



## Chapter 4

# **DEVELOPMENT ALTERNATIVES**

In the previous chapter, aviation facilities required to satisfy airside and landside demand through the long-term planning period of the master plan were identified. In addition, various Federal Aviation Administration (FAA) and Wisconsin Department of Transportation (WisDOT) – Bureau of Aeronautics (BOA) standards were discussed that apply to airfield design. The next step in the planning process is to evaluate reasonable ways in which these facilities can be provided and the design standards can be met. The purpose of this chapter is to formulate and examine rational development alternatives that address the short-, intermediate-, and long-term planning horizon levels. Because there are a multitude of possibilities and combinations, it is necessary to focus on those opportunities that have the greatest potential for success. Each alternative provides a differing approach to meet existing and future facility needs, and these layouts are presented for purposes of evaluation and discussion.

Some airports become constrained due to limited availability of space, while others may be constrained due to adjacent land use development. Careful consideration should be given to the layout of future facilities and impacts to potential airfield improvements at Merrill Municipal Airport (RRL). Proper planning at this time can ensure the long-term viability of the airport for aviation and economic growth.

The primary goal of this planning process is to develop a feasible plan for meeting applicable safety design standards and the needs that result from the projected market demand over the next 20 years. The plan of action should be developed in a manner that is consistent with the future goals and objectives of the City of Merrill, airport users, the local community, and the surrounding region, all of which have a vested interest in the development and operation of RRL.

The goal is to develop an underlying rationale that supports the final recommended concept. Through this process, an evaluation of the highest and best uses of airport property will be made, while also weighing local development goals, efficiency, physical and environmental factors, capacity, and appropriate safety design standards.

The alternatives presented in this chapter have been formulated as potential means to meet the overall program objectives for the airport in a balanced manner. Through coordination with the City of Merrill, airport management, the planning advisory committee (PAC), and the public, an alternative

(or combination of alternatives) will be refined and modified as necessary into a recommended development concept; therefore, the planning considerations and alternatives presented in this chapter can be considered a beginning point in the evolution of a recommended concept for the future of RRL.

## **PLANNING OBJECTIVES**

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

- Develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations
- Preserve and protect public and private investments in existing airport facilities
- Provide a means for the airport to grow, as dictated by demand
- Establish a plan to ensure the long-term viability of the airport and promote compatible land uses surrounding the airport
- Develop a facility that is responsive to the changing needs of all aviation users
- Reflect and support the long-term planning efforts that are currently applicable to the region
- Develop a facility with a focus on self-sufficiency in both operational and developmental cost recovery
- Ensure that future development is environmentally compatible

## **REVIEW OF PREVIOUS AIRPORT PLANS**

At RRL, an Airport Layout Plan & Narrative report was completed in 2009. More recently, the airport layout plan (ALP) was updated in 2016 to reflect as-built conditions at the airport. The existing ALP includes the following primary recommendations:

- Maintain primary Runway 7-25 length at 5,100 feet long; widen runway to 100 feet
- Maintain crosswind Runway 16-34 at 2,997 feet long by 75 feet wide
- Extension of parallel Taxiway F to the Runway 16 threshold
- Additional landside development in the form of apron pavement and hangars

The analysis presented in this chapter will revisit some of the recommendations presented on the ALP drawing and in the previous planning study, along with new development options to meet the existing/ultimate airport reference code (ARC) and runway design code (RDC) outlined in the previous

chapters. Since the completion of the last plan, the FAA has made significant modifications to design standards, as outlined in the previous chapter. As such, some of the previous plan's elements may be carried over to this master plan and others may be changed or removed from further consideration.

## ***NO ACTION/NON-DEVELOPMENT ALTERNATIVES***

The City of Merrill is charged with managing the airport for the economic betterment of the community and region. In some cases, alternatives may include a no action option; however, for RRL, this would effectively reduce the quality of services being provided to the public, affect the aviation facility's ability to meet FAA design standards, and impact the region's ability to support aviation needs. The ramifications of a no action alternative extend into impacts on the economic well-being of the region. If facilities are not maintained and improved so the airport provides a pleasant experience for the visitor or business traveler, or if delays become unacceptable, then activity and business may shift elsewhere. The no action alternative is also inconsistent with the primary long-term goal of the FAA and the BOA, which is to enhance local and interstate commerce. Additionally, the acceptance and use of state and federal grants carry an obligation, called grant assurances, which requires the City of Merrill to maintain and allow for the improvement of RRL as needed to serve local and regional demand. Other significant considerations are previous investments and outstanding contractual agreements with all airport tenants and users. Not continuing active management and development of the airport would require the city to breach these obligations and could create associated legal actions; therefore, a no action alternative is not considered further in this master plan.

This study will not consider the relocation of services to another airport or development of a new airport site. The development of a new facility like RRL is a very complex and expensive option. A new site would require greater land area, duplication of investment in facilities, installation of supporting infrastructure that is already available at the existing site, and greater potential for negative impacts to natural, biological, and cultural resources.

The purpose of this study is to examine aviation needs at RRL over the course of the next 20 years; therefore, this master plan will examine the needs of the existing airport and will present a program of needed capital improvement projects to cover the scope of the plan. The airport is a lucrative business, transportation utility, and economic asset for the region. It can accommodate existing and future demand and should be developed accordingly to support the interests of local residents and businesses that rely upon it. Ultimately, the final decision regarding pursuing development rests with the City of Merrill, the FAA, and the BOA on an individual project basis. The following analysis considers airside and landside development alternatives that take into account an array of facility demands, including safety, capacity, access, and efficiency.

## ***AIRSIDE ALTERNATIVES***

The development alternatives are categorized into two functional areas: airside and landside. The airside relates to runways, taxiways, navigational aids, lighting and marking aids, etc., which require the greatest

commitment of land area to meet the physical layout of an airport and the required airfield safety standards. The design of the airfield also defines minimum setback distances from the runway and object clearance standards; these criteria are defined first to ensure that the fundamental needs of RRL are met. The landside includes terminal services, hangars, and aircraft parking aprons, as well as utilization of remaining property to provide revenue support for the airport and to benefit the economic development and well-being of the regional area.

Each functional area interrelates and affects the development potential of the others. As such, all areas must be examined individually and then coordinated as a whole to ensure the final plan is functional, efficient, and cost-effective. The total impact of these factors must be evaluated to determine if the investment in RRL will meet the needs of the surrounding area, both during and beyond the planning period of this study.

## **AIRSIDE CONSIDERATIONS**

Airside planning considerations generally relate to airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at the airport. Planning must factor and balance many airside items, including meeting FAA design parameters of the established design aircraft, instrument approach capability, airfield capacity, runway length, taxiway layouts, and pavement strengths. Each of these elements for RRL was analyzed in the previous chapter. The alternatives to follow will examine airside improvement opportunities to meet design standards and/or capacity constraints. A summary of the primary airside planning issues to be considered in this alternatives analysis is included below.

### **Airside Planning Considerations**

1. Meet ultimate design standards on both runways (RDC B-II-4000 on primary Runway 7-25 and RDC A-I-5000 on crosswind Runway 16-34)
2. Analyze extension options for both runways
3. Mitigate non-standard conditions in safety areas
4. Improved instrument approach capability
5. Corrective measures for non-standard taxiway geometry and holding position separation
6. Upgraded/new visual approach aids to both runways
7. New/upgraded runway markings and taxiway lighting

### **Consideration #1 – Meet Ultimate Design Standards**

The critical aircraft analysis in Chapter Two concluded that primary Runway 7-25 should meet RDC B-II-4000 design standards in the ultimate condition. The runway is currently categorized as RDC A-I-5000; however, due to anticipated growth in operations and based aircraft by larger, more demanding aircraft, including turboprops and jets, it is prudent to plan facilities to accommodate these users. A transition to this higher design code corresponds to larger safety areas, and the alternatives to follow will illustrate options to protect both existing and ultimate safety areas.



Crosswind Runway 16-34 is currently classified as RDC A-I-VIS, meaning it supports smaller aircraft and is a visual runway only, without published instrument approach procedures. This runway is planned to meet ultimate RDC A-I-5000 if an instrument approach is implemented, which would not result in a change to safety areas or other design standards.

### **Consideration #2 – Analyze Runway Extension Options**

Primary Runway 7-25 is currently 5,100 feet long and 75 feet wide. The width exceeds existing/future RDC A-I-5000 design standards but meets the ultimate B-II standards and should be maintained. Regarding the potential for a runway extension, the runway length analysis in the previous chapter illustrated that some turbine operators are weight-restricted or unable to operate on the existing runway length, especially during hot weather. An extension is not currently justified via regular use by aircraft that need it; however, such a change could reasonably occur over the next 20 years.

Crosswind Runway 16-34 is 2,997 feet long and 75 feet wide. This width exceeds the existing/ultimate standard, which calls for a 60-foot-wide runway. As discussed in the previous chapter, the extra width provides an additional safety margin and should be maintained, if feasible, with the understanding that the BOA/FAA may not participate in funding maintenance projects for the additional width. The alternatives to follow will depict options for both scenarios: continued maintenance of the 75-foot width or reduction in width to 60 feet. In terms of runway length, crosswind Runway 16-34 falls short of the recommended length of 3,400 feet to accommodate small aircraft.

Extension options will be analyzed for both the primary and crosswind runways in the airside alternatives to follow. These options will carefully weigh the cost/benefit of extending one or both runways when considering existing constraining factors, including adjacent off-airport development.

### **Consideration #3 – Mitigate Non-standard Conditions in Safety Areas**

The runway safety area (RSA), runway obstacle free zone (ROFZ), and runway object free area (ROFA) associated with each runway meet existing design standards. At such a time that primary Runway 7-25 transitions from RDC A-I to B-II, the safety area dimensions will increase in size, resulting in an obstruction to the ultimate ROFA associated with this runway – the supplemental wind cone near Runway 7. The alternatives to follow will include an option to relocate this wind cone outside of the ROFA.

