Chapter Four

Airport Alternatives

In the previous chapter, airport facilities required to satisfy airside and landside aviation demand through the long term planning period of the Master Plan were identified. In addition, the various FAA design standards were discussed. The next step in the planning process is to evaluate reasonable ways these facilities can be provided and the design standards can be met. 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 McKinney and its citizens, as represented through elected officials, who have a vested interest in the development and operation of McKinney National Airport (TKI or Airport).
PLANNING OBJECTIVES

A set of basic planning objectives has been established to guide the alternatives development process. It is the goal of this master planning effort to produce a development plan for the Airport that addresses forecast aviation demand and meets FAA design standards to the greatest degree possible. As owner and operator, the City of McKinney provides the overall guidance for the operation and development of the Airport. It is of primary concern that TKI is marketed, developed, and operated for the betterment of the community and its users. The following basic planning principles and objectives will be utilized as general guidelines during this planning effort:

- To develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations;
- To preserve and protect public and private investments in existing Airport facilities;
- To provide a means for TKI to grow as dictated by demand;
- To put into place strategic property acquisition plans to ensure the long term viability of the Airport as well as to promote compatible land uses surrounding the Airport;
- To develop a facility that is readily responsive to the changing needs of all 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; and,
- To ensure that future development is environmentally compatible.

Exhibit 4A presents a summary of the primary planning considerations for the alternatives analysis. These include: land use/airport protection/property acquisition, airside, and landside development options. In addition, non-development alternatives include a no-build option, a replacement airport option, and a transfer of services option are detailed in the following section.

TKI is an important and valuable economic asset which happens to be a public transportation utility. As previously discussed, the Airport holds value regionally as well as nationally. Although relatively young in relation to other national airports, its growth has been impressive and the future will require expansive areas to meet demand. Moreover, the Airport could easily become constrained if current planning efforts do not factor long term future property needs and adjacent compatible land uses. As a result, the alternatives analysis will consider long term growth which will meet future demand and provide for compatible land use measures both during and, in some instances, beyond the 20-year planning horizon of this Master Plan.

The airside considerations relate to those airfield/airspace elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at an airport. This includes consideration of the established design standards for TKI, the instrument approach capability, the capacity of the airfield, the length and strength of the runway(s), navigational aids, and the layout of the taxiways. Each of these elements was introduced previously, including a definition of various needs established in Chapter Three.
AIRPORT LAND USE, PROTECTION, AND PROPERTY ACQUISITION ALTERNATIVES

- Safety and Security
- Minimum General Aviation Need and Long Term Protection
- Commercial Service Protection Options
- Parallel Runway Options

AIRSIDE ALTERNATIVES

- Airfield Geometry, Safety, and Security
- “Hot Spots”
- Direct Access Taxiways
- Airfield Capacity Improvements
- Runway Extension Options
- Parallel Runway Options
- Taxiway Efficiency Options

LANDSIDE ALTERNATIVES

- Highest and Best Use of Property
- General Aviation Terminal Building Options
- Commercial Service Facility Options
- Hangar Development Options
- Roadway and Parking Options
The landside considerations relate to those facilities providing support to the aviation function of an airport. This includes terminal services (both general aviation and the potential for commercial service operations), aviation business operators, hangars, aprons, and support functions such as aircraft fueling. The previous chapter introduced these elements and identified specific needs based on the forecast future aviation demand. The goal now is to identify alternatives for locating these facilities.

Each functional area (airside and landside) interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the existing facility must be evaluated to determine if the investment in TKI 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.

Not all airside or landside elements will require a detailed alternatives’ analysis. The alternatives analysis is reserved for presenting viable solutions to specific problems or challenges. For those airside or landside elements where only one solution is reasonable or where no alternative is necessary, an explanatory narrative is provided.

**NON-DEVELOPMENT ALTERNATIVES**

Prior to the presentation of development alternatives for TKI, the following non-development options are considered:

- **No-Build:** This alternative considers stopping all new investments at the Airport except for routine maintenance and safety-related projects.
- **Relocate Airport:** This alternative considers constructing a new airport and closing the existing facility.
- **Transfer Services:** This alternative considers transferring all services to another existing airport and closing the existing facility.

**FEDERAL AND STATE GRANT OBLIGATIONS**

Before discussion of the non-development alternatives, it is important to outline statutory grant obligations the City of McKinney is under regarding TKI. Federal grants are generally administered by the FAA; however, Texas participates in the Block Grant Program. As such, the Texas Department of Transportation – Aviation Division (TxDOT) acts on behalf of the FAA for general aviation airports. As such, TxDOT administers both federal and state grants. Federal and most state airport grants
are offered under the condition, via grant obligations, that the invested funds be protected for the life cycle of the intended use. Grant obligations will generally need to be factored in all three non-development alternatives.

Federal and state airport grant-in-aid obligations have done more to preserve public-use airports in the United States than any other single factor. There are over 4,000 publicly owned public-use airports in the United States, and most are subject to one or more federal and/or state aid grant obligations that either temporarily (or permanently) protect the public-use airports from potential closure. It is the policy of the Federal Aviation Administration (FAA) to fully enforce its airport grant-in-aid obligations, and the FAA will go to court if necessary to do so.

Pursuant to FAA grant assurances for airport sponsors, the airport sponsor may not "sell, lease, encumber, or otherwise transfer or dispose of any part of its title or other interests in the property shown on Exhibit A (property map)... for the duration of the terms, conditions, and assurances in this grant agreement without approval of the Secretary of Transportation. For land purchased under a grant for airport development purposes (other than noise compatibility), it will, when the land is no longer needed for airport purposes, dispose of such land at fair market value or make available to the Secretary an amount equal to the United States' proportionate share of the fair market value of the land." Land shall be considered to be needed for airport purposes under the assurances if it may be needed for aeronautical purposes (including runway protection zones) or serve as noise buffer land.

Airport land that is acquired with federal funds is obligated for airport purposes in perpetuity. If the federally acquired land is no longer necessary for airport purposes, it may be released from obligation and used for other non-aviation purposes, if agreed to by the FAA. All future revenue generated on the land must be directed into the airport operation fund or spent on airport improvements. In some cases, a portion of airport land may be sold, with the revenue returning to the airport (operation or capital improvement funding) or to the federal government. If an airport no longer exists at all, and all of the land is sold, all proceeds must be returned to the federal government.

The FAA regulations distinguish between the treatment of grants for the purchase of real property and those for airport development or improvement purposes. With respect to facilities developed or equipment obtained with federal funds, the assurances remain in effect only for the useful life of the facilities developed or equipment acquired, although the period may not exceed 20 years from the date the grant offer was accepted. Therefore, airport closure would require 1) approval of the Secretary of Transportation, 2) establishing that the land is no longer needed for aviation purposes, 3) payment of the FAA's proportionate share of the fair market value of all real property acquired with federal funds, and 4) coordination with the FAA with respect to the disposition of grants made for airport development or improvement.

All land at TKI is subject to the grant assurances and conditions outlined in the preceding paragraphs. Since 2006, approximately $50 million in federal and state funds have been expended for Airport improvements, as well as another $37.5 million in local contributions (see Table 1B). The federal and state funds remain grant-encumbered.
The procedural requirements involved in a request of release from federal obligations include: 1) written request by the sponsor, and 2) facts and circumstances justifying the request. The FAA will take into consideration factors such as: 1) the past and present owner’s compliance record under all its airport agreements and its actions to make available a safe and usable airport for maximum aeronautical use by the public, 2) evidence that the owner has taken or agreed to take all actions possible to correct non-compliance situations at the airport, 3) the reasonableness and practicality of the owner's request in terms of aeronautical facilities which are needed and the priority of need, 4) the net benefit to be derived by civil aviation and the compatibility of the proposal with the needs of civil aviation, and 5) consistency with the guidelines for specific types of releases. Environmental documentation may also be required.

Moreover, the FAA must also make at least one of several policy determinations, including 1) that the public purpose which a term, condition, or covenant of an agreement, or the agreement itself, was intended to serve is no longer applicable, or 2) that the release, modification, reformation, or amendment of an applicable agreement will not prevent accomplishment of the public purposes for which the airport or its facilities were obligated, and such action is necessary to protect or advance the interest of the United States in civil aviation, or 3) the release, modification, reformation or amendment will conform the rights and obligation of the owner to the statutes of the United States and the intent of Congress consistent with applicable law. For facilities (other than land) the FAA must find that 1) the grant agreement involved has expired, 2) the facility in question is no longer needed for the purpose for which it was developed, or 3) the useful life of the facility in question has expired. A successful argument must be made with the FAA that closure will benefit the national air transportation system, and that the funds derived from the sale and closure of the facility will be a benefit for the development of other airports in the system.

