 with Master Plan Update preferred alternative)

Improvements are recommended for several roadways, including Mockingbird Lane, Airdrome Drive, Cedar Springs Road/Herb Kelleher Way, and Lemmon Avenue, to accommodate future Airport demand (exhibited in the PAL E3 traffic conditions described above). The Master Plan Update preferred alternative includes roadway improvements along Mockingbird Lane that would result in four full continuous lanes from Airdrome Drive to Cedar Springs Road/Herb Kelleher Way, northbound and southbound lanes being tunneled below grade to accommodate through traffic, and an additional turn lane at Denton Drive. Projected traffic patterns under the preferred alternative demonstrate improvements at the two intersections along Mockingbird Lane that exhibited poor to failing levels of service for future conditions:

- Mockingbird Lane and Cedar Springs Road/Herb Kelleher Way intersection
  - Peak: LOS C
- Mockingbird Lane and Denton Drive intersection:
  - Peak: LOS D

9.19.1.3 Disruption of Established Communities

The Master Plan Update projects would not disrupt the larger neighborhood developments around the Airport. Improvements associated with the Master Plan Update preferred alternative would primarily be located on Airport property, with additional improvements along Lemmon Avenue, Airdrome Drive, Mockingbird Lane, and Cedar Springs Road/Herb Kelleher Way. The preferred alternative would not be located within any of the surrounding established communities and it is not anticipated that any of the elements of the preferred alternative would result in a disruption of established communities. The preferred alternative includes roadway improvements that would result in temporary construction noise and traffic. The roadway improvements would alleviate traffic congestion in surrounding communities and provide aesthetic improvements along the roadways.

9.19.1.4 Disruption of Orderly, Planned Development

Improvements associated with the Master Plan Update preferred alternative would primarily be located on Airport property, with additional improvements along Lemmon Avenue, Airdrome Drive, Mockingbird Lane, and Cedar Springs Road/Herb Kelleher Way. The preferred alternative would not be located within any of the surrounding planned developments and it is not anticipated that any of the elements of the preferred alternative would result in a disruption of any planned development.

9.19.1.5 Creation of an Appreciable Change in Employment

Improvements associated with the Master Plan Update preferred alternative would primarily be located on Airport property, with additional improvements along Lemmon Avenue, Airdrome Drive, Mockingbird Lane, and Cedar Springs Road/Herb Kelleher Way. No businesses would be removed or relocated as a result of the Master Plan Update projects. Construction of the Master Plan Update preferred alternative projects would generate a temporary employment demand. Aside from these temporary changes in employment, no long-term appreciable change in employment would be anticipated as a result of implementation of the Master Plan Update preferred alternative.

9.19.1.6 Roadway Noise

The preferred alternative includes roadway improvements that would result in temporary construction noise and traffic. Improvements are recommended for several roadways, including Mockingbird Lane, Airdrome Drive, Cedar Springs Road/Herb Kelleher Way, and Lemmon Avenue, to accommodate future Airport-related demand.

The improvements to Mockingbird Lane, Airdrome Drive, and Cedar Springs Road/Herb Kelleher Way would occur along corridors that are primarily commercial/industrial in use. Construction of improvements along Lemmon Avenue would occur adjacent to residential uses, but would be temporary. Additionally, roadway improvements would provide aesthetic improvements and provide a buffer between the Airport and residential areas along the northeast side of the Airport. Therefore, no residential land uses would be affected by roadway noise. Roadway noise is not expected to be a concern as a result of implementation of the preferred alternative.

9.19.2 AIR QUALITY

The Master Plan Update preferred alternative would not generate any additional aircraft-related operations at the Airport; therefore, no increase in operational emissions would occur. However, construction-related activities associated with implementation of the Master Plan Update preferred alternative would result in increased emissions. Because of the moderate nonattainment status for 8-hour ozone concentrations in the Dallas-Fort Worth area, all construction activities would have to meet applicable *de minimis* thresholds for ozone general conformity purposes, which are 100 tons per year of VOCs and 100 tons per year of NO_2.[27] Further air quality emissions analysis would be conducted for the required NEPA documentation to justify general conformity compliance for specific preferred alternative projects.

