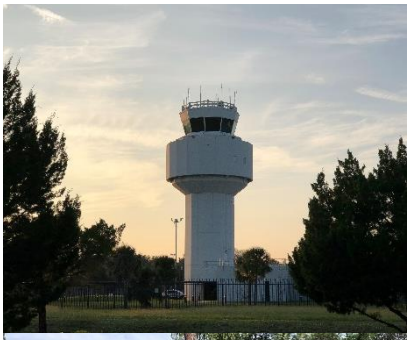

Vero Beach Regional Airport Master Plan

Facility Requirements, Environmental Overview and Alternatives Analysis Working Papers 3, 4 and 5

Draft

Vero Beach, Florida

October 2023

VERO BEACH REGIONAL AIRPORT | HANSON

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3. Facility Requirements

3.1. Introduction

Facilities at an airport are planned and developed to serve specific aircraft operations forecast over the 20-year planning horizon. These aircraft are defined by the approach (landing) speed, wingspan, and weight through the use of AAC and ADG, as discussed in Section 2.8, and taxiway design group (TDG), as defined in *FAA AC 150/5300-13B: Airport Design*. For runways, the visibility minimums of instrument approaches are also considered, resulting in the runway design code (RDC). The following sections use the FAA design criteria with data from the inventory, including interviews with airport staff, air traffic control, and tenants, and forecast chapters to identify facility improvements at VRB to be assessed further in the alternatives analysis.

In addition, VRB has a Title 14 CFR Part 139 Airport Operating Certificate. Part 139 certification includes annual inspections of the airfield and airport facilities and required documentation by the FAA. Any Part 139 requirements for applicable portions of the airport will be considered in this facility requirements analysis.

The facility requirements analysis begins with the runways because they are the most demanding and critical infrastructure on the airport, followed by airside and landside facilities that facilitate the movement and support services for aircraft.

3.2. Planning Activity Levels

While the aviation forecast summarized in Table 2.3 uses time periods, the level of activity within each period can also be considered as a planning activity level (PAL). This means that whether the activity projected by 2028 occurs in three, five, or eight years, the important element is to have a plan to meet that activity level. Therefore, the 2023 forecast should be considered the short-term PAL, the 2033 forecast the intermediate PAL, and the 2043 the long-term PAL. This results in the projected based aircraft and operations, as shown in **Table 3.1.** Because the commercial passenger service operator has been at VRB for less than one year at the time of this analysis, and while the enplanement levels are in the table below for reference, it recommended that passenger enplanement levels be used rather than PAL for the passenger facility.

TABLE 3.1: SUMMARY OF AVIATION ACTIVITY FORECASTS BY PAL

	Forecast		
	Short-Term PAL	Intermediate-Term PAL	Long-Term PAL
Based Aircraft			
Single-Engine	167	183	227
Multi-Engine (piston & turboprop)	42	45	53
Jet	23	31	42
Rotorcraft	5	7	12
Total	**237**	**266**	**334**
Annual Operations			
Total	**218,300**	**267,900**	**307,900**
Passenger Enplanements			
Total	38,400	43,400	55,500

Source: ESA, 2023.

3.3. Runway Orientation

Aircraft land and take off into the wind to have the highest airspeed for the lowest ground speed. Thus, wind influences the runway orientation and the number of runways needed to meet the FAA standard of 95% wind coverage. This means that 95% of the time, the crosswind does not exceed the demonstrated crosswind component (design capability) for the aircraft.

Ideally, a runway should be aligned with the prevailing wind. Prevailing winds blow predominantly from one general direction. Wind conditions affect all airplanes in varying degrees, with small aircraft more sensitive to crosswinds.

Previously shown in Table 1.7 are the crosswind components for the ARCs of the aircraft using VRB in varying weather conditions. The primary runway orientation provides the most wind coverage. However, for the ARC A/B-I and A/B-II (10.5 and 13 knots) using VRB, the primary runway, 12R/30L, does not provide 95% wind coverage. Therefore, a crosswind runway is justified at VRB to serve at least these aircraft. Runway 4/22 is the crosswind runway and, combined with the primary runway, provides at least 95% wind coverage for all aircraft operating at VRB.

3.4. Runway Designation

Runways are numbered by their magnetic heading rounded to the nearest 10 degrees. When there are parallel runways, the designation of left (L) or right (R) is added. Magnetic variation, also referred to as declination, is the difference between true north and magnetic north. This variation shifts a little each year, with the west variation continuing to increase to the west. At VRB, the magnetic variation is 7°15’ west.

The true heading of Runway 12R/30L is 110° 36' 7.26". Adding the magnetic variation and rounding to the nearest degree results in a magnetic heading of 118° and 298°. Rounded to the nearest 10 degrees results in Runway 12R/30L. With a shift of 0°4.8' per year, no redesignation of this runway is needed in the planning period.

The true heading of Runway 12L/30R is 110° 51' 20.03". Adding the magnetic variation and rounding to the nearest degree results in a magnetic heading of 118° and 298°. Rounded to the nearest 10 degrees results in Runway 12L/30R. With a shift of 0°4.8' per year, no redesignation of this runway is needed in the planning period.

The true bearing of Runway 4/22 is N 36° 10' 45.77" E. Adding the magnetic variation and rounding to the nearest degree results in a magnetic heading of the crosswind runway is 43° and 223°. This runway is designated as 4/22. With a shift of 0°4.8' per year, a redesignation of the runway will be needed in about 20 years.

3.5. Airfield Capacity

Airfield capacity is the maximum number of aircraft operations that an airport can support with reasonable levels of delay. VRB's airfield capacity calculations were prepared in accordance with *FAA AC 150/5060-5, Change 2: Airport Capacity and Delay*. Methodologies from this AC were used to calculate the annual service volume (ASV) of the airfield. These calculations consider the airfield geometry, operational, and meteorological characteristics at VRB.

Mix Index

The percentage of large aircraft — those with a maximum takeoff weight of 12,500 pounds or more — operating at an airport influences its capacity. Large aircraft require more separation from smaller aircraft due to wake turbulence. This reduces the capacity of an airport. The mix index for ASV is C+3D. A and B aircraft are less than 12,500 pounds and do not impact the mix index. C aircraft are12,500 pounds up to 300,000 pounds. D aircraft are more than 300,000 pounds. There are no D aircraft operating at VRB. All the aircraft operating at VRB other than A and B (single-engine and multi-engine piston aircraft) are C aircraft. C aircraft are 18.8% of the VRB operations in the base year of 2022. This rises to 23% in 20 years. As the mix index increases, the ASV will decline due to a higher proportion of larger aircraft operations.

Airfield Configuration

At VRB, the preferred operational configuration is to use the parallel runways 12L/30R and 12R/30L because this provides the highest capacity. Runway 12L/30R is limited to small aircraft only. This configuration is used, unless the wind direction and speed requires the use of the crosswind runway. Typically, when the crosswind runway is in use, almost all the aircraft operations are on Runway 4/22, unless an aircraft requires a longer runway length that is only available on the primary runway. For purposes of calculating the ASV, it was assumed that VRB will operate on the parallel runways or the crosswind runway. Using the wind coverage data, there is an average of 5% of the time that the 10.5-knot and 13-knot crosswind component is exceeded on the parallel runways. Therefore, it was assumed that about 5% of the time, operations at VRB are on Runway 4/22.

Weather Conditions

Using the wind data, the IFR observations are about 10% of the all-weather observations. Therefore, about 10% of the time, it was assumed that VRB is in IFR conditions. While VRB has an ATCT, it is a nonradar tower for IFR flights because the tower needs to call approach control to obtain a clearance. Also, VRB does not have an instrument landing system, so the ASV calculations were based on nonradar IFR operations. Poor visibility and ceiling conditions of less than 500 feet and visibility less than one mile are limited at VRB, so they were not addressed separately in the ASV calculations but included as part of the percentage of IFR conditions.

Touch-and-Go, Percentage of Arrivals, and Exit Taxiways

Depending on the airfield configuration, other factors in the tables in *FAA AC 150/5060-5* take into consideration the percentage of touch-and-go operations, the percentage of arrivals, and the location of exit taxiways. When all the operations are on Runway 4/22, the percentage of touch-and-go operations was assumed to be 21 to 30%, with VRB's mix index between 0 and 40. The arrivals and departures are assumed to be 50% each. A percentage other than 50% is common at commercial service airports with arrival and departure peak hours. When Runways 4/22 and 12R/30L (IFR) are operating as a single runway, they each have two exit taxiways within the desirable distance.

Annual Service Volume

The baseline annual operations, peak month, and average day in peak month are also used in the ASV calculations. The resulting base year ASV is 203,300 annual operations. VRB's base year operations are 65.8% of the ASV. The FAA recommends planning for additional capacity when an airport is operating at approximately 60% of its ASV and implementing capacity enhancements when it is at 80% of its ASV. Also, per Table G-1 in *FAA Order 5100.38D, Change 1: Airport Improvement Program Handbook*, a secondary runway that is not a crosswind runway is eligible for federal funding, when the primary runway or primary runway and secondary runway is operating at 60% of its capacity. Therefore, the parallel runway 12L/30R at VRB should be considered a secondary runway and eligible for federal funding.

Historical operations were almost as high as the ASV in 2019 at 201,644. By the end of the planning period in 2043, the forecast operations at VRB are 307,900 and will exceed the ASV by 104,600 operations. This will result in increasing delays. If delay increases at VRB, because many of the operations are training operations, some may shift to using other local airports to avoid the delay. Opportunities to increase the efficiency of the airfield should be considered.

Taxiway Considerations

Each of the runways at VRB is served by a full-length parallel taxiway on one side of the runway. When there is development on both sides of the runway, a full-length parallel taxiway on each side would reduce runway crossings, thereby enhancing airport safety, and increase the available runway capacity. The alternatives analysis should consider the development of additional full-length parallel taxiways. Also, opportunities to develop bypass taxiways near the ends of runways should be considered, so if an aircraft is holding for a flight plan clearance, others can still depart, improving the utilization of the runway. The location and alignment of connector taxiways should be considered. Also, the location and use of engine run-up pads near runway ends should be reviewed to make sure they are supporting efficient airfield operations and maximizing the developable areas on the airport.

3.6. Runway Requirements

There are multiple factors that are considered for a runway, ranging from the physical length and width of the runway to the required runway safety areas. Each of the factors to be considered for a runway are described in this section and will be applied to each of the runways at VRB.

Runway Length and Width

The required runway length is based on the requirements of aircraft operations. Multiple variables are considered when a pilot identifies if a runway has a suitable length for landing or departing. These variables include runway elevation, slope, condition (wet or dry), wind speed and direction, aircraft weight, and outside temperature.

The FAA provides runway length requirements in *FAA AC 150/5325-4B: Runway Length Requirements for Airport Design*, but recommends the use of aircraft manufacturer operating manuals, especially for larger aircraft. General runway length guidance from aircraft manufacturers is published for a standard day (15°C/59°F, pressure 29.92 inches) at sea level with no wind. The aircraft operating manual provides the data to adjust for varying conditions. Ideally, runways are planned to allow unconstrained operations by critical aircraft. However, physical constraints on or around the airport may limit the length available, in which case pilots must reduce the aircraft takeoff or landing weights to allow for operations on the available runway length.

The FAA specifies the required runway width and the runway shoulder width, based on the ARC of the critical aircraft. The FAA also specifies the allowable grade and grade changes along the length of the runway, based on the ARC of the critical aircraft. These standards also require a clear line of sight along the length of the runway.

Runway Safety Area

The FAA defines the runway safety area (RSA) as "a defined area surrounding the runway consisting of a prepared surface suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway."[1] The RSA also provides greater accessibility for ARFF equipment if an aircraft leaves the runway pavement. As a prepared surface, there are specific grading requirements associated with the RSA based on the ARC of the critical aircraft. The only items allowed within the RSA are navigational aids fixed by function, such as runway lights. Any objects within the RSA must be frangible, such that they break away if struck by an aircraft.

Runway Object Free Area

The FAA defines the runway object free area (ROFA) as "a clear area limited to equipment necessary for air and ground navigation, and provides wingtip protection in the event of an aircraft excursion from the runway."[2] Similar to a RSA, any equipment within the ROFA must be frangible. The ROFA does not have grading requirements, but the terrain cannot be higher than the nearest point of the RSA for half the wingspan of the most demanding aircraft of the RDC.

[1] *FAA AC 150/5300-13B: Airport Design*, dated March 31, 2022.
[2] *FAA AC 150/5300-13B: Airport Design*, dated March 31, 2022.

Runway Obstacle Free Zone

The FAA definition of the runway obstacle free zone (ROFZ) is "a defined volume of airspace centered on the runway centerline, whose base elevation is that of the highest runway elevation at that particular location".[3] The ROFZ extends 200 feet beyond each end of the runway. The width of the ROFZ varies, based on the size of the aircraft using the runway. For runways with approach lighting systems, there is an OFZ that extends beyond the runway to protect the approach lighting system. While the ROFZ overlaps the RSA and ROFA, the RSA and ROFA are surfaces on the ground, whereas the ROFZ applies to the airspace above the ground.

Runway Protection Zone

The runway protection zone (RPZ) is a trapezoidal shape beyond the end of each runway to protect people and property on the ground. The RPZ starts 200 feet from the runway threshold. The size of the RPZ is determined by the critical aircraft and visibility minimums associated with each runway end. The FAA recommends that an airport have property interest within the limits of RPZs. The preferred property interest is fee simple, but if the land cannot be acquired, an avigation easement to control object height and land use within an RPZ is acceptable. The goal is for the RPZ to be clear of any incompatible land use or activities and remain that way.

Runway Visibility Zone and Line of Sight

For airports without an ATCT or with a part-time ATCT, such as VRB, the FAA requires an area between intersecting runways, the runway visibility zone (RVZ), to be clear to avoid blocking the view of pilots to an intersecting runway. The FAA specifies the size of the RVZ based on the location of the intersection from the end of the runway. The FAA also has recommended standards for runways that converge but do not intersect, e.g., the extended runway centerlines intersect but the runway pavement does not.

Also, the FAA requires a clear line of sight along the length of the runway. For runways with a full-length parallel taxiway, such as at VRB, any point 5 feet above the runway centerline needs to be visible to any other point 5 feet above runway centerline, for a distance of half the length of the runway.

Declared Distances

When an object is off the end of a runway within the RSA or ROFA or penetrates the approach or departure path and cannot be removed, the FAA provides an alternate means to meet the design standards. These standards are known as declared distances. With declared distances, each takeoff and landing operation on the runway is considered separately, and the portion of the runway available for that operation is identified. With declared distances for some operations, the available runway length is less than the physical length of the runway pavement to provide the standard RSA or ROFA beyond the declared runway end or a clear approach or departure surface.

The takeoff and landing operations under declared distances are divided into four operations: landing distance available (LDA), accelerate-stop distance available (ASDA), takeoff run available (TORA), and takeoff distance available (TODA).

[3] *FAA AC 150/5300-13B: Airport Design*, dated March 31, 2022.

Pavement Strength and Condition

The required pavement strength is dictated by the weight and frequency of the critical aircraft operating on the runway. The strength of the runways required at VRB will vary with the critical aircraft for each runway. For runways used by jet aircraft, the pavement may be grooved, which is a benefit in wet conditions. An aircraft classification number (ACN) and pavement classification number (PCN), recently updated to aircraft classification rating (ACR) and pavement classification rating (PCR), is an international method for identify pavement strength. If the ACR is less than the PCR, an aircraft can use the pavement. Some airports still publish pavement ratings by MTOW and gear configuration.

Instrument Approaches, Navigational Aids, and Lighting Systems

Instrument Approaches

To enhance the utility of a runway in poor weather conditions, an instrument approach procedure may be developed and published for the runway. An instrument approach is a set of maneuvers for an aircraft operating under instrument flight rules to transition to the start of the approach and to a landing. Runways without an instrument approach are considered visual runways, because the pilot lands using only visual references.

Navigational Aids

There are two categories of navaids: those that serve a specific runway and those that serve the overall airport. Runway navaids include items such as precision approach path indicators (PAPIs), runway end identifier lights (REILs), approach lights, and instrument landing systems. Airport navaids are items such as primary wind cones and airport beacons. While not a navaid, an automated weather systems is an airport system that supports instrument approaches by providing real-time weather conditions. **Table 3.2** summarized the navaids at VRB.

TABLE 3.2: SUMMARY OF NAVAIDS AT VRB

Item Description	Owner	LED/Incandescent
Airport Navaids		
Airport Beacon	Airport	Incandescent
Segmented Circle (Lighted)	Airport	Incandescent
Primary Wind Cone	Airport	Incandescent
Runway Navaids		
Runway 12R/30L PAPIs	12R: FAA; 30L: FAA	12R: LED; 30L: LED
Runway 12R/30L REILs	12R: Airport; 30L: FAA	12R: LED; 30L: LED
Runway 4/22 PAPIs	4: FAA; 22: Airport	4: LED; 22: Incandescent
Runway 4/22 REILs	4: Airport; 22: Airport	4: Incandescent; 22: Incandescent
Runway 12L/30R PAPIs	12L: Airport; 30R: Airport	12L: Incandescent; 30R: Incandescent

Lighting

Edge lighting of various intensities is used to mark the edges of runways and taxiways at night and in poor visibility. Medium intensity is the most common type of lighting. PAPIs, REILs, and approach lights provide visual guidance to landing pilots. Approach lighting systems start at the landing threshold and extend into the approach 1,400 to 2,400 feet. The FAA has six approved types of approach lighting systems for runways with precision and nonprecision approaches, with the applicable type of system varying with the type of instrument approach. In addition to enhancing, identifying, and aligning with the runway, if a pilot on an instrument approach can identify the approach lighting system, they are allowed to descend below the minimum descent altitude or decision height to 100 feet above the threshold elevation. To go lower to land, the pilot must see other items in the runway environment. There are no approach lighting systems at VRB.

Approach and Departure Surfaces

In addition to establishing standards for the area around the runway, the FAA has established standards for the approach and departure surfaces off the ends of the runway. There are two documents used to define the approach and departure surfaces:

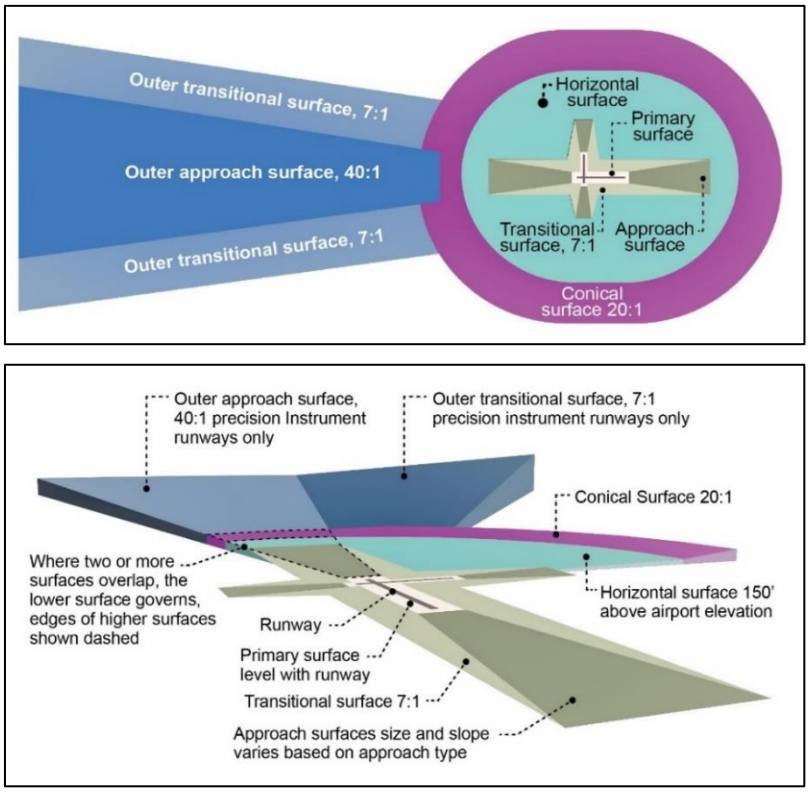
- *Title 14 CFR Part 77* (otherwise known as Federal Aviation Regulations [FAR] Part 77)*: Safe, Efficient Use and Preservation of Navigable Airspace,* establishes the notice requirements for certain proposed construction or alteration of structures, defines the standards for obstructions to air navigation, and details the process for studying potential obstructions to air navigation to determine the effect on the safe and efficient use of navigable airspace.
- *FAA AC 150/5300-13B* provides dimensional standards for threshold siting surfaces and instrument departure surfaces.

The FAA also uses *FAA Order 8260.3E: United States Standard for Terminal Instrument Procedures (TERPS)* to design instrument approaches, which have obstacle clearance requirements. The TERPs surfaces near an airport are generally represented by the surfaces in FAA AC 150/5300-13B.

14 CFR Part 77 Surfaces

14 CFR Part 77 defines the standards used in determining obstructions and hazards to air navigation. Obstructions are objects that penetrate the imaginary airspace surfaces surrounding an airport and can be a hazard to air navigation, unless an airspace study shows otherwise. Imaginary surfaces include the primary, approach, transitional, horizontal, and conical surfaces, as shown on **Figure 3.1**.

FIGURE 3.1: TITLE 14 CFR PART 77 SURFACES



Primary Surface

The primary surface is an area around the runway that cannot exceed the runway elevation. The primary surface width is determined by the critical aircraft size and approach visibility minimums. If there are different visibility minimums to each runway end, the runway end with the largest primary surface requirement controls the primary surface width for the entire runway.

Horizontal Surface

The horizontal surface protects aircraft operations in the vicinity of the airport. The horizontal surface is 150 feet above the airport elevation, which is the highest elevation on a runway. The radius of the horizontal surface from the end of the primary surface off each runway end is 10,000 feet for runways, other than utility runways with nonprecision approaches, and 5,000 feet for utility visual runway ends. The horizontal surface arcs from the center of primary surface off each runway end and are connected by tangent lines to close the surface.

Transitional Surface

The transitional surface extends outward and upward, from the sides of the primary surface and the approach surfaces at a 7:1 slope up to the horizontal surface.

Conical Surface

The conical surface extends upward and outward from the edge of the horizontal surface for 4,000 feet at a 20:1 slope.

Approach Surface

The approaches at VRB under 14 CFR Part 77 are classified as nonprecision or visual. The 14 CFR Part 77 approach surface for nonprecision instrument runways with visibility minimums as low as 3/4 of a mile has an inner width equal to the primary surface of 1,000 feet and extends 10,000 feet, beginning 200 feet from the runway end, with an outer width of 4,000 feet at a slope of 34:1.

Nonprecision instrument runways with visibility minimums greater than 3/4 of a mile have an inner width of 500 feet. The approach surface extends 10,000 feet, beginning 200 feet from the runway end, with an outer width of 3,500 feet at a slope of 34:1.

For utility runways with visual approaches, the approach surfaces have an inner width of 250 feet. The approach surface extends 5,000 feet, beginning 200 feet from the runway end, with an outer width of 1,250 feet at a slope of 20:1.

If a precision approach is considered as a future improvement, it has an inner width of 1,000 feet. The approach surface extends 50,000 feet, beginning 200 feet from the runway end, with the first 10,000 feet at 50:1 and the remaining approach surface at 40:1. It has an outer width of 16,000 feet.

Threshold Siting Surface

With the implementation of GPS-based approaches (RNAV approaches), rather than revising 14 CFR Part 77, the FAA issued additional approach standards through its advisory circulars and orders. The threshold siting surfaces from *AC 150/5300-13B,* Tables 3-2 to 3-4[4], must be kept clear for the associated instrument approach.

For the approach end of runways expected to accommodate instrument approaches having visibility greater than or equal to 3/4 of a mile, the threshold siting surface is offset 200 feet from the landing threshold, has an inner width of 400 feet, an outer width of 3,400 feet, and a length of 10,000 feet. This surface has a slope of 20:1.

For visual approaches serving small aircraft with approach speeds of 50 knots of more, the surface starts at the runway end, has an inner width of 250 feet widening to 700 feet at 2,250 feet from the runway end and continuing at a width of 700 feet, for an additional 2,750 feet. It has a slope of 20:1.

To accommodate a runway end with an instrument approach with vertical guidance, a surface known as the visual guidance surface (VGS) starts at the runway threshold with an inner width of the runway width plus 200 feet, a length of 10,000 feet, and an outer width of 1,520 feet with a slope of 30:1.

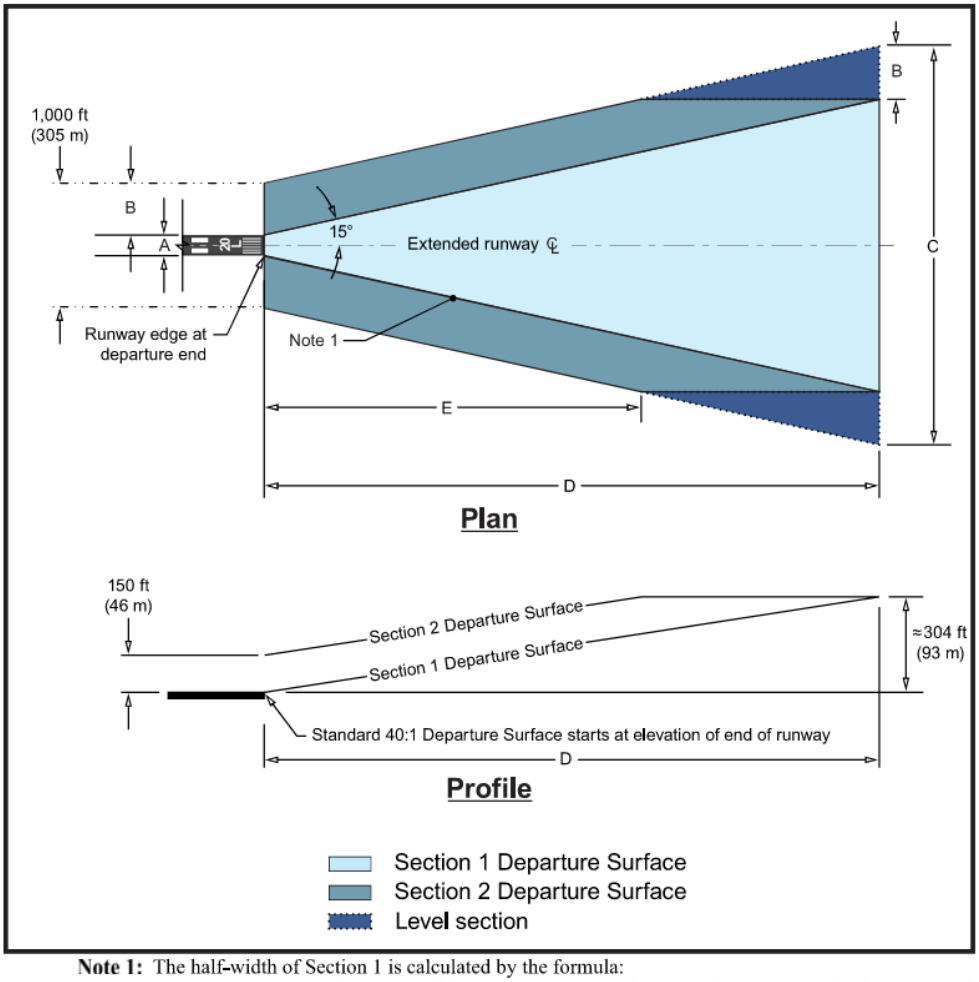
[4] FAA AC 150/5300-13B: Airport Design, dated March 31, 2022.

Departure Surfaces

On runways that support instrument departures, the FAA has designated an instrument departure surface. Per FAA AC 150/5300-13B, Table 3-5, the departure surface starts at the end of the departure threshold and is 12,152 feet long, with an outer width of 7,512 feet. The inner width is 1,000 feet. The center portion of the inner width of the departure surface, the width of the runway, starts at the runway end elevation and goes up to 150 feet above runway elevation at 500 feet from centerline. The entire approach surface goes up at a 40:1 slope along the extended runway centerline. While it is desirable to provide a clear departure surface, the FAA can design and publish instrument departure takeoff minimums, (obstacle) departure procedures, and takeoff obstacle notes to mitigate obstacles in departure surfaces. **Figure 3.2** depicts the departure surface. A clear departure surface is one of the considerations in establishing takeoff declared distances.

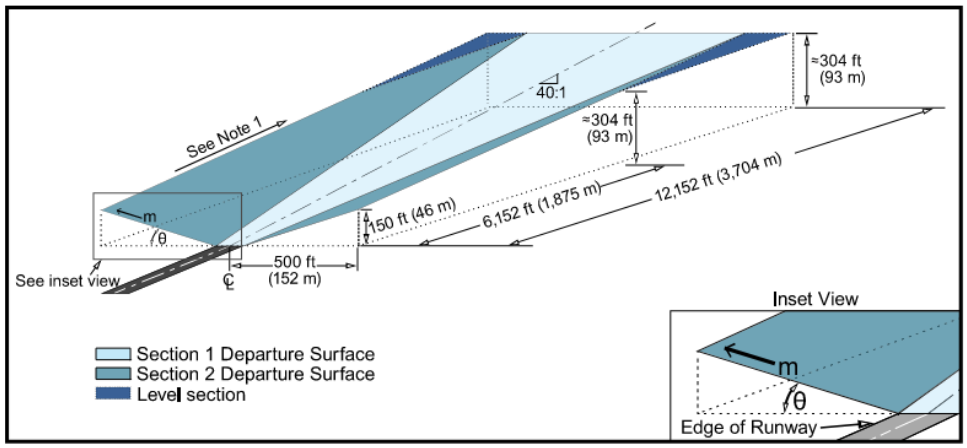
FIGURE 3.2: DEPARTURE SURFACE FROM FAA AC 150/5300-13B

Figure 3-9. Instrument Departure Surface



Note 1: The half-width of Section 1 is calculated by the formula:
Section $1_{\text{Half Width}}$ = (1/2 RWY Width) + (Tan 15° × X), where X = distance from the departure end of the runway.

Figure 3-11. Departure Surface – Perspective View (Without Clearway)



Note 1: The outer edge of the Section 2 Departure Surface has a slope of 40:1.
Note 2: The 304-foot (93 m) value represents the height above the DER.

3.7. Runway 12R/30L

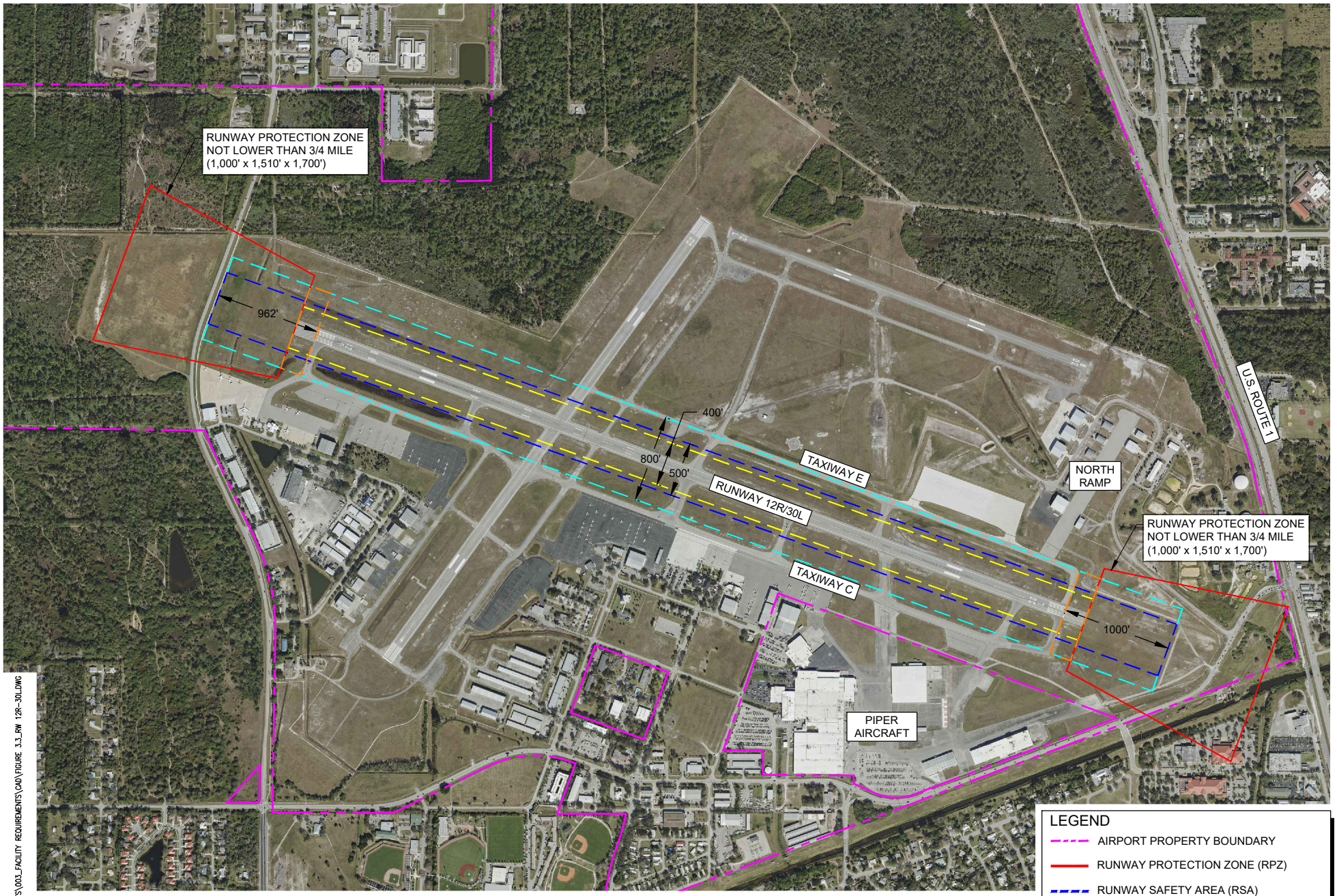
The runway standards described above will be applied to each runway at VRB. As previously identified in Table 2.26, which summarizes the approved forecast, the critical aircraft for Runway 12R/30L is the Airbus A220-300, ARC C-III, and the future critical aircraft is the Gulfstream 650, ARC D-III. The instrument approach visibility minimums are 3/4 of a mile, which converts to approximately 4,000 feet in runway visual range (RVR). If there is no change in future instrument approaches, this results in an existing and future RDC of C-III-4000 and D-III-4000, respectively, which are listed in **Table 3.3** and depicted on **Figure 3.3**.

TABLE 3.3: RUNWAY 12R/30L DESIGN STANDARDS

Item Description	Existing Runway 12R/30L	Future Runway 12R/30L
Runway Design Code (RDC)	C/D-III-4000	C/D-III-4000
Critical Aircraft	Airbus A220	Gulfstream 650
Runway Length	7,314’	7,314’
Runway Width	100’	150’
Runway Shoulder	15’	25’
Runway Blast Pads	200’ x 140’	200’ x 140’
Visibility	Not lower than ¾ mile	Not lower than ¾ mile or lower than ¾ mile
Runway Reference Code (ARC)	C/D-III less than 150,000 lbs. MTOW	C/D-III greater than 150,000 lbs. MTOW
FAR Part 77 Category	NP(D) – RW 12R NP(D) – RW 30L	NP(D) – RW 12R NP(D) – RW 30L
Runway Safety Area (length beyond runway end x width)	Standard: 1,000’ x 500’ 12R actual beyond: 962’ 30L actual beyond: 1,000’	1,000’ x 500’
Runway Safety Area (length before runway end x width)	600’ x 500’	600’ x 500’
Runway Object Free Area (length beyond runway end x width)	1,000’ x 800’	1,000’ x 800’
Runway Object Free Area (length before runway end x width)	600’ x 800’	600’ x 800’
Runway Obstacle Free Zone (length beyond runway x width)	200’ x 400’	200’ x 400’
Approach Runway Protection Zone (length x inner width x outer width)	1,700’ x 1,000’ x 1,510’	1,700’ x 1,000’ x 1,510’ or 2,500’ x 1,000’ x 1,750’
Departure Runway Protection Zone (length x inner width x outer width)	1,700’ x 500’ x 1,010’	1,700’ x 500’ x 1,010’
Runway Marking	Precision (12R)/Nonprecision (30L)	Precision (12R)/Nonprecision (30L)
Runway Lighting	Medium Intensity	Medium Intensity
Runway Centerline to Taxiway Centerline Separation	400–475’ (Existing) 400’ (Standard)	400–475’ (Existing) 400’ (Standard)

Sources: FAA AC 150/5300-13B, dated March 31, 2022; FAA Airport Data and Information Portal (ADIP), accessed March 31, 2023.

Notes: NP(D): nonprecision approach runway larger than utility with visibility minimums as low as ¾ mile.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 6:55 PM ALEXA02176
I:\20J0BS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.3_RW 12R-30L.DWG

VERO BEACH REGIONAL AIRPORT
MASTER PLAN

RUNWAY 12R/30L
DESIGN STANDARDS

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 3.3

Runway 12R/30L Length

Runway 12R/30L is the primary runway at VRB. It is also the Part 139 runway. The runway is 7,314 feet long by 100 feet wide. Runway 12R/30L has roads beyond both ends. To provide a clear RSA and ROFA, there are declared distances in use on Runway 12R/30L. The perimeter fence is 962 feet from the end of Runway 12R, with its location fixed relative to 43rd Avenue, and the perimeter fence reduces the length of the RSA and ROFA beyond the physical end of Runway 12R. To provide a 1,000-foot-long RSA and ROFA beyond Runway 12R, the ASDA and LDA on Runway 30L is shortened to 7,276 feet, as summarized in Table 3.3.

The existing and future critical aircraft for Runway 12R/30L is the Airbus A220 (ARC C-III) and Gulfstream 650 (ARC D-III), respectively. Airbus publishes airport planning information for its aircraft. The Airbus A220 with a PW1524G engine type requires 6,500 feet to depart on a standard day and 6,900 feet to depart on a hot day (+15°C) at MTOW. With the PW1521G engine, to operate within the 7,200-foot runway, it is limited to an MTOW of 143,000 pounds on a standard day and 141,000 pounds on a hot day. There is more runway length provided than required for the Airbus A220, regardless of the engine, for landing on a dry runway. The Gulfstream 650 has a takeoff distance of 5,858 feet at sea level on a standard day at MTOW. The existing and future critical aircraft can operate on Runway 12R/30L, albeit with some weight restrictions with certain engine models. Due to the surrounding development, no extensions are recommended. However, options to provide a full RSA and ROFA without the use of declared distances should be considered in the alternatives to maximize the length of the existing runway pavement.

Runway 12R/30L Width

For an ARC C-III or D-III runway or aircraft with a MTOW of less than 150,000 pounds, Runway 12R/30L provides the required 100 feet of width. The Airbus A220-300 has a maximum takeoff weight of 156,300 pounds. Therefore, applying the ARC C/D-III standards for aircraft with a maximum takeoff weight of more than 150,000 pounds should be considered in the future. The ARC C/D-III standards for more than 150,000 pounds MTOW include a runway width of 150 feet, shoulder width of 25 feet, and runway blast pad width of 200 feet. It is recommended that widening the runway 50 feet and adding 10 feet to the shoulders be considered in the alternatives analysis.

Runway Lighting and Signage

Runway 12R/30L is equipped with MIRLs, and all runway lighting is LED. MIRL meets the requirements of an instrument approach including lower than 3/4 of a mile. Some airfield signs are LED; however, the remaining signs that are incandescent are recommended to be upgraded to LED. The instrument approaches at VRB have minimums of not less than 3/4 of a mile. To obtain visibility minimums less than 3/4 of a mile, approach lights are required. The alternatives analysis should consider if an approach with less than 3/4 of a mile is feasible at VRB. If it is, a future approach light system will be required on that runway(s).

RSA, ROFA, and ROFZ

As identified under runway length, the perimeter fence is within 1,000 feet of the end of Runway 12R, so declared distances are in use to provide the 1,000 feet for the RSA and ROFA for landings and aborted takeoffs on Runway 30L, reducing the LDA and ASDA by 38 feet, as summarized in **Table 3.4**. The ROFZ that extends 200 feet beyond the runway end is clear.

TABLE 3.4: SUMMARY OF DECLARED DISTANCES FOR RUNWAY 12R/30L

Declared Distances				
Runway	**LDA**	**ASDA**	**TORA**	**TODA**
Runway 12R	7,314 feet	7,314 feet	7,314 feet	7,314 feet
Runway 30L	7,276 feet	7,276 feet	7,314 feet	7,314 feet

Sources: FAA ADIP, VRB, accessed March 27, 2023.

The RSA is to be clear of objects, excluding those fixed by function, such as runway lights. It is also to be graded and capable under dry conditions of supporting an aircraft. The FAA has established required longitudinal and traverse grades for an RSA. During the 2023 Part 139 airfield inspection, the FAA identified some areas along Runway 12R/30L that need to have the grading checked. A review of these grades is ongoing.

The ROFA is limited to equipment necessary for air and ground navigation to provide wind tip protection in the event of an aircraft excursion from the runway. The perimeter road at VRB is within the Runway 30L ROFA. It is parallel to the north side of the ROFA and within the corner of the southside ROFA. The perimeter road should be relocated outside the Runway 30L ROFA. Until that occurs, operational controls are used to avoid use of the road within the ROFA when aircraft are present on or approach Runway 12R/30L.

Runway Protection Zone

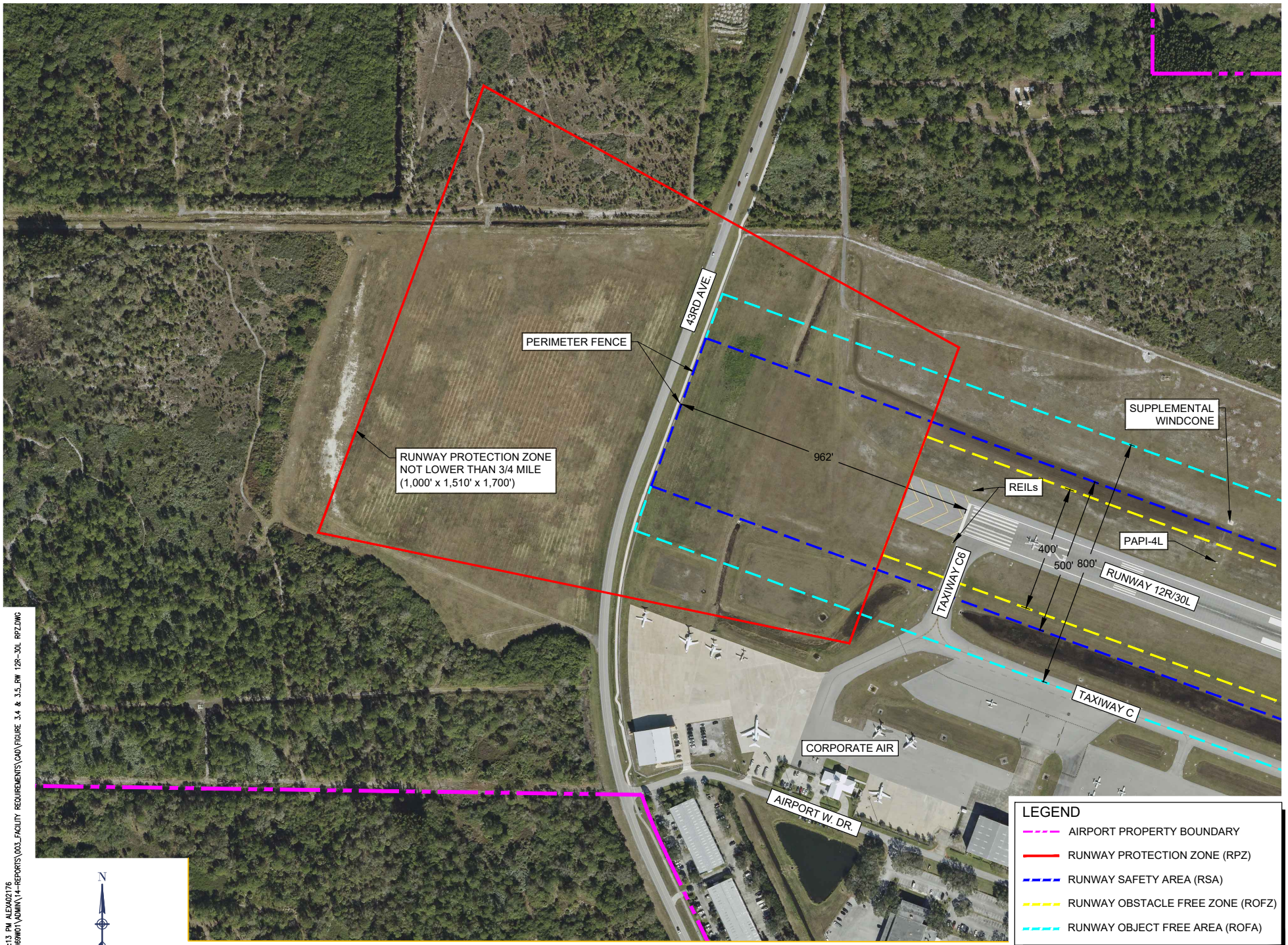
The goal of an RPZ is to protect people and property on the ground and should remain clear of incompatible land use. While it is recommended to avoid roads within the RPZ, when constructing a new runway or making improvements to a runway, existing roads are acceptable when there are no changes to a runway. When the landing threshold and a runway's end of takeoff length are the same, the larger RPZ — typically the approach RPZ — controls, and only one is depicted on the ALP. When declared distances are in use, there are separate approach and departure RPZs, if departure lengths are reduced.

Runway 12R

On Runway 12R, 43rd Avenue and the airport's perimeter fence is within the RPZ, as depicted on **Figure 3.4**. While objects are present, the airport has fee simple controlling interest over the Runway 12R RPZ, except for the 43rd Avenue right of way, which is publicly owned. If there are no changes to the runway, the FAA considers this condition to be legacy. If there are changes to the runway, including lower approach minimums, improvements to the RPZ need to be considered. This is typically accomplished through an RPZ analysis that considers various alternatives.

Runway 30L

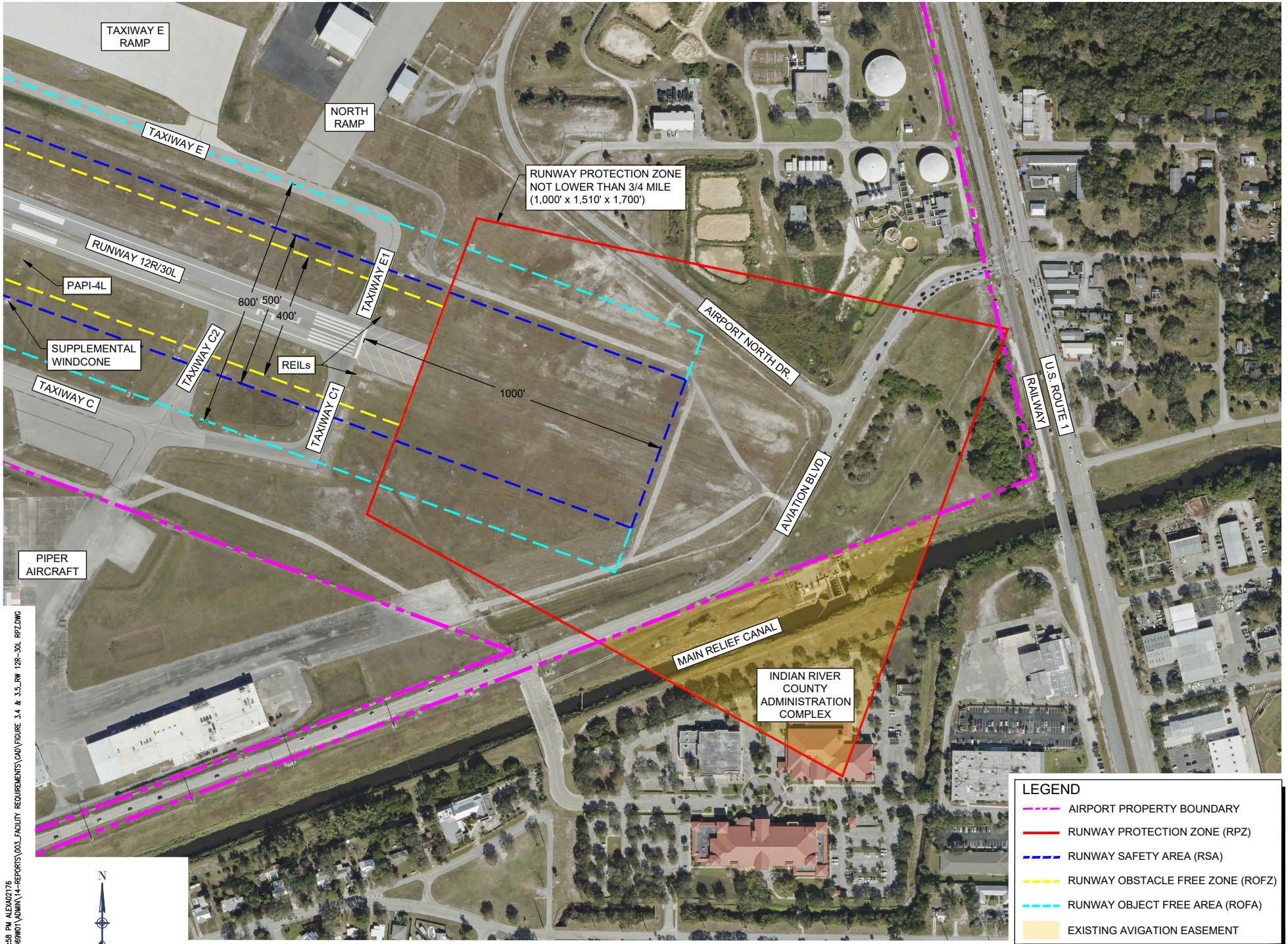
As shown on **Figure 3.5**, several objects are within the RPZ on the Runway 30L end, including Aviation Boulevard, Airport North Drive, the main relief canal, and the Indian River County Administration Complex. The airport owns the majority of the Runway 30L RPZ fee simple. The southeast corner is protected with avigation easements. FDOT is studying alternatives to improve the intersection of U.S. 1 and Aviation Boulevard. All remaining alternatives under consideration are at ground level. The location of the railway and main relief canal limit the opportunities to modify the road system within the Runway 30L RPZ. Any roadway improvements should not be any closer to the runway end than the existing condition. Any proposed changes to the road system would require an RPZ analysis to be submitted to the FAA to evaluate the proposed land use changes and alternatives considered.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 13, 2023 3:13 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.4 & 3.5_RW 12R-30L RPZ.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAY 12R RUNWAY PROTECTION ZONE	DRAWN BY: JA CHECKED BY: SZ	FIGURE 3.4



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 6:58 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.4 & 3.5_RW 12R-30L RPZ.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAY 30L RUNWAY PROTECTION ZONE	DRAWN BY: JA CHECKED BY: SZ
			FIGURE 3.5

Runway Visibility Zone and Line of Sight

Runways 12R/30L and 4/22 intersect. Therefore, with a part-time tower, there is an RVZ that should be kept clear. As shown on **Figure 3.6**, a portion of the Skyborne apron that includes 46 aircraft tie-down positions and a portion of the Paris Air apron that includes three helicopter parking positions are within the RVZ. Also, aircraft holding at Taxiway A, Taxiway C5, and Taxiway D would be within the RVZ. The FAA recommends that the apron layout keep aircraft parking positions outside an RVZ. Opportunities to minimize the parking of aircraft within the RVZ should be considered to maximize the visibility within the Runway 12R/30L and Runway 4/22 RVZ.

Runway 12R/30L has a maximum grade change of 0.22% and an effective grade of 0%. Therefore, Runway 12R/30L meets the FAA's standards for a clear line of sight along the length of the runway. Runway 12R/30L was rehabilitated in 2022. The FAA design standards are for no grade changes within 1/4 of the runway or 2,500 feet, whichever is less for a runway serving ADG C or larger aircraft. The first 1,650 feet of Runway 12R have no grade change. This is slightly less than 1/4 of the runway. However, the grade change of 0.08% is nominal. Runway 30L has three minimal grade changes within the last 1/4 of the runway, the greatest being 0.4%. With the existing taxiways at VRB, similar runway grades had to be maintained when the runway was rehabilitated to tie into the taxiways. Because of the flat grades on Runway 12R/30L, no centerline grade changes are recommended.

Pavement Strength and Condition

Runway 12R/30 L was rehabilitated in 2022. Therefore, the pavement is in excellent condition, as discussed in the airfield pavement condition section in Chapter 1 and detailed in Appendix B. The published PCR is 56/F/A/W/T, with a pavement strength of 85,000 pounds single wheel, 115,000 pounds dual wheel, and 220,000 pounds dual tandem. The Airbus A220 at maximum gross weight on a high strength CBR has an ACR of 28[5]. This is below the PCR, so the pavement has adequate strength to serve the Airbus A220, the heaviest aircraft regularly using VRB.

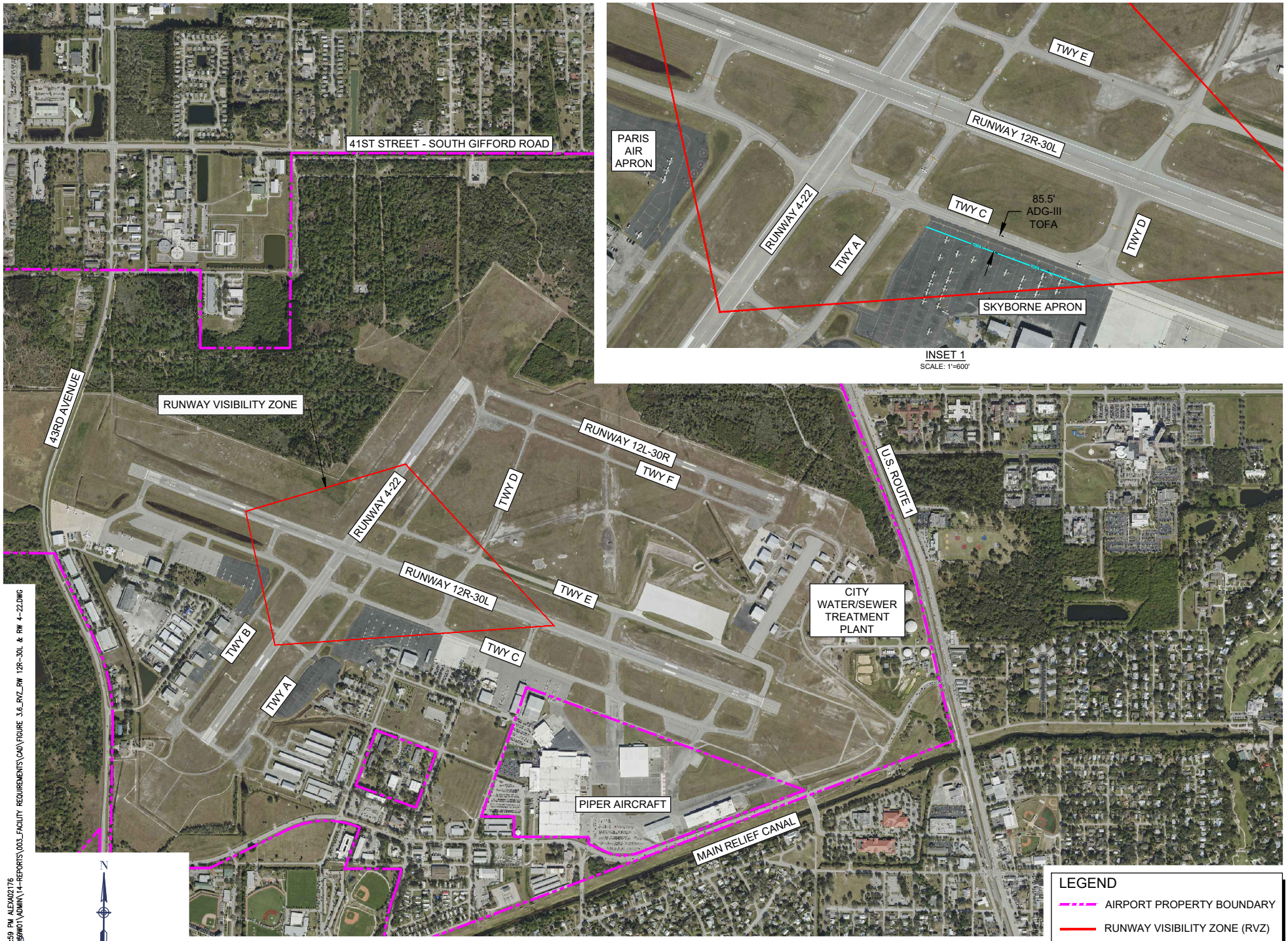
Instrument Approaches and Navigational Aids

Runway 12R/30L is served by LPV RNAV approaches, with minimums of ¾ of a mile visibility, a 256-foot ceiling on Runway 12R, and a 200-foot ceiling on Runway 30L. FAA Table K-1 in *FAA AC 150/5300-13B* depicts the criteria to support instrument flight procedure development, as shown on **Figure 3.7**. For visibility minimums of 3/4 of a mile to less than 1 mile, the minimum approach altitude or the height above touchdown elevation (HAT) minimum is typically 250 feet. At VRB, the HAT minimum for Runway 30L is 200 feet, so the requirement for less than 3/4 of a mile, which includes a HAT of less than 250 feet, should also be considered. With landing minimums of less than 250 feet, the precision obstacle free zone (POFZ) applies to Runway 30L and is in effect during IFR conditions, when an aircraft is on final approach within 2 miles of the runway threshold. The POFZ extends 200 feet beyond the runway end with a width of 800 feet and is clear.

