Chapter Four

DEVELOPMENT ALTERNATIVES

City of Dallas

Dallas Executive Airport

CHAPTER FOUR - DEVELOPMENT ALTERNATIVES

In the previous chapter, airside and landside facilities required to satisfy the demand through the long range planning period were identified. The next step in the planning process is to evaluate reasonable ways these facilities can be provided. There can be numerous combinations of design alternatives, but the alternatives presented here are those with the perceived greatest potential for implementation.

Any development proposed for a Master Plan is evolved from an analysis of projected needs for a set period of time. Though the needs were determined by utilizing industry accepted statistical methodologies, unforeseen future events could impact the timing of the needs identified. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands for the next 20 years. However, no plan of action should be developed which may be inconsistent with the future goals and objectives of the City of Dallas and its citizens, who have a vested interest in the development and operation of the airport.

The development alternatives for Dallas Executive Airport can be categorized into two functional areas: the **airside** (runways, navigational aids, taxiways, etc.) and **landside** (hangars, apron, and terminal area). Within each of these areas, specific capabilities and facilities are required or desired. In addition, the utilization of airport property to provide revenue support for the airport and to benefit the economic development and well-being of the region must be considered.

Each functional area interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated as a whole to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the existing airport must be evaluated to determine if the investment in Dallas Executive Airport will meet the needs of the community, both during and beyond the 20-year planning period.

The alternatives considered are compared using environmental, economic, and aviation factors to determine which of the alternatives will best fulfill the local aviation needs. With this information, as well as input from various airport stakeholders, a final airport concept can evolve into a realistic development plan.

AIRPORT DEVELOPMENT OBJECTIVES

Prior to identifying objectives specifically associated with development of Dallas Executive Airport, non-development alternatives are briefly considered. Non-development alternatives include a "no-build" or "do-nothing" alternative, the transfer of services to another existing airport, or the development a new airport at a new location.

Dallas Executive Airport plays a critical role in the economic development of the region, specifically for the southern portion of the City of Dallas. The airport also plays an important role in the continuity of the regional, state, and national aviation networks. There is significant public and private investment at the airport. In fact, nearly $30 million in public and private investments have been made at the airport in the last ten years. Pursuit of a non-development alternative would slowly devalue these investments, lead to infrastructure deterioration, and potentially the loss of significant levels of federal funding for airport improvements. Ultimately, the safety of aircraft, pilots, and persons on the ground could be jeopardized. Dallas Executive Airport serves a vital aviation and economic function for the City of Dallas and the surrounding region. The choice to cease improving and/or maintaining the airport would have serious negative impacts on the regional economy and transportation system. Therefore, the non-development alternatives should not be considered further.

It is the goal of this effort to produce a balanced development plan to best serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives should be considered. As owner and operator, the City of Dallas provides the overall guidance for the operation and development of the airport. It is of primary concern that the airport is marketed, developed, and operated for the betterment of the community and its users. With this in mind, the following development objectives have been defined for this planning effort:

- To preserve and protect public and private investments in existing airport facilities.
- To develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations.
- To develop a balanced facility that is responsive to the current and long term needs of all general aviation users.
- To be reflective and supportive of the long term planning efforts currently applicable to the region.
- To develop a facility with a focus on self-sufficiency in both operational and developmental cost recovery.
- To ensure that future development is environmentally compatible.

AIRSIDE PLANNING ALTERNATIVES

Generally, airside issues relate to those airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at the airport. This includes the established design standard for the airport, the instrument approach capability, the capacity of the airfield, the length and strength of runway pavements, and the layout of the taxiways. Each of these elements was introduced in the previous chapters. This chapter will examine airside issues specific to Dallas Executive Airport. These will then be applied to several airside development alternatives. **Exhibit 4A** presents a summary of the primary airside and landside elements to be considered in this alternatives analysis.

AIRFIELD DESIGN STANDARDS

The information presented in the previous chapter outlined the necessary airfield design standards required to meet the current and projected critical aircraft for the airport. As noted, business jets in airport reference code (ARC) C/D-II comprise the airport's current critical aircraft. While the future critical aircraft designation is planned for ARC D-II, if aircraft such as the Global Express, Gulfstream V, and/or the Boeing Business Jet (BBJ) operate at the airport at least 500 times annually, then the facility could transition to ARC C/D-III. As such, this chapter will analyze improvements needed to meet D-II and D-III standards.

