CHAPTER THREE – FACILITY REQUIREMENTS & DEVELOPMENT ALTERNATIVES

As detailed in previous chapters, an airport contains both airside and landside facilities. Airside facilities consist of the runways, taxiways, approach and departure facilities, navigational aids, lighting, markings, and signage that assist in the ground movement of aircraft. Landside facilities provide the interface between air and ground transportation and include the terminal building, hangars and tiedowns, aircraft parking aprons, automobile parking, and airport support facilities.

Cost-effective, safe, efficient, and orderly development of an airport should rely more on actual demand than on a time-based forecast figure. In order to develop a plan that is demand-based, rather than time-based, a series of planning horizon milestones has been established. These milestones take into consideration the reasonable range of aviation demand projections.

It is important to consider that the actual activity at the airport may be higher or lower over time than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand. It is important to plan for these milestones so airport officials can respond to unanticipated changes in a timely fashion. As a result, these milestones provide flexibility while potentially extending this plan's useful life if aviation trends slow over the period.

The most important reason for utilizing milestones is to allow the airport to develop facilities according to needs generated by actual demand levels. The demand-based schedule provides flexibility in development, as the schedule can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program.

The milestones utilized in the study are:

- Short Term: 0–5 Years
- Intermediate Term: 6–10 Years
- Long Term: 11–20+ Years

AIRSIDE FACILITY REQUIREMENTS

Airside facilities include those related to the arrival, departure, and ground movement of aircraft. Airside facility requirements are based primarily upon the runway design code (RDC) for each runway. Analysis in Chapter Two identified the existing RDC for primary Runway 12-30 as B-I-5000, and the ultimate RDC as B-II-5000. For crosswind Runway 5-23, the existing/ultimate RDC is A-I(Small)-VIS.

RUNWAY SAFETY AREAS

The Federal Aviation Administration (FAA) has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These surfaces include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ).

It is important that the RSA, ROFA, and ROFZ remain under direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and safety personnel. The airport should also own or maintain sufficient land use control over RPZ lands to ensure these areas are free of obstacles and have compatible land uses. Alternatives to owning RPZs include maintaining positive control through avigation easements or ensuring proper zoning measures are taken to maintain compatible land use. Existing and ultimate safety areas for Runways 12-30 and 5-23 at La Porte Municipal Airport (T41) are depicted on **Exhibit 3A** and described in the following sections.

Runway Safety Area (RSA)

The RSA is an established surface that surrounds a runway and is designed to increase safety and decrease potential damage if an aircraft undershoots, overshoots, or makes an excursion from the runway. The RSA is centered on the runway centerline, and its dimensions are based on the established RDC. The FAA states within Advisory Circular (AC) 150/5300-13B, *Airport Design,* Change 1 that the RSA must be cleared and graded and cannot contain hazardous surface variations. In addition, the RSA must be drained by grading or storm sewers. It must also be capable of supporting snow removal operations, aircraft rescue and firefighting (ARFF) equipment, and the occasional passage of aircraft without causing damage. The RSA must remain free of obstacles, other than those considered fixed by function, such as runway lights.

The FAA has placed high significance on maintaining adequate RSA at all airports. The FAA established the Runway Safety Area Program under Order 5200.8 (effective October 1, 1999). The Order states: “The objective of the Runway Safety Area Program is that all RSAs at federally obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13B, *Airport Design*, Change 1 to the extent practicable.” Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSAs for all runways at each airport and perform airport inspections.

Table 3A summarizes the standard RSA dimensions in the existing and ultimate conditions and whether these standards are met in each scenario.

TABLE 3A | RSA Standards

	Runway 12-30		Runway 5-23
	Existing RDC B-I-5000	Ultimate RDC B-II-5000	Existing/Ultimate RDC A-I(Small)-VIS
RSA Dimensions	240' beyond runway x 120' wide	300' beyond runway x 150' wide	240' beyond runway x 120' wide
Meets Standard?	Yes[1]	Yes[1]	Yes[1]

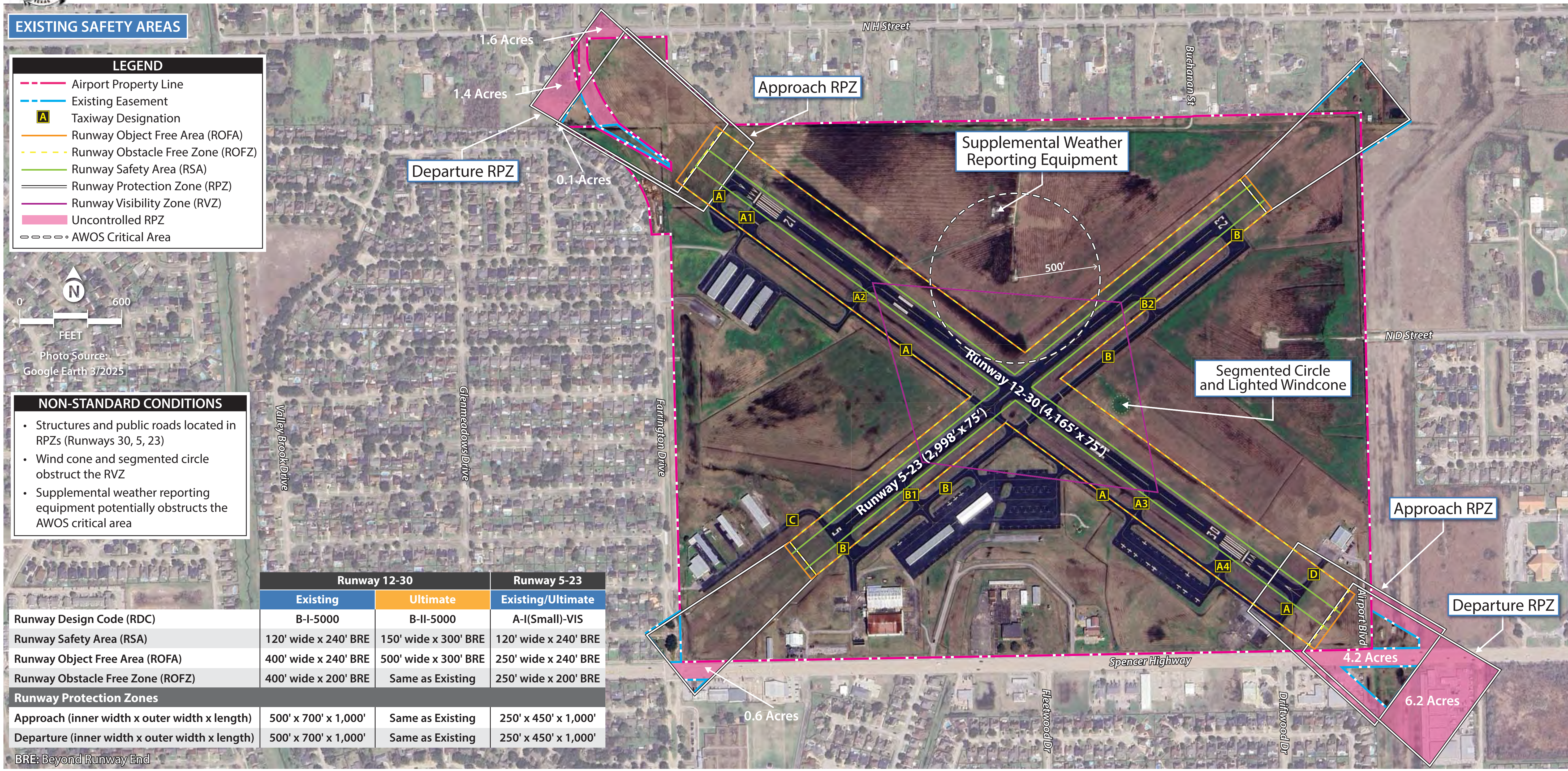
[1]RSA evaluation based on Google Earth imagery dated 03/2025

Sources: FAA AC 150/5300-13B, Change 1, Airport Design; Coffman Associates analysis

Runway Object Free Area (ROFA)

The ROFA can be described as a two-dimensional surface area that surrounds all airfield runways. This area must remain clear of obstructions, with the exception of those that are fixed by function, such as runway lighting systems. This safety area does not have to be level or graded like the RSA; however, the ROFA must be clear of any penetrations of the RSA’s lateral elevation. Like the RSA, the ROFA is centered on the runway centerline, and its size is determined based on the established RDC.

EXISTING SAFETY AREAS



LEGEND

- Airport Property Line
- Existing Easement
- Taxiway Designation
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Runway Visibility Zone (RVZ)
- Uncontrolled RPZ
- AWOS Critical Area

NON-STANDARD CONDITIONS

- Structures and public roads located in RPZs (Runways 30, 5, 23)
- Wind cone and segmented circle obstruct the RVZ
- Supplemental weather reporting equipment potentially obstructs the AWOS critical area

	Runway 12-30		Runway 5-23
	Existing	Ultimate	Existing/Ultimate
Runway Design Code (RDC)	B-I-5000	B-II-5000	A-I(Small)-VIS
Runway Safety Area (RSA)	120' wide x 240' BRE	150' wide x 300' BRE	120' wide x 240' BRE
Runway Object Free Area (ROFA)	400' wide x 240' BRE	500' wide x 300' BRE	250' wide x 240' BRE
Runway Obstacle Free Zone (ROFZ)	400' wide x 200' BRE	Same as Existing	250' wide x 200' BRE
Runway Protection Zones			
Approach (inner width x outer width x length)	500' x 700' x 1,000'	Same as Existing	250' x 450' x 1,000'
Departure (inner width x outer width x length)	500' x 700' x 1,000'	Same as Existing	250' x 450' x 1,000'

BRE: Beyond Runway End

ULTIMATE SAFETY AREAS

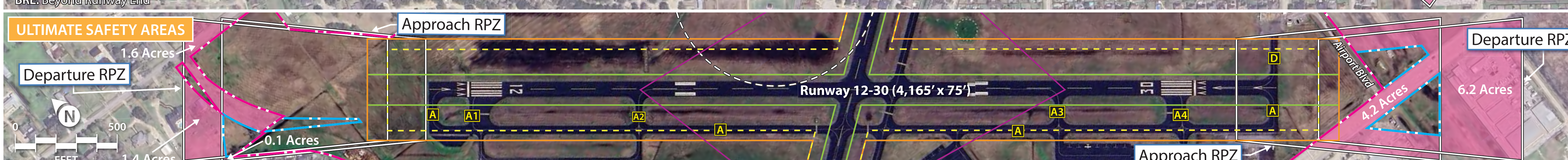


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Table 3B summarizes the standard ROFA dimensions in the existing and ultimate conditions, and whether these standards are met in each scenario.

TABLE 3B | ROFA Standards

	Runway 12-30		Runway 5-23
	Existing RDC B-I-5000	Ultimate RDC B-II-5000	Existing/Ultimate RDC A-I(Small)-VIS
ROFA Dimensions	240' beyond runway x 400' wide	300' beyond runway x 500' wide	240' beyond runway x 250' wide
Meets Standard?	Yes[1]	No[1] The ROFA beyond airport property and encompasses fencing and roads; the segmented circle is located within the ROFA	Yes[1]

[1]ROFA evaluation based on Google Earth imagery dated 03/2025

Sources: FAA AC 150/5300-13B, Change 1, Airport Design; Coffman Associates analysis

Obstacle Free Zones (OFZ)

The runway obstacle free zone (ROFZ) can be defined as a portion of airspace centered on the runway, with an elevation at any point equal to that of the closest point on the runway centerline. The function of the ROFZ is to ensure the safety of aircraft operations by preventing object penetrations to this portion of airspace, including penetrations by taxiing or parked aircraft. Any obstructions within this portion of airspace must be mounted on frangible couplings and be fixed in their positions by function.

Table 3C summarizes the standard ROFZ dimensions in the existing and ultimate conditions, and whether these standards are met in each scenario.

TABLE 3C | ROFZ Standards

	Runway 12-30		Runway 5-23
	Existing RDC B-I-5000	Ultimate RDC B-II-5000	Existing/Ultimate RDC A-I(Small)-VIS
ROFZ Dimensions	200' beyond runway x 400' wide	200' beyond runway x 400' wide	200' beyond runway x 250' wide
Meets Standard?	Yes[1]	Yes[1]	Yes[1]

[1]ROFZ evaluation based on Google Earth imagery dated03/2025

Sources: FAA AC 150/5300-13B, Change 1, Airport Design; Coffman Associates analysis

Runway Protection Zone (RPZ)

An RPZ is a trapezoidal area centered on the extended runway centerline, beginning 200 feet from the end of the runway. This safety area has been established to protect the end of the runway from airspace penetrations and incompatible land uses. The RPZ dimensions are based on the established RDC and approach visibility minimums serving the runway. While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions, and other land uses are prohibited. According to AC 150/5300-13B, *Airport Design,* Change 1, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements

- Irrigation channels, as long as they do not attract birds
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator
- Underground facilities, as long as they meet other applicable design criteria (e.g., RSA requirements)
- Unstaffed navigational aids (NAVAIDs) and airport equipment facilities that are fixed by function in regard to the RPZ
- Aboveground fuel tanks associated with backup generators for unstaffed NAVAIDs

In September 2022, the FAA published AC 150/5190-4B, *Airport Land Use Compatibility Planning*, which states that airport owner control over RPZs is preferred. Airport owner control over RPZs may be achieved through:

- Ownership of the RPZ property in fee simple;
- Possessing sufficient interest in the RPZ property through easements, deed restrictions, etc.;
- Possessing sufficient land use control authority to regulate land use in the jurisdiction that contains the RPZ;
- Possessing and exercising the power of eminent domain over the property; or
- Possessing and exercising permitting authority over proponents of development within the RPZ (e.g., where the sponsor is a state).