In terms of runway protection zone (RPZ) incompatibilities, portions of the Runway 34 RPZ are unowned or not controlled through easement. Additionally, three of the existing RPZs (Runways 34, 25, and 16) contain public roadways. While common for most airports, this is not a best practice. The alternatives will examine options for mitigating these potentially incompatible uses.

### **Consideration #4 – Instrument Approach Procedures**

RRL is currently equipped with two published instrument approach procedures. Each end of Runway 7-25 has a localizer performance with vertical guidance (LPV) via an area navigation (RNAV) global

positioning system (GPS) approach. Currently, the visibility minimums for these approaches are not lower than one-mile for Category A, B, and C aircraft.<sup>1</sup> There are currently no instrument approaches to crosswind Runway 16-34.

As described in Chapter Three, the approach visibility minimums serving a particular runway end help dictate the size of the RPZ. The RPZs associated with Runway 7-25 currently measure 1,000 feet (length) by 500 feet (inner width) by 700 feet (outer width). If an instrument approach with visibility minimums below one-mile but not lower than  $\frac{3}{4}$ -mile is implemented, the size of the RPZ will increase to dimensions measuring 1,700 feet (length) by 1,000 feet (inner width) by 1,510 feet (outer width)<sup>2</sup>. The  $\frac{3}{4}$ -mile RPZ encompasses a much larger area and extends beyond airport-controlled property, introducing new and potentially incompatible land uses; however, for long-term planning purposes, it is prudent to plan for the potential for this improved instrument approach capability, and the alternatives will depict such options. The alternatives will also depict the potential for an instrument approach to Runway 16-34 with visibility minimums not lower than one-mile. The addition of this instrument approach would not change the size of the RPZs currently associated with the crosswind runway.

### **Consideration #5 – Corrective Measures for Non-standard Taxiway Features**

#### *Direct Access*

FAA taxiway geometry design standards recommend offsetting taxiway connections between aprons and runways to mitigate the potential for pilots who are unfamiliar with the airport layout to unintentionally taxi directly onto a runway, resulting in a runway incursion. The two taxiway connectors extending from Taxiway F to Runway 16-34 allow for direct access to the runway from the east apron area, which is a non-standard design. The airside alternatives present options for eliminating the direct access point and forcing pilots to make turns, which increases pilots' situational awareness.

#### *Dual Purpose Pavement*

Taxiway F is a partial-parallel taxiway serving crosswind Runway 16-34. The taxiway terminates on the north end at the Runway 25 threshold, so pilots departing on Runway 16 are required to back-taxi in order to access the Runway 16 threshold. This is considered dual use of this pavement, which is not recommended by the FAA. Back-taxi operations can be considered historically common; however, they present hazards to flight and runway incursion opportunities. As such, the alternatives to follow will depict an extension of Taxiway F to connect with Runway 16 and function as a full-length parallel taxiway.

### **Consideration #6 – Visual Aids**

Both ends of primary Runway 7-25 are equipped with two-light precision approach path indicator (PAPI-2) systems. A four-light PAPI (PAPI-4) is recommended for airports serving turbine aircraft operations. As RRL currently serves and is anticipated to be utilized more frequently by turboprops and jets,

<sup>1</sup> LPV GPS instrument approaches to Runways 7 and 25 are not available for use by Category D aircraft.

<sup>2</sup> Refer to Exhibit 3G for a graphic comparison of the one-mile and  $\frac{3}{4}$ -mile RPZs.

PAPI-4s are recommended for each runway end when the need arises. Runway end identifier lights (REILs) are available on both ends of Runway 7-25. These systems are recommended for runway ends not served by a more sophisticated approach light system. Approach light systems are only required for instrument approaches that provide lower than  $\frac{3}{4}$ -mile visibility minimums but are recommended for approaches with minimums between  $\frac{3}{4}$ -mile and one-mile. As such, the alternatives to follow will depict an option with the inclusion of a medium intensity approach lighting system (MALs) on Runway 7, which is the runway most commonly used during instrument flight rules (IFR) conditions.

Crosswind Runway 16-34 is not equipped with any visual approach aids. Each alternative exhibit to follow reflects the installation of PAPI-2s and REILs on Runway 16-34.

### Consideration #7 – New/Upgraded Markings and Lighting

Both runways are equipped with medium intensity runway lights (MIRL), which are planned to remain. Medium intensity taxiway lights (MITL) is available on all taxiway pavement. In terms of runway markings, primary Runway 7-25 has non-precision markings, while crosswind Runway 16-34 has basic markings. Alternatives will depict an upgrade to non-precision markings on Runway 16-34.

The existing and ultimate design standards for both runways call for holding positions to be separated from the runway centerline by 200 feet. This standard is generally met, except on Taxiway F where it connects to Runway 25 and on the connector taxiways that extend from the east apron area to Runway 16-34. Each of these holding positions is situated 125 feet from the runway centerline and thus falls short of the standard. Alternatives will consider re-marking non-standard holding positions at a 200-foot separation from the runway centerline.

### AIRSIDE ALTERNATIVE 1

Depicted on **Exhibit 4A**, Airside Alternative 1 considers several upgrades to the airfield. Primary Runway 7-25 is proposed to remain at its existing dimensions (5,100 feet long by 75 feet wide) and with its current instrument approach capability to each runway end. While the Facility Requirements chapter identified a potential need for a longer runway, maintaining the existing length is an important scenario to consider because an extension to the runway is not a certainty. A runway extension requires justification to the FAA to be eligible for funding through the Airport Improvement Program (AIP). Justification typically involves documentation of at least 500 annual operations by aircraft and operators expressing a need for the additional runway. An environmental assessment (EA) process would also need to be completed, along with public outreach. If justification for a runway extension is not achieved for several years (or ever), a contingency airfield plan should be available.

Airside Alternative 1 does, however, consider an extension to crosswind Runway 16-34. At 2,997 feet long, this runway falls short of the FAA's recommended runway length to accommodate 95 percent of small aircraft users. The FAA-recommended length to serve this grouping of aircraft is 3,400 feet. To meet this recommendation, Alternative 1 depicts a 403-foot extension to the north, which would

bring Runway 16-34 to 3,400 feet long. Extension options to the south were also considered but were ultimately rejected due to safety area impacts. A 403-foot extension to Runway 34 would place Airport Road within the ROFA, which is generally not allowable<sup>3</sup>, and would introduce new, potentially incompatible land uses (including residential) into the shifted Runway 34 RPZ. While the northern extension also results in a shifted Runway 16 RPZ, this RPZ already contains a public road (Hillside Drive), and the proposed extension does not change this scenario.

In addition to the Runway 16 RPZ, the RPZs off the Runway 34 and 25 ends contain potentially incompatible land uses, with public roads traversing both. Additionally, small portions of the Runway 34 RPZ (less than 0.5 acres total) are not controlled by the airport. The FAA prefers property within an RPZ to be owned by the airport sponsor, or land use controls to be implemented via planning/zoning or through an aviation easement, and for the area to remain free of land uses that attract people (such as homes, businesses, roads, etc.); however, this is not a requirement. Recent guidance states that it is the airport sponsor's responsibility to allow or not allow a particular land use within an RPZ. Airside Alternative 1 does not reflect any modifications to the surrounding road network; however, it does propose aviation easements over the unowned portions of the RPZs to protect these areas from future development that could be incompatible with aeronautical activity.

It should be noted that Alternative 1 does not include a change in instrument approach capability to primary Runway 7-25 and is reflective of RDC B-II-5000. Lower minimums and the implications in terms of RPZ dimensions will be shown in Alternatives 2 and 3.

Other features of Airside Alternative 1 include:

1. Relocation of the supplemental wind cone near the Runway 7 end outside of the B-II ROFA.
2. Inclusion of no-taxi islands to mitigate the direct access points on the east apron areas. A no-taxi island is an area of either natural turf or artificial turf/paint that functions to force pilots to make a turn prior to entering the runway environment, thereby improving pilot situational awareness and reducing the risk of a runway incursion. Alternative 1 depicts painted no-taxi islands on these aprons. This action will potentially impact some of the existing tiedowns on this apron, depending on the amount of pavement removed; this will ultimately be determined during engineering design.
3. Extension of Taxiway F to the north to provide access to Runway 16.
4. An upgrade of the PAPI-2 systems serving Runway 7-25 to PAPI-4s when dictated by need (i.e., increased jet operations). Both ends of Runway 16-34 are also proposed to be equipped with PAPI-2s.
5. Maintenance of existing REILs on Runway 7-25 and installation of REILs on Runway 16-34.

<sup>3</sup> Under certain circumstances, the FAA will issue a Modification to Standard to a Runway Object Free Area, but only when all other reasonable options have been exhausted.