9.19.3 WATER QUALITY

Water quality BMPs would be integrated into the construction plans for the Master Plan Update preferred alternative, in accordance with the Airport *Storm Water Pollution Prevention Plan* (SWPPP) and applicable water quality regulations, along with other measures, as necessary and appropriate. In addition to water quality BMPs incorporated into the project design, ongoing implementation of Airport-wide water quality measures, such as source control BMPs (i.e., non-storm-water management, waste handling/disposal, good housekeeping, spill prevention, control, and cleanup), as set forth in the Airport SWPPP, would also help address potential water quality impacts associated with the recommended improvements.

Construction activities associated with the Master Plan Update preferred alternative have the potential to generate water pollutants, such as sediments from grading/ground disturbance; fuels, oil, grease, and solvents from construction equipment fueling and servicing; metals from steel/iron work; paints and miscellaneous chemicals stored and used during construction; and trash and debris. Potential water quality impacts would be addressed through compliance with the construction activity requirements specified in the Airport SWPPP.

9.19.4 NATURAL RESOURCES AND ENERGY SUPPLY

The prime concern would be if future growth, improvements, and expansion associated with implementation of the Master Plan Update preferred alternative would result in a shortage of energy or place a strain on existing energy suppliers to serve the Airport at the highest level of efficiency. While the Master Plan Update

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[27] Following standard industry practice, ozone concentrations were evaluated by evaluating the emissions of VOC and NO_X, which are precursors in the formation of ozone.

preferred alternative would increase the need for energy and other natural resources, the Airport's energy and natural resource providers would be able to meet future energy requirements for the Airport. Therefore, the Master Plan Update preferred alternative would have less than significant impacts on natural resources and energy supply.

9.19.5 HAZARDOUS MATERIALS AND SOLID WASTE

Implementation of the Master Plan Update preferred alternative, which includes construction and operation of airfield facilities, may involve the handling of hazardous materials/wastes; however, such materials/wastes would generally be of a common nature, such as fuels, lubricants, paints, cleansers/solvents, and the like. No acutely hazardous materials, substances, or wastes are anticipated to be associated with the recommended facilities. As stated earlier, the handling of hazardous materials/wastes at the Airport is subject to a number of federal, State, and local safety regulations. Based on the nature of the materials/wastes associated with the Master Plan Update preferred alternative and the regulatory framework that applies to the handling of such materials/wastes, potential impacts, if any, in the vicinity would be less than significant.

Construction activities related to implementation of the preferred alternative would result in a temporary increase in solid waste generated at the Airport. However, if necessary for specific projects, recycling, salvage, reuse, and disposal options would be identified in a Remediation Plan in advance of all activities to minimize the amount of debris directed to local landfills. Locations for sorting materials for reuse and recycling would also be identified. Therefore, the Master Plan Update preferred alternative would have a less than significant impact on the solid waste disposal system. The disposal of municipal (nonhazardous) waste would likely occur at the McCommas Bluff Landfill in accordance with applicable State and local requirements.

Any special or hazardous waste resulting from construction and operation of the preferred alternative projects would be disposed of at a landfill approved to receive special or hazardous waste, as required by local and State regulations, or otherwise treated/managed in accordance with federal, State, and local requirements. A project-specific Remediation Plan would address any specific waste issues based on site contaminants of concern following the identification of existing contaminants of concern and their concentrations. If any asbestos-containing material is found during demolition activities, it would be appropriately removed. Asbestos is considered a "special waste," as defined in Texas Administrative Code, Title 30, Part 1, Chapter 330, and it must be transported by a licensed asbestos waste transporter to a licensed asbestos waste facility/landfill, most likely the Lewisville Landfill.[28]

Soil must be characterized through sampling and laboratory analysis prior to the determination of disposal methods. A project-specific Remediation Plan would address any necessary soil excavation, transportation, and disposal once the full investigation and analysis are complete. Therefore, through implementation of a Remediation Plan and adherence to applicable regulations, the potential impacts of the Master Plan Update preferred alternative related to the regulation of solid waste would be less than significant.

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[28] State of Texas, Office of the Secretary of State, Texas Administrative Code, Title 30, Part 1, Chapter 330, accessed online May 2015; http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=330.

9.20 Airport Recycling, Reuse and Waste Reduction Plan

In May 2015, R&A was tasked with developing an Airport Recycling, Reuse, and Waste Reduction Plan as part of this Master Plan Update. The plan includes review and documentation of the Airport's current waste management program and procedures as well as a plan to minimize solid waste generation at the Airport. At the time this Master Plan Update was published, the study was ongoing. The final Airport Recycling, Reuse, and Waste Reduction Plan is published as separate document.