A four-box PAPI system with LEDs is on the left side of both ends of the runway. The runway is also equipped with LED REILs on both runway ends. The REILs on the Runway 30L end are owned and maintained by the FAA.

To obtain lower visibility minimums, an approach lighting system is required. Lower minimums would increase the size of the RPZ to an inner width of 1,000 feet, an outer width of 1,750 feet, and a length of 2,500 feet from an inner width of 1,000 feet, an outer width of 1,510 feet, and a length of 1,700 feet and would lower the slope of the approach surface from 34:1 to 50 to 1. The feasibility of installing an approach light system to enhance instrument approach procedures should be considered during the alternatives analysis.

[5] Airbus, A220 Airport Planning Publication, Issue 030, 2022.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 6:59 PM ALEXA02176
I:\20JOBS\20A00860W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.6_RVZ_RW 12R-30L & RW 4-22.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAYS 12R/30L & 4/22 RUNWAY VISIBILITY ZONE	DRAWN BY: JA CHECKED BY: SZ FIGURE 3.6

FIGURE 3.7: CRITERIA TO SUPPORT INSTRUMENT FLIGHT PROCEDURE DEVELOPMENT

Standards [1]	Visibility Minimums [1]			
	< 3/4 statute mile (1.2 km)	3/4 (1.2 km) to < 1 statute mile (1.6 km)	≥ 1 statute mile (1.6 km) straight-in	Circling [2] ≥ 1 statute mile (1.6 km)
HAT [3]	≤ 250 ft	≥ 250 ft	≥ 250 ft	≥ 350 ft
POFZ (PA and APV only)	Required	Not Required	Not Required	Not Required
IT-OFZ	Required	Not Required	Not Required	Not Required
ALP [4]	Required	Required	Required	Required
Minimum Runway Length	4,200 ft	3,200 ft [5]	3,200 ft [5]	3,200 ft [5]
Paved Surface	Required	Recommended [6]	Recommended [6]	Recommended [6]
Runway Markings (See AC 150/5340-1)	Precision	Non-precision	Non-precision	Visual
Holding Position Signs and Markings (See AC 150/5340-1, AC 150/5340-18)	Required	Required	Required	Required [6]
Runway Edge Lights [7]	HIRL or MIRL	HIRL or MIRL	MIRL or LIRL	MIRL or LIRL (Required only for night minimums)
Parallel Taxiway [8]	Required	Required	Recommended	Recommended
Approach Lights [9]	Required	Recommended [10]	Recommended [10]	Not Required
VGSI [11]	Recommended	Recommended	Recommended	Recommended
Applicable Runway Design Standards, (Reference online Runway Design Standards Matrix Tool or Appendix G)	Lower than 3/4 mile (1.2 km) visibility minimums	Not lower than 3/4 mile (1.2 km) visibility minimums	Not lower than 1 mile (1.6 km) visibility minimums	Not lower than 1 mile (1.6 km) visibility minimums
Approach or Departure Surface to be Met (Reference paragraph 3.6.1)	See Table 3-3 or Table 3-4	See Table 3-3 or Table 3-4	See Table 3-3 or Table 3-4	Table 3-3
Optimum Survey Type [12]	VGS	VGS	NVGS	NVGS [13]

Note: 1 ft = 0.305 m

3.8. Runway 4/22

Runway 12R/30L and 12L/30R provide less than 95% wind coverage for 10.5 and 13 knots, as shown in Table 1.7. Therefore, a crosswind runway is needed at VRB to provide the FAA-recommended 95% wind coverage. Runway 4/22 is the crosswind runway. While Runway 4/22 is needed to provide the necessary crosswind coverage for up to ARC B-II aircraft, as indicated in the approved forecast, the existing and future critical aircraft for Runway 4/22 is the Gulfstream 450, ARC D-II. Therefore, larger clear areas for ARC D-II aircraft should be provided on Runway 4/22.

Runway 4 has an instrument approach with visibility minimums of 7/8 of a mile, which converts to an RVR of approximately 4,000 feet. Runway 22 has an instrument approach with visibility minimums of 1 mile, which converts to an RVR of approximately 5,000 feet. This results in an existing and future RDC of D-II-5000. If there is no change in instrument approach visibility, the design standards for Runway 4/22 are listed in **Table 3.5** and depicted on **Figure 3.8.**

Runway 4/22 Length

Runway 4/22 is 4,974 feet long by 100 feet wide. Objects located off the Runway 4 end include 43rd Avenue, Aviation Boulevard, and a drainage swale. To provide a clear RSA and ROFA, there are declared distances in use on Runway 22. The location of a drainage swale approximately 972 feet beyond the end of Runway 4 reduces the length of the RSA and ROFA beyond the physical end of Runway 4. To provide a 1,000-foot-long RSA and ROFA beyond Runway 4, the ASDA and LDA on Runway 22 is shortened by 29 feet to 4,945 feet.

When Runway 12R/30L was closed for rehabilitation in 2022, several of the airport's users had to temporarily use other airports due to not having a runway available that was at least 5,000 feet long. FAA AC 150/5325-4B provides guidance to identify the recommended runway length. For runway length analysis, aircraft are grouped by MTOW into less than 12,500 pounds, 12,500 pounds but less than 60,000 pounds, and more than 60,000 pounds.

The ARC B-II to C-II aircraft operating at VRB typically are within the category of 12,500 pounds but less than 60,000 pounds. The FAA used aircraft operating manuals to develop curves for runway lengths for these aircraft. The aircraft are divided into two groups, 75% of fleet and 100% of fleet, and two operating conditions, 60% of useful load and 90% of useful load. Inputs to the runway length tables in FAA AC 150/5325-4B for VRB are airfield elevation (20 feet MSL) and mean maximum temperature of the hottest month (90°F). For aircraft weighing more than 60,000 pounds, the FAA recommends using the aircraft flight manual. However, these manuals are not typically publicly available for business jet aircraft.

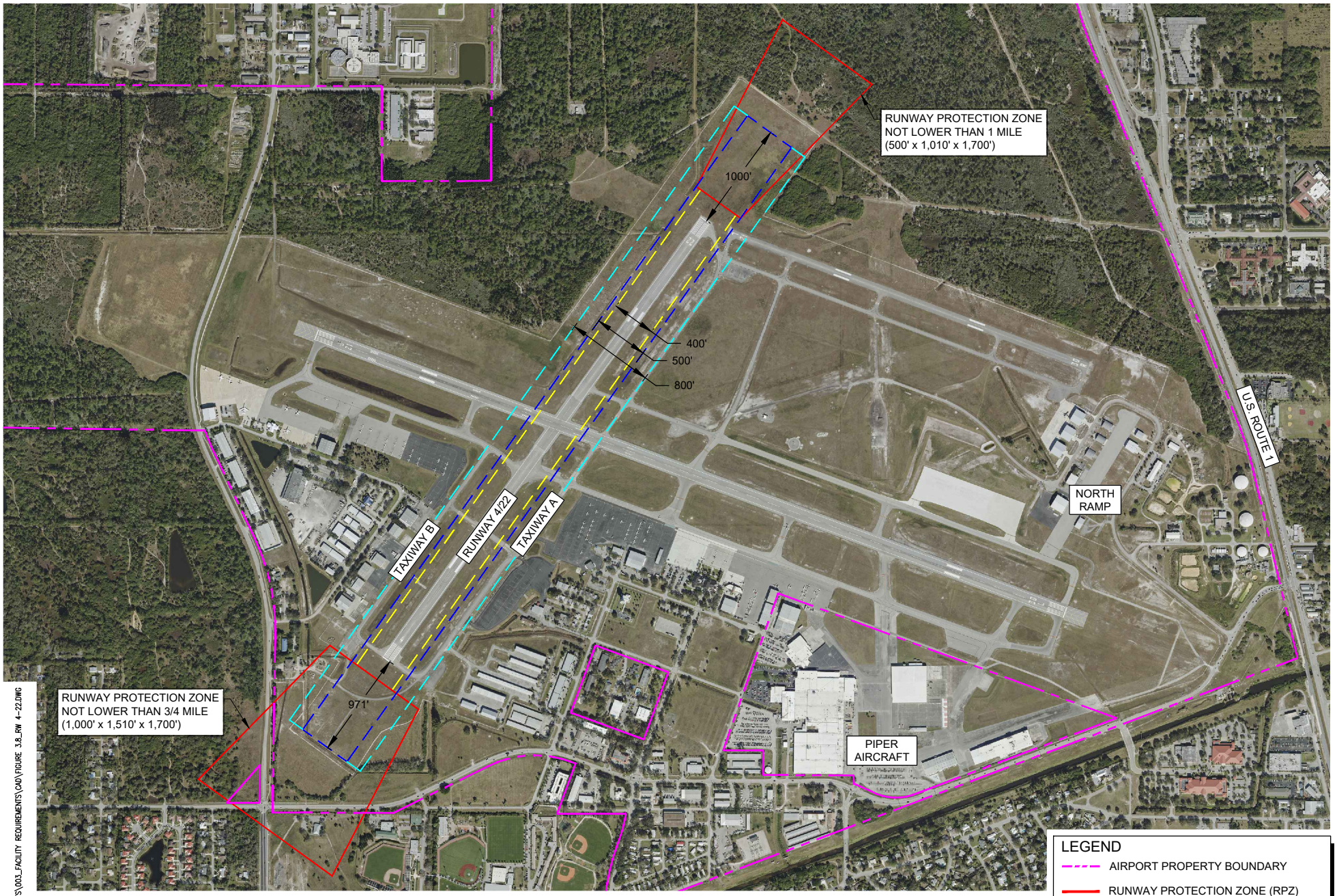
Using the curves in FAA AC 150/5325-4B for aircraft in 75% of the fleet, at 60% useful load they require 4,700 feet and at 90% useful load they require 6,700 feet. One hundred percent of the fleet requires 5,000 feet at 60% useful load and 8,300 feet for 90% useful load. VRB operations by aircraft in 75% of fleet include smaller Cessna Citations, Dassault Falcons, and Learjets, and 100% of the fleet include Bombardier Challenger 600s, larger Cessna Citations, Dassault Falcons, and Learjets.

TABLE 3.5: RUNWAY 4/22 DESIGN STANDARDS

Item Description	Existing Runway 4/22	Future Runway 4/22
Runway Reference Code (ARC)	D-II	D-II
Runway Length	4,974 feet	5,000+ feet
Runway Width	100’ (Existing) 100’ (Standard)	100’
Runway Shoulder	10’	10
Runway Blast Pad	NA	150’ X 120’
Visibility	7/8 mile/1 mile	7/8 mile/1 mile
Runway Design Code (RDC)	D-II-5000	D-II-5000
FAR Part 77 Category	NP(C) – RW 4 NP(C) – RW 22	NP(C) – RW 4 NP(C) – RW 22
Runway Safety Area (length beyond runway end x width)	1,000’ x 500’ 4 actual beyond: 971’ 22 actual beyond: 1,000’	1,000’ x 500’
Runway Safety Area (length before runway end x width)	600’ x 500’	600’ x 500’
Runway Object Free Area (length beyond runway end x width)	1,000’ x 800’	1,000’ x 800’
Runway Object Free Area (length before runway end x width)	600’ x 800’	600’ x 800’
Runway Obstacle Free Zone (length beyond runway x width)	200’ x 400’	200’ x 400’
Approach Runway Protection Zone (length x inner width x outer width)	1,700’ x 1,000’ x 1,510’/ 1,700’ x 500’ x 1,010’	1,700’ x 1,000’ x 1,510’/ 1,700’ x 500’ x 1,010’
Departure Runway Protection Zone (length x inner width x outer width)	1,700’ x 500’ x 1,010’	1,700’ x 500’ x 1,010’
Runway Marking	Nonprecision	Nonprecision
Runway Lighting	Medium Intensity	Medium Intensity
Runway Centerline to Taxiway Centerline Separation	350-–400’ (Existing) 300’ (Standard)	350–400’ (Existing) 300’ (Standard)

Sources: FAA AC 150/5300-13B, dated March 31, 2022; FAA Airport Data and Information Portal (ADIP), accessed March 31, 2023.

Notes: NP(C): nonprecision approach runway larger than utility with visibility minimums greater than 3/4 mile.



LEGEND

- AIRPORT PROPERTY BOUNDARY
- RUNWAY PROTECTION ZONE (RPZ)
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBSTACLE FREE ZONE (ROFZ)
- RUNWAY OBJECT FREE AREA (ROFA)

N

0 1,200

GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

VERO BEACH REGIONAL AIRPORT	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAY 4/22 DESIGN STANDARDS	DRAWN BY: JA CHECKED BY: SZ

FIGURE 3.8

OCT 12, 2023 7:01 PM ALEXA02176
I:\20J0BS\20A0069W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.8_RW 4-22.DWG

In addition, runway length requirements for the most common ARC B-II, C-I and C-II, and D-I and D-II aircraft operating at VRB were evaluated. The readily available information is for a dry, standard day (59°F and 29.92 in Hg at sea level) at maximum takeoff weight. While VRB is close to sea level, the mean maximum daily temperature at VRB is 90°F. The higher temperatures require longer runway length. The data in **Table 3.5** is for MTOW, so some adjustment in weight could occur in higher temperatures, but commonly a longer runway length is needed. With the FAA runway length curves recommending at least 5,000 feet for 100% of fleet at 60% useful load, and based on the data in **Table 3.6**, up to 5,700 feet is needed to accommodate these aircraft closer to MTOW.

TABLE 3.6: RUNWAY LENGTH FOR COMMON ARC B-II TO D-II AIRCRAFT OPERATING AT VRB

Aircraft Type	ARC	MTOW (pounds)	Balanced Field Takeoff (standard conditions)	Landing Distance (dry, standard conditions)
Challenger 300	C-II	38,850	4,810 feet	3,833 feet
Challenger 600	C-II	41,250	6,200 feet	4,150 feet
Citation Excel	B-II	20,000	4,060 feet	4,917 feet
Citation Latitude	B-II	30,800	3,580 feet	2,480 feet
Citation X	B-II	36,100	5,480 feet	4,693 feet
Falcon 900 EX	B-II	48,300	5,215 feet	3,750 feet
Falcon 2000LXS	B-II	42,800	4,675 feet	2,260 feet
G450	D-II	74,600	5,770 feet	3,260 feet
Gulfstream IV	D-II	73,200	5,700 feet	4,992 feet
Learjet 45	C-I	20,500	4,350 feet	4,063 feet
Learjet 60	C-I	23,500	5,450 feet	5,208 feet

Source: GlobalAir.com, accessed September 18, 2023.

Also, because VRB is supporting commercial service, it is interested in the potential of a backup Part 139 runway. Therefore, the alternatives analysis should consider improvements to Runway 4/22 to meet Part 139 standards.

Runway 4/22 Width

Runway 4/22 provides 100 feet of width and 10-foot shoulders, which meet the design standards for ARC D-II aircraft. Paved blast pads are only required for runways with ADG-III as the critical aircraft. Therefore, paved blast pads are not required for Runway 4/22.

Runway Lighting and Signage

Runway 4/22 is equipped with MIRLs, and all runway lighting is LED. Some airfield signs are LED; however, the remaining signs that are incandescent are recommended to be upgraded to LED.

RSA, ROFA, and ROFZ

A drainage swale is approximately 972 feet from the Runway 4 end of pavement. Therefore, declared distances are in use to provide the standard RSA and ROFA beyond the declared usable end of the runway. This reduces the ASDA and LDA for Runway 22. The published declared distances for Runway 4/22 are summarized in **Table 3.7**. The ROFZ extending only 200 feet beyond the runway end is clear.

TABLE 3.7: SUMMARY OF DECLARED DISTANCES FOR RUNWAY 4/22

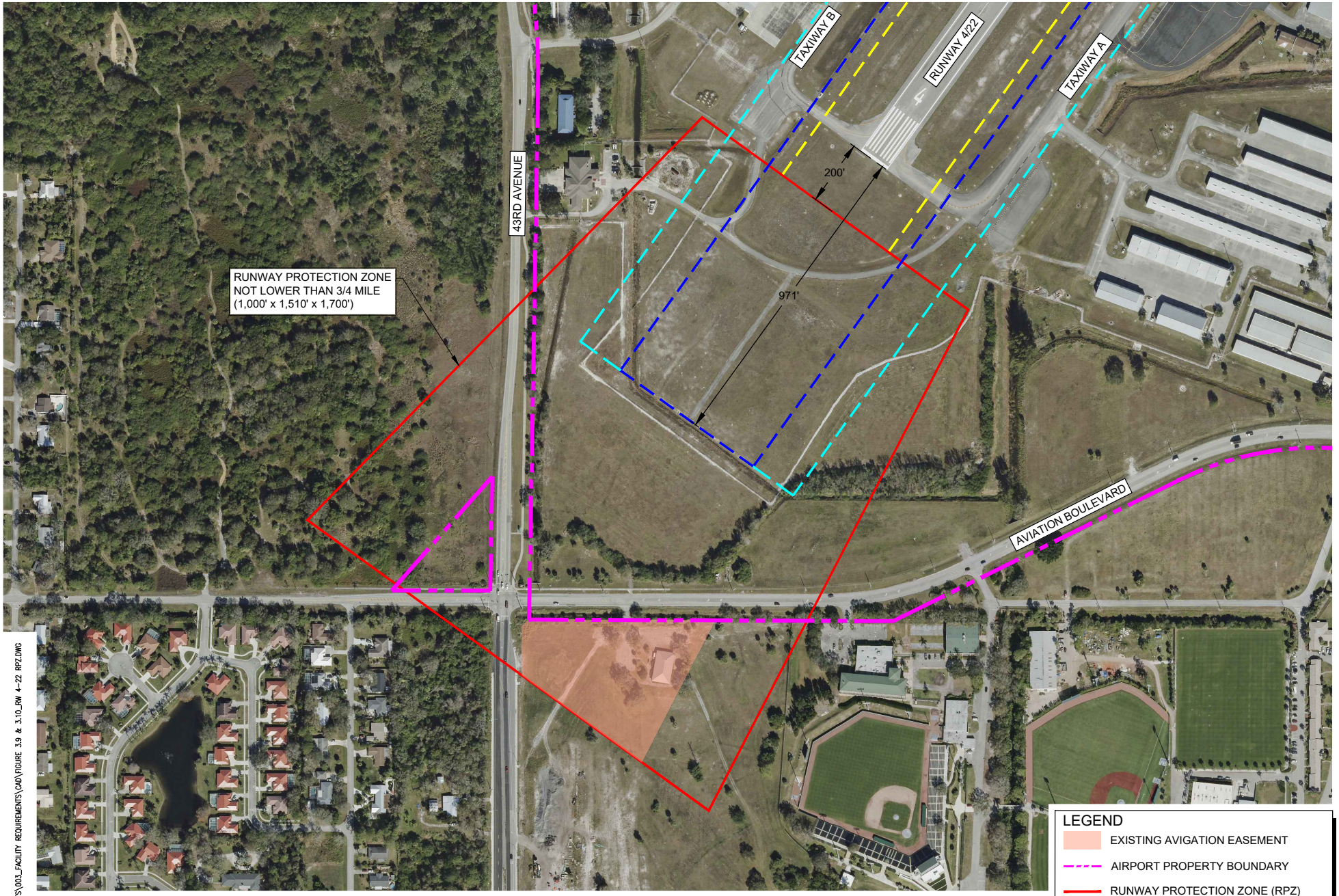
Declared Distances				
Runway	**LDA**	**ASDA**	**TORA**	**TODA**
Runway 4	4,974 feet	4,974 feet	4,974 feet	4,974 feet
Runway 22	4,945 feet	4,945 feet	4,974 feet	4,974 feet

Source: FAA ADIP, VRB, accessed March 27, 2023.

The Runway 12L RSA overlaps the Runway 22 RSA. FAA AC 150/5300-13B recommends avoiding overlapping RSAs to allow sufficient space for entrance taxiway and associated marking and signage. As part of considering improvements to Runway 4/22, providing a standard RSA and ROFA without the use of declared distances and eliminating the overlapping RSAs should be considered. These alternatives should include the consideration of entrance taxiways.

Runway Protection Zone

Similar to the primary runway, the landing threshold and end of takeoff length available on Runway 4/22 are the same. Therefore, only one RPZ is depicted on both runway ends. On Runway 4, 43rd Avenue, Aviation Boulevard, and the ARFF access road are within the RPZ, as depicted on **Figure 3.9**. As shown on **Figure 3.10**, a private airport access road is within the Runway 22 RPZ. Most of the Runway 4 RPZ is on airport property or has an avigation easement. Approximately eight additional acres of avigation easement are needed in the Runway 4 RPZ to protect the current larger RPZ due to the publication of an improved instrument approach procedure since the initial easement was acquired. The entire Runway 22 RPZ is on airport property.



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GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

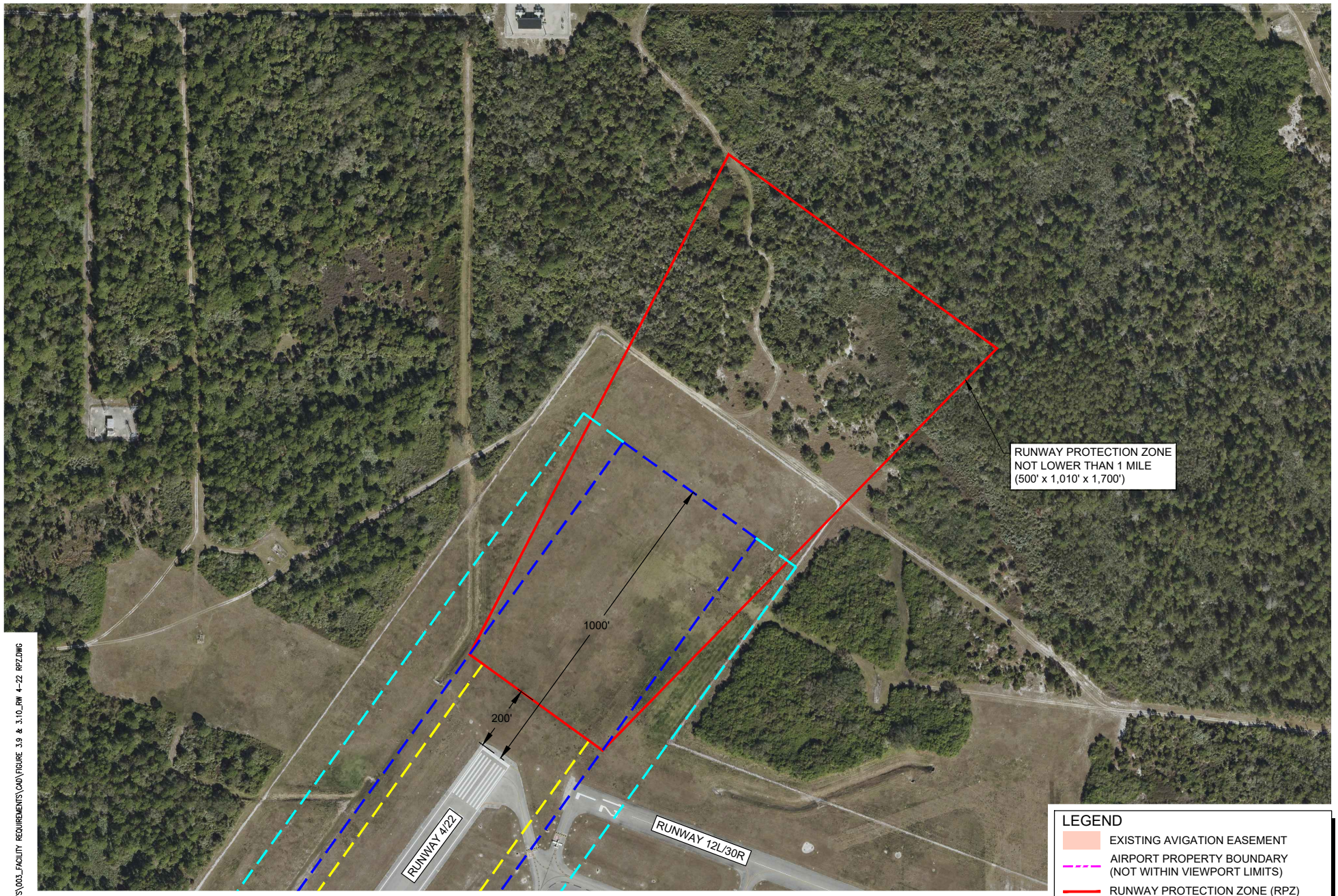
VERO BEACH REGIONAL AIRPORT
MASTER PLAN

RUNWAY 4
RUNWAY PROTECTION ZONE

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 3.9

OCT 12, 2023 7:03 PM ALEXA02176
I:\20UOBS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.9 & 3.10_RW 4-22 RPZ.DWG



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0 400

GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

VERO BEACH REGIONAL AIRPORT	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAY 22 RUNWAY PROTECTION ZONE	DRAWN BY: JA CHECKED BY: SZ
HANSON			FIGURE 3.10

OCT 12, 2023 7:03 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.9 & 3.10_RW 4-22 RPZ.DWG

Runway Visibility Zone and Line of Sight

Refer to the Runway 12R/30L Runway Visibility Zone and Line of Sight section for details on the RVZ between Runway 4/22 and Runway 12R/30L.

While Runway 4/22 and Runway 12L/30R do not intersect, they are converging runways, with the extended runway centerlines intersecting. **Figure 3.11** depicts the recommended area to be kept clear based on the takeoff decision speed (v1) associated distance. This area is clear and should be considered during the development of the alternatives analysis.

Runway 4/22 has a maximum grade change of 0.10%. The effective runway gradient for Runway 4 and Runway 22 is -0.1% and 0.1%, respectively, which is within FAA design standards for ARC D-II. The FAA design standards are to avoid grade changes in the first quarter of the runway from the threshold or 2,500 feet, whichever is less for a runway serving AAC D or larger aircraft. The Runway 4 and 22 ends have minimal grade changes of 0.02% and 0.03%, respectively.

Pavement Strength and Condition

Runway 4/22 was rehabilitated in 2013. This project included the reduction of the runway shoulders. At the time of this airport master plan, the pavement is in good condition. The published PCR is 41/F/B/W/T, with a pavement strength of 30,000 pounds single wheel, 115,000 pounds dual wheel, and 220,000 pounds dual tandem. The MTOW of a Gulfstream 450 is 74,600 pounds on dual wheels, which is less than the published pavement strength. Thus, Runway 4/22 has adequate weight-bearing capacity for the existing and future critical aircraft.

Instrument Approaches and Navigational Aids

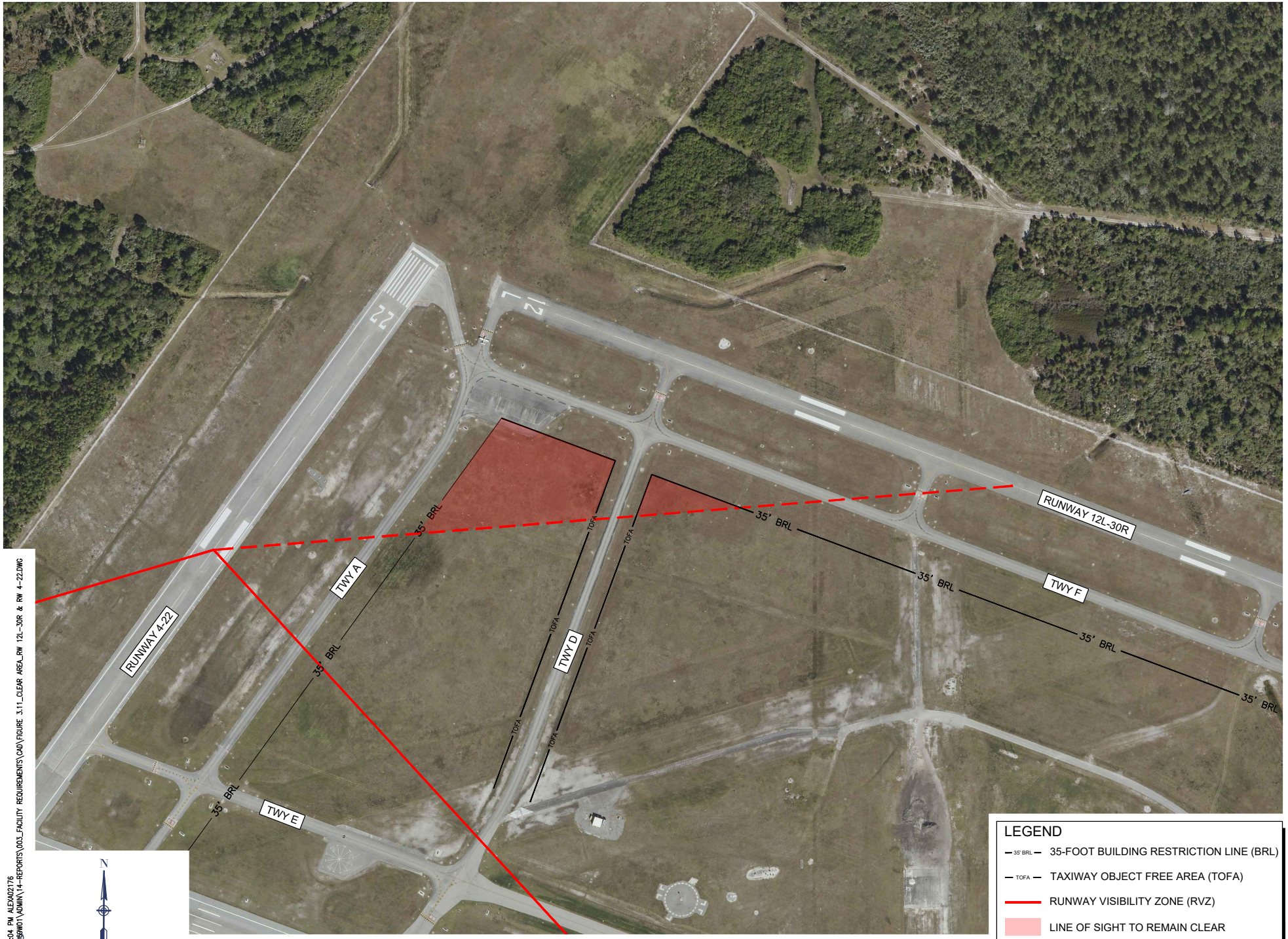
Runways 4 and 22 have LPV RNAV approaches with visibility minimums of 7/8 of a mile and a HAT of 273 feet on Runway 4 and 1-mile visibility and a HAT of 317 feet on Runway 22. Table K-1 in FAA AC 150/5300-13B depicts the criteria to support instrument flight procedure development, as previously shown on Figure 3.7. For visibility minimums of 3/4 of a mile to less than 1 mile, the HAT minimum can be as low as 250 feet. The current HAT for runways 4 and 22 is higher than 250 feet. Therefore, during the preparation of the ALP, the controlling objects for each runway will be identified to determine if any improvements in approach minimums are feasible.

A four-box PAPI system is on the left side of the runway on both runway ends. The Runway 4 PAPIs are LED and FAA-maintained, and the Runway 22 PAPIs are incandescent and airport-owned and -maintained. The runway is also equipped with incandescent REILs on both runway ends. In future lighting projects, it is recommended to upgrading the Runway 22 PAPIs and REILS to LED at the end of their useful life.

3.9. Runway 12L/30R

Runway 12L/30R is a parallel runway per the ASV and is classified as a secondary runway needed to meet the level of operations at VRB. As such, it is considered eligible for FAA funding. The separation between the parallel runway centerlines is 2,185 feet. With a separation of at least 700 feet, simultaneous independent VFR landings and takeoffs are allowed when the tower is open and closed.

VRB has two flight schools. When the winds favor the parallel runways, the tower uses Runway 12L/30R for training, especially for touch-and-go operations. It is common for the Runway 12L/30R pattern to be full and have training as well as have large aircraft waiting to depart on the primary runway. Runway 12L/30R also accommodates some transient operations.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 7:04 PM ALEXA02176
I:\20JOBS\20A0086W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.11_CLEAR AREA_RW 12L-30R & RW 4-22.DWG

VERO BEACH REGIONAL AIRPORT | HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAYS 12L/30R & 4/22 LINE OF SIGHT TO REMAIN CLEAR	DRAWN BY: JA CHECKED BY: SZ FIGURE 3.11

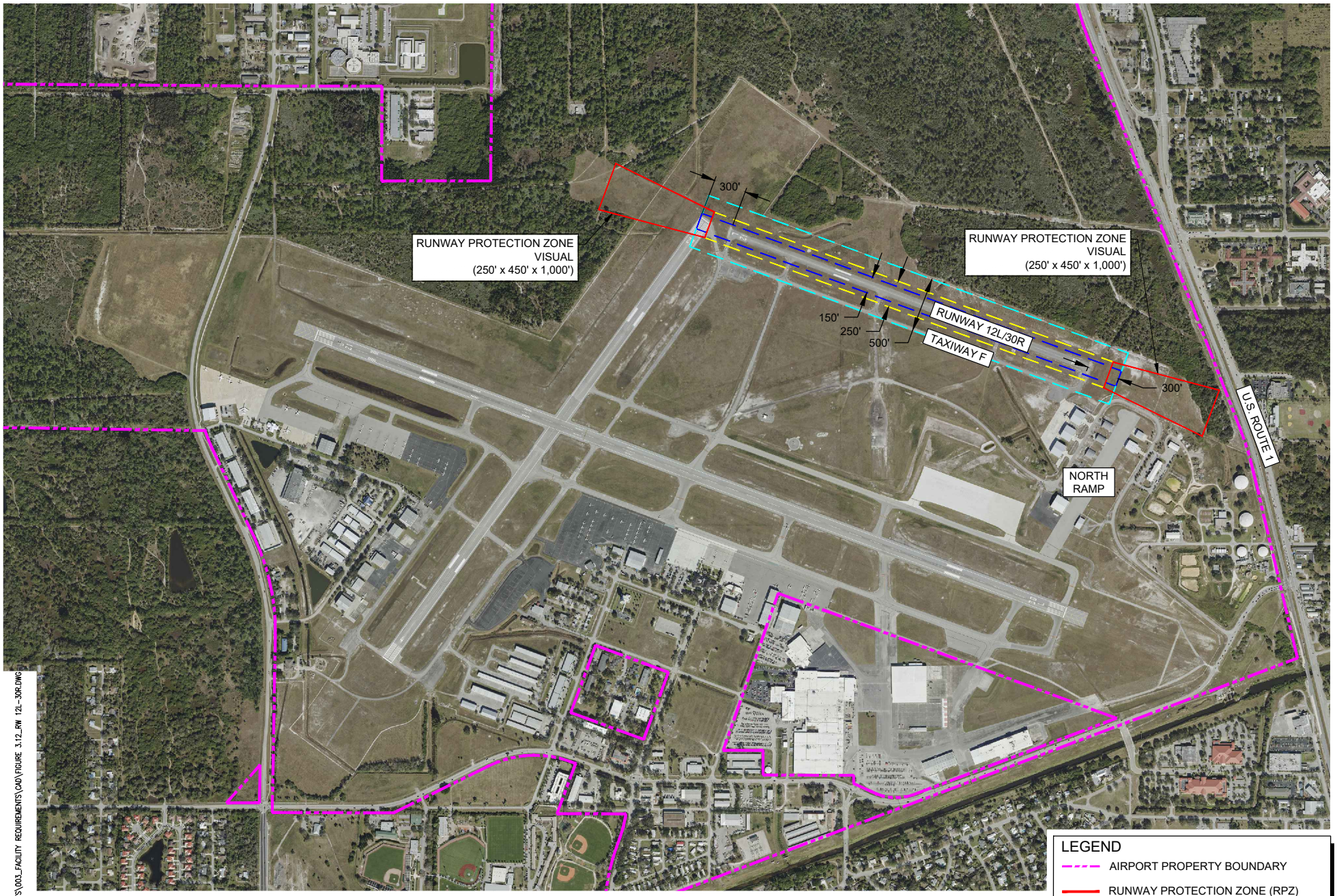
The existing and future critical aircraft for Runway 12L/30R is the King Air 200, ARC B-II small. Runway 12L/30R is a visual runway with no published instrument approach. This results in an existing and future RDC of B-II-5000. The design standards for Runway 12L/30R are listed in **Table 3.8** and depicted on **Figure 3.12**.

TABLE 3.8: RUNWAY 12L/30R DESIGN STANDARDS

Item Description	Existing/Future Runway 12L/30R
Runway Length	3,504 feet
Runway Width	75 feet
Runway Reference Code (ARC)	B-II Small
Visibility	Visual
Runway Design Code (RDC)	B-II Small-5000
Runway Width	75’ (Actual) 75’ (Standard)
FAR Part 77 Category	VIS(A) – RW 12L VIS(A) – RW 30R
Runway Safety Area (length beyond runway end x width)	300’ x 150’
Runway Safety Area (length before runway end x width)	300’ x 150’
Runway Object Free Area (length beyond runway end x width)	300’ x 500’
Runway Object Free Area (length before runway end x width)	300’ x 500’
Runway Obstacle Free Zone (length beyond runway x width)	200’ x 250’
Approach Runway Protection Zone (length x inner width x outer width)	1,000’ x 250’ x 1,510’
Departure Runway Protection Zone (length x inner width x outer width)	1,700’ x 500’ x 450’
Runway Marking	Basic
Runway Lighting	Medium Intensity
Runway Centerline to Taxiway Centerline Separation	240’ (Actual) 240’ (Standard)

Sources: FAA AC 150/5300-13B, dated March 31, 2022; FAA Airport Data and Information Portal (ADIP), accessed March 31, 2023.

Notes: VIS(A): visual approach utility runway.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 7:08 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.12_RW 12L-30R.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAY 12L/30R DESIGN STANDARDS	DRAWN BY: JA CHECKED BY: SZ
			FIGURE 3.12

Runway 12L/30R Length

Runway 12L/30R is 3,504 feet long by 75 feet wide. Per FAA AC 150/5325-4B, for small aircraft with fewer than 10 passenger seats at 100% of the fleet, the required runway length is approximately 3,600 feet. Per coordination with airport staff, the existing length of Runway 12L/30R is sufficient for multiengine training, although the flight schools prefer to have the multiengine aircraft use the primary runway when activity allows. Any reduction in length on Runway 12L/30R would make it undesirable to use for multiengine operations. Therefore, at a minimum, the existing length should be maintained on Runway 12L/30R.

Runway 12L/30R Width

Runway 12L/30R provides 75 feet of width, which meets the design standards for ARC B-II small aircraft. Paved blast pads are only required for runways with a critical aircraft of an ADG-III or higher. Therefore, paved blast pads are not required for Runway 12L/30R.

Runway Lighting and Signage

Runway 12L/30R is equipped with MIRLs, and all runway lighting is LED. Some airfield signs are LED; however, the remaining signs that are incandescent are recommended to be upgraded to LED.

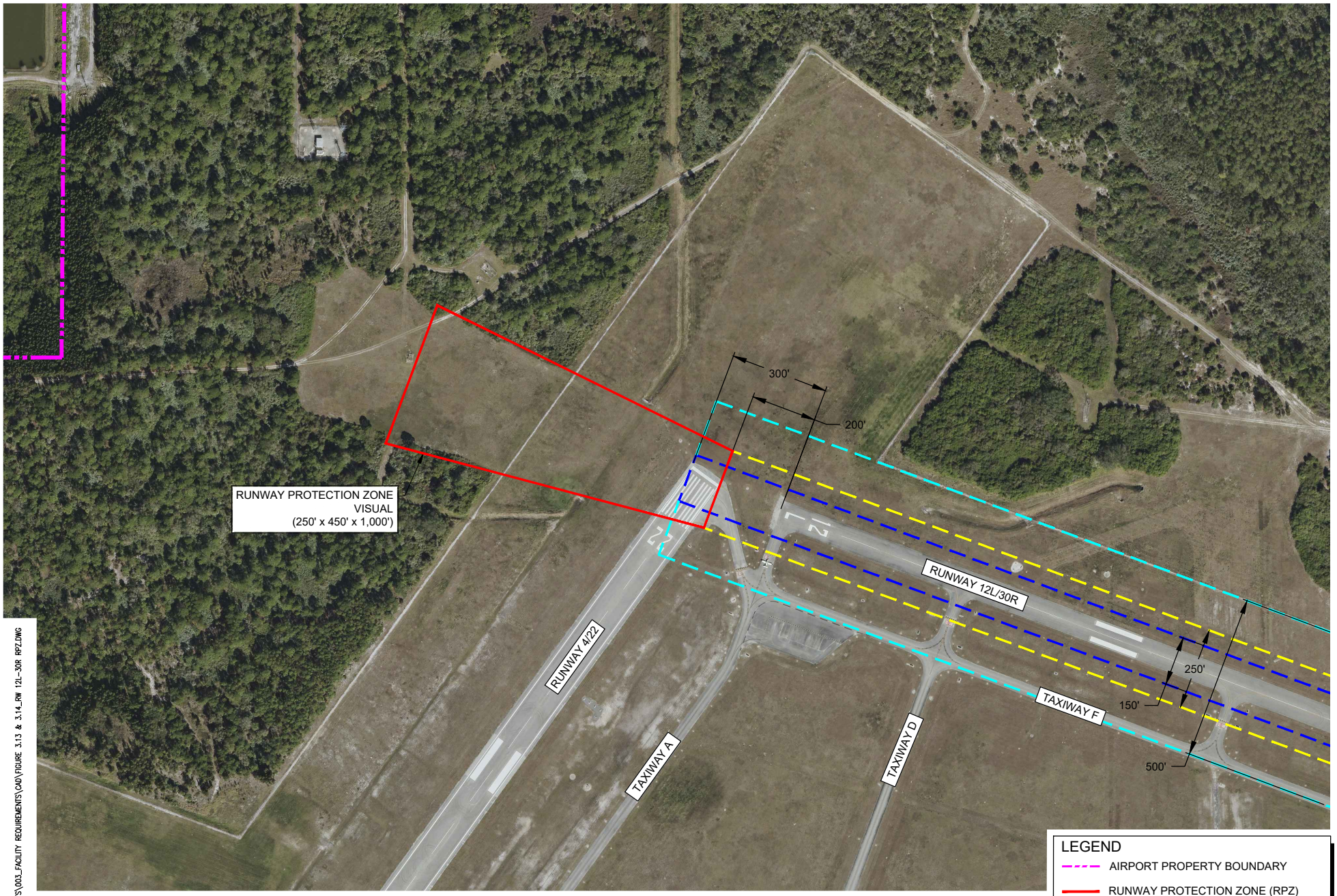
RSA, ROFA, and ROFZ

Runways 12L/30R and 4/22 converge but do not intersect, resulting in the runways having overlapping RSAs. FAA standards recommend avoiding overlapping RSAs to increase the margin of safety and minimize operational limitations.[6] The utility of Runway 12L/30R needs to remain the same by supporting flight training operations. Due to the proximity of existing development adjacent to the north ramp near the Runway 30R end, any changes to the runway length should be evaluated on the Runway 12L end during the alternatives analysis. The evaluation should consider the overlapping RSAs and modifying the parallel taxiway end connector to Runway 4/22, per FAA design standards.

Runway Protection Zone

No declared distances with reduced runway length are in place on Runway 12L/30R, so the landing and takeoff lengths of Runway 12L/30R are the same at 3,504 feet. Therefore, only one RPZ is depicted on both runway ends. On Runway 12L, the Runway 22 end and Taxiway A2 connector are within the RPZ, as depicted on **Figure 3.13**. As shown on **Figure 3.14**, the RPZ off the Runway 30R end is clear. Runway 22 and Taxiway A2 within the Runway 12L RPZ will be addressed in the alternatives analysis as part of considering alternatives to address the overlapping RSAs.

[6] Federal Aviation Administration, AC 150/5300-13B: *Airport Design*, dated March 31, 2022.



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Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

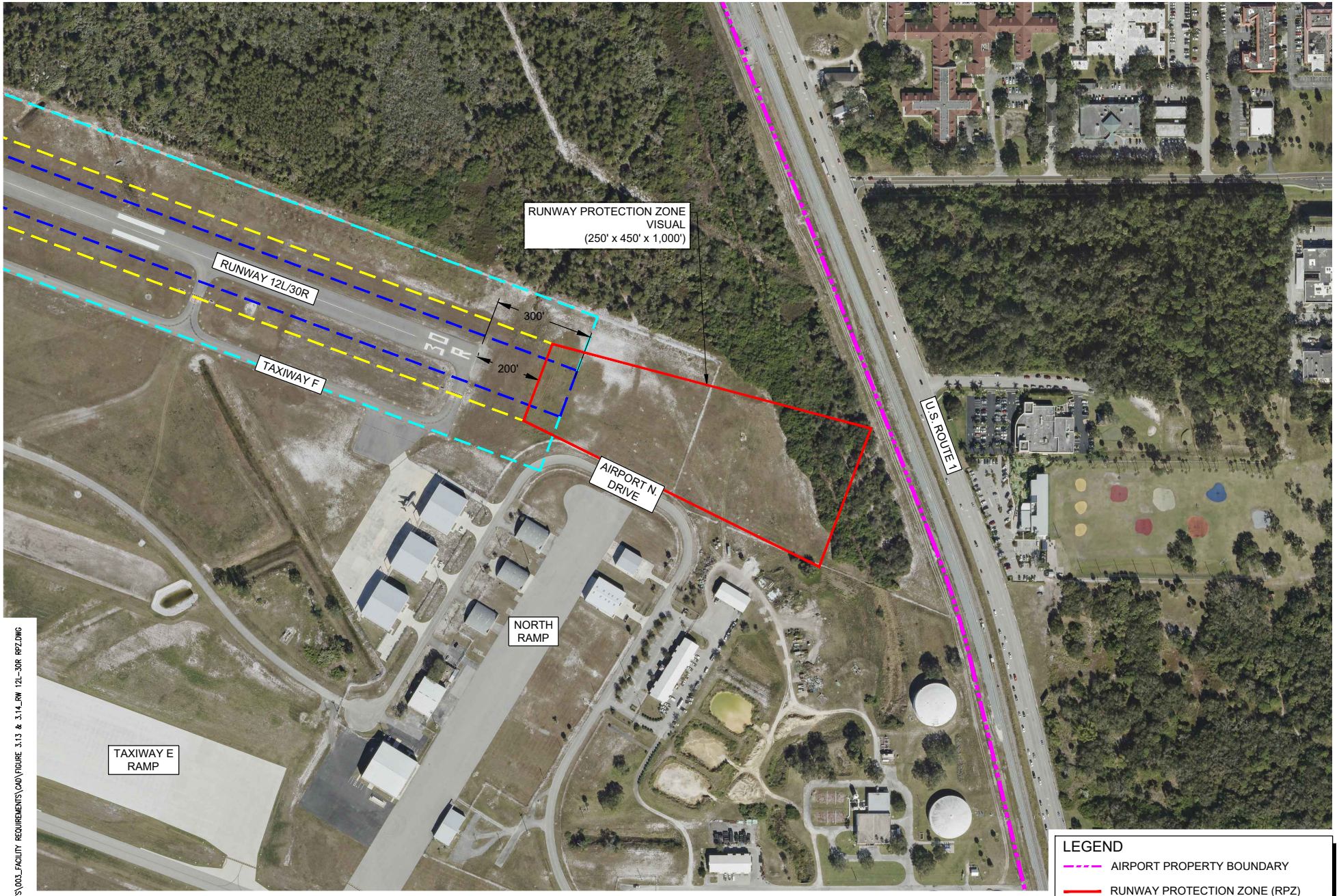
OCT 12, 2023 7:09 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.13 & 3.14_RW 12L-30R RPZ.DWG

VERO BEACH REGIONAL AIRPORT
MASTER PLAN

RUNWAY 12L
RUNWAY PROTECTION ZONE

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 3.13



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAY 30R RUNWAY PROTECTION ZONE	DRAWN BY: JA CHECKED BY: SZ
			FIGURE 3.14

OCT 12, 2023 7:10 PM ALEXA02176
I:\2020BS\20A00690\01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.13 & 3.14_RW 12L-30R RPZ.DWG

Runway Visibility Zone and Line of Sight

As discussed under Runway 4/22, while Runway 12L/30R and Runway 4/22 do not intersect, they are converging runways, with the extended runway centerlines intersecting. Figure 3.11 depicts the area recommended to be kept clear and should be considered in the alternatives analysis.

Runway 12L/30R has a maximum grade change of -0.05%. The effective runway gradient for Runway 12L and Runway 30R is 0%. This meets the FAA design standards. The FAA design standards require avoiding grade changes in the first quarter of the runway from the threshold for a runway serving AAC B aircraft. The Runway 12L/30R ends have minimal grade changes of -0.10% and -0.13%, respectively.

Pavement Strength and Condition

At the time of this airport master plan, the Runway 12L/30R pavement is in fair condition, with a published PCR of 8/F/B/Y/T and a pavement strength of 12,500 pounds. Runway 12L/30R is a utility runway that supports small aircraft with an MTOW of 12,500 pounds single wheel, so the pavement strength is adequate.

Instrument Approaches and Navigational Aids

Both ends of Runway 12L/30R have visual approaches only. As a shorter parallel runway to the primary runway, which is used for VFR student training, and with instrument approaches to both ends of the primary runway, no changes to the visual approaches to Runway 12L/30R are recommended.

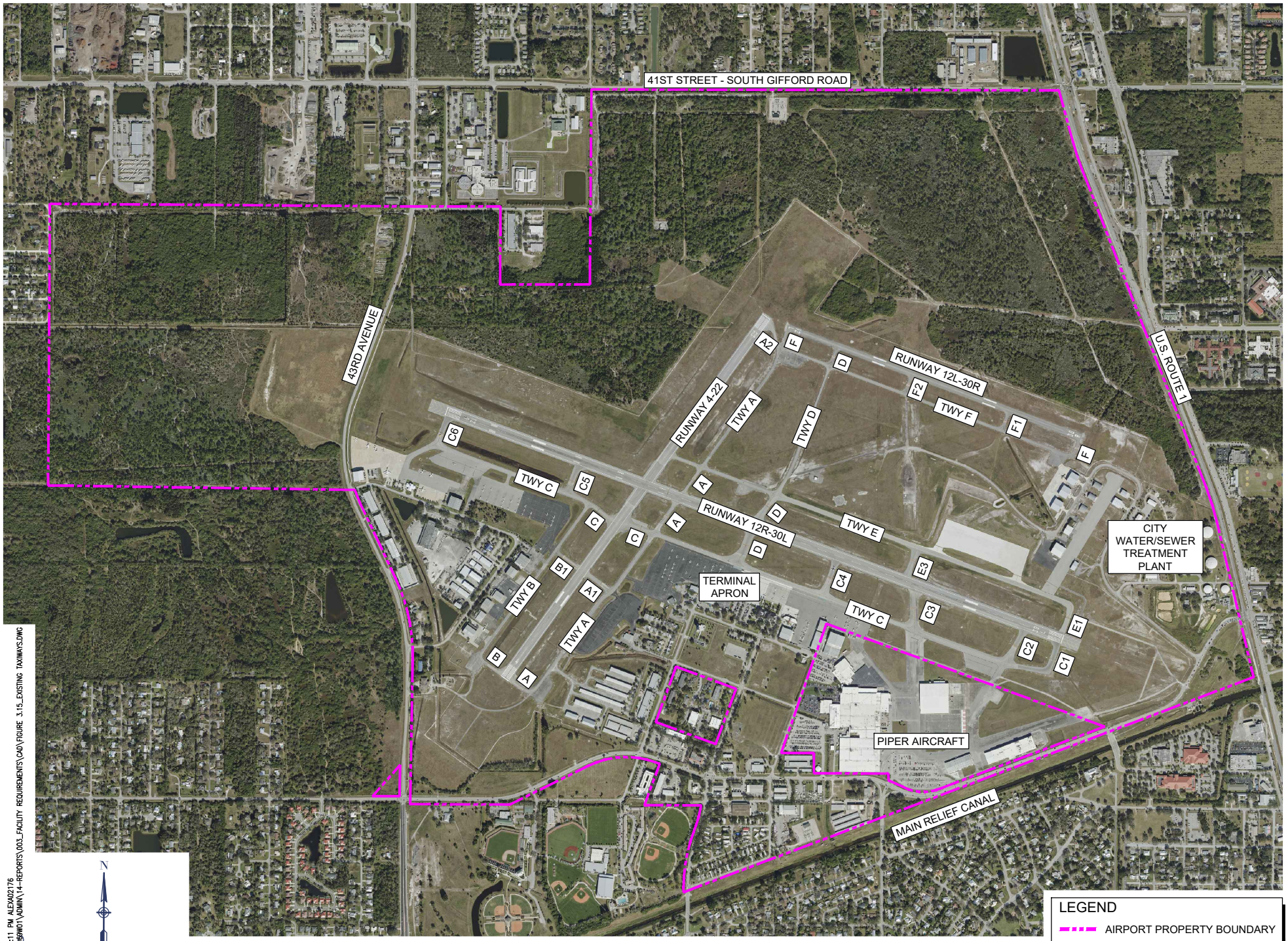
A two-box PAPI system is on the left side of both ends of the runway. Both PAPI systems are incandescent. In future lighting projects, it is recommended to upgrade both sets of PAPIs to LED when they reach the end of their useful life.

3.10. Taxiway Requirements

Taxiway facilities at an airport are established to enhance the safety and operational efficiency of the airfield. Taxiways minimize runway occupancy time by promoting quick entry and exit from the runway, as well as movement between terminal and hangar areas. Taxiways also provide access to and from the runways to terminal areas and aprons. Taxiways are located within the movement area on the airfield, which is under air traffic control when the ATCT is open from 7 a.m. to 9 p.m. daily. Taxilanes provide access from taxiways to aircraft parking and other terminal areas. The taxi speeds on a taxilane are generally no more than 15 miles per hour. Taxilanes are typically located in the nonmovement area outside air traffic control, but if the tower can see, the area controllers may offer guidance.

There are various types of taxiways and taxilanes that make up a taxiway system, including full-length parallel, partial parallel, entrance/exit, connector, bypass, and crossfield taxiways and apron edge and hangar taxilanes. Run-up areas are typically adjacent to a taxiway outside the taxiway object free area (TOFA). FAA AC 150/5300-13B recommends providing engine run-up areas for performing engine ground run-ups and requires locating them to minimize the exposure of engine exhaust in areas of public congregation and areas outside the air operations area (AOA). **Figure 3.15** depicts the existing taxiways at VRB.

Design standards vary for taxiways versus taxilanes and the sizes of critical aircraft using them. Similar to runways, safety and object free surfaces surround the taxiways and taxilanes to enhance the safety of aircraft movements. These surfaces include taxiway safety area (TSA), TOFA, and taxilane object free area (TLOFA).



LEGEND

AIRPORT PROPERTY BOUNDARY

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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OCT 12, 2023 7:11 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.15_EXISTING TAXIWAYS.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

EXISTING TAXIWAYS

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 3.15

The TSA, TOFA, and the taxiway to taxiway/taxilane or fixed or movable objects are based on the ARC of the critical aircraft for the surface.

The taxiway pavement, shoulder width, and edge safety margin are based on the TDG, which is discussed below.

Table 3.9 summarizes the taxiway and taxilane design standards based on the critical aircraft of each runway. Taxiways that serve more than one runway should be designed for the largest critical aircraft of either runway. If a hangar area only serves A/B-I small aircraft, it can be designed to those standards. If a taxiway serves a hangar area for aircraft larger than the runway it serves, the TDG may need to be larger.

TABLE 3.9: STANDARD TAXIWAY AND TAXILANE REQUIREMENTS PER RUNWAY

Runway (ARC)	Runway to Taxiway Separation	Taxiway Safety Area (TSA)	Taxilane Object Free Area (TLOFA)	Taxiway Object Free Area (TOFA)	Taxiway Centerline to Fixed or Movable Object	Taxilane Centerline to Fixed or Movable Object
Runway 12R/30L (Ex.: C-III; Fut.: D-III)	400’	118’	158’	171’	85.5’	79’
Runway 4/22 (Ex. and Fut.: D-II)	300’ 400’ – lower than 3/4 mile	79’	110’	124’	62’	55’
Runway 12L/30R (Ex. and Fut.: B-II Small)	240’ 300’ – lower than 3/4 mile	79’	110’	124’	62’	55’

Source: FAA AC 150/5300-13B, dated March 31, 2022.