Ultimate Runway Design Codes  
Runway 7-25: RDC B-II-5000  
Runway 16-34: RDC A-I-5000

LEGEND

A

Taxiway Designator

Airport Property Line

Avigation Easement

Clear Zone Easement

AWOS Critical Area

Ultimate Pavement

RSA

ROFA

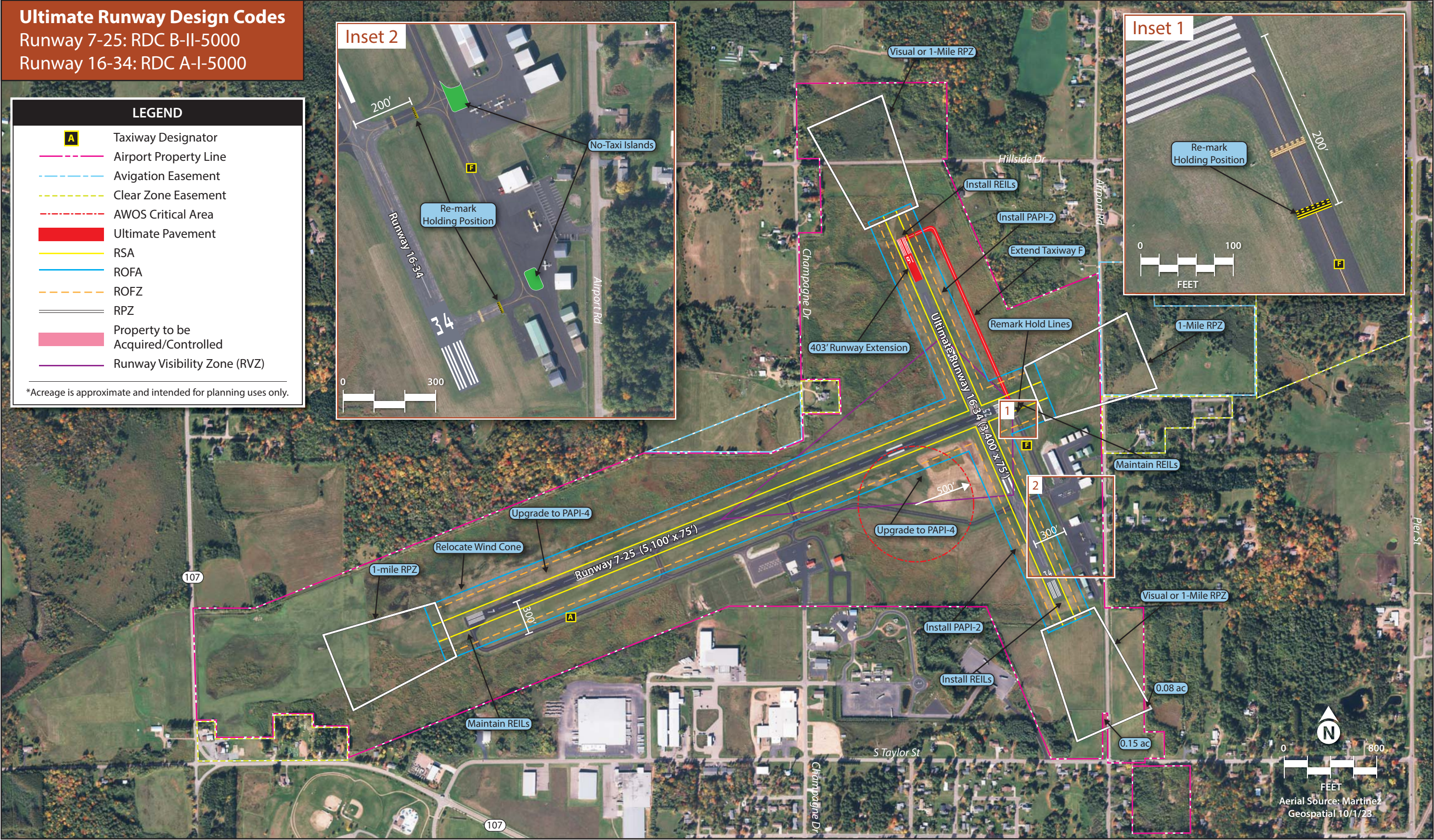
ROFZ

RPZ

Property to be Acquired/Controlled

Runway Visibility Zone (RVZ)

\*Acreage is approximate and intended for planning uses only.





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6. Upgrading runway markings on Runway 16-34 from basic markings to non-precision markings. This is proposed in the event the runway is equipped with an instrument approach procedure. The additional markings would include threshold markings and aiming points.
7. Re-marking of the holding positions located on Taxiway F at the Runway 25 threshold and on the Taxiway F connectors where they lead to Runway 16-34. These markings are currently separated from the runway centerline by 125 feet, while the standard in the ultimate condition calls for a 200-foot separation.

## AIRSIDE ALTERNATIVE 2

Depicted on **Exhibit 4B**, Airside Alternative 2 has several similarities to Airside Alternative 1, including the proposed extension to crosswind Runway 16-34 and Taxiway F, upgraded/new visual approach aids (i.e., PAPIs and REILs), and upgraded or new pavement markings. Alternative 2 does, however, consider some notable differences on both the primary and crosswind runways.

The first consideration is an extension to primary Runway 7-25 to accommodate a greater number of turbine operators and provide increased utility during hot weather. The previous chapter determined a potential need for a 400-foot runway extension to primary Runway 7-25, bringing the ultimate runway length to 5,500 feet. Alternative 2 proposes this extension on the Runway 7 end, with a corresponding extension of Taxiway A and a new threshold connector. Other actions related to the runway extension would include clearing/grading of the shifted safety area, installation of additional runway lighting and signage, and relocation of the PAPIs and REILs serving this runway end.

Alternative 2 also considers the implementation of an improved instrument approach procedure to Runway 7, with visibility minimums not below  $\frac{3}{4}$ -mile. As previously detailed, the lower visibility minimums would increase the size of the RPZ serving Runway 7, encompassing approximately 2.8 acres of property not owned or controlled by the airport. This land also includes potentially incompatible land uses, including residential structures and public roads. For comparison purposes, the RPZ for the existing instrument approach with one-mile visibility minimums is shown, as indicated on **Exhibit 4B**. Even with the 400-foot extension, the RPZ is located almost entirely on airport property, except for a small portion in the southwestern corner; however, a clear zone easement that was previously acquired by the airport controls the height of structures in this area.

For crosswind Runway 16-34, Alternative 2 depicts a 403-foot extension to the north and considers a width reduction from the existing 75-foot width to 60 feet. As outlined previously, the design standard for an A-I runway is 60 feet wide. While the sponsor has indicated a desire to maintain the runway at its existing width, the FAA/BOA may not participate in funding assistance for the additional width, and local funding sources would be necessary for continued maintenance of this portion of pavement. As such, it is prudent to illustrate a scenario in which Runway 16-34 is narrowed to 60 feet wide, allowing decision-makers the opportunity to carefully weigh both options prior to the development of a recommended concept for the airport.

Additional features of Airside Alternative 2 include:

1. Relocation of the supplemental wind cone near the Runway 7 end outside of the B-II ROFA.
2. Removal of a portion of pavement on the FBO apron to mitigate the direct access from this area to Runway 16-34. This action will potentially impact some of the existing tiedowns on this apron, depending on the amount of pavement removed, which will ultimately be determined during engineering design.
3. Removal of the connector taxiway located just north of the Runway 34 threshold. This taxiway serves as a second direct access point from the east apron, and this option considers complete removal of this pavement and construction of new taxiway pavement from the south end of the apron. A no-taxi island is proposed to mitigate the direct access via the new taxiway. The hangars on the west side of the apron, which are aging and in poor condition, are proposed to be removed.
4. Extension of Taxiway F to the north to provide access to Runway 16.
5. An upgrade of the PAPI-2 systems serving Runway 7-25 to PAPI-4s when dictated by need (i.e., increased jet operations). Both ends of Runway 16-34 are also proposed to be equipped with PAPI-2s.
6. Maintenance of existing REILs on Runway 7-25 and installation of REILs on Runway 16-34.
7. Upgrading runway markings on Runway 16-34 from basic markings to non-precision markings. This is proposed in the event the runway is equipped with an instrument approach procedure. The additional markings would include threshold markings and aiming points.
8. Re-marking of the holding positions located on Taxiway F at the Runway 25 threshold and on the Taxiway F connector that is proposed to remain. These markings are currently separated from the runway centerline by 125 feet, while the standard in the ultimate condition calls for a 200-foot separation. Proposed connector taxiways would be marked with holding positions that meet the design standard.

### AIRSIDE ALTERNATIVE 3

Airside Alternative 3 is presented on **Exhibit 4C**. Like the previous alternative, this option also evaluates a 400-foot extension to primary Runway 7-25 but takes a different approach. Rather than extending the runway to the west on the Runway 7 end, the extension is proposed for the Runway 25 end. An extension to Runway 25 is feasible without significant impacts to safety areas while maintaining the existing instrument approach capability to this runway end. As shown on the exhibit, the RSA, ROFZ, and ROFA extending off the Runway 7 end are all contained within airport property, and the majority of the shifted RPZ is controlled by an aviation easement. A 0.23-acre portion of the RPZ extends beyond the easement and is proposed to be purchased fee simple or an easement obtained over this area.



Ultimate Runway Design Codes  
Runway 7-25: RDC B-II-4000  
Runway 16-34: RDC A-I-5000