AC 150/5190-4B further states that "control is preferably exercised through acquisition of sufficient property interest and includes clearing RPZ areas (and keeping them clear) of objects and activities that would impact the safety of people and property on the ground." The FAA recognizes that land ownership, environmental factors, geography, and other considerations can complicate land use compatibility within RPZs. Regardless, airport sponsors must comply with FAA grant assurances, including (but not limited to) Grant Assurance 21, *Compatible Land Use*. Sponsors are expected to take appropriate measures to "protect against, remove, or mitigate land uses that introduce incompatible development within RPZs." For a proposed project that would shift an RPZ into an area with existing incompatible land uses, such as a runway extension or the construction of a new runway, the sponsor is expected to have, or secure, sufficient control of the RPZ, ideally through fee simple ownership.

Where existing incompatible land uses are present, the FAA expects sponsors to "seek all possible opportunities to eliminate, reduce, or mitigate existing incompatible land uses" through measures such as acquisition, land exchanges, right of first refusal to purchase, agreements with property owners regarding land uses, and easements. These efforts should be revisited during master plan or airport layout plan (ALP) updates, and periodically thereafter, and they should be documented to demonstrate compliance with FAA grant assurances. If new or proposed incompatible land uses impact an RPZ, the

FAA expects the airport to take the above actions to control the property within the RPZ and adopt a strong public stance opposing the incompatible land uses.

For new incompatible land uses that result from a sponsor-proposed action (e.g., an airfield project such as a runway extension, a change in the critical aircraft that increases the RPZ dimension, or lower minimums that increase the RPZ dimension), the airport sponsor is expected to conduct an alternatives evaluation. The intent of the alternatives evaluation is to "proactively identify a full range of alternatives and prepare a sufficient evaluation to be able to draw a conclusion about what is 'appropriate and reasonable.'" For incompatible development off-airport, the sponsor should coordinate with the FAA Airports District Office (ADO) as soon as the sponsor learns of the development. Subsequently, the alternatives evaluation should be conducted within 30 days of becoming aware of the development within the RPZ. The following items are typically necessary in an alternatives evaluation:

- Sponsor's statement of the purpose and need of the proposed action (airport project, land use change, or development)
- Identification of any other interested parties and proponents
- Identification of any federal, state, and/or local transportation agencies involved
- Analysis of sponsor control of the land within the RPZ
- Summary of all alternatives considered, including:
    - Alternatives that preclude introducing the incompatible land use within the RPZ (e.g., zoning action, purchase, and design alternatives, such as implementation of declared distances, displaced thresholds, runway shift or shortening, raising minimums, etc.)
    - Alternatives that minimize the impact of the land use in the RPZ (e.g., rerouting a new roadway to pass through less of the RPZ, etc.)
    - Alternatives that mitigate risk to people and property on the ground (e.g., tunnelling, depressing, and/or protecting a roadway through the RPZ; implementing operational measures to mitigate any risks; etc.)
- Narrative discussion and exhibits or figures depicting the alternative
- Rough order-of-magnitude cost estimates associated with each alternative, regardless of potential funding sources
- Practicability assessment based on the feasibility of the alternative in terms of cost, constructability, operational impacts, and other factors

Once the alternatives evaluation has been submitted to the ADO, the FAA will determine whether the sponsor has made an adequate effort to pursue and fully consider appropriate and reasonable alternatives. **The FAA will not approve or disapprove the airport sponsor's preferred alternative. The**

FAA will only evaluate whether an acceptable level of alternatives analysis has been completed before the sponsor makes the decision to allow or disallow the proposed land use within the RPZ.

In summary, the RPZ guidance published in September 2022 shifts the responsibility of protecting the RPZ from the FAA to the airport sponsor. The airport sponsor is expected to take action to control the RPZ or to demonstrate that appropriate actions have been taken. It is ultimately up to the airport sponsor to permit or disallow existing or new incompatible land uses within an RPZ, with the understanding that the sponsor still has grant assurance obligations, and that the FAA retains the authority to review and approve or disapprove portions of the ALP that would adversely impact the safety of people and property within the RPZ.

RPZs include both approach and departure RPZs. The approach RPZ is a function of the aircraft approach category (AAC) and the approach visibility minimums associated with the approach runway end. The departure RPZ is a function of the AAC and the departure procedures associated with the runway. For a particular runway end, the more stringent RPZ requirements (usually associated with the approach RPZ) will govern the property interests and clearing requirements the airport sponsor should pursue. Runway 12-30 features displaced thresholds at both ends, so there are separate approach and departure RPZs. The existing RPZs at La Porte Municipal Airport are presented on **Exhibit 3A** and detailed further in **Table 3D**.

TABLE 3D | Runway Protection Zones (RPZ) Summary

Runway	Visibility Minimums	RPZ Dimensions	Uncontrolled RPZ	Notes/Potential Incompatibilities
RUNWAY 12-30 EXISTING RDC B-I-5000				
Runway 12	Visual	1,000' length 500' inner width 700' outer width	3.1 acres	Approximately 3.1 acres within the Runway 12 RPZ are uncontrolled. There is a residence/building in the northwestern portion of the departure RPZ, which is considered an incompatible land use.
Runway 30	1-mile	1,000' length 500' inner width 700' outer width	10.4 acres	Approximately 10.4 acres within the Runway 30 RPZ are uncontrolled. The approach/departure RPZs encompass buildings and public roadways.
RUNWAY 12-30 ULTIMATE RDC B-II-5000				
Runway 12	Visual	1,000' length 500' inner width 700' outer width	Same as existing condition	Same as existing condition.
Runway 30	1-mile	1,000' length 500' inner width 700' outer width	Same as existing condition	Same as existing condition.
RUNWAY 5-23 EXISTING/ULTIMATE RDC A-I (Small)-VIS				
Runway 5	Visual	1,000' length 250' inner width 450' outer width	0.6 acres	The 0.6 acres of RPZ land not controlled by the airport are associated with Spencer Highway; the RPZ also encompasses portions of residential/commercial structures.
Runway 23	Visual	1,000' length 250' inner width 450' outer width	None	The majority of the Runway 23 RPZ is on airport property, and the remainder is protected by an easement. Two small structures/outbuildings are located in the RPZ.

Note: Acreages are approximate.

Source: Coffman Associates analysis

Runway Visibility Zone (RVZ)

The runway visibility zone (RVZ) is an area formed by imaginary lines connecting the line-of-sight points of intersecting runways. The purpose of the RVZ is to facilitate coordination among aircraft and between aircraft and vehicles that are operating on active runways. Having a clear line of sight allows departing and arriving aircraft to verify the locations and actions of other aircraft and vehicles on the ground that could create a conflict. Within the RVZ, any point five feet above the runway centerline must be mutually visible with any other point five feet above the centerline of the crossing runway. These standards apply to airports without airport traffic control towers (ATCTs) or with part-time ATCT operations. The RVZ at T41 is depicted in **Exhibit 3A**. Based on available data and imagery, the only fixed objects within the RVZ at La Porte Municipal Airport are the segmented circle and wind cone. A portion of the RVZ encompasses the central aircraft parking apron (Apron 2) and contains marked aircraft parking. Any aircraft parking in these spaces would obstruct the RVZ. The alternatives will consider relocation of these features to maintain an object-free RVZ.

RUNWAY ORIENTATION

A runway's designation is based on its magnetic headings, which are determined by the magnetic declination for the area. The magnetic declination in the area of La Porte Municipal Airport is 1°35' E. Runway 12-30 has a true heading of 126°/306°, while Runway 5-23 has a true heading of 051°/231°. Adjusting for the magnetic declination, the current magnetic heading of Runway 12-30 is 124°/304°, while Runway 5-23 has a magnetic heading of 049°/229°. Based on this information, the runway designation for both runways should be maintained. Based on future magnetic declination, change in designation for Runway 12-30 to Runway 13-31 may be necessary in 2028. If any re-designation in the future is necessary, it should be coordinated with the Texas Department of Transportation (TxDOT) and the FAA to ensure its necessity and that all appropriate publications are updated accordingly. If it is confirmed that the runway should be re-designated, new runway end designation markings can be incorporated concurrently with a future pavement rehabilitation project.

FAA AC 150/5300-13B, *Airport Design,* Change 1, recommends that a crosswind runway be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed on the basis of not exceeding a 10.5-knot (12 miles per hour [mph]) component for airport reference code (ARC) A-I and B-I; a 13-knot (15 mph) component for ARC A-II and B-II; a 16-knot (18 mph) component for ARC A-III, B-III, C-I through C-III, and D-I through D-III; and a 20-knot (23) component for ARC A-IV through E-VI.

Exhibit 1C, presented previously, details the associated wind coverage at La Porte Municipal Airport. In all-weather conditions, the orientation of primary Runway 12-30 provides 94.80 percent coverage for the 10.5-knot component, and greater than 95 percent coverage for 13-, 16-, and 20-knot components in all-weather conditions. In instrument flight rules (IFR) conditions, Runway 12-30 provides 93.82 percent coverage for the 10.5-knot component and greater than 95 percent coverage for 13-, 16-, and 20-knot components. Based on this information, a crosswind runway at T41 is eligible for grant consideration, with specific FAA justification analysis needed for federal funding assistance.

RUNWAY LENGTH

AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. The determination of runway length requirements for the airport is based on five primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)

The mean maximum daily temperature of the hottest month for La Porte Municipal Airport is 93.5 degrees Fahrenheit (°F), which occurs in August. The airport elevation is 25.1 feet above mean sea level (MSL). Primary Runway 12-30 has a longitudinal gradient of 0.002 percent.

Airplanes operate on a wide variety of available runway lengths. Many factors govern the sustainability of runway lengths for aircraft, such as elevation, temperature, wind, aircraft weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures. Airport operators can pursue policies that maximize the sustainability of the runway length, such as area zoning and height and hazard restrictions. Airport ownership (fee simple or easement) of land leading to the runway ends reduces the possibility of natural growth or human-made obstructions. Runway planning should include an evaluation of the aircraft types that are expected to use the airport now and in the future. Future planning should be realistic, supported by the FAA-approved forecasts, and based on the critical aircraft (or family of aircraft).

General Aviation (GA) Aircraft

Most operations at La Porte Municipal Airport are conducted using smaller GA aircraft that weigh less than 12,500 pounds. FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, recommends that airports be designed to serve at least 95 percent of small airplanes. The advisory circular further defines the fleet categories as follows:

- *95 Percent of Small Airplane Fleet* | This category applies to airports that are primarily intended to serve medium-population communities with a diversity of usage and greater potential for increased aviation activities. This category also includes airports that are primarily intended to serve low-activity locations, small-population communities, and remote recreational areas.

- *100 Percent of Small Airplane Fleet* | This type of airport is primarily intended to serve communities located on the fringes of metropolitan areas, or relatively large population communities that are remote from metropolitan areas.

The airport is also utilized by aircraft that weigh more than 12,500 pounds, including small- to medium-sized business jet aircraft. Runway length requirements for business jets that weigh less than 60,000 pounds have also been calculated. These calculations take into consideration the runway gradient and landing length. AC 150/5325-4B stipulates that runway length determination for business jets must consider a grouping of airplanes with similar operating characteristics. The AC provides separate family groupings of airplanes, each of which is based on its representative percentage of aircraft in the national fleet. The first grouping is those business jets that comprise 75 percent of the national fleet, and the second grouping is those that comprise 100 percent of the national fleet. **Table 3E** presents a partial list of common aircraft in each aircraft grouping. A third grouping considers business jets that weigh more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

Table 3F summarizes the recommended runway lengths for different aircraft types that utilize T41. It should be noted that utilization of the 90 percent category for runway length determination for large airplanes that weigh less than 60,000 pounds is generally not considered by the FAA unless there is a demonstrated need at an airport (i.e., a business jet operator that flies out frequently with heavy loads).

TABLE 3E | Business Jet Categories for Runway Length Determination

Aircraft	MTOW (lbs.)
75 Percent of the National Fleet	
Lear 35	20,350
Lear 45	20,500
Cessna 550	14,100
Cessna 560XL	20,000
Cessna 650 (VII)	22,000
IAI Westwind	23,500
Beechjet 400	15,800
Falcon 50	18,500
75–100 Percent of the National Fleet	
Lear 55	21,500
Lear 60	23,500
Hawker 800XP	28,000
Hawker 1000	31,000
Cessna 650 (III/IV)	22,000
Cessna 750 (X)	36,100
Challenger 604	47,600
IAI Astra	23,500
Greater than 60,000 Pounds	
Gulfstream II	65,500
Gulfstream IV	73,200
Gulfstream V	90,500
Global Express	98,000
Gulfstream 650	99,600
MTOW = maximum takeoff weight	

Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design

TABLE 3F | General Aviation Runway Length Recommendations

RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with fewer than 10 passenger seats	
95 percent of these small airplanes	3,100'
100 percent of these small airplanes	3,700'
Small airplanes with 10 or more passenger seats	4,200'
Large airplanes that weigh 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	4,700'
100 percent of these large airplanes at 60 percent useful load	5,500'
75 percent of these large airplanes at 90 percent useful load	6,900'
100 percent of these large airplanes at 90 percent useful load	8,600'

Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design

Another method to determine runway length requirements for aircraft at La Porte Municipal Airport is to examine aircraft flight planning manuals under conditions specific to the airport. **Table 3G** provides a detailed runway length analysis for several of the most common turbine aircraft in the national fleet. This data was obtained from Ultranav software, which computes operational parameters for specific aircraft based on flight manual data. The analysis includes the MTOW allowable and the percent useful load from 60 percent to 100 percent.

The analysis shows that some business aircraft evaluated can operate at T41 at 100 percent useful load during the hottest days of the summer while some cannot. The most demanding aircraft types analyzed cannot operate at 60 percent useful load on the hottest days of the year. All turboprop aircraft analyzed can operate at 100 percent useful load.