Table 3G in the previous chapter outlined specific airfield design standards. Analysis in this chapter will utilize this information to determine if current and future airport facilities meet standard or require improvement to do so. Analysis to follow will detail the airfield design standards and any necessary steps needed to improve non-standard conditions.

Runway Length

Runway 13-31 is currently 6,451 feet long and 150 feet wide, while crosswind Runway 17-35 is 3,800 feet long by 150 feet wide. Runway 13-31 is the airport's primary runway as it provides the greatest length; yet, crosswind Runway 17-35 is the most utilized runway as it is better suited to meet the predominant winds for all aircraft types. While a higher number of annual operations occur on Runway 17-35, they are primarily those conducted in small aircraft as Runway 17-35 is too short to be utilized by most corporate jet aircraft.

Analysis in Chapter Three indicated that the optimum recommended runway length necessary to satisfy the needs of existing and forecast business jet usage is 7,000 feet. This recommendation was confirmed in the Planning Advisory Committee (PAC) meeting where the airport's fixed base operators (FBOs) indicated that their clientele had similarly indicated a runway length need for up to 7,000 feet.

The alternative analysis in this chapter will consider providing a runway length of up to 7,000 feet. The analysis will not only consider the possibility of extending Runway 13-31, but also opportunities to extend Runway 17-35. An extension of either runway will not be simplistic as the airport has been encroached on all sides by urban residential and commercial/industrial development. Furthermore, the airport is bound on all sides by existing roads which include Ledbetter Drive (Loop

Exhibit 4A: ALTERNATIVE CONSIDERATIONS

AIRSIDE CONSIDERATIONS

Runway 13-31

- Evaluate improvements necessary for the runway to meet ultimate Airport Reference Code (ARC) D-II design standards
- Determine the most practicable solution to meeting runway safety area (RSA) standards off the southeast end of the runway
- Consider providing up to 7,000 feet of runway length
- Consider improving and strengthening runway pavement

Runway 17-35

- Consider runway extension opportunities
- Evaluate improvements necessary for the runway to meet ultimate ARC C/D-II design standards

Taxiways/Marking Aids/Environmental

- Evaluate the existing and ultimate taxiway system in order to improve circulation, efficiency, and safety while meeting appropriate FAA design standards
- Evaluate a west side taxiway on Runway 13-31
- Provide an environmentally sensitive plan

LANDSIDE CONSIDERATIONS

- Identify locations for potential hangar development
- Analyze property on the east and west sides of the airport for future development
- Identify potential revenue support parcels to include both airfield access and non-airfield access areas
- Maximize revenue production of land to include non-aviation uses

12) to the north and U.S. Highway 67 and Red Bird Lane (four-lane divided thoroughfare) to the south. Moreover, on-airport topography will present significant challenges to runway extension options. Further challenging matters, analysis in the previous chapter indicated that the south end of Runway 13-31 does not currently conform to Federal Aviation Administration (FAA) runway safety area (RSA) standards. Before any runway extension can be accomplished, the RSA will need to be improved to FAA's satisfaction. There are many options available for improving the RSA, to include doing nothing, which will be explored later in this chapter.

Runway Protection Zones

Exhibit 4B presents the existing runway protection zones (RPZs) for all four runway ends. As depicted, the RPZs for Runway 17-35 are fully contained within airport property. Thus, the current RPZs for Runway 17-35 meet FAA design standards.

Both of the RPZs for Runway 13-31 extend beyond current airport property. As depicted, portions of the Runway 13 RPZ extend just northwest of airport property. The northeastern 1.16-acre triangular portion of the RPZ extends over Ledbetter Drive and four commercial properties. The southwestern 1.46-acre triangular portion of the RPZ extends over Westmoreland Road including one commercial property. In total, 2.62 acres of the Runway 13 RPZ extends beyond airport property. A total of 16.27 acres of the Runway 31 RPZ extends beyond airport property. The southwestern corner of the RPZ covers a portion of the Redbird Mall

and other commercial properties while the northeastern corner of the RPZ extends atop residential properties. Photographic analysis indicates that the current Runway 31 RPZ lies atop five commercial properties and 12 residential units.

FAA design standards call for the airport to provide positive land use control over the land in the RPZ. The purpose and function of the RPZ is to "enhance the protection of people and property on the ground". The FAA standard is intended to keep the RPZ free of any uses that would promote the congregation of people for extended periods of time. As such, the RPZ should be clear of any uses which support the congregation of people such as residential, commercial, industrial, and institutional uses.