LEGEND

A

Taxiway Designator

—

Airport Property Line

—

Avigation Easement

—

Clear Zone Easement

—

AWOS Critical Area

█

Ultimate Pavement

▨

Pavement to be Removed

▨

Buildings to be Removed

—

RSA

—

ROFA

—

ROFZ

—

RPZ

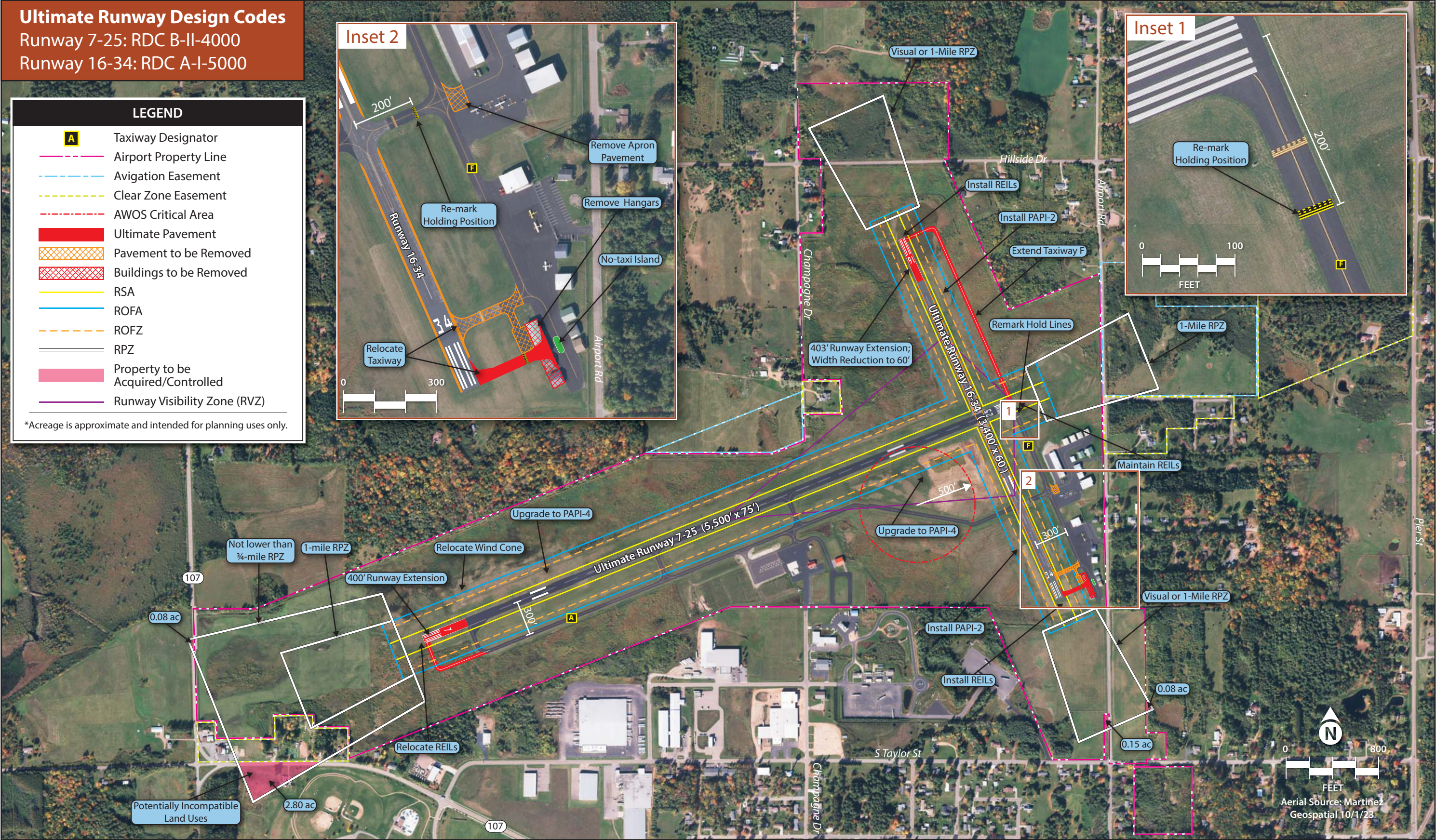
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Property to be Acquired/Controlled

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Runway Visibility Zone (RVZ)

\*Acreage is approximate and intended for planning uses only.





Ultimate Runway Design Codes

Runway 7-25: RDC B-II-4000  
Runway 16-34: RDC A-I-5000

LEGEND

A

Taxiway Designator

Airport Property Line

Avigation Easement

Clear Zone Easement

AWOS Critical Area

Ultimate Pavement

Pavement to be Removed

RSA

ROFA

ROFZ

RPZ

Property to be Acquired/Controlled

Runway Visibility Zone (RVZ)

\*Acreage is approximate and intended for planning uses only.





Taxiway A is proposed to be reconfigured to function as a full-length parallel taxiway, with new pavement proposed from the point where the taxiway jogs to the southeast to the proposed extended Runway 25 threshold. A portion of existing Taxiway A pavement is proposed to be removed, as indicated on **Exhibit 4C**. While there are benefits to reconfiguring Taxiway A (full-length parallel and elimination of direct access from FBO apron), there are some challenges to consider. Taxiway A was designed to avoid an area southwest of the runways' intersection that experiences poor drainage, and a new, full-length parallel taxiway would pass through this area. The proposed taxiway pavement also passes through the middle third of Runway 16-34, which is considered the "high-energy" portion of the runway. The FAA recommends that runway crossings be limited to the outer thirds of the runway, keeping the middle third clear so pilots can maneuver to avoid potential collisions.

Alternative 3 depicts a  $\frac{3}{4}$ -mile RPZ on Runway 7. Without an extension to this runway end, the majority of the RPZ is located on airport property or on land controlled via clear zone easement. A 0.98-acre portion of the RPZ extends beyond the boundaries of owned/controlled property and across a public road (Highway 107). A MALS is also shown. A MALS is a lighting system installed in the approach zone along the extended runway centerline. It consists of steady burning light bars that provide pilots with visual information on runway alignment. While it is recommended for runways offering straight-in approaches with minimums below 1-mile, a MALS is not required unless the minimums are below  $\frac{3}{4}$ -mile. This system, if installed, would replace the REILs currently serving Runway 7.

Additional features of Airside Alternative 3 include:

1. Relocation of the supplemental wind cone near the Runway 7 end outside of the B-II ROFA.
2. A 403-foot extension to crosswind Runway 16-34 and continued maintenance of its 75-foot width.
3. Mitigation of direct access from the FBO apron. With the removal of a portion of Taxiway A and construction of new parallel taxiway pavement, as described above, the connector leading from the FBO apron to Runway 16-34 is also proposed to be removed.
4. Removal of a portion of the connector taxiway located just north of the Runway 34 threshold. This taxiway serves as a second direct access point from the east apron, and this option considers removal of a portion of pavement to mitigate this non-standard condition. New taxiway pavement is proposed that would require pilots to make a series of turns prior to entering the runway environment.
5. Extension of Taxiway F to the north to provide access to Runway 16.
6. An upgrade of the PAPI-2 systems serving Runway 7-25 to PAPI-4s when dictated by need (i.e., increased jet operations). Both ends of Runway 16-34 are also proposed to be equipped with PAPI-2s.
7. Maintenance of existing REILs on Runway 25 and installation of REILs on Runway 16-34.
8. Upgrading runway markings on Runway 16-34 from basic markings to non-precision markings. This is proposed in the event the runway is equipped with an instrument approach procedure. The additional markings would include threshold markings and aiming points.

9. Re-marking of the holding positions located on Taxiway F at the Runway 25 threshold and on the Taxiway F connector that is proposed to remain. These markings are currently separated from the runway centerline by 125 feet, while the standard in the ultimate condition calls for a 200-foot separation. Proposed connector taxiways will be marked with holding positions that meet the design standard.

## AIRSIDE SUMMARY

The sections above outline three planning considerations for the airfield at Merrill Municipal Airport. The primary issues on the airside are evaluating runway extension options for both the primary and crosswind runways, addressing non-standard taxiway geometry, and upgrading visual approach aids. The runway extension considerations will likely be the most impactful to both the public and the aviation community. For this reason, it is vital that the PAC, airport and city management, and the public offer feedback so that the best course of action is selected.

## LANDSIDE CONSIDERATIONS

Generally, landside issues are related to those facilities necessary or desired for the safe and efficient parking and storage of aircraft, movement of pilots and passengers to and from aircraft, airport support facilities, and overall revenue support functions. To maximize airport efficiency, it is important to locate facilities together when they are intended to serve similar functions. The best approach to landside facility planning is to consider the development like a community, where land use planning is the guide. For airports, the land use guide in the terminal area should generally be dictated by aviation activity levels. Consideration should also be given to non-aviation uses that can provide additional revenue support to the airport and contribute to economic development for the region.

Landside planning considerations, summarized below, will focus on strategies following a philosophy of separating activity levels. Potential landside facility development at RRL is focused on the south and east sides of airport property where existing facilities (terminal, FBO, hangars, etc.) are already located. Property on the north side of Runway 7-25 also has development potential and has been reserved for future aviation development on each of the landside alternatives.

### Landside Planning Considerations

1. Consider the Building Restriction Line (BRL) when planning vertical infrastructure
2. Increase aircraft storage capacity
3. Expand aircraft parking apron and add additional marked aircraft and helicopter parking
4. Consider appropriate aviation- and non-aviation-related uses for the future development of vacant property, or release of property



### Consideration #1 – Building Restriction Line (BRL)

The BRL identifies suitable building area locations on the airport. It encompasses the RPZs, the object free area (OFA), navigational aid critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight criteria. Two primary factors contribute to the determination of the BRL: type of runway (“utility” or “other-than-utility”) and the capability of the instrument approaches. The BRL is the product of Title 14 Code of Federal Regulations (CFR) Part 77 transitional surface clearance requirements, which stipulate that no object be located in the primary surface. Primary Runway 7-25 is considered an other-than-utility, non-precision instrument runway with visibility minimums greater than  $\frac{3}{4}$ -mile, while crosswind Runway 16-34 is an other-than-utility runway with visual approaches. The primary surface for both runways is currently 500 feet wide. From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet.

At Merrill Municipal Airport, the 35-foot BRL for each runway is currently set at 495 feet from the runway centerline, and the 25-foot BRL is set at 425 feet from the centerline. Some of the landside facilities on the east side of the airport are located within the BRL, with the nearest structures (the hangars nearest the Runway 34 threshold) located approximately 245 feet from the runway centerline, placing them within the primary surface. The FBO hangar is located approximately 360 feet from the Runway 16-34 centerline, placing it outside the primary surface but inside the BRL. This does not necessarily mean this structure penetrates Part 77 surfaces, and it should be clearly stated that the BRL is not a standard, but rather a guideline to use when planning vertical infrastructure on the airport. The FAA may require structures inside the BRL to be equipped with obstruction lights<sup>4</sup>.

It should be noted that the location of the BRL will change if primary Runway 7-25 is provided with an instrument approach with visibility minimums down to  $\frac{3}{4}$ -mile. The width of the primary surface increases to 1,000 feet for non-precision runways with  $\frac{3}{4}$ -mile and lower visibility minimums, thus shifting the 35-foot BRL from the existing 495 feet from runway centerline to 745 feet from runway centerline. This would result in additional existing structures, including the terminal building, being located in front of the BRL and potentially penetrating the Part 77 transitional surface. Nevertheless, an alternative will be shown depicting potential landside development under this scenario.