TABLE 3G | Business Aircraft Takeoff Length Requirements

Aircraft Name	MTOW	TAKEOFF LENGTH REQUIREMENTS (FEET) Useful Load				
		60%	70%	80%	90%	100%
Citation V	15,900	2,735	2,973	3,229	3,496	3,776
Citation 560 XL	20,000	3,299	3,550	3,810	4,098	4,419
Citation 560 XLS	20,200	3,232	3,470	3,720	3,996	4,199
Citation X	35,700	4,312	4,683	5,128	5,596	6,074
Citation Bravo	14,800	3,293	3,538	3,804	4,115	4,458
Citation Sovereign	30,300	3,339	3,371	3,480	3,702	3,886
Citation 525 CJ1	10,600	3,128	3,538	3,949	4,350	4,761
Citation 525A CJ2	12,375	3,080	3,316	3,563	3,817	4,087
Challenger 300	38,850	4,209	4,605	5,018	5,445	5,891
King Air 200	12,500	3,322	3,422	3,526	3,634	3,746
King Air 350	15,000	3,342	3,477	3,630	3,865	4,163
Lear 45	21,500	4,169	4,506	4,855	5,406	6,002
Pilatus PC-12	9,921	1,987	2,145	2,310	2,483	2,663

Green figures are less than or equal to the longest runway length available at La Port Municipal Airport; orange figures are greater than that length (4,165').
MTOW = maximum takeoff weight

Source: Ultranav software

Runway Length Summary

Many factors are considered when determining appropriate runway length for safe and efficient operations of aircraft at La Porte Municipal Airport. The airport should strive to accommodate business jets and turboprop aircraft to the greatest extent possible, as demand dictates. Runway 12-30 is 4,165 feet long, and it can accommodate all small aircraft with fewer than 10 seats, as well as many of the more common small business jets and turboprops, even with higher payloads and during hot weather. The existing displaced thresholds on Runway 12-30 are also a factor when considering runway length. While the published runway length is 4,165, the 190-foot displacement on Runway 12 and the 402-foot displacement on Runway 30 serve as visual cues to pilots that a reduced operating surface is available during landing operations. In other words, pilots landing on Runway 12 have 3,975 feet of runway available for landing, while pilots arriving on Runway 30 have 3,763 feet of runway available. At present, there are no published declared distances for either runway end, so the displacements apply only to landing operations.

Once the airport sees regular use by aircraft with MTOWs greater than 12,500 pounds, such as those in the first rows of **Table 3G**, a runway extension to 4,700 feet may be justified as eligible for FAA funding to meet the 75 percent of the fleet at 60 percent useful load length recommendation. Alternatives will analyze a future extension to this length as well as a longer extension to 5,500 feet to accommodate 100 percent of the fleet at 60 percent useful load.

An extension option for Runway 5-23 will also be examined. Currently, the crosswind runway is 2,998 feet long, which falls short of the FAA-recommended length of 3,100 feet to accommodate 95 percent of small aircraft.

RUNWAY WIDTH

Runway width design standards are based primarily on the airport's critical aircraft, but they can also be influenced by the visibility minimums of published instrument approach procedures. For primary Runway 12-30, existing RDC B-I-5000 design criteria stipulate a runway width of 60 feet, while ultimate RDC B-II-5000 standards call for a width of 75 feet. Runway 12-30 is currently 75 feet wide, which meets both the existing and ultimate design standards.

Crosswind Runway 5-23 is 75 feet wide, which exceeds existing/ultimate A-I(Small)-VIS design standards which call for a 60-foot-wide runway. A reduction in width should be considered during planning, as TxDOT may not fund maintenance of the pavement that exceeds the width standard. If the City of La Porte wishes to maintain the current 75-foot width, it should be with the understanding that local funding mechanisms may be necessary to maintain the additional 15-foot width that extends beyond the standard.

RUNWAY PAVEMENT STRENGTH

Airport pavements must be able to withstand repeated operations by aircraft of significant weight; therefore, the strength rating of a runway is an important consideration in facility planning. While each runway is assigned a specific strength rating, aircraft that weigh more than the published strength rating are not precluded from using the runway. All federally obligated airports must remain open to the public, and it is typically up to the pilot of an aircraft to determine if a runway can support the aircraft safely. An airport sponsor cannot restrict an aircraft from using a runway simply because its weight exceeds the published strength rating. On the other hand, the airport sponsor has an obligation to properly maintain the runway and protect its useful life (typically for 20 years). According to the FAA publication *Airport/Facility Directory*, "Runway strength rating is not intended as a maximum allowable weight or as an operating limitation. Many airport pavements are capable of supporting limited operations with gross weights in excess of the published figures." The directory also states that operators of aircraft that exceed an airport's pavement strength rating should contact the airport sponsor for permission to operate at the airport.

The current runway strength rating on primary Runway 12-30 is reported at 23,000 pounds single wheel loading (S). Crosswind Runway 5-23 has a reported pavement strength of 25,000 pounds S. This pavement strength is likely sufficient to accommodate the aircraft that currently operate at the airport, but a dual wheel loading value will be an important metric to establish as jet operations at the airport increase. When full-depth runway reconstruction projects are necessary, the runway pavement strength should be planned to accommodate the heaviest aircraft operating on a regular basis. For Runway 12-30, the heaviest aircraft in the B-II grouping that operated in previous 12 calendar months was the Beech Super King Air 350, with a maximum takeoff weight of 15,000 pounds. The heaviest aircraft in the B-I grouping that operated in the last year is the Cessna Citation 501, with a maximum takeoff weight of 11,850 pounds.

TAXIWAYS

The design standards associated with taxiways are determined by the taxiway design group (TDG) and the airplane design group (ADG) of the critical design aircraft. As determined previously, the applicable ADG for Runway 12-30 is ADG I in the existing conditions and ADG II in the ultimate conditions. For Runway 5-23 the existing and ultimate condition is ADG I. **Table 3H** presents the various taxiway design standards related to ADG I and II. The table also shows the taxiway design standards related to TDG; these are based on the main gear width (MGW) and cockpit to main gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiway and taxilane pavements can and should be planned to the most appropriate TDG design standards, based on usage.

TABLE 3H | Taxiway Dimensions and Standards

STANDARDS BASED ON WINGSPAN	ADG I	ADG II
Taxiway and Taxilane Protection		
Taxiway Safety Area (TSA) Width	49'	79'
Taxiway Object Free Area (TOFA) Width	89'	124'
Taxilane Object Free Area (TLOFA) Width	79'	110'
Taxiway and Taxilane Separation		
Taxiway Centerline to Parallel Taxiway Centerline	70'	101.5'
Taxiway Centerline to Fixed or Moveable Object	44.5'	62'
Taxilane Centerline to Parallel Taxilane Centerline	64'	94.5'
Taxilane Centerline to Fixed or Moveable Object	39.5'	55'
Wingtip Clearance		
Taxiway Wingtip Clearance	20'	22.5'
Taxilane Wingtip Clearance	15'	15.5'
STANDARDS BASED ON TDG	**TDG 1A/1B**	**TDG 2A/2B**
Taxiway Width Standard	25'	35'
Taxiway Edge Safety Margin	5'	7.5'
Taxiway Shoulder Width	10'	15'

Note: All dimensions are in feet.
ADG = airplane design group
TDG = taxiway design group

Source: FAA AC 150/5300-13B, Airport Design, Change 1

The current design for taxiways serving Runway 12-30 and Runway 5-23 is TDG 1A, based on the Cessna Citation I, which dictates a width of 25 feet. Both parallel taxiways at T41 are 40 feet wide, and all connector taxiways are 35 feet wide except for the run-up connector taxiways located at the end of each runway. With the exception of the threshold connectors, the existing widths for taxiways serving Runway 12-30 should be maintained if feasible; however, until the airport meets requirements for a critical aircraft in the TDG 2A/2B category, which necessitates a 35-foot taxiway width, the airport may be responsible for funding maintenance of the portion of the taxiway width that exceeds the standard. Similarly, taxiways serving Runway 5-23 may need to be reduced in width to 25 feet, unless the City of La Porte wishes to fund maintenance of the pavement that exceeds the standard.

At La Porte Municipal Airport, the taxiway object free area (TOFA) for taxiways serving Runway 12-30 and Runway 5-23 is 89 feet wide, based on the applicable ADG standards detailed above. In the ultimate B-II environment, TOFAs for taxiways serving Runway 12-30 will increase to 124 feet wide. The TOFA should be cleared of objects except those needed for air navigation or aircraft ground maneuvering purposes. Based on available imagery, the TOFAs associated with the airfield taxiways are clear of obstructions.

The taxilane object free area (TLOFA) is similar to the TOFA in that it should be clear of objects; however, the width of the TLOFA varies depending on the type(s) of aircraft using the taxilane. Taxilanes can be designed based on the types of aircraft using that pavement, with TLOFA dimensions based on the largest wingspan of the aircraft based in these hangars. Future projects, such as hangar construction or pavement markings on the apron, should be designed to ensure the TLOFA remains clear of obstructions.

Taxiway and Taxilane Design Considerations

FAA AC 150/5300-13B, *Airport Design,* Change 1, provides guidance on recommended taxiway and taxilane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft." The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation included in the current AC, as well as previous FAA safety and design recommendations.

1. <u>*Taxiing Method*</u>: Taxiways are designed for cockpit-over-centerline taxiing, with pavement that is sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, existing intersections should be upgraded to eliminate judgmental oversteering, which is when a pilot must intentionally steer the cockpit outside the marked centerline to ensure the aircraft remains on the taxiway pavement.

2. <u>*Curve Design*</u>: Taxiways should be designed so the nose gear steering angle is no more than 50 degrees, which is the generally accepted value to prevent excessive tire scrubbing.

3. <u>*Three-Path Concept*</u>: To maintain pilot situational awareness, taxiway intersections should provide a pilot with a maximum of three choices of travel. Ideally, these are right, left, and a continuation straight ahead.

4. <u>*Channelized Taxiing*</u>: To support visibility of airfield signage, taxiway intersections should be designed to meet standard taxiway width and fillet geometry.

5. <u>*Designated Hot Spots and Runway Incursion Mitigation (RIM) Locations*</u>: A hot spot is a location on the airfield with an elevated risk of a collision or runway incursion. For areas the FAA designates as hot spots or RIM locations, mitigation measures should be prioritized.

6. <u>*Intersection Angles*</u>: Turns should be designed to be 90 degrees, wherever possible. For acute-angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.

7. <u>*Runway Incursions*</u>: Taxiways should be designed to reduce the probability of runway incursions.

    a. *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Taxiway systems should be kept simple using the three-path concept.

    b. *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, direct access to a runway should be avoided.

c. *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold: a reduction in the number of occurrences and in air traffic controller workload.

d. *Avoid High-Energy Intersections*: These are intersections in the middle third of a runway. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.

e. *Increase Visibility*: Right-angle intersections between both taxiways and runways provide the best visibility. Acute-angle runway exits provide greater efficiency in runway usage, but should not be used as runway entrances or crossing points. A right-angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.

f. *Avoid Dual-Purpose Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.

g. *Direct Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion in areas where a pilot typically expects to encounter a parallel taxiway.

h. *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other hot spots should be corrected as soon as practicable.

8. *Runway/Taxiway Intersections*:

a. *Right Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for an acute-angled exit. Right-angle taxiways provide the best visual perspective for a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. Right angles also provide optimal orientation of the runway holding position signs, so they are visible to pilots.

b. *Acute Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage. The construction of high-speed exits is typically only justified for runways that experience regular use by jet aircraft in approach categories C and above.

c. *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway-runway intersections in a single area create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.

9. *Taxiway/Runway/Apron Incursion Prevention*: Apron locations that allow direct access to a runway should be avoided. Increase pilot situational awareness by designing taxiways in a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming straight lines across runways at mid-span should be avoided.

    a. *Wide-Throat Taxiways*: Wide-throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and make lighting and marking more difficult.

    b. *Direct Access from Apron to Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout or a no-taxi island that forces pilots to make a conscious decision to turn.

    c. *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

The taxiway system at La Porte Municipal Airport consists of two full-length parallel taxiways, one serving Runway 12-30 and one serving Runway 5-23, and several connector taxiways. While there are no FAA-determined hot spots on the airfield, there are several non-standard taxiway geometry conditions, as detailed below and shown on **Exhibit 3B**.

- There is direct access to Runway 5-23 and Runway 12-30 from various apron areas.
- Taxiways A and B cross the high-energy portion of the runways.
- The threshold taxiways serving all runway ends are considered wide expanses of pavement.

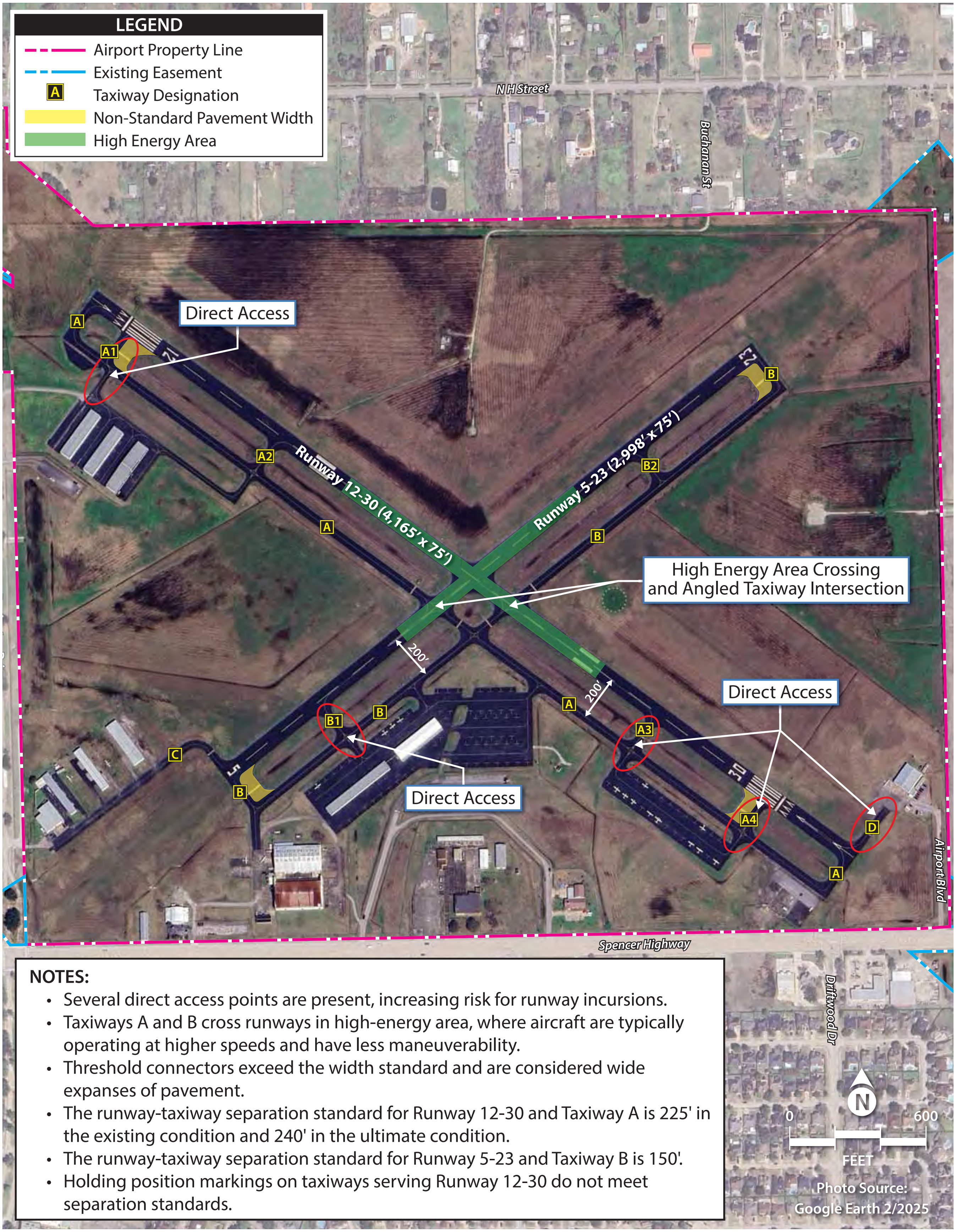
The alternatives section of this chapter will present potential solutions to these non-standard conditions. The alternatives analysis will also consider improvements that could be implemented on the airfield to minimize runway incursion potential, improve efficiency, and conform to FAA standards for taxiway design.