Notes: Ex.: Existing; Fut.: Future

Taxiway Design Groups

The FAA uses a taxiway design methodology that focuses on taxiway geometry by determining the proper turning radii and taxiway fillet geometry. This methodology is known as the TDG and is used to minimize excess taxiway pavement and increase pilot situational awareness. Taxiways and taxilanes are designed to enhance safety by avoiding runway incursions. The design standards for taxiways are for “cockpit over centerline” taxiing, with pavement wide enough to allow a certain amount of wander. This wander limit is known as the taxiway edge safety margin (TESM) and is measured from the outside of the aircraft’s main gear to the edge of the taxiway pavement. Each aircraft is categorized in a TDG, which considers the main gear width (MGW) and cockpit to main gear length (CMG). The existing and future TDG associated with each runway is summarized in **Table 3.10**.

TABLE 3.10: SUMMARY OF TDG PER RUNWAY

Runway	Taxiway Design Group (TDG)	
	Existing	Future
Runway 12R/30L	TDG 3	
Runway 4/22	TDG 2A	
Runway 12L/30R	TDG 2A	

Source: VRB Airport Master Plan: Forecast Chapter, prepared by ESA, 2023.

Taxiway Designations

FAA AC 150/5340-18G: Standards for Airport Sign Systems recommends using guidelines and standards for designating taxiways. For a runway with a parallel taxiway, alphanumeric designators are used at the entrance and exit taxiways at the ends of and along the runway. Apply an increasing, sequentially numbered pattern from one runway end to the other, such as A1, A2, …, A5.[7] Taxiways that do not conform to these standards are not required to be updated until an airport signage plan, an airport layout plan, or a future development occurs. At the time of this airport master plan, four taxiway end connectors at runways 4 (both sides) and 12L/30R at VRB do not have alphanumeric designations and should be updated with the next associated taxiway project. **Figure 3.16** indicates the taxiway redesignations recommended at VRB.

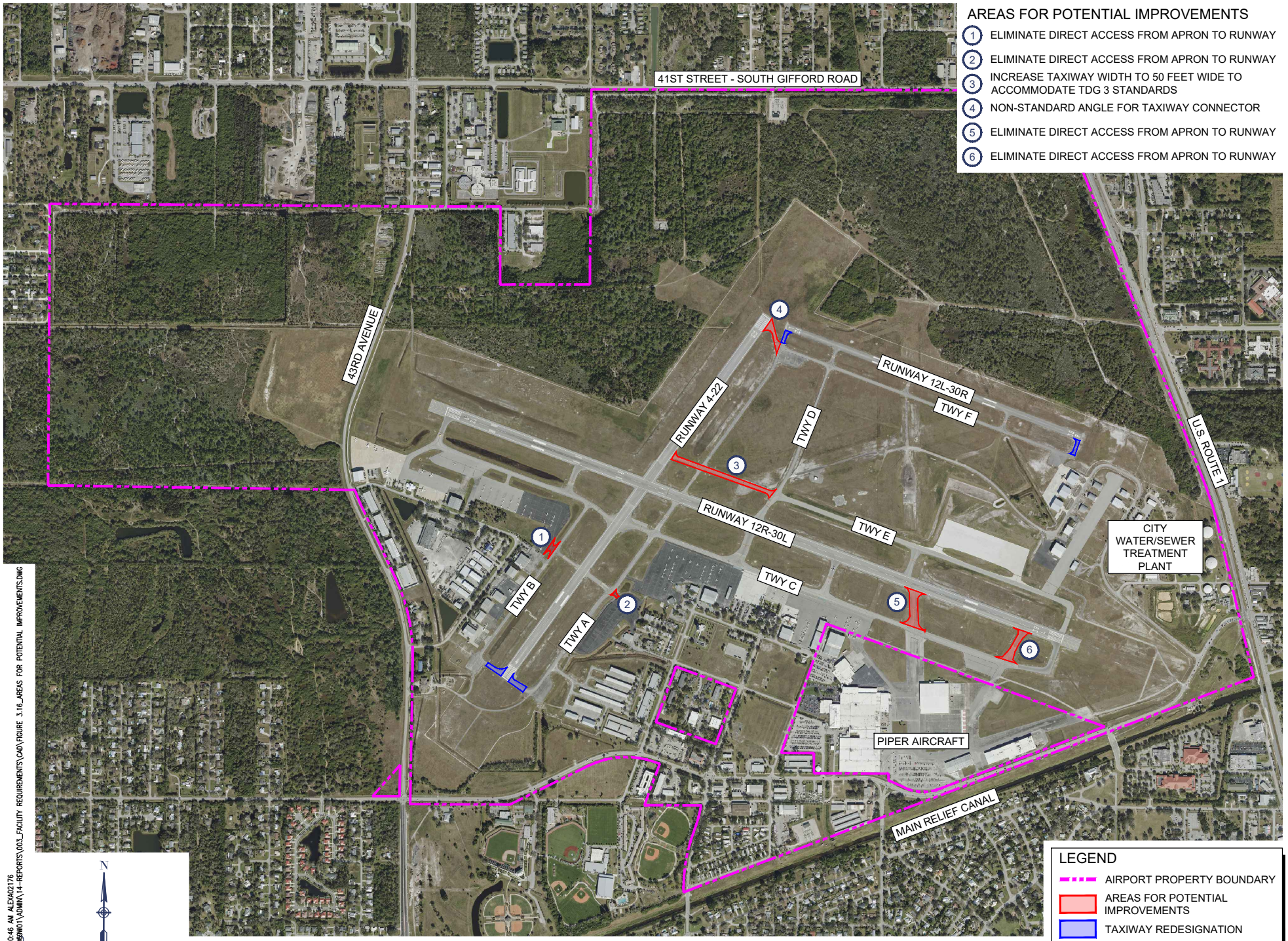
Taxiway Areas Previously Identified for Potential Improvements

Appendix J in FAA AC 150/5300-13B provides guidance to help prevent runway incursions and meet airfield design standards. Areas that should be analyzed include direct apron-to-runway access, wide expanses of pavement at runway-taxiway intersections, an entrance taxiway intersecting a runway not at a right angle, and a wide expanse of holding bay pavement. The taxiways previously identified for improvements at VRB include A1 (direct connection), B1 (direct connection; improvement project in progress), C2 (not 90 degrees), C3 (direct connection and not 90 degrees), A at the end of Runway 22 (not 90 degrees), and widening E 50 feet from D to Runway 4/22. As shown on **Figure 3.16**, these areas should be addressed when projects adjacent to the identified areas are completed.

FAA Hot Spots

A hot spot is a location on an airport movement area where heightened attention by pilots and drivers is necessary[8]. The FAA identifies these hot spots on airport diagrams. These airport diagrams assist pilots in planning for the safest taxi path possible, especially at an airport they may not be familiar with. The ways to improve hot spots should be addressed, as feasible, when construction in the area is contemplated. As depicted on **Figure 3.17**, VRB has one FAA hot spot at the intersection of Runway 4/22 and Taxiway C. Taxiway C has different separation distances from Runway 12R/30L on each side of Runway 4/22. Alternatives to straighten Taxiway C where it crosses Runway 4/22 should be considered. The addition of runway guard lights, flashing lights at the runway hold line, can be used to increase pilot situational awareness and should be considered for this area.

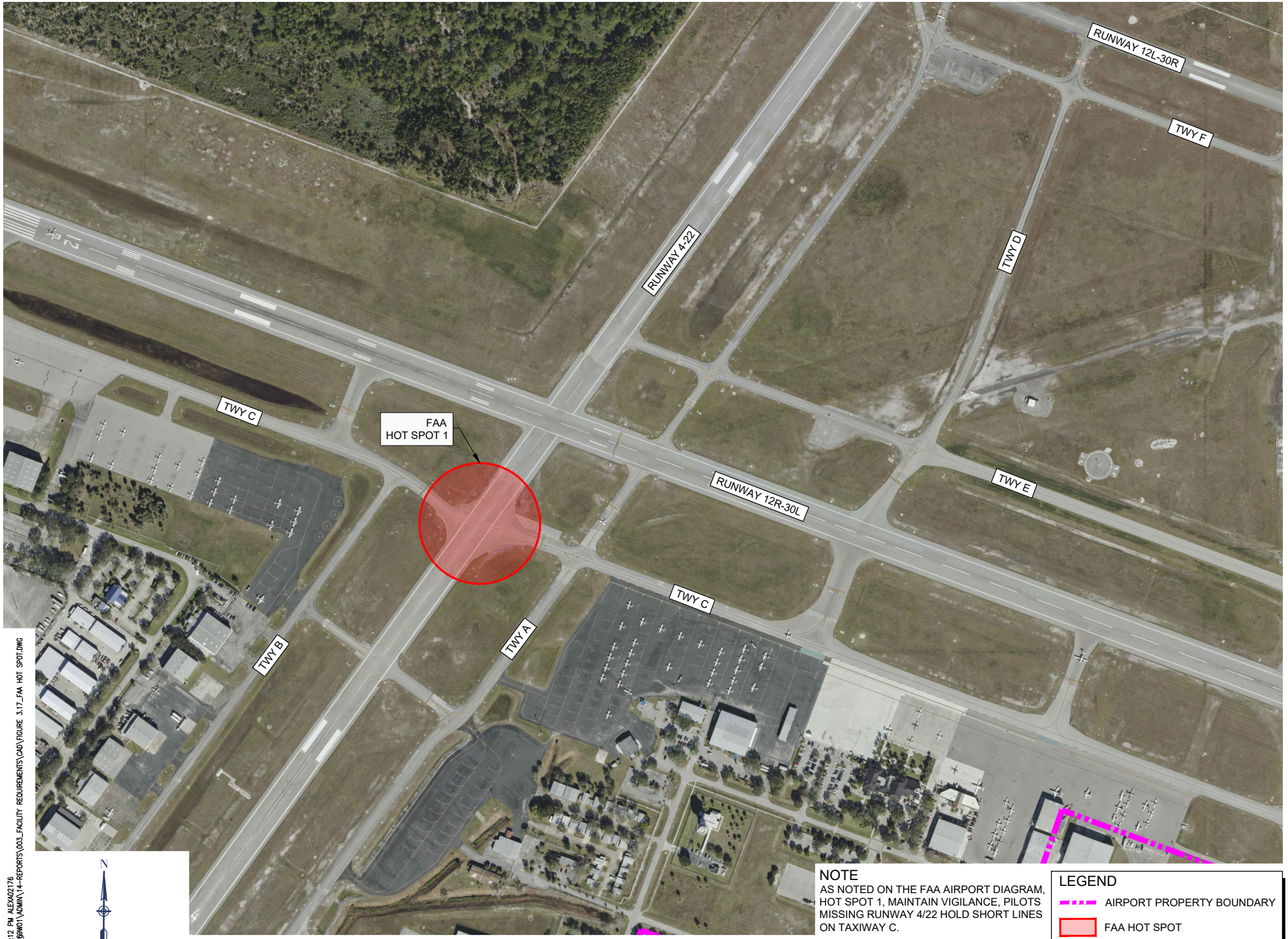
[7] FAA AC 150/5340-18G, dated December 23, 2020.
[8] FAA, Hot Spot Standardized Symbology, Hot Spot Standardized Symbology | Federal Aviation Administration (faa.gov), accessed March 28, 2023.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

NOV 20, 2023 10:46 AM ALEXA02176
I:\20JOBS\20A00860W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.16_AREAS FOR POTENTIAL IMPROVEMENTS.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	AREAS FOR POTENTIAL IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ FIGURE 3.16



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NOTE
AS NOTED ON THE FAA AIRPORT DIAGRAM, HOT SPOT 1, MAINTAIN VIGILANCE, PILOTS MISSING RUNWAY 4/22 HOLD SHORT LINES ON TAXIWAY C.

LEGEND
AIRPORT PROPERTY BOUNDARY
FAA HOT SPOT

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023; FAA Hot Spot, Federal Aviation Administration, October 2023.

VERO BEACH REGIONAL AIRPORT
MASTER PLAN

FAA HOT SPOT

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 3.17

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I:\20JOBS\20A0089W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.17_FAA HOT SPOT.DWG

Taxiways

A summary of the design standards for each taxiway is shown in **Table 3.11**. Only a portion of Taxiway E does not meet the width required for the TDG and needs to be considered for improvements. Other taxiway geometric improvements should also be considered, as detailed in the following sections.

TABLE 3.11: SUMMARY OF INDIVIDUAL TAXIWAYS DESIGN STANDARDS

Taxiway	Existing Width (feet)	Existing TDG	Meets FAA Standards
A	35'/50'	2B/3	Yes
A1	50'	3/4	Yes
A2	35'	2A/2B	Yes
B	35'	2A/2B	Yes
B1	35'	2A/2B	Yes
C	50'	3/4	Yes
C1	75'	5/6	Yes
C2	75'	5/6	Yes
C3	75'	5/6	Yes
C4	70'	3/4	Yes
C5	60'	3/4	Yes
C6	60'	3/4	Yes
D	35'/75'	2B/6	Yes
E	40'	2A/2B	No
F	35'	2A/2B	Yes
F1	35'	2A/2B	Yes
F2	35'	2A/2B	Yes

Source: VRB Airport Layout Plan prepared by Ricondo, 2016.

Taxiway A

Taxiway A is a full-length parallel taxiway on the east side of Runway 4/22. Taxiway A north of Runway 12R/30L is 35 feet wide and south of Runway 12R/30L is 50 feet wide, which meet TDG 2A standards. The Runway 4/22 and Taxiway A separation varies at 350 feet and 400 feet, which meets ADG-II standards of at least 300 feet for ADG II with visibility minimums not lower than 3/4 of a mile. To straighten Taxiway A, the adjacent apron would require modification, which will be considered in the alternatives analysis.

Including the two end connectors, starting from the Runway 4 end, Taxiway A has five connectors: A, A1, C, E, and A2. At the time of this airport master plan, the end connector on the Runway 4 end is designated as A. To comply with FAA standards, an alphanumeric designator should be added to this end connector. A1 and A2 should be redesignated, as needed. A1 provides direct apron-to-runway access and is not consistent with FAA guidelines. To eliminate this, a portion of A1 should be relocated. Per FAA AC 150/5300-13B, Appendix J, A2 on the Runway 22 end does not intersect the runway at a right angle. The acute angle reduces the pilot's vision, and the taxiway geometry increases the width of the pavement. FAA standards for taxiway connectors that are not high-speed exits should be at 90-degree angles. Therefore, alternatives to reconfigure Taxiway A2 should be considered. There is an engine run-up area at the south end of Taxiway A. When landing on Runway 4, taxiways C and E are at least 2,000 feet from the runway end and can serve as exit taxiways for smaller aircraft. When landing on Runway 22, taxiways C and A1 can serve as exit taxiways. The quicker an aircraft can exit a runway, the higher the runway capacity.

Taxiway B

Taxiway B is a partial parallel taxiway on the west side of Runway 4/22. The taxiway starts on the Runway 4 end and extends north to Taxiway C. Taxiway B is 35 feet wide and meets TDG 2A standards. It has a 375-foot taxiway centerline to the Runway 4/22 centerline separation, which meets ADG-II standards of at least 300 feet for ADG II with visibility minimums not lower than 3/4 of a mile. The location of Taxiway B is constrained by the adjacent development. The chart supplement for VRB indicates the use of Taxiway B for any aircraft with a wingspan larger than 79 feet is at the pilot's discretion.

There are three taxiway connectors: B, B1, and C. The entrance taxiway on the Runway 4 end is designated as Taxiway B. To comply with FAA standards, an alphanumeric designator should be added to this end connector. Taxiway B1 provides direct apron-to-runway access. Taxiway B1 or the stub connector between Taxiway B and the west ramp should be realigned to eliminate direct access, per FAA design standards. VRB has developable areas west of Runway 4/22, so extending Taxiway B the full length of Runway 4/22 should be considered. There is a run-up area at the south end of Taxiway B. When landing on Runway 4, Taxiway E is at least 2,000 feet from the runway end and can serve as an exit taxiway for smaller aircraft. When landing on Runway 22, taxiways C and B1 can serve as exit taxiways. The quicker an aircraft can exit a runway, the higher the runway capacity.

Taxiway C

Taxiway C is a full-length parallel on the south side of Runway 12R/30L. Taxiway C is 50 feet wide and meets TDG 3 standards. The Runway 4/22 and Taxiway A separation varies at 400 feet to 475 feet, which meets ADG-III standards of at least 400 feet. Consideration should be given to straightening Taxiway C with 400 feet of separation to eliminate the transition where it crosses Runway 4/22, an identified FAA hot spot. This would also open an additional 75 feet for the apron area south of Taxiway C.

There are eight taxiway connectors. Starting from the Runway 30L end, they are C1, C2, C3, C4, D, A, C5, and C6. C3 provides direct apron access from Piper Aircraft to Runway 12R/30L. Alternatives should be evaluated to eliminate the direct apron-to-runway access. The updated FAA taxiway design standards in FAA AC 150/5300-13B recommend rounding the corners of end taxiways to assist pilots in distinguishing between the runway and taxiway pavement. When Taxiway C is rehabilitated in the future, rounding the end should be considered.

Taxiway C2 can serve as a bypass taxiway to allow departures if an aircraft is on C1, waiting for an IFR flight plan clearance. However, Taxiway C2 does not connect with Runway 30L at a 90-degree angle and provides direct runway-to-apron access with Piper Aircraft. Alternatives should be evaluated to eliminate the direct apron-to-runway access while maintaining a bypass taxiway. Adding a taxiway connector on the Runway 12L end that can serve as a bypass taxiway should also be considered. There are engine run-up areas at both ends of Taxiway C.

Taxiway D

Taxiway D provides crossfield access from the Skyborne apron south of Runway 12R/30L to runways 12L, 30R, and 22 on the north side of the airfield. The portion of Taxiway D between Taxiway C and Runway 12R/30L is 75 feet wide and Taxiway D north of Runway 12R/30L is 35 feet wide, which meet TDG 2A standards. Because the portion north of Runway 12R/30L is used primarily to provide access to Runway 12L/30, which is designed for small aircraft only, the width of Taxiway D in this area is sufficient.

Taxiway E

Taxiway E is a partial parallel taxiway north of Runway 12R/30L. Taxiway E east of Taxiway D to the Runway 30L end is 50 feet wide. Taxiway E has lease separations preserving ADG-IV TLOFA. There are four taxiway connectors. Starting from the Runway 30L end, they are: E1, E3, D, and A. Taxiway E west of Taxiway D to Runway 4/22 is 40 feet wide. This portion of Taxiway E should be widened to 50 feet to serve TDG 3 aircraft. There is a compass calibration pad within the ROFA south of Taxiway E between taxiways D and A. Relocation of the compass calibration pad should be planned.

VRB has developable areas north of Runway 12R/30L, so extending Taxiway E the full length of Runway 12R/30L should be considered. Any extension of Taxiway E should be able to serve ADG III and TDG 3 aircraft.

Taxiway F

Taxiway F is a full-length parallel taxiway on the south side of Runway 12L/30R. The taxiway is 35 feet wide and meets TDG 2A standards. There is 240 feet of separation between Runway 12L/30R and Taxiway F, meeting ADG II standards with visual approaches. The chart supplement for VRB indicates use of Taxiway F for any aircraft with a wingspan larger than 79 feet is at the pilot's discretion.

There are five connectors: F, F1, F2, D, and A. At the time of the airport master plan, the Runway 30R end connector is designated as Taxiway F. To comply with FAA standards, an alphanumeric designator should be added to this end connector. F1 and F2 should be redesignated, as needed. There is an engine run-up area on each end of Taxiway F.

In summary, the following taxiway improvements should be evaluated in the alternatives analysis:

- Redesignate four taxiway end connectors (A and B on the Runway 4 end, A on Runway 22 and F on Runway 12L/30R).
- Eliminate direct apron-to-runway connections at A1, B1, C2, and C3.
- Realign Taxiway A2 at Runway 22, Taxiway C2, and Taxiway C3 to be perpendicular to the runway.
- Widen Taxiway E to 50 feet, from Taxiway D to Runway 4/22.
- Add a bypass taxiway at the Runway 12R end.
- Realign Taxiway C to a 400-foot runway centerline to taxiway centerline separation from Taxiway B to the end of Runway 30L.
- Extend Taxiway B to a full-length parallel taxiway.
- Extend Taxiway E to a full-length parallel taxiway.

3.11. Airfield Facilities

Airport Traffic Control Tower

The ATCT was relocated to the southeast corner of Cherokee Drive and Flight Safety Drive in 2003. This location was selected to provide better visibility by minimizing tower controllers looking into the sun. An ATCT needs a clear line of sight to all movement areas in the airfield, including runways and taxiways. During the inventory site visit and tenant interviews, the tower staff indicated no line of sight issues. A detailed ATCT siting study was conducted before the existing ATCT was constructed. Therefore, it is important that all planning for future airport facilities protect the ATCT's clear line of sight to all airfield movement areas.

Electrical Vault

At the time of this airport master plan, the airfield electrical vault is considered to be an adequate size and in good condition, including the equipment that controls the airfield systems. However, due to normal use, replacements and/or upgrades to equipment will be needed over the 20-year planning horizon. Electrical upgrades to existing equipment should be considered as part of any future airfield lighting, signage, or navigational aid projects and at the end of their useful life.

Navaids and Weather Equipment

At the time of this master plan, VRB was equipped with a rotating beacon, ASOS, and wind cones.

Rotating Beacon

The rotating beacon is north of Runway 12L/30R in the northeast quadrant of the airport. The equipment is accessed by a private dirt road available to airport staff and is surrounded by dense vegetation, which makes it difficult to maintain. Therefore, other locations should be evaluated during the alternatives analysis. Any beacon location considered needs to avoid the beacon shining into the ATCT cab.

ASOS

The ASOS is approximately 20 years old and is owned by the National Weather Service. The equipment is in the midfield area, adjacent to Taxiway E. Because of the location of the ASOS and the height restrictions associated with its siting, future midfield development is limited. To alleviate the siting restrictions in this area and expand the area available for development, relocating the ASOS is desired. Other locations for the ASOS should be considered in the alternatives analysis.

Wind Cones

A segmented circle and primary wind cone are in the midfield area, adjacent to Taxiway E. Supplemental wind cones are on the left side of each runway end. At the time of this master plan, all the supplemental wind cones are operational, except for the wind cone near the Runway 22 end. This supplemental wind cone must be replaced and should be coordinated with the Runway 22 end alternatives.

Compass Calibration Pad

The compass calibration pad is on the south side of Taxiway E and west of Taxiway D within the ROFA. It should be relocated outside of the ROFA. A compass calibration pad needs to be located away from materials that could create magnetic interference. The alternatives analysis will consider options to relocate the compass calibration page, per the FAA AC 150/5300-13B guidance that the center of the pad should be located[9]:

- a minimum of 600 feet from magnetic objects, e.g., parking lots, busy roads, railroad tracks, high voltage electrical transmission lines, or cables carrying direct current
- a minimum of 300 feet from buildings, fuel lines, and electrical or communication cable conduits, if they contain magnetic materials
- a minimum of 150 feet from runway and taxiway light bases, airfield signs, ducts, and grates for drainage, if they contain iron, steel, or ferrous materials
- clear of any critical area for electronic navaid facilities
- not penetrate the OFZ, safety areas, OFAs, etc.

3.12. Advanced Air Mobility

There has been a strong interest in the Florida market from operators of advanced air mobility (AAM) aircraft and vertiport developers. At the time of this airport master plan, VRB has a developer interested in building a vertiport at VRB. Therefore, the alternatives analysis should consider how AAM and a vertiport can be accommodating at VRB. *FAA Engineering Brief 105: Vertiport Design* provides guidance until the FAA releases an advisory circular.

3.13. Commercial Service Facilities

The requirements for commercial service facilities were based on the continued development of passenger service at VRB, meetings with airport management, site visits, and guidance in *FAA AC 150/5360-13A: Airport Terminal Planning*. The following sections outline the different factors considered, along with the associated assumptions, to derive the requirements for the basic functional areas of the commercial service facilities.

Development of Passenger Service

The activity forecasts in Chapter 2 projected the level of air carrier operations and passenger enplanements expected through 2043, including potential high- and low-growth scenarios. These projections included the need to accommodate up to 55,500 enplanements and were based on the initial seven-month schedule from Breeze Airways when the forecasts were prepared. The schedules included flights using the airline's 118-seat Embraer ERJ-195 and 126-seat Airbus 220-300. Since then, operational and passenger data from Breeze became available, including flight schedules through the end of 2023. Additionally, Breeze has also reconfigured some of its Airbus 220-300 aircraft with 137 seats. Thus far, the passenger service activity has met or exceeded expectations, with no flight cancellations and a higher-than-expected average passenger flight load. This resulted in VRB recording 21,104 annual enplanements between February and August 2023, the first seven months of operations for Breeze. This study's activity forecasts projected 20,300 enplanements for that period.

[9] FAA AC 150/5300-13B, dated March 31, 2022

During the inaugural months of operations in 2023, Breeze Airways did not offer service at VRB every day, and the schedule was limited to two flights per day (one in the morning and one in the afternoon). Between June and September 2023, there were no flights scheduled for Tuesdays and Wednesdays. Based on the latest published schedules from Breeze Airways, beginning in October 2023, two flights will be conducted every day. In November 2023 and running through the end of the year, a third flight is scheduled every Sunday, Tuesday, and Thursday, resulting in 17 flights per week. On the days with three flights, initially there are two flights in the morning and one in the afternoon. This shifts halfway through November to one flight in the morning and two in the afternoon for the rest of the year. No 2024 schedules were available at the time of this analysis.

Air Carrier Operations

Typically, due to the uncertainties associated with long-term activity forecasting, PALs are established to represent future points at which different facility improvements would be required. For commercial service facilities, PALs are usually based on passenger enplanement thresholds and, for some analyses, peak-hour enplanements. This demand-based approach allows certain improvements to correlate to when the future PAL is reached, rather than a set point in time.

A peaking analysis for the passenger service operations was not included in the activity forecasts chapter because there was no data.

In June 2023, the city passed a resolution to formalize the method that rates and charges were applied to any commercial airline operating at VRB. Within the resolution, block times were created for each air carrier operation. These were established due to the limited size and capacity of the terminal building with respect to life-safety requirements, as well as Transportation Security Administration (TSA) screening capability. At the airport director's discretion, the block times set two hours before and one hour after each flight to prevent the overcrowding of facilities with overlapping flights and to accommodate delays.

Given the circumstances at VRB, establishing PALs based on passenger enplanements does not provide much value. For example, under the current practices, the commercial terminal facilities could accommodate four flights a day (two in the morning and two in the afternoon) to include the block time before and after each flight. In theory, if the 126-seat Airbus 220-300 configuration operated by Breeze Airways was scheduled for each of the four daily flights and the average 80% percent load factor from the activity forecasts applied, VRB could realize nearly 142,000 annual enplanements. This is 2 1/2 times the passenger enplanements projected for 2043 and 60% more than the high-growth scenario envisioned. Therefore, in lieu of PALs, the commercial service facilities for VRB are more dependent on the number of overlapping or simultaneous flights, as well as the desire to continuously improve the overall passenger level of service. For some of the terminal building areas, this was evident during the few occasions when a departure delay resulted in an overlap of two flights. During these conditions, the problems experienced were primarily due to the limited space in the secure passenger holdroom but also in other areas, such as the outbound baggage screening and make-up areas.

Terminal Building Requirements

As described in FAA AC 150/5360-13A, master plans usually only include basic information, which can be applied to a more detailed terminal planning process when needed. Given the unique characteristics of the passenger service activity at VRB, requirements for the terminal building were based on a high-level evaluation of the space required to increase the level of passenger service, as well as the potential to accommodate more than one flight simultaneously. The functional elements of the terminal building have been grouped into those needed for the

departing and arriving passenger functions. **Table 3.12** provides details on these functional elements, as well as the improvements being designed for construction in 2024 to improve the level of service.

TABLE 3.12: EXISTING AND SHORT-TERM TERMINAL BUILDING FACILITIES

	Existing		After 2024 Improvements	
Departing Passengers				
Check-In Counters	66 SF	2 positions	66 SF	
Check-In Queuing	344 SF	1 queue	576 SF	Relocates rental cars
Outbound Baggage Screening and Make-Up	343 SF	1 EDS machine Bag make-up outside	343 SF	
Passenger Security Screening Equipment	446 SF	1 TSA lane	446 SF	
Passenger Security Screening and Queuing	745 SF	1 queue	745 SF	
Holdroom	1,742 SF	120 seats	2,223 SF	Additional 481 SF
Restrooms (secure side)	423 SF		423 SF	
Arriving Passengers				
Baggage Claim and Arrivals Lounge	0 SF	Bag claim outside	1,027 SF	Bag claim outside
Restrooms (nonsecure side)	0 SF		440 SF	
Rental Car Queuing	87 SF		65 SF	New rental car space
Rental Car Counter	145 SF		125 SF	New rental car space
TOTAL SPACE	**4,341 SF**		**6,479 SF**	

Notes: All areas have been estimated based on available drawings for past and future terminal improvements. EDS: explosive detection screening; SF: square feet.
Source: ESA, 2023 analysis.

As shown in Table 3.12, the improvements planned for 2024 will increase the passenger terminal facilities by 50% to achieve the goal of improving the level of passenger service.

Departing Passenger Spaces

The general spaces required for departing passenger services are summarized in the following sections. It should be noted that this high analysis does not include every space required, such as the areas for offices, storage, janitorial functions, and the mechanical and structural components of the building. These will be incorporated as part of the actual design.

Check-In Areas

The approximate processing time per passenger for a single, traditional check-in counter is between two and five minutes. This varies, based on whether the passenger needs full check-in services, just a boarding pass, or other assistance. As such, the two positions at VRB have the potential to check in up to 60 passengers per hour. The check-in counters open two hours before a flight's scheduled departure time. With a range of 126 to 137 seats on the Airbus 220-300, there is typically enough time to check in passengers, given that some passengers arrive two hours before their flight, the flights are not always full, and a certain number of passengers will check in online. Additional check-in capabilities should be considered to increase the level of service and would be required if processing passengers overlaps for more than one flight.

The queuing area for passengers checking in is limited to between the check-in counters and the rental car facilities in the terminal building lobby. This area is frequently congested before a flight, because the check-in counters are near the front doors of the terminal, the queuing line for the passenger security screening, and the general circulation to other areas of the terminal building. For lower-activity terminals, a general rule is to provide a queuing area 35 feet deep for at least the width of the check-in counter. For the two check-in positions at VRB, this would be approximately 400 square feet. As shown in Table 3.12, the area would increase from 344 to 576 square feet, providing more queuing space. This space should be at least 1,000 square feet to support four check-in positions (with lobby circulation) to process passengers of more than one flight with overlapping times.

Outbound Baggage Screening and Make-Up

The type of explosive detection screening (EDS) equipment at VRB can screen approximately 225 bags per hour. As such, the single unit is adequate for processing the 126- to 137-seat Airbus 220-300 flights, considering that not every passenger will check a bag. A second unit may be required if two flights have departure times within an hour of each other. In addition to a higher screening rate, a second EDS unit would provide redundancy to avoid hand inspections of each checked bag if the single unit went offline.

Once screened, outbound baggage is loaded onto airline carts for the departing aircraft. While this function begins inside the building, there is no dedicated outbound baggage make-up area. The airline carts are outside, in a secure area adjacent to the terminal. Ideally, the space at VRB should be doubled to enable a portion of the baggage make-up to occur inside the building prior to being loaded onto the carts. To accommodate overlapping flights, the overall space for outbound baggage screening and make-up would also need to double if a second EDS unit were added. The outside areas used by the carts will be significantly improved in 2024 to provide a wider paved path and a looped route, versus the current configuration of one way in and one way out.

Passenger Security Screening

The average throughput for the type of security screening at VRB is approximately 150 passengers per hour. As such, the single TSA passenger security screening lane is adequate to process the passengers and flight crews for the 126- to 137-seat Airbus 220-300 flights. However, a larger overall security screening area is desired to provide additional space for the TSA staff and their functions, as well as a higher level of passenger service. Given the processing rate of the TSA lane, a second lane would not be required, even for two flights departing within a short period of each other. However, the TSA and passenger screening areas should be increased approximately 50% to better accommodate two overlapping flights.

Holdroom

The holdroom area provides approximately 120 seats in just under 1,750 square feet of space. This area will be expanded by nearly 500 square feet as part of the 2024 improvements, which would provide additional space and seating. While certainly an improvement for the level of service, additional space would still be required to accommodate the passengers of two overlapping flights who have cleared security.

There are two common ways to calculate holdroom requirements. One is to apply a standard area based on the maximum aircraft size served. The approximate area used for narrow-body aircraft like the Airbus 220-300 is 2,500 square feet. The other is to estimate the demand based on the estimated gate requirements in the peak hour of operation. For planning purposes, up to 5,000 square feet should be planned to provide enough secure passenger holdroom space to accommodate all the passengers of two overlapping flights. Additionally, this area would account for the space required to expand the restroom facilities and provide concessions for passengers on the secure side of the terminal. Concessions not only improve the level of passenger service, they create an opportunity for increased revenue generation. Ultimately, airport management may work with a concessionaire to determine appropriate concessions based on the airport's passenger profile. At smaller terminals such as VRB, this typically would be a small shop or kiosk with grab-and-go types of food, beverages, and other sundries.

Arriving Passenger Spaces

The general spaces required for arriving passenger services are summarized in the following sections. As with the departing passenger areas, the following sections do not include an assessment of every space required, just the major functional areas.

Baggage Claim and Arrival Lounge

The baggage claim area is outside the terminal building. The airline carts pull up to an area where passengers who have exited the secure side of the commercial terminal facilities can retrieve their bags. This outside baggage claim area and the sidewalks between it and the terminal building will be improved as part of the 2024 terminal improvements. These will primarily consist of expanding and covering the areas for passengers.

Additionally, part of the building will be renovated during the 2024 improvements to provide inbound passengers with a dedicated arrivals lounge. This area will include approximately 1,000 square feet of nonsecure circulation space for arriving passengers and people meeting them. The renovations also include new restroom facilities and an area to relocate the rental car facilities, which are currently in the terminal building lobby.

While the new arrivals lounge space and its current features will increase the level of service for passengers, ultimately, the inbound terminal facilities need to incorporate the baggage claim area as part of the structure. For planning purposes, doubling the circulation space would enable a single baggage device to be integrated into the terminal facilities. Space to accommodate a second rental car company in the future should also be considered.

Summary of Terminal Building Requirements

Table 3.13 provides an overview of the space required for the different functional elements of the terminal building necessary to support overlapping flights with a high level of passenger service. As with the current terminal facilities, it is assumed that any future terminal improvements will meet local building codes, including Americans With Disabilities Act provisions. The 12,430 square feet of space identified is nearly twice as much as what will be available once the 2024 terminal improvements are complete. This space and the features required are addressed further in the alternatives analysis.

TABLE 3.13: TERMINAL BUILDING REQUIREMENTS TO SUPPORT OVERLAPPING FLIGHTS

	Space and Features Required	
Departing Passengers		
Check-In Counters	150 SF	4 positions
Check-In Queuing	1,000 SF	2 queues
Outbound Baggage Screening and Make-Up	1,500 SF	2 EDS machines Bag make-up inside
Passenger Security Screening Equipment	700 SF	1 TSA lane with more space
Passenger Security Screening and Queuing	1,200 SF	1 queue with more space
Holdroom	5,000 SF	For 2 aircraft departures
Restrooms (secure side)	0 SF	Included with holdroom
Arriving Passengers		
Baggage Claim and Arrivals Lounge	2,000 SF	Bag claim inside
Restrooms (nonsecure side)	500 SF	
Rental Car Queuing	130 SF	2 rental car companies
Rental Car Counter	250 SF	2 rental car companies
TOTAL SPACE	**12,430 SF**	

Source: ESA, 2023 analysis.

Airside Facilities for Commercial Aircraft

Runway 12R/30L and parallel Taxiway C are designed to accommodate a majority of the passenger airline narrow-body fleet, including the Embraer ERJ-195 and Airbus 220-300 aircraft operated by Breeze Airways. Therefore, only the number of aircraft parking positions is addressed for the airside facilities necessary to support commercial aircraft operations.

During the preparation of this master plan, a second aircraft parking position was delineated on the commercial service hardstand apron immediately northwest of the terminal building. The parking positions can simultaneously accommodate two of the larger Airbus 220-300 aircraft. As such, no additional parking positions are required to accommodate the activity projected.

3.14. General Aviation Facilities

VRB, with more than 200 based aircraft and annual operations exceeding 133,000, supports a variety of GA traffic. Based on the historical activity and projected growth in the forecast chapter, there is a high demand for aeronautical development, including a hangar waiting list for 90 aircraft.

The flight schools have 75 aircraft based at VRB. Their single-engine aircraft are tied down on the apron within their leasehold when not in use. Therefore, they were omitted from the GA future facility development calculations. Hangar capacity at VRB is 100%. Almost all based aircraft, except for the single-engine aircraft used by the flight schools, are or are desired to be stored in hangars. Therefore, the GA facility development calculations are based on the assumption that all future based aircraft will require hangar storage. The following section provides additional information on the calculations used to determine the future GA development.

Aircraft Hangar Requirements

There are various types and sizes of hangars at VRB to support the high aeronautical demand. These hangars include small and medium T-hangars, executive hangars, and large corporate hangars. At the time of this airport master plan, VRB has multiple private hangar developments in process that will provide 32 T-hangars, 10 small box hangars, three medium to large hangars totaling approximately 54,800 square feet and six large box hangars totaling 86,500 square feet. These ongoing projects will be included to help meet the GA facility demand over the planning period but fall short of addressing the full forecasted demand. Future alternative concepts will depict areas to be reserved for T-hangars, small box hangars, and large box hangars for flexibility to meet the forecasted demand, based on the hangar square footage required to meet the demand, as shown in **Table 3.14**.

To project the future hangar needs, the total future based aircraft exceeding flight school aircraft were identified. The flight school aircraft were assumed to grow by 10% during the 20-year forecast period. These future based aircraft were then identified by size, based on the aviation forecasts. There are some aircraft on the VRB basedaircraft.com list that are registered at other airports or at Piper. These were excluded from the future GA facility development requirements. After identifying the total future needs, the existing hangar facilities were subtracted to identify the number of new hangar facilities needed. For planning purposes, it was assumed that the single-engine aircraft would require T-hangar space and larger aircraft would be housed in box hangars. To project the future square footage for box hangars, 3,000 square feet was used for multiengine aircraft, based on the King Air 200 as a representative multiengine aircraft. Using the Dassault Falcon as a representative aircraft, 7,100 square feet was used for jets, and 2,000 square feet was used for helicopters.

As depicted in Table 3.14, an additional 68 hangars for single-engine aircraft, 45,000 square feet of multiengine hangars, 184,600 square feet of jet hangars and 18,000 square feet for helicopters will be required during the planning period. These are the total future needs. The private hangar development in process will be considered in the alternatives analysis when identifying options to meet these future hangar needs at VRB. These hangar facilities should be implemented to align with the PALs.

TABLE 3.14: SUMMARY OF FUTURE GA HANGAR FACILITY DEVELOPMENT

	Based Aircraft		
Total 2022	216		
Skyborne Airline Academy	44		
Paris Air	31		
2022 Total Aircraft in Hangars	**141**		
Total 2043	334		
Skyborne Airline Academy	52		
Paris Air	37		
2043 Total Aircraft in Hangars	**245**		
	Number of Aircraft		
Aircraft Type	**2022**	**2043**	**Net Difference**
Single-Engine	70	138	68
Multiengine	38	53	15
Jet	16	42	26
Helicopter	3	12	9
Aircraft Registered at Another Airport	10	10	0
Aircraft at Piper	4	4	0
2043 Future Hangar Needs			
T-Hangars (Single-Engine)	Total Units to Meet Future Demand		68 units
Small Box Hangar (Multiengine)	Additional Multiengine Aircraft Square Footage		15 aircraft 45,000 SF
Large Box Hangars (Jets)	Additional Jet Aircraft Square Footage		26 aircraft 184,600 SF
Box Hangar (Helicopter)	Additional Helicopters Square Footage		9 Helicopters 18,000 SF

Aircraft Parking Aprons

Except for the commercial service parking positions, the apron facilities at VRB are within tenant leaseholds. During the inventory process, no tenants identified the need for additional apron area for regular operations. During special events and around the winter holidays, there are times when additional aircraft parking areas are needed. At these times, the airport has identified overflow areas, including the engine run-up pads and some paved areas along taxiways. As described in the RVZ section, the other facility need is to minimize aircraft parking within the RVZ when the tower is closed, which will be addressed as part of the alternatives analysis.

3.15. Other Airport Support Facilities

Aircraft Rescue and Firefighting

Fire Station No. 3 is on the southwest side of the airport, adjacent to 43rd Avenue near the Runway 4 end. With the start of commercial service operations, VRB upgraded to an ARFF Index B, which includes air carrier aircraft at least 90 to 126 feet long. VRB has three vehicles, including the recently acquired 1993 Oshkosh T-1500. VRB meets the FAA ARFF requirements of a three-minute response time to the midpoint of the furthest commercial service runway. Therefore, the ARFF station meets FAA requirements, and no changes are needed. Based on the aviation forecast, no change in ARFF index is anticipated during the planning period.

There is a need to redevelop the ARFF road due to unsuitable grades and excessive bank angles. Therefore, evaluating modifications to the ARFF road should be considered during the alternatives analysis.

Airport Operations Facility

The airport operations facility was completed in 2014. The building is approximately 8,000 square feet and accessed via a security gate south of the west industrial area off Flight Safety Drive. This facility stores large vehicles, mowers, and equipment owned by the airport. Automobile parking is on the east side of the building and includes 10 standard spaces. At the time of this master plan, additional storage space for airport operations equipment is needed. The alternatives analysis will consider opportunities to reserve space to expand the airport operations facility.

Fuel Farms

There are seven active fuel farms, including two self-serve fuel farms, at VRB. The fuel farms provide a fuel capacity of 65,000 gallons of Jet A, 49,000 gallons of 100LL, 500 gallons of autogas, and 500 gallons of diesel. There are three fuel farms on the west ramp, operated by Corporate Air, Paris Air, and Continental Jet. Three of the remaining four fuel farms are near the terminal area. These fuel farms are operated by Sun Aviation and Skyborne. One fuel farm is just outside the AOA at the corner of Cherokee Drive and Piper Drive and provides a driveway for tractor trailer access. Davis Development on the north ramp also has a fuel system for its operations. At the time of this airport master plan, the fuel farms are in good working condition and meet airport needs. All the fuel farms are operated by private entities. No requests to reserve additional areas for fuel farms were received from these tenants during the inventory process.

Alternate Fuel Systems

With increasing technology, electric aircraft continue to make advancements in the aviation industry. During the alternatives analysis, available space should be protected to provide charging stations for electric aircraft within the existing airfield and consider other opportunities to accommodate electric aircraft that support the aviation industry's AAM initiative. Hydrogen power for aircraft is also under development. This may require future storage for hydrogen for fueling aircraft.

Perimeter Fence and Security Access Gates

Perimeter fencing and security updates were completed in late 2019. The 52 security gates on VRB are shown on **Figure 3.18**. The 2019 improvements included the partial removal of the fence, removal of manual and pedestrian gates, and upgrades to 8-foot-high chain-link fence with three strands of barbed wire. These improvements took place in the terminal area, north ramp, and west airfield. The perimeter fence on the north side of the airfield along the tree line was upgraded to a height of 10 feet. This consisted of 2 feet below-ground, 7 feet above-ground and 1 foot of barbed wire. There is a need to upgrade the perimeter fence on the south side of the airport, similar to the improvements completed to the north side, to help prevent wildlife access. Therefore, perimeter/wildlife fence alternatives are recommended during the alternatives analysis.

Additional security cameras are required to enhance the security at airport facilities. Security cameras around the T-hangars and a camera at the security gate off Flight Safety Drive is needed, at a minimum. Also, additional security cameras to provide visibility of the taxilanes between the T-hangars is needed.

3.16. Landside Facilities

Landside facilities, including vehicle ground access, pedestrian access, and automobile parking, are essential to efficient movement around an airport.

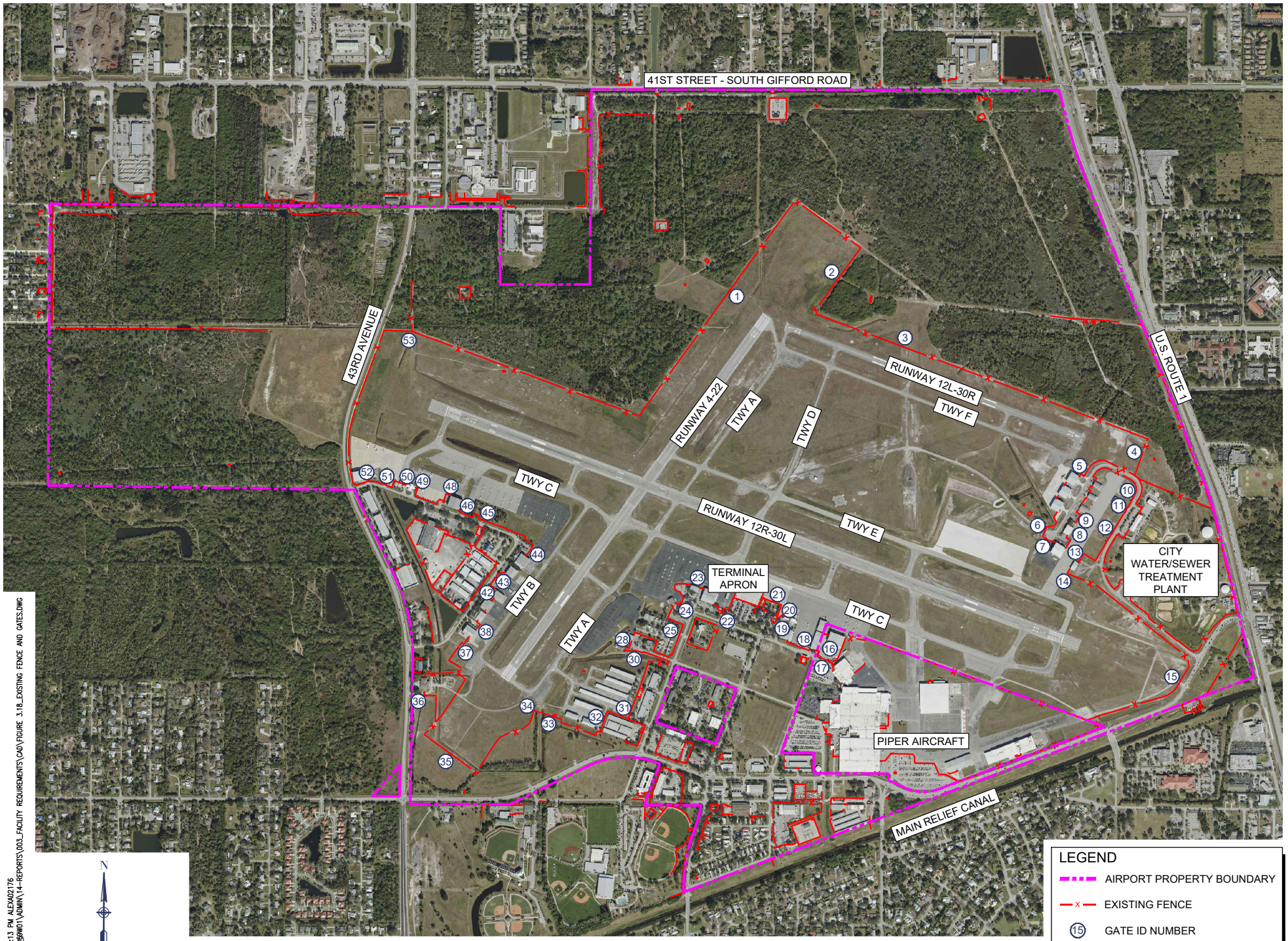
Vehicle Ground Access

As shown on **Figure 3.19**, four primary vehicle access roads surround VRB. These surrounding roads include 41st Street to the north, U.S. 1 to the east, Aviation Boulevard to the south, and 43rd Avenue to the west. The city of Vero Beach plans to widen Aviation Boulevard from 43rd Avenue to U.S. 1. At the time of this airport master plan, an ongoing project development and environment (PD&E) study is evaluating improvements to the intersection of State Road 5/U.S. 1 and Aviation Boulevard. This intersection is within the Runway 30L RPZ. In coordination with the airport, the PD&E study has eliminated all alternatives that included an overpass or underpass, so as not to adversely impact airport operations.

Within airport property, VRB owns the roads and right of way. This allows the airport to modify the roadway system if needed to support the expansion of airport operations. VRB is responsible for the maintenance of the roads within airport property. The roads are public use and used primarily for aviation-related access. Some of the city-planned improvements to Airport Boulevard are within the airport-owned portion. Depending on the funding source, a change of ownership of the right of way may be required. Because VRB is a surplus property airport (deeded from the federal government after military use ceased), any proposed change of ownership will require a land release by the FAA.

Pedestrian Access

Crosswalks from the long-term parking lots south of Cherokee Drive provide passengers access to the terminal. To assist with the demand of additional passengers and visitors caused by increased commercial service operations, pedestrian access improvements, including lighted crosswalks and signs, should be considered.



LEGEND

- AIRPORT PROPERTY BOUNDARY
- EXISTING FENCE
- (15) GATE ID NUMBER

N

0 1400

GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 7:13 PM ALEXA02176
I:\2020BS\20A0086W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.18_EXISTING FENCE AND GATES.DWG

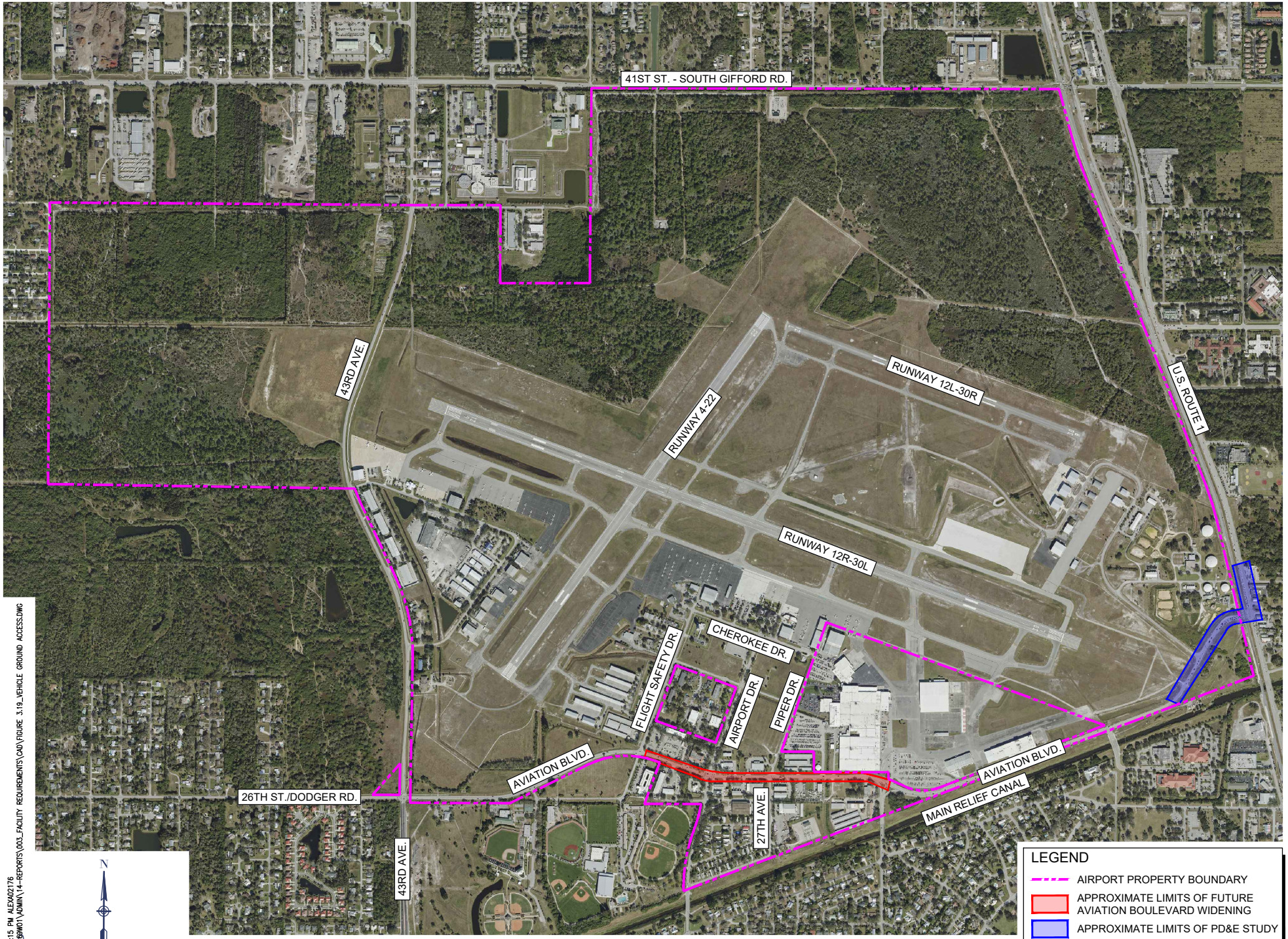
VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

EXISTING PERIMETER FENCE AND SECURITY GATES

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 3.18



LEGEND

- AIRPORT PROPERTY BOUNDARY
- APPROXIMATE LIMITS OF FUTURE AVIATION BOULEVARD WIDENING
- APPROXIMATE LIMITS OF PD&E STUDY

N

0 1400

GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\2020BS\20A0089W01\ADMIN\14-REPORTS\003_FACILITY REQUIREMENTS\CAD\FIGURE 3.19_VEHICLE GROUND ACCESS.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

SURROUND VEHICLE GROUND ACCESS ENHANCEMENTS

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 3.19

Automobile Parking

The primary automobile parking areas are around the terminal building in short- and long-term parking areas. Additional automobile parking areas are adjacent to the FBOs, Corporate Air and Sun Aviation, and the flight training schools, Skyborne and Paris Air. Vehicle parking for the city hangars and T-hangars in the general aviation area are generally inside or adjacent to the hangars.

FIGURE 3.20: SHORT-TERM PARKING

Automobile Parking Near Terminal Area

Automobile parking is available adjacent to the terminal building. Parking is divided into two areas: short- and long-term parking. As shown on **Figure 3.20**, short-term parking is north of Cherokee Drive, adjacent to the terminal building. This area has 111 parking spaces, including standard, compact, and accessible spaces.

As shown on **Figure 3.21** and **Figure 3.22**, long-term parking is south of Cherokee Drive and divided into two areas: Lot A and Lot B. Lot A has 51 spaces and Lot B has 82 spaces, totaling 133 long-term parking spaces. The pavement is in good condition, requiring only routine maintenance. A parking study conducted for the Breeze Airways' operations indicated 150–200 additional parking spaces may be needed to support passenger service. The alternatives analysis should consider additional areas for parking to meet the needs of commerical service operations. Other businesses at VRB and Piper Aircraft have their own designated parking areas. With the initiation of passenger service, provisions for taxi, transportation network companies, and other ground transportation options should be considered in the alternatives analysis.

FIGURE 3.21: LONG-TERM PARKING – LOT A

FIGURE 3.22: LONG-TERM PARKING – LOT B

Automobile Parking Near FBOs

Automobile parking is available at both the FBOs at VRB. The FBOs are Corporate Air and Sun Aviation. Corporate Air is on the west side of the airfield, and Sun Aviation is east of the terminal building. The FBOs have automobile parking areas available within their leaseholds that are outside the control of the airport. Potential areas that could be available for additional lease space for tenants should be identified during the alternatives analysis. The next subsections provide additional automobile parking details for both FBOs.

Corporate Air

Landside access to Corporate Air is by Airport West Drive via 43rd Avenue. Corporate Air has a parking area west of the FBO terminal that includes 13 standard parking spaces and two accessible spaces, as shown on **Figure 3.23**. During the inventory process, it was observed that the grass area across the street from the FBO terminal building is used for overflow parking. An automobile parking area should be considered to accommodate the overflow parking.

Sun Aviation

Sun Aviation is on the east side of the terminal building and accessed via Cherokee Drive. Sun Aviation has 43 parking spaces south of the FBO terminal, as shown on **Figure 3.24**. Sun Aviation did not indicate a need for additional parking. However, at the time of this airport master plan, Hertz would use the grass area south of Cherokee Drive for overflow parking. Additional rental car parking should be considered in the alternatives analysis.

Nonaeronautical Parking and Connectivity

VRB is in the process of adding 26 parking spaces and pedestrian walkway improvements to the north side of the automobile parking along 26th Street/Dodger Road between Airport Drive and Bonanza Lane to better support the businesses in this area. This will improve the connection of the area to the terminal for pedestrians or bicycles.