There is a definite relationship between the magnitude and condition of an airport's infrastructure and its probable future vitality, and perhaps its survival. Airports with better facilities (e.g., longer runways, newer hangars, better instrument approaches, etc.) and a very active demand base (such as that at TKI) have somewhat less chance of closure. Airports without deficiencies can serve a broader segment of the general aviation market and generate revenues by selling more products or services. Federal and state grant funding, which are essential to airport development projects, also provide the greatest long-term protection from airport closure.

**NO-BUILD ALTERNATIVE**

The no-build alternative would essentially consider making no new capital investments in the Airport. Limited maintenance and upkeep would be required so that the Airport remains safe for aviation activity. No new hangars or apron area would be planned to be built by the City; however, this would not and could not include the prohibition of the same by a private entity under grant obligations. The obvious result of the no-build alternative is that TKI would be unable to meet the current and forecast demand for aviation services in the area. There is currently a substantial aircraft owner wait list whose need for hangar space would never be satisfied under the no-build alternative.
The City of McKinney and the surrounding region has experienced strong growth in all socioeconomic categories over the past several decades. Forecasts indicate this trend will continue throughout and beyond the long term planning horizon. The City of McKinney has a vested interest in maintaining and improving airport facilities for both recreational and business users. Without a commitment to ongoing improvement of the Airport, users of TKI will be constrained from taking full advantage of the facility’s air transportation capabilities.

The unavoidable consequence of the no-build alternative would be the Airport’s inability to accommodate potential users. Corporate aviation plays a major role in the transportation of business leaders and key employees. Thus, airports are often the first impression many corporate and business leaders will have of the community. If the Airport does not have the capability to meet hangar, apron, or airfield needs of potential users, the region’s ability to attract businesses will be diminished. This is especially true for businesses that utilize private aviation as a means to increase productivity.

The long term consequences of the no-build alternative would be a reduction of the quality of the existing airport facilities over time, producing undesirable results. This scenario would result in overcrowded conditions, unnecessary delays, and an overall unpleasant experience for regular users and visitors.

TKI is part of a system of airports in the region, with each facility providing a certain level of service and economic stimuli. Pursuing the no-build alternative at TKI would place a burden on other airports, and users of TKI may relocate to these other facilities as well. Additionally, businesses at TKI and in the region would experience negative economic impacts, and new business may look elsewhere. The no-build alternative is also inconsistent with the development objectives outlined previously.

As outlined previously in Chapter One, the Airport has received nearly $50 million in federal/state development grants since 2006. These grants represent a direct economic stimulus that has lasting positive economic impacts. The no-build alternative means that the City of McKinney would forgo future grants for Airport development, which would have a negative economic impact which, over time, would become more noticeable.

The primary reason a community might choose a no-build alternative is to ultimately not be bound by the grant assurance obligations associated with the acceptance of airport development grants. Grant assurances are part of the grant package contract that the airport sponsor commits to when accepting a development grant from TxDOT, as explained earlier. As such, airport sponsors are bound to maintain the useful life of the facilities developed or equipment acquired for an airport development project. Useful life is a term not to exceed twenty (20) years from the date of acceptance of a grant offer of federal and/or state (TxDOT) funds for a project. There is no limit on the duration of the terms, conditions, and assurances with respect to real property acquired with federal and/or state funds.
RELOCATE AIRPORT ALTERNATIVE

This option considers constructing a new airport to replace the existing facility. The new airport would have to be completed prior to closure of the existing Airport and would likely cost up to $500 million to develop. Additional studies beyond the scope of this Master Plan would be required. These would include a feasibility study, a site selection study, a master plan for the replacement site, and appropriate environmental documentation of the new site (typically an environmental assessment [EA] or environmental impact statement [EIS]).

An important consideration is the potential cost associated with both constructing a new airport and closing the existing Airport. A large portion of the development costs could be eligible for FAA/TxDOT grant funding, but that funding is not guaranteed. Typically, non-revenue producing facilities to be located within the airport property line are eligible for funding, while private development, such as private businesses and hangars, is not generally eligible. Elements outside the property line, such as utility extension and surface roads, are not eligible for funding. Moreover, regional growth would likely require a new airport to be somewhere distant from the City of McKinney, at an inconvenience to its aviation demand. This option could significantly negatively impact economic opportunities for the City as the existing Airport has been a key instrument in attracting and maintaining industry in McKinney. As such, relocating the Airport is not considered prudent.

TRANSFER SERVICES ALTERNATIVE

A similar alternative considers the feasibility of transferring aviation services and activity to other existing airports in the region. This would involve closing the existing Airport, thus leaving hundreds of aircraft owners and multiple businesses to find other locations from which to base and operate. A significant challenge to this approach is the fact that other airports are already capacity-constrained, lacking the facilities, hangars, and services to accommodate an influx of new aircraft. Other airports already have established aviation businesses, so those at the existing Airport may simply go out of business.

Most aircraft owners will choose an airport at which to base their aircraft or business based on proximity to their home or business. Transferring services to another airport would place an undesirable burden on those aircraft owners and businesses.

The capability of other airports is also a limiting factor to transferring services from TKI. The vicinity airports were previously identified on Exhibit 1M. The nearest airport of substance is Addison Airport; however, Addison is significantly limited and could not accommodate most of TKI’s demand. Other regional airports could accommodate the demand at a cost and at significant inconvenience to operators living in and around McKinney, especially the corporate operators supporting locally based businesses and industry.

An important consideration is the impact to the overall aviation system in the region and state. If TKI were to close or if services were to be transferred, there would be a void in the continuity of the aviation
system. One of the fastest growing regions of the country would be without one of its most important aviation facilities.

As discussed in the previous alternative of constructing a replacement airport, if TKI were to close and transfer services and activity, the City would be responsible for a significant reimbursement for development grants already received. Any grant received in the previous 20 years for facility development would be subject to a prorated reimbursement. Land acquired for Airport purposes with grant funds would have to be sold, with the proceeds going back to the grant agency.

Closing the Airport would mean the loss of a substantial investment in a sizable transportation facility. In a situation where public funds are limited, the replacement of a functional airport facility would represent an unjustifiable loss of significant public investment. Many private investments have also been made at the Airport. To abandon these investments and transfer aviation services to another airport would result in an investment with little or no return.

NON-DEVELOPMENT ALTERNATIVES SUMMARY

The purpose of this Master Plan is to examine aviation needs at TKI over the course of the next 20 years. Therefore, this Master Plan will examine the needs of the existing Airport and will present a program of needed capital improvement projects to cover the scope of the plan. Nonetheless, various non-development alternatives may be considered by the airport sponsor.

Information pertaining to the three most common non-development alternatives has been presented. These are the no-build, replacement, and transfer of services alternatives. Two of the three non-development alternatives would lead to the closure of the existing airport. There is a lengthy process to obtain approval for this course of action. Often the primary hindrance to considering airport closure is the fact that airports that have accepted federal development grants agree to certain grant assurances, one of which is to maintain the improvement for its useful life (20 years). If an airport is closed in the interim, then the sponsor must refund a prorated amount to the federal government. For TKI, the City of McKinney has accepted approximately $50 million since 2006, and the Airport has accommodated more than $30 million in private investment. The Airport is a lucrative business, transportation utility, and economic asset for the region. It is quite capable of accommodating existing and future demand and should be developed accordingly to support the interests of local residents and businesses which rely upon it.

REVIEW OF THE PREVIOUS AIRPORT PLAN

The previous planning study for TKI was completed in 2012, consisting of an Airport Layout Plan (ALP) Update and Narrative Report. A variety of projects were identified as part of that study. The following summarizes the most significant projects as depicted on Exhibit 4B:
• Acquire property to the south in order to extend Runway 18-36 1,500 feet south;
• Acquire property to the east in order to construct 7,000-foot by 100-foot parallel runway and commercial service passenger terminal complex;
• Modify FM Road 546 and Enloe Drive to connect with the future East Airport Drive;
• Construct new aprons, connector roads/parking lots, and adjoining hangars in the existing southeastern and northwestern terminal areas;
• Acquire property to the north, construct new entrance road off of Airport Road, and allow for private development along expanded apron;
• Acquire property along and south of Industrial Boulevard to allow for large hangar/airport business operations as well as a new interior roadway connector; and,
• Relocate ASOS.