SEPARATION STANDARDS

Runway/Taxiway Separation

The design standard for the separation between runways and parallel taxiways is a function of the critical aircraft and the instrument approach visibility minimum. The separation standard for Runway 12-30 in the existing condition is 225 feet from runway centerline to the parallel taxiway centerline, and 240 feet in the ultimate B-II-5000 environment. The existing and ultimate RDC A-I(Small)-VIS separation standard for Runway 5-23 is 150 feet from the runway centerline to the parallel taxiway centerline.

As shown on **Exhibit 3B**, both parallel taxiways are separated from the runway by 200 feet, which does not meet design standards. Consideration should be given to relocating Taxiway A to accommodate the ultimate 240-foot standard for Runway 12-30, while Taxiway B should be evaluated for a 150-separation with Runway 5-23 at the time the taxiway needs to be reconstructed. It should also be noted that if Taxiway A is relocated to meet the ultimate B-II design standard, the southeast aircraft parking apron would be impacted. Aircraft utilizing tiedowns nearest Taxiway A would penetrate the TOFA.



NOTES:

- Several direct access points are present, increasing risk for runway incursions.
- Taxiways A and B cross runways in high-energy area, where aircraft are typically operating at higher speeds and have less maneuverability.
- Threshold connectors exceed the width standard and are considered wide expanses of pavement.
- The runway-taxiway separation standard for Runway 12-30 and Taxiway A is 225' in the existing condition and 240' in the ultimate condition.
- The runway-taxiway separation standard for Runway 5-23 and Taxiway B is 150'.
- Holding position markings on taxiways serving Runway 12-30 do not meet separation standards.

Holding Position Separation

Holding position markings are placed on taxiways leading to runways. When approaching the runway, pilots should stop short of the holding position marking line. FAA design standards call for hold lines to be 200 feet from the runway centerline for B-I and B-II runways with approach minimums no lower than 1-mile. These standards apply to Runway 12-30 in the existing and ultimate conditions. For A-I(Small) visual runways, all hold lines should be 125 feet from runway centerline, which applies to Runway 5-23 in the existing and ultimate conditions. The FAA also recommends that hold lines be parallel to the runway so that a pilot is fully perpendicular to the runway with a clear, unobstructed view of the entire runway length. If a 90-degree angle intersection with the runway is not practicable, a margin of +/-15 degrees is allowable.

At La Porte Municipal Airport, all hold lines on connector taxiways leading to Runway 12-30 and 5-23 are approximately 125 feet from the runway centerline, which does not meet FAA design standards in the existing or ultimate conditions for Runway 12-30. The hold lines are parallel to the runway centerline. Future planning should include re-marking the hold lines on taxiways serving Runway 12-30, in accordance with B-II design standards, if and when the taxiway is reconstructed to meet the appropriate runway-taxiway separation standard.

Aircraft Parking Area Separation

According to FAA AC 150/5300-13B, *Airport Design*, Change 1, aircraft parking positions should be located to ensure aircraft components (wings, tail, and fuselage) do not do either of the following:

1. Conflict with the object free area for the adjacent runway or taxiways:
    a. Runway object free area (ROFA)
    b. Taxiway object free area (TOFA)
    c. Taxilane object free area (TLOFA)
2. Violate any of the following aeronautical surfaces and areas:
    a. Runway approach or departure surface
    b. Runway visibility zone (RVZ)
    c. Runway obstacle free zone (ROFZ)
    d. Navigational aid equipment critical areas

There are 89 marked aircraft parking positions at La Porte Municipal Airport, located on the three public aircraft parking aprons. The majority of the aircraft parking spaces, all intended for fixed-wing aircraft, are clear of the object-free areas and aeronautical surfaces detailed above; however, seven tiedowns along the northern edge of Apron 2 (refer to Exhibits 1D and 3A) are located within the RVZ. Consideration should be given to removing these tiedowns to maintain a clear RVZ.

NAVIGATIONAL AND APPROACH AIDS

Navigational aids are devices that provide pilots with guidance and position information when utilizing the runway system. Electronic and visual guidance to arriving aircraft enhances the safety and capacity of the airfield. Such facilities are vital to the success of an airport and provide additional safety to pilots and passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by pilots conducting flight training and operating larger aircraft when visibility is good.

Instrument Approach Aids

La Porte Municipal has one published instrument approach procedure (IAP), as detailed previously on Exhibit 1F. This includes an area navigation (RNAV) global positioning system (GPS) approach to Runway 30 with visibility minimums of 1-mile.

Data collected by the FAA indicates the following percentages of time when each runway end was preferred for aircraft arriving under IFR.

- Runway 12 – 54.5 percent
- Runway 30 – 23.6 percent
- Runway 5 – 9.6 percent
- Runway 23 – 11.8 percent
- Unknown – 0.6 percent

Consideration should be given to enhancing instrument approach capabilities at the airport. No ground-based equipment is necessary to achieve an approach with 1-mile minimums and above; however, as mentioned in the *Runway Protection Zone (RPZ)* section earlier in this chapter, lower approach minimums can increase the size of the RPZ, resulting in additional unprotected RPZ land and/or causing new incompatible land uses to be introduced.

Exhibit 3C depicts the RPZs for Runway 12 as it exists today as a visual runway with a displaced threshold. If an IAP with visibility minimums not lower than 1-mile was implemented, the size and location of the RPZ would not change; however, if minimums were reduced below 1-mile and but now lower than ¾-mile, the approach RPZ would increase in size significantly, encompassing more land not controlled by the airport along with additional residences and public roadways.

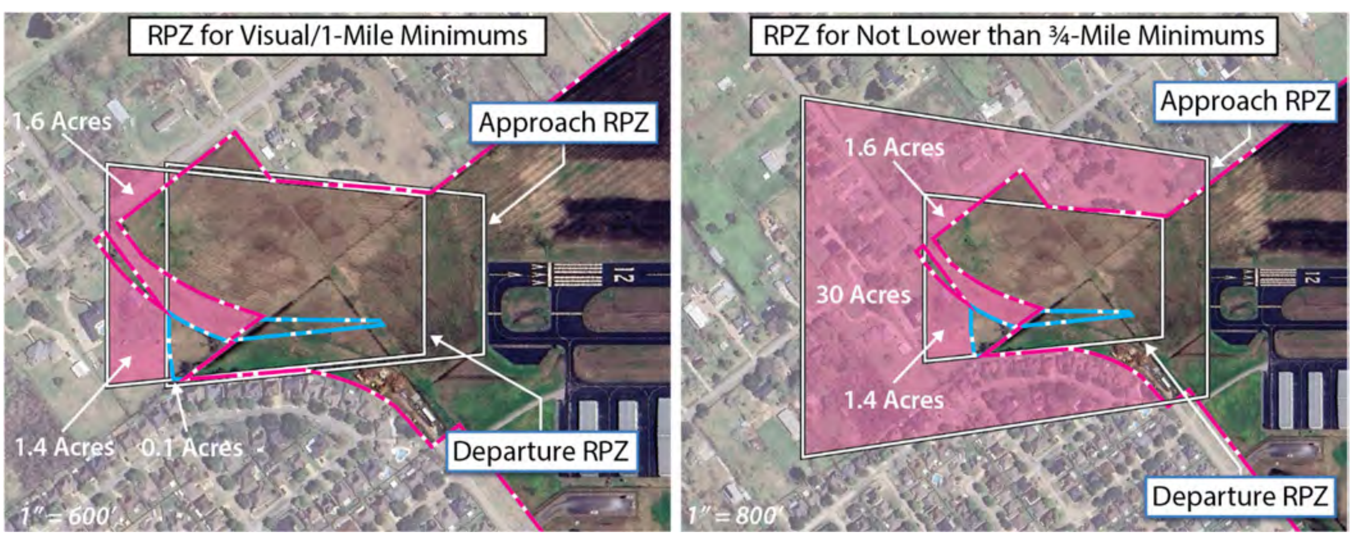


Exhibit 3C – RPZ Comparison

Visual Approach Aids

In most instances, the landing phase of any flight must be conducted in visual conditions. Electronic visual approach aids are commonly utilized at airports to provide pilots with visual guidance information during landings to runways. Runway 12 is equipped with a four-box precision approach path indicator (PAPI-4), which is a visual approach aid that provides pilots with indications of their positions above, below, or on the correct descent glidepath. A PAPI-4 should be installed on Runway 30 and consideration should be given to installing PAPI-2s on Runway 5-23 as this runway is currently not equipped with visual approach aids.

Runway end identification lights (REILs) are flashing lights located at the runway threshold that facilitate rapid identification of the runway end at night and during poor visibility conditions. REILs provide pilots with the ability to identify the runway threshold and distinguish runway end lighting from other lighting on the airport and in the approach areas. Runway 12 is equipped with REILS. Runway 30 and Runways 5 and 23 are not equipped with REILs; as such, consideration should be given to adding these systems to each runway end.

AIRFIELD MARKING, LIGHTING, AND SIGNAGE

Runway 12-30 has non-precision markings, including designation, aiming point, centerline, and threshold markings. Runway 5-23 has basic markings, consisting only of runway designation and centerline markings. Runway and taxiway lighting systems serve as the primary means of navigation in reduced visibility and nighttime operations. Currently, Runway 12-30 and Runway 5-23 are equipped with medium intensity runway lighting (MIRL), which is a common runway lighting system that can be activated via a pilot-controlled system. MIRL should be maintained throughout the planning period. The taxiways at T41 are equipped with centerline reflectors and no taxiway lightings. Consideration should be given to installing medium intensity taxiway lighting (MITL) on all taxiways.

Airfield signage serves as another means of navigation for pilots. Airfield signage informs pilots of their locations at the airport and directs them to major airport facilities, such as runways, taxiways, and aprons. Directional signs are installed on the airfield. Consideration should be given to upgrading to light-emitting diode (LED) bulbs for all signage and other airfield lighting, as necessary.

WEATHER FACILITIES

La Porte Municipal Airport is equipped with a lighted wind cone and segmented circle. The wind cone provides pilots with information about wind conditions, while the segmented circle provides traffic pattern information to pilots. As mentioned previously, a small portion of the segmented circle is located within the ultimate B-II ROFA associated with Runway 12-30 while the entire segmented circle and wind cone are located within the RVZ. This equipment should be relocated to ensure they do not obstruct any safety or object-free areas.

The airfield is also equipped with an automated weather observing system (AWOS). An AWOS transmits on-site weather condition information to pilots. It should be noted that the AWOS has three critical areas that must be kept free of obstructions that interfere with its sensors. There is a 100-foot radius surrounding the AWOS, which requires no structure or vegetation taller than 10 inches, a 500-foot radius that requires structures be at least 15 feet lower than the height sensors, and a 1,000-foot radius that requires structures be at least 10 feet lower than the height of the sensor (shown on **Exhibit 3A**).[1] The airport also has supplemental weather reporting equipment. This equipment is located within the 500-foot radius of the AWOS and could potentially obstruct the critical area; however, due to the size and placement of these structures, it is unlikely that they will adversely affect AWOS performance.

AIRSIDE FACILITY REQUIREMENTS SUMMARY

The intent of this section has been to outline the airside facilities required to meet potential aviation demands projected for La Porte Municipal Airport through the long-term planning period. A summary of the airside requirements is included in **Exhibit 3D**.

AIRSIDE DEVELOPMENT ALTERNATIVES

This section identifies and evaluates various airside development factors at La Porte Municipal Airport to meet the requirements set forth in the previous section. Airside facilities are, by nature, the focal point of an airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable development options. Each functional area interrelates and affects the development potential of the others; therefore, all areas are examined individually and then coordinated as a whole to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the airport must be evaluated to determine if the investment in T41 will meet the aviation needs of La Porte and the region, both during and beyond the 20-year planning period.

The alternatives described below address the airside facility needs of the airport, including the potential for runway extensions, taxiway geometry modifications, upgrade of navigational aids, and mitigation for safety area deficiencies. For each alternative, the Airport Sponsor should coordinate with TxDOT/FAA to evaluate the continued need for displaced thresholds on Runways 12 and 30, and the location of those displacements should they prove necessary. If the displacements are maintained, declared distances[2] should be published to notify pilots of the runway distance available during takeoff and landing operations. At present, based on the existing displaced thresholds, the landing distance available (LDA) for Runway 12 should be published at 3,975 feet and 3,763 feet for Runway 30. If Runway 12-30 achieves a B-II design standard, an additional reduction in LDA and accelerate-stop distance available [ASDA] for Runway 12 would be necessary to provide an unobstructed ROFA, at a minimum.