FIGURE 3.23: CORPORATE AIR AUTOMOBILE PARKING

FIGURE 3.24: SUN AVIATION AUTOMOBILE PARKING

3.17. Nonaeronautical Facilities

Based on the aviation forecasts, the aviation use at VRB is projected to continue to grow. During the alternatives analysis, areas will be identified that could accommodate aeronautical development within the airport property. Areas that must be protected, such as city wells or environmentally sensitive areas, will be taken into account when development is being considered. After that occurs, areas without potential airfield access could be considered for nonaeronautical use.

As detailed in Section 1.20, VRB houses a wide range of nonaeronautical development. Nonaeronautical development has the potential to provide additional revenue to the airport to diversify the revenue stream and help support airport operations. The opportunity for other types of nonaeronautical development, compatible with airport operations, should be considered in the alternatives analysis after all aeronautical needs are met.

3.18. Facility Requirements Summary

The section has identified opportunities to improve the facilities at VRB to better meet current and future demands. Within the 20-year planning period, the activity at VRB is forecast to continue to grow. Based aircraft are projected to increase from slightly more than 200 aircraft to more than 300 aircraft, with growth in all sizes of based aircraft. To accommodate this growth, additional hangar facilities of various sizes will be needed. Passenger enplanements are projected to increase to more than 50,000, which will require additional terminal building, ground transportation, and parking facilities. Operations are projected to increase to more than 300,000 annual operations, higher than the pre-COVID-19 peak. The airfield facilities will need to be maximized through runway and taxiway improvements to avoid significant operational delays as activity increases. Alternatives will be developed to identify options to meet these demands, starting with the airfield and progressing toward potential nonaeronautical development. In addition to considering the facility requirements, the alternatives will consider environmental factors, as identified in the environmental overview.

4. Environmental Overview

4.1. Introduction

FAA AC 150/5070-6B, Change 2: Airport Master Plans encourages the consideration of environmental factors in airport master planning to "help the sponsor thoroughly evaluate airport development alternatives and to provide information that will help expedite subsequent environmental processing." Also, FDOT's 2021–22 *Guidebook for Airport Master Planning* notes that there are different environmental processes for projects that are funded by the FAA or FDOT. However, both agencies recognize that it is not the intent of a master plan to complete the federal and state environmental review processes. Instead, the information should provide a foundation for future environmental clearances and evaluations that may be required.

This chapter provides an overview of known environmental resources that will be considered during the identification and evaluation of development alternatives in this master plan. The environmental resources discussed in this chapter include many of those identified in *FAA Order 5050.4B: National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* and *FAA Order 1050.1F: Environmental Impacts: Policies and Procedures*. In addition to referencing previous studies and data, a site visit was conducted by a field biologist and wetland scientist in August 2023 to verify information documented in the following sections. This overview does not constitute an environmental assessment; instead, it is intended to serve as a basis for preparing NEPA reviews that are required by the FAA for advancing future projects at VRB.

4.2. Air Quality

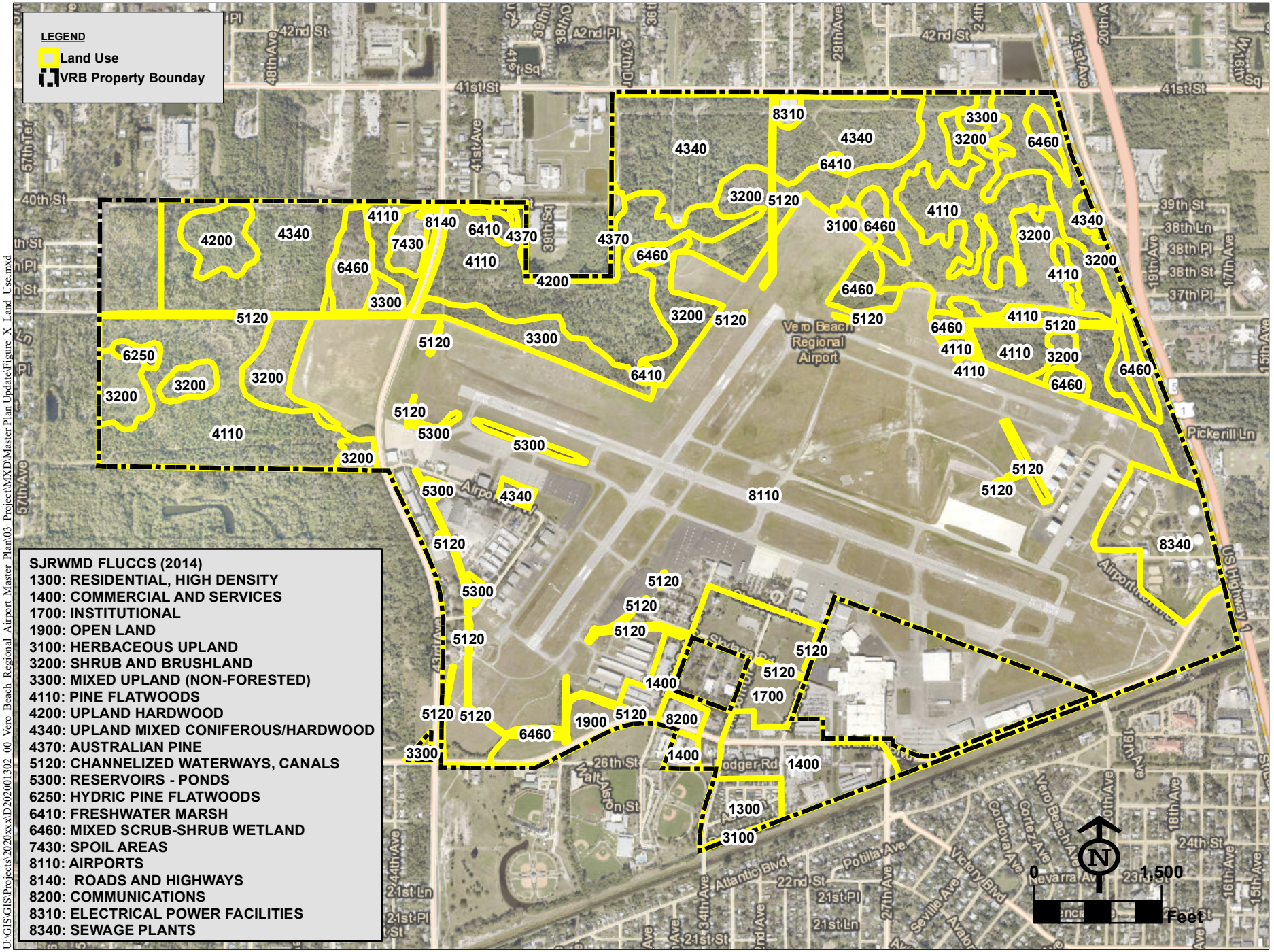
The federal Clean Air Act, as amended, required the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for principal air pollutants considered harmful to public health and the environment. Areas where the NAAQS are not met are designated as "nonattainment." Indian River County is classified as "attainment" for all criteria air pollutants listed in the NAAQS. Emission sources at VRB, which are typical of airports, include aircraft engines, ground support equipment, auxiliary power units, motor vehicles, the temporary use of construction equipment, and various stationary sources, such as generators.

The existing and projected activity for VRB, in conjunction with Indian River County's attainment status, indicates that continued operation of the airport is not likely to substantially affect air quality, exceed thresholds that require detailed air quality analyses, or require conformance with a state implementation plan. Any future airport projects that require NEPA review will consider the project's effect on air quality. Certain projects and tenant activities, such as operating paint booths, must comply with applicable federal, state, and local regulations and permitting requirements.

4.3. Biological Resources

Biotic Communities and Vegetation

VRB covers approximately 1,650 acres. The land use and cover types have been mapped for VRB using the St. Johns River Water Management District (SJRWMD) Florida Land Use, Cover, and Forms Classifications Systems (FLUCCS) data for Indian River County. The FLUCCS communities are listed in **Table 4.1** and depicted on **Figure 4.1**.



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U:\GIS\GIS\Projects\2020xxx\D20200130 2_00 Vero Beach Regional Airport Master Plan\03 Project\MXD\Master Plan Update\Figure X Land Use.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar, USDA 2023, SJRWMD 2014, Hanson 2023, ESA 2023

VERO BEACH REGIONAL AIRPORT (VRB)
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FIGURE 4.1
LAND USE

TABLE 4.1: FLORIDA LAND USE, COVER AND FORMS CLASSIFICATION SYSTEMS (FLUCCS) COMMUNITIES AT VRB

Land Use Code	Description
1300	Residential, High-Density
1400	Commercial and Services
1700	Institutional
1900	Open Land
3100	Herbaceous Upland Nonforested
3200	Shrub and Brushland
3300	Mixed Upland Nonforested
4110	Pine Flatwoods
4200	Upland Hardwood
4340	Upland Mixed Coniferous/Hardwood
4370	Australian Pine
5120	Channelized Waterways, Canals
5300	Reservoirs – Ponds
6250	Hydric Pine Flatwoods
6410	Freshwater Marshes
6460	Mixed Scrub-Shrub Wetland
7430	Spoil Areas
8110	Airports
8140	Roads and Highways
8200	Communications
8310	Electrical Power Facilities
8340	Wastewater Treatment/Sewage Plants

Sources: SJRWMD 2014 and ESA 2023.

Potential impacts to biotic communities are regulated by a variety of agencies at the federal, state, and local level, depending on the project type and resource affected. In Indian River County, local agencies support development review, but federal and state agencies maintain jurisdiction over the resource categories discussed in this section.

Wildlife, Listed Species, and Essential Fish Habitat

Wildlife Hazard Management

An FAA-compliant wildlife hazard assessment (WHA) was completed in 2014, and a wildlife hazard management plan (WHMP) was approved by the FAA in October 2015. A habitat conservation plan was completed in 2016 to satisfy the permitting requirements for the implementation of the WHMP. The WHMP was updated after the most recent FAA wildlife inspection was completed in December 2019. As detailed in the WHMP, current management and future airport improvements should be designed to minimize wildlife hazards to the greatest extent possible.

Listed Species

In addition to assessing impacts under NEPA, airport improvement projects are subject to other federal and state laws associated with wildlife and protected species. Most notable is the federal Endangered Species Act, which protects and recovers imperiled species and the habitats on which they depend. The FAA and/or other federal

agencies that may be involved with airport improvement projects at VRB are required to determine if their action(s) would affect listed species.
Depending on the potentially impacted habitat or species affected, coordination with the U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) fisheries, and/or the Florida Fish and Wildlife Conservation Commission (FFWCC) may be required. In cases in which wetlands are also impacted, this coordination typically occurs in conjunction with the wetland permitting process.

A review of publicly available resources, such as the Florida Natural Areas Inventory (FNAI) and previous environmental studies, including the WHA and WHMP, identified the VRB property and surrounding area as potentially having suitable habitat for federal- and state-listed wildlife. **Table 4.2** provides the listed species for which suitable habitat may exist or for which there is a possibility of occurrence on or adjacent to the airfield.

TABLE 4.2: FEDERAL- AND STATE-LISTED WILDLIFE SPECIES IN THE VICINITY OF VRB

Common Name	Scientific Name	USFWS/NOAA Listings	FFWCC Listings
Fish			
Opossum pipefish	Microphis branchyurus	SC	
Mangrove Rivulus	Rivulus marmoratus	SC	
Reptiles			
American alligator	Alligator mississippiensis	T(S/A)	T(S/A)
American crocodile	Crocodylus acutus	T	T
Eastern indigo snake	Drymarchon couperi	T	T
Gopher tortoise	Gopherus polyphemus		T
Pine snake	Pituophis melanoleucus		T
Birds			
Florida scrub jay	Aphelocoma coerulescens	T	T
Burrowing owl	Athene cunicularia	T	T
Audubon's crested caracara	Polyborus plancus audubonii	T	T
Red-cockaded woodpecker	Dryobates borealis	E	T
Little blue heron	Egretta caerulea		T
Reddish egret	Egretta refescens		T
Tricolored heron	Egretta tricolor		T
American oystercatcher	Haematopus palliates		T
Bald eagle	Haliaeetus leucocephalus	*	*
Eastern black rail	Laterallus jamaicensis spp. Jamaicensis	T	T
Wood stork	Mycteria americana	T	T
Snail kite	Rostrhamus sociabilis	E	E
Black skimmer	Rynchops niger		T

Least tern	Sternula antillarum		T
Mammals			
Florida panther	Puma concolor coryi	E	E
Southeastern beach mouse	Peromyscus polionotus niveiventris	T	T

This information is provided as a guide to project planning and is not a substitute for site-specific surveys. Such surveys may be needed to assess species' presence or absence, as well as the extent of project effects on listed species and/or designated critical habitat.

E = endangered; T = threatened; SC/SSC = species of special concern; C = candidate for list at the federal level by USFWS; T(S/A) = threatened (similarity of appearance) to American crocodile - Crocodylus acutus

*Federal protection under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

Candidate species receive no statutory protection under the Endangered Species Act. The FWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the EPA.

Sources: USFWS, FFWCC, and FNAI, accessed August 2023.

While the biologic resources reviewed indicate that VRB is in an area that has the potential for the occurrence of wildlife listed in Table 5.2, VRB does not contain habitat that would support a majority of these species. The following specific-species surveys, monitoring, consultation, and/or permitting guidelines, established by the FFWCC and/or USFWS, should be considered for airport projects within the property limits: eastern indigo snake, gopher tortoise, American bald eagle, red-cockaded woodpecker, Florida scrub jay, Audubon's crested caracara, burrowing owl, wood stork, and the West Indian manatee (potential adjacent stormwater impacts). Further, it should be noted that all construction projects that require clearing large areas should be stabilized as quickly as possible to avoid leaving large, cleared areas for an extended duration to prevent attracting nesting shorebirds.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801, et seq.) reflects the secretary of commerce and National Marine Fisheries Service's (NMFS) authority and responsibilities for the protection of essential fishery habitat. The act specifies that "each federal agency shall consult with the Secretary with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat identified under this Act." Essential fish habitat is defined by the act as "… those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. 'Waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include areas historically used by fish. 'Substrate' includes sediment, hard bottom, structures underlying the waters, and any associated biological communities. 'Necessary' means the habitat required to support a sustainable fishery and the managed species contribution to a healthy ecosystem. 'Spawning, breeding, feeding, or growth to maturity' covers all habitat types used by a species throughout its life cycle," according to Public Law 94-265, as amended by the Magnuson-Stevens act. Only species managed under a federal fishery management plan are covered.

The NMFS, also known as NOAA Fisheries, reviews potential impacts to marine listed species and coordinates for projects that may affect EFH. There are four required components of an EFH consultation: Notification, EFH assessment, NMFS EFH conservation recommendations, and U.S. Army Corps of Engineers (USACE) response. VRB is within the area of NOAA Fisheries' Southeast Regional Office.

Typically, EFH assessments are conducted where projects have the potential to affect identified resources, mostly in-water activities or activities that could affect coastal vegetation or substrate. For VRB, EFH consultation may be required for projects that discharge into adjacent drainage ditches that lead to the Indian River. This would potentially include any projects where stormwater improvements require altering conveyances or structures that discharges to the Indian River. Further, critical habitat for the West Indian manatee occurs within the main relief canal, 0.1 miles southeast of VRB and east of the U.S. 1 intersection, and the Indian River 1.6 miles east of VRB.

4.4. Department of Transportation Act: Section 4(f) and Other Environmentally Sensitive Public Lands

Section 4(f) of the Department of Transportation Act of 1966, recodified and renumbered as Section 303(c) of U.S. Code Title 49, states that the transportation secretary "may approve a transportation program or project … requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if-

(1) there is no prudent and feasible alternative to using that land; and
(2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."

At this time, there are two recreational areas and 40 historical resources, as listed on the National Register of Historic Places and the Florida Master Site File, adjacent to or within 500 feet of the airport. The Section 4(f) recreational areas are the Troy Moody Park and the Indian River Citrus Museum, 0.4 miles and 0.6 miles, respectively, southeast of VRB. The historical resources are discussed in Section 4.6 the Florida Master Site File report in **Appendix F**. There are no wildlife and waterfowl refuges on or in the immediate vicinity of VRB. The Indian River, approximately 1.6 miles east of VRB, and the main relief canal (east of U.S. 1), 0.1 mile southeast of VRB, are the closest features designated as critical habitat, specifically for the West Indian manatee.

4.5. Hazardous Materials and Waste Management

Hazardous Materials

Federal, state, and local laws regulate hazardous materials use, storage, transport, or disposal. Major laws and issue areas include:

- Resource Conservation and Recovery Act (RCRA) – hazardous waste management
- Federal Hazardous and Solid Waste Amendments – hazardous waste management
- Comprehensive Environmental Response, Compensation, and Liability Act – cleanup of contamination
- Superfund Amendments and Reauthorization Act (SARA) – cleanup of contamination
- Emergency Planning and Community Right-to-Know Act (SARA Title III) – business inventories and emergency response planning

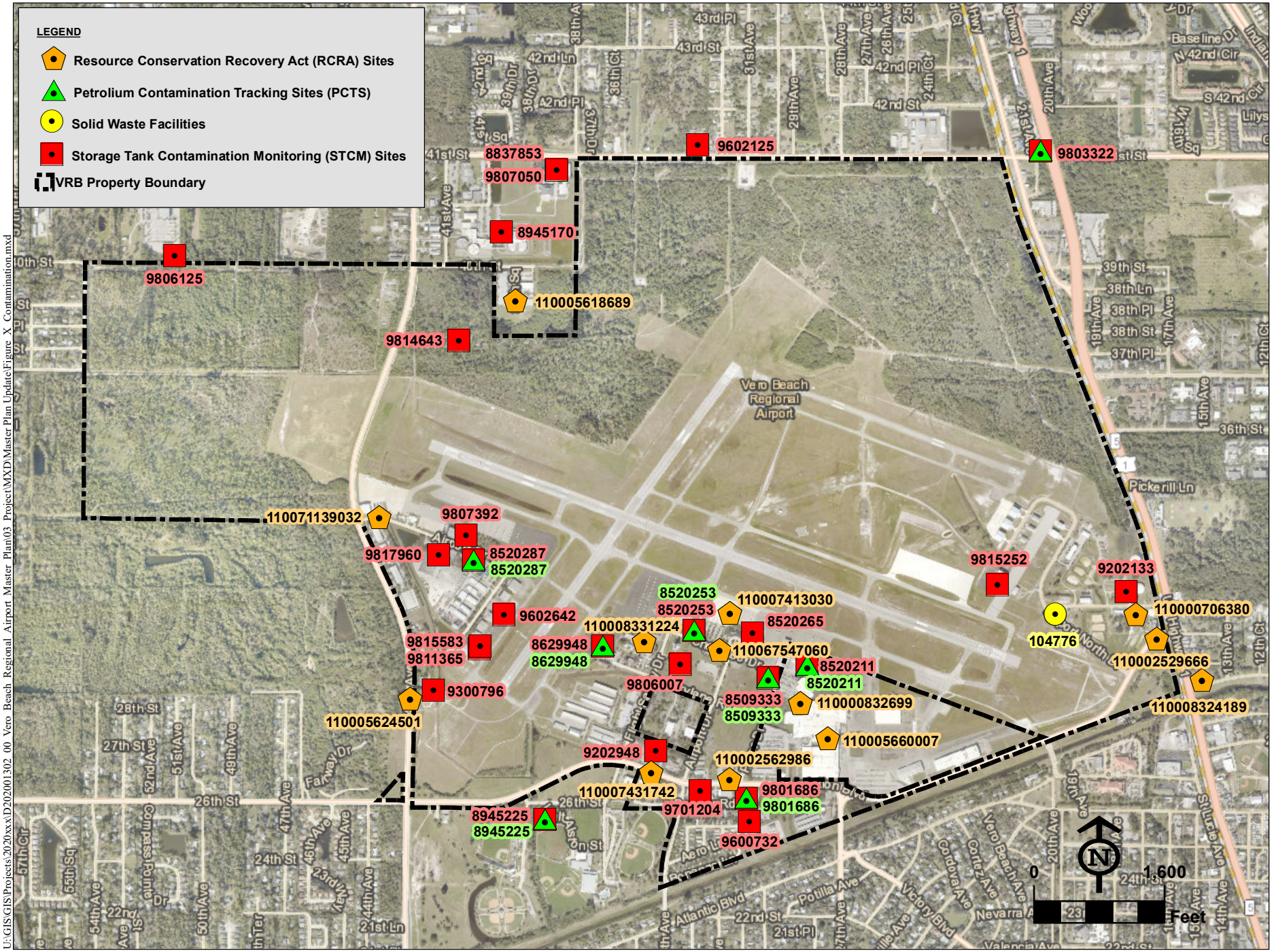
According to the Florida Department of Environmental Protection (FDEP) online RCRA database, OCULUS, there are 21 sites listed that contain/contained fuel storage tanks. In addition, there are 12 sites that store, generate, transport, treat, and dispose of hazardous waste, as well as six listed as waste cleanup sites. These sites include on-airport as well as any immediately adjacent to airport property to document the potential for future contamination resettlement. These are listed in **Table 4.3** and shown on **Figure 4.2.** The table also details that nine sites have been closed or are no longer generating waste and seven facilities with storage tanks have been closed or are "not active," as reported by FDEP. No other outstanding contamination issues were noted.

TABLE 4.3: STORAGE, WASTE GENERATION, AND REMEDIATION FACILITIES WITHIN VRB

Facility ID	Name	Comment	Compliance
Storage Tank Contamination Monitoring Sites			
9817960	VRB – Offsite Tennant	No Reports Found	NOT ACTIVE
9815583	Corporate Air Inc.	Petroleum Storage	In Compliance/Closed – NOT ACTIVE
9815252	Davis Property	Petroleum Storage	In Compliance
9814643	Indian River County West Airport Water Treatment Facility	Muriatic Acid Storage	In Compliance
9811365	Continental Jet Aviation Inc.	Petroleum Storage	In Compliance
9801686	Former Vero Beach NAS Site #1	Petroleum Storage	In Compliance/Closed – NOT ACTIVE
9807392	Paris Air Inc.	Petroleum Storage	In Compliance
9806125	Indian River County Fleet Management Complex	Petroleum Storage	FDEP Inspection Compliance Follow-up 2023
9806007	Vero Beach Airport Traffic Control Tower	Petroleum Storage	In Compliance
9701204	Chevron – Airport	Petroleum Storage	In Compliance
9602642	Corporate Aircraft Service	Petroleum Storage	In Compliance
9600073	C&D Auto	Petroleum Storage	In Compliance
9300796	Indian River County Fire Station 3	Tank Closure/Monitoring and Assessment	In Compliance/Closed – NOT ACTIVE
9202133	Vero Beach Water Treatment Facility	Misc Water Treatment Agent Storage	FDEP Inspection Required
9202948	Southern Bell – VRBHFLTC	Petroleum Storage	In Compliance/Closed – NOT ACTIVE
8629948	Pro-Flight of Vero Inc.	Tank Closure/Assessment	In Compliance/Closed – NOT ACTIVE
8520287	City of Vero Beach Public Works	Petroleum Storage	In Compliance
8520211	New Piper Aircraft Inc.	Petroleum Storage	Current Compliance Letter Not Found
8520265	Vero Beach Airport	Petroleum/Tank Closure	In Compliance/Closed – NOT ACTIVE
8520253	Skyborne Airline Academy	Petroleum Storage	In Compliance
8509333	Vero Beach Airport Services	Petroleum Storage	In Compliance
RCRA Sites			
110071139032/ FLR000221465	Girard Equipment Inc.	Individual Generator	In Compliance

110008331224/ FLD134336734	Chautauqua Airlines	Small Generator	NOT ACTIVE
110008324189/ FLD984243063	Hill Jones Inc.	No Reports Found	No Reports Found
110007431742/ FLD982153710	Bell South Communications Inc.	Individual Generator	In Compliance
110007413030/ FLD981467236	Contract Application Inc.	Small Generator	NOT ACTIVE
110006754706/ FLR000217927	TSA/Vero Beach Municipal Airport	No Reports Found	No Reports Found
110005660007/ FLR000062083	MC Miller Company Inc.	Facility Closed	In Compliance/Closed – NOT ACTIVE
110005624501/ FLD984258046	Vero Beach Fire Department 3	Small Generator	NOT ACTIVE
110002529666/ FLD032823213	Riverfront Groves Inc.	Facility Removed – No Reports Found	NOT ACTIVE
110000832699/ FLR000217927	Piper Aircraft Inc.	No Reports Found	No Reports Found
110000706380/ FLR000140087	City of Vero Beach Water Treatment Plant	No Reports Found	No Reports Found
Solid Waste Facilities			
104776	City of Vero Beach Water Treatment Plant	Disaster Debris Management Area – Closed	In Compliance
Petroleum Contamination Tracking Sites (PCTS)			
9801686	Former Vero Beach NAS Site 1	Petroleum – Wells Tested Below Detection Limits	In Compliance/Wells Closed – NOT ACTIVE
8629948	Pro-Flight of Vero Inc.	Petroleum – Tank Closure – No Additional Actions	In Compliance/Closed – NOT ACTIVE
8520287	City of Vero Beach Public Works	Petroleum	In Compliance
8520253	Skyborne Airline Academy	Petroleum – No Testing Required	In Compliance
8520211	New Piper Aircraft Inc.	Petroleum/Chlorinated Solvent – Well Testing – Superfund Site	No Reports Found
8509333	Vero Beach Airport Services	Petroleum – No Testing Required	In Compliance

Source: FDEP OCULUS, accessed August 2023.



Date: 11/8/2023
U:\GIS\GIS\Projects\2020xxx\D202001302 00 Vero Beach Regional Airport Master Plan\03 Project\MXD\Master Plan Update\Figure X Contamination.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar, USDA 2023, FDEP 2022, 2023, Hanson 2023, ESA 2023

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FIGURE 4.2

HAZARDOUS MATERIALS AND CONTAMINATION MONITORING SITES

Waste Management

Per FAA Order 5100.38D, master plans funded with AIP dollars must address issues related to the airport's recycling, reuse, and waste reduction programs. This includes:

- Reviewing waste management contracts
- Assessing the feasibility of solid waste recycling at the airport
- Identifying operations and maintenance requirements
- Identifying the potential for cost savings or generation of revenue
- Minimizing the generation of waste at the airport

The recycling, reuse, and waste reduction plan includes a review of the waste management and recycling throughout the airfield facilities. This was primarily achieved by surveying and interviewing the different airport tenants to understand their practices and programs. A number of potential initiatives were identified to advance VRB's recycling and waste reduction efforts. The complete plan is included as **Appendix G**.

4.6. Historical, Archaeological, and Cultural Resources

Laws and regulations require that possible effects on historic, archaeological, and cultural resources be considered during the planning and execution of federally funded projects. The primary laws that pertain to the treatment of historic, architectural, archaeological, and cultural resources during environmental analyses are the National Historic Preservation Act, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act. Historic, architectural, archaeological, and cultural resources may include archaeological sites, buildings, structures, objects, districts, works of art, architecture, and natural features that were important in past human events. They may consist of physical remains and may include areas where significant human events occurred, even though evidence of the events no longer exist.

A review of the EPA's NEPAssist database and the Florida Master Site File indicates that 40 historical/cultural resources are identified on or within 500 feet of VRB (**Appendix F**). Of these 40 resources, 15 Florida structures, three resource groups, and five Florida sites are on or directly adjacent to the airport boundary (see **Table 4.4**). Of these, one resource group (IR01619) and two Florida sites (IR00001 and IR00009) are on VRB property. It should be noted that IR01619, identified as Indian River Farms Company Canal – 37th is an upland cut canal in the northwestern portion of VRB that is not eligible for historical listing. However, the two Florida sites (IR00001 and IR00009) in the southeast portion of VRB are eligible for historical listing because human remains may be present. Further historical and cultural evaluations would be required for potential development within the southeastern portion of VRB.

TABLE 4.4: DEPARTMENT OF HISTORICAL RESOURCES GENERATED HISTORICAL/CULTURAL RESOURCES LOCATED ON OR DIRECTLY ADJACENT TO VRB

Resource Site ID	Resource Name	Address	SHPO Evaluation
Florida Structures			
IR00207	4135 28th Avenue	Vero Beach	None Identified
IR00239	1911 38th Place	Vero Beach	None Identified
IR00248	3890 41st Street	Vero Beach	None Identified
IR00753	1345 32nd Street	Vero Beach	None Identified
IR00761	1355 33rd Street	Vero Beach	None Identified
IR00762	1365 33rd Street	Vero Beach	None Identified
IR00763	1366 33rd Street	Vero Beach	None Identified
IR00764	1376 33rd Street	Vero Beach	None Identified
IR00765	1375 33rd Street	Vero Beach	None Identified
IR00766	1394 33rd Street	Vero Beach	None Identified
IR01146	Mt. Zion Baptist Church	18th Ave., Vero Beach	Not Eligible
IR01572	3882 Old Dixie Highway	Vero Beach	Not Eligible
IR01574	Kool Cuts	4306 Old Dixie Hwy., Vero Beach	Not Eligible
IR01735	4004 43rd Avenue	Vero Beach	None Identified
IR01736	4024 43rd Avenue	Vero Beach	None Identified
Resource Groups			
IR01148	Indian River Farms Main Canal	Vero Beach	Not Eligible
IR01619	Indian River Farms Company Canal – 37th	VRB	Not Eligible
IR01723	Dodgertown	Vero Beach	None Identified
Florida Sites			
IR00001	Vero Man	VRB	Eligible
IR00009	Vero Locality	VRB	Eligible
IR01497	Florida East Coast Railroad	Vero Beach	None Identified
IR01519	Dixie Highway	Sebastian	Eligible
IR01579	Gifford Glass Scatter	Gifford	Insufficient Info

Abbreviation: SHPO – state historic preservation officer

Source: Florida Division of Historical Resources, requested August 2023.

4.7. Energy Supply and Natural Resources

Florida Power & Light Co. (FPL) is the electric power supplier to VRB and has a supply network capable of serving existing and prospective tenants at the airport. Proposed airport improvement projects would likely require lighting; power for specialized equipment, tools, and processes; office equipment; and air conditioning. Local power utility requirements would primarily include electric service. Overall, based on discussions with airport management, there is sufficient capacity to accommodate the projects envisioned in this master plan of a similar nature to existing operations. If new technology operations, such as electric aircraft, are established at VRB, VRB should work with FPL to ensure sufficient capacity is available.

4.8. Water Resources

Prior environmental studies, permit actions, reports, GIS data, and other available information were reviewed to determine the extent of water resources on airport property. The USACE, FDEP, SJRWMD and the Indian River Farms Water Control District, a political subdivision of the state of Florida, have jurisdiction over these resources at VRB.

Wetlands

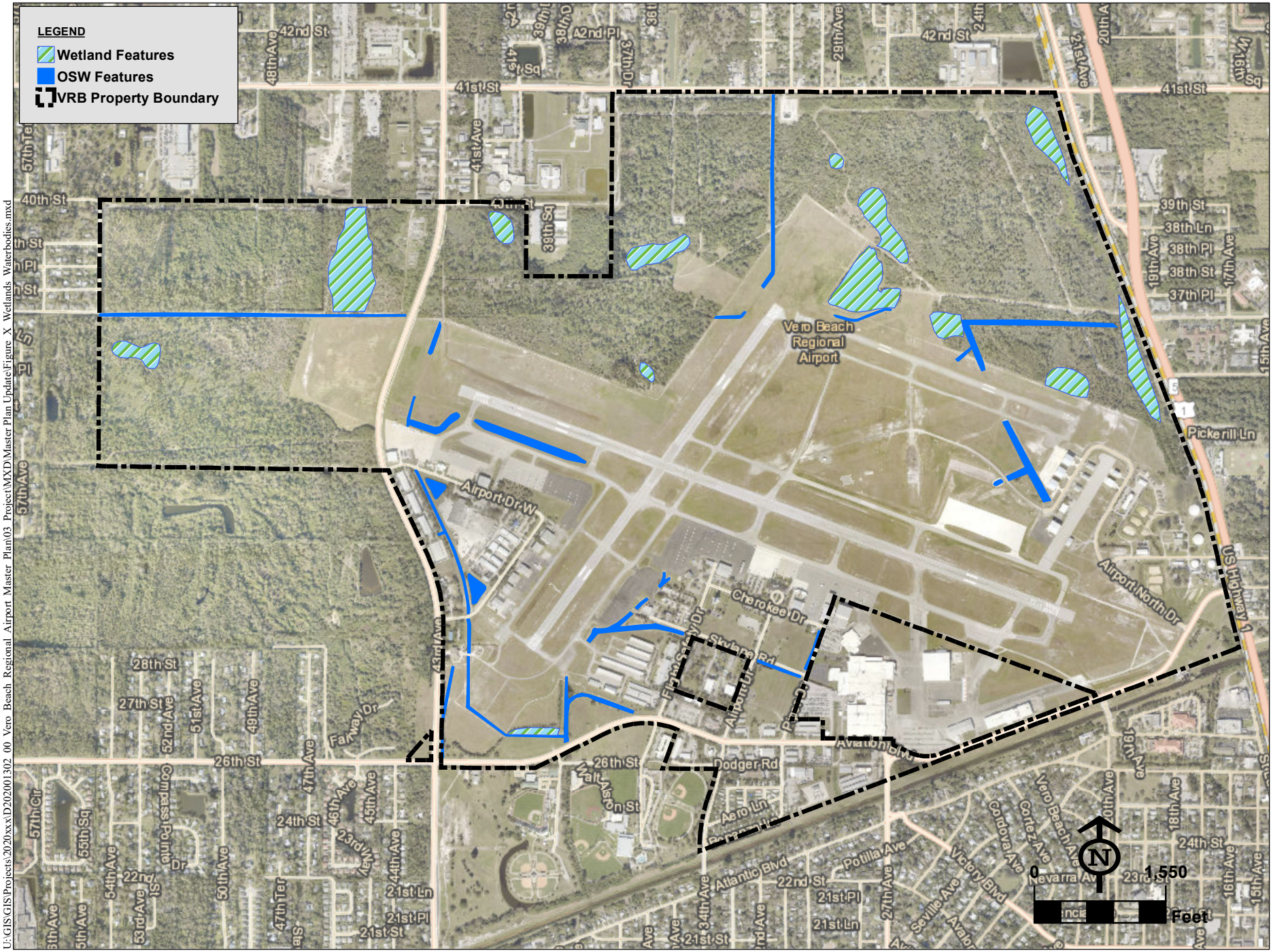
VRB is within the Central Indian River Lagoon Watershed. Jurisdictional wetlands have been identified within the airport property limits. **Figure 4.3** depicts general areas identified as wetlands and/or surface waters at VRB. However, field reviews/wetland delineations should be conducted in the naturally occurring areas of the airport property prior to clearing and permitting activities to identify the wetland extent and quality. Although VRB property limits do not abut the Indian River, discharge from the airport flows through stormwater conveyances to large stormwater features outside the airport property, then directly into the Indian River. Water quality impacts to the Indian River and any other surface water features (e.g., stormwater ditches) will require some level of NEPA review and permitting for advancing future projects.

Potential impacts to on-site wetland resources can be offset through the purchase of credits at an agency-approved mitigation bank with service areas covering the airport, such as the Basin 22 Wetland Mitigation Bank. Mitigation through a bank is consistent with the hierarchy of mitigation preference established by the USACE in its 2008 Mitigation Rule, and it is compatible with the airport and FAA's goal of reducing wildlife hazards at the airport.

Other Surface Waters

VRB maintains a large network of stormwater drainage features throughout the airport property that largely flow south toward the main relief canal along the airport's southern property limit. A majority of these features are identified as conveyances, which ultimately discharge to the Indian River. These drainage structures are maintained to reduce wildlife hazards on airport property. In addition, the airport operates under stormwater management permits and implements pollution prevention plans and best management practices. Permitting will be required if a proposed project at VRB is determined to impact these facilities. VRB is in the process of preparing a stormwater master plan that will include long-term management for surface waters. It will be coordinated with the recommended developments in this airport master plan.

National Pollutant Discharge Elimination System (NPDES) regulations serve to protect water quality. In Florida, the NPDES permit program is administered by the FDEP. An NPDES Generic Permit for construction will be required for projects at VRB that disturb more than one acre. As previously mentioned, a portion of the main relief canal along the southern limits of VRB is designated as critical habitat for the Western Indian manatee. Therefore, additional drainage and NPDES concerns may need to be addressed during the permitting process for project implementation.



Date: 11/8/2023
U:\GIS\GIS\Projects\2020xxx\D20200130 2_00 Vero Beach Regional Airport Master Plan\03 Project\MXD\Master Plan Update\Figure X Wetlands Waterbodies.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar, USDA 2023, SJRWMD 2016, Hanson 2023, ESA 2023

VERO BEACH REGIONAL AIRPORT (VRB)
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FIGURE 4.3
WETLANDS AND WATERBODIES

Floodplains

Executive Order 11988: Floodplain Management, directs federal agencies "to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains." *Department of Transportation Order 5650.2: Floodplain Management and Protection* and FAA orders 5050.4B and 1050.1F contain policies and procedures for implementing the executive order and evaluating potential floodplain impacts. Agencies are required to make a finding that there is no practicable alternative before taking action that would encroach a floodplain based on a 100-year flood.

The Federal Emergency Management Agency (FEMA) identifies flood hazard areas that are depicted on Flood Insurance Rate Maps (FIRMs). A floodplain is defined as the lowlands and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands that are, at a minimum, prone to the 100-year flood. The 100-year floodplain is considered the base floodplain.

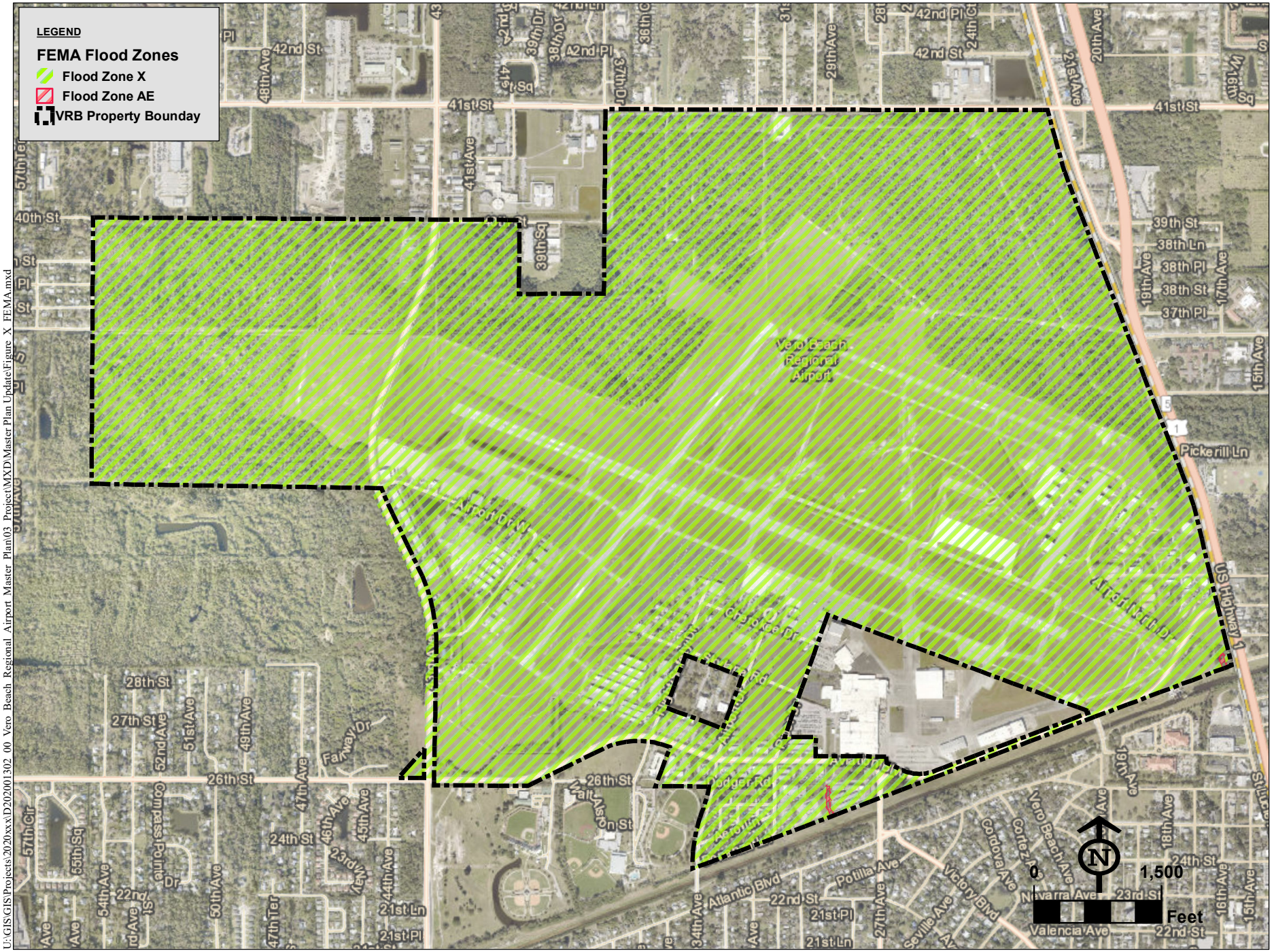
The most recent FIRMs, published in December 2022, were adopted by Indian River County January 26, 2023. **Figure 4.4** depicts the updated FIRMs for the area surrounding VRB.

The majority of the airport property is identified as Zone X, which includes moderate risk areas. Zone X areas that are identified as moderate have a 0.2% probability of flooding every year, also known as the 500-year floodplain. Two small areas along the southern property limits were identified as Zone AE. Zone AE is a special flood hazard area with a 1% annual flood risk. No base flood elevations or base flood depths are shown within these zones. While flood insurance is not typically required by regulation for Zone X, additional flood insurance will be required for projects in Zone AE.

4.9. Construction Impacts

Construction impacts are generally short-term and would vary, depending on which projects are implemented. The construction required for any proposed improvement could potentially impact air quality, surface transportation, water quality, and noise by using heavy equipment and by using vehicles to transport construction workers to and from the project sites.

For water quality, each project must adhere to the applicable stormwater pollution prevention plan maintained by VRB. Projects would also require notification or permitting through the FDEP in compliance with the NPDES program. In Florida, this program is delegated to the state and does not require additional authorization through the EPA. This process includes developing and adhering to best management practices for preventing or reducing the release of pollutants from a construction site. The construction impacts would be evaluated as part of the required NEPA analysis, prior to constructing any of the proposed improvement projects.



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U:\GIS\GISProjects\2020xxx\D202001302_00 Vero Beach Regional Airport Master Plan\03 Project\MXD\Master Plan Update\Figure X_FEMA.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar, USDA 2023, FEMA 2022, Hanson 2023, ESA 2023

VERO BEACH REGIONAL AIRPORT (VRB)
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FIGURE 4.4
FEMA FLOOD ZONES

4.10. Noise

This study did not include the development of new day-night average sound level (DNL) noise contours. However, the 65 DNL contours, shown on the land use plan in the 2016 ALP drawing set, are within VRB property and demonstrated no incompatible land uses. Since the time that the ALP was prepared, operations at VRB saw a significant decline due to a variety of factors. Even though operations today include more regular operations by commercial passenger operators, it is reasonable to assume that there are no incompatible land uses with respect to noise exposure. These contours were used recently in an environmental document because they are still considered to represent the noise conditions at the airport today.

4.11. Types of Environmental Reviews

Federal Reviews

The FAA is responsible for ensuring compliance with NEPA with respect to actions at federally obligated airports. The processing of AIP grant applications and ALP approvals are two types of "federal actions" commonly undertaken by the FAA in support of airport improvement projects that require environmental review under NEPA. While NEPA requires varying levels of interagency coordination, developing environmental documents under NEPA does not exempt airport projects from compliance with other federal environmental laws (e.g., Endangered Species Act) or state and local environmental regulations.

The process for on-airport development requiring NEPA changed when Congress passed the FAA Reauthorization Act of 2018. Section 163 of the act modified the scope of federal actions that trigger NEPA. Specifically, Section 163(d) narrowed the scope of ALP modifications considered formal actions within the regulatory authority of the FAA. Sections 163(a-c) define other factors related to how the land was acquired and whether a release of the land from aeronautical use is required as a federal action. In short, all on-airport projects are now subject to a Section 163 review by the FAA Orlando Airports District Office before initiating the NEPA process. Depending on the type of project, the FAA Section 163 review could result in a categorical exclusion (CatEx) with a release of the airport sponsor from federal obligations, a CatEx or environmental assessment (EA) for the aeronautical elements, or a combination of the two. Depending on the scope and magnitude of a project, NEPA may require an environmental impact statement (EIS).

For projects that involve a federal action, not exempted under Section 163, and requiring an environmental review under NEPA, there are three types of documentation summarized in **Table 4.5**. CatEx and EA documents are typically prepared by the airport sponsor and, if the documentation meets FAA requirements, they are accepted by the FAA and become federal documents. EIS documents are prepared by the FAA. Every future project recommended as part of this master plan is subject to the appropriate level of environmental review when a project is ready to implement. It should be acknowledged that most airport actions require some level of NEPA review, and a project does not need to be federally funded to require NEPA compliance.

TABLE 4.5: TYPES OF FAA NEPA REVIEW DOCUMENTATION (NOT SPECIFIC TO VRB)

CatEx	The FAA has identified certain actions that may be categorically excluded from a more detailed environmental review. However, extraordinary circumstances, such as wetland impacts, may preclude CatEx. A CatEx requires reviewing the impacts and completing the forms provided by the FAA. In some cases, documentation and agency coordination may be necessary to address extraordinary circumstances (see *FAA SOP 5.1: CATEX Determinations*). CatExs that may apply to future airport development projects at VRB are summarized below (emphasis added). See FAA orders 1050.1F and 5050.4B for more detailed descriptions of these and other categorically excluded actions that may apply to development projects. 1. Access and service road construction that does not reduce the level of service on local traffic systems below acceptable levels 2. Construction, repair, reconstruction, resurfacing, extending, strengthening, or widening a taxiway, apron, loading ramp, or runway safety area; or reconstruction, resurfacing, extension, strengthening, or widening of a runway — provided the action would not result in significant erosion or sedimentation and will not result in a significant noise increase over noise-sensitive areas or result in significant impacts to air quality 3. Construction or limited expansion of accessory on-site structures, including storage buildings, garages, hangars, T-hangars, small parking areas, signs, fences, and other essentially similar minor development items 4. Construction or expansion of facilities, such as terminal and parking facilities or cargo buildings, or facilities for nonaeronautical uses that do not substantially expand those facilities. 5. Demolition and removal of FAA or non-FAA on-airport buildings and structures, provided no hazardous substances or contaminated equipment are on the site of the facility; does not apply to historic structures 6. Placing fill into previously excavated land with material compatible with the natural features of the site, provided the land is not delineated as a wetland; or minor dredging or filling of wetlands or navigable waters for any categorically excluded action, provided the fill is of material compatible with the natural features of the site and the dredging and filling qualifies for a USACE nationwide or a regional general permit 7. Grading land, removing obstructions to air navigation, or erosion control measures, provided those activities occur on and only affect airport property 8. Topping or trimming trees to meet 14 CFR Part 77 standards for removing obstructions, which can adversely affect navigable airspace

EA	An EA is prepared for proposed actions with expected minor or uncertain environmental impact potential. An EA requires analysis and documentation similar to that of an EIS, but with somewhat less detail and coordination. The FAA will review the EA and decide to issue a finding of no significant impact (FONSI) or prepare an EIS. Future airport development projects and actions that may require an EA are summarized below (emphasis added). See FAA orders 1050.1F and 5050.4B for more information. 1. Runway extensions due to possible wetland impacts, potential off-airport impacts related to aircraft noise, and potential impacts to affect listed species habitat 2. Taxiway construction due to possible wetland impacts and potential to affect listed species habitat 3. Aircraft parking apron, hangar and structures, and/or access road projects that may not qualify for a CatEx due to extraordinary circumstances (e.g., wetland impacts may not qualify for a nationwide or regional general permit) 4. Approval of operation specifications or amendments that may significantly change the character of the operational environment of an airport 5. New air traffic control procedures (e.g., instrument approach procedures, departure procedures, en-route procedures) and modifications to approved procedures that routinely route aircraft over noise-sensitive areas at less than 3,000 feet above ground level
EIS	An EIS is prepared for major federal actions, which are expected or known to significantly affect the quality of the human environment.

Compiled by ESA, 2023.

State Reviews

For projects that require NEPA compliance, state environmental reviews typically initiate with the Florida State Clearinghouse, which is administered by FDEP. A primary function of the Florida State Clearinghouse is to serve as the state's single point of contact for the receipt of federal activities that require interagency review, which includes activities subject to consistency review under the Florida Coastal Management Program. Upon completion of their review, the clearinghouse will typically issue a letter summarizing any potential concerns or inconsistencies regarding the proposed activity. The clearance letter will include information on obtaining necessary state permits and will inform the applicant if there is a need to submit additional information to a state agency for review. When NEPA compliance is not required, direct coordination with the relevant state regulatory agencies may still be required. Information related to the specific agencies and coordination and/or permits required is discussed in each of the individual resource sections in this chapter.

4.12. Summary

The information provided in this chapter will be used to evaluate the different improvement options considered for the airport. The level of environmental review required for a recommended alternative will be included in the overall development program to facilitate the timely advancement of future projects.

5. Alternatives Analysis

This chapter uses the facility requirements data to develop alternatives to meet the projected development needs at VRB. The alternatives considered must meet the aviation demand — by PAL, where applicable — and FAA design standards. In an alternatives analysis, the existing condition, also known as a no-build condition, is an alternative that should be considered. While graphics depicting the existing condition may not be included in this chapter, the development alternatives identified will be compared against the no-build condition as part of the evaluation.

Improvements, especially to the taxiway system, were identified in the previously approved ALP. These previously recommended improvements, which have not been constructed, will be evaluated to ensure they continue to meet FAA design standards and projected VRB user needs, as identified in the facility requirements. If the previously preferred alternative still meets these criteria, a full range of alternatives will not be developed for that facility; rather, the recommended alternative will be confirmed.

As identified in the facility requirements, the based aircraft are projected to grow to more than 300 from approximately 200 aircraft. The annual operations are projected to increase to more than 300,000, surpassing the pre-COVID-19 peak, and the annual enplaned passengers are projected to grow to more than 50,000. In this chapter, alternatives to meet VRB's development needs during the 20-year planning period are identified and evaluated for a variety of factors. The conceptual development alternatives are evaluated based on the goals and objectives identified for the airport master plan. They will be evaluated for operational performance, best planning practices, and environmental and fiscal factors. In particular, they will be evaluated for:

- Ease of operations
- Conformance to best practices for safety and security
- Conformance to the intent of FAA design standards and other appropriate planning guidelines
- Providing highest and best on- and off-airport land use
- Allowing for forecast growth throughout the planning period and beyond, as applicable
- Balance between functional area and types of users
- Providing flexibility to adjust to unforeseen changes
- Ability to meet airport sponsor's vision
- Conformance with appropriate local, regional, and state transportation plans and other applicable plans, developments of regional impact, or zoning
- Technical feasibility
- Social and political feasibility
- Ability to meet users' needs
- Minimizing or ability to mitigate environmental impacts
- Financial feasibility for implementation

Not all factors will apply to all alternatives. Only those applicable to an alternative are described in its evaluation. In this chapter, unless required to evaluate the alternatives, the financial feasibility will be considered at a macro level, e.g., if the alternative is financially feasible. Development cost estimates will not be prepared for every alternative. As part of the implementation plan, the probable development cost estimates will be prepared for the recommended development. The environmental overview chapter provides additional details on VRB's environmental setting that was used to evaluate the alternatives.

The alternatives are developed and evaluated with a primary focus on the airfield, then facilities that require airfield access. After identifying the areas required to support the high demand for aeronautical development, the remaining areas will be evaluated to support nonaeronautical facilities. Nonaeronautical facilities provide additional revenue streams for VRB to support the aeronautical functions. The facility requirements identified for each airfield and airside feature will be identified at the start of the analysis for that section.

To meet the aviation demands at VRB throughout the course of the 20-year planning horizon, this chapter focuses on alternatives for:

- Airfield: runway and taxiway systems and navaids and airfield support infrastructure, including:
  - Runway 12R/30L widening
  - Potential for lower instrument approach minimums on the instrument runways
  - Improvements to eliminate the use of declared distances on runways 12R/30L and 4/22
  - Potential extension of Runway 4/22
  - Improving the taxiway system to meet the latest FAA design standards
  - Additional parallel taxiway extensions and connectors to maximize utility of the runways
- Accommodating emerging aircraft technologies
- Airside commercial service, including:
  - Terminal building expansion
  - Auto parking expansion
  - Improved pedestrian access to the terminal
- GA hangar facilities, including improvements to maximize available development areas
- Other auto parking and utility improvements
- Nonaeronautical development opportunities

This chapter focuses on alternatives that could change the geometry of facilities on the airfield. For any facilities that will remain unchanged, while not accessed in the alternatives, recommendations for keeping them in good operational condition through maintenance, rehabilitation, reconstruction, or replacement will be incorporated as part of the implementation plan.

While this chapter will recommend alternatives to meet the facility requirements, an important step in the alternatives analysis process is to present these alternatives to airport staff, tenants, the public, and other agencies for input. This input will be incorporated to form the recommended development plan.

5.1. Runway System

The facility requirements chapter identified potential improvements to the runways at VRB. Each of these runway improvements is discussed in the following sections.

Runway system facility requirements

- Improve Runway 12R/30L for ARC C-III aircraft with MTOW > 150,000 pounds.
- Evaluate the feasibility of instrument approaches with less than a 3/4-mile visibility on Runway 12R/30L and a 7/8-mile visibility on Runway 4/22.
- Evaluate the feasibility of eliminating the use of declared distances on runways 12R/30L and 4/22.
- Extend Runway 4/22 to at least 5,000 feet and up to 5,700 feet to better serve the critical aircraft.
- Resolve runways 4/22 and 12L/30R overlapping RSAs.
- Minimize aircraft parked in RVZ when the ATCT is closed.

The facility requirements chapter identified a different critical aircraft for each of the runways at VRB. **Table 5.1** lists the key design standards applicable to each runway.

TABLE 5.1: EXISTING AND FUTURE RUNWAY DESIGN STANDARDS

Runway	Critical Aircraft	Runway Length x Length	RSA	ROFA	RPZ
12R/30L Existing	C-III Airbus 220-300	7,314' x 100'	1,000' beyond end, 600' before landing, 500' wide	1,000' beyond end, 600' before landing, 800' wide	1,000' inner width, 1,510' outer width, 1,700' length
12R/30L Future	D-III Gulfstream G650	7,314' x 150'	1,000' beyond end, 600' before landing, 500' wide	1,000' beyond end, 600' before landing, 800' wide	Up to 1,000' inner width, 1,750' outer width, 2,500' length
4/22 Existing	D-II Gulfstream G450	4,974' x 100'	1,000' beyond end, 600' before landing, 500' wide	1,000' beyond end, 600' before landing, 800' wide	500' inner width, 1,010' outer width, 1,700' length
4/22 Future	D-II Gulfstream G450	5,000' to 5,700' x 100'	1,000' beyond end, 600' before landing, 500' wide	1,000' beyond end, 600' before landing, 800' wide	500' inner width, 1,010' outer width, 1,700'; length
12L/30R Existing and Future	B-II Small Aircraft King Air B200	At least existing 3,504' x 75'	300' beyond end, 300' before landing, 150' wide	300' beyond end, 300' before landing, 500' wide	250' inner width, 450' outer width, 1,000' length

Sources: VRB Airport Master Plan: Forecast Chapter, prepared by ESA, 2023; FAA AC 150/5300-13B.

Runway 12R/30L

Runway Width

Runway 12R/30L is the primary runway at VRB. This runway is 7,314 feet long by 100 feet wide, with 20-foot-wide shoulders and blast pads that are 200 feet long by 140 feet wide. The existing critical aircraft is an Airbus A220-300, which has a MTOW of 156,000 pounds. Per AC150/5300-13B, runways that have a critical aircraft with an MTOW greater than 150,000 pounds should be 150 feet wide with shoulders that are 25 feet wide and a runway blast pad that is 200 feet wide and long. The existing runway length meets the operational needs; therefore, no changes to the runway length are recommended.

There is space available on VRB to widen Runway 12R/30L and make the shoulders and blast pad improvements to meet the FAA design standards for aircraft with an MTOW greater than 150,000 pounds. Therefore, the future development plans should consider increasing the runway width to 150 feet. If widened, the runway should be widened on each side to maintain the runway centerline to parallel centerline separation with the appropriate shoulders and blast pad improvements. The need to widen the runway is triggered by the operations of the Airbus A220-300, which has a maximum takeoff weight of 156,000 pounds, slightly more than the 150,000 pounds trigger for an increased runway width. The Airbus A220-300 is operating on Runway 12R/30L and can continue to operate on this runway until it is improved.