The analysis to follow in this alternatives chapter will consider the recommendations presented in the previous planning study, in addition to presenting new alternatives based on current standards. Some elements from the previous study may be carried over to this Master Plan and others may be removed from future consideration.

AIRPORT PROTECTION AND PRESERVATION

Airports have become increasingly constrained, especially those in major metropolitan areas. Over time, communities have failed to either acquire sufficient property to allow for long term growth or put into place sufficient land use measures to protect the airport from encroachment. Exhibit 4C illustrates the problem by showing severely constrained airports at 12 separate locations. Obviously, these are only a few of the many more that exist; however, the purpose of the illustration is to provide a cautionary tale. One example depicted is only a short distance away in the Town of Addison. Addison Airport is a major aviation facility that can generally not serve increased demand, only redevelopment options, due to being hemmed in on all sides. Scottsdale Airport (Arizona) serves as another example. Like Addison Airport, Scottsdale Airport was once a small airstrip outside of the metro area. It is now completely surrounded by industrial, commercial, and residential development, limiting its existence to serve only existing demand and redevelopment opportunities. The same situation exists for the others on the exhibit with the most dramatic being the Santa Monica Airport located in Santa Monica, California.

Santa Monica Airport has evolved to serve a very high-level of demand including regular use by large corporate aircraft; however, the airport has been surrounded over time by residential development. The homeowners have long fought to close the airport, and the City of Santa Monica finally joined their position. The city stopped receiving grants to allow all grant assurance obligations to expire. Several decades of legal battles between the city and the federal government have recently concluded with the FAA agreeing to a significant reduction in runway length until ultimate airport closure in 2027.

TKI is not immune to the outcomes experienced at these other airports. If not protected, the Airport will also become constrained from any further growth. The facility has relatively little room left now for
Exhibit 4C
EXAMPLES OF CONSTRAINED AIRPORTS

- Addison Airport - TX
- Chicago Executive Airport - IL
- Compton/Woodley Airport - CA
- Crystal Airport - Minneapolis, MN
- Gillespie Field Airport - San Diego, CA
- Hawthorne Municipal Airport - CA
- McClellan-Palomar Airport - CA
- Montgomery-Gibbs Executive Airport - CA
- Santa Monica Airport - CA
- Scottsdale Airport - AZ
- Timmerman Airport - WI
- Zamperini Field Airport - CA
development potential to meet future demands, and without additional property acquisition, could become similarly constrained within 5-10 years. The result would be a devalued economic asset and would include diminished returns in the local economy. In short, a constrained airport would likely hamper further business development, job opportunities, and economic output for the City of McKinney.

There are two primary methods to protect the long term viability of TKI. The first is to put into place effective and compatible land use controls. Land owners generally will not want their property to remain vacant if development opportunities arise. As such, land use planning and zoning is not the best measure, because if the land surrounding the airport is developed for anything other than the airport, the resultant use will hinder aviation growth. Traditionally, land use controls are put into place to allow for compatible uses and prohibit incompatible uses adjacent to the airport. In most cases, this is done to ensure that the airport does not become a noise nuisance to its immediate neighbors. In short, land use measures are effective in properly placing compatible land uses together, but these measures stop short of providing the airport long term growth opportunities and could generate a constrained situation at the airport.

The second, and most effective, measure to ensure the long term viability for airport growth is to acquire property around an airport. Property acquisition is always challenging as the FAA and State grant process is not set up for, nor can it be use for “land banking” to preserve for long term growth. The federal and state grants can be used for acquiring property needed immediately (1-5 years) if necessary justification exists including safety, security, and/or capacity reasons. In these situations, the FAA/State will pay up to 90 percent of the property value based upon appraised value. Values above the appraised value must be paid entirely by the airport sponsor. So, if the airport sponsor were to acquire property for long term development protection, it must do so with the understanding that local funds must be used first. Once the land is developed for aviation uses, the FAA can reimburse the airport sponsor with up to 90 percent of the land costs.

As the purpose of a Master Plan is to consider the long term needs of an airport, the plan should consider including property acquisition plans to meet long term demand and beyond. The cost of property, while less expensive today than tomorrow, is still a major factor in deciding the extent to which land is acquired for future use purposes. As such, a minimum property acquisition goal should be established to strategically outline a plan for future airport protection.

Exhibit 4D depicts the initial proposed minimum property acquisition boundaries for long term planning. As depicted, all property not currently owned 2,300 feet from runway centerline to the west and 1,500 feet from runway centerline to the east is recommended for acquisition. The 138.5 acres of property on the west side could be developed for landside aviation development such as aviation related businesses, hangars, aprons, taxiways, and supporting facilities. The 147 acres of property to the east would protect for future airside and landside development as well as for land use compatibility. As previously outlined in this study, long term plans for TKI have historically included a parallel runway. This option will be analyzed later in this chapter, but the minimum property acquisition as depicted could allow for the currently planned parallel runway. However, landside development to the east would be severely lim-
ited. Additional property other than presented on the exhibit would be desirable with the parallel runway option and will be outlined later. However, if a parallel runway were to never be developed, the minimum property plan shown on Exhibit 4D would be sufficient for future general aviation landside development only. If commercial service (passenger and/or cargo) were to become a reality, additional property may also be needed. Again, at this time, justification for a parallel runway and/or commercial service facilities does not exist.

As presented, the proposed property acquisition plan would situate the Airport to remain as a vital economic and transportation utility for the City of McKinney for the next 50 years or more. It should be clearly stated that the acquisition of property discussed here is only planning level at this point. Moreover, the plan as proposed above can be modified, as necessary, to accommodate local initiatives and other planning concepts. The final recommended plan will be based upon input from City leaders, the planning and technical advisory groups, airport users, and the public.

The exhibit also depicts new and changed roadway features which are based on a draft plan currently being analyzed, and is the latest working draft (as of July 2017) of the City of McKinney's Master Thoroughfare Plan (MTP). Please note that the proposed roadways shown on all exhibits are part of a Draft Thoroughfare Plan that has not been adopted by City Council. The Draft Thoroughfare Plan provides generalized locations for future thoroughfares, subject to City Council approval. Alignments may shift as roads are engineered and designed to accommodate floodplain areas and to meet sound engineering and planning principles. The roadway lines shown on the plan are not precise (site specific) locations of future thoroughfares. The location and classification of the Limited Access Roadways (LARS) shown are still being discussed at a regional level and are subject to change. The line widths on the exhibit, and those to follow, only depict the potential right-of-way based upon the roadway type.

As is clearly evident from Exhibit 4D, the proposed roadways will limit and constrain future airport development opportunities to the east and south. The constraining factor roads put on airports is sometimes desired as the road offers access to the site and typically will assist in setting proper land uses which are compatible with airport uses. To the east, the Unnamed D traffic way would effectively set an easterly airport boundary which could be somewhat constraining in the northern portion of future airport landside development area. Its design could be a very good supporting facility for future airport development. To the south, the proposed modification to FM 546/Harry McKillop Boulevard would offer better expansion opportunities than the existing road; however, it could pose airspace and/or safety area issues. Finally, the proposed Spur 399 extension would also be welcome as a ground access improvement; however, it would effectively limit runway expansion opportunities to the south. These issues will be further explored and detailed in the following sections.

**AIRSIDE 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 an airport. This in-
Note: The roadways shown are part of a Draft Thoroughfare Plan that has not been adopted by City Council. The Draft Thoroughfare Plan provides generalized locations for future thoroughfares, subject to City Council approval. Alignments may shift as roads are engineered and designed to accommodate floodplain areas and to meet sound engineering and planning principles. The roadway lines shown on the plan are not precise (site specific) locations of future thoroughfares. The location and classification of the Limited Access Roadways (LARS) shown are still being discussed at a regional level and are subject to change.
cludes runways, taxiways, hold bays, instrument approaches, and navigational aids. Each of these elements was introduced in previous chapters. This chapter will examine several airside issues specific to the Airport and present several alternatives. Exhibit 4A presents a summary of the major airside considerations.

TKI currently offers a robust airside facility with a singular Runway 18-36 which is 7,002 feet long by 150 feet wide. The current length and width are sufficient to meet existing demand; however, long term plans should factor increased use by aircraft needing longer lengths to accommodate heavier loads, longer stage lengths, or even new user missions such as commercial services (passenger and/or cargo).

Other airside issues involve airfield and taxiway geometry. The previous chapter outlined updated FAA airfield design standards which have changed, in some cases significantly, since the last planning effort at TKI. The alternatives to follow will consider changes to the airfield to meet new FAA design standards.