It should be noted that consideration was given to further displacement of thresholds to bring each RPZ fully onto airport property, as preferred by FAA; however, the displacements that would be necessary to accomplish this would be a significant detriment to the airport, resulting in substantial reductions in

[1] Refer to FAA Order JO 6560.20C for additional AWOS/ASOS siting criteria. (https://www.faa.gov/documentLibrary/media/Order/6560_20c_ord.pdf)
[2] Declared distances are the distances declared available for an aircraft's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. Refer to Appendix A – Glossary for additional information.

	EXISTING Runway 12-30	ULTIMATE Runway 12-30	EXISTING Runway 5-23	ULTIMATE Runway 5-23
Runways				
Runway Design Code (RDC)	B-I-5000	B-II-5000	A-I(Small)-VIS	Maintain
Dimensions	4,165' X 75'	Consider runway extension options; maintain width	2,998' x 75'	Consider runway extension options and width reduction to 60'
Pavement Strength	23,000 lbs S	Maintain until reconstruction is necessary, then plan to accommodate heaviest aicraft operating regularly	25,000 lb S	Maintain until reconstruction is necessary, then plan to accommodate heaviest aircraft operating regularly
Safety Areas				
Runway Safety Area (RSA)	Standard RSA	Maintain	Standard RSA	Maintain
Runway Object Free Area (ROFA)	Standard ROFA	ROFA extends beyond property & contains obstructions; consider mitigation	Standard ROFA	Maintain
Runway Obstacle Free Zone (ROFZ)	Standard ROFZ	Maintain	Standard ROFZ	Maintain
Runway Visibility Zone (RVZ)	Relocate segmented circle/wind cone and tiedowns outside RVZ	Maintain clear RVZ	Relocate segmented circle/wind cone outside RVZ	Maintain clear RVZ
Runway Protection Zone (RPZ)	Portions of the RPZs uncontrolled; potentially incompatible land uses present	Where feasible, acquire easement and remove incompatible land uses	Portions of the RPZs uncontrolled; potentially incompatible land uses present	Where feasible, acquire easement and remove incompatible land uses
Taxiways				
Design Group	1A	2A	1A	Maintain
Parallel Taxiway	Maintain	Maintain	Maintain	Maintain
Parallel Taxiway Separation from Runway	200'	Relocate to 240'	200'	Consider relocation to 150' separation
Widths	35'-40'	Maintain	35'-40'	Consider reduction to 25'
Holding Position Separation	125'	Relocate to 200'	125'	Maintain
Notable Conditions	Direct access; high-energy crossing; wide expanses of pavement on threshold connectors	Consider taxiway geometry modifications to meet FAA standards	Direct access; high-energy crossing; wide expanses of pavement on threshold connectors	Consider taxiway geometry modifications to meet FAA standards
Navigational and Weather Aids				
Instrument Approaches	RNAV (GPS) Runway 30	Maintain existing; Consider GPS approach to Runway 12	Visual	Maintain
Weather Aids	AWOS, wind cone, segmented circle, rotating beacon	Relocate equipment out of ROFA and RVZ as necessary		
Approach Aids	PAPI-4 (12), REILs (12)	Maintain PAPI-4 and REILs on Runway 12, add PAPI-4 and REILs on Runway 30	None	PAPI-2/REILs on Runways 5 and 23
Lighting and Marking				
Runway Lighting	MIRL	Maintain	MIRL	Maintain
Runway Marking	Non-precision	Maintain	Basic	Maintain
Taxiway Lighting	Centerline reflectors	Install MITL	Centerline reflectors	Install MITL

KEY
AWOS - Automated Weather Observation Station
GPS - Global Positioning System
MIRL - Medium Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
PAPI - Precision Approach Path Indicator
RDC - Runway Design Code
REIL - Runway End Identification Lights
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area
S - Single Wheel Load

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takeoff/landing lengths. For this reason, this option was not considered further and is not included as a potential alternative.

AIRSIDE ALTERNATIVE 1

Airside Alternative 1 is depicted on **Exhibit 3E** and considers several airfield upgrades to meet ultimate airfield design standards and enhance safety at La Porte Municipal Airport, while maintaining current runway dimensions. Primary actions proposed with this alternative include the following:

- Maintain existing Runway 12-30 dimensions to be consistent with the ultimate RDC of B-II-5000. While the current length of 4,165 does not meet the FAA-recommended length of 4,200 feet to accommodate small airplanes with 10 or more seats, or the recommended 4,700 feet to accommodate 75 percent of large airplanes at 60 percent useful load, it is capable of accommodating many of the aircraft analyzed using Ultranav software (see Table 3G).

- Publish declared distances to correspond with existing displaced thresholds and provide a full B-II ROFA off the end of Runway 30. For takeoff operations on Runway 12, the ASDA would be reduced by approximately 140 feet to allow for an unobstructed ROFA, leaving an available runway length of 4,025. The LDA for each runway is also reduced, with 3,835 feet of available runway for aircraft landing on Runway 12, and 3,763 feet of available runway for aircraft landing on Runway 30.

- Land within RPZs that is not controlled by the airport is proposed to be protected through property acquisition or the acquisition of easements, with structures removed if feasible. No changes to public roadways are proposed.

- Relocate the wind cone and segmented circle outside the RVZ and ultimate ROFA. The proposed site for the relocated equipment is approximately 150 feet east of its existing location.

- Remove tiedowns located in the RVZ.

- Relocate parallel Taxiway A to meet 240-foot separation standard for the ultimate B-II-5000 environment.

- Update taxiway designations to correspond to FAA Engineering Brief No. 89, *Taxiway Nomenclature Convention*, which calls for alphanumeric designations for all connecting taxiways, including threshold connectors.

- Relocate/remove taxiway pavement to resolve direct access. The FAA recommends that aircraft make a 90-degree turn prior to entering the runway. As such, Alternative 1 considers relocation of ultimate Taxiways A4 and B2. The direct access provided by the Runway 12-30 threshold connectors is proposed to be mitigated by a reduction in pavement width (described in the next bullet).

- Remove excess pavement associated with the connector taxiways at the end of Runway 12-30 and Runway 5-23. Wide pavement areas result in the placement of airfield signs far from a pilot's view, reducing the conspicuousness of critical visual cues.

- Re-mark runway holding position lines at 200 feet from runway centerline on all taxiways serving Runway 12-30 to be consistent with ultimate RDC B-II-5000 standards.

- Install PAPI-4 and REILs systems on Runway 30; install PAPI-2 and REILs systems on Runways 5 and 23.

- Install MITL on all existing and proposed taxiway pavement.

AIRSIDE ALTERNATIVE 2

Airside Alternative 2, as depicted on **Exhibit 3F**, illustrates a second option to meet ultimate airfield design standards and improve safety at the airport, while also increasing the available runway lengths. Several components of this alternative, such as mitigation of direct access and control over property in RPZs, are similar to the first alternative; however, there are some key differences.

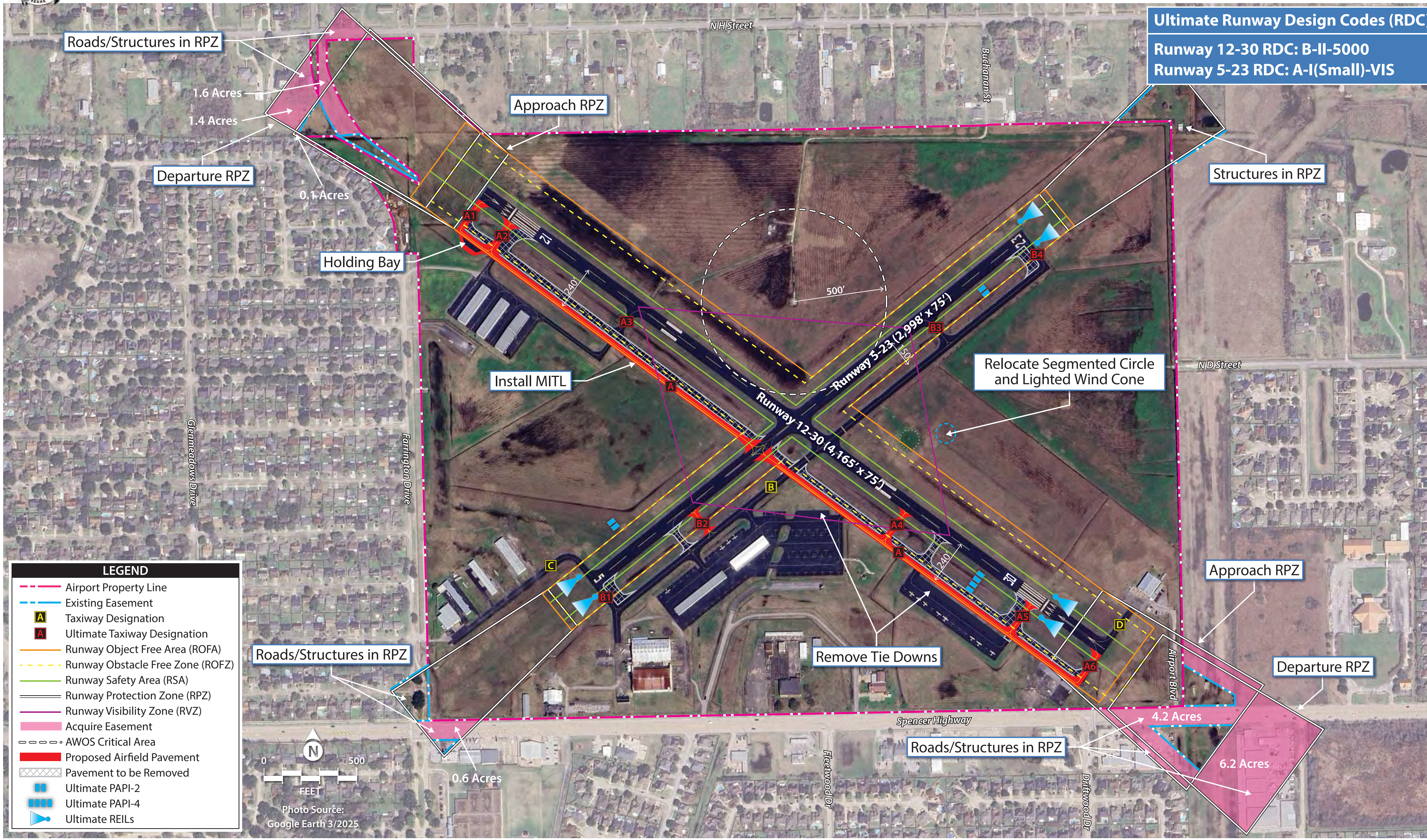
Proposed actions include the following:

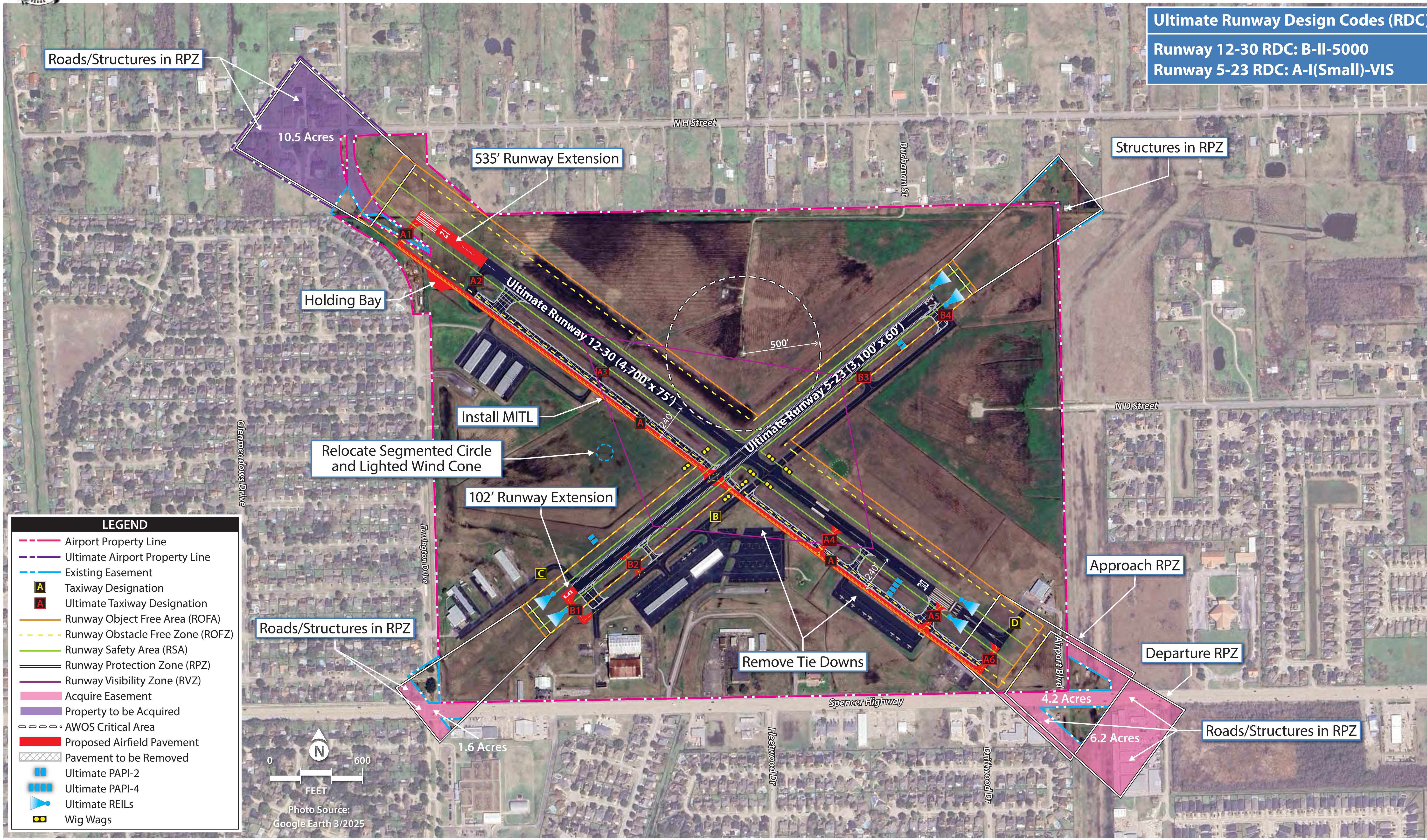
- Extend Runway 12-30 535 feet northwest for an ultimate length of 4,700 feet. At this length, the airport could accommodate 75 percent of large aircraft at 60 percent useful load, per FAA runway length calculations. An extension would also help the airport attract more jet and turboprop operations. However, there are several drawbacks that must be considered. Property in the ultimate ROFA not currently owned by the airport would need to be acquired fee simple. In addition, the FAA would likely require property within the RPZ be purchased fee simple and the residences removed. A more significant portion of public roads would also be encompassed by the RPZ and would likely need to be closed or rerouted, if necessary.