Runway 12R/30L Width Recommendation

It is recommended to widen Runway 12R/30L to 150 feet wide, widen the shoulders to 25 feet wide (beyond the wider runway), and enlarge the blast pads to 200 feet long and wide. The Airbus A220-300 has been operating regularly at VRB for approximately seven months. A longer history of regular operations by aircraft with an MTOW

of more than 150,000 pounds should be present before investing in widening the runway. Runway 12R/30L was rehabilitated in 2022. The runway widening could be planned to coincide with a future Runway 12R/30L paving project or runway lighting project to avoid disturbing the infrastructure before it has met is useful life.

Potential Improvements to Instrument Approach

There are three criteria that must be considered for instrument approaches: Part 77, FAA AC 150/5300-13B design standards, and TERPS. An airport should strive to meet Part 77 surfaces. The airport needs to meet the design standards, and the FAA will use TERPS to design the instrument approach and missed approach and establish the appropriate minimums.

Both ends of Runway 12R/30L have an LPV approach, with visibility minimums of 3/4 of a mile. Each runway end has a Part 77 nonprecision approach surface with a 34:1 slope and an RPZ with visibility minimums of not lower than 3/4 of a mile, with dimensions of 1,000 feet by 1,510 feet by 1,700 feet. With ongoing commercial service operations, the potential to improve each runway end to an approach with visibility minimums that are lower than 3/4 of a mile using GPS (similar capability to a precision approach) was evaluated to maximize the accessibility of VRB.

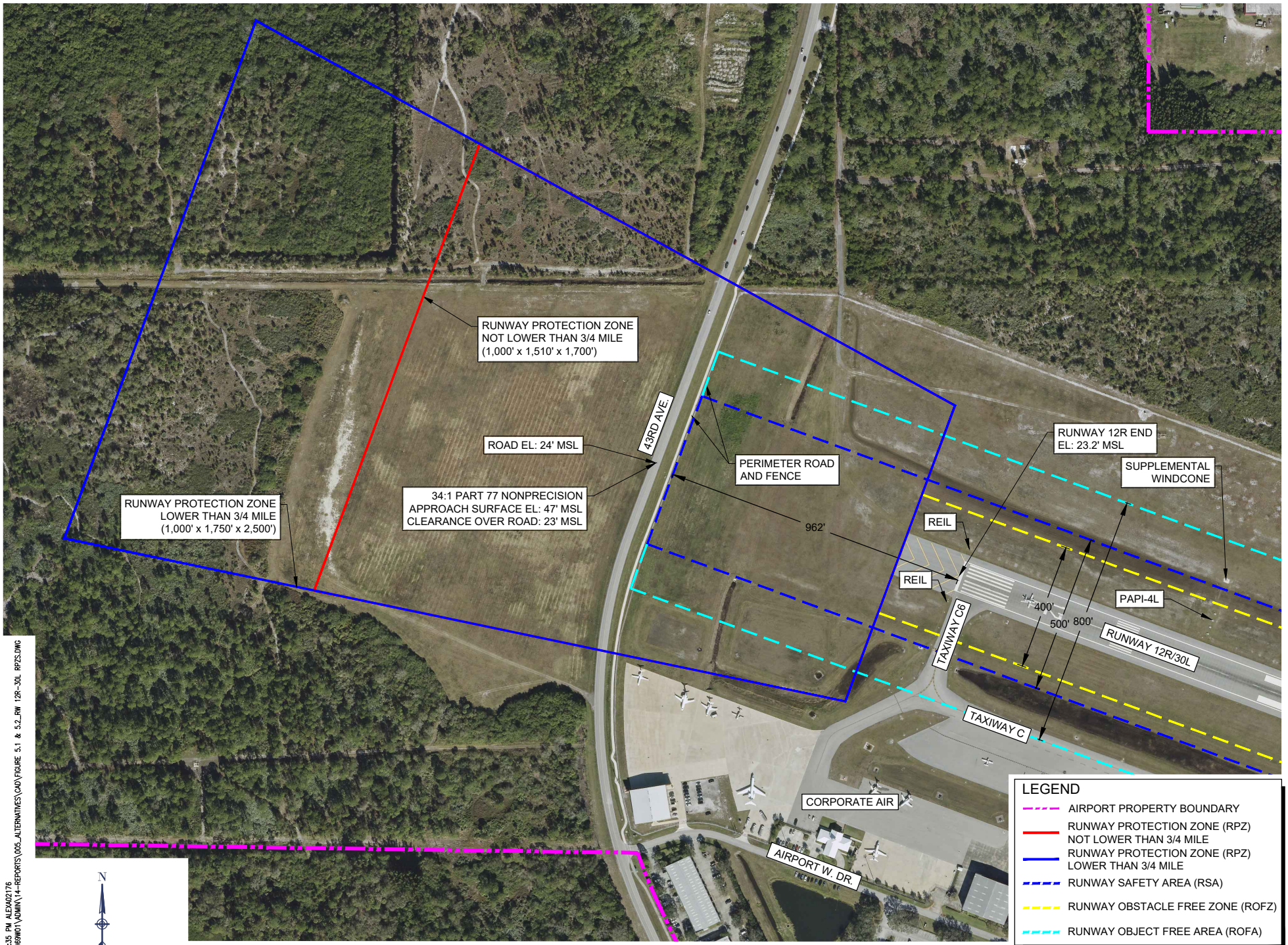
An LPV approach, even with lower minimums, is still classified as an approach with vertical guidance, not a precision approach. Therefore, the Part 77 precision approach surface with a slope of 34:1 is unchanged. However, the dimension of the RPZ increases to 1,000 feet by 1,750 feet by 2,500 feet. *FAA AC 150/5190-4B: Airport Land Use Compatibility Planning* identifies that RPZs should be clear of incompatible objects and land use. 43rd Avenue is within the RPZ for Runway 12R. Public roads are an incompatible land use and should be avoided within an RPZ to the extent feasible, especially if not an existing condition. Establishing an approach with a visibility that is lower than 3/4 of a mile on Runway 12R would be a change to the runway, and the FAA will require an RPZ analysis and that removing the land use of a road in an RPZ be considered, as discussed in the upcoming section on Runway 12R/30L declared distances.

Figure 5.1 shows the larger RPZ for an approach with lower-than-3/4-mile visibility on the Runway 12R end would remain within the airport property boundary; therefore, no additional aviation easements would be required. With 3/4-mile visibility minimums, Runway 12R/30L already supports a 1,000-foot-wide primary surface, so there would be no change to the primary surface for a precision approach.

To facilitate an approach with lower-than-3/4-mile visibility, at least a medium intensity approach lighting system with sequenced runway alignment indicator lights (MALSR) would be required. A MALSR extends 2,400 feet from the runway end and consists of enhanced threshold lighting, light bars, and strobe lights extending into the RPZ. This system could be installed within airport-owned property. With airline service, the ability to provide lower minimums could be a benefit to the operations. Instrument approach minimums below 3/4 of a mile would require a larger RPZ, plus the associated costs of MALSR installation and operation and a potential road relocation.

Runway 12R Instrument Approach Recommendation

While the no-build condition of 3/4-mile visibility minimums can continue to serve VRB, VRB has space on airport property to install an approach lighting system and support a precision approach on Runway 12R. Therefore, it is recommended to install an approach lighting system for reduced visibility minimums on Runway 12R to support commercial operations and enhance the safety of the airport during instrument approach procedures. This improvement is anticipated to require relocating 43rd Avenue. As part of the implementation plan that will be prepared for this master plan, the investment to lower the instrument approach minimums to Runway 12R should



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GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20J0BS\20A0069W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.1 & 5.2_RW 12R-30L RPZS.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	INSTRUMENT APPROACH IMPROVEMENTS RUNWAY 12R	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.1

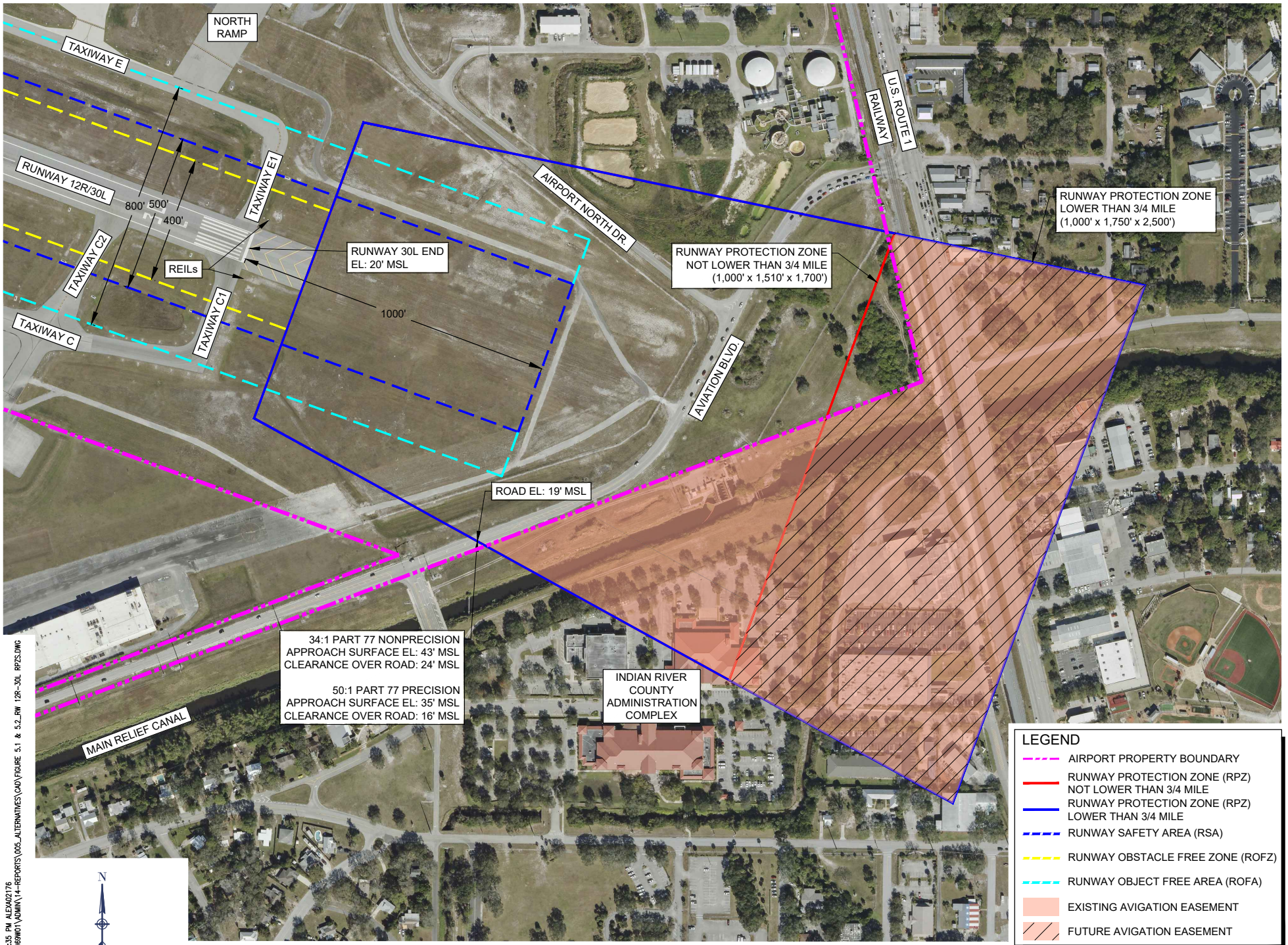
be evaluated further to determine the recommended triggers and/or timing. VRB should also consult with the FAA to identify the potential controlling object for an approach with visibility that is lower than 3/4 of a mile if other obstacle removals are needed to obtain the lowest minimums.

Figure 5.2 shows that the larger RPZ on the Runway 30L end would extend beyond the airport property boundary, which would introduce additional incompatible land use, including an additional roads and buildings, and would require approximately 28 acres of additional avigation easements to protect the RPZ. Steps to reduce the incompatible development would also need to be considered.

Runway 30L Instrument Approach Recommendation

With the extensive development off the end of Runway 30L, the cost to mitigate the incompatible land use would be extensive and have significant off-airport impacts due to the locations of roads, railroads, and buildings. The cost of mitigating incompatible land use within the larger RPZ for a lower visibility approach would not outweigh the benefit of an improved instrument approach. Therefore, to avoid additional incompatible land use in the Runway 30L RPZ and potential impacts on the area adjacent to the airport, the no-build condition of an instrument approach with 3/4 of a mile of visibility is recommended on Runway 30L.

Airlines also need to plan for one-engine inoperable conditions on a departure. For domestic operations, this is defined by the FAA as the obstacle accountability area (OAA). The slope in the OAA is best approximated by 62.5:1 from the end of the TORA. While not required to be cleared as part of FAA design standards, objects within this surface will be reviewed as part of the approach surface analysis during the preparation of the ALP to identify any improvements to maximize the available runway length for airline operations.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 5:35 PM ALEXA02176
I:\20JOBS\20A00690\01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.1 & 5.2_RW 12R-30L RPZS.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	INSTRUMENT APPROACH IMPROVEMENTS RUNWAY 30L	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.2

Runway 12R/30L Declared Distance Improvements

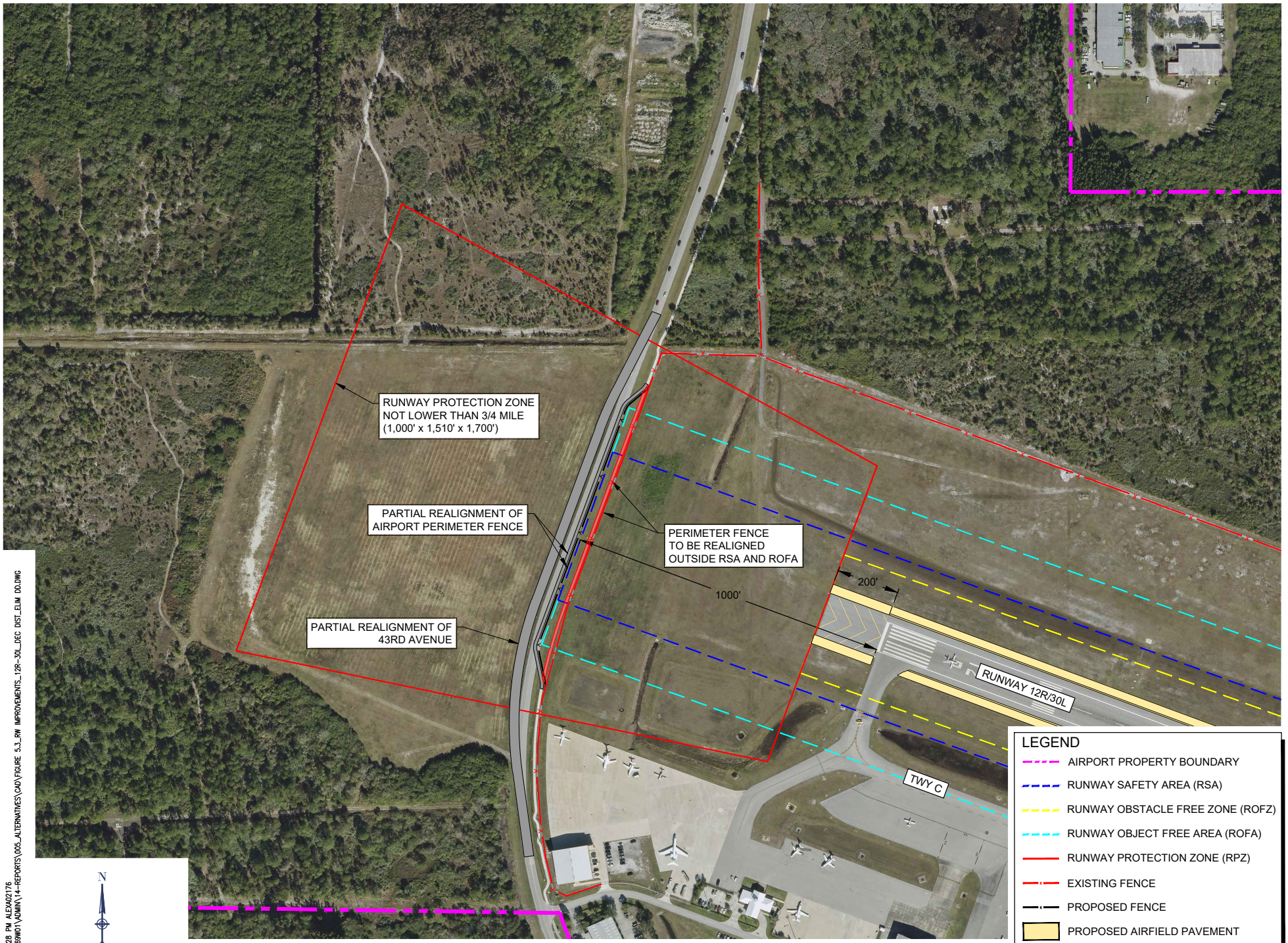
ARC C/D-III standards require that the RSA and ROFA extend 1,000 feet beyond the takeoff end of the runway. At the time of this airport master plan, declared distances are published for Runway 12R/30L. These declared distances are in place due to the perimeter fence, which is within 1,000 feet of the physical end of Runway 12R. Declared distances of 7,276 feet are implemented on Runway 30L for accelerate-stop distance available (ASDA) and landing distance available (LDA) operations. By shortening the available runway length for the Runway 30L ASDA and LDA, the declared distances provide aircraft taking off and landing on Runway 30L a 1,000-foot RSA beyond the Runway 12R end. While the use of declared distances provides a safe operating environment by meeting FAA design standards, the potential to recapture the runway length through improvements to eliminate declared distances should be evaluated.

Figure 5.3 shows the minimum realignment of 43rd Avenue and the airport perimeter fence to provide the standard 1,000-foot RSA beyond the physical end of Runway 12R. Relocating the airport perimeter fence would require a partial realignment of 43rd Avenue. The community is planning improvements to 43rd Avenue to accommodate growing development in the vicinity of the airport. The airport owns land that could accommodate the realignment of 43rd Avenue off the end of Runway 12R. VRB should work with the community to incorporate realigning 43rd Avenue as part of any future improvement plans to allow for the realignment of the airport perimeter fence to eliminate the declared distances and addition of an airport perimeter road. Moving 43rd Avenue farther from the end of Runway 12R would also increase the margin of safety on Runway 12R/30L.

As discussed above, it is recommended that VRB preserve the space to provide an instrument approach on Runway 12R. **Figure 5.4** shows a relocation of 43rd Avenue outside the limits of a precision approach RPZ and within airport property. The speed limit on 43rd Avenue is 35 mph. It should be feasible to design the relocated 43rd Avenue to maintain that speed limit; however, the travel distance will increase from 3,500 feet to approximately 6,600 feet.

Runway 12R/30L Declared Distances Recommendation

VRB should work with the community such that, at a minimum, the slight realignment of 43rd Avenue would be included as part of the next improvement project on 43rd Avenue to eliminate the declared distances on Runway 12R/30L. Space should be preserved and coordination initiated to determine whether the community would accept a potentially larger relocation of 43rd Avenue around the RPZ to enable VRB to accommodate an approach with lower than 3/4 of a mile of visibility on Runway 12R and remove an incompatible land use from the RPZ.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

VERO BEACH REGIONAL AIRPORT | HANSON

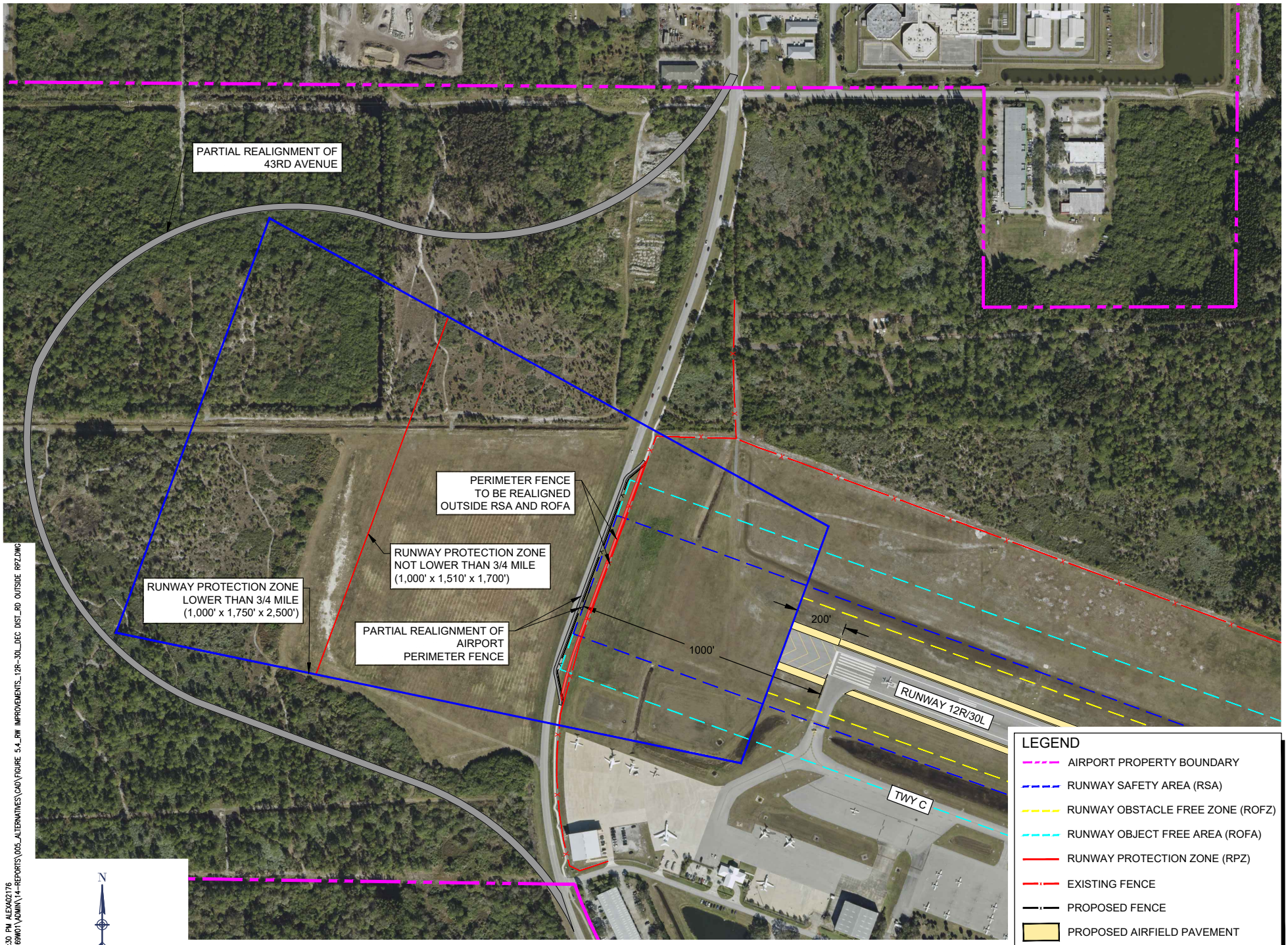
VERO BEACH REGIONAL AIRPORT MASTER PLAN

POTENTIAL IMPROVEMENTS TO RUNWAY 12R/30L DECLARED DISTANCES

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.3

OCT 13, 2023 2:28 PM ALEXA02176
I:\2020BS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.3_RW IMPROVEMENTS_12R-30L_DEC DIST_ELIM DD.DWG



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GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.4_RW IMPROVEMENTS_12R-30L_DEC DIST_RD OUTSIDE RPZ.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

43RD AVENUE REALIGNMENT OUTSIDE OF RUNWAY 12R RPZ - LOWER THAN 3/4 MILE

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.4

Runway 4/22

Length and Instrument Approaches

Runway 4/22, known as the crosswind runway, is needed to provide crosswind coverage for the ARC A-I to B-II aircraft operating at VRB, including corporate jets and smaller GA traffic. However, Runway 4/22 is also used by larger aircraft able to operate on its 4,974-foot length and 100-foot width. The existing Runway 4/22 critical aircraft is ARC C-II, and the future critical aircraft is ARC D-II. The ARC C-II and D-II standards are generally the same. Because the runway length is 4,974 feet, there are operational constraints on some larger operators when using Runway 4/22. As identified in the facility requirements, at least 5,000 feet and up to 5,700 feet should be provided on Runway 4/22 to meet the critical aircraft (ARC C/D-II) operating on this runway.

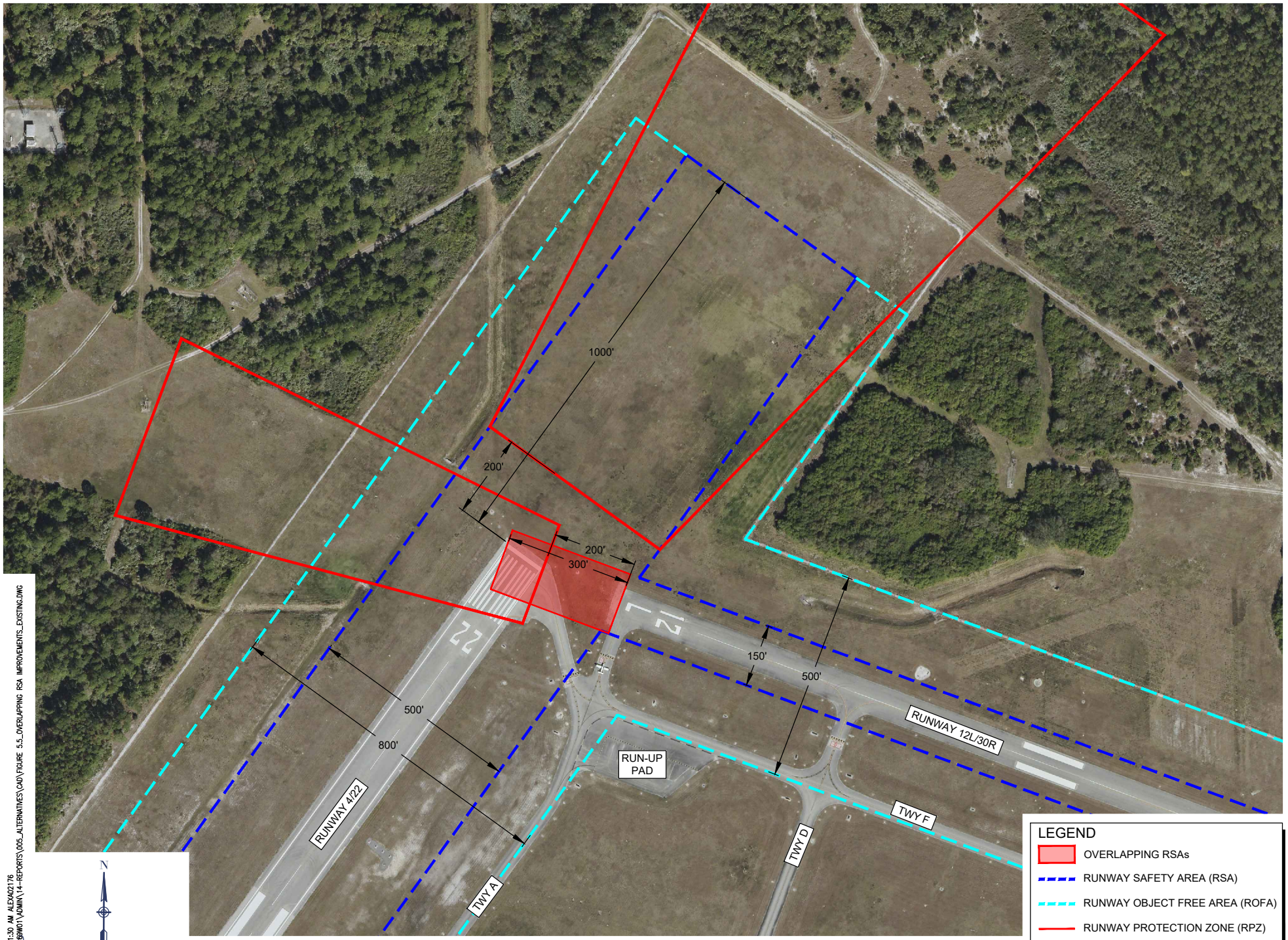
Resolve Overlapping RSAs

As identified in the facility requirements and shown in **Figure 5.5**, the RSA of runways 4/22 and 12L/30R overlap, and the end taxiway connector to Runway 22 is not at a standard 90-degree angle to the runway. Therefore, the potential alternatives for extending Runway 4/22 should also consider improvements to eliminate the overlapping RSAs and provide standard taxiway connectors. Three alternatives were identified to address extending Runway 4/22 and improving the taxiway connectors and reducing or eliminating the overlapping RSA. All the alternatives are within existing VRB property.

Alternative 1, depicted in **Figure 5.6,** extends Runway 4/22 to 5,300 feet, the minimum length to provide a standard connector to the end of Runway 22 from Taxiway A, with space to allow an aircraft to hold at the end of Runway 22 clear of Runway 12L. Also, as identified in the facility requirements chapter, extending Taxiway B the full length of Runway 4/22 should be considered, so it is included in this alternative and depicted in Figure 4.6. In this alternative, the nonstandard taxiway connectors are resolved; however, the overlapping RSAs remain.

Alternative 2, as depicted in **Figure 5.7,** builds on Alternative 1 but shortens the Runway 12L end by 339 feet to resolve the overlapping RSAs with the taxiway modification. Reducing the length of Runway 12L/30R allows sufficient space to protect for the full RSA of 300 feet beyond the Runway 12L end; however, this option reduces Runway 12L/30R to 3,165 feet long. Shortening Runway 12L/30R does not meet the minimum usable length, as identified in the facility requirements of 3,600 feet. Further, the flight schools that use this runway already have runway length limitations with aircraft such as the Piper Arrow and Seminole during touch-and-go training operations, and shortening the runway length would introduce additional operational limitations that would potentially impact airfield capacity.

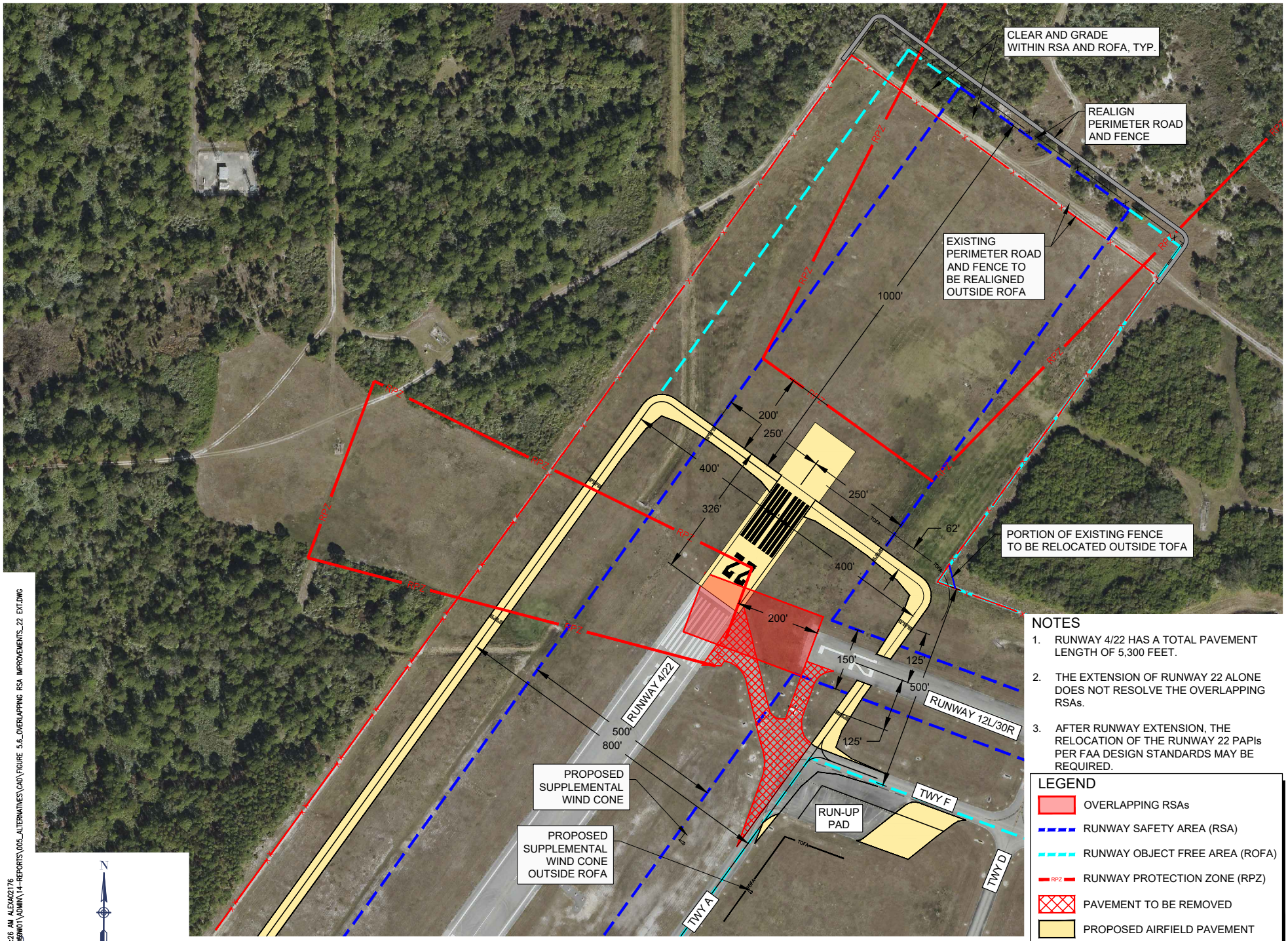
Alternative 3, as depicted in **Figure 5.8**, extends the Runway 12L and 22 ends by 700 feet and 326 feet, respectively, eliminating the overlapping RSA without reducing the length of Runway 12L/30R. The extensions on both runway ends are the minimum length required to meet airfield design standards. These airfield design standards include the runway-to-taxiway centerline separation of 400 feet for the extension of future Taxiway B and for aircraft taxiing on the future Taxiway A extension to hold short and perpendicular at Runway 22. This alternative includes the extension of the parallel taxiways on each side of Runway 4/22 to enhance airfield access. This alternative resolves the overlapping RSAs and the operational needs to extend Runway 4/22 to at least 5,000 feet. The run-up pad near the end of Runway 12L is proposed to be expanded to the east to replace the portion within the realigned and extended Taxiway A.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 02, 2023 11:30 AM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.5_OVERLAPPING RSA IMPROVEMENTS_EXISTING.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	OVERLAPPING RSAs RUNWAYS 4/22 AND 12L/30R	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.5



NOTES

1. RUNWAY 4/22 HAS A TOTAL PAVEMENT LENGTH OF 5,300 FEET.
2. THE EXTENSION OF RUNWAY 22 ALONE DOES NOT RESOLVE THE OVERLAPPING RSAs.
3. AFTER RUNWAY EXTENSION, THE RELOCATION OF THE RUNWAY 22 PAPIs PER FAA DESIGN STANDARDS MAY BE REQUIRED.

LEGEND

- OVERLAPPING RSAs
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- RUNWAY PROTECTION ZONE (RPZ)
- PAVEMENT TO BE REMOVED
- PROPOSED AIRFIELD PAVEMENT

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GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

ALTERNATIVE 1
EXTEND RUNWAY 22 AND
TAXIWAY GEOMETRY MODIFICATIONS

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.6

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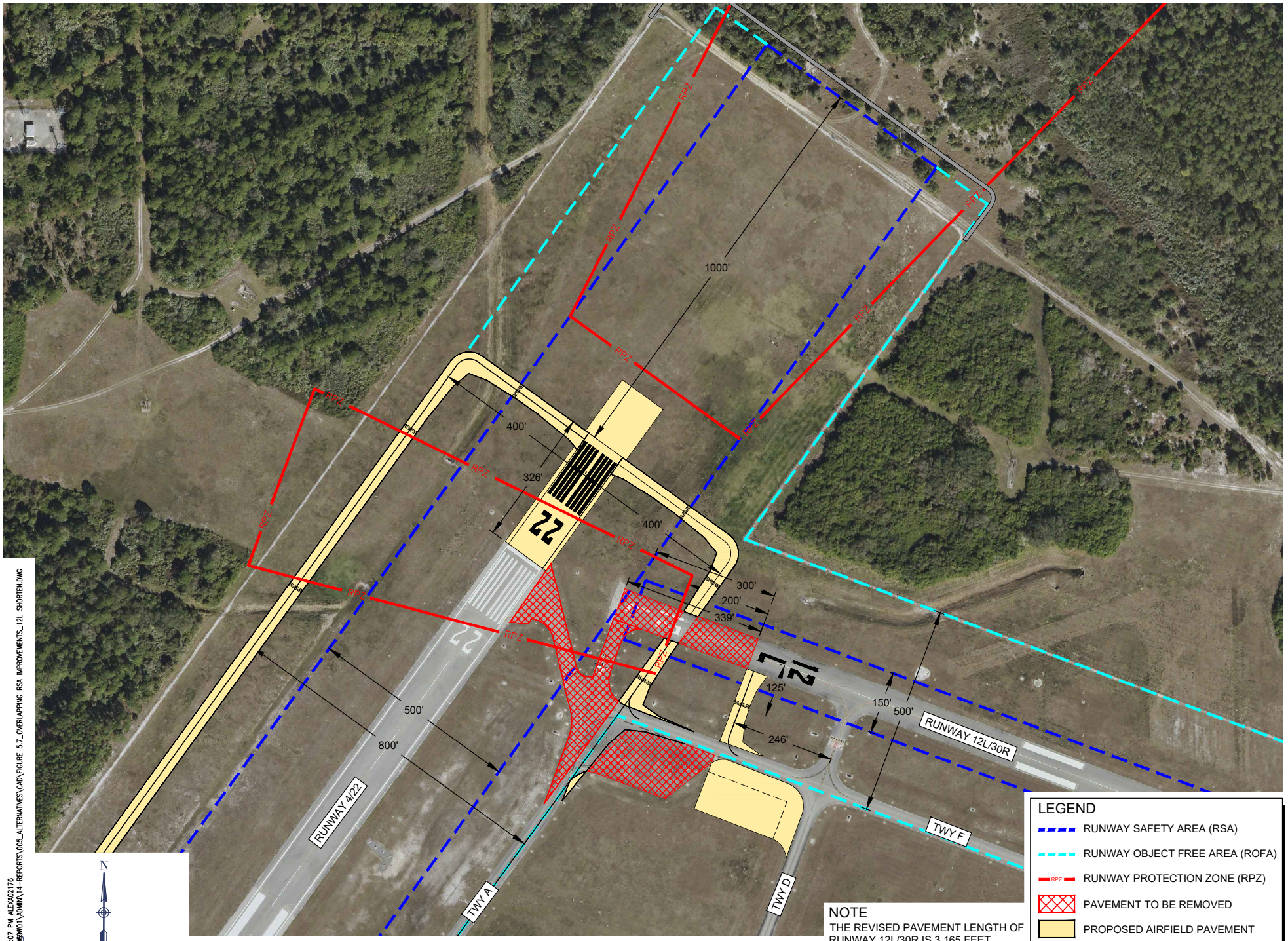
I:\2020BS\20A00860W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.6_OVERLAPPING RSA IMPROVEMENTS_22 EXT.DWG



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20JOBS\20A00860W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.7_OVERLAPPING RSA IMPROVEMENTS_12L SHORTEN.DWG

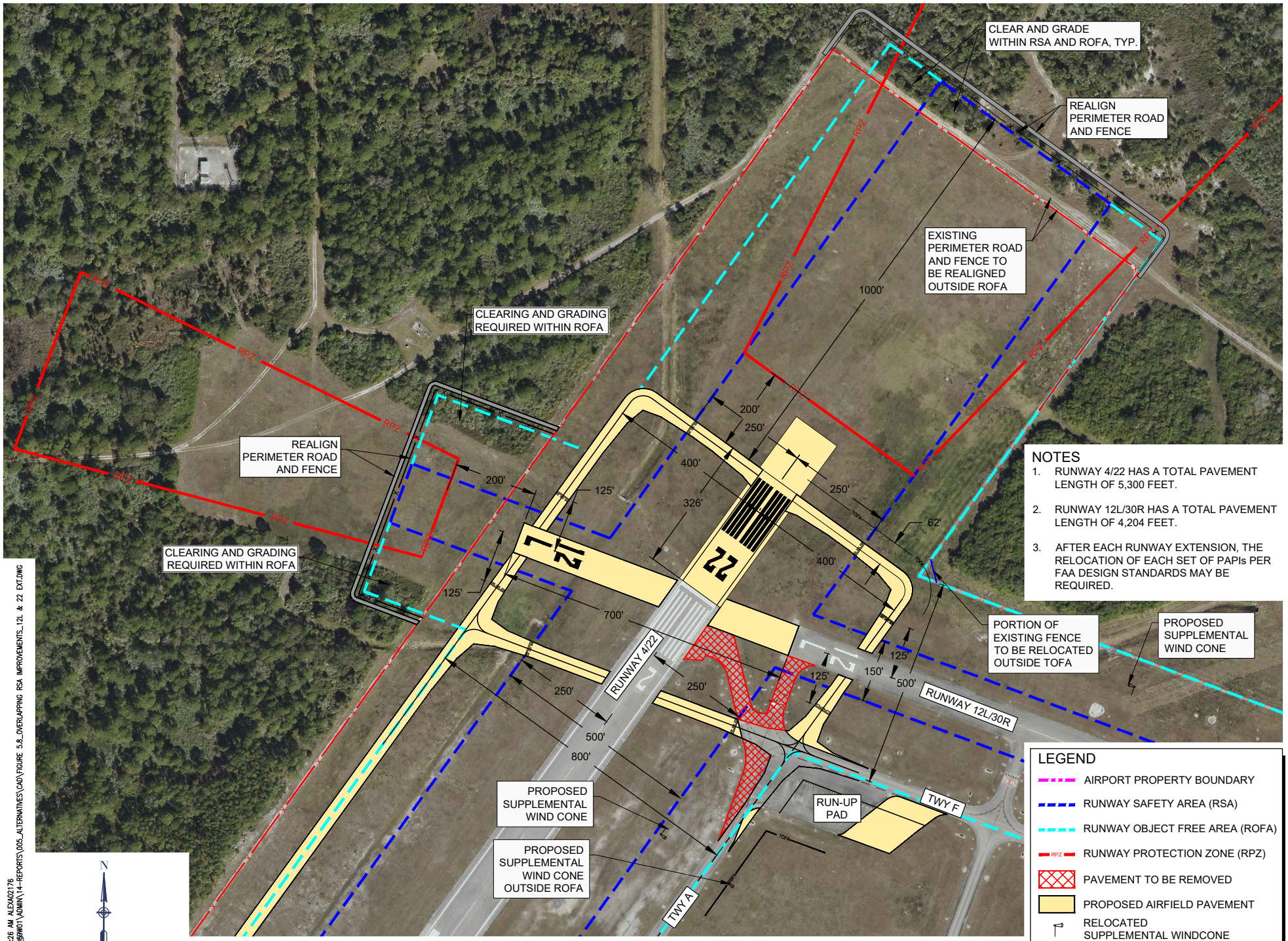
VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

ALTERNATIVE 2
SHORTEN RUNWAY 12L TO ELIMINATE OVERLAPPING RSAs

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.7



NOTES

1. RUNWAY 4/22 HAS A TOTAL PAVEMENT LENGTH OF 5,300 FEET.
2. RUNWAY 12L/30R HAS A TOTAL PAVEMENT LENGTH OF 4,204 FEET.
3. AFTER EACH RUNWAY EXTENSION, THE RELOCATION OF EACH SET OF PAPIs PER FAA DESIGN STANDARDS MAY BE REQUIRED.

LEGEND

- AIRPORT PROPERTY BOUNDARY
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- RUNWAY PROTECTION ZONE (RPZ)
- PAVEMENT TO BE REMOVED
- PROPOSED AIRFIELD PAVEMENT
- RELOCATED SUPPLEMENTAL WINDCONE

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GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 13, 2023 8:26 AM ALEXA02176
I:\2020BS\20A0086W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.8_OVERLAPPING RSA IMPROVEMENTS_12L & 22 EXT.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

ALTERNATIVE 3
EXTEND RUNWAY 22 AND 12L TO ELIMINATE OVERLAPPING RSAs

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.8

Maximum Runway 22 Extension

As previously shown in Figure 5.6, extending the Runway 22 end 326 feet for a total length of 5,300 feet is the minimum runway extension necessary to comply with FAA airfield design standards of holding aircraft perpendicular to the runway. The facility requirements identified the need to extend Runway 4/22 up to 5,700 feet for the critical aircraft. **Figure 5.9** depicts the extension of Runway 22 for a total runway length of 5,700 feet. At this length, the Runway 22 RPZ remains within airport property while providing standard taxiway connectors and resolving the overlapping RSAs. The perimeter road and fence beyond the Runway 22 end would require relocation to provide the full 1,000-foot RSA. This would also require the relocation of the Runway 22 PAPIs to comply with the FAA siting standards for the distance from the runway threshold. The supplemental wind cone on the Runway 22 end needs to be replaced, as detailed in the navaids section, so it can be located such that the supplemental wind cone would comply with FAA design standards for the extended runway. Clearing and grading would be required within the RSA and ROFA. Also, the extension of Runway 22 would shift the runway approach surfaces farther north, so it is likely that removing trees or other obstructions will be needed. This will be further analyzed in the ALP.

The commercial airline operator indicated that to consider using the crosswind runway, the runway would need to be approximately 6,000 feet long. Because 5,700 feet is the maximum length within the airport's property, the critical aircraft for an extension of Runway 4/22 would remain ARC C/D-II.

Runway 4/22 Extension and Overlapping RSA Alternatives Recommendation

The taxiway geometry in the no-build condition does not meet the latest FAA design standards. Therefore, the no-build condition is not acceptable, and the taxiway configuration should be modified to meet FAA design standards. Only alternatives 2 and 3 meet FAA design standards. The overlapping RSAs remain in Alternative 1; therefore, Alternative 1 has been eliminated from consideration.

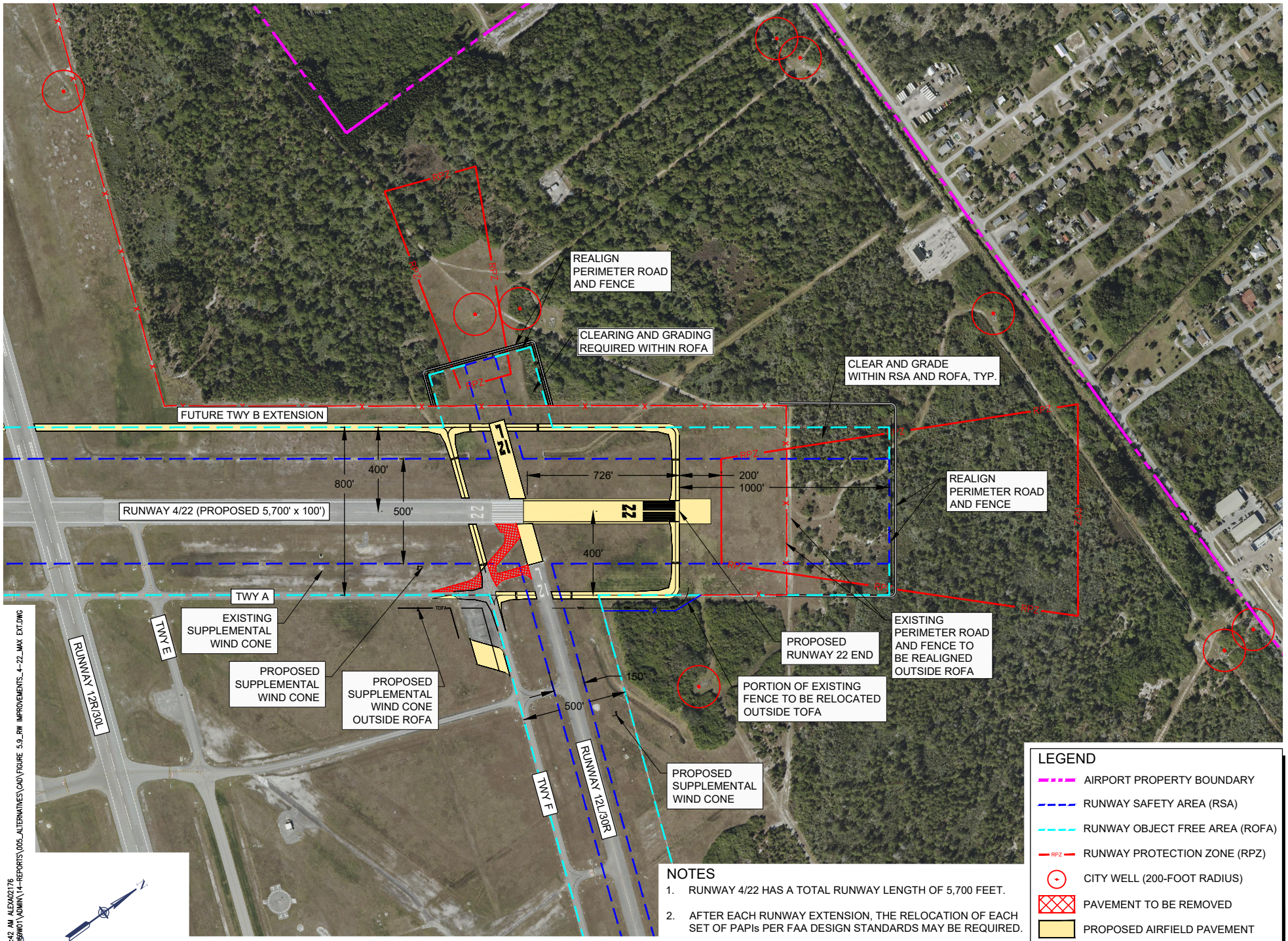
Alternative 2 does not meet the facility requirement of maintaining at least the existing length on Runway 12L/30R; therefore, it is not recommended. Alternative 3 is recommended because it meets FAA design standards and all operational facility requirements and provides the flexibility to extend Taxiway B the full length of an extended Runway 4/22, with a runway centerline to taxiway centerline separation of 400 feet.

It is recommended that Runway 22 be extended at least 326 feet and Runway 12L be extended 700 feet to resolve the overlapping RSAs and provide standard taxiway connectors. This would increase Runway 12L/30R to 4,204 feet and Runway 4/22 to 5,300 feet. These runway extension improvements would eliminate the overlapping RSAs and increase the overall length of Runway 4/22 to reduce limitations on business jet operations on this runway.

The ability to extend Runway 4/22 up to 5,700 feet is recommended, so this alternative should be preserved for ultimate airfield development. Any extension to Runway 22 would require an obstruction analysis and removing any obstructions to the approach to maximize the utility of the additional runway length.

Runway 4/22 Instrument Approach Improvements

Consideration was given to improving the instrument approaches to Runway 4/22 to lower the visibility minimums to as low as or lower than 3/4 of a mile. Because of the location of the existing development on the west side of Runway 4/22, this runway cannot support the 1,000-foot-wide primary surface needed for visibility minimums as low as or lower than 3/4 of a mile. Therefore, the instrument approach visibility minimums for Runway 4/22 should be maintained at 7/8 of a mile or higher.



NOTES

1. RUNWAY 4/22 HAS A TOTAL RUNWAY LENGTH OF 5,700 FEET.
2. AFTER EACH RUNWAY EXTENSION, THE RELOCATION OF EACH SET OF PAPIs PER FAA DESIGN STANDARDS MAY BE REQUIRED.

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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GRAPHIC SCALE IN FEET

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

EXTENSION OF RUNWAY 22 TO 5,700 FEET

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.9

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I:\20JOBS\20A00690W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.9_RW IMPROVEMENTS_4-22_MAX EXT.DWG

An airport should own or have an interest in all the land within the RPZ to control the land use. A portion of the Runway 4 RPZ extends off airport property over county-owned property. A large portion of the RPZ is protected by an easement. There is one building within the easement area. However, the Runway 4 RPZ size has increased due to instrument approach improvements since this easement was acquired. VRB should pursue the acquiring additional property interest or at least an easement to protect the larger Runway 4 RPZ. VRB should also pursue acquiring the rights to remove the building within the RPZ.

Runway 4/22 Instrument Approach Improvement Recommendation

The existing development along Runway 4/22 precludes the ability to meet the wider primary surface for instrument approach minimums as low as or lower than 3/4 of a mile. Therefore, the instrument approach visibility minimums for Runway 4/22 are recommended to be maintained at no lower than 7/8 of a mile. It is recommended that VRB pursue acquiring an easement for the larger RPZ over this county-owned property. Also, VRB should pursue acquiring the rights to remove the building within the RPZ.

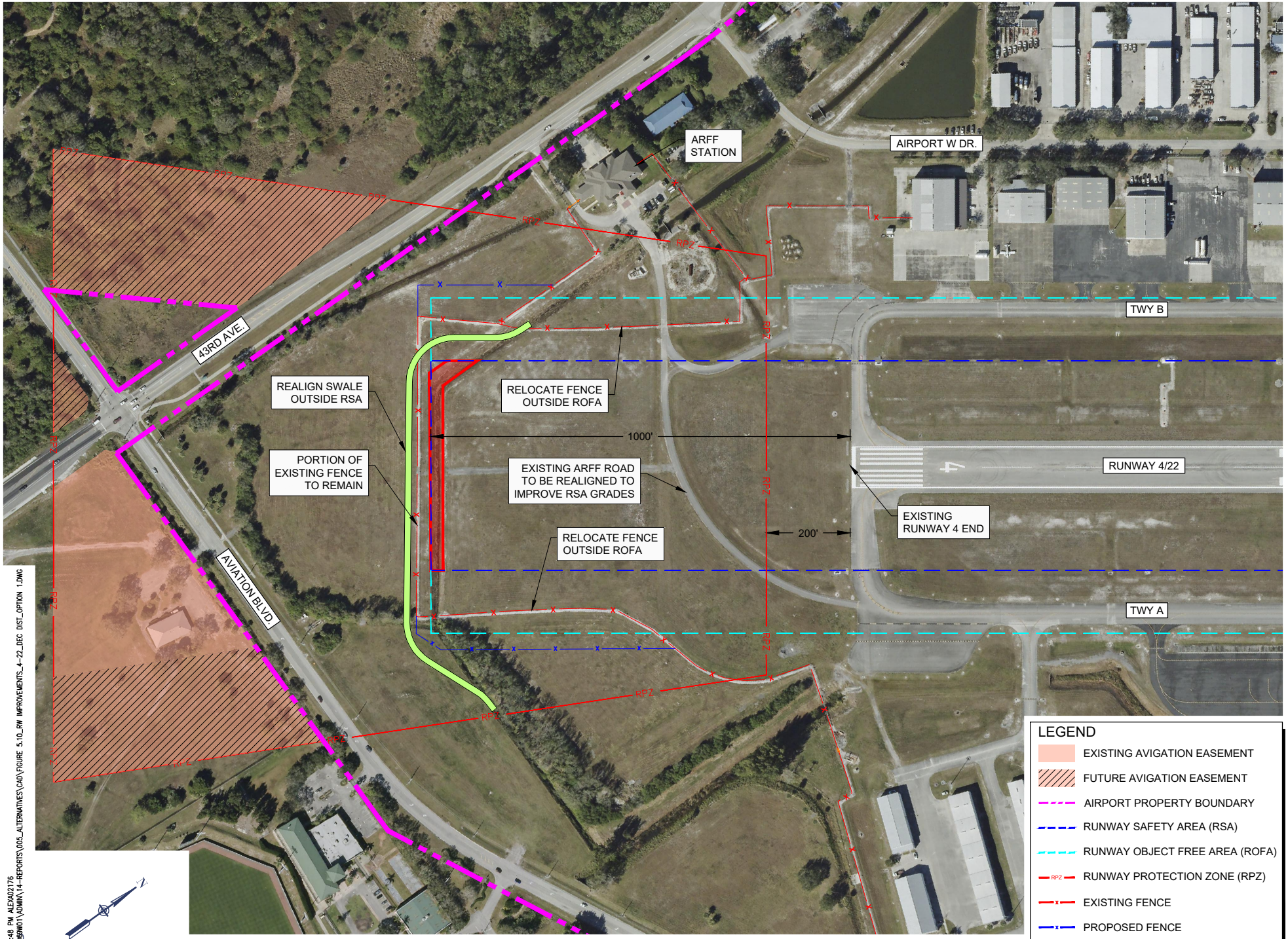
Runway 4/22 Declared Distance Improvements

ARC C/D-II design standards require that the RSA and ROFA extend 1,000 feet beyond the takeoff end of the runway. At the time of this airport master plan, declared distances are published for Runway 4/22. These declared distances are in place due to a drainage swale within 1,000 feet of the physical Runway 4 end. Declared distances of 4,945 feet are implemented on the Runway 22 ASDA and LDA operations to provide a 1,000-foot RSA beyond the declared end of Runway 4 for aircraft taking off and landing on Runway 22. Two alternatives were evaluated to eliminate the declared distances for Runway 22 ASDA and LDA operations.