**RUNWAY 18-36 LENGTH**

As mentioned, Runway 18-36 is currently sized properly to meet most aircraft user needs. Some operations have been limited due to hot temperatures and/or heavy loads (long stage lengths). Future considerations should factor needs of aircraft having longer take-off rolls as discussed in the previous chapter. Northerly extension options would be cost-prohibitive due to severely falling terrain and water features north of the runway. As such, any extension of the runway should be considered only to the south. Historically, the Airport has been planned for Runway 18-36 to be extended to 8,500 feet, with a 1,500-foot southerly extension. Exhibit 4E presents three runway extension options for consideration, with pavement extended south only.

**Runway 18-36 Extension Alternative 1**

Alternative 1 presents the historic plan currently on the ALP accepted by both TxDOT and the FAA. As shown, the 1,500-foot southerly extension would provide the full pavement length plus runway safety area (RSA) and runway object free area (ROFA) beyond the extended pavement. In fact, the existing layout of FM Road 546 was designed specifically for this reason, so that the runway could be extended to 8,500 feet with full RSA and ROFA beyond the pavement end without having to ultimately relocate the roadway again. The plan would also extend the medium intensity approach lights (MALS) accordingly.

In 2012, however, the FAA adopted a changed position on the runway protection zone (RPZ) which no longer automatically allows for things such as roadways to be in the RPZ. As shown in Alternative 1, the proposed approach RPZ (for Runway 36) and departure RPZ (for Runway 18) would encompass FM Road 546, whereas they do not today.
Runway protection zones are trapezoidal areas beginning 200 feet from the runway end. The standard for RPZs is that they be clear of height obstructions and incompatible land uses, in order to enhance the protection of people and property on the ground. Essentially, any place where people can gather is considered an incompatible land use, such as homes. A detailed description of the RPZ standards was previously presented in Chapter Three – Facility Requirements. RPZs frequently have incompatible land uses and it is the responsibility of the local airport sponsor to consider options for meeting the standards. This is complicated by the fact that RPZ lands are often privately owned, so airports may have limited options with regard to land uses in RPZ.

In 2012, FAA issued *Interim Guidance on Land Uses within a Runway Protection Zone*. Since 2012, the FAA (and TxDOT) has referenced the *Interim Guidance* when analyzing potential new incompatible land uses within an RPZ. New incompatible land uses may be introduced as a result of:

- An airfield project (e.g., runway extension, runway shift),
- A change in the critical design aircraft that increases the RPZ dimensions,
- A new or revised instrument approach procedure that increases the size of the RPZ, and/or
- A local development proposal in the RPZ (either new or reconfigured).

While the airport sponsor may have control over an airfield project or a development proposal, they often do not have control over a change in the critical design aircraft (which is the result of actual activity that the airport cannot limit), or an instrument approach change (which the FAA frequently updates independent of other FAA lines of business or the airport sponsor). Therefore, there are limits to what airports can do to meet RPZ design standards. As outlined in the previous chapter, the RPZ sizing is based primarily on two factors: critical aircraft using the runway and visibility minimums offered by instrument approach(es) to the runway end. The exhibit depicts two approach RPZs: one for visibility minimums of not lower than ¼-mile which is the existing standard, and the other being not lower than ½-mile commonly referred to as Category (or CAT) I minimums. CAT I minimums are currently provided on Runway 18 and it would be ideal to do same on Runway 36 if possible in the future. As such, the extension alternatives depict both RPZs. As shown, the proposed extension would require additional land acquisition for the following:

- Departure RPZ – 11.2 acres;
- ¼-mile visibility RPZ – 17.2 acres; and,
- ½-mile visibility RPZ – 48.5 acres.

If roadways exist in current RPZs prior to 2012, the FAA considers them grandfathered; however, any changes to the runway end or changes to roadways in the RPZ could require changes to the road and/or the runway to clear the RPZ. The FAA has also indicated that accepted plans, such as TKI’s existing ALP, having changed runway ends or new roads in RPZs could also be grandfathered. As such, the FAA could approve Alternative 1 as proposed even though road(s) would be in the RPZs. The FAA holds full discretion in approving roads within the RPZ, a decision which is made only by FAA headquarters (APP-400 division).
Note: The roadways shown are part of a Draft-Thoroughfare Plan that has not been adopted by City Council. The Draft-Thoroughfare Plan provides generalized locations for future thoroughfares, subject to City Council approval. Alignments may shift as roads are engineered and designed to accommodate floodplain areas and to meet sound engineering and planning principles. The roadway lines shown on the plan are not precise (site specific) locations of future thoroughfares. The location and classification of the Limited Access Roadways (LARS) shown are still being discussed at a regional level and are subject to change.
Runway 18-36 Extension Alternative 2

As proposed, Alternative 1 would provide adequate length for most operators likely to operate at TKI on a regular basis. The question remaining is whether the FAA will allow the plan to continue after changes to its updated RPZ standards. As such, a second option has been explored in Alternative 2. The second runway extension alternative has very similar physical features but utilizes operational limitations to keep the runways out of the RPZ.

As depicted on Exhibit 4E, Alternative 2 includes a 1,500-foot pavement extension to the south; however, the Runway 36 landing threshold would remain in its current location as a runway displacement (displaced threshold). The 1,500-foot Runway 36 displacement would allow for the Runway 36 approach RPZ to remain in its current location and not be shifted atop Harry McKillop Boulevard/FM Road 546. The operational impact would be relatively minor as landing length is much less critical for most aircraft than is take-off length. As shown, all RPZs would remain on existing airport property or over the road.

Under this alternative, the departure RPZ for Runway 18 would typically shift south with the pavement placing it atop the roadway(s) to the south. The FAA may not approve this shift unless the implementation of declared distances were put into place.

Artificially reducing operations lengths by implementing declared distances is a viable alternative as outlined in FAA AC 150/5300-13A, Airport Design. With FAA approval, the runway length can be declared (published) shorter for certain operations to provide the necessary safety areas and/or RPZ land use compatibility. The AC describes declared distances as follows: “Declared distances represent the maximum length available and suitable for meeting takeoff, rejected takeoff, and landing distance performance requirements for turbine-powered aircraft.” The declared distances are defined by the FAA as:

- **Takeoff run available (TORA)** - The distance to accelerate from brake release to lift-off, plus safety factors. The departure RPZ begins 200 feet beyond the TORA.
- **Takeoff distance available (TODA)** - The distance from brake release past lift-off to start of takeoff climb, plus safety factors.
- **Accelerate-stop distance available (ASDA)** - The distance to accelerate from brake release to takeoff decision speed ($V_1$), 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. Approach RPZ begins 200 feet beyond the landing threshold.

Implementation of declared distances to meet RPZ requirements as proposed in Alternative 2 does not require any changes to the physical runway pavement. The exception would be the need to put the MALS lights in pavement. The operational runway length available to pilots for calculation of available runway length would be published. All operations to/from Runway 36 would be unaffected, except for TORA calculations which would be 7,400 feet instead of 8,500 feet. Only landings on Runway 36 would be impacted, remaining at the current 7,000 feet available for those operations accounting for the displaced threshold. Table 4A presents the declared distances that would be required. When declared distances are implemented, the departure RPZ may not be entirely contained within the approach RPZ, which is the case when the runway end and pavement end are the same.
### TABLE 4A
Declared Distances Under Alternative 2
McKinney Municipal Airport

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Runway 18</th>
<th>Runway 36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takeoff Run Available (TORA)¹</td>
<td>7,400’</td>
<td>8,500’</td>
</tr>
<tr>
<td>Takeoff Distance Available (TODA)²</td>
<td>8,500’</td>
<td>8,500’</td>
</tr>
<tr>
<td>Accelerate Stop Distance Available (ASDA)³</td>
<td>8,500’</td>
<td>8,500’</td>
</tr>
<tr>
<td>Landing Distance Available (LDA)³</td>
<td>8,500’</td>
<td>7,000’</td>
</tr>
</tbody>
</table>

¹ Departure RPZ begins 200 feet from the end of the TORA.
² TORA cannot be longer than TODA. Departure surface is set on TODA. TODA can be shortened to mitigate departure surface penetrations; if so, TORA is shortened, too.
³ Available runway length plus RSA. Approach RPZ begins 200 feet from the landing threshold. Assumes ¾-mile visibility minimums; if CAT I minimums implemented, LDA for Runway 36 could be reduced to 6,402 feet.