- Publish declared distances to correspond with the existing displaced threshold on Runway 30 and provide a full ROFA off the end of Runway 30. For takeoff operations on Runway 12, the ASDA would be reduced by approximately 140 feet to allow for an unobstructed ROFA in the ultimate B-II condition, leaving an available runway length of 4,560. The LDA for each runway is also reduced, with 4,560 feet of available runway for aircraft landing on Runway 12, and 4,298 feet of available runway for aircraft landing on Runway 30.

- Actions connected to the proposed Runway 12 extension include extension of parallel Taxiway A and construction of a new threshold connector (ultimate Taxiway A1). The existing PAPI-4 and REILs serving Runway 12, along with signage, would also need to be relocated, while additional MIRL would need to be installed.

- Extend Runway 5-23 102 feet southwest for an ultimate length of 3,100 feet. This length is derived from the FAA's runway length calculator for T41, which showed that 3,100 feet would be needed to accommodate 95 percent of the small aircraft fleet. Taxiway B is also proposed to be extended and a new threshold connector (ultimate Taxiway B1) constructed.


Ultimate Runway Design Codes (RDC)
Runway 12-30 RDC: B-II-5000
Runway 5-23 RDC: A-I(Small)-VIS
Roads/Structures in RPZ
1.6 Acres
1.4 Acres
Departure RPZ
0.1 Acres
Approach RPZ
Structures in RPZ
Holding Bay
Install MITL
Relocate Segmented Circle and Lighted Wind Cone
Runway 5-23 (2,998' x 75')
Runway 12-30 (4,165' x 75')
500'
240'
150'
Remove Tie Downs
Roads/Structures in RPZ
0.6 Acres
Approach RPZ
Departure RPZ
4.2 Acres
6.2 Acres
Roads/Structures in RPZ
N H Street
N D Street
Buchanan St
Glenmeadows Drive
Farrington Drive
Spencer Highway
Fleetwood Dr
Driftwood Dr
Airport Blvd
LEGEND
Airport Property Line
Existing Easement
Taxiway Designation
Ultimate Taxiway Designation
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Safety Area (RSA)
Runway Protection Zone (RPZ)
Runway Visibility Zone (RVZ)
Acquire Easement
AWOS Critical Area
Proposed Airfield Pavement
Pavement to be Removed
Ultimate PAPI-2
Ultimate PAPI-4
Ultimate REILs
N
0
500
FEET
Photo Source:
Google Earth 3/2025


Ultimate Runway Design Codes (RDC)
Runway 12-30 RDC: B-II-5000
Runway 5-23 RDC: A-I(Small)-VIS
Roads/Structures in RPZ
10.5 Acres
535' Runway Extension
Structures in RPZ
N H Street
Buchanan St
Holding Bay
Ultimate Runway 12-30 (4,700' x 75')
Ultimate Runway 5-23 (3,100' x 60')
500'
240'
Install MITL
N D Street
Relocate Segmented Circle
and Lighted Wind Cone
102' Runway Extension
Glenmeadows Drive
Farrington Drive
Approach RPZ
Departure RPZ
Roads/Structures in RPZ
Remove Tie Downs
Airport Blvd
Spencer Highway
4.2 Acres
6.2 Acres
1.6 Acres
Roads/Structures in RPZ
Fleetwood Dr
Driftwood Dr
A1 A2 A3 A A4 A5 A6 B B1 B2 B3 B4 C D
N
0 600
FEET
Photo Source:
Google Earth 3/2025
LEGEND
Airport Property Line
Ultimate Airport Property Line
Existing Easement
Taxiway Designation
Ultimate Taxiway Designation
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Safety Area (RSA)
Runway Protection Zone (RPZ)
Runway Visibility Zone (RVZ)
Acquire Easement
Property to be Acquired
AWOS Critical Area
Proposed Airfield Pavement
Pavement to be Removed
Ultimate PAPI-2
Ultimate PAPI-4
Ultimate REILs
Wig Wags

- Reduce width of Runway 5-23 to 60 feet to align with A-I (Small Aircraft)-VIS standards.

- Land within RPZs that is not controlled by the airport is proposed to be protected through property acquisition or the acquisition of easements, with structures removed if feasible. No changes to public roadways on the south side of the airport are proposed.

- Relocate the wind cone and segmented circle outside the RVZ and ultimate ROFA. The proposed site for the relocated equipment is west of the runways' intersection.

- Remove tiedowns located in the RVZ.

- Relocate parallel Taxiway A to meet 240-foot separation standard for the ultimate B-II-5000 environment.

- Construct a new holding bay on Taxiway A nearer to the relocated Runway 12 threshold; remove existing holding bay pavement.

- Update taxiway designations to correspond to FAA Engineering Brief No. 89, *Taxiway Nomenclature Convention*, which calls for alphanumeric designations for all connecting taxiways, including threshold connectors.

- Relocate/remove taxiway pavement to resolve direct access. Alternative 2 depicts relocation of ultimate Taxiways A4 and B2. The direct access provided by the Runway 12-30 threshold connectors is proposed to be mitigated by a reduction in pavement width (described in the next bullet).

- Remove excess pavement associated with the connector taxiways at the end of Runway 12-30 and Runway 5-23.

- Re-mark runway holding position lines at 200 feet from runway centerline on all taxiways serving Runway 12-30 to be consistent with ultimate RDC B-II-5000 standards.

- Install PAPI-4 and REILs systems on Runway 30; install PAPI-2 and REILs systems on Runways 5 and 23.

- Install MITL on all existing and proposed taxiway pavement.

- Increase visibility at high-energy area crossings by installing wig-wag lights on Taxiways A and B prior to runway crossings.

AIRSIDE ALTERNATIVE 3

Airside Alternative 3 is shown on **Exhibit 3G**. Like the previous alternative, this option considers extensions of both the primary and crosswind runways, with a longer extension shown on Runway 12-30. Taxiway geometry is also proposed to modified under this option to align with the FAA's preference for right-angled intersections and avoidance of taxiway crossings in the high-energy area of the runway.

- Extend Runway 12-30 1,335 feet northwest for an ultimate length of 5,500 feet. At this length, the airport could accommodate 100 percent of large aircraft at 60 percent useful load, per FAA runway length calculations. Like the previous alternative, there will be impacts to homes and roads, with even more significant property acquisition and structure removal. (Note: Extension options to Runway 30 were also considered; however, the location of Spencer Highway on the airport's southern border is a major limiting factor as it is not feasible to reroute this roadway.)

- Publish declared distances to correspond with the existing displaced threshold on Runway 30 and provide a full ROFA off the end of Runway 30. For takeoff operations on Runway 12, the ASDA would be reduced by approximately 140 feet to allow for an unobstructed ROFA in the ultimate B-II condition, leaving an available runway length of 5,360. The LDA for each runway is also reduced, with 5,360 feet of available runway for aircraft landing on Runway 12, and 5,098 feet of available runway for aircraft landing on Runway 30.

- Actions connected to the proposed Runway 12 extension include extension of parallel Taxiway A and construction of a new threshold connector (ultimate Taxiway A1). The existing PAPI-4 and REILs serving Runway 12, along with signage, would also need to be relocated, while additional MIRL would need to be installed.

- Extend Runway 5-23 102 feet northeast for an ultimate length of 3,100 feet. This length is derived from the FAA's runway length calculator for T41, which showed that 3,100 feet would be needed to accommodate 95 percent of the small aircraft fleet. Taxiway B is also proposed to be extended and a new threshold connector (ultimate Taxiway B4) constructed.

- Reduce width of Runway 5-23 to 60 feet to align with A-I (Small Aircraft)-VIS standards.

- Land within RPZs that is not controlled by the airport is proposed to be protected through property acquisition or the acquisition of easements, with structures removed if feasible. No changes to public roadways on the south side of the airport are proposed.

- Relocate the wind cone and segmented circle outside the RVZ and ultimate ROFA. The proposed site for the relocated equipment is west of the runways' intersection.

- Remove tiedowns located in the RVZ.

- Relocate parallel Taxiway A to meet 240-foot separation standard for the ultimate B-II-5000 environment.

- Construct a new holding bay on Taxiway A nearer to the relocated Runway 12 threshold; remove existing holding bay pavement.

- Update taxiway designations to correspond to FAA Engineering Brief No. 89, *Taxiway Nomenclature Convention*, which calls for alphanumeric designations for all connecting taxiways, including threshold connectors.

- Relocate/remove taxiway pavement to resolve direct access. Alternative 3 depicts relocation of ultimate Taxiway A4 and removal of the existing Runway 12 threshold connector and a portion

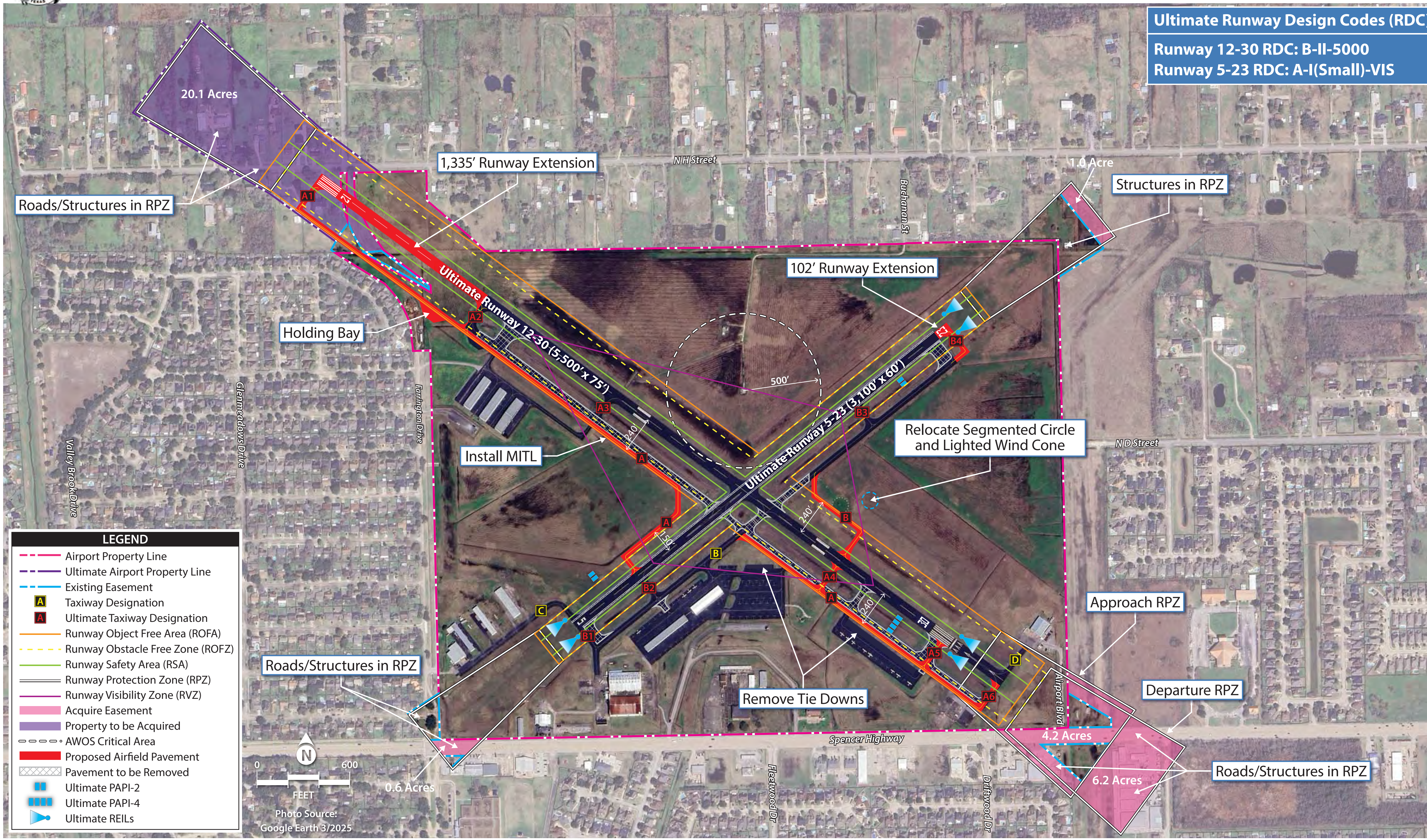

Ultimate Runway Design Codes (RDC)
Runway 12-30 RDC: B-II-5000
Runway 5-23 RDC: A-I(Small)-VIS
20.1 Acres
1,335' Runway Extension
Roads/Structures in RPZ
N H Street
1.0 Acre
Structures in RPZ
102' Runway Extension
Holding Bay
Ultimate Runway 12-30 (5,500' x 75')
Ultimate Runway 5-23 (3,100' x 60')
500'
Relocate Segmented Circle and Lighted Wind Cone
N D Street
Install MITL
Approach RPZ
Departure RPZ
Roads/Structures in RPZ
Remove Tie Downs
4.2 Acres
6.2 Acres
0.6 Acres
Roads/Structures in RPZ
Spencer Highway
Valley Brook Drive
Glenmeadows Drive
Farrington Drive
Buchanan St
Airport Blvd
Fleetwood Dr
Driftwood Dr
LEGEND
Airport Property Line
Ultimate Airport Property Line
Existing Easement
Taxiway Designation
Ultimate Taxiway Designation
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Safety Area (RSA)
Runway Protection Zone (RPZ)
Runway Visibility Zone (RVZ)
Acquire Easement
Property to be Acquired
AWOS Critical Area
Proposed Airfield Pavement
Pavement to be Removed
Ultimate PAPI-2
Ultimate PAPI-4
Ultimate REILs
0 600
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Photo Source: Google Earth 3/2025

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of Taxiway B2 where it connects to the apron. The direct access provided by the Runway 30 threshold connector is proposed to be mitigated by a reduction in pavement width (described in the next bullet).