Alternative 1, shown in **Figure 5.10**, depicts maintaining the location of the Runway 4 end and relocating the drainage swale outside the RSA and ROFA. Portions of the fence on the east and west side of the runway would also be relocated outside the ROFA. Realigning the drainage swale outside the fence would allow easier access for maintenance and assist in keeping wildlife outside the fence. The ARFF access road connecting the station to the airfield passes within the Runway 4 ROFA. As part of this alternative, the overall RSA grades would be improved, including modifications to the ARFF access road. Any changes to the ARFF road would still allow the emergency team to meet the FAA's response time requirements. This alternative does not change the location of the RPZ. The roads within the RPZ would remain. This alternative does not change the runway, so the location of the roads with the RPZ should continue to be acceptable for FAA compliance purposes.

Alternative 2, shown in **Figure 5.11**, relocates the Runway 4 end to the northeast by 29 feet. This relocation would shorten the runway so that the drainage swale is outside the RSA and ROFA. While it would eliminate the declared distances, unless there is a corresponding extension on the other end, it would shorten the overall runway length for all operations instead of just the Runway 22 ASDA and LDA. In addition, this runway end relocation would require the runway to be remarked, the runway end and edge lights to be relocated, guidance signs to be relocated, and taxiway end connectors to be modified. While this alternative moves the RPZ 29 feet to the north, the roads will remain within the RPZ. Because there is a need for additional length on Runway 4/22, reducing the runway length does not meet the facility requirement recommendations.

An extension of the Runway 22 end would be a change to the runway. Therefore, consideration needs to be given to eliminating the roads within the Runway 4 RPZ. The Runway 4 end would need to shift 1,172 feet so that 43rd Avenue would be outside the Runway 4 RPZ. The shift of the RPZ would impact existing development, introducing additional incompatible land use along Taxiway B and decreasing the overall Runway 4/22 length to 3,802 feet.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20UOBS\20A00860W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.10_RW IMPROVEMENTS_4-22_DEC DIST_OPTION 1.DWG

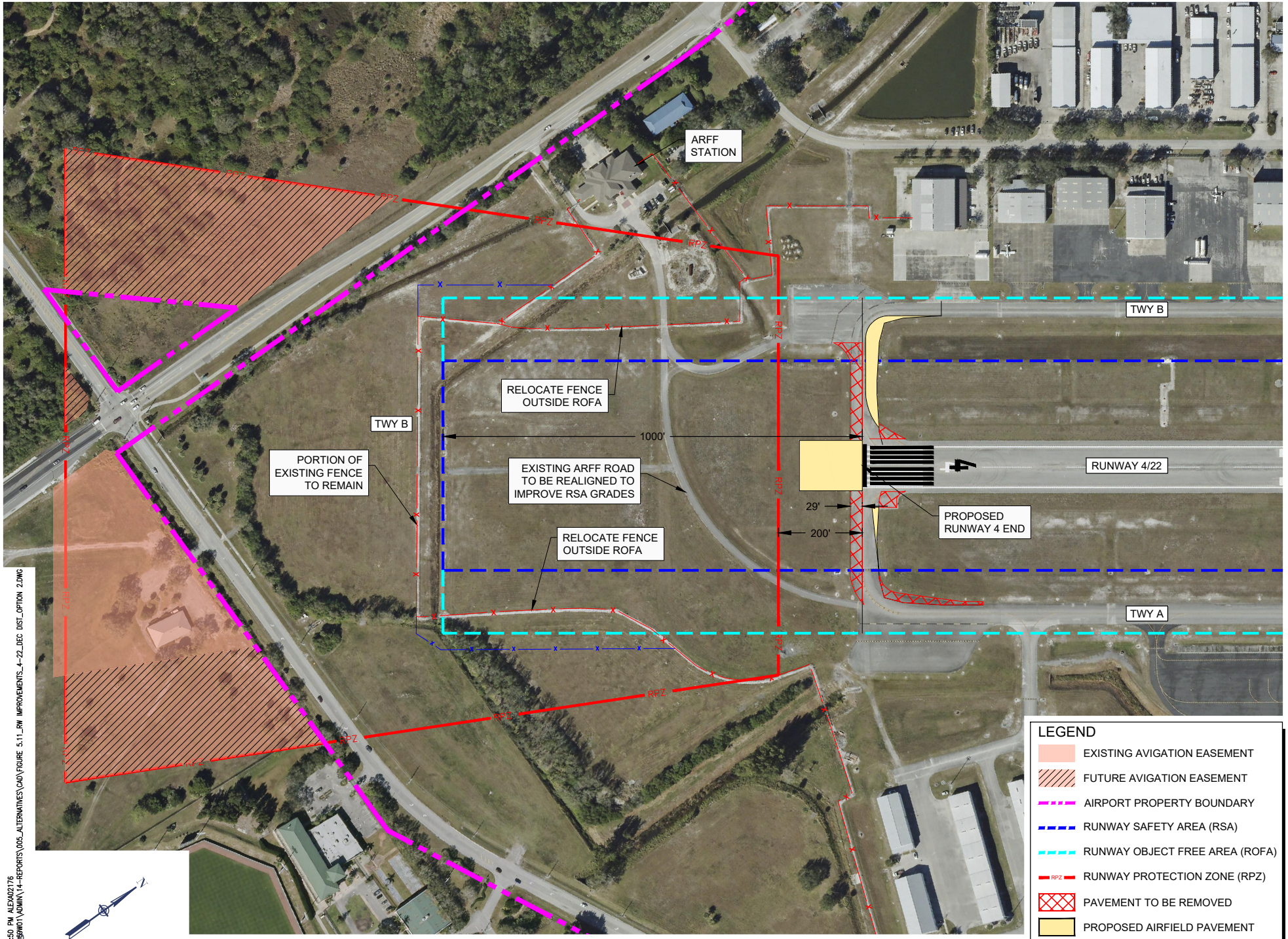
VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

ALTERNATIVE 1
RUNWAY 4/22 POTENTIAL
DECLARED DISTANCES IMPROVEMENTS

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.10



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20JOBS\20A00860W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.11_RW IMPROVEMENTS_4-22_DEC DIST_OPTION 2.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

ALTERNATIVE 2
RUNWAY 4/22 POTENTIAL
DECLARED DISTANCES IMPROVEMENTS

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.11

Therefore, shifting Runway 4/22 to the north to remove the roads is not feasible. The maximum shift of Runway 4/22 without impacting on-airport development is 100 feet, as depicted in **Figure 5.12**. This shift does not remove any roads.

Runway 4/22 Declared Distances Recommendation

The no-build condition meets FAA design standards and can remain. However, to maximize the use of the existing runway pavement, Alternative 1 is recommended. Alternative 1 maintains the length and enhances the margin of safety by relocating the drainage swale outside the RSA.

Runway 12L/30R

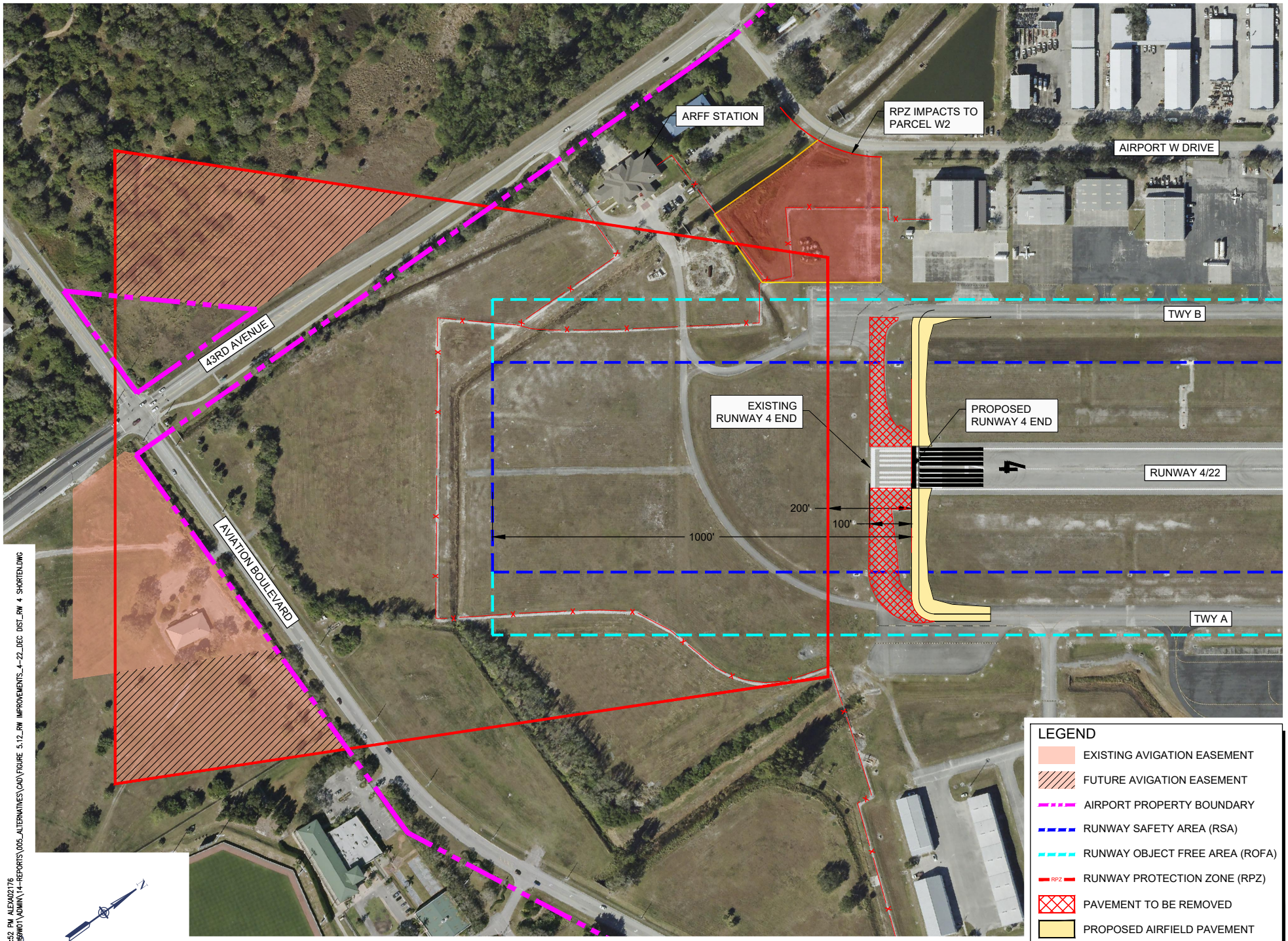
Runway 12L/30R is a secondary runway, critical to providing operational capacity at VRB. It serves as a parallel runway to the primary runway. This runway is 3,504 feet long by 75 feet wide. Based on the critical aircraft for Runway 12L/30R of a King Air 200, the length and width of the runway is sufficient, but no reduction in length is acceptable. Although the runway length is sufficient for existing and forecasted operations, future runway length improvements are recommended to mitigate the overlapping RSAs, as discussed for Runway 4/22. The extension to Runway 12L/30R to mitigate the overlapping RSAs would provide an additional margin of safety for twin-engine aircraft operating on this runway.

Runway Visibility Zone Improvements

With a part-time ATCT, there are runway visibility zones (RVZ) around the intersection of runways or extended runway centerlines to allow pilots a clear line of sight to see other aircraft on the intersecting runway. The facility requirements identified that there are aircraft and helicopter parking positions within the RVZ of runways 12R/30L and 4/22. These parking positions are within the leasehold of the flight schools.

RVZ Improvement Recommendation

The no-build condition results in aircraft parking within the RVZ when the tower is closed. Steps should be taken to eliminate or at least reduce aircraft parking within the RVZ. Until the leases can be modified and/or other parking areas developed, the airport staff should work with the flight schools to keep these parking positions vacant, when feasible, outside the ATCT operating hours by first using other parking positions within their leasehold.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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GRAPHIC SCALE IN FEET

VERO BEACH REGIONAL AIRPORT | HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RUNWAY 4/22 SHIFT 100 FEET TO THE NORTH	DRAWN BY: JA CHECKED BY: SZ FIGURE 5.12

OCT 12, 2023 5:52 PM ALEXA02176
I:\20J0BS\20A00880W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.12_RW IMPROVEMENTS_4-22_DEC DIST_RW 4 SHORTEN.DWG

5.2. Taxiway System

The facility requirements chapter identified potential improvements to the taxiways at VRB. Each improvement is discussed in the following sections. The goal is to identify improvements to the taxiway system to meet the latest FAA design standards while maintaining operational safety and efficiency.

Taxiway system facility requirements

- Establish a standard taxiway connector to Runway 22 (as discussed previously).
- Establish alphanumeric names on taxiway end connectors.
- Eliminate direct apron-to-runway taxiway connectors.
- Improve an FAA-identified hot spot where Taxiway C crosses Runway 4/22.
- Provide a bypass taxiway at each end of Runway 12R/30L.

Table 5.2 identifies the taxiway design standards for VRB that will be used to assess taxiway alternatives.

TABLE 5.2: SUMMARY OF TAXIWAY DESIGN STANDARDS RUNWAY

Runway	Taxiway Design Group (TDG)		Taxiway Width
	Existing	Future	
Runway 12R/30L	TDG 3		50 feet
Runway 4/22	TDG 2A		35 feet
Runway 12L/30R	TDG 2A		35 feet

Sources: VRB Airport Master Plan: Forecast Chapter, prepared by ESA, 2023; FAA AC 150/5300-13B.

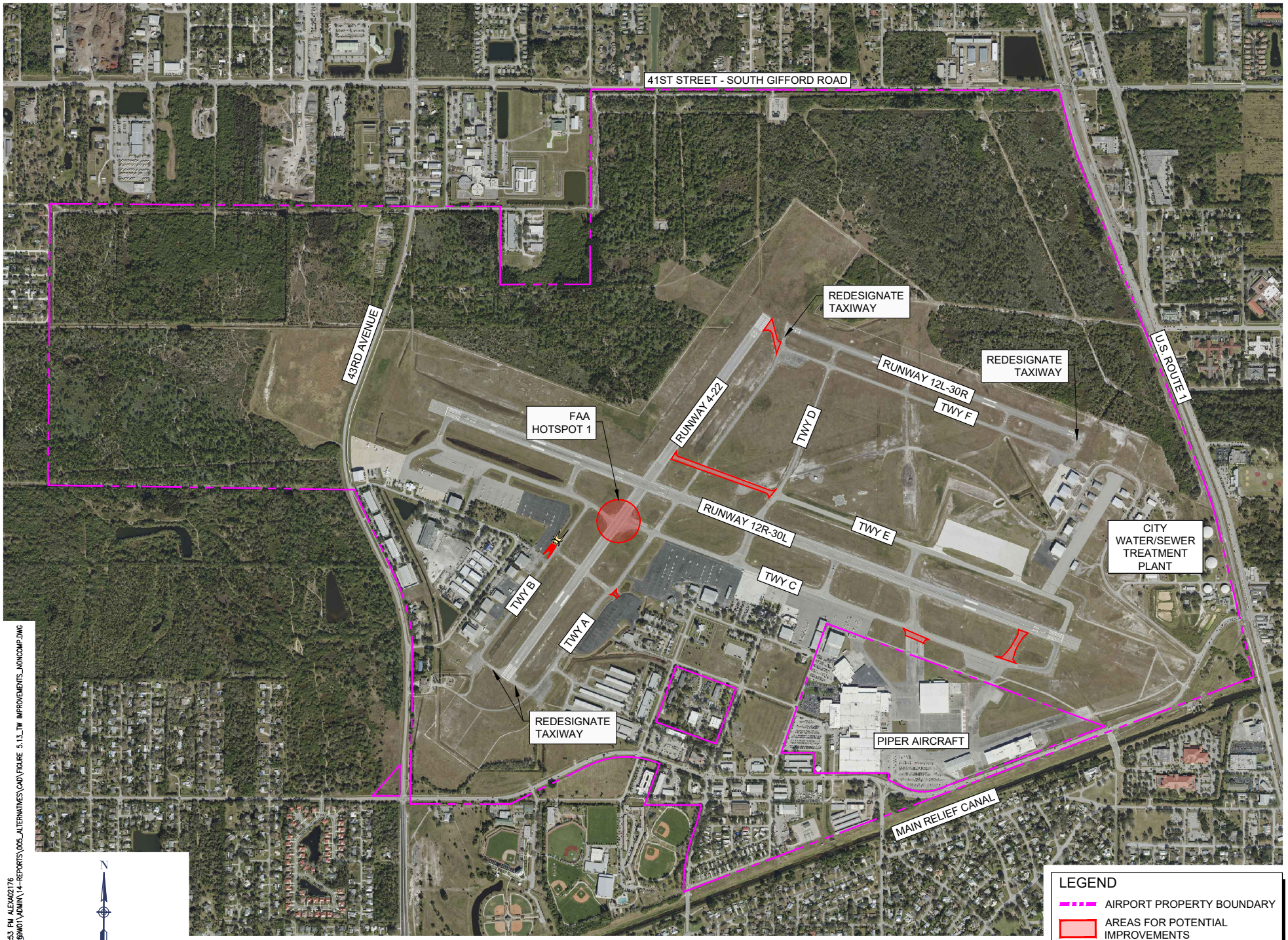
Figure 5.13 shows the potential taxiway improvements from the previously approved ALP that have not been implemented and are being reviewed for continued applicability. Each potential improvement will be discussed with its applicable taxiway in the following sections.

Taxiway A

Taxiway A is a full-length parallel taxiway on the east side of Runway 4/22. Taxiway A varies in width from 35 feet to 50 feet, which meets TDG 2A standards of 35 feet wide. North of Taxiway A1, Taxiway A has a runway centerline to taxiway centerline separation of 400 feet. The portion of Taxiway A south of Taxiway A1 has a runway to taxiway centerline separation of 350 feet. This separation meets ADG-II standards with visibility minimums not lower than 3/4 of a mile. However, a 350-foot separation limits the use of this portion of Taxiway A to ADG-II aircraft. Because there is an existing apron along the portion of Taxiway A with the 350-foot separation and it meets ADG II standards for the critical aircraft using Runway 4/22, the existing condition could be acceptable. Even though realigning the southern portion of Taxiway A with a 400-foot separation would impact an apron and aircraft parking positions, the advantages and disadvantages of realigning Taxiway A should be discussed further as part of evaluating all the alternatives. Considerations include the potential use of this portion of taxiway by larger aircraft compared to the construction cost and impacts to other facilities. The potential realignment of Taxiway A is depicted on **Figure 5.14**. Whether or not the separation is increased for the southern portion of Taxiway A, maintaining the other portion at a 400-foot separation provides maximum flexibility.

Taxiway A1 comprises two portions and provides direct apron-to-runway access. One portion is between Taxiway A and Runway 4/22. The other is a small stub connector between Taxiway A and the Skyborne Airline Academy south apron. One of the two segments should be relocated to eliminate the direct runway-to-taxiway connection.

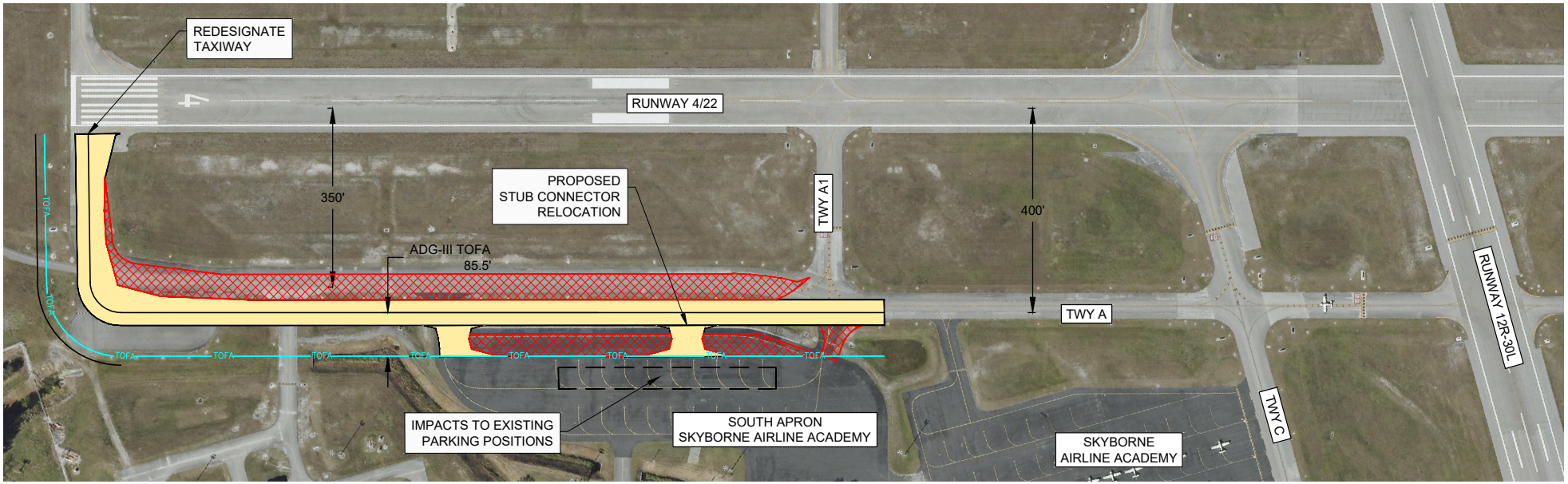
The previous ALP recommended relocating the smaller stub connector between Taxiway A and the Skyborne Airline Academy south apron, as depicted in Figure 5.14.

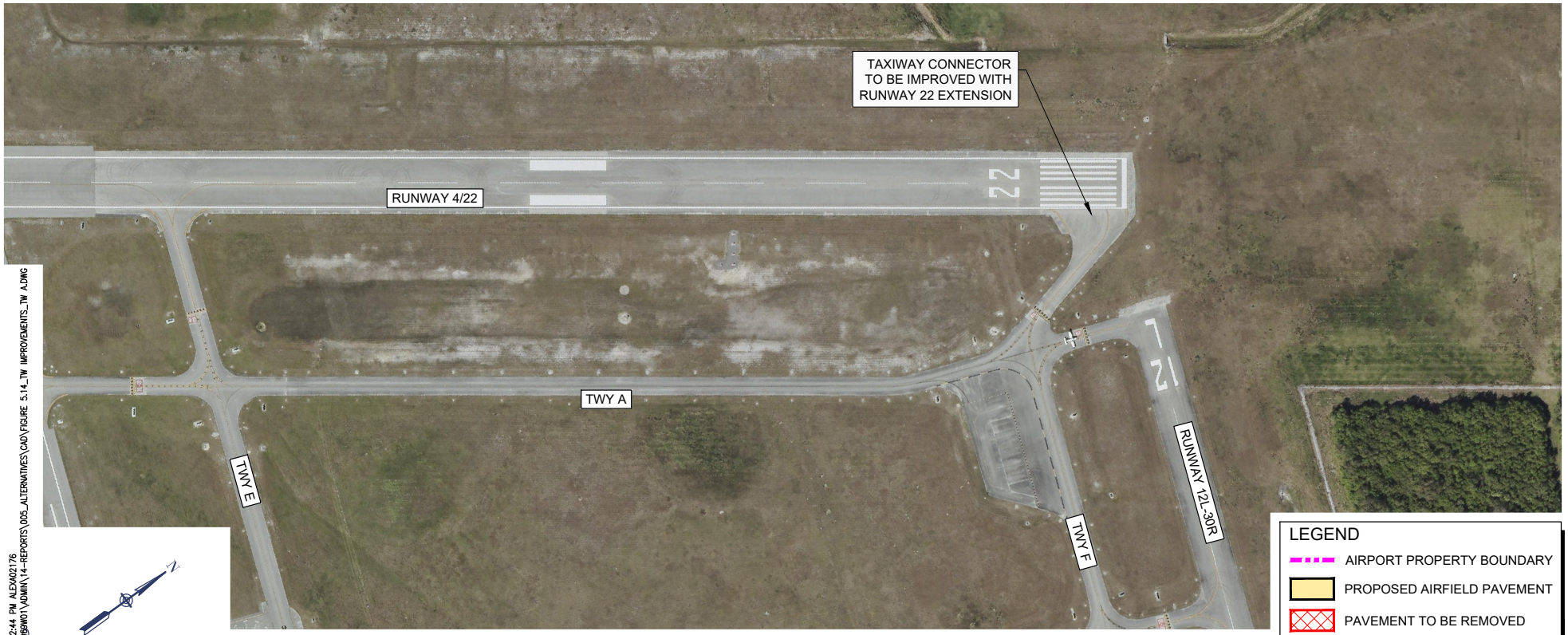


Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 5:53 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.13_TW IMPROVEMENTS_NONCOMP.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	PREVIOUS ALP RECOMMENDED TAXIWAY IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ FIGURE 5.13





Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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OCT 13, 2023 12:44 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.14_TW IMPROVEMENTS_TW A.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	TAXIWAY A IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ FIGURE 5.14

Taxiway A2 connects at the Runway 22 end at an angle other than 90 degrees. This taxiway connector reconfiguration would be addressed when mitigating the overlapping RSAs between runways 4/22 and 12L/30R, as detailed in the Runway 4/22 section.

The taxiway end connector at the Runway 4 end is designated as Taxiway A. Redesignating it to align with FAA standards for alphanumeric numbering for connector taxiways should be considered, as described in the facility requirements chapter. The other connecting taxiways would be redesignated as needed to support this change.

Taxiway A Recommendations

The no-build condition for taxiways A1 and A2 and the end connector designation do not meet the latest FAA design standards. Therefore, it is recommended to relocate the stub connector between Taxiway A and the Skyborne Airline Academy to remove the direct apron-to-runway connection. Relocating this portion is the lowest-cost solution because it is the shorter segment. As discussed previously, runways 4/22 and 12L/30R are recommended to be extended to allow for the construction of standard taxiway end connectors that are 90 degrees to runway centerline. The Taxiway A connector at the end of Runway 4 should be redesignated to Taxiway A1 to align with FAA standards, and the other connectors should be renamed to support this change. As part of renaming the taxiway connector, the text on the guidance sign at the connector will need to be updated. This update, as with any guidance sign updates, should be coordinated to occur with other improvements to the taxiway in the same area. Further consideration should be given to the potential benefits of relocating the portion of Taxiway A with a 350-foot runway centerline to taxiway centerline separation.

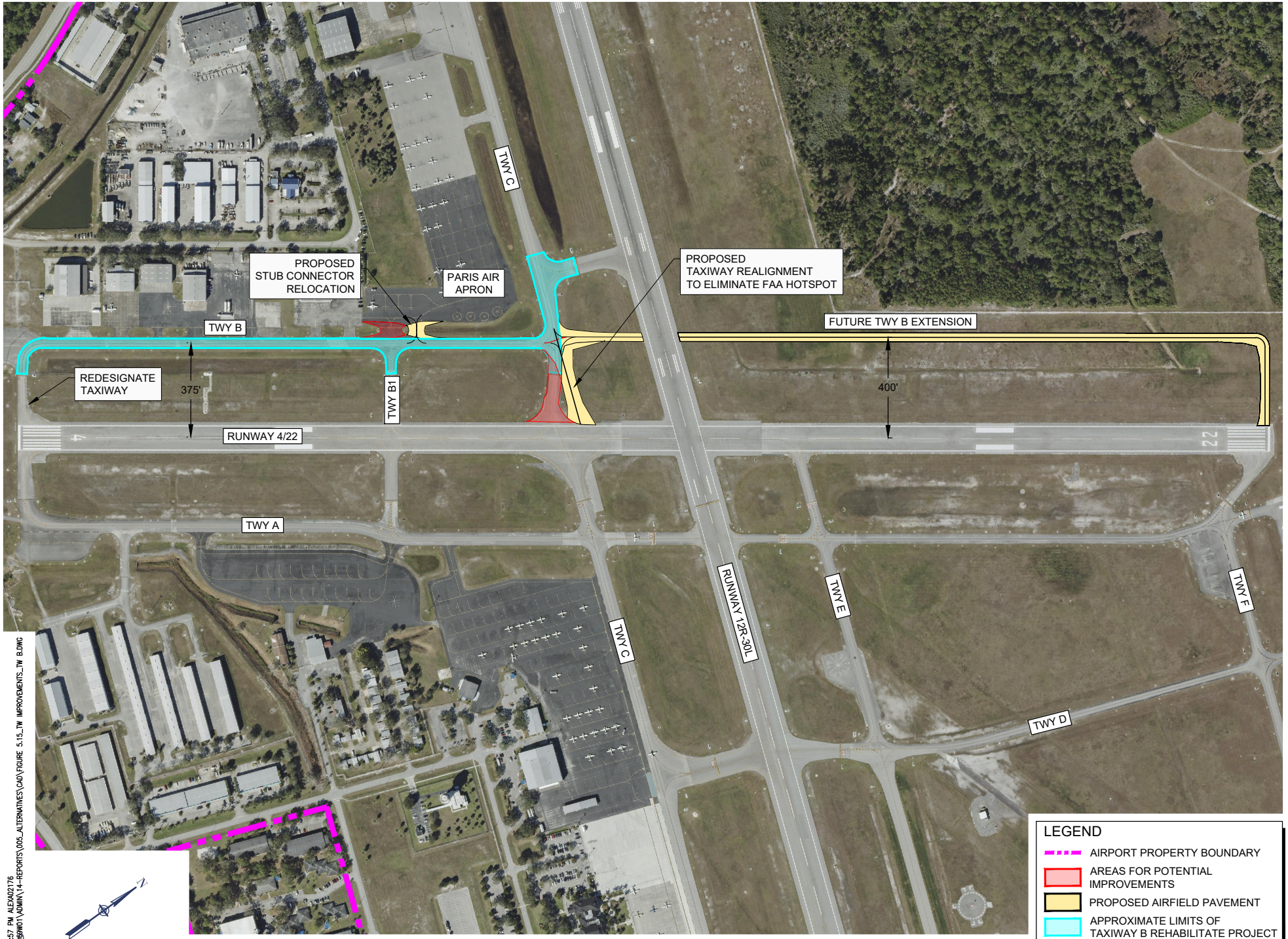
Taxiway B

Taxiway B is a partial parallel taxiway on the west side of Runway 4/22. The taxiway is 35 feet wide and meets TDG 2A standards. It has 375 feet for its runway centerline to taxiway centerline separation. This exceeds ARC C/D-II standards but is short of ARC III standards.

At the time of this airport master plan, an ongoing project to rehabilitate Taxiway B includes relocating the stub connector at Taxiway B1 to eliminate the direct runway-to-apron access. It also includes adding runway guard lights at the hold lines on Taxiway C on each side of Runway4/22. **Figure 5.15** shows the relocation of the stub connector and the approximate limits of the rehabilitation.

VRB has undeveloped land west of Runway 4/22 and north of Runway 12R/30L. As this area is developed, extending Taxiway B 2,600 feet to the end of Runway 22 should be considered to minimize runway crossings and increase taxiway efficiency and airfield circulation. Because Taxiway B south of Runway 12R/30L has a 375-foot separation, the extended taxiway could be built with the same separation or the standard ARC C/D-II or C-D-III separation. Extending Taxiway B with the same separation would avoid a jog in the taxiway. Extending Taxiway B with a 300-foot separation would provide maximum space for future airside development but limit the use of the taxiway to ADG-II aircraft and create a jog in the taxiway. Extending Taxiway B with a 400-foot separation would lessen the jog in the taxiway and allow up to ADG-III aircraft to use the parallel taxiway. As such, the 400-foot separation would provide the most flexibility and, therefore, efficiency to taxiway movements at VRB.

The taxiway end connector at Runway 4 is designated as Taxiway B. Consideration should be given to redesignating it to align with FAA standards, with the other connecting taxiways renamed to allow for this redesignation.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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VERO BEACH REGIONAL AIRPORT | HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	TAXIWAY B IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ FIGURE 5.15

OCT 12, 2023 5:57 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.15_TW IMPROVEMENTS_TW B.DWG

Taxiway B Recommendations

With undeveloped land that could accommodate up to ADG-II aircraft adjacent to where Taxiway B, Taxiway B should be extended and constructed with an FAA-standard runway centerline to taxiway centerline separation of 400 feet. In addition to being a standard separation distance, taxiing from a portion of a 375-foot separation to a 400-foot separation minimizes the change, compared to a change to a 300-foot separation.

It is recommended that the Taxiway B end connector at Runway 4 be redesignated and the other taxiway connectors renamed to align with FAA design standards. A future end connector at Runway 22 would also have an alphanumeric designation.

Taxiway C

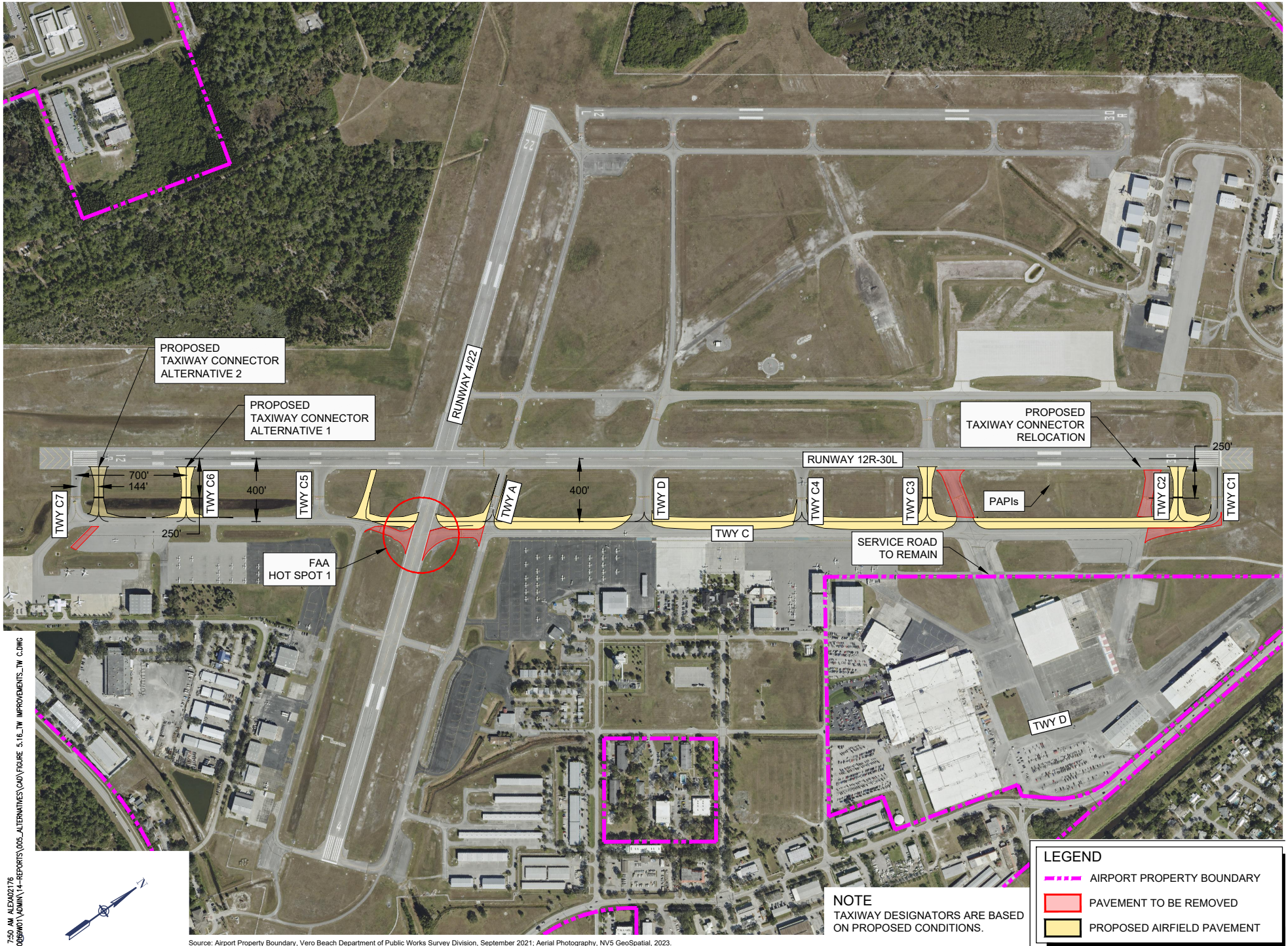
Taxiway C is a full-length parallel taxiway on the south side of Runway 12R/30L. The taxiway is 50 feet wide and meets TDG 3 standards. Taxiway C varies from a 400-foot to a 475-foot runway centerline to taxiway centerline separation. The 400-foot runway to taxiway centerline separation meets ADG III standards and would support an approach with less than 3/4 of a mile of visibility. Taxiway C jogs to change separation at Runway 4/22, which is an FAA hot spot. To eliminate the jog in Taxiway C, Taxiway C should be realigned to the standard 400-foot separation for the entire length. This shift would improve the FAA-identified hot spot, where the taxiway separation from the runway changes, and provide the potential to develop additional apron space around the terminal area. **Figure 5.16** shows the potential improvement to Taxiway C. As part of relocating Taxiway C, the portion of Taxiway C from taxiways C1 and C2 would be realigned to be parallel to Runway 12R/30L.

Taxiway C1 is an end connector at Runway 30L, and the corner of the taxiway is squared. Per FAA standards, taxiway end connectors should be rounded to differentiate between a runway and taxiway. Consideration should be given to improving the no-build condition to meet the latest FAA design standards.

Taxiway C2 connects with Runway 30L at an angle other than 90 degrees and provides direct runway-to-apron access from Piper Aircraft. It is used by ATC as a bypass taxiway to allow aircraft to continue to depart Runway 30L if an aircraft is holding on Taxiway C1.

To eliminate the direct runway-to-apron access, Taxiway C2 should be relocated. The relocated Taxiway C2 should be 90 degrees to the runway centerline and relocated east of the hold pad to avoid a direct apron-to-runway connection, while positioning it to continue to serve an end bypass taxiway. The relocation of Taxiway C2 needs to meet the standards for parallel taxiway centerline to parallel taxiway centerline separation. The standard taxiway centerline to taxiway centerline separation is 144.5 feet for ADG III, 207 feet for ADG-IV, and 249 feet for ADG-V. The critical aircraft for Runway 12R/30L is ARC C/D-III. However, the runway centerline to taxiway centerline separation can serve larger aircraft. Therefore, in case of occasional use by larger aircraft, increasing the taxiway centerline to taxiway centerline separation up to 249 feet should be considered. Because the length of the taxiway will not change, only its location, there should be no cost difference to increase the separation between the two connecting taxiways. As part of relocating Taxiway C2, some stormwater modifications will be needed because there is a dry detention between taxiways C1 and C2. This stormwater detention could be shifted to the other side of the relocated Taxiway C2 to maintain the capacity.

If an aircraft is holding at the end of Runway 12R, such as for an instrument flight plan clearance, no bypass taxiway is available. To help reduce departure delays behind a holding aircraft, a bypass taxiway should be constructed near the end of Runway 12R. With the location of the hold pad at the end of Runway 12R, this taxiway would need to be east of the hold pad, or the hold pad would need to be modified or removed to avoid a



NOTE
TAXIWAY DESIGNATORS ARE BASED ON PROPOSED CONDITIONS.

LEGEND
- AIRPORT PROPERTY BOUNDARY
- PAVEMENT TO BE REMOVED
- PROPOSED AIRFIELD PAVEMENT

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20JOBS\20A0086W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.16_TW IMPROVEMENTS_TW C.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	TAXIWAY C IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.16

direct apron-to-runway connection. To maintain the hold pad, the bypass taxiway would need to be approximately 700 feet from the end connector to avoid a direct runway connection. This exceeds the minimum separation for up to ADG-V aircraft. It would provide a shorter runway length, which would be adequate for all the training operations at VRB. Larger aircraft using the bypass taxiway would need to back-taxi if they need the entire runway length. To locate the bypass taxiway close to the end of Runway 12R, the hold pad would be shortened to avoid a direct runway connection. Any taxiway connector near the end of Runway 12R would require modifications to the drainage swale between Taxiway C and Runway 12R/30L.

Where there are large expanses of pavement, such as an apron adjacent to connector taxiways, the FAA allows green “islands” to be painted on the pavement so pilots can taxi around the island, which necessitates a turn between the apron and runway. Green islands are in place at taxiways C4 and D south of Taxiway C. This no-build condition meets FAA standards, so no changes are needed.

Taxiway C Recommendations

To improve the FAA-identified hot spot and maximize the space south of Taxiway C, a portion of Taxiway C with the larger separation, east of Taxiway B, should be relocated to have a runway-to-taxiway separation of 400 feet.

To meet FAA design standards and help landing pilots differentiate between the runway and taxiway end, the end of Taxiway C1 should be rounded. The change could occur when Taxiway C1 is rehabilitated or when Taxiway C is realigned to 400-foot separation. To eliminate the direct runway-to-apron access, Taxiway C2 should be relocated to have at least a 249-foot taxiway centerline to taxiway centerline separation from Taxiway C1.

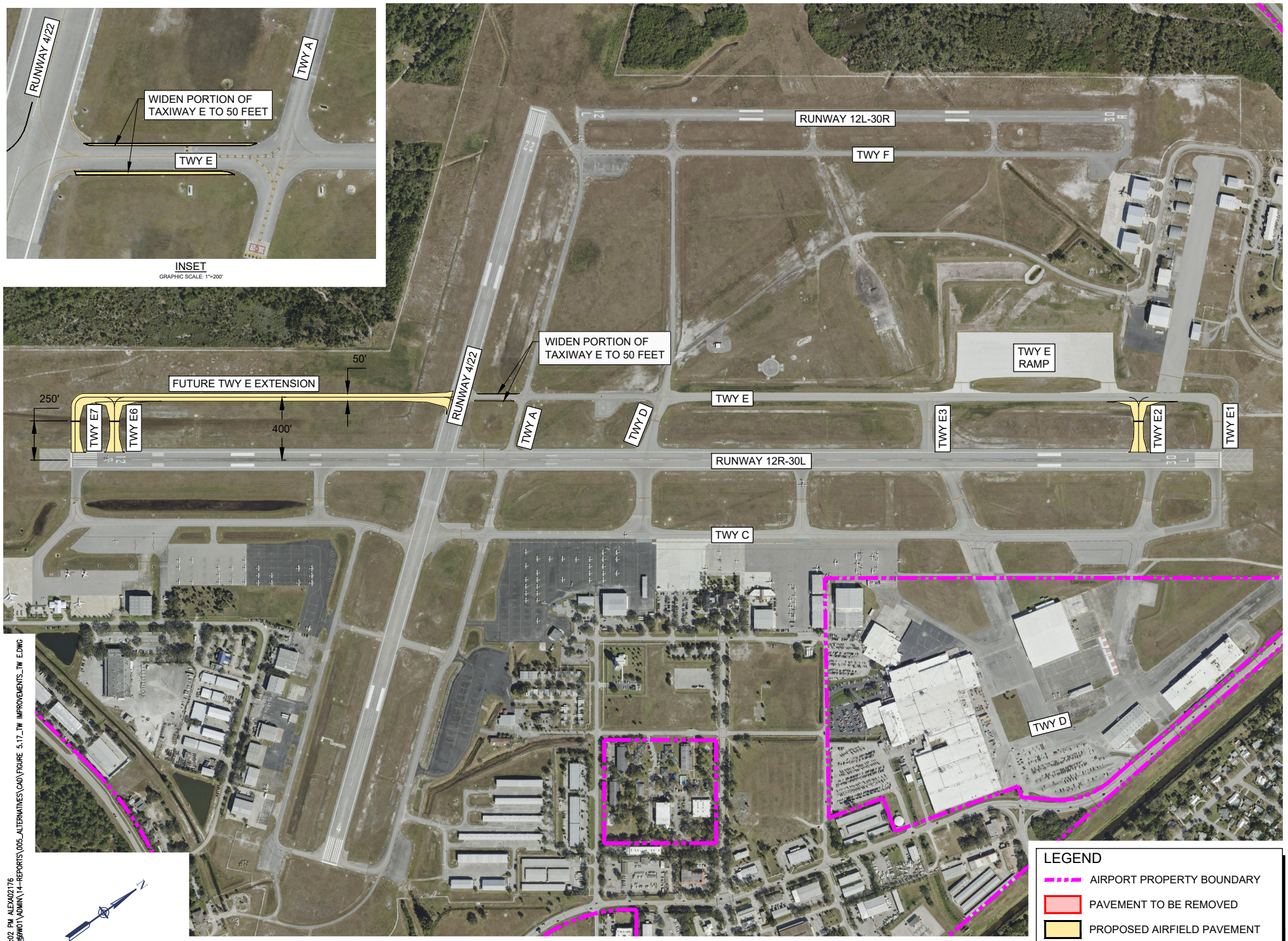
With the projected increasing operations at VRB, a bypass taxiway should be developed near the end of Runway 12R. This would allow ATC to route departing aircraft around a holding aircraft to maximize the capacity of the runway. To preserve the hold pad that is used for engine run-ups by training aircraft, the bypass taxiway should be located east of the hold pad, with the appropriate stormwater modifications.

Taxiway D

Taxiway D provides crossfield access from the Skyborne apron south of Runway 12R/30L to runways 12L, 30R, and 22 on the north side of the airfield. The portion of Taxiway D between Taxiway C and Runway 12R/30L is 75 feet wide, and Taxiway D north of Runway 12R/30L is 35 feet wide, which meets TDG 2A standards. Taxiway D is primarily used for access to Runway 12L/30R, an ARC B-II small runway. Therefore, no changes to Taxiway D are needed.

Taxiway E

Taxiway E is a partial parallel taxiway on the north side of Runway 12R/30L. Taxiway E has 400-foot separation runway centerline to taxiway centerline, meeting FAA design standards for ARC C/D-III aircraft. This taxiway is 50 feet wide from the Runway 30L end to Taxiway D. However, west of Taxiway D to Runway 4/22, Taxiway E is 40 feet wide. Because Taxiway E serves the primary runway, it should be able to accommodate TDG-3 aircraft, which require 50-foot-wide taxiways. Therefore, as shown in **Figure 5.17,** to meet TDG 3 standards, the portion of Taxiway E west of Taxiway D to Runway 4/22 should be widened to 50 feet. Widening this portion of Taxiway E would provide more routes for aircraft to access the ongoing development north of Runway 12R/30L, increasing the efficiency of the airfield.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20JOBS\20A00860W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.17_TW IMPROVEMENTS_TW E.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	TAXIWAY E IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.17

Additional hangar development is ongoing north of Runway 12R/30L. To avoid crossing Runway 12R/30L for these aircraft to reach the end of Runway 12R and to increase taxiway efficiency and airfield circulation, extending Taxiway E 2,400 feet to the Runway 12R end, maintaining a runway to taxiway centerline separation of 400 feet for ADG-III aircraft, should be considered. This taxiway extension could serve future development in the undeveloped area north of Runway 12R/30L and west of Runway 4/22. If development on the north side is warranted in the future, bypass taxiways similar to those on Taxiway C could be developed on Taxiway E.

Taxiway E Recommendations

To meet FAA design standards, Taxiway E between Taxiway D and Runway 4/22 should be widened to 50 feet. It is also recommended to extend Taxiway E the full length of Runway 12R/30L. This extension would increase the margin of safety for airside development north of Runway 12R/30L by providing access to both ends of Runway 12R/30L without crossing the runway. It would minimize aircraft taxiing across Runway 12R/30L, maximizing the capacity of the runway for takeoffs and landings.

Taxiway F

Taxiway F is a full-length parallel taxiway on the south side of Runway 12L/30R. This taxiway has a 240-foot runway centerline to taxiway centerline separation, meeting ARC B-II small standards. This taxiway is 35 feet wide and meets TDG 2A standards. At the time of the airport master plan, both taxiway end connectors are designated Taxiway F. To align with FAA standards, the end connectors should be redesignated with alphanumeric names.

Unless there is development proposed for the north side of Runway 12L/30R as part of the airside alternatives, Taxiway F provides sufficient access for Runway 12L/30R, and an additional parallel taxiway would not be needed on the north side.

Taxiway F Recommendations

The Taxiway F end connectors should be redesignated and existing taxiways F1 and F2 should be redesignated, as needed, to align with FAA design standards.

Engine Run-Up Pads

With the high level of training at VRB, there are engine run-up pads near each runway end on at least one side. FAA AC 150/5300-13B recommends locating engine run-up areas away from parking positions, gate areas, and buildings, as well as locating them to minimize exposure to engine exhaust and noise.

Engine Run-Up Pad Recommendations

If the location of the run-up pads does not conflict with access to the airfield, they should remain. Access through a run-up pad to the parallel taxiway should be avoided. If it cannot be avoided, the run-up pad should be modified or removed. If any run-up pad needs to be removed to support airside development, VRB should work with the tenants to designate alternate run-up locations to avoid aircraft blocking the taxiway to conduct an engine run-up.

Taxiway Lighting

All taxiways are equipped with MITLs and are LED. Some airfield signs have been upgraded to LED; however, the remaining incandescent signs should be upgraded to LED in future lighting projects. Updating a sign to LED should be coordinated with renaming connector taxiways.

5.3. Navaids and Weather Equipment

Rotating Beacon

The rotating beacon is on the north side of Runway 12L/30R. It is accessed via an unpaved road and surrounded by dense vegetation, which causes difficulty to access and maintain. Relocating the rotating beacon to an area more accessible for routine maintenance has been identified as a need. Per FAA AC 150/5300-13B, an airport beacon should be within 5,000 feet of all runways, be above surrounding objects, and avoid interference with pilots' or ATCT controllers' vision. To avoid the potential of the flashing beacon being visible in the ATCT, sites with the areas southeast of the runways were avoided. An airport beacon is not considered fixed by function, so it needs to be clear of all runway and Part 77 design surfaces. **Figure 5.18** shows potential sites that would have minimal visual impacts to ATCT staff and pilots. The ongoing development at VRB is depicted in Figure 5.18, and these areas are not available for the relocation of the rotating beacon. The ATCT also requested that the beacon is not located on top of the tower due to maintenance considerations.

Potential Site 1 locates the rotating beacon north of Runway 12L/30R. The site is in an area clear of vegetation and can be accessed by the airfield perimeter road.

Potential Site 2 locates the rotating beacon to west of the airfield, near the Paris Air ramp. This location is within the Paris Air leasehold and could impact future development.

Potential Site 3 is along 43rd Avenue. It would be near an access point from 43rd Avenue. The height of the surrounding vegetation would need to be checked and potentially reduced. Its location would need to be coordinated with any future development plan to avoid impacts. Power would also need to be extended to this site.

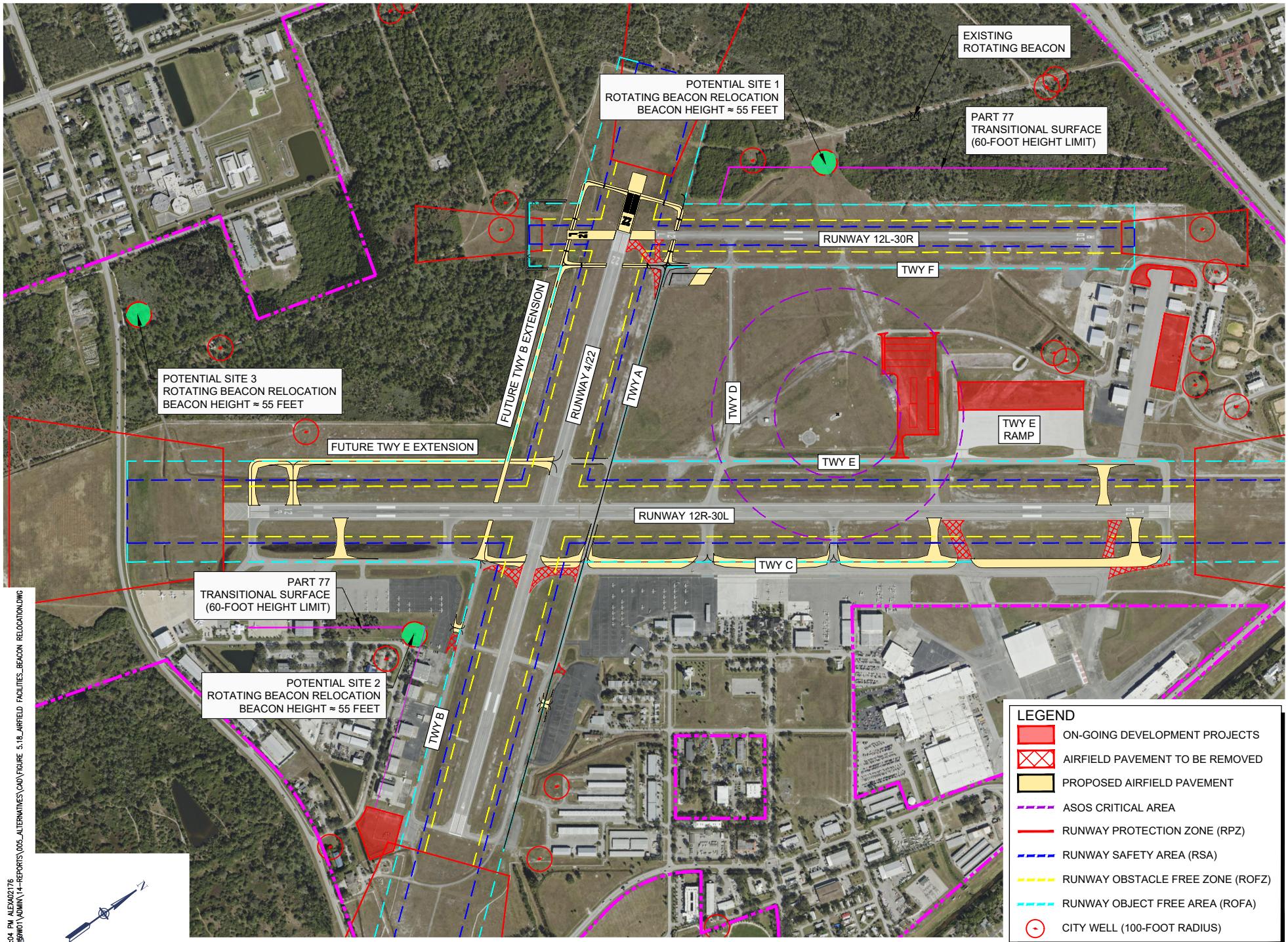
Rotating Beacon Recommendation

The no-build alternative for relocating the beacon is not considered feasible, because it does not address the difficulty accessing the site for maintenance. To improve the ease of maintaining the beacon, the rotating beacon should be relocated to Site 1 to provide better accessibility while minimizing visual impacts for controllers and pilots. Site 3 would also be a viable alternative if power is provided to the site.

ASOS

The ASOS is in the midfield, east of Taxiway D and north of Taxiway E. The midfield area is prime for hangar development, with utilities already in place. However, due to the height-restrictive critical areas around the ASOS and the ATCT's line of sight to Runway 12L/30R, future development in the midfield area is limited. The ATCT's line of sight will not change, but the relocation of the ASOS could open developable areas.

The ASOS is a National Weather Service (NWS)-owned system. VRB would need to work with the NWS to relocate the ASOS. If the NWS is not willing to relocate the ASOS, VRB could consider installing an AWOS that provides the same function but is airport-owned. The NWS siting criteria are not publicly available. Therefore, the relocation of the ASOS was evaluated per FAA Order 6560.20C. For airports with visual and/or nonprecision runways, the preferred siting area is adjacent to the primary runway, 1,000 feet to 3,000 feet from the threshold and 500 feet to 1,000 feet perpendicular from the runway centerline, with the critical areas clear. For an airport with a precision runway, the location is a minimum of 750 feet not to exceed 1,000 feet from the runway centerline. If the wind sensor site is above this, the minimum separation is increased by 7 feet for every foot the



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	SITES FOR ROTATING BEACON RELOCATION	DRAWN BY: JA CHECKED BY: SZ
			FIGURE 5.18

sensor site elevation is above the runway elevation. Each sensor in the system has its own specified clearances, but the most restrictive is the wind sensor. All obstructions must be at least 15 feet lower than the height of the wind sensor that is 30 to 33 feet above the average ground height within a 500-foot radius, and they must be at least 10 feet lower than the sensor where the radius is 500 feet to 1,000 feet. The ASOS location should not be subject to jet blast from engine run-ups or taxiing. A relocated ASOS should remain clear of the RVZ. There is an FAA stand-alone weather sensors system collocated with the ASOS that serves as a backup system for the ASOS. It should be relocated with the ASOS.