*Source: FAA AC 150/5300-13A, Airport Design*

It should be noted that if the airport were to seek full CAT I minimums, the displacement may need to be an additional 600 feet if the FAA wants the entire approach RPZ off the road. The resultant LDA for Runway 36 could be 6,402 feet, which would be shorter than what is offered today prior to a runway extension.

### Runway 18-36 Extension Alternative 3

The final runway extension alternative is a cursory review of the option to extend the runway to 10,000 feet, which has been historically considered. The 10,000-foot length would likely be a requirement only for some commercial service operators or limited general aviation operators with international destinations. As shown on Exhibit 4E, the 3,000-foot southerly extension would place the runway end south of existing FM Road 546. As a result, the alternative would require relocating the road around or tunneling it underneath such a runway extension. The extended RSA and ROFA would approach the proposed, but not yet approved, Spur 399 connection in the MTP (as of July 2017). The FAA would not likely allow the RPZs to be atop the Spur 399 Extension; thus, the alternative may require the use of a displaced Runway 36 threshold similar to Extension Alternative 2. The displacement would need to be at least 850 feet to allow for the not lower than ¾ mile visibility minimum approach RPZ and 1,650 feet for a ½-mile visibility minimum approach RPZ. The TORA for Runway 18 would need to be reduced to 9,000 feet to keep the departure RPZ clear of the roadway.

As presented, the alternative would shift most of all safety areas for Runway 36 beyond existing airport property. Along with roadway changes, this alternative would require a minimum acquisition of 80.5 acres for RSA, OFA, departure RPZ, and approach RPZ having ¾-mile visibility minimums. For all the same areas plus the larger CAT I RPZ, an estimated 113 acres of land would need to be acquired.
PARALLEL RUNWAY ALTERNATIVES

Airport capacity analysis in the previous chapter outlined a potential long term need for a parallel runway. Parallel runways are much more common at commercial service airports, but are often needed to support busy FAA designated reliever airports such as TKI. Analysis considered here must consider two primary factors: the parallel runway location in relation to the existing runway (separation) and the general designed users for the runway. It is the intent here to discuss both issues and, following presentations to the planning and technical advisory groups and the public, select a preferred alignment, if any, for inclusion in the final recommended plan to be presented in the next chapter.

Parallel Runway Designed Use

Chapter Three presented the concept of airfield design based upon the airport’s critical aircraft. For the proposed parallel runway, the intended users could include:

- Small to medium general aviation users to serve primarily as a relief runway;
- All general aviation aircraft operators with similar design as existing Runway 18-36; or
- Combination of both but be planned to also serve the future potential for commercial service operators.

As with all airfield facilities, grant funding for construction of a parallel runway would require specific justification. It is likely that the FAA and TxDOT would initially move to develop a small parallel runway to serve primarily training and small to medium sized general aviation aircraft. The runway would be primarily designed as a “reliever runway.” Ultimately, however, the runway could be upgraded to serve all demand, especially if landside development to include commercial service operations occurred on the airport’s east side. As such, the planning analysis here will begin with the layout of a runway similar in size to the existing runway (as depicted on the currently approved ALP). After discussion with the planning committees, the recommended design can be modified as desired.

Parallel Runway Location

FAA design outlines three primary minimum separation distances between parallel runways which are based upon operational conditions. These three options are presented on Exhibit 4F. As depicted, the location of the parallel runway is based upon dual operational conditions. The minimum distance between runways is 700 feet which allows for simultaneous use for take-offs and landings in visual flight rule (VFR) conditions only. When in instrument flight rule (IFR) conditions, only one runway can be used at a time. The next location is set at 2,500 feet separation which would allow for simultaneous departures and/or for dual approach and departure operations under radar control. The final condition having a separation of 4,300 feet would allow for both runways to basically operate independently under VFR and IFR (radar) conditions.
Obviously, the most ideal separation would be the 4,300-foot distance offering the greatest operational flexibility for the airfield. This separation, however, would require the acquisition of approximately 1,200 acres of land. It would allow for landside development to be located between the runway system and to the east of the parallel runway. As such, this option would be the most advantageous if TKI were to become a significant commercial service airport. It would not, however, likely be justifiable to primarily serve general aviation operations even having a limited level of commercial service operations.

The option of placing the runway at 2,500-foot separation would be the next best choice for operational conditions; however, this option would require the acquisition of at least 710 acres and would not allow for landside development between the runway system as did the previous alternative. The operational flexibility gained may not justify the extra land acquisition costs and would provide a similar landside development opportunity as the final option.

The final consideration is the minimum separation distance of 700 feet which would require the acquisition of at least 228 acres of land. No landside development could occur between the runways. This option would allow for dual runway uses during VFR conditions only; however, VFR conditions occur the majority of time.

Previous planning efforts have presented similar concepts with recommended plans including the 700-foot separation option, as depicted on the currently approved ALP. Unless the Airport were to become a significant commercial service option, the 4,300-foot separation would not likely be eligible for federal or state grants. The 2,500-foot separation option does not offer significantly more operational benefit in a predominately VFR weather region. As such, the 700-foot separation option is likely the best choice if a parallel runway is to be planned at all.

Earlier alternatives consider the options of extending Runway 18-36 to 8,500 and 10,000 feet. Although not shown, the same could be considered for the parallel runway option(s). Obviously, the option of a longer parallel runway is available. Once determined if the parallel runway is to be included in the final plan, its siting will be finalized to include options of proposed length. As previously mentioned, the FAA and TxDOT will typically support only a small general aviation aircraft runway design for the parallel runway unless it can be proven that the existing runway is not expandable. Given the existing and proposed runway alignments, the existing and proposed parallel runway alignments would be somewhat constrained by existing and planned roadways. The final plan will consider all input from city officials, planning committees, and the public.

**AIRFIELD GEOMETRY**

The FAA has placed a greater emphasis on taxiway geometry in recent years. As noted in the Facility Requirements chapter, there are several locations on the airfield where the taxiway geometry does not meet current design standards. The non-standard taxiway geometries are as follows:
Note: The roadways shown are part of a Draft-Thoroughfare Plan that has not been adopted by City Council. The Draft-Thoroughfare Plan provides generalized locations for future thoroughfares, subject to City Council approval. Alignments may shift as roads are engineered and designed to accommodate floodplain areas and to meet sound engineering and planning principles. The roadway lines shown on the plan are not precise (site specific) locations of future thoroughfares. The location and classification of the Limited Access Roadways (LARS) shown are still being discussed at a regional level and are subject to change.
• Taxiway B2 provides direct access between the runway and general aviation development (hangar apron areas) farther west;
• Taxiway B3 provides direct access between the runway and main apron;
• Taxiway B4 provides direct access between the southeast corner of main apron and runway;
• Taxiway B (north and south) is a designated hot spot.

Each of these non-standard taxiway geometries are planned to be redesigned to current design standards. The options depicted on Exhibit 4G include the application of the new taxiway geometries. The primary issues for TKI are direct access links between the runway and landside aprons at Taxiways B2, B3, and B4.

Exhibit 4G outlines three primary options to modify each taxiway linkage to conform with taxiway geometry standards. The first two options would include shifting the taxiways north or south and removing the existing taxiway pavements. The third option would be to create a no-taxi island (either via paint or pavement removal) to effectively prohibit the straight-line access between the apron areas and the taxiway. Obviously, the least expensive and least disruptive would be implementing the no-taxi island options. The recommended plan will include one of the three options presented for each taxiway linkage based upon the input for the planning committees and airport users.

Taxiway B was historically the airport’s only runway and currently serves as the primary airfield parallel taxiway. Its design and current width can create confusion to aircraft on approach which mistake it for a current runway, thereby giving the north and south ends a “hot spot” designation. This situation is not unique to TKI and there are no perfect options to alleviate it. Some airports have used non-standard markings to denote that the pavement area is a taxiway, others have modified the actual pavement footprint by removing or adding pavement to modify the look of the pavement from the air. This issue will be discussed with the FAA and TxDOT to determine the best correction options, if any.

**LANDSIDE DEVELOPMENT CONSIDERATIONS**

Generally, landside issues are related to those facilities necessary or desired for the safe and efficient parking and storage of aircraft, movement of pilots and passengers to and from aircraft, airport support facilities, and overall revenue support functions. Landside planning considerations, summarized previously on Exhibit 4A, will focus on strategies following a philosophy of separating activity levels. To maximize airport efficiency, it is important to locate facilities together that are intended to serve similar functions. The best approach to landside facility planning is to consider the development to be like that of a community where land use planning is the guide. For airports, the land use guide in the terminal area should generally be dictated by aviation activity levels. Landside development alternatives to follow include consideration of general aviation services and facilities, support areas, as well as potential sites for a future commercial service (passenger and/or cargo) functions.