- Reconfigure Taxiways A and B so they no longer cross through Runways 5-23 and 12-30. This change would require construction of new taxiway pavement and removal of existing taxiway pavement near the runways' intersection. Rather than running parallel for the full length of the runways, this modification would result in new taxiway pavement that connects at right-angles outside of the runways' high-energy areas.

- Remove excess pavement associated with the connector taxiways at the end of Runway 12-30 and Runway 5-23.

- Re-mark runway holding position lines at 200 feet from runway centerline on all taxiways serving Runway 12-30 to be consistent with ultimate RDC B-II-5000 standards.

- Install PAPI-4 and REILs systems on Runway 30; install PAPI-2 and REILs systems on Runways 5 and 23.

- Install MITL on all existing and proposed taxiway pavement.

LANDSIDE FACILITY REQUIREMENTS

Elements included within this section include general aviation terminal facilities, aircraft hangars and tiedowns, aircraft parking aprons, automobile parking, and airport support facilities.

TERMINAL BUILDING AND VEHICLE PARKING REQUIREMENTS

La Porte Municipal Airport does not have a traditional airport terminal building. Tri-Star Aviation provides FBO services from two hangars that also house flight simulators, and a maintenance and avionics shop. Harvey & Rihn Aviation also provides FBO services with one hangar that includes a maintenance shop and flight training. The remainder of this section discusses terminal building space and vehicle parking forecasts. These can either be applied to the existing portions of Tri-Star Aviation and Harvey & Rihn Aviation facilities used for terminal building functions, or to a new city-owned terminal building.

The number of itinerant passengers expected to use terminal services during the design hour is taken into consideration to estimate terminal facility needs. These requirements are based on a range of designated square feet per design hour passenger (typically between 90 and 125 sf). For this study, a planning standard of 125 sf was used to estimate the space required. To determine the number of design hour passengers, the number of itinerant design hour operations is multiplied by the number of passengers expected on the aircraft. Design hour itinerant operations have been estimated at 15 percent of the design day itinerant operations occurring at the airport. Because most of the aircraft operating at T41 allow for multiple passengers, a multiplier of 2.5 was established for the short term, growing to 3.5

by the long term. This is a reasonable multiplier, as the airport is expected to see an increase in aircraft with a capacity of five or more passengers.

Table 3J details current and projected terminal building requirements over the planning period; 3,100 sf is estimated to be needed by the end of the planning period. Consideration should be given to constructing a dedicated public terminal building if/when the need for additional space arises.

Vehicle parking spaces for airport users have also been evaluated. There are multiple parking lots serving the various on-airport businesses and hangar developments, with space for approximately 183 vehicles in total. Approximately 76 of these are located near general aviation hangars. Parking space requirements were based on estimated existing and future itinerant traffic, as well as based aircraft at the airport. Although some based aircraft owners prefer to park their vehicles in their hangars, safety can be compromised when automobile and aircraft movements are intermixed. This planning study assumes 30 percent of based aircraft will require vehicle parking spaces. **Table 3J** details vehicle parking requirements for the airport. By the long term, 85 marked vehicle parking spaces are estimated to be needed to accommodate local and transient airport users.

TABLE 3J | GA Terminal Services Requirements

	Available	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Operations	5	5	6	7
Multiplier	–	2.5	3.0	3.5
Design Hour Itinerant Passengers	–	13	19	25
Total Building Space (sf)	–	**1,600**	**2,400**	**3,100**
Marked Vehicle Parking Spaces	**76**	**45**	**60**	**85**

Source: Coffman Associates analysis

AIRCRAFT STORAGE HANGARS AND APRON REQUIREMENTS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single- or multi-engine, is toward more sophisticated (and, consequently, more expensive) aircraft; therefore, many aircraft owners prefer enclosed hangar space to outside tiedowns.

The demand for aircraft storage hangars is dependent on the number and type(s) of aircraft expected to be based at the airport in the future. For planning purposes, it is necessary to estimate hangar requirements based on forecast operational activity; however, actual hangar construction should be based on actual demand trends and financial investment conditions.

A variety of aircraft storage options are typically available at an airport, including shade hangars, T-hangars, linear box hangars, executive/box hangars, and bulk storage conventional hangars. Shade hangars are the most basic form of aircraft protection and are common in warmer climates. These structures provide a roof covering, but no walls or doors. There are no shade hangars at T41.

T-hangars are intended to accommodate individual small single-engine piston aircraft or, in some cases, individual multi-engine piston aircraft. T-hangars are so named because they are constructed in the shape of a “T,” providing space for the aircraft’s nose and wings but no space for turning the aircraft within the hangar. Essentially, the aircraft can be parked in only one position. T-hangars are commonly "nested" with several individual storage units to maximize hangar space. In these cases, taxiway access is needed on both sides of the nested T-hangar facility. T-hangars are popular among aircraft owners with tighter budgets, as they tend to be the least expensive enclosed hangar space to build and lease. There are 50 individual T-hangar units and linear box hangars at T41, or approximately 94,900 sf of T-hangar storage space.

Executive hangars are another hangar type commonly used for GA aircraft storage. These hangars provide additional storage space, usually with a footprint between 2,500 and 10,000 sf. Spaces this size allow for increased aircraft maneuverability, and they can provide for the storage of multiple aircraft within one hangar. Some executive hangars also have space for a small office. T41 features two executive hangars, totaling 17,900 sf of aircraft storage capacity.

Conventional hangars are large, clear span hangars that are typically located facing the main aircraft apron at an airport. These hangars provide for bulk aircraft storage and are often utilized by airport businesses, such as an FBO. T41 currently features two conventional hangars totaling 45,300 sf of storage space. For planning purposes, executive, conventional, and box hangars have been grouped together to develop an overall total for future capacity needs.

Planning for future aircraft storage needs is based on typical owner preferences and standard sizes for hangar space. For determining future aircraft storage needs, planning standards of 1,200 square feet per single-engine piston aircraft and 1,500 sf per multi-engine piston aircraft are utilized for T-hangars. For executive/conventional hangars, a planning standard of 3,000 sf is utilized for turboprop aircraft storage needs; 5,000 sf for business jet aircraft storage needs; and 1,500 sf for helicopter storage needs.

In total, there is approximately 158,100 sf of aircraft storage capacity at La Porte Municipal Airport. With 81 aircraft currently based at the facility and more anticipated to base at the airport by the end of the planning period, expansion of hangar facilities should be planned. **Table 3K** details the estimated hangar space requirements over the planning period. Over the long term, an additional 368,600 sf of hangar space is estimated to be needed, with particular need for additional T-hangar capacity. Options to include these additional facilities will be explored in the next section. Construction of new hangars should be phased to meet existing demand, rather than tied to a particular date or timeframe. Construction can be undertaken by either the airport sponsor or a private developer.

TABLE 3K | Aircraft Storage Requirements

	Current	Short Term	Intermediate Term	Long Term
Based Aircraft	81	107	135	201
T-hangar Area (sf)	94,900	180,100	251,400	379,000
Executive/Conventional/ Box Hangar Area (sf)	63,200	109,200	130,200	147,700
Total Aircraft Storage (sf)	**158,100**	**289,300**	**381,600**	**526,700**

Source: Coffman Associates analysis

Parking apron and parking position requirements have also been calculated. Parking aprons should provide space for locally based aircraft that are not in storage hangars, as well as itinerant aircraft and aircraft that are used for training and air taxi operations. Industry planning standards were applied to determine the required aircraft apron space. These standards call for 650 square yards (sy) per local aircraft, 800 sy per itinerant aircraft, and 1,600 sy per large turboprop/jet aircraft. Aircraft parking position requirements have been calculated at 19 percent of based aircraft for local operations and 40 percent of busy day itinerant operations for transient GA operations. As jet operations are anticipated to increase over the planning period, there may be demand for more turbine aircraft parking positions.

Table 3L details parking apron and position requirements over the planning period. La Porte Municipal Airport currently has approximately 18,300 sy of available public aircraft parking apron, including 89 marked spaces. As detailed in the table, the available apron area will likely not be sufficient, as early as the short-term (0-5 years).

TABLE 3L | Aircraft Apron and Parking Requirements

	Current	Short Term	Intermediate Term	Long Term
AIRCRAFT PARKING				
Local Positions	–	20	25	37
Transient GA Positions	–	18	21	24
Corporate Jet Positions	–	1	1	2
Helicopter Positions	–	5	5	6
Total Aircraft Parking Positions	**89**	**43**	**51**	**68**
Total Apron Area (sy)	**18,300**	**31,500**	**37,300**	**49,800**

Source: Coffman Associates analysis

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF)

La Porte Municipal Airport does not have an aircraft rescue and firefighting (ARFF) building or equipment located on the airfield. Because T41 is a general aviation airport, the FAA does not require ARFF services to be provided. The airport is anticipated to remain a general aviation airport through the planning period, so on-site ARFF facilities are not planned.

AVIATION FUEL STORAGE

Fuel at La Porte Municipal Airport is provided by Tri-Star Aviation and Harvey & Rihn Aviation. Records of existing fuel storage capacity or historic fuel sales were unavailable. The airport should continue to work with any FBOs providing fuel to ensure an adequate supply of fuel is maintained. Maintaining a 14-day fuel supply allows the airport to limit the impact of a disruption to fuel delivery. Planning should also consider the addition of a tank to store unleaded aviation fuel (100UL). The FAA has recently approved the use of 100UL in piston-powered aircraft, although unknowns regarding infrastructure and distribution remain.

UTILITIES

The availability and capacity of the utilities serving the airport are important factors in determining the development potential of the airport property, as well as the land immediately adjacent to the facility. Ultimately, the availability of water, gas, sewer, and power sources are primary concerns when assessing available utilities. Given the forecast potential for future landside facility growth, the utility infrastructure serving the airport may need to be expanded to serve future development.

PERIMETER FENCING AND GATES

Perimeter fencing is used at airports primarily to secure the aircraft operational area and reduce wildlife incursions. The physical barrier of perimeter fencing:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area;
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary;
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV);
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter;
- Demonstrates the intent of an intruder by their overt action of gaining entry;
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection;
- Creates a psychological deterrent;
- Optimizes the use of security personnel, while enhancing the capabilities for detection and apprehension of unauthorized individuals;
- Demonstrates a corporate concern for facility security; and
- Limits inadvertent access to the aircraft operations area by wildlife.

La Porte Municipal Airport currently has a full perimeter fence with access gates where necessary. This fence should be maintained and inspected regularly to ensure there is no damage that could allow unauthorized access to the airfield.

LANDSIDE FACILITY REQUIREMENTS SUMMARY

A summary of the landside facilities projected to be needed at La Porte Municipal Airport is presented in **Exhibit 3H**.

LANDSIDE DEVELOPMENT ALTERNATIVES

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; and overall revenue support functions, including airport support facilities. To maximize airport efficiency, it is important to locate facilities together when they are intended to serve similar functions. The best approach to landside facility planning is to consider the development as a community, for which land use planning is the guide. For airports, the land use guidance in the terminal area should generally be dictated by aviation activity levels. Consideration will also be given to non-aviation uses that can provide additional revenue to the airport and support economic development for the region.

LANDSIDE ALTERNATIVE 1

Depicted in **Exhibit 3J,** Landside Alternative 1 focuses primarily on the expansion of aircraft storage facilities in the current development areas and the addition of a public terminal building on the south side of the airport. Consideration has been given to extended vehicle access roads and dedicated parking for tenants and visitors to segregate vehicle and aircraft movements as much as possible.

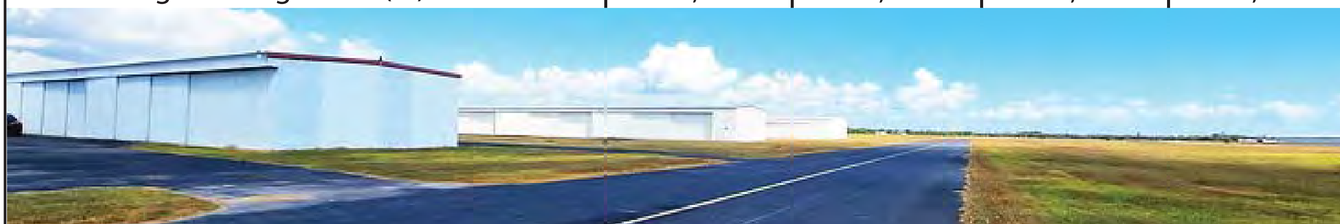
A 25-foot and 35-foot building restriction line (BRL), based on each runway's existing and ultimate instrument approach capability, are also shown. The BRL is the product of Title 14 CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object may be located in the primary surface or penetrate the transitional surface. For La Porte Municipal Airport, the primary surface is currently 500 feet wide, centered on the runway, for Runway 12-30, while Runway 5-23 is 250 feet wide because it is a utility runway[3] with no instrument approach procedures. 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 on structure height. **It should be noted that the BRL is not a standard; rather, it is a guideline to use when planning vertical infrastructure on the airport.** The FAA may require structures inside the BRL to be equipped with obstruction lights. The ends of some hangars are already located within the 25-foot BRL, but if their height is less than 25 feet this may not need to be addressed.

Landside Alternative 1 proposes the following:

1. Nine (9) 75' x 75' box hangars constructed in line with the existing northwest T-hangars with associated apron and taxilanes.
2. Four (4) additional T-hangar structures aligned with the existing hangars in the southwest quadrant of the airfield, including associated taxilanes.