The most effective and FAA-recommended control of the RPZ is outright ownership of the land so as to keep it open space. Purchasing airspace and land use rights through avigation easements is another option. Finally, if ownership of the property is not possible, land use controls via zoning can be used. For rural and some suburban airports, the three RPZ control options above can be simply achieved. For urban airports in heavily populated areas, such as the case for Dallas Executive Airport, these three options are very challenging. As indicated, five commercial properties to the north and five commercial properties, including the Redbird Mall, to the south currently populate the Runway 13-31 RPZs. The Runway 31 RPZ also includes 12 residential properties.

Obviously, land contained within both RPZs is in nonstandard use, so re-zoning cannot be achieved to adhere to FAA standards. Property acquisition is an option. Avigation easements can be purchased and are appropriate in some cases; however, easements are only appropriate for land which is undeveloped and likely to remain in that condition (i.e., agricultural uses). Easements for the Runway 13-31 RPZs would not prohibit the location of incompatible uses as they already exist. Thus, easements are not a viable option for the RPZs. The only option left would be to acquire the property and relocate the incompatible uses outside the RPZs. While an option, the costs would extend into the tens of millions of dollars due to the number and types of commercial uses (i.e., Redbird Mall). This approach has been supported by the FAA under very specific circumstances, such as densely populated urban areas where maintaining runway length is of paramount concern. Dallas Executive Airport may not meet this criteria. While this remains an option, it is very likely that the FAA would not support the costs to do so and the costs would likely exceed the ability for the City of Dallas to undertake without federal funding assistance. Therefore, other options must be explored as a means to provide for FAA RPZ design standards.

When factoring costs, a more reasonable solution to the non-standard RPZs would be to modify the existing runway environment so as to move the RPZ off the incompatible land uses. This can be done in two ways. The first would be to simply reduce the runway length. This option would then shift the RPZ in relation to the amount of runway reduced. As previously noted, the airport and its users would like to achieve greater runway length, not less. Reducing the runway pavement would impact both landings in one direction and take-offs in the other. As a result, this option is not preferred and should be avoided if possible.

A second option is to allow the runway pavement to remain intact but instead utilize declared distances to artificially limit operational runway length. Declared distances are the effective runway length that the airport operator declares available for take-off run, take-off distance, accelerate stop distance, and landing distance requirements. Pilots utilize these measurements in their runway length calculations. The use of declared distances is also a method to achieve runway safety area standards as will be addressed later in the chapter. The four declared distances are defined as the following:

Take-off run available (TORA) - The length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors.

Take-off distance available (TODA) - The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off, to start of take-off climb, plus safety factors.

Accelerate-stop distance available (ASDA) - The length of the runway plus stopway declared available and suitable to accelerate from brake release to take-off decision speed, and then decelerate to a stop, plus safety factors.

Landing distance available (LDA) - The distance from the threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors.

The TORA and TODA are often equal to the actual runway length which is currently the case at the airport. The ASDA and the LDA are the primary considerations in determining the