The orderly development of the airport terminal area (those areas parallel to the runway and along the flight line) can be the most critical, and probably the most difficult, development to control on an airport.
A development approach of “taking the path of least resistance” can have a significant effect on the long-term viability of an airport. Allowing development without regard to a functional plan can result in a haphazard array of buildings and small ramp areas which will eventually preclude the most efficient use of valuable space along the flight line.

As previously discussed, landside facilities at TKI have been developed on the west side of the airfield. As existing property on the Airport’s west side comes closer to being built out, additional land should be analyzed for acquisition in order to satisfy future aviation demand. Earlier in this chapter, a minimum property acquisition boundary (depicted on Exhibit 4D) for TKI was proposed for long term planning considerations. While that proposed boundary would be sufficient to accommodate general aviation and potential commercial passenger service/air cargo demands for the next several years, it is merely a starting point to aid in the discussion to ensure the long term viability for the Airport.

With the land areas under consideration for development, the potential landside alternatives can be numerous. The following alternatives explore filling in remaining undeveloped land on the west side of the Airport and potential opportunities to acquire additional property on the west side to meet future demand. In addition, potential development is considered on the east side of the Airport, and considers the potential for a parallel runway as previously detailed in the airside analysis.

**AVIATION ACTIVITY LEVELS**

The aviation development areas should be divided into high, medium, and low activity levels at TKI. The high activity area should be planned and developed to provide aviation services on the Airport. An example of the high activity areas is the airport terminal building and adjoining aircraft parking apron, which provides tiedown locations and circulation for aircraft. In addition, large conventional hangars used for fixed base operators (FBOs), corporate aviation departments, or storing a large number of aircraft would be considered a high activity use area. The best location for high activity areas is along the flight line near midfield, for ease of access to all areas on the airfield. All major utility infrastructure would need to be provided to these areas.

The medium activity use category defines the next level of airport use and primarily includes smaller corporate aircraft that may desire their own executive hangar storage on the Airport. The best location for medium activity use is off the immediate flight line, but still readily accessible to aircraft including corporate jets. Due to an airport’s layout and other existing conditions, if this area is to be located along the flight line, it is best to keep it out of the midfield area of the airport, so as to not cause congestion with transient aircraft utilizing the facility. Parking and utilities, such as water and sewer, should also be provided in this area.

The low activity use category defines the area for storage of smaller single and multi-engine aircraft. Low activity users are personal or small business aircraft owners who prefer individual space in linear box hangars or T-hangars. Low activity areas should be located in less conspicuous areas. This use category will require electricity, but generally does not require water or sewer utilities.
In addition to the functional compatibility of the aviation development areas, the proposed development concept should provide a first-class appearance for TKI. As previously mentioned, the Airport serves as a very important link to the entire region, whether it is for business or pleasure. Consideration to aesthetics should be given high priority in all public areas, as the airport can serve as the first impression a visitor may have of the community.

To allow for maximum development of the airport while keeping with mandated safety design standards, it is very important to devise a plan that allows for the orderly development of airport facilities. Typically, airports will reserve property adjacent to the runway system for aviation related activity exclusively. This will allow for the location of taxiways, aprons, and hangars.

**TERMINAL BUILDING ANALYSIS AND SUPPORT**

A terminal facility is often the first impression air travelers have of the area. A functional and attractive terminal facility can be needed to secure and build air travelers’ favorable opinion of the surrounding area, particularly business leaders who may be investing in communities adjacent to an airport. Currently, a dedicated general aviation terminal facility is offered at TKI as outlined in previous chapters. McKinney Air Center, the only FBO located on the airfield, currently provides approximately 6,000 square feet of space for various activities including a waiting lobby, pilot’s lounge, flight planning, and FBO administrative offices. This facility is centrally located on the west side of the Airport. The second floor of this facility is primarily comprised of office space for Airport management and operations, as well as other various aeronautical activities.

At a minimum, the terminal facility should be maintained and improved in order to meet the needs of general aviation users. A more aggressive approach would be to plan for a new and modern terminal facility that can serve pilots and passengers while also serving the needs of Airport administration and FBO activities.

It is important to note that the City of McKinney is in the process of designing a new FBO facility at the Airport. This two-story, approximate 17,000 square-foot facility will be constructed approximately 300 feet south of the existing terminal building and situated in the southeast corner of the existing terminal area, just south of the airport traffic control tower (ATCT). While this location can accommodate high activity levels typically associated with FBO operations, future projected demands (namely aircraft parking and hangar storage) could limit the effectiveness of this location through the long term planning horizon of this Master Plan. As such, the alternatives to follow will consider this FBO facility while also analyzing other locations for a long term terminal facility that could better accommodate a mixture of future FBO and Airport administration activities.

As previously detailed in Chapters Two and Three, consideration is also being given to the potential for commercial service activities at the Airport. TKI does not currently have a dedicated passenger terminal facility. All existing commercial charter activities are accommodated through the FBO facility. The aviation demand forecasts and facility requirements analysis identified the potential for TKI to attract one or
more scheduled commercial airline operators at some point in the future. Should this type of activity occur, a dedicated passenger terminal facility would be needed. Several passenger enplanement scenarios were identified in previous chapters; ultimately, the facility requirements identified terminal spacing needs of approximately 34,000 square feet based upon a potential for up to 300,000 annual enplane-
ments.

Terminal Siting Considerations

FAA Advisory Circular (AC) 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities, identifies a number of basic considerations that affect the location of a terminal building. The primary considerations include the following:

1. **Runway Configuration**: The terminal site should be located to minimize aircraft taxiing distances and active runway crossings.

2. **Airfield Access**: The terminal site should consider the layout of terminal aprons and access taxilanes or taxiways and apply recommended airfield design standards to reduce the probability of runway incursions.

3. **FAA Geometric Design Standards and Airspace**: The terminal location needs to assure adequate distance from present and future aircraft operational areas and remain clear of imaginary airspace surfaces.

4. **Access to Highway Network**: The terminal should be located to provide the most direct/shortest routing to the access transportation system.

5. **Expansion Potential**: The long term viability of the terminal is dependent upon the ability of the site to accommodate expansion of the terminal beyond forecast requirements.

6. **Existing and Planned Facilities**: The terminal site should consider the existing and planned locations of other airport facilities and equipment so as to not interfere with line-of-sight or other operational restrictions associated with these facilities.

7. **Terrain**: Topographical conditions should be considered in the selection of a terminal site.

The landside alternatives consider locations for a general aviation terminal facility as well as a commer-
cial passenger terminal complex that could meet the functionality needs of both aviation segments. Ob-
viously, the commercial passenger terminal complex should only be further analyzed in the event that enhanced scheduled airline/air charter service would take place at TKI in the future; however, prudent planning will consider potential locations that could best accommodate such functions in the future. Consideration in the alternatives analysis is given to terminal locations that best meets the criteria listed
above while taking into account existing Airport infrastructure investment and future development potential, while also being able to best segregate general aviation and potential commercial service activities.

Commercial Passenger Terminal Complex

As detailed in the previous chapter, primary guidance on terminal design is provided in FAA AC 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities. Additional guidance is provided in Airport Passenger Terminal Planning and Design: Volume 1 Guidebook, as published by the Airport Cooperative Research Program (ARCP - Report 25).

There are several basic terminal design concepts: simple, linear, pier finger, satellite, and transporter. A simple terminal design concept involves a single building accommodating all passenger processing functions (ticketing, bag claim, departure lounges). Aircraft parking is adjacent to the airside portion of the building and normally involves ground level boarding. A simple terminal design concept offers the advantage of close-in vehicle parking and reduced walking distances to the terminal. Additionally, walking distances within the terminal are minimized. With a single departure area, security screening is usually achieved through one location.

A linear terminal design concept builds upon the simple terminal design concept by providing for a longer building to provide for aircraft parking along the entire length of the building. A linear terminal design is distinguished from a simple terminal design as common facilities (such as departure areas, ticket counters, etc.) may be duplicated throughout the building. A linear terminal design can be easily expanded on either end to provide for additional space if needed. The existing terminal building is considered a combination simple-linear terminal design as some functions are consolidated (ticketing, security, passenger hold room, baggage claim).