[3] A utility runway is a runway that serves small aircraft (those aircraft weighing less than 12,500 pounds) exclusively.

	Available	Short Term	Intermediate Term	Long Term
Aircraft Storage Hangar Requirements				
Aircraft to be Hangared	66	87	110	164
T-Hangar Area (sf)	94,900	180,100	251,400	379,000
Executive/Conventional Hangar Area (sf)	63,200	109,200	130,200	147,700
Total Hangar Storage Area (sf)	158,100	289,300	381,600	526,700



Aircraft Parking Apron				
Aircraft Parking Positions	89	43	51	68
Total Public Apron Area (sy)	18,300	31,500	37,300	49,800

General Aviation Terminal Facilities and Parking				
Building Space (sf)	-	1,600	2,400	3,100
Terminal and Tenant Vehicle Parking	76	45	60	85

Exhibit 3H
LANDSIDE FACILITY REQUIREMENTS

3. Seven (7) 75' x 75' box hangars constructed along the southeast apron, including additional apron area.

4. A centralized 100' x 50' terminal building and two (2) 100' x 100' conventional hangars on the south side of the airfield.

5. Inclusion of additional access roads and vehicle parking lots for the new proposed hangars and terminal building.

6. Reserve areas for future aeronautical or non-aeronautical development. Generally, portions of airfield property with access to the airfield should be used for aeronautical development (i.e., hangars, aircraft parking aprons, etc.). Portions of property with less access may be used for non-aeronautical purposes, if approved by the FAA. Alternative 1 depicts 46.9 acres reserved for future aeronautical development in the east and west quadrants of the airport, while 19.9 acres are reserved for future non-aeronautical development. This includes a portion of property currently occupied by the National Guard, which has not had a presence on the airport in many years. Approximately 28.4 acres on the north side of the airport is considered open space as much of this area includes the AWOS critical area, which should be kept clear of development.

LANDSIDE ALTERNATIVE 2

Landside Alternative 2 is depicted in **Exhibit 3K**. This alternative considers a different hangar layout, again focused on the already developed west and south sides of the airport. A vertiport to support advanced air mobility (AAM) activity is also depicted. Like Landside Alternative 1, 25-foot and 35-foot BRLs, based on each runway's existing and ultimate instrument approach capability, are shown.

Landside Alternative 2 proposes the following:

1. One (1) 100' x 150' conventional hangar, four (4) 80' x 80' executive hangars, and four (4) T-hangar structures constructed on the west side of the airfield, including associated apron space, taxilanes, and eight (8) tie-downs for fixed wing aircraft.

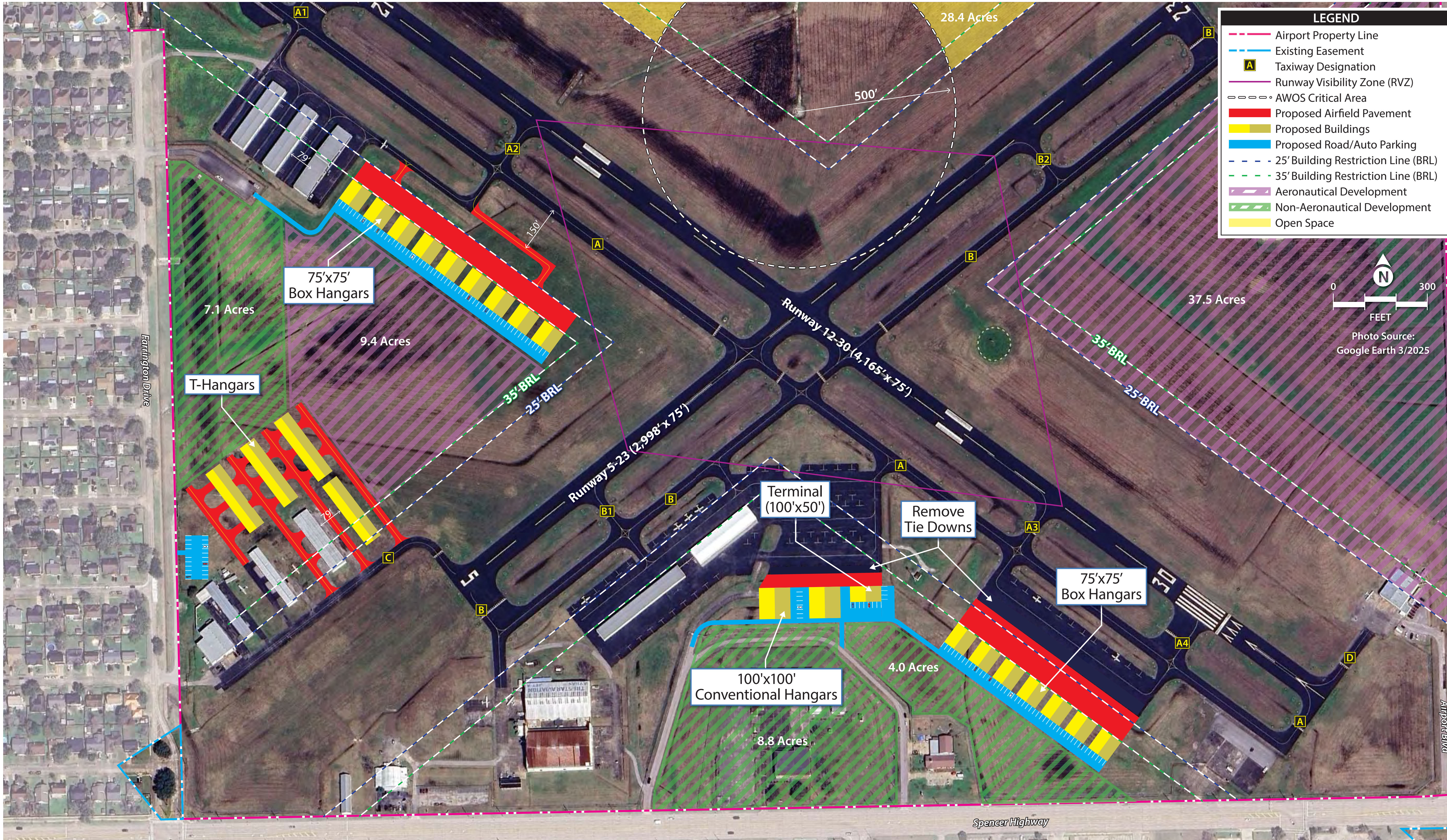
2. Eight (8) 60' x 60' box hangars and one T-hangar structure constructed south of the central apron area.

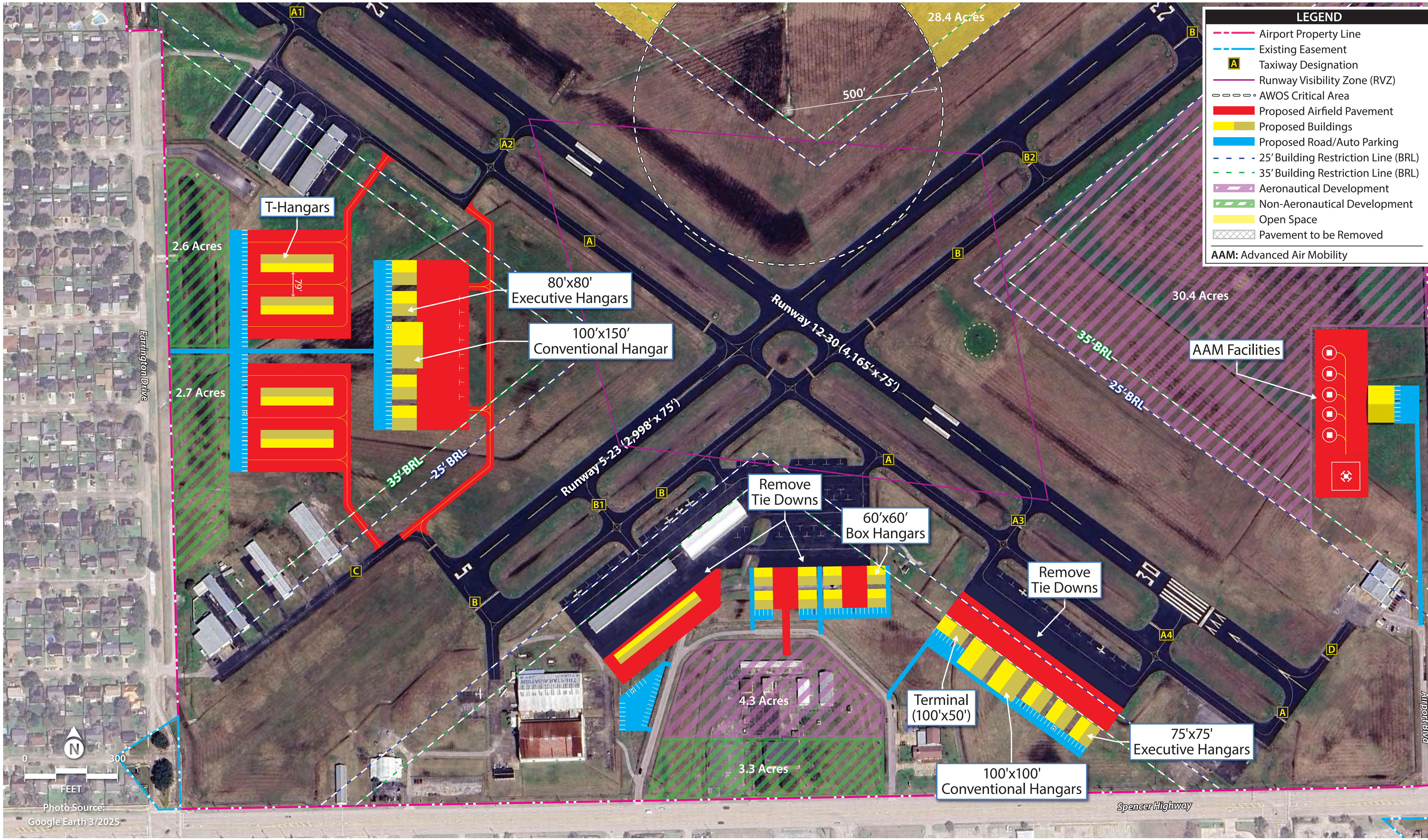
3. A 100' x 50' terminal building, two (2) 100' x 100' conventional hangars, and three (3) 75'x 75' executive hangars along the southeast apron, with additional apron space.

4. Inclusion of additional access roads and vehicle parking lots for the new proposed hangars and terminal building.

5. An advanced air mobility (AAM) facility, including a terminal building, vertiport takeoff and landing area, and five (5) aircraft parking spaces, along with vehicle access and parking.

6. Reserve areas for future development that include 34.7 acres for future aeronautical development, 8.6 acres reserved for future non-aeronautical development, and 28.4 acres of open space on the north side of the airfield.


LEGEND
Airport Property Line
Existing Easement
Taxiway Designation
Runway Visibility Zone (RVZ)
AWOS Critical Area
Proposed Airfield Pavement
Proposed Buildings
Proposed Road/Auto Parking
25' Building Restriction Line (BRL)
35' Building Restriction Line (BRL)
Aeronautical Development
Non-Aeronautical Development
Open Space
0
300
FEET
Photo Source: Google Earth 3/2025
28.4 Acres
500'
37.5 Acres
7.1 Acres
9.4 Acres
4.0 Acres
8.8 Acres
75'x75' Box Hangars
T-Hangars
Terminal (100'x50')
Remove Tie Downs
100'x100' Conventional Hangars
Runway 12-30 (4,165' x 75')
Runway 5-23 (2,998' x 75')
35' BRL
25' BRL
150'
79'
Farrington Drive
Spencer Highway
Airport Blvd


LEGEND
Airport Property Line
Existing Easement
Taxiway Designation
Runway Visibility Zone (RVZ)
AWOS Critical Area
Proposed Airfield Pavement
Proposed Buildings
Proposed Road/Auto Parking
25' Building Restriction Line (BRL)
35' Building Restriction Line (BRL)
Aeronautical Development
Non-Aeronautical Development
Open Space
Pavement to be Removed
AAM: Advanced Air Mobility
T-Hangars
80'x80' Executive Hangars
100'x150' Conventional Hangar
2.6 Acres
2.7 Acres
28.4 Acres
500'
30.4 Acres
AAM Facilities
Runway 12-30 (4,165' x 75')
Runway 5-23 (2,998' x 75')
35' BRL
25' BRL
Remove Tie Downs
60'x60' Box Hangars
Remove Tie Downs
Terminal (100'x50')
75'x75' Executive Hangars
100'x100' Conventional Hangars
4.3 Acres
3.3 Acres
Farrington Drive
Airport Blvd
Spencer Highway
0
300
FEET
Photo Source: Google Earth 3/2025

LANDSIDE SUMMARY

The landside alternatives consider various options to accommodate an array of aviation activities that either currently occur or could be expected to occur at La Porte Municipal Airport in the future. There is demand for new facilities at the airport now, and the city will need to determine how to develop the property in an organized and thoughtful way. It is beneficial to provide a long-term vision for the airport for future generations, and each of the development options considers a long-term vision that would, in some cases, extend beyond the 20-year scope of this master plan. **Table 3M** summarizes the various capacities of landside facilities proposed in each alternative.

TABLE 3M | Landside Alternatives – Added Facility Capacities

	Landside Alternative 1	Landside Alternative 2
T-Hangar (sf)	54,000 sf	66,600 sf
Executive/Conventional/Box Hangars (sf)	110,000 sf	106,300 sf
Apron (sy)	8,500 sy	17,000 sy
Terminal Building (sf)	5,000 sf	5,000 sf

Source: Coffman Associates analysis

SUMMARY

This chapter is intended to present an outline of airside and landside facilities needed at La Porte Municipal Airport and potential alternatives to meet safety requirements and demand. Following review of the proposed development alternatives with La Porte officials, the planning advisory committee, and the TxDOT Aviation Division, the next step in the planning process is to arrive at a recommended development concept. Once a consolidated development plan is identified, a capital improvement program, including a list of prioritized projects tied to aviation demand and/or necessity, will be presented.