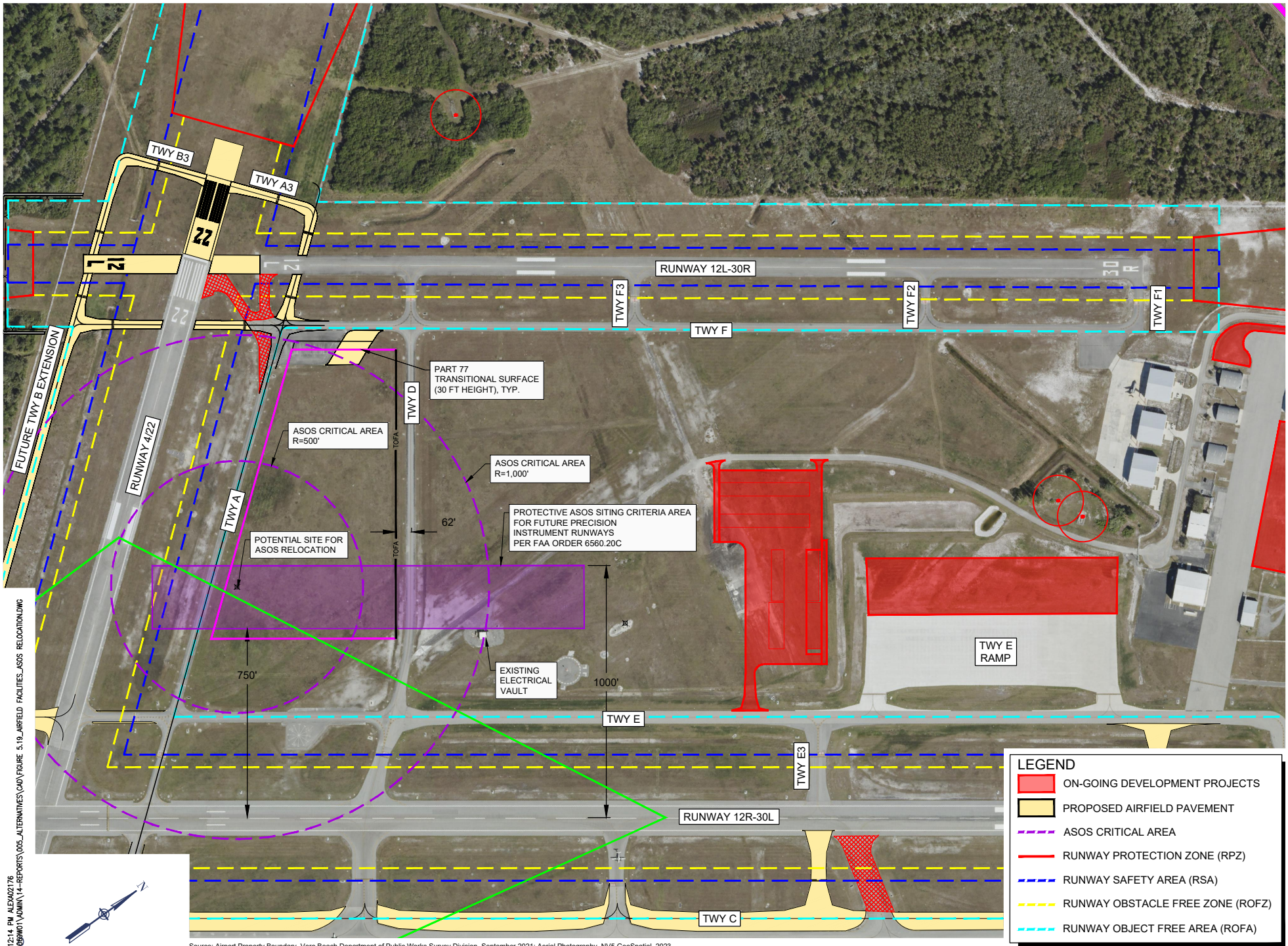
There are three alternatives for the ASOS. The first is no-build and keep the ASOS in its existing location. However, without the relocation of the ASOS, VRB has little to no remaining developable airside area without utility improvements.

The second alternative is between taxiways A and D. The space between taxiways A and D is limited to future aeronautical development due to height restrictions but could accommodate the ASOS while providing sufficient clearance for the wind sensor, as depicted in **Figure 5.19**.

The third option is to locate the ASOS northwest of runways 12R/30L and 4/22 in the undeveloped area. Relocating the ASOS to this area would require tree clearing and would impact future development opportunities.

ASOS Recommendation

The no-build condition of keeping the ASOS in its existing location does not provide the highest and best use of VRB property. Further, relocating the ASOS northwest of runways 12R/30L and 4/22 would limit future development and not provide the highest and best use of VRB property. Relocating the ASOS between taxiways A and D meets the siting criteria and makes good use of an area that cannot be used for airside development. Therefore, relocating the ASOS between taxiways A and D is recommended.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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OCT 02, 2023 12:14 PM ALEXA02176
I:\2023\B3\20A0089W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.19_AIRFIELD FACILITIES_ASOS RELOCATION.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT
MASTER PLAN

SITE FOR
ASOS RELOCATION

DRAWN BY: JA
CHECKED BY: SZ

FIGURE
5.19

Segmented Circle and Wind Cones

VRB is equipped with a primary lighted wind cone and segmented circle north of Taxiway E and east of Taxiway D. There are also six supplemental wind cones, two for each runway, on the left side of the runways. During the inventory data collection, the supplemental wind cones for runways 12R/30L, 12L/30R, and 4 were operational, and no changes are needed. However, the supplemental wind cone at the Runway 22 end needs to be replaced. Before it is replaced, it should be evaluated to identify the most appropriate long-term location.

Appendix A in FAA AC 150/5340-30J: Design and Installation Details for Airport Visual Aids requires that the supplemental wind cone be 1,000 feet (plus or minus 500 feet) from the runway end. A location is proposed 500 feet from the existing Runway 22 end and 1,226 feet from the end of Runway 22 if it is extended to 5,700 feet. As long as the Runway 22 end does not shift to the southwest, the proposed supplemental wind cone location along the length of the runway should meet FAA design standard for the existing and future Runway 22. This Runway 22 supplemental wind cone is outside the RSA. The FAA allows the supplemental wind cone to be within the ROFA if there are no other feasible alternatives and they are on a frangible mount. The wind cones at VRB are outside the RSA but typically within the ROFA due to surrounding development that would limit a pilot's view. Whenever a wind cone is being replaced or relocated, the feasibility of moving it outside the ROFA should be assessed.

Locating the Runway 22 supplemental wind cone outside the ROFA was considered, but this would require it to be located east of Taxiway A. In this location, aircraft on Taxiway A, Runway 12L/30R, or the run-up pad near the end of Runway 12L could block the view of the wind cone for a landing pilot. The wooded area on the west side of Runway 4/22, which could block wind, precludes a supplemental wind cone location on the west side of the runway.

Runway 4/22 Supplemental Wind Cone Recommendation

Because the Runway 22 supplemental wind cone is not operational, there is not a no-build option. The supplemental wind cone should be located to serve the existing length and any future extension of Runway 22. The recommended location is between Runway 4/22 and Taxiway A. This recommended supplemental wind cone was considered and shown on the alternative concepts for Runways 4/22 and 12L/30R in figures 5.6 to 5.8.

The FAA requested consideration of the relocation of the Runway 4 supplemental wind cone. It is outside the RSA but within the ROFA. Because of the location of the parallel taxiway and surrounding development, to provide a clear line of sight to the wind cone for approaching pilots, the best location is the existing location between Runway 4/22 and Taxiway B, outside the RSA but within the ROFA.

Compass Calibration Pad

A compass calibration pad is at VRB. With Piper Aircraft using VRB to test new aircraft, the compass calibration pad is an important asset. The compass calibration pad is west of Taxiway D along the south edge of Taxiway E, within the Runway 12R/30L ROFA. It should be relocated outside the ROFA to keep aircraft outside the ROFA when using the pad. FAA AC 150/5300-13B provides guidance on the preferred locations of a compass calibration pad. The center of the pad should be located[1]:

- A minimum of 600 feet from magnetic objects, e.g., parking lots, busy roads, railroad tracks, high-voltage electrical transmission lines, or cables carrying direct current

[1] FAA AC 150/5300-13B, dated March 31, 2022.

- A minimum of 300 feet from buildings, fuel lines, and electrical or communication cable conduits, if they contain magnetic materials
- A minimum of 150 feet from runway and taxiway light bases, airfield signs, ducts, and grates for drainage, if they contain iron, steel, or ferrous materials
- Clear of any critical area for electronic navaid facilities
- Not penetrate the OFZ, safety areas, OFAs, etc.

A potential site meeting these criteria was identified, as depicted in **Figure 5.20.** This potential site is west of Taxiway D, near the midpoint of taxiways E and F. This location complies with the preferred location guidance in FAA AC 150/5300-13B. The potential relocation site is a minimum of 600 feet from the electrical vault and the potential relocated ASOS site. This area is also limited to future aeronautical development due to height restriction limitations. While there are no known electrical cables in this area, a magnetic survey should be conducted to verify that the potential location is suitable for the pad or modify it to allow it to be suitable. The compass calibration pad is used primarily by ADG-II aircraft, so its location along Taxiway D that serves ADG-II aircraft would be acceptable.

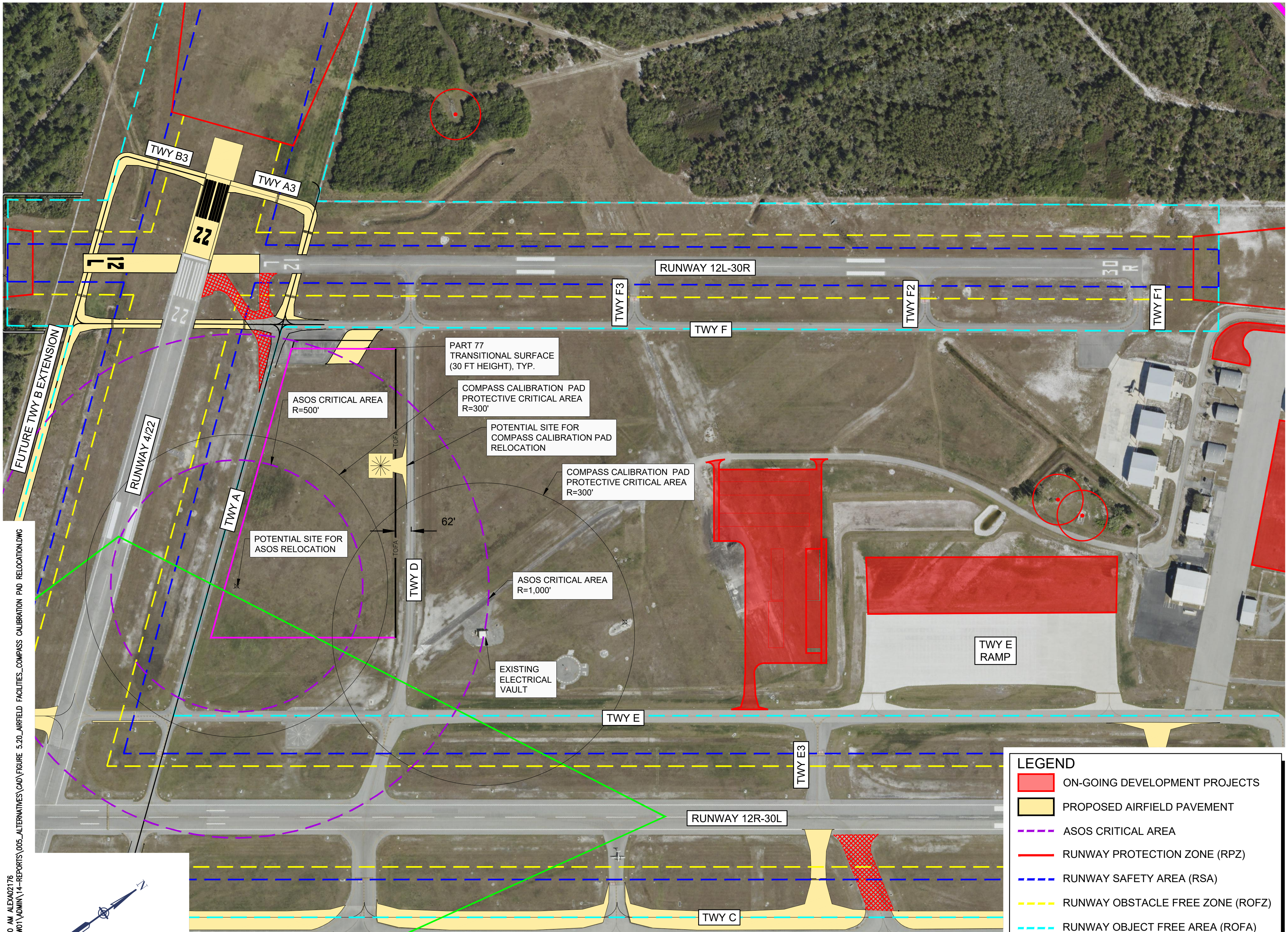
Compass Calibration Pad Recommendation

With the use of the compass pad by new aircraft and others needing a compass calibration pad, it is recommended to provide a compass calibration pad at VRB. The no-build condition of maintaining the compass calibration pad in its existing condition is not acceptable, as its location within the Runway 4/22 ROFA for ARC C-III aircraft does not meet FAA design standards. Only one feasible location was identified with existing taxiway access. This location is along Taxiway D, as depicted in **Figure 5.20**.

5.4. Other Airfield Support Infrastructure

Electrical Vault

The electrical vault is considered to be in good condition and has adequate space. Standard useful life upgrades should be considered, particularly when upgrading lighting to LED.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

VERO BEACH REGIONAL AIRPORT MASTER PLAN

SITE FOR COMPASS CALIBRATION PAD RELOCATION

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.20

5.5. Emerging Technology

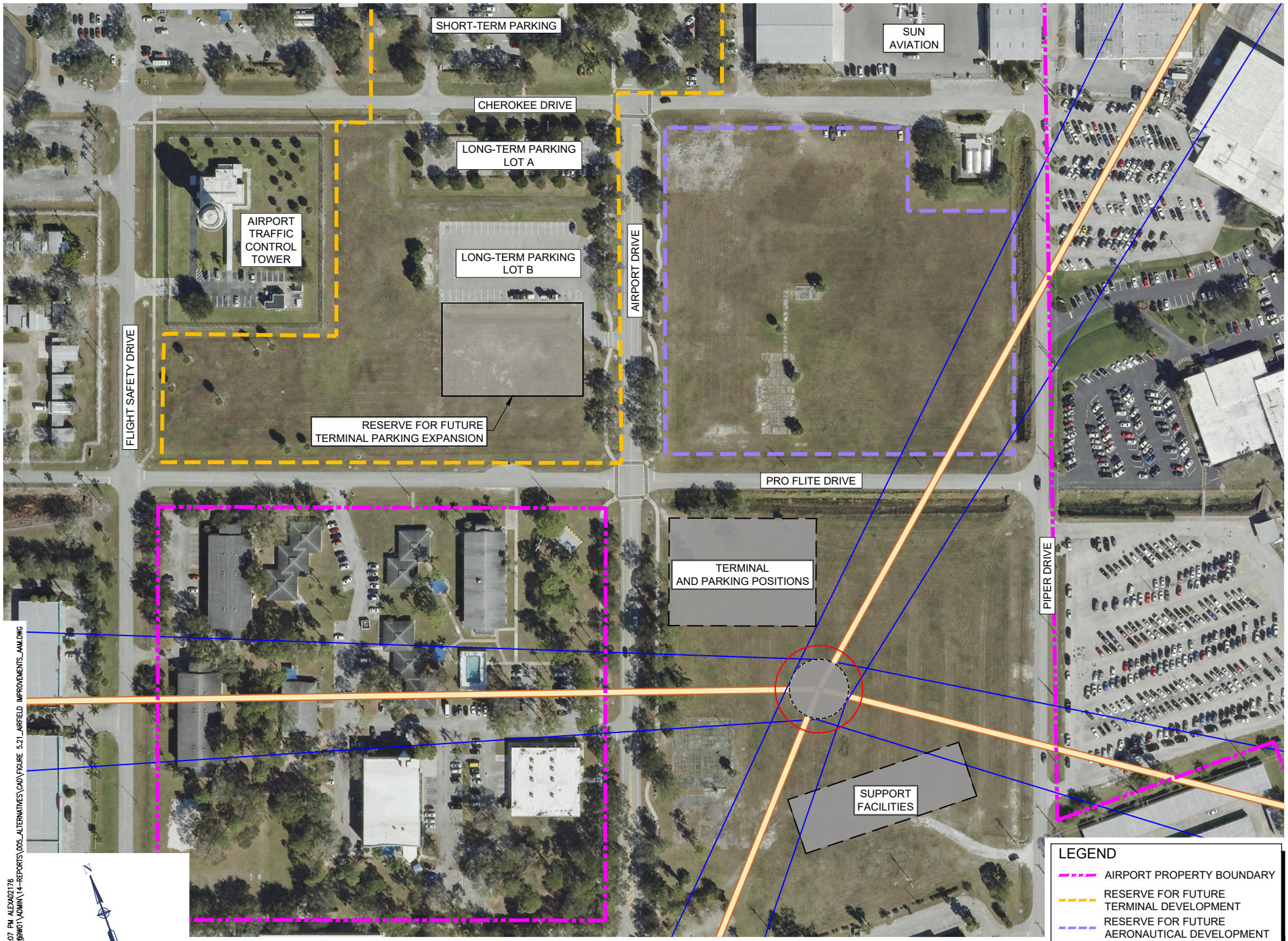
Multiple companies are working to develop electric vertical takeoff and landing aircraft (eVTOL). Companies are also working to prepare infrastructure to support these AAM aircraft. In September 2022, the FAA released *Engineering Brief 105: Vertiport Design* to set forth interim guidance for airport sponsors and vertiport developers. The FAA has indicated it anticipates releasing a vertiport design advisory circular in the next 24 months and is working to develop a review and approval process for proposed vertiports. An important step for an airport to prepare to serve eVTOL or other new-energy-source vehicles is to include the proposed infrastructure in its ALP.

VRB has a letter of intent with a vertiport developer. The location of the proposed vertiport, subject to FAA and city approvals, is southeast of the terminal between Airport, Pro Flite, and Piper drives. The conceptual layout of the vertiport and approach surfaces is depicted in **Figure 5.21**. This location allows for pedestrian access via existing sidewalks to the passenger terminal. It is also within proximity to electrical service to support the anticipated operations and charging needs of eVTOL aircraft.

All the aircraft fueling at VRB is provided by the FBOs. In addition to the proposed privately developed vertiport, electric vehicle chargers for aircraft may also be developed by the FBOs. The commercial service facilities should consider including provisions to be able to support electric ground service equipment. As part of the parking lot expansion, VRB may also wish to consider installing electric automobile charging stations. The ground vehicle-related facilities will be considered further in the related sections that follow.

5.6. Airfield Perimeter Road

To provide access to all areas of the airfield without using surrounding public roads, an extension of the perimeter road system on the north and west side of the airport is needed. A perimeter road is also to be used to facilitate monitoring the perimeter security fence. Taking into account the recommended airfield improvements, a location for extending a perimeter fence to the northern and western portions of the airfield is depicted with the preferred airfield development on **Figure 5.22**.



Source: Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 6:07 PM ALEXA02176
I:\2020BS\20A00890W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.21_AIRFIELD IMPROVEMENTS_AAM.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

CONCEPTUAL VERTIPORT LAYOUT

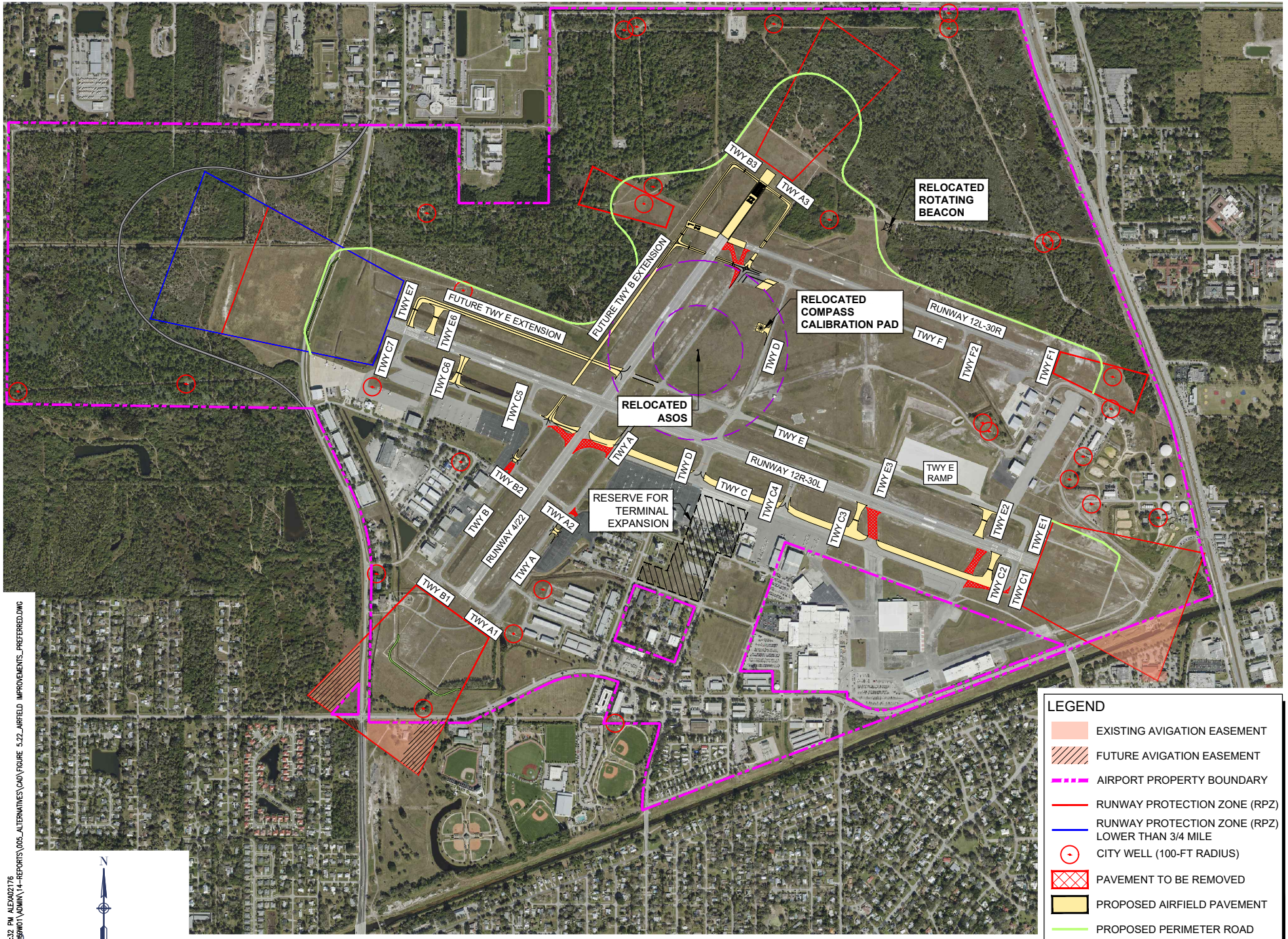
DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.21

5.7. Preferred Airfield Improvements

Figure 5.22 depicts an overview of the preferred airfield improvements and airfield support facilities at VRB. These recommended airfield improvements include:

- Relocate 43rd Avenue and the perimeter fence to eliminate the use of declared distances on Runway 12R/30L.
- Pursue approach minimums of 1/2 a mile on Runway 12R with the installation of the MALSR and obstruction mitigation.
- Extend the Runway 22 end up to 726 feet.
- Relocate the drainage swale and fence and RSA improvements to eliminate the need for declared distances on Runway 4/22.
- Extend Taxiway B the full length of Runway 4/22 with a 400-foot runway centerline to taxiway centerline separation and pavement at least 35 feet wide.
- Widen Taxiway E from 40 feet to 50 feet between Taxiway D and Runway 4/22.
- Extend Taxiway E the full length of Runway 12R/30L with a 400-foot runway centerline to taxiway centerline separation and pavement 50 feet wide.
- Realign Taxiway C for a 400-foot runway centerline to taxiway centerline separation the entire length.
- Modify Taxiway A1 to eliminate the direct apron-to-runway connection.
- Modify Taxiway C2 to eliminate the direct apron-to-runway connection and provide a standard 90-degree connector.
- Add a bypass taxiway from Taxiway C at the Runway 12R end.
- Rename taxiway end connectors and others as needed to support this change.
- Relocate the airfield rotating beacon, ASOS, and compass calibration pad.
- Work with the flight schools to minimize aircraft parking in RVZ.
- Extend perimeter road on north and west sides of airfield.



LEGEND

- EXISTING AVIGATION EASEMENT
- FUTURE AVIGATION EASEMENT
- AIRPORT PROPERTY BOUNDARY
- RUNWAY PROTECTION ZONE (RPZ)
- RUNWAY PROTECTION ZONE (RPZ) LOWER THAN 3/4 MILE
- CITY WELL (100-FT RADIUS)
- PAVEMENT TO BE REMOVED
- PROPOSED AIRFIELD PAVEMENT
- PROPOSED PERIMETER ROAD

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GRAPHIC SCALE IN FEET

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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I:\20JOBS\20A00860W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.22_AIRFIELD IMPROVEMENTS_PREFERRED.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

PREFERRED AIRFIELD IMPROVEMENTS

DRAWN BY:	JA
CHECKED BY:	SZ

FIGURE 5.22

5.8. Airside Development

The facility requirements chapter identified the need for additional airside facilities to support commercial service and general aviation operations. Using the recommended airfield development as the future airfield for planning purposes, areas for potential airside development are identified.

Ongoing Development Projects

At the time of this airport master plan, VRB has several areas committed to development projects that are in various stages of planning, design, and construction. For the purpose of identifying areas for potential development, these areas are considered not available. However, the ongoing development, including hangars, will be considered when identifying the additional square footage needed to support the facility requirements.

Environmental Considerations

The 2015 City of Vero Beach Comprehensive Plan identified areas on the north and northwest side of the airport as conservation. Through this master plan, those areas are being reviewed for any potential recommended updates to the comprehensive plan. Therefore, they are being considered for potential development, subject to environmental considerations.

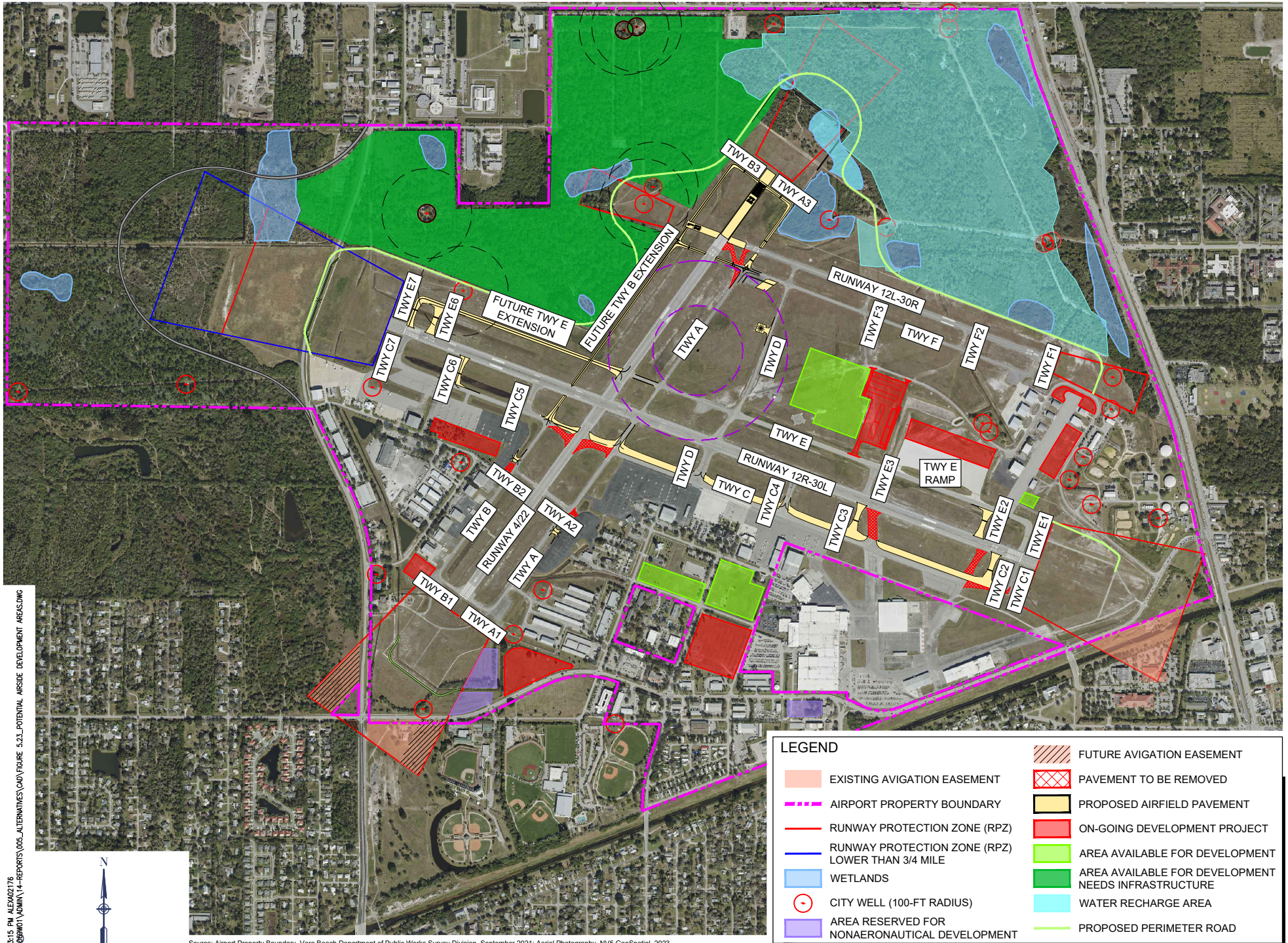
As identified in the environmental overview chapter, there are wetlands and city wells that require a protective area in the undeveloped areas that should be avoided. There is a 100-foot-radius lease around each of the water wells on VRB. The state has established wellhead protection areas that extend a 500-foot radius from the water well to protect the ground water supplies from contamination.

The northeast portion of the airport is part of the water (aquifer) recharge area. The environmental overview identified that VRB is within the range of threatened and endangered species, including the gopher tortoise, scrub jay, and snail kite. The 2016 VRB Habitat Conservation Plan identified 174 acres of suitable Florida scrub jay habitat. At the time of the conservation plan, it was anticipated that any development on VRB would be within the existing airport operations area or already improved lots. Prior to development in undeveloped areas, additional environmental analysis, including potential field studies for species, will be required.

Any development at VRB must have adequate stormwater management. There is a stormwater master plan ongoing concurrent with this airport master plan. Data is being shared between the two master plans. After the recommended development plan is identified for the airport master plan, it will be coordinated with the stormwater master plan to identify areas for the stormwater detention that will be needed to support the planned infrastructure.

Figure 5.23 shows the preferred airfield development, ongoing development projects, and mapped environmentally sensitive areas to identify areas to accommodate potential airside development. VRB has been focused on developing already improved areas first, so there is limited improved, uncommitted area remaining. However, there are undeveloped areas that may be suitable for development. Because there are undeveloped areas, redeveloping areas with existing infrastructure was not considered for this analysis.

With the water recharge area northeast of the runways, this area should remain undeveloped, at least until all other developable areas on the airport have been used. Therefore, accommodating airside development, beyond what can be met in the already improved areas, will focus on the northwest area.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 13, 2023 3:15 PM ALEXA02176
I:\2020BS\20A0086W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.23_POTENTIAL AIRSIDE DEVELOPMENT AREAS.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

POTENTIAL AIRSIDE DEVELOPMENT AREAS

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.23

5.9. Commercial Service Facilities

The commercial service facilities at VRB are centered around the terminal building. Therefore, the area that will be reserved for future commercial service facilities is considered before the general aviation facilities, which have more flexibility in their location on VRB.

The passenger terminal areas needed to provide a higher level of service and support overlapping flights were included in the facility requirements chapter. In addition, the terminal building improvements being designed for construction in 2024 were summarized. While the 2024 improvements will increase the current passenger terminal facilities by 50%, once they are complete there are very few, if any, options to further improve or expand the terminal building.

The facility requirements chapter also addressed the short- and long-term automobile parking areas of the passenger terminal. It documented a prior study that showed additional automobile parking spaces were needed. The demand for more spaces was based on a maximum of 10 commercial service flights per week, which started occurring in September 2023. Published schedules show this frequency increasing to 14 flights per week in October 2023 and 17 flights per week in November 2023.

Considering the developed areas of VRB before opening the undeveloped areas, the reasonable alternative to provide additional terminal building and automobile parking improvements would be adjacent to the existing facilities. **Figure 5.24** depicts the existing terminal facilities and outlines the areas that need to be reserved to provide future commercial service facilities.

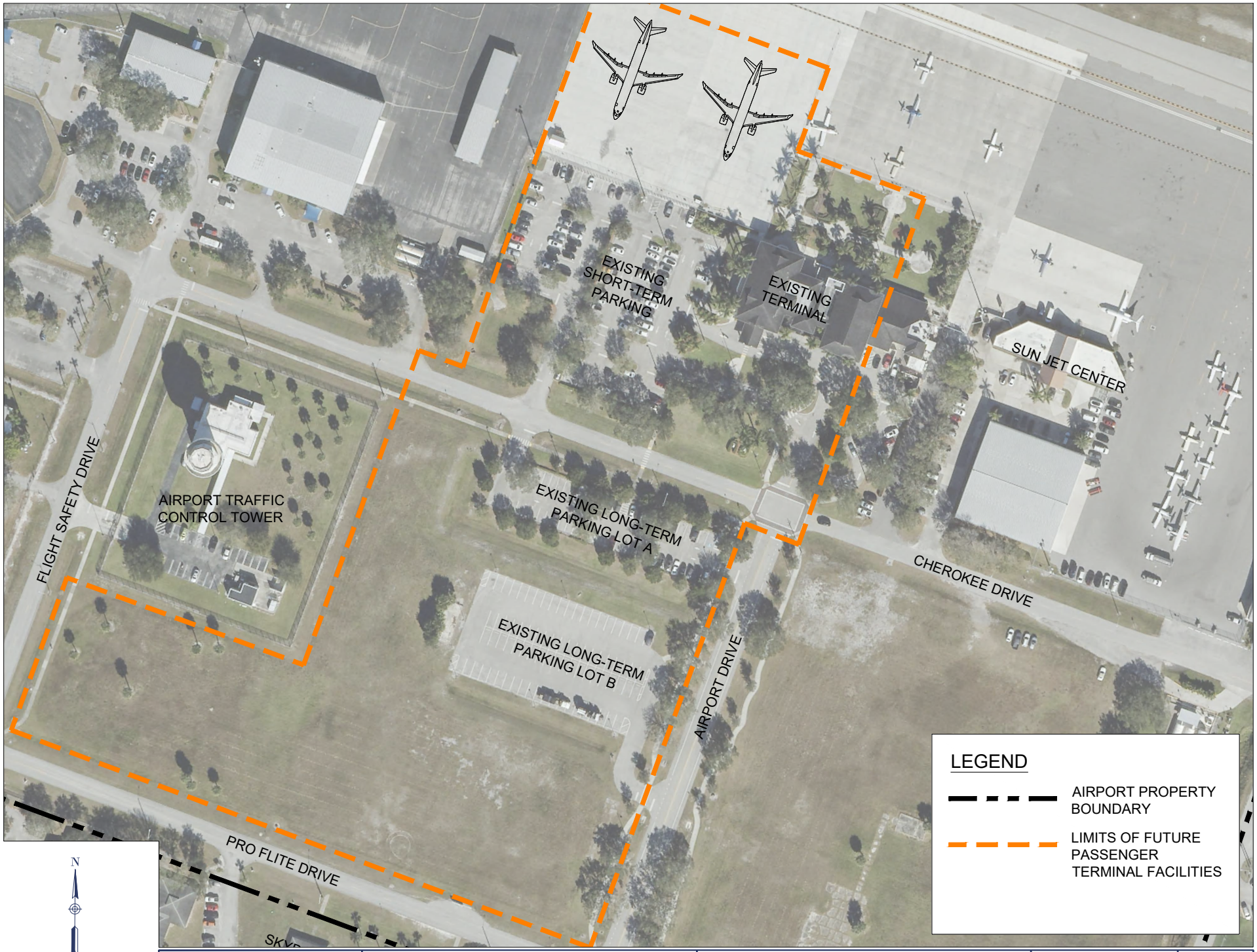
Concept for Future Terminal Building Space

The facility requirements established that 12,430 square feet of terminal space are required to support overlapping flights. **Figure 5.25** illustrates a general concept for a 12,430-square-foot terminal building northwest of the existing terminal. The building footprint shown would be for a single-story structure, because it is not envisioned that a new terminal would require a second level. Furthermore, any new facility should be as simple as possible to provide flexibility for other uses, should the demand for passenger service at VRB change in the future.

A new 12,430-square-foot facility also enables the existing terminal building to remain operational during construction. Once complete, the existing terminal building might continue to support passenger service, or the space could be reconfigured for another use. This will depend on whether passenger service is expected to exceed the capabilities of the new 12,430-square-foot facility. Such growth would justify an updated projection of commercial service activity and a more detailed terminal area planning program.

Expansion of Passenger Terminal Automobile Parking

Figure 5.25 also demonstrates the potential to expand the automobile parking lots south of Cherokee Drive. The prior parking study identified a need for an additional 150 to 200 spaces. Given the current airline schedules, the immediate need is closer to the 200-space estimate. Additional spaces will be required in the future, especially given that some short-term spaces will be lost if a new terminal building is constructed. It is also worth noting that as the passenger airline options and frequencies increase, the average length of stay for those using the long-term parking may also change. For these reasons, Figure 5.25 illustrates how the surface lots could be expanded to accommodate demand beyond that projected, even for a high-growth passenger scenario. Finally, it should be



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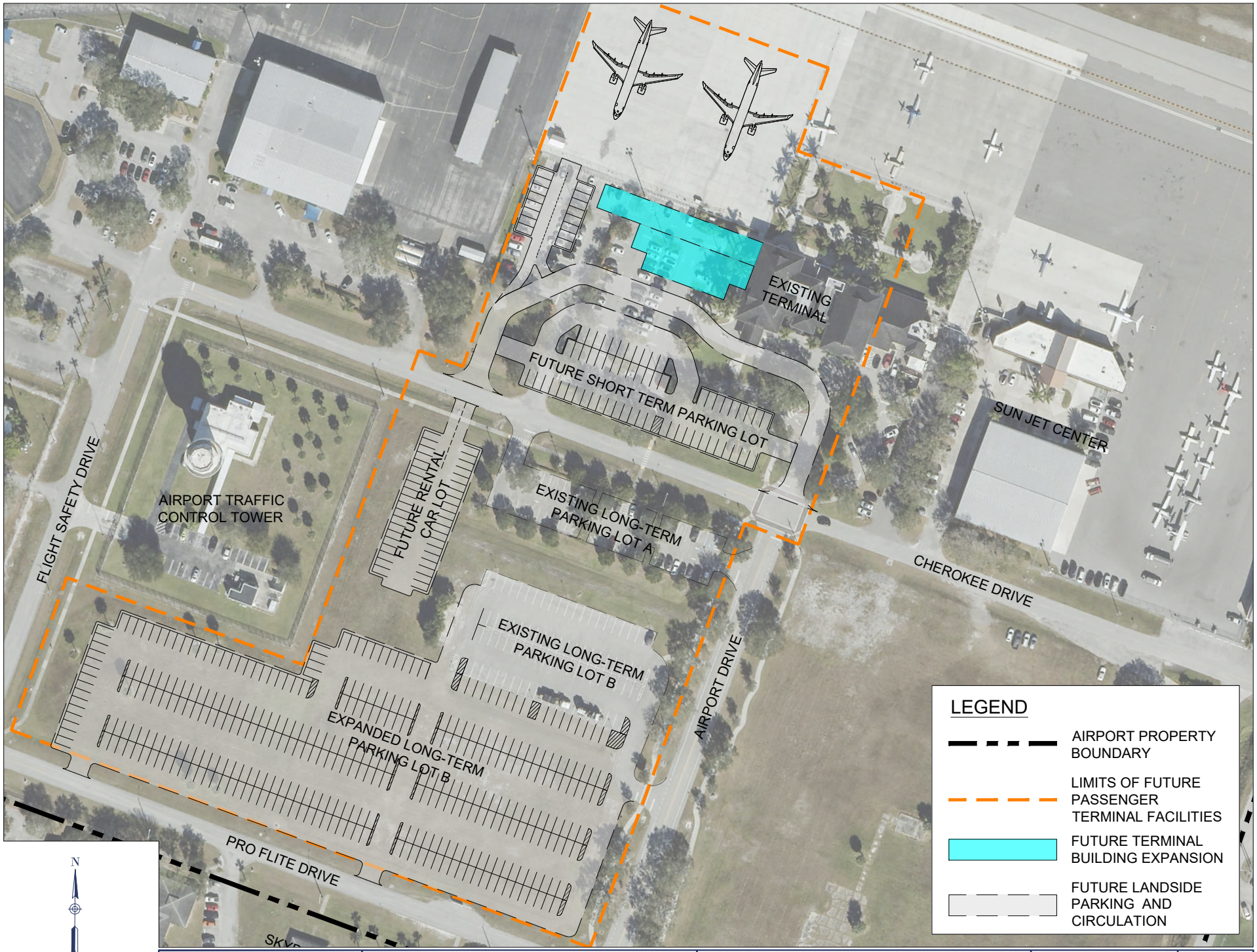
C:\USERS\JHALISKY\DOCUMENTS\AVIATION PLANNING\AIRPORTS\VRB\05 GRAPHICS-GIS-MODELING\DRAWINGS\VRB MP - FIGURE 4-A.DWG

ESA	VERO BEACH REGIONAL AIRPORT MASTER PLAN	EXISTING PASSENGER TERMINAL FACILITIES	DRAWN BY: JJH CHECKED BY: DJD	FIGURE 5.24



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C:\USERS\JHAUSKY\DOCUMENTS\AVIATION PLANNING\AIRPORTS\VRB\05 GRAPHICS-GIS-MODELING\DRAWINGS\VRB MP - FIGURE 4.B.DWG

ESA	VERO BEACH REGIONAL AIRPORT MASTER PLAN	CONCEPT OF FUTURE PASSENGER TERMINAL FACILITIES	DRAWN BY: JJH CHECKED BY: DJD	FIGURE 5.25

noted that airport management has the option of closing a portion of Cherokee Drive to the west of Airport Drive to enhance the margin of safety for pedestrian traffic.

Based on the commercial service enplanement forecast, as included in the aviation forecast chapter, the area around the existing terminal should be sufficient to accommodate the project demand.

Commercial Service Facilities Recommendation

The existing areas around the terminal should be sufficient to accommodate the passenger enplanements, as projected in the aviation forecasts. Therefore, the area west and south of the existing terminal should be reserved for commercial passenger terminal and auto parking expansion. A detailed layout of these facilities should be developed in a future terminal area plan. To maximize the use of the available space, more detailed planning should occur as part of the planning and design of these facilities. The detailed planning would include provisions for ground service equipment, network transportation companies, and taxi and other ground transportation, as well as Americans with Disabilities Act and other access accommodations. Any terminal facilities should be planned to meet the customer service expectations set for VRB.

5.10. General Aviation Facilities

This section analyzes potential areas to support the demand for the future development of GA facilities. The analysis to determine the future development uses the baseline and projected 20-year forecast of based aircraft at VRB, compared to the facilities available that were identified in the facility requirements chapter. VRB is a complex airport with a dynamic GA presence, with operations by business jets and smaller GA aircraft, in addition to two active flight schools. Flight schools generally use single-engine aircraft that are tied down on their ramp when not in use. Therefore, the single-engine aircraft associated with both flight schools were omitted from the hangar demand calculations. VRB also provides commercial service operations; however, these aircraft do not require hangars at VRB are not included in the calculations for future GA facility development. The following sections provide additional information on the future GA facilities' development.

Aircraft Hangar Development

There are various types and sizes of hangars at VRB to accommodate the demand by based aircraft. As identified in the forecast chapter, the existing hangar occupancy on the airport is 100%. There are few, if any, nonflight, school-based aircraft that are tied down, with owners desiring protection for their aircraft. Any tied-down based aircraft are typically short-term waiting for hangar space. It is assumed that all future based aircraft, except for the single-engine aircraft used for flight training, would require a hangar. The Piper aircraft being manufactured are also excluded from the hangar calculations, because they are located on Piper Aircraft property. Based on the forecast demand, the future GA development alternatives identified in this section assume that the increase in nonflight, school-based aircraft over the 20-year planning period would be stored in hangars.

T-Hangar Development

VRB has two sizes of T-hangars: small (1,034 square feet) and medium (1,296 square feet). Generally, T-hangars are used to store single-engine, piston-powered aircraft. For planning purposes, it has been assumed that T-hangars would be desired to store future single-engine aircraft at VRB. The facility requirements identified the need for 70 additional T-hangars to meet the demand over the 20-year planning period. At the time of this airport master plan, ongoing hangar development projects in the midfield area and adjacent to the north ramp will provide an additional 32 T-hangars and 10 box hangars, respectively. With 32 T-hangars being developed, space for an

additional 38 T-hangars needs to be identified. The 32 planned T-hangars would meet the project demand through the intermediate PAL for single-engine aircraft.

Small Box Hangar Development

Generally, small box hangars at airports accommodate small, multiengine, piston-powered aircraft. For the purposes of this airport master plan, because multiple GA aircraft can be stored together in a large hangar, the additional space is identified in the square footage needed. The facility requirements identified the need for approximately 45,000 square feet for multiengine aircraft and 18,000 square feet for rotorcraft, for a total of 63,000 square feet. At the time of this airport master plan, several ongoing hangar development projects in the midfield area and adjacent to the north ramp provide 20,460 square feet, 18,432 square feet, and 15,900 square feet, respectively. These developments provide approximately 54,792 square feet of small hangar space, which almost meets the additional square footage needed through the long-term PAL for multiengine and rotorcraft. Approximately 8,200 square feet of additional small box hangar space is needed to meet the long-term PAL.

Large Box Hangar Development

Generally, large box hangars at airports accommodate business jets. For the purposes of this airport master plan, because multiple GA aircraft can be stored together in a large hangar, the additional space is identified in the square footage needed. The facility requirements identified the need for approximately 184,600 additional square feet of large hangar space. At the time of this airport master plan, an ongoing hangar development project adjacent to the Taxiway E ramp will provide six large box hangars, for a total 86,500 square feet. These planned large box hangars would meet the project demand through the short-term and into the intermediate-term PAL. Therefore, an additional 98,100 square feet should be reserved for large-box hangar development to fully accommodate the intermediate- and long-term PAL.

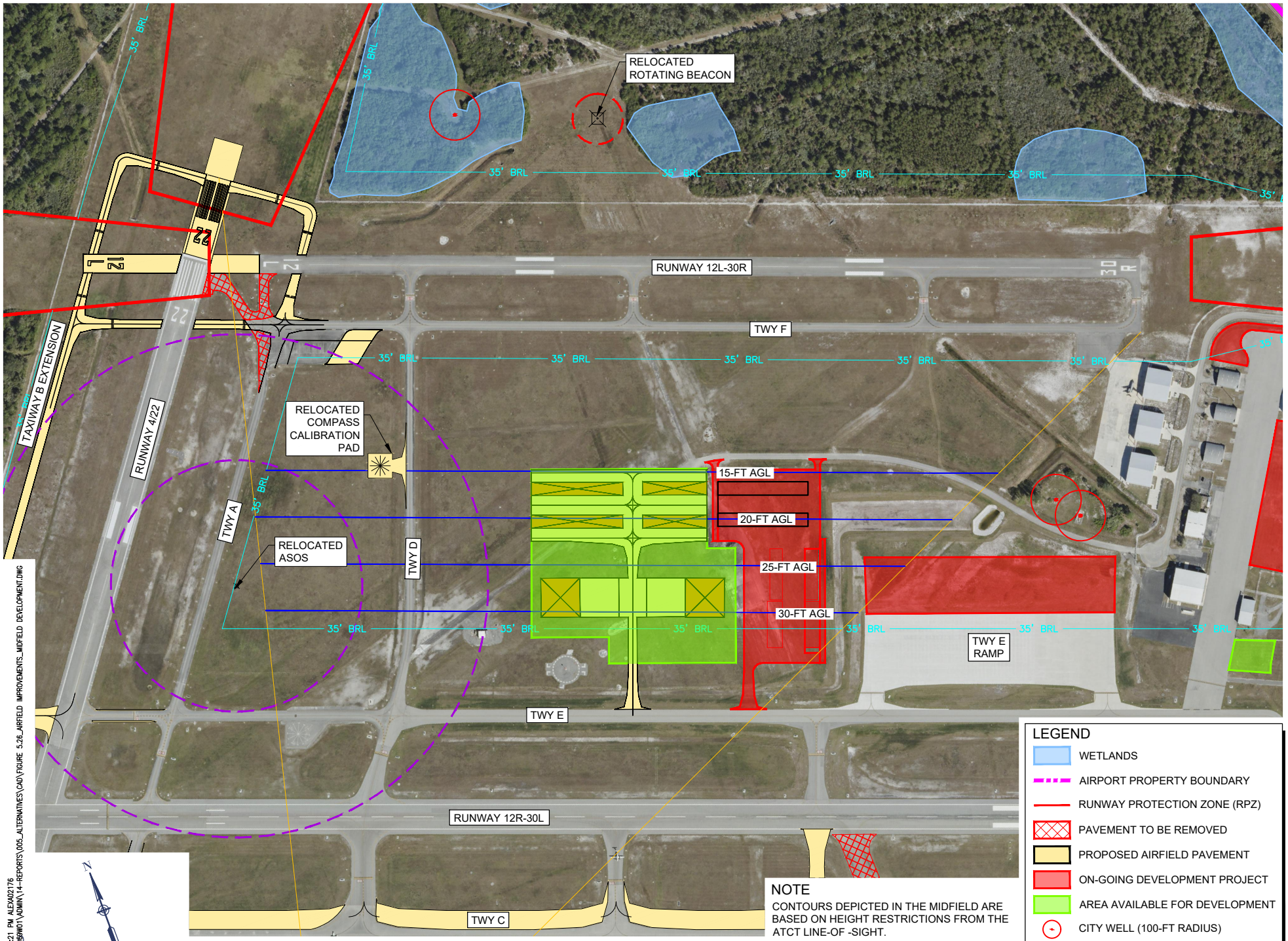
5.11. Development Areas Available for GA Facilities

Figure 5.23 identified the area potentially available for airside facilities. As described above, the area west and south of the existing terminal should be reserved for commercial service facilities. If the ASOS is relocated, some additional midfield development can occur. If a portion of Cherokee Drive is closed, a connection to the airfield could be established between Sun Aviation and the parcel to the south that contains its fuel farm.

Figure 5.26 shows the potential midfield development area with the relocation of the ASOS with a hangar development concept. This area is approximately 560,000 square feet. Due to height restrictions from the ATCT LOS, T-hangar development is best suited farthest north, leaving the area closer to Taxiway E for box hangars.

Approximately 5,000 square feet is needed per T-hangar to protect for a T-hangar and associated pavement with ADG-I TLOFA. Therefore, to meet the demand for 38 additional T-hangars, approximately 190,000 square feet is needed. The remaining area could accommodate up to two large box hangars or some small box hangars. Recent hangar development at VRB has been done with private investment. Therefore, the exact layout of this area would be determined by the developer. The conceptual layouts are shown to identify a sufficient area to meet the projected needs.

The parcel south of Sun Aviation is only accessible through the Sun Aviation leasehold. Therefore, Sun Aviation would be the most likely developer of this area. In case this area is not developed, sufficient space to accommodate the long-term PAL will be identified.



LEGEND

- WETLANDS
- AIRPORT PROPERTY BOUNDARY
- RUNWAY PROTECTION ZONE (RPZ)
- PAVEMENT TO BE REMOVED
- PROPOSED AIRFIELD PAVEMENT
- ON-GOING DEVELOPMENT PROJECT
- AREA AVAILABLE FOR DEVELOPMENT
- CITY WELL (100-FT RADIUS)

NOTE

CONTOURS DEPICTED IN THE MIDFIELD ARE BASED ON HEIGHT RESTRICTIONS FROM THE ATCT LINE-OF -SIGHT.

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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GRAPHIC SCALE IN FEET

OCT 10, 2023 1:21 PM ALEX402176
I:\2020BS\20A0088W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.26_AIRFIELD IMPROVEMENTS_MIDFIELD DEVELOPMENT.DWG

VERO BEACH REGIONAL AIRPORT MASTER PLAN

MIDFIELD DEVELOPMENT AREAS WITH ASOS RELOCATION

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.26

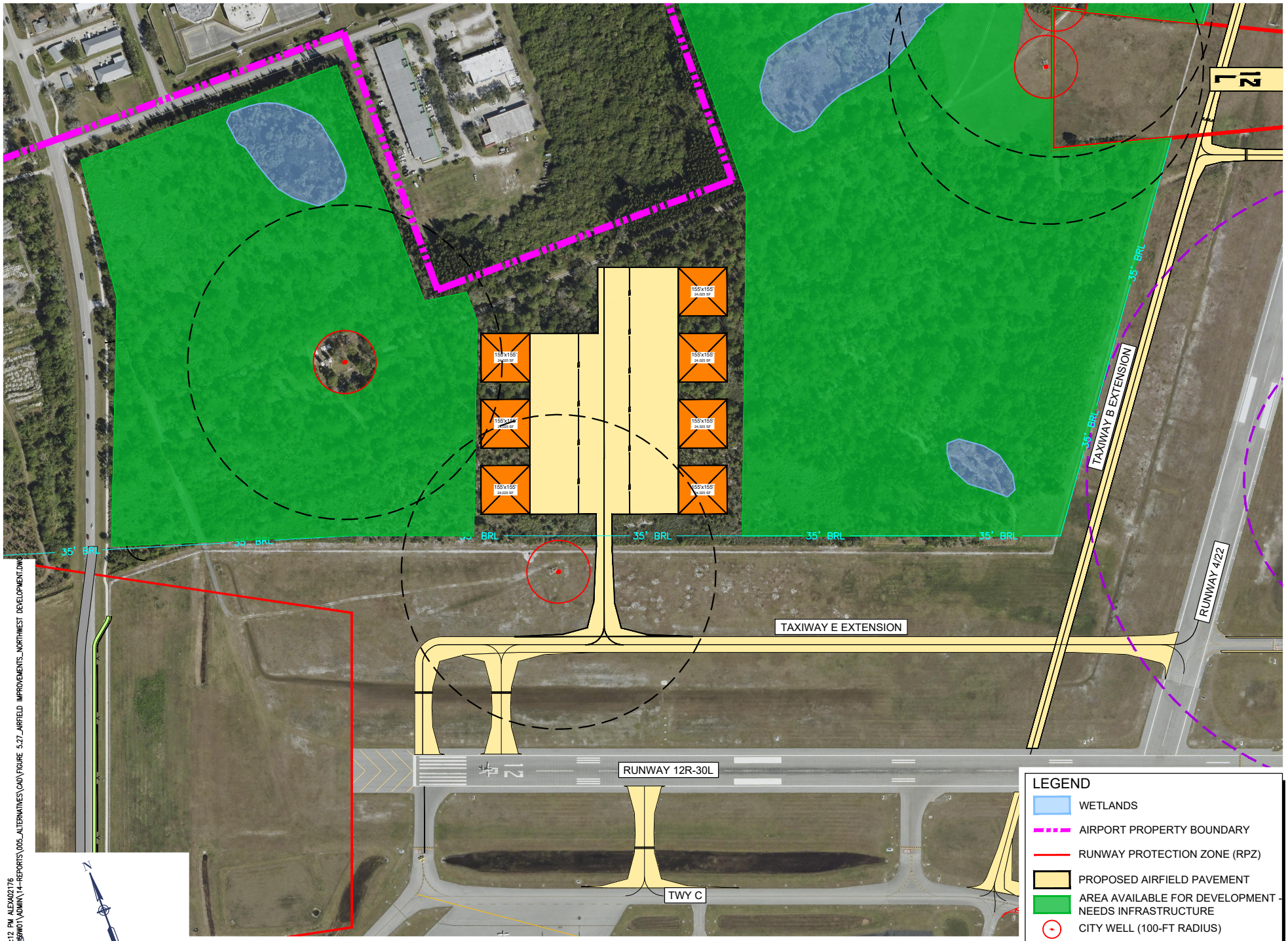
Thus, to meet the future facility requirements, development areas beyond the improved areas are required. The two largest undeveloped areas on VRB with potential airfield access are northwest of the runways and northeast of the runways. As identified previously, there are several environmental considerations in the northeast area. Therefore, the northwest area has been assessed.

The area northwest of the runways has the potential for direct access to the primary or crosswind runway. Any development in this area would need to maintain the appropriate setback from the water wells and comply with the requirements of Florida Administrative Code Section 62-521.400, which regulates the location of hazardous material storage around the wells. The wetlands in this area should be avoided and, if not, mitigation will be required. Further environmental study, including an assessment of endangered species, would be needed before pursuing development in this area, which would also require tree removal.