The pier finger terminal design concept builds upon the simple terminal design by providing for aircraft gate and departure areas along a pier extending onto the apron from the building. In contrast to the simple/linear terminal design, the pier finger terminal design has the advantage of providing for centralized ticketing and bag claim functions without having to duplicate these features in other portions of the terminal. This offers operating efficiencies for the airlines and easier aircraft movements along the apron. Walking distances become a factor in this design as some aircraft gates can be located a considerable distance from the main terminal. Apron design is an important component of the pier finger design as the apron must allow for the development of the pier finger while providing for adequate taxiway areas.

A comparison of the terminal building concepts to forecast enplanement levels is presented in Table 4B. Local factors must be taken into consideration when determining which design concept to select for an airport. Physical factors such as developable space, terrain, existing facilities, and roads should be considered. Other terminal building concepts include the satellite terminal design and transporter terminal design. These concepts are generally associated with larger airports that experience at least 500,000
annual enplanements. With a long term forecast enplanement level of 300,000, FAA guidance suggests a simple/linear design with apron level boarding.

<table>
<thead>
<tr>
<th>Airport Size by Annual Enplanements</th>
<th>Design Concept</th>
<th>Simple</th>
<th>Linear</th>
<th>Pier Finger</th>
<th>Satellite</th>
<th>Transporter</th>
<th>Physical Concepts</th>
<th>Single Level Curb</th>
<th>Multi-Level Curb</th>
<th>Multi-Level Terminal</th>
<th>Single Level Terminal</th>
<th>Apron Level Boarding</th>
<th>Aircraft Level Boarding</th>
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</thead>
<tbody>
<tr>
<td>Feeder under 25,000</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Secondary 25,000-75,000</td>
<td></td>
<td>X</td>
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<td>75,000-200,000</td>
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<td>200,000-500,000</td>
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</tr>
</tbody>
</table>

Source: FAA AC 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities

**HANGAR DEVELOPMENT**

Analysis in Chapter Three indicated that the Airport should plan for the construction of additional aircraft hangars over the next 20 years. Hangar development takes on a variety of sizes corresponding with several different intended uses.

Commercial general aviation activities are essential to providing the necessary services on an airport. This includes privately owned businesses involved with, but not limited to, aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. These types of operations are commonly referred to as FBOs or specialized aviation service operators (SASOs). The facilities associated with businesses such as these include large conventional type hangars that hold several aircraft. High levels of activity often characterize these operations, with a need for apron space for the storage and circulation of aircraft. These facilities are best placed along ample apron frontage with good visibility from the runway system for transient aircraft. Utility services are needed for these types of facilities, as well as vehicle parking areas.

Aircraft hangars used for the storage of smaller aircraft primarily involve T-hangars or linear box hangars. Since storage hangars often have lower levels of activity, these types of facilities can be located away from the primary apron areas in more remote locations of the airport. Limited utility services are needed for these areas.

Other types of hangar development can include executive hangars for accommodating either one larger aircraft or multiple smaller aircraft. Typically, these types of hangars are used by corporations with company-owned aircraft or by an individual or group of individuals with multiple aircraft. These hangar areas typically require all utilities and segregated roadway access.
Table 4C summarizes the aircraft hangar types and corresponding size and aviation uses that are typically associated with each facility. Currently, there is approximately 456,300 square feet of hangar space (including maintenance area) provided on the Airport, made up of a combination of the hangar types previously discussed.

<table>
<thead>
<tr>
<th>Hangar Type</th>
<th>Typical Size</th>
<th>Aviation Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>Clear span hangars greater than 10,000 square feet</td>
<td>FBOs, SASOs, and other commercial aviation activities resulting in high activity uses</td>
</tr>
<tr>
<td>Executive</td>
<td>Clear span hangars less than 10,000 square feet</td>
<td>SASOs, corporate flight departments, and private aircraft storage resulting in medium-to-high activity uses</td>
</tr>
<tr>
<td>T-Hangar/Linear Box</td>
<td>Individual storage spaces offering 1,200 - 1,500 square feet</td>
<td>Private aircraft storage resulting in low activity uses</td>
</tr>
</tbody>
</table>

FBO – Fixed Base Operator  
SASO – Specialized Aviation Service Operator

A large conventional hangar is being designed and will soon be constructed on the south side of the airfield adjacent to the west extension of Taxiway B5. This hangar is to comprise approximately 40,000 square feet of aircraft storage capability and also include office space. It will be utilized to support FBO activities associated with McKinney Air Center. Similar to the FBO facility under design for construction, this hangar is being implemented into the landside alternatives to follow.

**AIRPORT SUPPORT FACILITIES**

Airport support facilities include a variety of activities related to the overall operation of the Airport and include fuel storage, airport maintenance, and aircraft rescue and firefighting (ARFF), among others. As detailed in Chapter Three, additional future storage capacity should be planned to meet aircraft demand. The existing fuel farm, which currently consists of four fuel storage tanks, has the ability to expand and accommodate an additional six tanks. As such, future fuel storage should continue to be met in the existing fuel farm area. Future consideration should also be given to the best location for self-serve fueling capabilities. The landside alternatives to follow will consider the potential relocation of the existing self-serve fuel facility in order to best accommodate terminal area functions.

Presently, TKI maintenance activities are staged in the 400-series linear box hangar complex. Consideration should be given to constructing a dedicated maintenance facility elsewhere on Airport property in the event its current location could be better utilized for aviation activities. The landside alternatives presented later in this chapter will depict alternate locations farther south and west in more remote areas of the airfield.

Another support function that TKI is exploring is U.S. Customs and Border Protection (CBP) service. This service would allow visitors from all over the world to fly in and out of TKI, provided they have the proper
visas. CBP services can be made available at an airport such as TKI through the User Fee Airport (UFA) Program. Additional consideration will be given in the landside alternatives for potential locations that could satisfy CBP services. These locations are currently being explored by Airport management based upon input from another consultant outside the scope of this study.

**REVENUE SUPPORT DEVELOPMENT**

As previously discussed, TKI has undeveloped property that can be marketed for aviation related and other development. Land located along the flight line with direct access to the airfield should be reserved for aviation related activities. With the amount of available land, the Airport should continue to market itself as an economic center to attract new businesses and revenue streams. The alternatives analysis examines locations for primarily meeting aviation related development.

In certain instances, the Airport could consider non-aviation related development. Non-aviation related uses can be allowed on airports for areas not required for aviation purposes. In some cases, airport land inventories allow for non-aviation uses as long as the areas are not accessible to the airfield. Non-aviation use could support commercial, industrial, or business development and would provide the Airport with an opportunity to improve revenue streams on land that would otherwise remain vacant. The alternatives to follow will further outline areas on airport property that could potentially accommodate non-aviation development potential.

The FAA typically requires airports to receive approval through a land-use release to lease airport-owned land for non-aviation related purposes. The FAA stipulates that all land with reasonable airside access should be used or reserved for aviation purposes. Those areas on an airport not readily linked to the airfield can be considered favorably in a land-use release. In some cases, the FAA will be hesitant to release land-use if the airport has limited development areas near the airfield system.

**BUILDING RESTRICTION LINE**

The building restriction line (BRL) identifies suitable building area locations on the airport. The BRL encompasses the RPZs, the ROFA, navigational aid critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight criteria.

Two primary factors contribute to the determination of the BRL: type of runway (utility or other-than-utility) and the capability of the instrument approaches. Runway 18-36 is considered an “other-than-utility” runway.

The BRL is the product of Title 14 Code of Federal Regulations (CFR) Part 77 transitional surface clearance requirements. These requirements stipulate that no object be located in the primary surface, defined as being no closer than 250 feet from a non-precision instrument runway centerline and not closer than 500 feet to a runway served by a precision instrument approach. For TKI, the primary surface is 1,000
feet wide (500 feet either side of the runway centerline). From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet.

The location of the BRL is dependent upon the selected allowable structure height. Traditionally, the BRL is set at a point where the transitional surface is 20 feet or 35 feet above runway elevation. The alternatives to follow consider a 35-foot BRL in relationship to the runway system and existing and proposed land uses. Due to the amount of space between the runway system and existing landside facilities on the west side of the Airport, the BRL should not be a factor in future landside development within these areas.

**LANDSIDE ALTERNATIVES**

The following section describes a series of landside alternatives as they relate to considerations detailed above. As previously discussed, aviation activity at TKI is well established on the west side of the Airport. This area can continue to accommodate aviation demand in the near term and is the most readily available for development given existing roadway access and utility infrastructure; however, future planning should consider the acquisition of property to accommodate long term projected activity.