### Consideration #2 – Hangars

Hangar occupancy at RRL is at 100 percent, with approximately 18 people on a waiting list for hangar space, as of late 2023. With clear demand for additional hangar capacity at the airport, the landside alternatives will consider areas for the development of various hangar styles, including small aircraft facilities, executive/conventional hangars, and service/maintenance hangars. These areas are further defined below.

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<sup>4</sup> The FAA typically does not permit structures within Part 77 surfaces and is the final arbiter on whether or not an existing or proposed structure can be located in a particular area, pending airspace analysis.

- **Small aircraft facilities** typically consist of T-hangars/T-shades. These facilities often experience lower levels of activity and, as such, can be located away from the primary apron areas in more remote locations on the airport. Limited utility services are needed for these areas. The airport currently has approximately 12,600 square feet (sf) of T-hangar storage space, with an additional 15,500 sf projected to be needed by the end of the 20-year planning period.
- **Executive/conventional hangars** consist primarily of clear span hangars with no interior supporting structure. Executive hangars are typically less than 10,000 sf and can accommodate small aviation businesses, one larger aircraft, or multiple smaller aircraft, while conventional hangars can range in size from 10,000 sf to 20,000 sf. Both of these hangar types typically require all utilities and segregated roadway access. RRL has approximately 47,600 sf of executive hangar space and no conventional hangar space. An additional 25,000 sf of executive/conventional hangar capacity is estimated to be needed by the end of the planning period.
- **Service/maintenance hangars** house businesses that offer services such as aircraft maintenance, line service, aircraft manufacturing, and aircraft fueling. High levels of activity can be concentrated around these hangars, necessitating adequate apron space for the storage and circulation of aircraft. These facilities are best placed along ample apron frontage with good visibility from the runway system for transient aircraft. Utility services and vehicle parking areas are needed for these types of facilities. Currently, RRL has about 4,700 sf of service/maintenance hangar space available, with an additional 9,300 sf anticipated to be needed by the end of the planning period.

### Consideration #3 – Aprons and Marked Aircraft Parking

RRL has approximately 7,800 square yards (sy) of apron space for aircraft parking and circulation, with 18 marked parking positions for fixed-wing aircraft. Based on projected growth in based aircraft and transient operations, an additional 2,600 sy of apron capacity is needed over the next 20 years. Because apron space is typically co-located with hangar facilities, the landside alternatives assume areas of hangar development will also include apron space. Additional marked aircraft parking is also projected to be needed, and the alternatives to follow will depict parking for both fixed-wing aircraft and helicopters.

### Consideration #4 – Land Development

The landside alternatives present development and redevelopment areas on the airport for aviation-related and non-aviation-related uses, considering highest and best use potential. Aviation-related uses are typically reserved for property with direct access to the airfield. For property that is segregated from the airfield, the airport could consider non-aviation-related development, following coordination with the FAA. The FAA stipulates that all land with reasonable airside access should be used or reserved for aviation purposes. Generally, airport property is subject to AIP grant assurances; therefore, if the sponsor wishes to pursue non-aeronautical development on airport property acquired with federal grants, they will need to coordinate with the FAA to request a land use change. If the FAA determines that the land is not needed for aeronautical purposes until a long-term condition is met, a land use change may be justified

and granted for a short-term use. Ordinarily, land on or in proximity to the flight line and airport operations area is needed for aeronautical purposes and should not be used or planned for non-aviation purposes. The proceeds derived from the land use change must be used exclusively for the benefit of the airport. They may not be used for a non-airport purpose, and they cannot be diverted to the airport sponsor's general fund or used for general economic development unrelated to the airport.

A land use change of airport property will generally be reviewed on a case-by-case basis at the time the change is necessary; however, the airport land use drawing, which is included as part of the ALP set, shows those areas likely eligible to be released from obligation.

The following sections detail four landside alternatives as they relate to the considerations detailed above. The first alternative is a terminal area layout plan previously developed by the airport's engineer. Three additional alternatives have been prepared to illustrate other potential development plans aimed at meeting the needs of general aviation through the long-term planning period and – in some cases – beyond. It should be noted that the alternatives presented are not the only reasonable options for development. In some cases, a portion of one alternative could be intermixed with another, or some development concepts could be replaced with others. The overall intent of this exercise is to outline basic development concepts to spur collaboration for a final recommended plan. The final recommended plan serves as a guide for the airport, which will aid the City of Merrill in the strategic planning of airport property. Airport operators often change their plans to meet the needs of specific users. The goal in analyzing landside development alternatives is to focus future development so that airport property can be maximized and aviation activity can be protected.

## LANDSIDE ALTERNATIVE 1

Depicted on **Exhibit 4D**, Landside Alternative 1 reflects a terminal area plan previously developed by the airport's engineer. This option focuses solely on developable space on the airport's south side, near the terminal building. It should be noted that some grading, site preparation, and stormwater infrastructure have already been completed in this area. A 35-foot BRL based on the airport's existing instrument approach capability (GPS approaches with visibility minimums not lower than one-mile) is also shown.

As shown on the exhibit, the proposed layout includes executive hangars of varying sizes to accommodate a variety of storage needs, as well as an eight-unit T-hangar. New taxiways accessing each facility are also depicted. Land use reserve areas are shown on the back of the exhibit. Areas along the flightline should generally be reserved for future aeronautical development if/when the need arises, while areas that are inaccessible to the airfield or are considered to be surplus property by airport stakeholders may be considered for release for non-aeronautical development.

Landside Alternative 1 proposes approximately 107,400 total sf of new hangar facilities, with 9,600 sf in the form of T-hangars and 97,800 sf of executive and conventional style hangars.

## LANDSIDE ALTERNATIVE 2

Depicted on **Exhibit 4E**, Landside Alternative 2 focuses primarily on expansion of small aircraft storage facilities, including additional apron pavement and aircraft parking. Because there is limited space for construction of new facilities on the east side of the airport, the majority of the proposed development is located in the terminal area. Consideration has also been given to the construction of new vehicle access roads and dedicated parking for tenants in an effort to segregate vehicle and aircraft movements as much as possible. A 35-foot BRL based on the airport's existing instrument approach capability (GPS approaches with visibility minimums not lower than one-mile) is also shown.

The features of Landside Alternative 2 include the following:

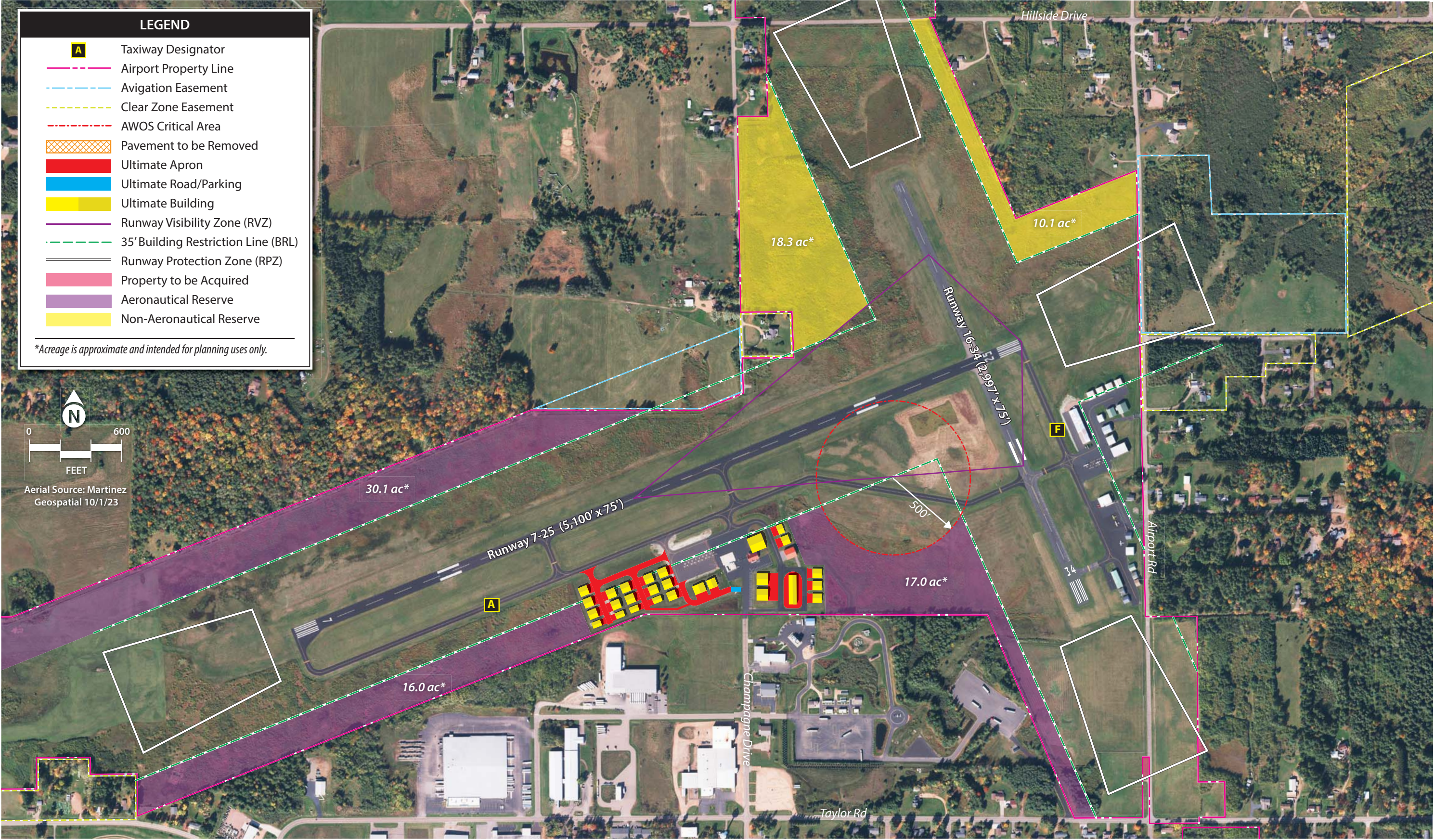
1. Construction of two executive box hangars and one T-hangar south of the terminal building on sites that are currently shovel-ready. For planning purposes, the proposed executive box hangars are sized 75 feet by 75 feet and the T-hangar is shown as 72 feet by 210 feet.
2. East of the terminal, five new executive hangars are proposed adjacent to an existing executive box hangar. To access the easternmost of these hangars from the airside, new taxilane pavement would need to be constructed, as depicted on the exhibit. Vehicle access is proposed to extend from the existing roadway serving the proposed T-hangar in this area.
3. The terminal apron is proposed to be expanded to the south by approximately 3,800 sy, with space for additional marked parking for fixed-wing aircraft.
4. West of the terminal, two conventional hangars sized 100 feet by 100 feet are proposed, along with two 60-foot by 60-foot executive hangars and three six-unit T-hangars (60 feet by 158 feet). A new vehicle road extending west from Champagne Drive is proposed to provide access to these facilities.
5. Three hangars are proposed on the east side of the airport and would be accessible via the FBO apron from the airside. As shown on the exhibit, two executive hangars and a two-unit T-hangar are proposed north of the existing city-owned T-hangar.
6. Options for both aeronautical-use and non-aeronautical reserve property are depicted on the second page of **Exhibit 4E**. Landside Alternative 2 depicts an option that maintains the majority of property north and south of primary Runway 7-25 for future aeronautical development, while property east and west of Runway 16 is proposed to be considered for potential release.