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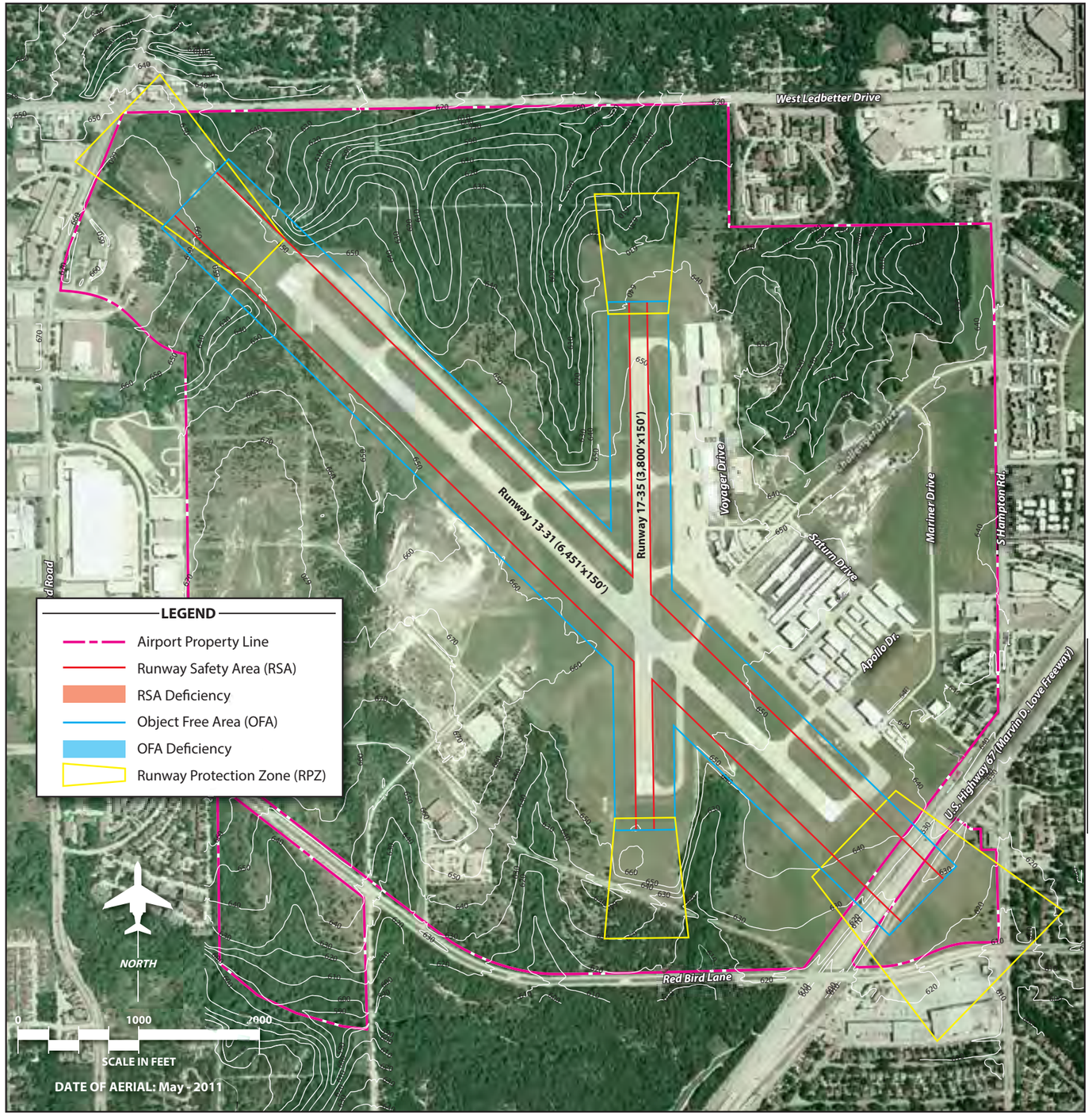