Three alternatives have been developed with emphasis given to utilizing existing Airport property as well as providing options for future land acquisition. In addition, one of the main considerations in each alternative is providing an ultimate location to accommodate future general aviation and commercial service activities, especially as it relates to terminal area functionality. Each alternative proposes a different site. As a result, the infrastructure and support (i.e., vehicle access and parking) associated with each alternative can have an impact on the location and layout of other landside components.

The alternatives provide potential development plans aimed at meeting the needs of general aviation, potential commercial service levels, and support functions. The alternatives to be presented are not the only reasonable options for development. In some cases, a portion of one alternative could be intermixed with another. Also, some development concepts could be replaced with others. The overall intent of this exercise is to outline basic development concepts to spur collaboration for a final recommended plan. The final recommended plan only serves as a guide for TKI which will aid the City of McKinney in the strategic planning of Airport property. Many times, airport operators change their plan to meet the needs of specific users. The goal in analyzing landside development alternatives is to focus future development so that Airport property can be maximized and aviation activity can be protected.

**LANDSIDE ALTERNATIVE 1**

Landside Alternative 1 is depicted on Exhibit 4H. Landside development is composed of development west of the runway, as presently occurs, and future development opportunity to the east of the runway. As presented, the primary development items proposed for the west side under Alternative 1 include:
• A commercial passenger terminal complex development site on the northwest side of the airfield with direct access to existing parallel Taxiway A;
• A commercial cargo facility with direct access to existing parallel Taxiway A;
• A potential future general aviation terminal building/FBO complex located approximately 400 feet south of the SASO Hangar (Monarch Air);
• Removal of the 300-series and 400-series T-hangars and linear box hangars in order to better accommodate a future general aviation terminal area;
• 25 large clear span conventional hangars located in various developable areas;
• Five executive hangars situated on the southwest side of Airport property;
• Four T-hangar/linear box hangar complexes adjacent to the north side of the existing fuel farm;
• Expansion potential associated with the existing fuel farm;
• A dedicated Airport maintenance facility adjacent to the east side of the fuel farm;
• Three potential locations on the airfield that could accommodate CBP services as previously outlined; and,
• Potential aviation/non-aviation development parcels with access to existing roadway infrastructure associated with Airport Road immediately to the west.

In order to accommodate the potential passenger and cargo commercial service layouts being proposed in this alternative, approximately 158.8 acres of property would need to be acquired which would allow for even greater expansion opportunity into the future.

The proposed general aviation terminal building proposed farther south would allow for improved functionality over its current location, mainly due to the depth and amount of aircraft parking apron space made available to transient aircraft. In order to accommodate this layout, the 300-series and 400-series hangar complexes would need to be removed. It is also recommended that the self-service fuel facility be relocated to the south edge of the aircraft parking apron to allow for better circulation in proximity to the proposed terminal building. Vehicle access to the general aviation terminal building could be granted by extending a roadway south from Industrial Boulevard. Given the layout of proposed facilities in this area and aiming to make best use of existing property, an office complex is proposed at the corner of the terminal area entrance that could provide administrative space for aviation businesses on the Airport. The plan would require the acquisition of approximately 16 acres just south of Industrial Boulevard, as indicated on Exhibit 4H.

Alternative 1 also considers long term aviation development to the east of the airfield, which would require the Airport acquire approximately 100 acres of property. For discussion purposes, this alternative considers that a parallel runway is not constructed. As such, the east side development would require a parallel taxiway separated by 400 feet from Runway 18-36 as shown. The primary functionality of the east side development would be a large apron serving large clear span conventional hangars which could house aviation related business and/or large aircraft operator needs. To the north and south are medium activity areas consisting of executive hangars, then shifting to low activity T-hangar/linear box hangar facilities at the northern and southern terminal ends. As proposed, the plan would offer:
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- 12 large clear span conventional hangars;
- 20 medium/large executive hangars;
- 32 small/medium executive hangars; and,
- 32 T-hangar/linear box hangar facilities which could provide 300+ individual storage units.

In total, the east side plan would require the acquisition of approximately 100 acres. It would provide adequate automobile access and parking and could be directly linked to the Unnamed D Roadway as depicted on Exhibit 4H.

**LANDSIDE ALTERNATIVE 2**

The second landside alternative is presented on Exhibit 4J. The alternative considers long term development on both sides of the Airport; however, this alternative and the one to follow both factor a parallel runway as well. Another immediate difference between this alternative and the first is the proposed location of a commercial service terminal complex for passenger and cargo being on the east side of the Airport. As depicted, the following facilities are proposed for the Airport’s west side:

- A potential future general aviation terminal building/FBO complex located approximately 400 feet south of the SASO Hangar (Monarch Air);
- 31 large clear span conventional hangars with additional aprons adjacent;
- 61 executive hangars situated in various development areas;
- 11 T-hangar/linear box hangars providing 110+ individual storage units;
- A dedicated Airport maintenance facility adjacent to the east side of the fuel farm; and
- Three potential locations that could accommodate CBP services as outlined on the previous alternative.

As stated, this alternative also considers a new central terminal complex for general aviation uses which would require removal/relocation of the 300 and 400 series hangars as shown. This alternative proposes a slightly different approach to accessing the terminal area when compared to the previous alternative. Overall, the plan would require 101.3 acres of land to be acquired on the west side in three separate locations as depicted on Exhibit 4J.

East side development differs significantly from the first alternative. As proposed, this alternative would allow for more than half of all development area to be utilized for commercial passenger and cargo facilities. The southern portion of the east side could house general aviation facilities, including a series of large conventional hangars and T-hangar/linear box hangar facilities. East side development would require the acquisition of 266.3 acres. As depicted, the following facilities are proposed on the east side:

- A commercial passenger terminal complex in a desirable midfield location;
- A commercial cargo facility adjacent to the north of the proposed passenger complex;
- Five large clear span conventional hangars with ideal access to the airfield system;
- Seven T-hangar/linear box hangar complexes situated farther east; and
• A fuel farm to accommodate east side development potential and provide for enhanced airfield safety associated with fuel vendors needing to cross the runway system from the Airport’s east side.

**LANDSIDE ALTERNATIVE 3**

The final landside alternative presents a more robust west side development plan than the second alternative given that approximately 110 acres of land is proposed for acquisition. As presented on Exhibit 4K, the plan would require the acquisition of 61.5 acres at the northwestern corner of the terminal area to develop a hangar complex comprised of:

- 16 large clear span conventional hangars;
- 16 executive hangars;
- Eight T-hangar/linear box hangar facilities which could offer 80+ individual storage units; and
- A series of small linear box hangars that could provide storage for individual or small groupings of aircraft.

The central portion of the west side plan is similar to Landside Alternative 1, although this plan would place the dedicated Airport maintenance facility in a location associated with proposed property acquisition. It would also allow for additional development potential toward Airport Road, which could include a mix of aviation and non-aviation uses. The following facilities are proposed in this area as well as areas farther to the south along the Airport’s west side:

- A future general aviation terminal building/FBO complex situated adjacent to the west side of a large aircraft parking apron pending removal of the 300-series and 400-series T-hangars and linear box hangars;
- 12 large clear span conventional hangars;
- 26 executive hangars; and
- A series of T-hangars and linear box hangars that could provide 30+ individual storage units.

The proposed plan for the east side is similar to the second alternative; however, Alternative 3 considers a larger “T” shaped (pier finger) terminal building complex which requires greater depth of development. As such, the plan would require the acquisition of 273.7 acres as shown in order to accommodate the commercial passenger service and air cargo facilities depicted. The inclusion of a new fuel farm is also shown to alleviate the need for fuel vendors to cross the field to deliver fuel to the Airport’s east side.

This plan also considers the least amount of general aviation development on the east side having only a series of large conventional hangars proposed. Obviously, space exists for additional hangars and would be available especially if the planned parallel runway were to be longer than shown or expanded to the south.
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**SUMMARY**

Planning future development of both the airside and landside is important because individual actions taken in one area can impact the potential for other options in the future. Therefore, it is important to examine alternative development options in order to maximize a precious resource, which is land on an airport.

Several development alternatives related to both the airside and landside have been presented in this chapter. The process utilized in assessing these alternatives involved a detailed analysis of short and long term requirements as well as future growth potential. After review and input from the planning and technical advisory groups, Airport management, the City of McKinney, Airport users, and interested citizens, a recommended development concept for TKI to include a detailed capital improvement program and environmental overview will be presented in the next phase of this study. The resulting plan will represent an airside facility that fulfills safety and design standards and a landside complex that can be developed as demand dictates.