Landside Alternative 2 proposes approximately 106,400 total sf of new hangar facilities, including 40,700 sf in the form of T-hangars and linear box hangars, and 65,700 sf of executive and conventional style hangars. Approximately 3,800 sy of aircraft parking apron space is also proposed under this alternative, with additional apron and taxilane pavement planned for proposed hangars.

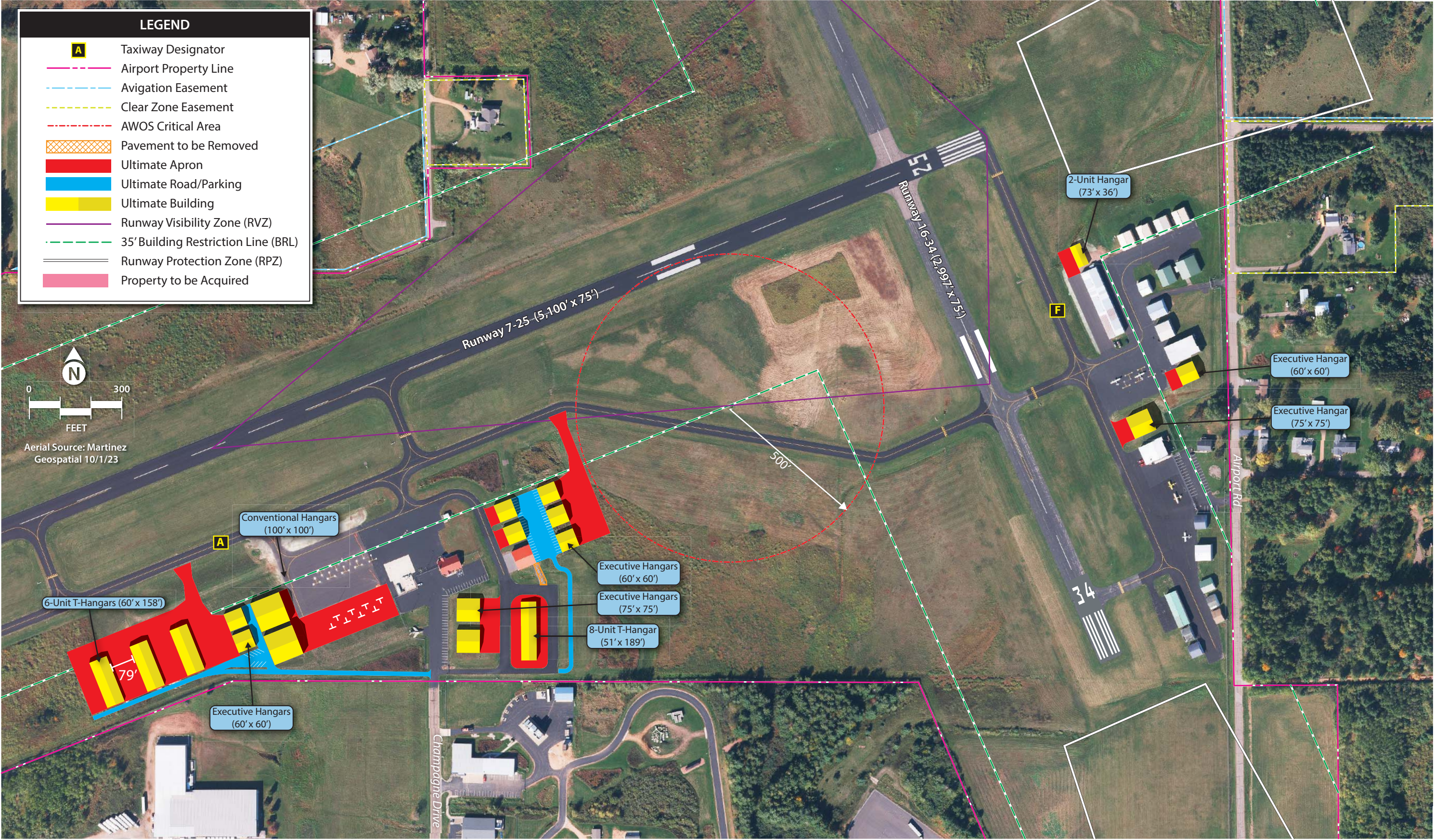




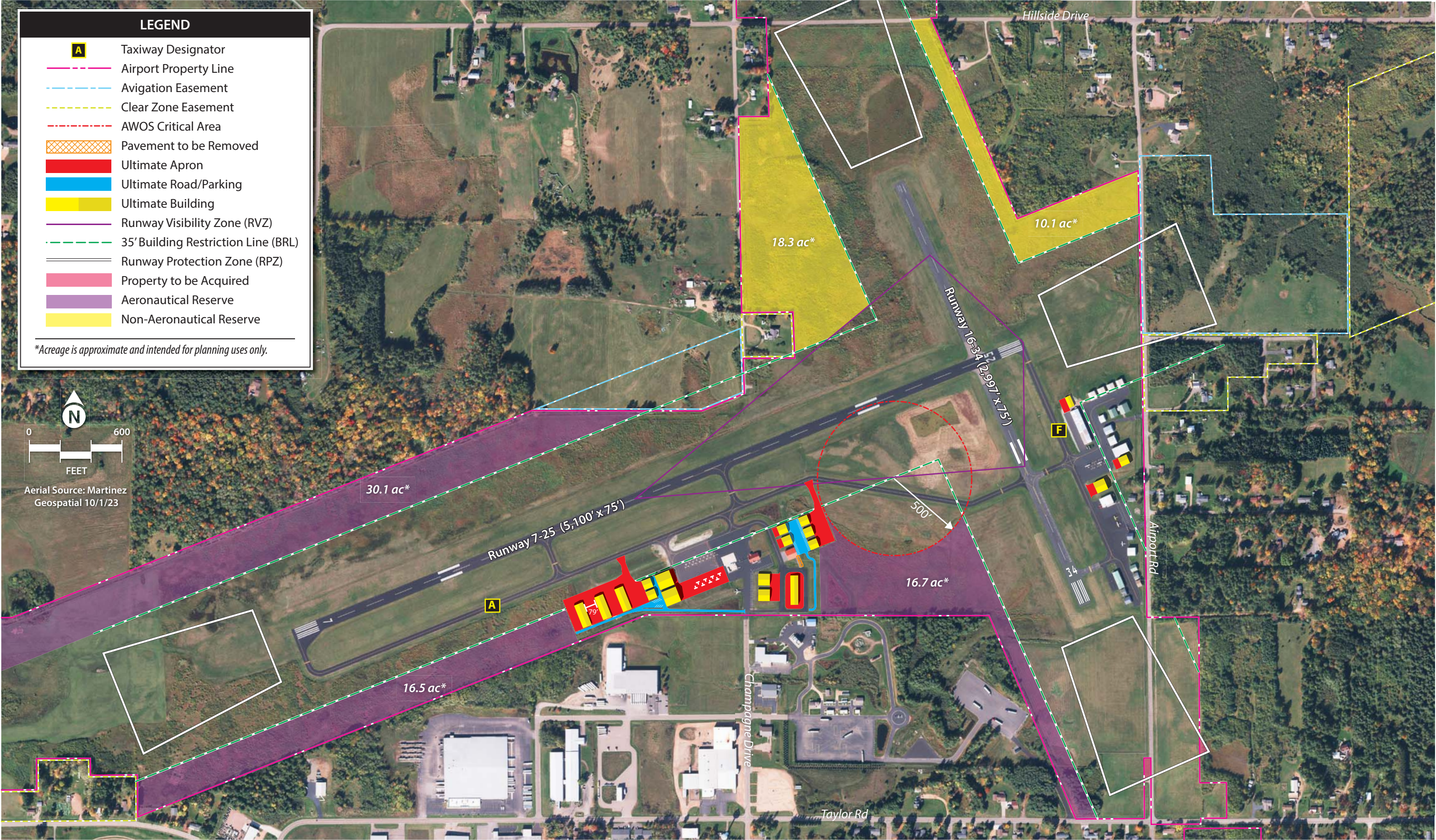














### LANDSIDE ALTERNATIVE 3

Landside Alternative 3, depicted on **Exhibit 4F**, considers a different layout for hangar development at Merrill Municipal Airport. Under this scenario, all proposed structures are located on the west side of the airport, in the vicinity of the terminal, and no vertical development is proposed on the east side. This option considers a greater potential for facility development and earmarks areas that could be reserved for specific hangar types. Like the previous alternative, a 35-foot BRL based on the airport's existing instrument approach capability (GPS approaches with visibility minimums not lower than one-mile) is shown.