To meet the demand of the 98,100 square feet needed for large box hangars, options to open the northwest area for development, as needed, should be considered. Opening the northwest area for development will require at least a portion of the Taxiway E extension to be constructed. Utilities will also need to be extended to the area. The appropriate stormwater management will need to accompany any new impervious areas. **Figure 5.27** shows a potential development option for the northwest quadrant. While only a portion of this area northwest of the runway is needed to support airside development during the planning period, it is recommended that the entire area that could have airside access be reserved for aviation-related development, even if beyond the planning period. As with the small box hangars, because the recent hangar facilities at VRB have been privately developed, the northwest layouts are conceptual as a guide.

GA Facility Recommendation

If the ASOS is relocated, the midfield area could accommodate the short-term GA development needed. To accommodate the GA facility need for the full planning period, the northwest portion of VRB should be opened for development. The development will need to be planned around the water wells and, if possible, the wetlands. With the environmental considerations in the northeast portion of the airfield, the entire northwest portion should be reserved for aviation development. VRB should work with the city to update the city's comprehensive plan classification of the northwest portion of the airport to allow for development.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 6:12 PM ALEXA02176
I:\20JOBS\20A00880W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.27_AIRFIELD IMPROVEMENTS_NORTHWEST DEVELOPMENT.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

POTENTIAL NORTHWEST DEVELOPMENT OPTION

DRAWN BY: JA
CHECKED BY: SZ

FIGURE 5.27

5.12. Other Airport Support Facilities

Airport Operations Facility

The airport operations facility is in the southwest quadrant of the airport, east of the Runway 4 end. During the inventory site visit, the need for additional storage space for operations equipment was identified, and any additional space was preferred to be located near the existing facility. There is limited space in the existing airport operations area due to a stormwater detention area south of the operations facility and north of the T-hangars. Therefore, other areas of the airport were considered. **Figure 5.28** shows a potential supplemental operations facility along the north ramp in Parcel 10B. This site has limited landside access, making it difficult to be used for hangar development. As a supplemental airport operations facility, the airside access would be sufficient. If the ASOS is relocated, a site could also be identified at that time within the midfield development, which would minimize transporting equipment across the active airfield.

Airport Operations Recommendation

The site along the north ramp should be reserved for an airport operations facility.

Fuel Farms

At the time of this airport master plan, all fuel farms are in good working condition and meet airport needs. All the fuel farms are operated by private entities. No requests to reserve additional areas for fuel farms were received from tenants during the inventory process. There is a move toward unleaded Avgas. As this occurs, entities providing aircraft fueling may add an unleaded fuel, either as an additional option or as a future replacement for the current Avgas. Unless VRB receives a request for additional space to accommodate unleaded fuel, no changes to the fuel farms are recommended.

Perimeter Fence and Security Gates

The perimeter fence on the north side of the airfield along the tree line was upgraded to 10 feet high. This included 2 feet below ground, 7 feet above ground and 1 foot of three-strand barbed wire on top. It is desired to upgrade the existing perimeter fence on the south side of the airport similar to the improvements completed to the north side to help prevent wildlife access.

In addition to security gates, security cameras should be considered to provide additional security to the airport facilities and T-hangars.

Perimeter Fence and Security Gate Recommendations

To enhance the safety of the airport by improving the access and wildlife control, upgrades to the 10-foot-high perimeter fence on the south side of the airport are recommended. In addition, security camera improvements are recommended. At a minimum, a camera at the security gate off Flight Safety Drive is needed. Additional security cameras to see taxilanes between the T-hangars would also be beneficial to monitoring operations at VRB.

LEGEND

PROPOSED AIRPORT OPERATIONS FACILITY EXPANSION

Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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OCT. 12, 2023 6:14 PM ALEXA02176
I:\20\06\S\20A00699\01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.28_AIRPORT OPERATIONS FACILITY.DWG

VERO BEACH | HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	AIRPORT OPERATIONS FACILITY IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.28

5.13. Landside Facilities

Vehicle Ground Access

At the time of this airport master plan, an ongoing PD&E study evaluated improvements to the intersection of State Road 5/U.S. 1 and Aviation Boulevard. This intersection is within the Runway 30L RPZ. However, to avoid impacts to airport operations, the PD&E study has eliminated all alternatives that included an overpass or underpass. VRB should continue to work with FDOT, such that any improvements would be located farther from the existing runway end than the existing roadways.

The community also plans to improve Airport Boulevard. As depicted in **Figure 5.29**, portions of Aviation Boulevard are in city-owned right of way and portions are owned by the airport. VRB pursued a release of the right of way to the city for improvements to the intersection of Aviation Boulevard and 43rd Avenue. However, because the section was within the Runway 4 RPZ, and some of the improvements were closer to the end of the runway, the FAA denied this land release request. Road improvements, subject to FAA review, could be acceptable, providing VRB retains property ownership. Any road improvements within an RPZ should at least be farther from the runway than the existing road. Therefore, any future improvements in this area should at least be farther from the end of the runway than the existing road and will require an FAA RPZ analysis. It should be recognized that right-of-way ownership may influence the potential funding sources for improvements.

Vehicle Ground Access Recommendation

VRB should continue to monitor and work closely with the owners of the roads surrounding the airport to protect the airport and airspace.

Pedestrian Access

With the initiation of commercial service operations, automobile parking and passenger drop-off has increased. Pedestrian access improvements, such as lighted crosswalks and signs, should be considered during future landside improvement projects.

As mentioned in the commercial service facility section, the closure of a portion of Cherokee Drive, at least to through traffic, could occur to improve pedestrian flow to the terminal. As depicted in **Figure 5.30**, there are sidewalks along Airport Drive from the terminal to Dodger Road and along a portion of Airport Boulevard from Airport Drive to the entrance to Piper Aircraft east of Piper Drive.

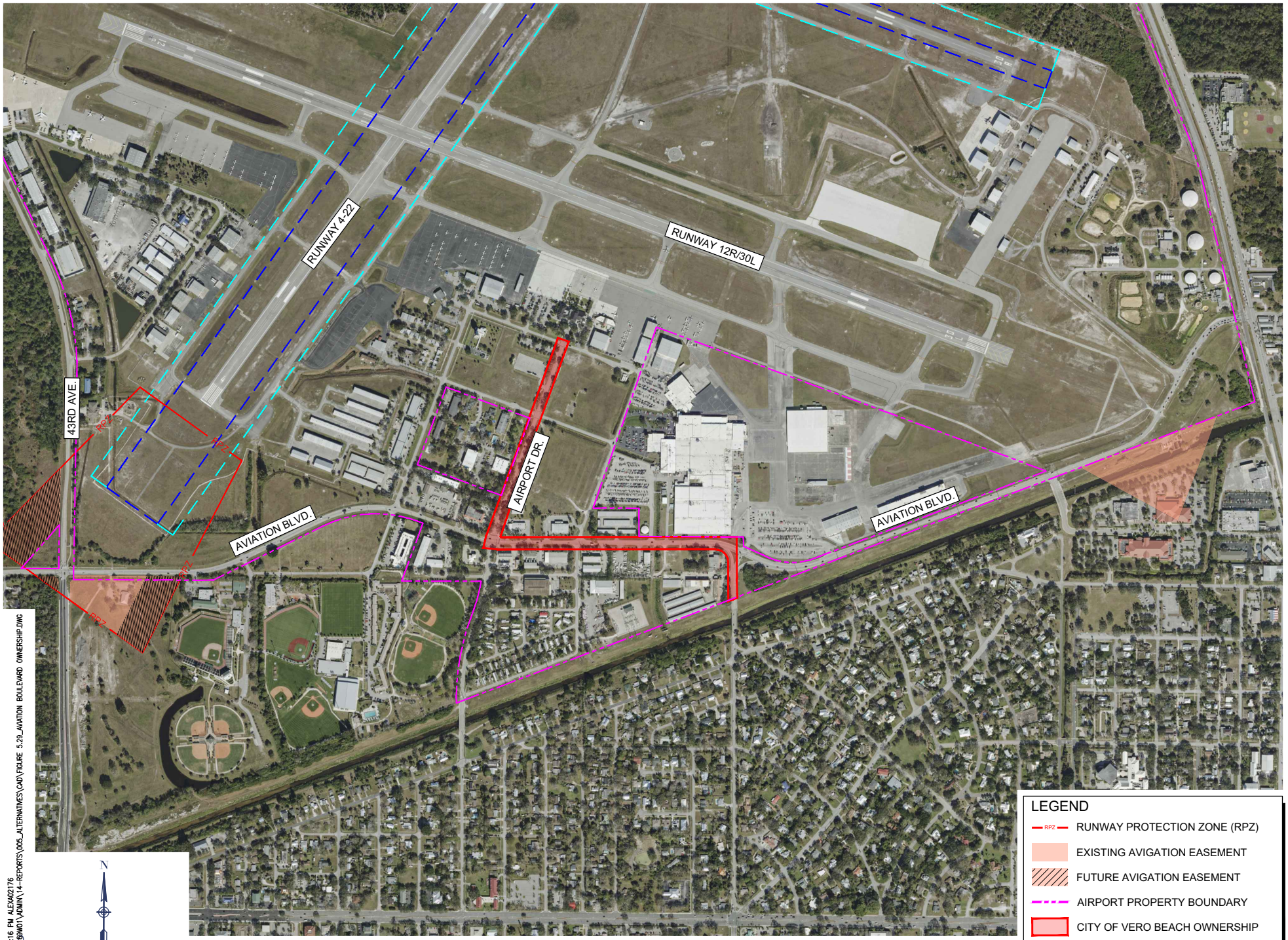
VRB is in the process of adding parking and pedestrian access along Dodger Road, as shown in **Figure 5.31**. This parking will be used by patrons of nonaeronautical businesses in this area. The pedestrian access provides a connection between the terminal and nonaeronautical businesses, which include food and beverage, in this area.

Pedestrian Access Recommendation

VRB should consider closing Cherokee Drive between Airport Drive and Skyborne to through traffic to improve the pedestrian access from expanded future auto parking to the terminal.

Automobile Parking – FBOs and Flight Schools

Corporate Air provides automobile parking for employees and visitors adjacent to the FBO terminal building. However, a grass area across from the FBO terminal building adjacent to Airport West Drive is used as overflow parking. **Figure 5.32** shows the area used for automobile parking overflow parking. Because of the proximity of the retention pond, grading improvements may be required. If the overflow area is paved, appropriate stormwater



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

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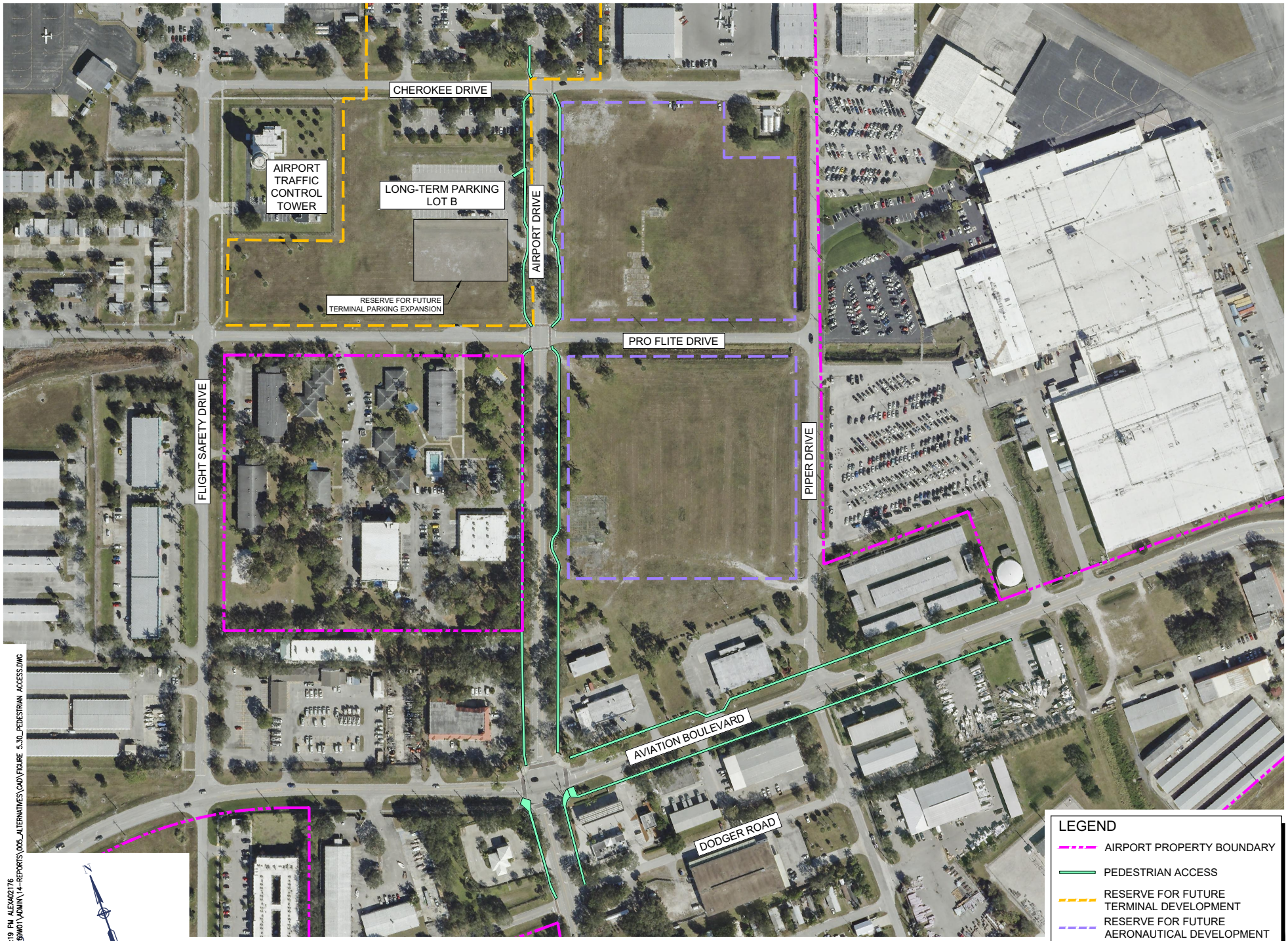
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.29_AVIATION BOULEVARD OWNERSHIP.DWG

VERO BEACH REGIONAL AIRPORT | HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	AVIATION BOULEVARD OWNERSHIP	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.29



Source: Aerial Photography, NV5 GeoSpatial, 2023.

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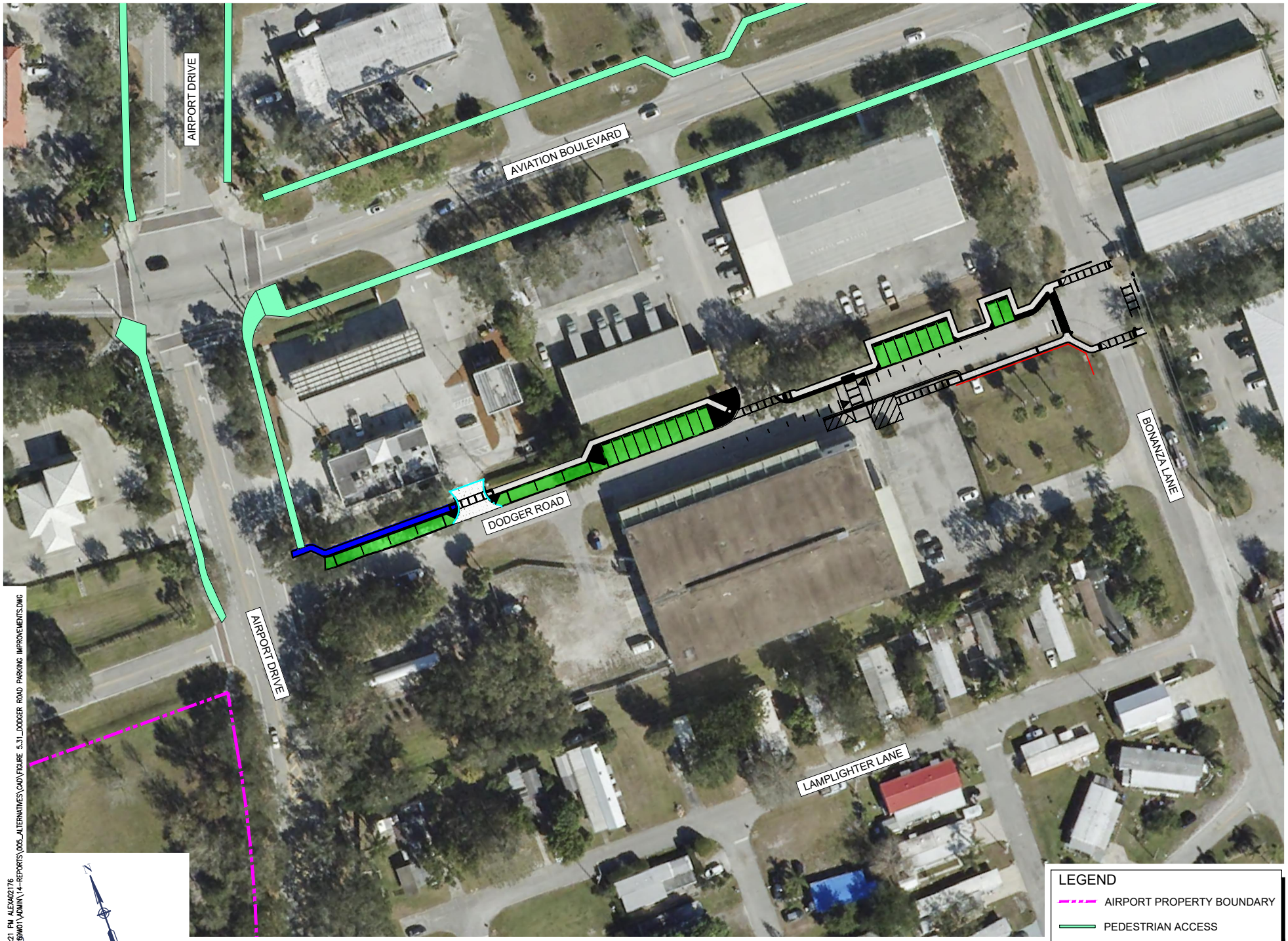
I:\20UOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.30_PEDESTRIAN ACCESS.DWG

VERO BEACH REGIONAL AIRPORT | HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	PEDESTRIAN ACCESS	DRAWN BY: JA CHECKED BY: SZ FIGURE 5.30



Source: Aerial Photography, NV5 GeoSpatial, 2023.

OCT 12, 2023 6:21 PM ALEXA02176
I:\20JOBS\20A0086W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.31_DODGER ROAD PARKING IMPROVEMENTS.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

DODGER ROAD PARKING IMPROVEMENTS

DRAWN BY:	JA
CHECKED BY:	SZ

FIGURE 5.31

Source: Aerial Photography, NV5 GeoSpatial, 2023.

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OCT 12, 2023 6:23 PM ALEXA02176
I:\20\08\20A00868\W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.32_AUTOMOBILE PARKING IMPROVEMENTS_FBO.DWG

VERO BEACH REGIONAL AIRPORT | HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	FBO OVERFLOW PARKING	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.32

management should be included. Consideration may also be given to improving this area for regular parking use but without an impervious surface.

Sun Aviation provides automobile parking for employees and visitors adjacent to the FBO terminal building. The existing automobile parking area provides adequate space. However, if future aeronautical development expands to the south of the existing FBO, additional automobile parking should be considered as a component of this development. Hertz car rental has a counter in the Sun Aviation terminal. Its rental cars overflow to a grass area south of Sun Aviation. Additional parking for rental cars should be provided. Overflow student parking also occurs at Paris Air outside its designated auto parking areas. Additional paved parking is needed to accommodate the students.

Automobile Parking – FBOs Recommendation

VRB should work with the FBOs and flight schools to allow for sufficient parking and the necessary improvements within the existing or an expanded leasehold.

5.14. Nonaeronautical Development

After identifying areas to meet the high aeronautical development demand, any remaining areas and those without potential airfield access could be considered for nonaeronautical use, as shown in **Figure 5.33**. Nonaeronautical development has the potential to provide airports additional revenue to diversify the revenue stream and help support airport operations. The primary area that could be opened for nonaeronautical development is west of 43rd Avenue outside of the RPZ. Any development in this area should keep a buffer between the nonaeronautical use and surrounding land use. Access and utilities would be needed to open this area for development. As a surplus property airport, the federal government has an interest in the land, so environmental documentation and any associated studies will be required to open this area for development, as further addressed in the environmental overview chapter.

Nonaeronautical Development Recommendation

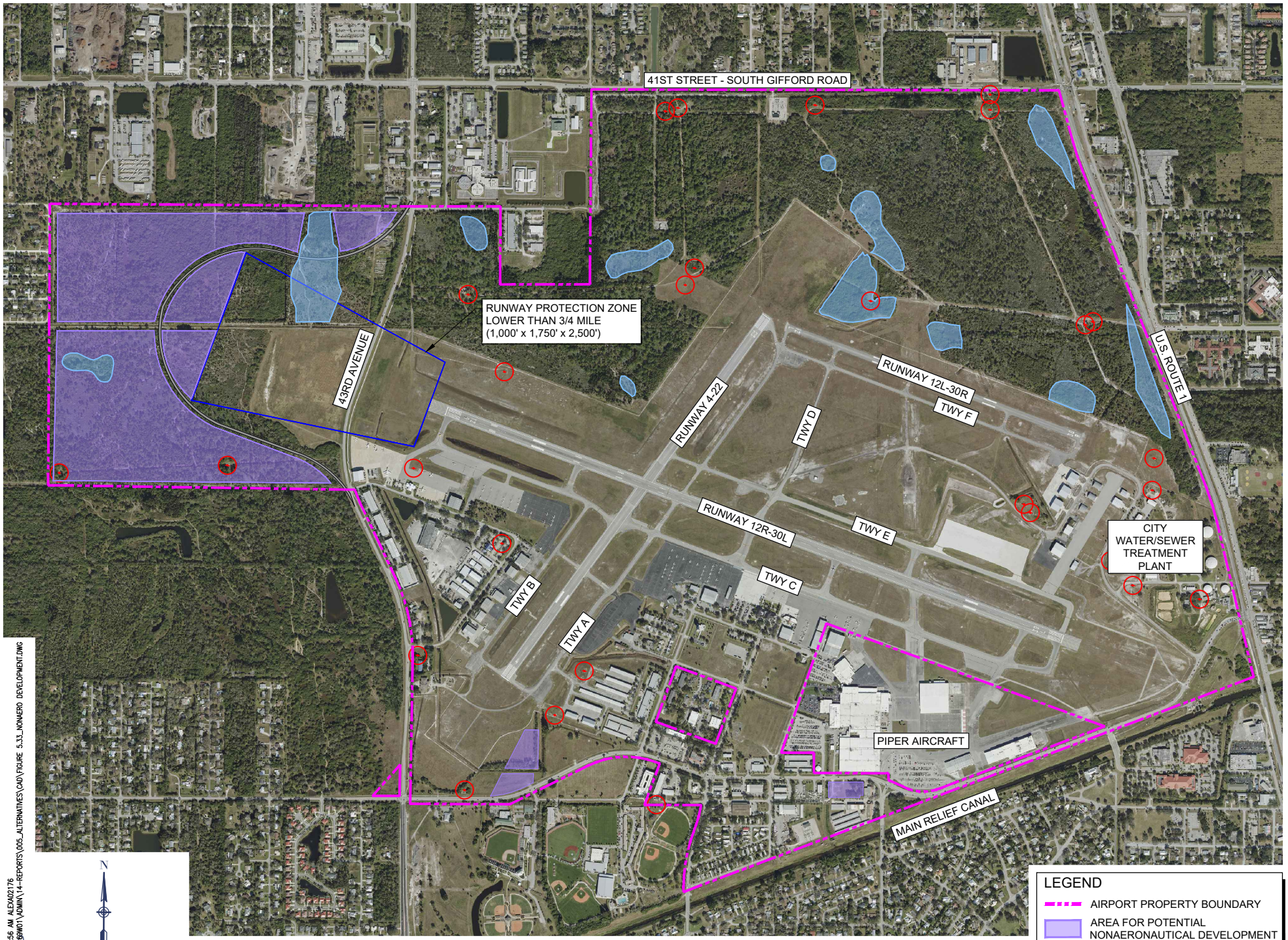
VRB should work with the city to update the city's comprehensive plan to allow for the development of airport property west of 43rd Avenue.

5.15. Utility Improvements

Once the preferred alternatives are identified for the future aeronautical and nonaeronautical development, utility upgrades to support the development will be identified so they can be considered as part of the development costs. In addition to the utilities to support VRB development, the city has identified the need to install a water main from the water plant to 43rd Avenue to support development west of the airport. Consideration should be given to a utility corridor for this water main in the vicinity of and parallel to Taxiway E, outside the TSA and preferably outside the TOFA. The location would provide the most direct route across the airport. This water main could also be used to support development in the northwest portion of the airport and airport property west of 43rd Avenue.

Utility Recommendation

The implementation planning should include the costs of any utility upgrades to open undeveloped areas on VRB for development. A utility corridor should be planned, with the appropriate lease, to provide a route from the water plant to 43rd Avenue for a new line that is needed to support development west of VRB. Utility costs for any relocations to accommodate proposed development should also be included in the implementation planning.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

LEGEND
- AIRPORT PROPERTY BOUNDARY
- AREA FOR POTENTIAL NONAERONAUTICAL DEVELOPMENT

N

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OCT 13, 2023 8:56 AM ALEXA02176
I:\20JOBS\20A00860W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.33_NONAERO DEVELOPMENT.DWG

VERO BEACH REGIONAL AIRPORT | HANSON

VERO BEACH REGIONAL AIRPORT MASTER PLAN

AREAS FOR POTENTIAL NONAERONAUTICAL DEVELOPMENT

DRAWN BY: JA
CHECKED BY: SZ

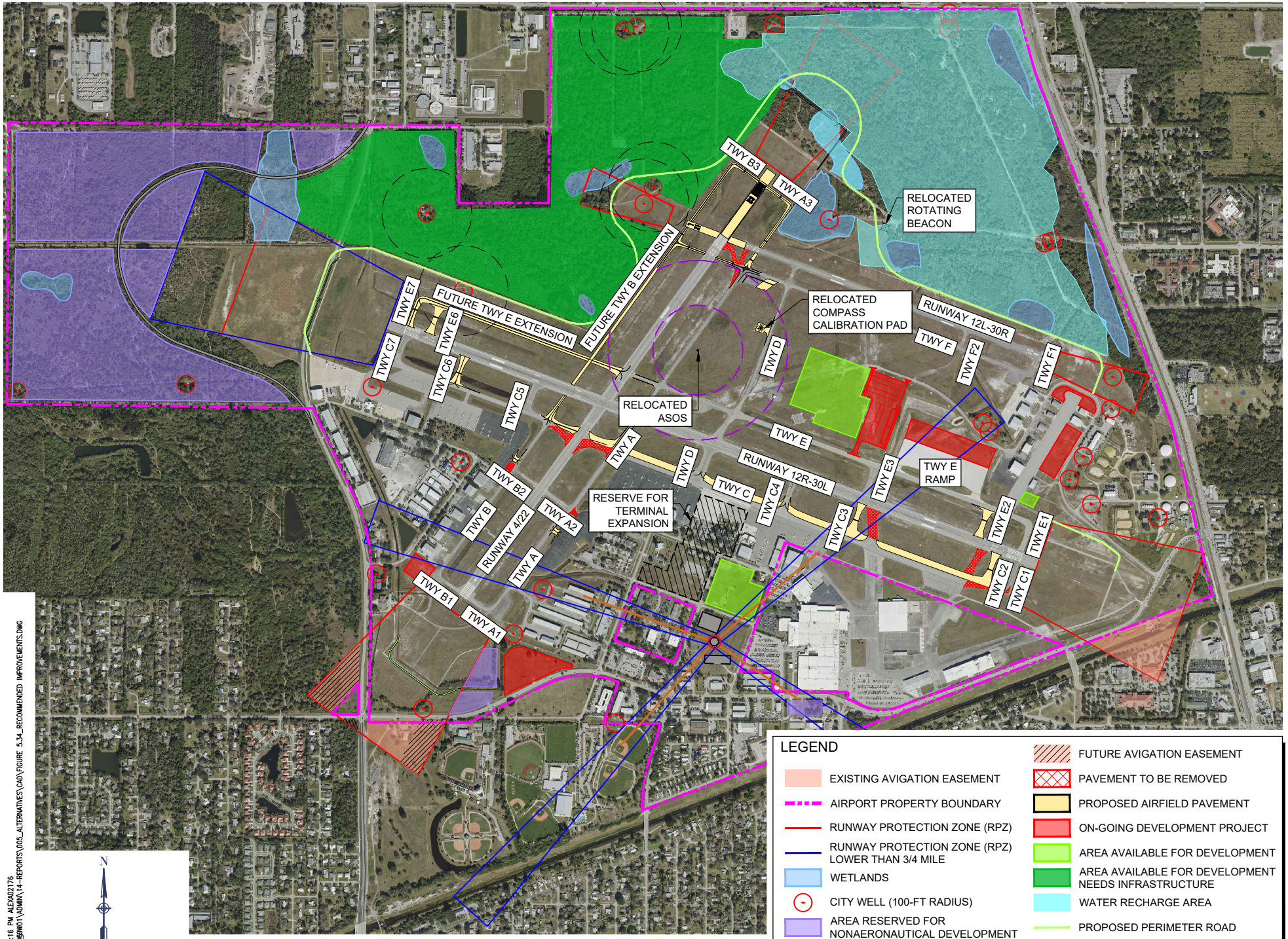
FIGURE 5.33

5.16. Recommended Development Plan

This chapter details potential and recommended alternatives for the airfield: runway and taxiway systems and navaids and airfield support infrastructure, emerging aircraft technologies, commercial service facilities, GA hangar facilities, other auto parking and utility improvements and nonaeronautical development opportunities. **Figure 5.34** summarizes the recommended alternatives that are listed below. The next step to finalize the recommended development plan is to obtain airport staff, tenant, and public input.

The recommended improvements identified through this alternative analysis include:

- Relocate 43rd Avenue and the perimeter fence to eliminate the use of declared distances on Runway 12R/30L.
- Pursue approach minimums of 1/2 a mile on Runway 12R with the installation of the MALSR and obstruction mitigation.
- Extend to the Runway 22 end up to 726 feet.
- Relocate the drainage swale and fence and RSA improvements to eliminate the need for declared distances on Runway 4/22.
- Extend Taxiway B the full length of Runway 4/22 with a 400-foot runway centerline to taxiway centerline separation and pavement at least 35 feet wide.
- Widen Taxiway E from 40 feet to 50 feet between Taxiway D and Runway 4/22.
- Extend Taxiway E the full length of Runway 12R/30L with a 400-foot runway centerline to taxiway centerline separation and pavement 50 feet wide.
- Realign Taxiway C for a 400-foot runway centerline to taxiway centerline separation the entire length.
- Modify Taxiway A1 to eliminate the direct apron-to-runway connection.
- Modify Taxiway C2 to eliminate the direct apron-to-runway connection and provide a standard 90-degree connector.
- Add a bypass taxiway from Taxiway C at the Runway 12R end.
- Rename taxiway end connectors and others as needed to support this change.
- Relocate the airfield rotating beacon, ASOS, and compass calibration pad.
- Work with the flight schools to minimize aircraft parking in RVZ.
- Extend perimeter road on north and west sides of airfield.
- Reserve an area west and south of the terminal for commercial service facilities and prepare a terminal area plan.
- Reserve the midfield area opened by the ASOS relocation for T-hangar and box hangar development.
- Reserve the northwest portion of airport for general aviation facility development, an initial step to open the area for development.
- Work with the city to update its comprehensive plan to reclassify the northwest portion of airport and airport property west of 43rd Avenue for development.
- Reserve Parcel 10B along the north ramp for a supplemental airport operations facility.
- Upgrade the perimeter fence on the south side of airfield and add security cameras.
- Work with the city and county to plan upgrades to roads around the airport perimeter without impact to the airport.
- Consider closing Cherokee Drive between Airport Drive and Skyborne to improve the terminal area pedestrian access.
- Work with FBOs to allow sufficient parking and necessary improvements in leaseholds.



Source: Airport Property Boundary, Vero Beach Department of Public Works Survey Division, September 2021; Aerial Photography, NV5 GeoSpatial, 2023.

OCT 13, 2023 3:16 PM ALEXA02176
I:\20JOBS\20A00869W01\ADMIN\14-REPORTS\005_ALTERNATIVES\CAD\FIGURE 5.34_RECOMMENDED IMPROVEMENTS.DWG

VERO BEACH REGIONAL AIRPORT / HANSON	VERO BEACH REGIONAL AIRPORT MASTER PLAN	RECOMMENDED IMPROVEMENTS	DRAWN BY: JA CHECKED BY: SZ	FIGURE 5.34

Appendix F: Florida Master Site File

Manuscript Roster

Total=12

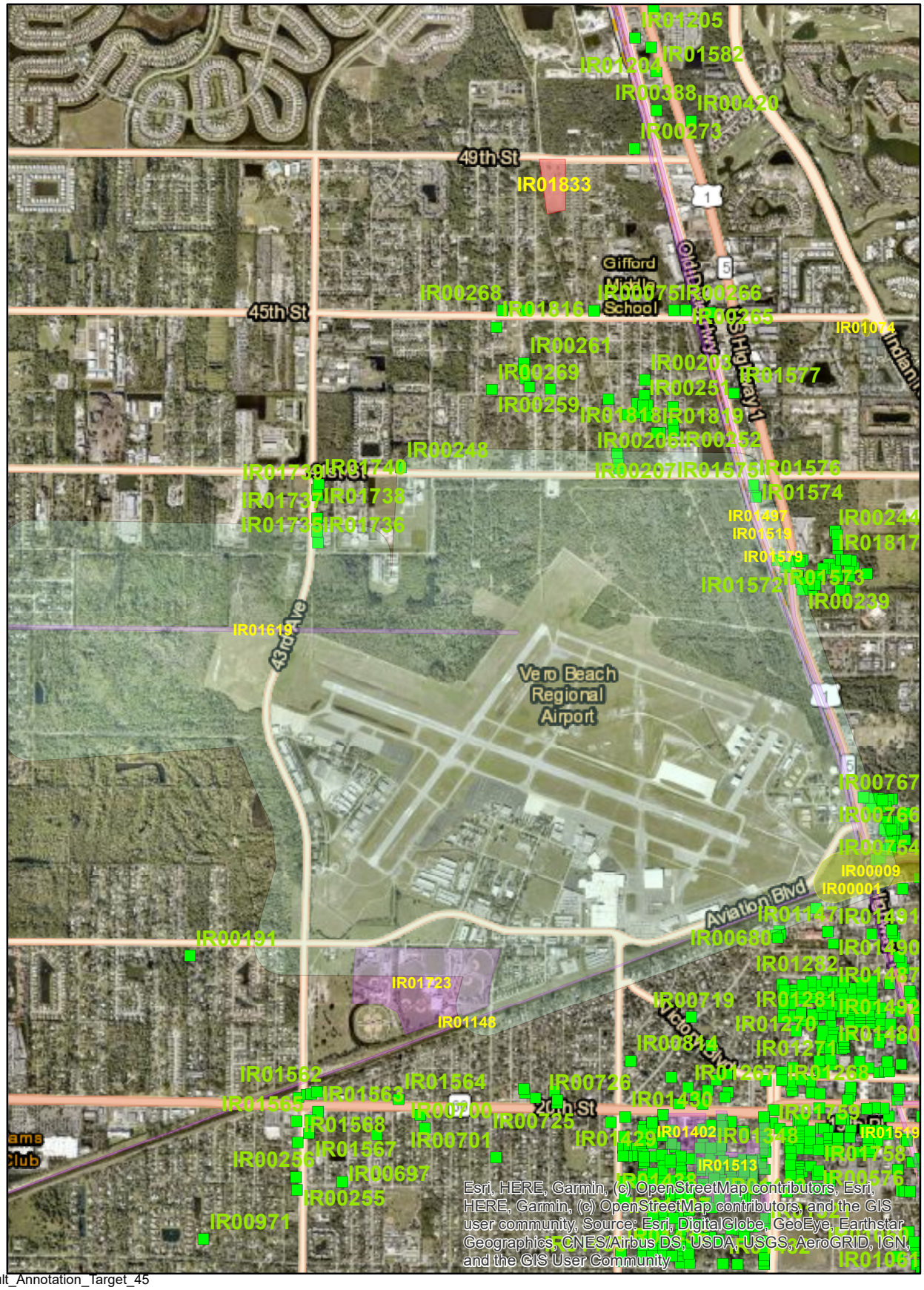
MS#	Title	Publication Information	Year
22439	A Cultural Resource Assessment Survey of the Proposed 43rd Avenue Sidewalk Improvements from 26th Street to Airport Drive West Indian River County, Florida	2015, Wallace, Jelane. A Cultural Resource Assessment Survey of the Proposed 43rd Avenue Sidewalk Improvements from 26th Street to Airport Drive West Indian River County, Florida. Panamerican Consultants, Inc., Lakeland, Florida	2015
25910	A Cultural Resource Assessment Survey of the Proposed 43rd Avenue Sidewalk Improvements from Airport Drive West ti 41st Street Indian River County, Florida	PanAmerican Consultants, Inc., prepared for G.K. Environmental, Inc.	2015
20946	A Cultural Resource Assessment Survey of the Proposed Old Dixie Highway Sidewalk Project Between 45th Street and 38th Lane in Vero Beach, Indian River County, Florida	2013, Wallace, Jelane, and Stacey Griffin. A Cultural Resource Assessment Survey of the Proposed Old Dixie Highway Sidewalk Project Between 45th Street and 38th Lane, In Indian River County, Florida, Panamerican Consultants, Inc., Lakeland, Florida	2013
20495	Cultural Resource Assessment Report for the All Aboard Florida Passenger Rail Project from Orlando to West Palm Beach	Janus Research, 1107 N. Ward Street, Tampa FL 33607	2013
18447	Cultural Resource Assessment Survey of State Road 5/US-1 from 37th Place to 45th Street, Indian River County, Florida	Janus Research, prepared for the Florida Department of Transportation, District 4	2011
14147	A Preliminary Archaeological Survey of the Main Canal Vortex Treatment System/Vero Site, Vero Beach, Florida	Thomas Penders & Associates, Titusville. Prepared for Public Works Department Stormwater Engineering Division, Government of Indian River County, Vero Beach	2005
14150	An Archeological and Historical Survey of the Proposed Indian River County Adminstration Complex, Vero Beach, Florida	Thomas Penders & Associates, Titusville. Prepared for Government of Indian River County, Vero Beach	2005
7312	An Archaeological and Historical Survey of the Act Vero Airport Tower Location in Indian River County, Florida	PANAMERICAN CONSULTANTS, INC., TAMPA. Submitted TO EPAC ENVIRONMENTAL SCIENCES, INC., POMPANO BEACH	2002
7420	An Archaeological and Historical Survey of the Proposed Vero Airport Tower Location in Indian River County, Florida	PANAMERICAN CONSULTANTS, INC., TAMPA. Submitted TO G.K. ENVIRONMENTAL, INC., VERO BEACH	2002
7396	An Archaeological and Historical Survey of the Proposed Dodger Town Tower Location in Indian River County, Florida	PANAMERICAN CONSULTANTS, INC., TAMPA. Submitted TO EPAC ENVIRONMENTAL SERVICES, INC., POMPANO BEACH	2001
2580	Historical resource assessment survey of the proposed bridge replacement on 27th Avenue over the Main Canal in Vero Beach, Florida	Florida Department of Transportation, Tallahassee.	1990
2670	Historic Properties Survey of the City of Vero Beach, Florida	Report submitted to the City of Vero Beach, FL, by Historical Property Associates, Inc., St. Augustine.	1990

AR=3
SS=32
CM=0
RG=5
BR=0
Total=40

Cultural Resource Roster

SiteID	Type	Site Name	Address	Additional Info	SHPO Eval	NR Status
IR00001	AR	VERO MAN	Fellsmere	Human Remains May Be Present	Eligible	
IR00009	AR	VERO LOCALITY	Vero Beach	Human Remains May Be Present	Eligible	
IR00204	SS	4115 28TH AVE	4115 28TH AVE, GIFFORD	c1930 Frame Vernacular		
IR00205	SS	4127 28TH AVE	4127 28TH AVE, GIFFORD	c1930 Frame Vernacular		
IR00206	SS	4133 28TH AVE	4133 28TH AVE, GIFFORD	c1925 Frame Vernacular		
IR00207	SS	4135 28TH AVE	4135 28TH AVE, GIFFORD	c1925 Frame Vernacular		
IR00232	SS	1915 38TH LN	1915 38TH LN, GIFFORD	c1925 Frame Vernacular		
IR00233	SS	1925 38TH LN	1925 38TH LN, GIFFORD	c1925 Bungalow		
IR00238	SS	1910 38TH PL	1910 38TH PL, GIFFORD	c1925 Bungalow		
IR00239	SS	1911 38TH PL	1911 38TH PL, GIFFORD	c1925 Bungalow		
IR00248	SS	3890 41ST ST	3890 41ST ST, GIFFORD	c1925 Bungalow		
IR00732	SS	MARVIN GARDENS LUNCH	3030 US 1, A, VERO BEACH	1926 Frame Vernacular		
IR00733	SS	MARVIN GARDENS OFFICE	3030 US 1, B, VERO BEACH	c1925 Frame Vernacular		
IR00738	SS	1316 31ST STREET #6	1316/#6 31ST STREET, VERO BEACH	c1935 Frame Vernacular		
IR00739	SS	1316 31ST STREET #7	1316/#7 31ST STREET, VERO BEACH	c1935 Frame Vernacular		
IR00740	SS	1316 31ST STREET #8	1316/#8 31ST STREET, VERO BEACH	c1935 Frame Vernacular		
IR00741	SS	1316 31ST STREET #9	1316/#9 31ST STREET, VERO BEACH	c1935 Frame Vernacular		
IR00742	SS	1316 31ST STREET #10	1316/#10 31ST STREET, VERO BEACH	c1935 Frame Vernacular		
IR00743	SS	1316 31ST STREET #11	1316/#11 31ST STREET, VERO BEACH	c1935 Frame Vernacular		
IR00753	SS	1345 32ND STREET	1345 32ND STREET, VERO BEACH	c1935 Frame Vernacular		
IR00761	SS	1355 33RD STREET	1355 33RD STREET, VERO BEACH	c1925 Frame Vernacular		
IR00762	SS	1365 33RD STREET	1365 33RD STREET, VERO BEACH	c1935 Frame Vernacular		
IR00763	SS	1366 33RD STREET	1366 33RD STREET, VERO BEACH	c1935 Frame Vernacular		
IR00764	SS	1376 33RD STREET	1376 33RD STREET, VERO BEACH	c1935 Frame Vernacular		
IR00765	SS	1375 33RD STREET	1375 33RD STREET, VERO BEACH	c1925 Frame Vernacular		
IR00766	SS	1394 33RD STREET	1394 33RD STREET, VERO BEACH	c1935 Masonry Vernacular		
IR01146	SS	Mt. Zion Baptist Church	18th AVE, Vero Beach	c1923 Other	Not Eligible	
IR01148	RG	Indian River Farms Main Canal	Vero Beach	Linear Resource - 1 Contrib Resources	Not Eligible	
IR01497	RG	Florida East Coast Railroad	Vero Beach	Linear Resource - 1 Contrib Resources		
IR01519	RG	Dixie Highway	Sebastian	Linear Resource - 1 Contrib Resources	Eligible	
IR01572	SS	3882 Old Dixie Highway	3882 Old Dixie HWY, Vero Beach	1950- Masonry Vernacular	Not Eligible	
IR01573	SS	3880 Old Dixie Highway	3880 Old Dixie HWY, Vero Beach	1950- Masonry Vernacular	Not Eligible	
IR01574	SS	Kool Kuts	4036 Old Dixie HWY, Vero Beach	1964- Commercial	Not Eligible	
IR01575	SS	Gold Fried Rice &Player's Club Pool Hall	4050-4066 Old Dixie HWY, Vero Beach	1948- Masonry Vernacular	Not Eligible	
IR01576	SS	New Club Bali	4076 Old Dixie HWY, Vero Beach	1948- Masonry Vernacular	Not Eligible	
IR01579	AR	Gifford Glass Scatter	Gifford		Insufficient Info	
IR01619	RG	Indian River Farms Company Canal-37th St	Vero Beach	Linear Resource - 1 Contrib Resources	Not Eligible	
IR01723	RG	Dodgertown	Vero Beach	FMSF Building Complex		
IR01735	SS	4004 43rd Avenue	4004 43rd AVE, Vero Beach	1957- Masonry Vernacular		
IR01736	SS	4024 43rd Avenue	4024 43rd AVE, Vero Beach	1956- Masonry Vernacular		

Date: 8/28/2023



Legend

- Buffer_of_Default_Annotation_Target_45
- FloridaSites
- HistoricalBridges
- HistoricalCemeteries
- ResourceGroups
- FloridaStructures

900 450 0 900 Meters

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Appendix G: Recycling, Reuse and Waste Reduction Plan

Recycling, Reuse, and Waste Reduction Plan

Per FAA Order 5100.38D, master plans funded with AIP dollars must address issues related to an airport's recycling, reuse, and waste reduction programs. This includes:

- Reviewing waste management contracts
- Assessing the feasibility of solid waste recycling at the airport
- Identifying operations and maintenance requirements
- Identifying the potential for cost savings or generation of revenue
- Minimizing the generation of waste at the airport

This recycling, reuse, and waste reduction plan provides information regarding the VRB waste and recycling programs, based on a review of the practices by VRB and its tenants.

1.1. Background

The inventory chapter detailed the various facilities and features of the airport. As a public-use airport, VRB is owned and operated as a department of the city of Vero Beach, Florida, and as such, primarily receives waste-handling services through the city's contract with Waste Management. Most of the waste at VRB is generated by the aeronautical and nonaeronautical tenants, as well as the users of the various facilities. VRB is responsible for collecting waste generated by the commercial airline service and its administration offices, while tenants are responsible for their own trash and any recycling disposal. In addition to municipal solid waste, VRB and some of the tenants have hazardous waste, spill waste, and project-related construction and demolition waste, which are typically managed by an outside contractor.

Common waste disposed at VRB includes:

- General office waste: paper, plastic (hard plastic containers and film plastics), aluminum cans, bottles, and cardboard boxes
- Small-scale in-flight service-related waste such as food, food packaging, paper products, and cardboard
- Construction and demolition waste from construction projects
- Hazardous waste such as batteries, fluorescent light bulbs, solvents, tires, and paint

Most of the waste generated by VRB staff is from the office areas; however, this is a small volume relative to the overall waste generated by the tenants, passenger airline service, restaurant, and other airport users. Some of the waste minimization efforts undertaken by one or more tenants include:

- Double-sided printing and electronic document use/storage
- Recycling fluorescent light bulbs, oil, and cleaning solvents
- Converting fluorescent light bulbs to longer-life LEDs
- Recycling scrap metal

VRB does not have a formalized recycling or waste reduction program; however, a number of tenants and businesses on VRB property have taken steps to reduce waste and increase recycling efforts. For example, there are tenants that recycle paper, plastic, glass, and scrap metals. Regardless, there are no formalized goals or targets and, therefore, no tracking or reporting on such measures at VRB. Because of the way solid waste and

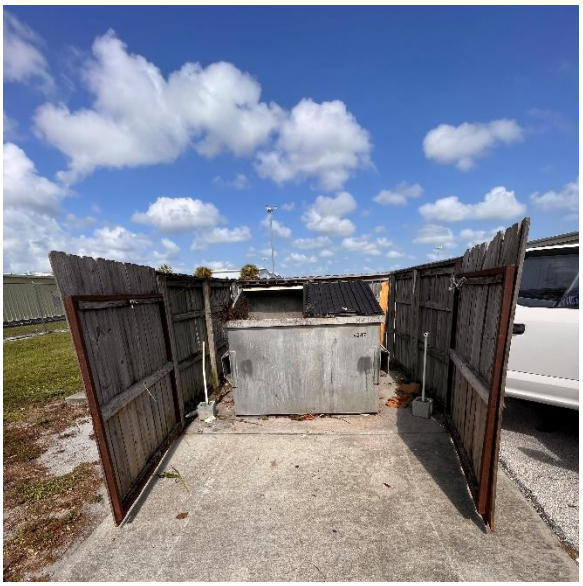
recycling services are billed (i.e., flat-rate billing rather than by volume), it is even difficult to track and monitor the performance of these services. A formalized recycling program could be established, but staff time requirements and costs are common challenges to such programs.

1.2. Waste Review

In lieu of a full waste audit, a review of waste management practices and programs was completed. In-person and virtual meetings were held with airport management, while other tenants and stakeholders, including aeronautical and numerous nonaeronautical businesses on VRB property, were contacted to complete a survey of their waste disposal practices. Of the 50 invitations sent to tenants, 23 completed the survey. A copy of the survey is included at the end of this document.

The tenants of VRB-managed hangars and facilities have access to dumpsters and even waste oil receptacles (see **Figure 1**). Other tenants are responsible for collecting waste items from their leased facilities. More than 50 aeronautical and nonaeronautical businesses have waste receptacles near their facilities, while others transport it to the various marked disposal containers (dumpsters) around VRB.

FIGURE 1: **DUMPSTER AND WASTE OIL RECEPTACLE IN THE VRB HANGAR AREA**



On-airport waste removal and disposal services are primarily provided through the city of Vero Beach's Solid Waste Division; however, some are handled by the Indian River County Solid Waste Disposal District. The city and county contract these services to Waste Management. From tenant responses, it was determined that most of those that recycle and have on-property collection are also serviced by Waste Management.

While there is no airportwide recycling pickup service, several tenants and businesses at VRB independently pay for commercial recycling services. In fact, more than half of the tenants that responded to the waste review survey indicated having some form of a commercial recycling program. Typical recycled items include paper, plastic, and cardboard, glass, plastic, metal, and aluminum cans. Additionally, a few contractors, mechanics, and construction businesses in VRB's industrial areas recycle scrap aluminum, other metals, and waste oils. Some tenants, mostly small business owners, report periodically taking recyclables to their residences for recycling disposal or to the

county landfill, which operates a recycling center. One of the more unique findings of this waste review was from the distillery in the south airport industrial park, which shared its practice of providing process waste (spent grains) to cattle farmers as a feed supplement. A small number of tenants expressed interest in recycling but would prefer a free option or inclusion with commercial waste removal, because the added cost of commercial recycling would be too expensive.

1.3. Review of Recycling Feasibility

There are factors that impact the operations at VRB's ability to recycle. The primary factor is that a recycling pick-up service is not provided in parallel with regularly scheduled commercial solid waste pickup and would require VRB to procure these services and assign staff to manage it. These would likely be the greatest barriers to implementing an effective airportwide recycling program. VRB has a relatively large footprint with many tenants and limited resources. Because most tenants and businesses oversee their own waste management contracts, continual coordination with all the tenants would not necessarily be needed for a successful recycling program to be implemented at airport-managed facilities.

Every other year, VRB hosts the Vero Beach Air Show. At the time of this airport master plan, this event is in the planning stages for the spring 2024 show. As a three-day event with additional days for setup and breakdown, the air show has historically drawn crowds between 55,000 and 75,000 attendees. This provides an opportunity for a recycling stream from an event that generates a fair amount of recyclable materials (e.g., bottles, cans, and paper products).

1.4. Operation and Maintenance Requirements

VRB has a very limited number of staff and additional responsibilities could be a burden, specifically on the limited janitorial staff responsible for maintaining the spaces and buildings managed by VRB. This could create a barrier to the implementation of an airportwide recycling program. Conversely, there are airport tenants that have considerably more staff than the airport and would be less burdened by initiating an in-house recycling program.

1.5. Potential for Cost Savings or Revenue Generation

For construction projects, the airport should consider promoting that all contracts require some level of cost savings related to the reuse or repurposing of materials. VRB may also be able to sell scrap metal, particularly from projects that involve demolition and/or construction. While the low volume of waste limits the potential for savings or a reliable revenue generation source, some of the nonaeronautical tenants sell scrap metals, proving the commodity market is present in the area. These are various contractors and construction businesses in the industrial areas leased by VRB.

1.6. Plan to Minimize Solid Waste Generation

The following initiatives were identified that could advance VRB's recycling and waste reduction efforts that can be implemented individually, based on staff resources.

- **Provide airportwide recycling:** Work with the city to establish a recycling service and collocate recycling receptacles with waste receptacles throughout the public areas in the terminal, administration offices, and facilities where waste is managed by the airport.
- **Provide water bottle filling stations:** Install water filling stations near water fountains beyond the security checkpoint and in public areas to help minimize disposable plastic bottles by encouraging the use of reusable bottles.

- **Provide recycling for large events:** Coordinate with organizers of large events at VRB that may create a large recycling stream, such as the Vero Beach Air Show, to provide recycling options for patrons and visitors.
- **Develop a waste reduction program:** Develop and implement a waste reduction program and encourage employee participation. The program should incentivize waste reduction, diversion, and recycling, as well as include quantifiable goals to track progress and performance. Identify relevant waste reduction goals and officewide recycling methods (e.g., reusable toner cartridges, rechargeable batteries, reusable packaging, etc.) and individual participation (e.g., reusable water bottles, etc.) to further this program.
- **Develop environmentally preferable purchasing procedures:** Work with the city to establish procedures for purchasing materials with recycled/bio-based content, low toxicity, or other environmentally friendly products. Consider green-label equipment in purchasing guidelines or other equipment that has low emissions and/or low sound levels.
- **Develop an awareness campaign:** If a recycling service is provided, educate employees, tenants, and customers about proper recycling practices; this could include posters and additional signage.
- **Provide hand dryers:** Install high-efficiency hand dryers in all restrooms that do not have them and reposition towel dispensers to reduce paper towel use.
- **Charitable donations:** Collect lost and found items (e.g., jackets, sunglasses), as well as materials abandoned in the passenger terminal facilities and donate these materials to a local charity, if allowed.
- **Enhance tenant engagement:** Coordinate with tenants to consolidate materials, improve the economies of scale, and expand awareness about recycling practices.
- **Host a periodic universal waste collection day:** Coordinate with the city of Vero Beach and/or Indian River County to host a periodic (quarterly or semiannual recommended) collection day for universal waste. Provide an opportunity for VRB employees, tenants, and even the local community to drop off materials such as batteries, lightbulbs, electronics, chemicals, paints, pesticides, etc. An example could be to coordinate with local jurisdictions to create an annual electronics recycling drive.

1.7. Waste Review Survey Distributed to Airport Tenants

1. What is the name of the business or organization that you represent?
   _____
2. What are the typical waste items your organization throws away?
   - **Paper**
   - **Plastic**
   - **Glass**
   - **Cardboard**
   - **Metals**
   - **Paint**
   - **Construction materials**
   - **Other (please specify)** _____
3. If you selected Metals, Paints, and/or Construction Materials in question 2 above, do you recycle, sell, or salvage construction waste or metal shavings?
   - ***Yes (please describe)*** _____
   - ***No***
   - ***Don't Know***
4. Before trash is disposed, are obvious or visible recyclables removed?
   - ***Yes (please specify)*** _____
   - ***No***
   - ***Don't Know***
5. Does your organization have a recycling program?
   - ***Yes***
   - ***No***
6. What materials does your organization collect for recycling?
   - **Paper**
   - **Plastic**
   - **Glass**
   - **Cardboard**
   - **Metals**
   - **Other (please specify)** _____
7. Do you separate recyclables, or do you use single-stream recycling (collected in one bin)?)
   - **Separate**
   - **Single-stream**
   - **Other (please specify)** _____
8. When did you begin your recycling program?
   _____

9. How frequently is waste picked up? **[daily, twice a week, weekly, monthly, other]**
    - **Daily**
    - **Twice a Week**
    - **Weekly**
    - **Monthly**
    - **Other (please specify)** _____
10. Who is your waste removal service provider? _____
11. Do you track the volume of waste or recyclables that is disposed/picked up? **[Yes or No]**
    - ***Yes***
    - ***No***
    - ***Don't Know***
12. Please Estimate the monthly volume for waste and recycling:
    - **Average total waste disposed of:** _____
    - **Average amount of recycling picked up:** _____

Policies and Practices

13. What current policies or procedures does your company require/follow related to waste collection or recycling? _____

14. Does your company have any waste reduction practices (e.g., double-sided printing, paperless office, preferable purchasing [recycled content, no VOCs, etc.], materials reuse)?

    _____

15. Do you have any materials (flyers, posters, etc.) promoting recycling near waste and recycling bins to encourage recycling?
    - ***Yes (describe)*** _____
    - ***No***
16. Has your facility established any waste reduction goals or targets? **[Yes or No]**
    - ***Yes***
    - ***No***
    - ***Don't Know***
17. Please Describe your waste reduction goals and targets.

    _____
18. Tell us about your success in meeting these goals. From your perspective, what are the challenges to this success? _____
19. Please provide any other information on how your company manages waste and recycled materials.

    _____
20. Would you be willing to share a recent waste and/or recycling collection invoice(s), so we may document volumes and service frequency at the airport? _____