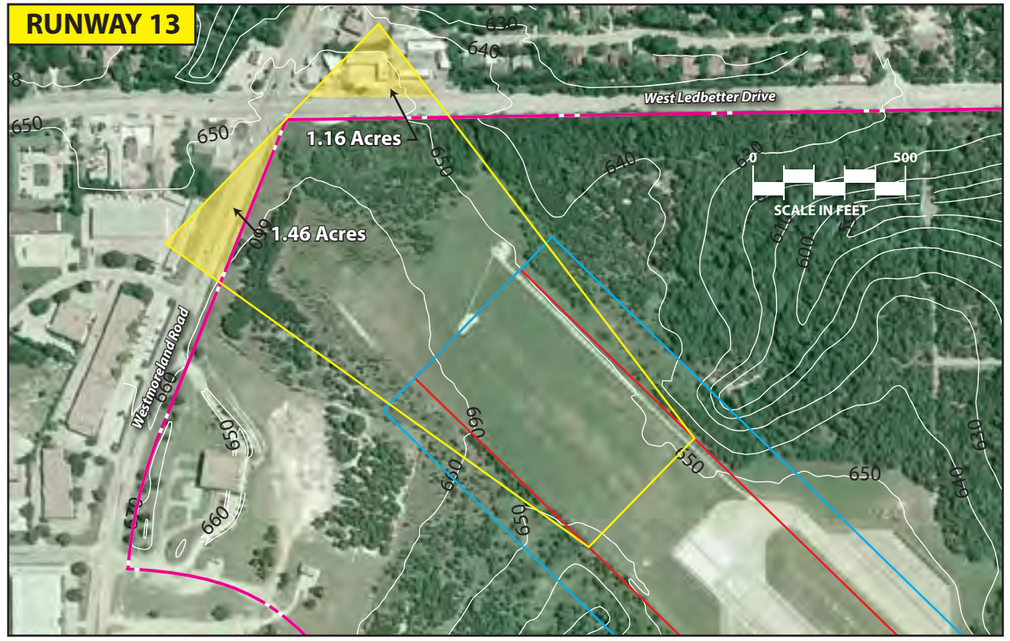

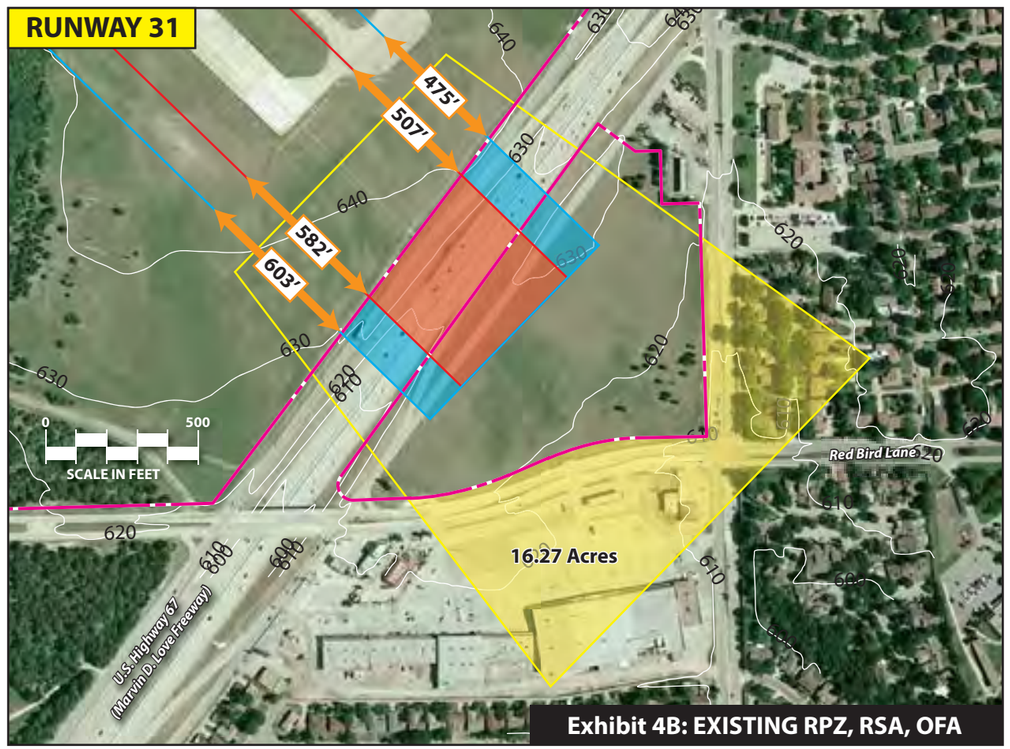

Exhibit 4B: EXISTING RPZ, RSA, OFA

runway length available for use by aircraft, as these calculations must consider providing full RSA.

Utilizing declared distances and/or displaced landing thresholds also requires the application of departure RPZs when the landing point declared available on one runway end differs from the departure point for operations in the opposite direction. The departure RPZ is similar in function and purpose to the approach RPZ in that it should be clear of incompatible uses. The departure RPZ has a dimension equal to that of the existing RPZ on Runway 13 with each having an inner width of 500 feet, outer width of 1,510 feet, and an overall length of 1,700 feet.

Exhibit 4C presents the alternative of utilizing declared distances as a means to shift the RPZs so that they no longer would be over incompatible land uses. As depicted, the Runway 13 RPZ would need to be shifted a minimum of 400 feet southeast so as to remain on airport property. Since the RPZ begins 200 feet prior to the landing threshold, this alternative would require displacing the Runway 13 landing threshold by 400 feet. Since the approach RPZ to Runway 13 is the same size as the departure RPZ for Runway 31, the exhibit depicts only one RPZ for the north end.

For Runway 31, the declared distance alternative would require the use of both an approach and departure RPZ. First, the approach RPZ would need to be shifted a minimum of 500 feet northwest to remove all incompatible land uses from the RPZ as depicted. It should be noted that the RPZ would still extend beyond airport property and avigation easments would need to be acquired over those areas. The 500-foot approach RPZ shift would require

displacing the Runway 31 landing threshold by 500 feet. In order to maximize take-off length for Runway 13, the departure RPZ could begin no closer than 170 feet northwest of the current runway end.

Based on the changes proposed under this alternative scenario, declared distances can be calculated. For Runway 13, the TODA would remain as the current pavement length, or 6,451 feet. The TORA would be reduced to 6,081 feet in accordance with the departure RPZ reducing the take-off calculation by 370 feet (170 feet northwest of the threshold plus 200-foot buffer). The ASDA would be 6,451 feet and the LDA 6,051 feet due to the 400-foot displaced threshold.