The features of Landside Alternative 3 include the following:

1. Construction of two executive hangars and one T-hangar south of the terminal building on sites that are currently shovel-ready. For planning purposes, the proposed hangars are sized 75 feet by 75 feet for the executive hangars and 72 feet by 210 feet for the T-hangar.
2. East of the terminal, a 100-foot by 100-foot conventional hangar is proposed adjacent to the existing executive hangar. Vehicle access is proposed to extend from the existing roadway serving the proposed T-hangar in this area.
3. Like Alternative 1, the terminal apron is proposed to be expanded to the south by approximately 6,600 sy, with space for additional tiedowns for fixed-wing aircraft. An expansion to the west is also proposed, including approximately 2,200 sy of pavement that includes dedicated helicopter parking. A 75-foot by 75-foot executive hangar is proposed south of the expanded apron.
4. A complex of executive hangars is proposed west of the proposed helicopter parking area. As shown on the exhibit, these hangars are sized 75 feet by 75 feet and are situated to avoid a north-facing position as much as possible, given the available developable space. A new vehicle road extending west from Champagne Drive is proposed to provide access to these facilities, with tenant parking provided at the rear of each hangar.
5. No new hangars are proposed on the east side of the airport. The three hangars located nearest Runway 34 and the associated taxiway pavement on the west side are proposed to be removed when these facilities reach the end of their useful life.
6. The FBO apron is proposed to be expanded to the south, with space for four tiedowns provided for fixed-wing aircraft parking.
7. Relocation of the automated weather observing system (AWOS) that is currently located near the intersection of Runways 7-25 and 16-34, adjacent to Taxiway A. Relocating this equipment to the north side of Runway 7-25 allows for greater development potential south of the runway, as the critical area associated with the AWOS equipment restricts vertical development.
8. Two areas that are centrally located on the south side of the airfield are set aside for specific hangar type development, provided that the AWOS is relocated. Closer to primary Runway 7-25, an area is earmarked for expansion of corporate hangar facilities (i.e., executive or conventional style hangars). South of this area and extending to the east along crosswind Runway 16-34,

the area is proposed to be intended for development of T-hangar facilities, with a taxiway depicted on the west side of Runway 34 that would ultimately provide an access point to this area.

9. As depicted on the second page of **Exhibit 4F**, property to be held in reserve for aeronautical or non-aeronautical development is shown. Alternative 2 maintains the majority of property north and south of primary Runway 7-25 for future aeronautical development, while property east and west of Runway 16 is proposed to be considered for potential release.

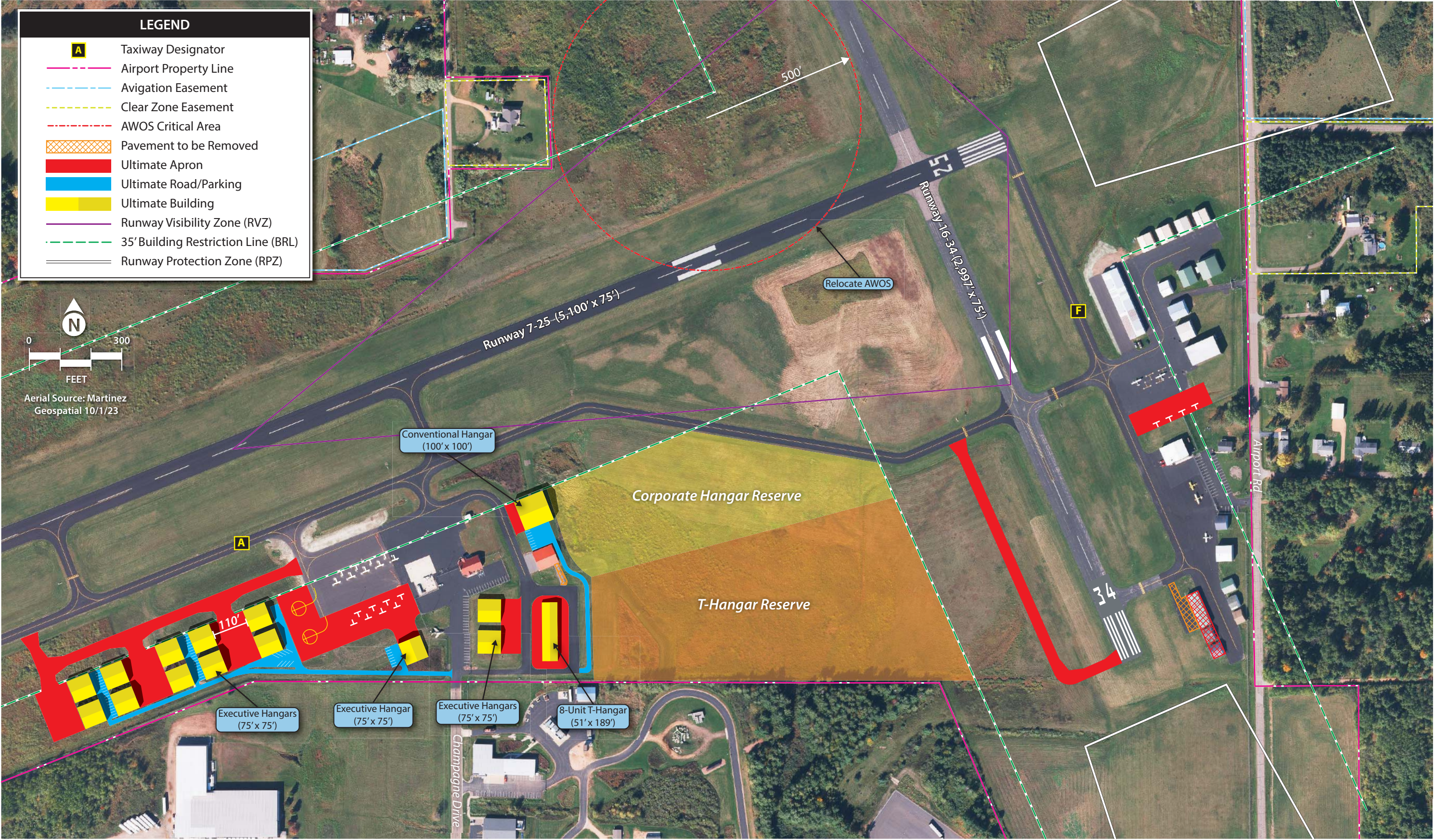
Landside Alternative 3 proposes approximately 92,700 total sf of new hangar facilities, including 9,600 sf in the form of T-hangars and 83,100 sf of executive and conventional style hangars. Approximately 8,800 sy of aircraft parking apron space is also proposed under this alternative.

#### LANDSIDE ALTERNATIVE 4

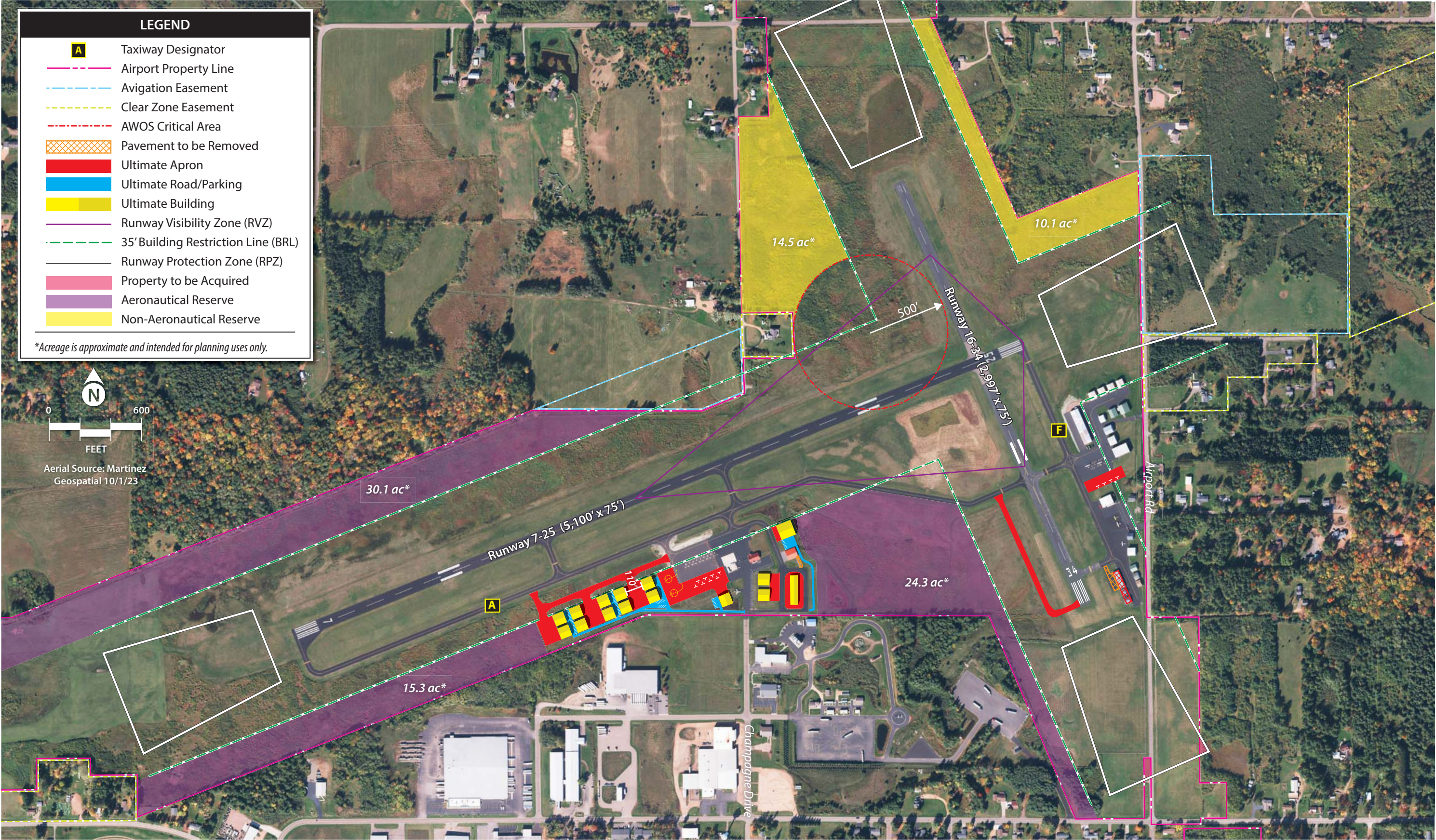
Depicted on **Exhibit 4G**, Landside Alternative 4 considers a different development scenario based on the implementation of an approach with lower visibility minimums (down to  $\frac{3}{4}$ -mile). As described, if this were to occur, the primary surface width would increase from its current 500-foot width to a 1,000-foot width, shifting the 35-foot BRL farther from the Runway 7-25 centerline, as shown on the exhibit, and likely limiting the development potential along this runway. Features of Landside Alternative 4 are described as follows:

1. Construction of two executive hangars and one T-hangar south of the terminal building on sites that are currently shovel-ready. For planning purposes, the proposed hangars are sized 75 feet by 75 feet for the executive hangars and 72 feet by 210 feet for the T-hangar.
2. There is limited potential for development west of the terminal due to the shifted BRL; however, some structures may be allowable, depending on their height and through coordination with the FAA. **Exhibit 4G** depicts two proposed T-hangars, which are typically under 35 feet tall, along with additional apron pavement for helicopter parking.
3. East of the terminal, a new apron is proposed to support one 75-foot by 75-foot executive box hangar and two 100-foot by 100-foot conventional hangars. Vehicle access is proposed to extend from the existing roadway serving the proposed T-hangar in this area.
4. A complex of executive hangars is proposed farther to the east, with airside access from Taxiway A and vehicle access from the south.
5. A hangar complex along Runway 16-34 is also proposed, primarily consisting of T-hangars. As shown, 10-unit and four-unit T-hangars are proposed, along with two 50-foot by 50-foot executive hangars, with a vehicle parking lot at the rear.
6. On the east side of the airport, three executive hangars are proposed northeast of the FBO hangar. New apron pavement is also shown with additional parking for fixed-wing aircraft.
7. The three hangars located nearest Runway 34 and the associated taxilane pavement on the west side are proposed to be removed when these facilities reach the end of their useful life.





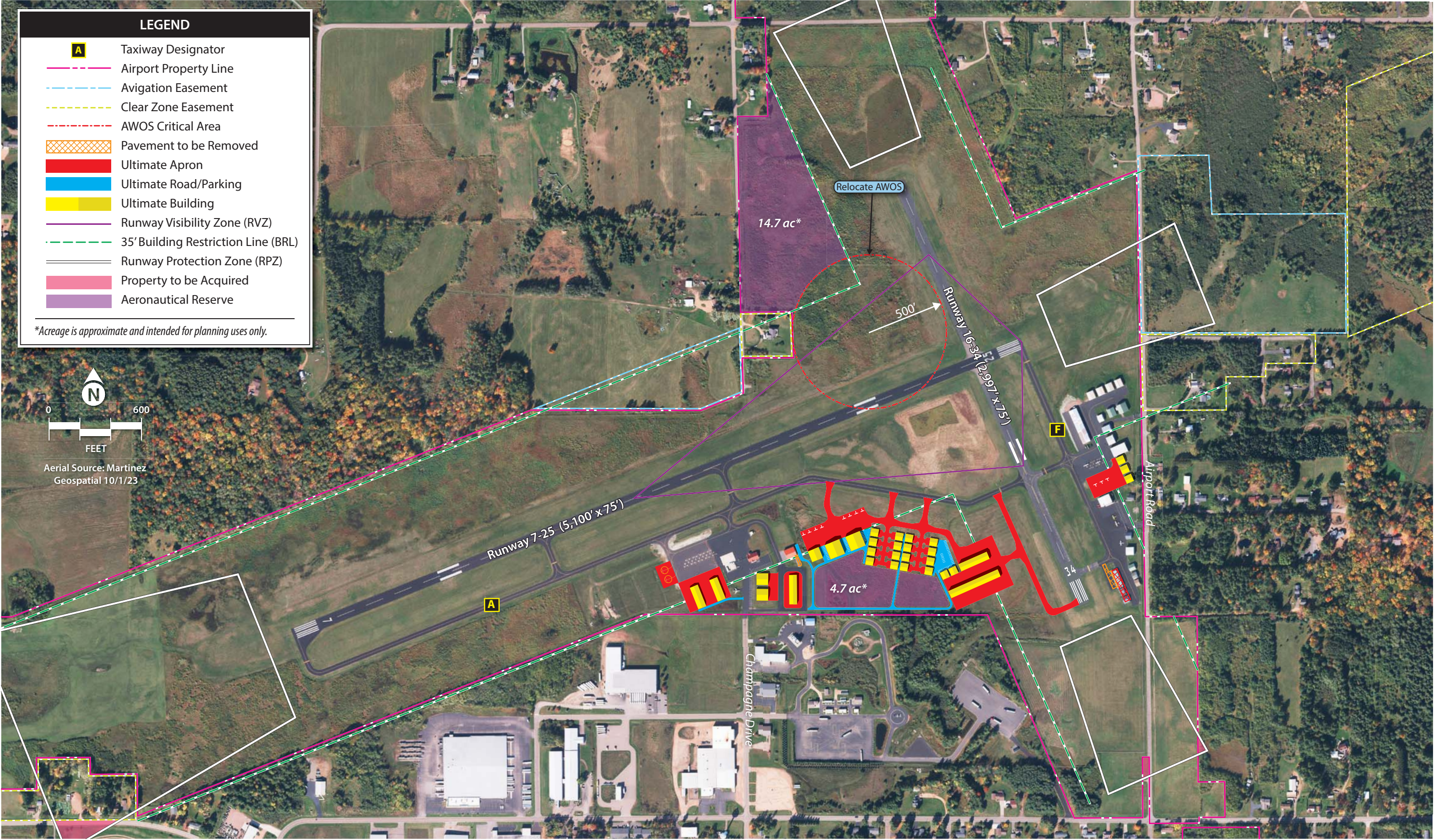














8. Relocation of the AWOS that is currently located near the intersection of Runways 7-25 and 16-34, adjacent to Taxiway A. Relocating this equipment to the north side of Runway 7-25 allows for greater development potential south of the runway, as the critical area associated with the AWOS equipment restricts vertical development.
9. In terms of reserve property for future development, Alternative 3 depicts two areas that are set aside for future aeronautical development. The first is a 4.7-acre area south of the primary proposed development area. The second is a 14.7-acre area north of Runway 7-25. This alternative does not include any reserved areas for non-aeronautical development.

Landside Alternative 4 proposes approximately 143,000 total sf of new hangar facilities, with 53,600 sf in the form of T-hangars and 89,400 sf of executive and conventional style hangars. Approximately 11,500 sy of new apron pavement is proposed.

## LANDSIDE SUMMARY

The landside alternatives presented are intended to accommodate an array of aviation activities that either currently occur or could be expected to occur at RRL in the future. There is current demand for new facilities at RRL, and airport and city management will need to determine how to develop the property in an organized and thoughtful way. It is beneficial to provide a long-term vision for the airport for future generations, and each of the development options considers a long-term vision that would, in some cases, extend beyond the 20-year scope of this master plan. **Table 4A** summarizes the various capacities of hangars and apron space proposed in each alternative.

**Table 4A | Landside Alternative Facility Capacities**

	Landside Alternative 1	Landside Alternative 2	Landside Alternative 3	Landside Alternative 4
T-Hangar/Linear Box Hangars (sf)	9,600	40,700	9,600	53,600
Executive/Conventional Hangars (sf)	97,800	65,700	83,100	89,400
Apron Space (sy)	NA	3,800	8,800	11,500

*Source: Coffman Associates analysis*

## SUMMARY

This chapter is intended to present an analysis of various options that may be considered for specific airport elements. The need for alternatives is typically spurred by projections of aviation demand growth and/or by the need to resolve non-standard airport elements. FAA design standards are frequently updated with the intent of improving the safety and efficiency of aircraft movements on and around airports, which can lead to pavement geometries that previously qualified as standard becoming classified as non-standard.

Several development alternatives related to both the airside and the landside have been presented. For the airside, the major considerations involve evaluating runway extension options for both the primary



and crosswind runways, addressing non-standard taxiway geometry, and upgrading visual approach aids. For the landside, alternatives were presented to consider additional aviation development, primarily on the south and east sides of the airport, and under different runway environments (i.e., existing and potential improved instrument approach capability).

The next step in the master plan development process is to arrive at a recommended development concept. The participation of the PAC and the public will be important considerations. Additional consultation with the FAA and BOA may also be required. Once a consolidated development plan is identified, a 20-year capital improvement program, including a list of prioritized projects tied to aviation demand and/or necessity, will be presented. Finally, a financial analysis will be presented to identify potential funding sources and show airport/city management what local funds will be necessary to implement the plan.