It should be noted, however, that the ASDA and LDA as calculated in this scenario would not provide for the full RSA. To meet the full RSA standard for Runway 13 operations, the ASDA and LDA would have to be reduced by another 493 feet since the current RSA beyond the southeast end of the runway only provides 507 feet. A 493-foot reduction in Runway 13 ASDA and LDA would allow for 1,000 feet of RSA beyond the far end of the runway; however, the 493-foot reduction would leave only 5,958 feet for ASDA. The Runway 13 LDA would need to be reduced by 493 feet for RSA beyond the far end of the runway and another 400 feet to account for the displaced threshold, leaving only 5,558 feet for LDA. Since this alternative would propose a 500-foot displaced threshold for Runway 31, the RSA standard of 600 feet prior to the runway would be provided; thus no further reduction of the Runway 31 LDA would be required. The RSA beyond the northwest end of the runway currently meets standard so the ASDA for Runway 31 would not have to be further reduced either.

The primary impact of such a change to the declared distances would be on takeoff calculations by pilots of business jet aircraft that generally need more runway length. With 7,000 feet of runway length considered optimum for current and future aircraft users, a runway length reduction would negatively impact operations. Any length below 6,000 feet would likely impact operations in a way to prohibit some operators from regularly using Dallas Executive Airport. The airport's FBOs have invested millions of dollars in improvements at the airport to be able to serve large aircraft operators. The city, state, and FAA have also made significant investments. Reducing the operational length of the runway

below 6,000 feet would negatively impact these investments.

The FAA has clearly indicated in published documentation that the goal of meeting RPZ and RSA requirements is to enhance safety but not to override the functionality and utility of a runway and/or airport. As with the alternatives to be presented later in the Runway Safety Area Determination, the FAA will need to be consulted to determine if the alternative would be required or if some other compromise can be reached.

Runway Safety Areas

The RSA is a designated area surrounding the runways. According to the FAA, the RSA is to be:

(1) cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;

(2) drained by grading or storm sewers to prevent water accumulation;

(3) capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft, and;

(4) free of objects, except for objects that need to be located in the RSA because of their function (in aiding air navigation).

The dimension of the RSA surrounding the runway is a function of the critical design aircraft. For Runway 13-31 at Dallas Executive Airport, the critical

design aircraft is that group of general aviation aircraft that fall in ARC D-II. Accordingly, the RSA is 500 feet wide and requires 1,000 feet of RSA beyond the far ends of the runway and 600 feet prior to the landing thresholds. Since operations are performed to both runway ends, depending on wind conditions, the RSA effectively needs to extend 1,000 feet beyond each runway end.

As was presented on **Exhibit 4B**, the RSA south of Runway 13-31 is penetrated by the airport's perimeter fence approximately 507 feet southeast of the runway end. As such, the existing RSA does not meet FAA design standards and will need to be remedied per Federal Law in line with FAA regulations and standards.

The FAA has provided a method for determining appropriate RSA improvements necessary by performing a Runway Safety Area Determination. In order to determine if Runway 13-31 can provide any additional length, improvements to the southern RSA must first be considered. Once a solution is found for the RSA, extension options can be considered. The following section will present the RSA determination alternatives.

RUNWAY 13-31 RUNWAY SAFETY AREA DETERMINATION

The master planning process is an appropriate time to re-evaluate the existing RSA disposition. The FAA prefers a standard runway layout with thresholds located at the pavement ends when possible. Several design standards related to RSA have been updated by the FAA since the completion of the previous airport layout plan. The following discussion will consider the effect of more recent design standards as applied to Dallas Executive Airport.

FAA Order 5300.1F, *Modification of Agency Airport Design, Construction, and Equipment Standards*, indicates in Paragraph 6.d the following:

". . . Runway safety areas at both certificated and non-certificated airports that do not meet dimensional standards are subject to FAA Order 5200.8, *Runway Safety Area Program*. Modification of Standards is not issued for nonstandard runway safety areas."

The FAA placed a greater emphasis on meeting RSA standards with the publication of FAA Order 5200.8, *Runway Safety Area Program,* in 1999, following congressional direction. The Order states in Paragraph 5, "The object of the Runway Safety Area Program is that all RSAs at federally obligated airports and all RSAs at airports certified under 14 Code of Federal Regulations (CFR) Part 139 shall conform to the standards contained in AC 150/5300-13, *Airport Design*, to the extent practicable."

The Order goes on to state in Paragraph 8.b: