Chapter 4
Development Alternatives

The aviation facilities required to satisfy airside and landside demand through the 20-year planning period of the master plan were identified in the previous chapter. Several Federal Aviation Administration (FAA) and Wisconsin Department of Transportation (WisDOT) Bureau of Aeronautics (BOA) development standards that apply to airfield design were also discussed. The next step in the planning process is to evaluate appropriate staging for these facilities while meeting applicable federal and local design standards. The purpose of this chapter is to formulate and examine a range of realistic development alternatives that address the short-term, intermediate-term, and long-term planning horizon levels. Because there are multiple possibilities and combinations, it is necessary to focus on the opportunities that have the greatest potential for success. Each alternative provides a different approach to meeting existing and future facility needs. The alternatives considered in this chapter are presented in graphic form for ease of understanding, evaluation, and discussion.

Some airports become constrained due to limited availability of vacant and/or underutilized land, while others may be constrained due to adjacent existing and/or approved land use development or other human-made or geographical features. These conditions must be carefully considered and understood to organize a functionally successful layout of the new and improved facilities at Waupaca Municipal Airport (PCZ). Taking a long-term approach to facility planning now will provide an effective insurance policy for the City of Waupaca, ensuring the airport's long-term viability for safe and functional aviation operations while supporting compatible and sustainable economic growth.

The primary goal of this planning process is to develop a feasible plan to meet the projected needs driven by market demand over the next 20 years. The resulting master plan and capital financial plan should be developed in a manner consistent with the future goals and objectives of the City of Waupaca and airport stakeholders, including users of the airport and the local community and region, all of which have a vested interest in the successful development and operation of PCZ.

The goal of this chapter is to develop an underlying rationale that supports the final recommended concept. Through this planning process, an evaluation of the highest and best uses of airport property will be made, while also considering 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 solutions to meet the overall program objectives for the airport in a balanced manner. Through coordination with the City of Waupaca, 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 in Chapter Five; therefore, the planning considerations and alternatives presented in this chapter serve as the starting points in a recommended development concept to attain the airport's desired future.

PLANNING OBJECTIVES

A set of basic planning objectives has been established to guide the alternative development process. The goal of this master planning update effort is to produce a development plan for the airport that addresses forecasted aviation demand and meets FAA and/or BOA design standards to the greatest degree possible. As the owner and operator of PCZ, the City of Waupaca provides the overall guidance for the operation and development of the airport. It is of primary importance that PCZ is marketed, developed, and operated for the benefit 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 future development is environmentally compatible

NO-ACTION/NON-DEVELOPMENT ALTERNATIVES

The City of Waupaca is charged with managing the airport for the economic betterment of the community and region. In some studies, alternatives may include a no-action option; however, for PCZ, a no-action alternative 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 can provide a pleasant experience for visitors and business travelers, or if delays become unacceptable, 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 carries the obligation of grant assurances, which require the City of Waupaca to maintain and allow for the improvement of PCZ as needed to serve local and regional demand. Other significant considerations are previous investments and outstanding contractual agreements with all airport tenants and users. Discontinuing active management and development of the airport would require the city to breach these obligations and could result in associated legal actions; therefore, a no-action alternative is not considered further in this master plan.

This study does not consider the relocation of services to another airport or the development of a new airport site. The development of a new facility like PCZ is a 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 PCZ over the course of the next 20 years. As such, this master plan examines the needs of the existing airport and will present a program of necessary capital improvement projects to cover the scope of the plan. The airport is a lucrative business, transportation utility, and economic asset for the region. PCZ can accommodate existing and future demand and should be developed accordingly to support the interests of the residents and local businesses that rely upon it. Ultimately, the final decision to pursue development rests with the City of Waupaca, the FAA, and the WisDOT BOA on an individual project basis. The following analysis presents airside and landside development alternatives that consider an array of facility demands, including safety, capacity, access, and efficiency.

REVIEW OF PREVIOUS AIRPORT PLANS

Although the airport has not historically undergone an official master planning process, it has an airport layout plan (ALP) drawing set, which was completed in 2005 and fully approved in 2007. The ALP is shown on **Exhibit 4A**. The ALP provides information regarding existing and ultimate conditions at PCZ, including the following:

- Airport data related to airport category, airport reference code (ARC), elevation, wind conditions, temperature, and navigational aids located at the airport
- Runway data related to the critical design aircraft, safety areas, markings, lighting, and visual and navigational aids associated with the runway and taxiway system

Additionally, the drawing graphically depicts the following airside and landside recommendations based on previous airport planning efforts:

- Extension of Taxiway A and Runway 10-28 to an ultimate length of 6,100 feet
- Maintenance of Runway 13-31
- Construction of a partial parallel taxiway serving the north side of Runway 10-28
- Implementation of ground-based navigational systems and approach aids
- Construction of landside facilities (aprons/taxilanes/hangars) on the south side of Runway 10-28

The analysis presented in this chapter revisits the recommendations presented on the ALP. Since the completion of the last ALP, the FAA has made modifications to design standards, as outlined in the previous chapter. As such, some of the previous plan's elements are carried over to this master plan and others are changed or removed from further consideration.

AIRSIDE ALTERNATIVES

As previously detailed, the development alternatives are categorized into two functional areas: airside and landside. Airside considerations relate to runways, taxiways, navigational aids, lighting and marking aids, etc., and require the commitment of an extensive land area to meet the physical layout of the 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 established first to ensure the fundamental operational needs of the airport are met. Landside considerations include hangars, aircraft parking aprons, and terminal services, as well as the potential utilization of property to provide revenue support for the airport and benefit the economic development and well-being of the surrounding area.

Exhibit 4B presents the airside and landside alternative considerations that are specifically addressed in this analysis. These initial concepts stem from the findings of the aviation demand forecasts and facility requirements evaluations, as well as input from the PAC, the City of Waupaca, and the public.

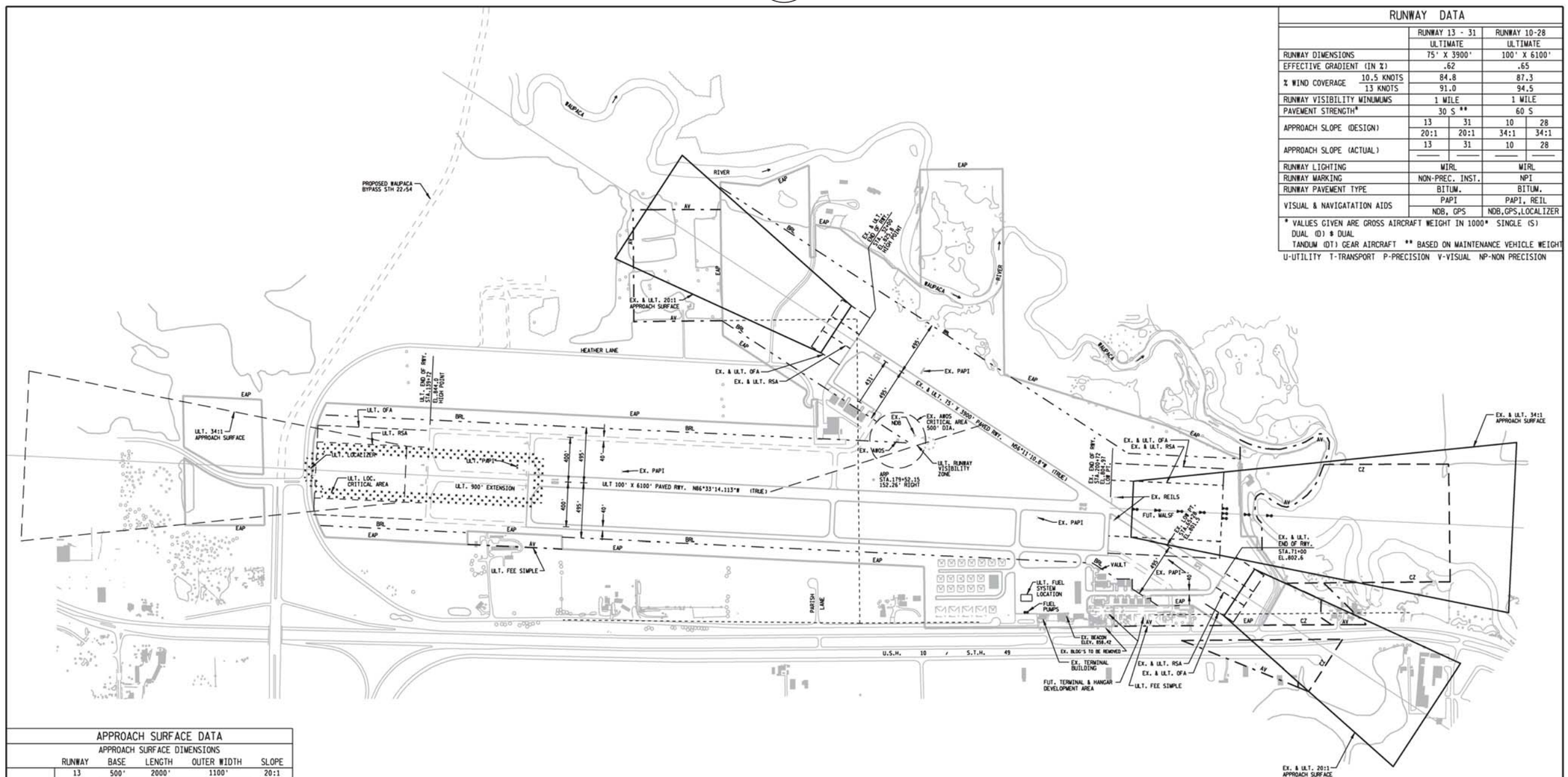
The remainder of this chapter describes various development alternatives for airside and landside facilities. Although each airfield component is treated separately in this chapter, the final master plan will integrate all these individual requirements so they complement one another.

AIRSIDE CONSIDERATIONS

This section identifies and evaluates various airside development factors at PCZ to meet the requirements set forth in Chapter Three. By nature, airside facilities are the focal point of an airport facility. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs often serve as the most critical factor in the determination of viable development options.

AIRPORT DESIGN CRITERIA

Applicable standards for airport design are outlined in FAA Advisory Circular (AC) 150/5300-13B, *Airport Design,* Change 1. The design of airfield facilities is primarily based on the physical and operational characteristics of the aircraft that use the airport. As discussed in Chapter Two, a runway design code (RDC) is applied to each runway at an airport to identify the appropriate design standards for the runway and its associated taxiway system. The RDC relates to the maximum size and top speed of aircraft that regularly operate at the airport and is comprised of the aircraft approach category (AAC), the airplane design group (ADG), and the approach visibility minimums expressed in runway visual range (RVR) values. The FAA has historically defined regular use as at least 500 annual operations at the airport. While this standard can sometimes be represented by one specific make and model of aircraft, most of the runway's RDC values are represented by several different aircraft that, collectively, operate frequently at the airport.



RUNWAY DATA				
	RUNWAY 13 - 31		RUNWAY 10-28	
	ULTIMATE		ULTIMATE	
RUNWAY DIMENSIONS	75' X 3900'		100' X 6100'	
EFFECTIVE GRADIENT (IN %)	.62		.65	
% WIND COVERAGE 10.5 KNOTS	84.8		87.3	
% WIND COVERAGE 13 KNOTS	91.0		94.5	
RUNWAY VISIBILITY MINUMUMS	1 MILE		1 MILE	
PAVEMENT STRENGTH*	30 S **		60 S	
APPROACH SLOPE (DESIGN)	13	31	10	28
	20:1	20:1	34:1	34:1
APPROACH SLOPE (ACTUAL)	13	31	10	28
	___	___	___	___
RUNWAY LIGHTING	MIRL		MIRL	
RUNWAY MARKING	NON-PREC. INST.		NPI	
RUNWAY PAVEMENT TYPE	BITUM.		BITUM.	
VISUAL & NAVIGATATION AIDS	PAPI		PAPI, REIL	
	NDB, GPS		NDB,GPS,LOCALIZER	

* VALUES GIVEN ARE GROSS AIRCRAFT WEIGHT IN 1000* SINGLE (S)
DUAL (D) $ DUAL
TANDUM (DT) GEAR AIRCRAFT ** BASED ON MAINTENANCE VEHICLE WEIGHT
U-UTILITY T-TRANSPORT P-PRECISION V-VISUAL NP-NON PRECISION

APPROACH SURFACE DATA					
APPROACH SURFACE DIMENSIONS					
	RUNWAY	BASE	LENGTH	OUTER WIDTH	SLOPE
ULTIMATE	13	500'	2000'	1100'	20:1
	31	500'	2000'	1100'	20:1
	10	500'	3400'	1520'	34:1
	28	500'	3400'	1520'	34:1

RUNWAY SAFETY AREA (RSA)		
ULTIMATE RUNWAY SAFETY AREA DIMENSIONS		
RUNWAY	WIDTH	LENGTH BEYOND RUNWAY END
13	150'	300'
31	150'	300'
10	500'	1000'
28	500'	1000'

RUNWAY OBJECT FREE AREA (OFA)		
ULTIMATE RUNWAY OBJECT FREE AREA DIMENSIONS		
RUNWAY	WIDTH	LENGTH BEYOND RUNWAY END
13	500'	300'
31	500'	300'
10	800'	1000'
28	800'	1000'

RUNWAY END COORDINATES (NAD 83)		
ULTIMATE		
13	44°20'11.989"	89°01'18.086"
31	44°19'50.559"	89°00'33.519"
10	44°20'00.644"	89°02'10.771"
28	44°19'57.032"	89°00'46.998"

-LEGEND-

EAP — EX. AIRPORT PROPERTY LINE
UAP — ULT. AIRPORT PROPERTY LINE
CZE — EX. CLEAR ZONE EASEMENT LINE
AV — EX. AVIGATION EASEMENT LINE
BRL — BUILDING RESTRICTION LINE

VAR. 2°05'W
N
DEC. 17, 2002
0 500' 1000 FEET
SCALE

SHEET 3 REVISIONS			
DESCRIPTION OF REVISIONS	DATE:	FIRM OR AGENCY NAME	DRAWN BY:

ULTIMATE AIRPORT LAYOUT PLAN

WAUPACA MUNICIPAL AIRPORT
WAUPACA, WISCONSIN

PREPARED BY:
WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF AERONAUTICS

DATE: 6-30-05 | DRAWN BY: KJS
SCALE: 1"=500' | SHEET 3 OF 11

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AIRSIDE CONSIDERATIONS

- Evaluate improvements necessary to meet the appropriate existing and ultimate Federal Aviation Administration (FAA) design standards.
- Examine a potential runway extension on Runway 10-28 and consider options for ultimate disposition of Runway 13-31.
- Analyze options to mitigate incompatible land uses within the runway protection zones (RPZs).
- Consider increased runway pavement strength on Runway 10-28 to 60,000 lbs (D).
- Evaluate the potential for improved instrument approach minimums serving Runway 28.
- Evaluate the taxiway system in meeting airfield safety, design, and geometry standards.
- Upgrade airport signage to include runway distance remaining signs and upgrade visual approach aids.

LANDSIDE CONSIDERATIONS

- Determine efficient land uses that allow the airport to meet the needs of aviation users and promote non-aviation uses where possible.
- Identify locations for hangar development and additional aircraft apron area to meet projected demand.
- Consider options for expanded or additional general aviation terminal facilities.
- Evaluate options to construct support facilities such as perimeter fencing, access gates and potential for a dedicated airport maintenance and snow removal equipment (SRE) building.
- Examine options for vehicle parking access while best segregating aircraft and vehicle traffic on airport movement areas.

As a local general aviation airport in the FAA's *National Plan of Integrated Airport Systems* (NPIAS), PCZ should be capable of safely accommodating the needs of recreational, instructional, and public safety uses, as well as charter and military aviation uses on a more limited basis. Analysis in Chapter Two indicated that the RDC for Runway 10-28 is currently B-II-4000, while the RDC for Runway 13-31 is B-I(S)-VIS. The airfield should continue to be planned with the most demanding piston- and turbine-powered aircraft that utilize the airport in mind and should account for a potential increase in business jet activity to the greatest extent possible, as demand dictates. As such, alternatives associated with runway length and the possibility of improved instrument approach visibility minimums are considered. Design considerations for Runway 10-28 are presented under B-II-4000 standards, as well as ultimate RDC C-II-4000 standards, while considerations for Runway 13-31 are presented under RDC B-I(S)-VIS standards. The ultimate disposition of Runway 13-31 is also evaluated in this chapter. Wind analysis conducted in Chapter Three indicated that Runway 10-28 meets 95 percent wind coverage at 10.5 knots, which is above the design criteria to justify funding eligibility for a crosswind runway; therefore, all future costs associated with maintaining Runway 13-31 will likely be the responsibility of the airport sponsor.

OBJECTS AFFECTING NAVIGABLE AIRSPACE – TITLE 14 CFR PART 77

Title 14 Code of Federal Regulations (CFR) Part 77 establishes standards for determining obstructions in navigable airspace and sets forth requirements for the construction and alteration of structures (e.g., buildings, towers, etc.). This federal regulation provides for studies of obstructions to determine their effects on the safe and efficient use of airspace, public hearings regarding these obstructions, and the creation of antenna or wind farm areas. It also establishes methods for identifying surfaces that must be free from penetration by obstructions (including buildings, cranes, cell towers, etc.) in the vicinity of an airport. This regulation is predominately focused on airspace-related issues. Implementation and enforcement of the elements contained in this regulation are a cooperative effort between the FAA and individual state aviation agencies or individual airports. The imaginary surfaces defined in 14 CFR Part 77 include the primary surface, transitional surface, approach surface, horizontal surface, and conical surface. As part of the PCZ airport master plan, a detailed obstruction analysis is being conducted for inclusion in the ALP drawing set. The ALP is the culmination of the airport master plan and depicts the ultimate layout for the airport over the next 20 years or more.

BUILDING RESTRICTION LINE

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

Two primary factors contribute to the determination of the BRL: the type of runway (utility or other-than-utility) and the capability of the instrument approaches. Utility runways serve aircraft that weigh under 12,500 pounds, while other-than-utility runways serve large aircraft that weigh over 12,500 pounds. Under the ultimate condition, Runway 10-28 is an other-than-utility non-precision instrument runway with visibility minimums not lower than ¾-mile and Runway 13-31 is a utility runway with visual approaches.

The BRL is the product of 14 CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object be located in the primary surface, which is defined as 1,000 feet wide for other-than-utility runways with instrument approach minimums as low as ¾-mile, and 250 feet wide for utility runways with visual approaches. From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet. For Runway 10-28, the 25-foot BRL is based on a 1,000-foot-wide primary surface (500 feet on either side of the runway) set at 675 feet from the runway centerline. For Runway 13-31, the 25-foot BRL is based on a 250-foot-wide primary surface (125 feet on either side of the runway) set at 300 feet from the runway centerline. The BRL at PCZ is depicted for all landside development alternatives to be considered.

RUNWAY LENGTH

The runway length analysis in the previous chapter concluded that the existing length of Runway 10-28 (5,200 feet) is capable of safely accommodating up to 100 percent of small aircraft (less than 12,500 pounds) with 10 or more passenger seats; 4,200 feet of runway length is recommended.

The analysis concluded that Runway 10-28's current length of 5,200 feet is adequate for many business jet and turboprop aircraft for takeoffs at up to 60-70 percent useful load. Of the aircraft analyzed, some are able to operate at 90 or 100 percent useful load, while others become weight-restricted. During hot summer periods, some business jet and turboprop aircraft must depart from PCZ with restricted payloads (less fuel/freight; fewer passengers), which can limit nonstop destination distances. Furthermore, when considering wet runway conditions, the landing length requirements of several business jets analyzed in Chapter Three exceed the current runway length. Of the aircraft analyzed, only the Pilatus PC-12 and Cessna Citation I/SP can conduct landing operations during wet runway conditions while operating under the 60 percent rule.

The facility requirements concluded that additional length on the primary runway may become necessary in the future, depending on how the business jet aircraft fleet mix changes and grows. For these reasons, the following alternatives consider extension options for the runway so the airport is prepared in the future if demand for an extension materializes. At a minimum, planning for runway extensions allows the City of Waupaca to develop land use and zoning policies that limit the potential for encroaching developments that would restrict future airport expansion. As discussed in Chapter Three, a runway length of 7,000 feet can accommodate 75 percent of the business jet fleet operating at 90 percent useful load. Additionally, a runway of this length could accommodate the Challenger 300 for takeoff operations at 100 percent useful load under design day conditions and landing operations to a contaminated runway under the 80 percent rule. As such, analysis in this chapter examines the potential impacts of an extension to Runway 10-28 to approximately 7,000 feet while considering the appropriate safety design standards.

Given that Runway 13-31 is designed to accommodate B-I(S) aircraft only, the existing runway length (3,899 feet) is planned to be maintained under the condition that the City of Waupaca decides to preserve the runway.

OVERLAPPING RUNWAY SAFETY AREAS AND ELEVATED RISK

As discussed in Chapter Three, the current configuration of Runway 10-28 and 13-31 is subject to elevated risk, as the Runway 10 threshold is situated on Runway 13-31. This configuration does not provide sufficient physical space for the runway safety areas, entrance/exit taxiways, or associated markings and signage, thus increasing the potential for runway incursions, pilot confusion, and loss of situational awareness. The following alternatives examine potential solutions to alleviate risks associated with the intersecting runways.

TAXIWAY CONFIGURATION

The taxiway system at PCZ primarily meets the recommended design and geometry standards set forth by the FAA; however, the following existing non-standard taxiway geometry conditions need to be addressed:

- The midfield Taxiway A3 crosses within the high-energy area of Runway 10-28.
- Taxiway A3 provides direct access as it connects the northern apron to Runway 10-28.
- Taxiway A4 provides direct access as it extends from the main apron area to Runway 10-28.
- Taxiway C is acutely angled to the Runway 31 threshold.

These conditions are addressed in the following airside alternatives because they introduce various hazards and can lead to pilots inadvertently taxiing onto the runway, causing runway incursions and other potentially dangerous airfield safety concerns.

ANCILLARY IMPROVEMENTS

Runway Strength | An important feature of airfield pavement is its ability to withstand repeated use by aircraft. The strength rating of a runway does not preclude aircraft that weigh more than the published strength rating from using the runway. Runway strength is based on design parameters that support a high volume of aircraft at or below the published weight and allow the pavement to survive its intended useful life. The current pavement strength for Runway 10-28 is reported as 30,000 pounds single wheel loading (S). Given the number of turboprop and jet aircraft that currently operate and are forecasted to operate at PCZ, future planning should consider maintaining the existing Runway 10-28 pavement strength rating of 30,000 pounds S and increasing to 60,000 pounds dual wheel loading (D). If the City of Waupaca decides to maintain Runway 13-31 in its current disposition, its existing pavement strength of 13,000 S should be maintained.

Visual Approach Aids | Runways 10 and 28 are currently equipped with two-box precision approach path indicator (PAPI-2) systems. Generally, four-box precision approach path indicators (PAPI-4s) are recommended for runways that are used by jet and turboprop aircraft; therefore, consideration should be given to upgrading the PAPI-2 systems to PAPI-4 systems.

Improved Instrument Approach Minimums | The instrument approach capabilities at an airport are an important consideration that directly impacts the utility of the airport; lower visibility minimums increase the utility of an airport. From an economic development standpoint, it is important to achieve the lowest

possible visibility minimums. The best possible approach minimums will prevent aircraft from having to divert to another airport, which can create additional operating costs and time delays for aircraft operators and on-airport businesses. Runway 10 is currently served by ¾-mile instrument approach minimums and Runway 28 is served by one-mile instrument approach minimums. The following alternatives consider impacts associated with enhanced instrument approach minimums of ¾-mile serving the Runway 28 end.

Airfield Signage | Airfield identification signs are lighted signs installed on the runway and taxiway system on the airfield. These signs assist pilots in identifying their locations on the airfield and directing them to their desired locations. The signage system includes runway and taxiway designation, holding position, routing/directional, and runway exit signs. All existing signs at PCZ should be maintained through the planning period. At present, there are no distance remaining signs serving PCZ; at a minimum, consideration should be given to the addition of distance remaining signage on Runway 10-28. Airfield signage should be expanded or upgraded as airfield improvements are made.

AIRSIDE ALTERNATIVES

Four airfield alternatives have been prepared to address the airfield components outlined in the previous section. The following alternatives have been analyzed under existing RDC B-II-4000 design criteria as an interim scenario, as well as ultimate C-II-4000 design criteria for Runway 10-28. The details of each alternative are described along with each alternative's associated advantages and disadvantages. **It should be noted that all airside alternatives that involve changes to existing runway ends are pending survey analysis. Any selected alternative may need to be adjusted, depending on the survey results.**

INTERIM AIRSIDE ALTERNATIVE 1

As depicted on **Exhibit 4C**, Airside Alternative 1 considers improvements to the airfield to increase the current runway length while meeting critical safety area design standards for existing RDC B-II-4000 on Runway 10-28 and maintaining the existing instrument approach minimums. In addition, this alternative explores options to mitigate the increased risk associated with the current intersection of Runways 10-28 and 13-31, address direct access from each apron area to Runway 10-28, realign the Taxiway A3 midfield connector to eliminate a runway crossing through the high-energy area, and realign the acute-angled Taxiway C as it connects to Runway 31. This alternative maintains Runway 13-31 in its existing condition.

Runway 10-28 | A 900-foot extension to Runway 10-28 results in a length of 6,100 feet, which would satisfy the ultimate critical aircraft (Bombardier Challenger 300) requirements for takeoff operations at 90 percent useful load. This length would also increase the runway's overall utility for other business jets and turboprop aircraft. As such, this alternative considers an 900-foot runway extension to the east and the necessary improvements to maintain existing RDC B-II-4000 design standards. By extending the runway in this manner, the RPZ serving Runway 28 would extend beyond the existing airport property boundary and would need to be controlled through avigation easement or fee simple acquisition; however, a runway extension to the east would shift the RPZ serving Runway 28 over a private residence, which is considered an incompatible land use. To meet RDC B-II-4000 design standards, consideration is given to the implementation of a threshold displacement on Runway 28, as well as declared distances to mitigate safety area deficiencies for the ultimate RPZ beyond the east end of the runway, which includes a private residence.

Declared distances are used to define the effective runway length for landing and takeoff when a standard RSA/ROFA cannot be achieved or an RPZ needs to be relocated. The four declared distances are as follows:

- **Takeoff Run Available (TORA) –** the runway length declared available and suitable for the ground run of an aircraft taking off (factors in the positioning of the departure RPZ)
- **Takeoff Distance Available (TODA) –** the TORA plus the length of any remaining runway or clearway beyond the far end of the TORA; the full length of the TODA may need to be reduced because of obstacles in the departure area
- **Accelerate-Stop Distance Available (ASDA) –** the runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff (factors in the RSA/ROFA length beyond the runway end)
- **Landing Distance Available (LDA) –** the runway length declared available and suitable for landing an aircraft (factors in the RSA/ROFA length beyond the runway end and positioning of the approach RPZ)

The declared distances pertaining to the RSA and ROFA are the ASDA and LDA, while the TORA and LDA relate to the RPZs. The runway extension and declared distances presented in Alternative 1 reduce the LDA for Runway 28. The TORA for Runway 10 is also reduced due to incompatibilities beyond the runway end. The application of declared distances maintains the Runway 28 RPZ in its existing location, which minimizes impacts to off-airport property while allowing for a Runway 10-28 extension to the east and through the intersection of Runway 13-31. This configuration also allows for the extension of Taxiway A to the east, which could be routed across the Runway 31 threshold and ultimately to the extended Runway 28. The resulting declared distances for this alternative are presented in **Table 4A**.

TABLE 4A | Airside Alternative 1 – Declared Distances

Runway 10-28 Declared Distances	10	28
Takeoff Run Available (TORA)	5,200'	6,100'
Takeoff Distance Available (TODA)	6,000'	6,100'
Accelerate-Stop Distance Available (ASDA)	6,000'	6,100'
Landing Distance Available (LDA)	6,000'	5,200'

Source: Coffman Associates analysis

The proposed improvements to the runway would involve several connected projects and other airfield improvements, including the following:

- Extension of Taxiway A
- Extension of medium intensity runway lighting (MIRL) and taxiway lighting (MITL)
- Acquisition of approximately 1.8 and 2.2 acres of uncontrolled property within the existing and ultimate Runway 10 RPZ
- Mitigation of overgrown vegetation and gradient incompatibilities within the RSA, ROFA, and ROFZ associated with the eastern runway extension

Further analysis will be required at the time of construction of a runway extension.

Existing Runway Design Codes
Runway 10-28: B-II-4000
Runway 13-31: B-I(S)-VIS

DEFINITIONS

TODA - Takeoff Distance Available
TORA - Takeoff Run Available
ASDA - Accelerate/Stop Distance Available
LDA - Landing Distance Available

DECLARED DISTANCES

	Runway 10	Runway 28
TORA	5,200′	6,100′
TODA	6,000′	6,100′
ASDA	6,000′	6,100′
LDA	6,000′	5,200′

LEGEND

- Airport Property Line
- Existing Taxiway Designation
- Ultimate Taxiway Desigmation
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Runway Protection Zone (RPZ)
- Property to be Acquired
- AWOS Critical Area
- High-Energy Area
- Ultimate Airfield Pavement
- Remove Pavement

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

Heather Ln
Public Road in RPZ
Webster Way
Rotary St
Commercial Drive
22
1.8 Acres
900′ Runway Extension/ Displaced Threshold
Private Residence
Runway 13-31 (3,899′ x 75′)
B
B1
B2
B3
B4
240′
Ultimate Runway 10-28 (6,100′ x 100′)
A1
A2
A3
A4
A5
400′
A
C
240′
2.2 Acres
Public Road in RPZ
Runway Drive
10
6.45 Acres
200′ Holding line
Public Road in RPZ
Airport Rd
N
0
800
SCALE IN FEET
Aerial Photo:
Google Earth 05/2024

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Taxiway Geometry Improvements | To mitigate the existing (and unsafe) direct access from the northern and southern aircraft apron areas to Runway 10-28, this alternative considers the removal and relocation of the southern apron connector at the A4 Taxiway and construction of partial parallel Taxiway B with a 240-foot runway-to-taxiway centerline separation on the north side of Runway 10-28. Ultimately, this would allow for the removal and relocation of the existing taxiway, which currently provides direct access from the northern apron area to Runway 10-28, as well as elimination of a runway crossing through the high-energy area of Runway 10-28 at existing Taxiway A3.

Additionally, this alternative considers the extension of Taxiway A to the southeast to connect with Taxiway C. Taxiway A5 is also proposed to be removed and relocated to the east to serve the extended runway. The existing Taxiway C could then be reoriented so the holding position serving the Runway 31 end is positioned 200 feet from the runway centerline and 90 degrees perpendicular to the runway as Taxiway C connects to Runway 31.

INTERIM AIRSIDE ALTERNATIVE 2

As depicted on **Exhibit 4D**, Airside Alternative 2 considers improvements to the airfield to increase the current runway length while meeting critical safety area design standards for RDC B-II-4000 on Runway 10-28 and maintaining the existing instrument approach minimums. This alternative also explores options to mitigate the existing direct access and eliminate the existing crossing through the high-energy area of Runway 10-28. In addition, this alternative addresses the increased risk of the existing intersection of Runway 10-28 and Runway 13-31 by relocating Runway 13-31 and redesignating it as a turf runway.

Runway 10-28 | A 500-foot extension on the west end of Runway 10-28 results in a length of 5,700 feet, which would allow the ultimate critical aircraft to take off above 80 percent maximum takeoff weight (MTOW) during the hottest periods of the summer and would satisfy runway length requirements to accommodate 100 percent of the business jet fleet at 60 percent useful load. Primary impacts associated with a runway extension of 500 feet on the Runway 10 end would include shifting the RPZ that serves Runway 10 farther west, beyond the existing airport property boundary; the Runway 10 RPZ would encompass approximately 16.4 acres of uncontrolled property and would be completely traversed by Runway Drive and Highway 22. The existing RPZ serving Runway 28 will remain in its existing location. The proposed improvements to the runway would involve numerous connected projects, including the following:

- Extension of Taxiway A
- Extension of MIRL and MITL
- Relocation of the runway end identifier lights (REILs) and PAPI system serving Runway 10
- Acquisition (fee simple/easement) of approximately 16.4 acres of uncontrolled property within the ultimate Runway 10 RPZ
- Potential relocation of public roadways
- Mitigation of potential gradient incompatibilities associated with the RSA, ROFA, and ROFZ

Further analysis will be required at the time of construction of a runway extension.

Runway 13-31 | Airside Alternative 2 considers relocating Runway 13-31 to the northeast and converting it to a turf runway. Based on the current wind coverage of Runway 10-28 (97.21 percent at 10.5 knots), a paved crosswind runway is no longer justified and would be prioritized very low for federal funding assistance. Given these circumstances, a turf runway option is explored for Runway 13-31 if local demand warrants. Due to the nature of aircraft (and pilots) that typically operate on turf, the runway length could be shortened to 2,500 feet and shifted to the northeast to alleviate current risks associated with the existing intersecting runway configuration. The proposed improvements to the runway involve several connected projects, including the following:

- Closure of existing paved Runway 13-31
- Implementation of turf runway edge markers
- Mitigation of overgrown vegetation and gradient incompatibilities associated with the RSA, ROFA, and ROFZ

Taxiway Geometry Improvements | This alternative considers the construction of full-length parallel Taxiway B serving the north side of Runway 10-28 with a runway-to-taxiway centerline separation of 240 feet. Ultimately, this configuration would allow for the removal and relocation of the existing taxiway connection that provides direct access from the north apron area and would eliminate the runway crossing through the Runway 10-28 high-energy area at Taxiway A3. This alternative also considers the implementation of a no-taxi island on the southern apron area to prevent direct access provided from the apron to Runway 10-28 via Taxiway A4. Finally, Taxiway A could be extended to the east to provide more convenient access to Taxiway C and the existing landside development.

ULTIMATE AIRSIDE ALTERNATIVE 3

As shown on **Exhibit 4E**, Ultimate Airside Alternative 3 also considers improvements to the airfield to maximize the runway length while meeting critical safety area design standards for ultimate RDC C-II-4000 on Runway 10-28 and limiting off-airport impacts. This alternative also explores the potential for enhanced instrument approach visibility minimums serving Runway 28. Additional taxiway layouts were examined to create more efficient traffic flow while mitigating identified taxiway geometry deficiencies. Runway 13-31 is maintained in its existing condition under this scenario.

Runway 10-28 | A 900-foot extension to the west and a 1,000-foot extension to the east of Runway 10-28 results in a length of 7,100 feet, which would satisfy the ultimate critical aircraft requirement for takeoff operations at 100 percent useful load, as well as landing operations under 14 CFR Part 25 and the 80 percent rule with a wet or contaminated runway. This length would also increase the runway's overall utility for other business jets and turboprop aircraft. As such, this alternative considers the aforementioned runway extension and the necessary improvements to meet ultimate RDC C-II-4000 design standards. By extending the runway in this manner, the RPZ serving Runway 10 extends beyond the airport property boundary to the west and encompass multiple roadways, while the RSA, ROFA, and RPZ serving Runway 28 extend beyond the existing airport property boundary to the east and encompass an existing residence and private property. The ultimate RSA and ROFA would need to be acquired in fee, while the RPZs could be acquired through avigation easement or fee simple acquisition. To meet ultimate RDC C-II-4000 design standards and limit impacts to off-airport property, consideration is given

Existing Runway Design Codes
Runway 10-28: B-II-4000
Runway 13-31: B-I(S)-VIS

LEGEND

- Airport Property Line
- Existing Taxiway Designation
- Ultimate Taxiway Desigmation
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Runway Protection Zone (RPZ)
- Property to be Acquired
- AWOS Critical Area
- High-Energy Area
- Ultimate Airfield Pavement
- Remove Pavement

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

Public Road in RPZ

Heather Ln

Ultimate Turf Runway 13-31 2,500' x 75'

Webster Way

Rotary St

Commercial Drive

22

500' Runway extension

Private Residence

16.4 Acres

B

B1 B2 B3 B4 B5

240'

Ultimate Runway 10-28 5,700' x 100'

A1 A2 A3 A4 A5

400'

A

C

Potentially Relocate Public Roads in RPZ

Runway Drive

10

No-Taxi Island

Airport Rd

0 800

SCALE IN FEET

Aerial Photo: Google Earth 05/2024

Ultimate Runway Design Codes
Runway 10-28: C-II-4000
Runway 13-31: B-I(S)-VIS

DEFINITIONS

TODA - Takeoff Distance Available
TORA - Takeoff Run Available
ASDA - Accelerate/Stop Distance Available
LDA - Landing Distance Available

DECLARED DISTANCES

	Runway 10	Runway 28
TORA	6,100′	6,200′
TODA	7,100′	7,100′
ASDA	7,100′	7,100′
LDA	5,200′	6,100′

LEGEND

- Airport Property Line
- Existing Taxiway Designation
- Ultimate Taxiway Desigmation
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Runway Protection Zone (RPZ)
- Runway Visibility Zone (RVZ)
- Property to be Acquired
- AWOS Critical Area
- High-Energy Area
- Ultimate Airfield Pavement
- Remove Pavement

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

Heather Ln
Public Road in RPZ
1,000′ Runway Extention and Displaced Threshold
Potentially Relocate Private Residence and Driveway in RPZ
Webster Way
Rotary St
Commercial Drive
22
900′ Runway Extention and Displaced Threshold
Apron Area in Ult. ROFA
1.8 Acres*
Runway 13-31 3,899′ x 75′
1-Mile RPZ (Acquire 14.2 Acres*)
Runway 10-28 (7,100′ x 100′)
400′
¾-Mile RPZ (Acquire 19.9 Acres*)
2.2 Acres*
6.45 Acres*
Runway Drive
10
Remove/Reloacte Connector
Public Road in RPZ
Airport Rd
N
0
800
SCALE IN FEET
Aerial Photo:
Google Earth 05/2024

to the implementation of a threshold displacement on each end of Runway 10-28, as well as declared distances to mitigate safety area deficiencies for the ultimate RPZ beyond the west end of the runway and the ultimate RSA, ROFA, and RPZ beyond the east end of the runway.

As previously discussed, the declared distances pertaining to the RSA and ROFA are the ASDA and LDA, while the TORA and LDA relate to the RPZs. The runway extension and declared distances presented in Alternative 3 reduce the LDA and TORA for Runways 10 and 28. The application of declared distances minimizes impacts to off-airport property. The resulting declared distances for this alternative are presented in **Table 4B**.

TABLE 4B | Airside Alternative 3 – Declared Distances

Runway 10-28 Declared Distances	10	28
Takeoff Run Available (TORA)	6,100'	6,200'
Takeoff Distance Available (TODA)	7,100'	7,100'
Accelerate-Stop Distance Available (ASDA)	7,100'	7,100'
Landing Distance Available (LDA)	5,200'	6,100'

Source: Coffman Associates analysis

The proposed improvements to the runway would involve several connected projects and other airfield improvements, including the following:

- Extension of Taxiway A
- Extension of MIRL and MITL
- Acquisition (fee simple/easement) of approximately 1.8 and 2.2 acres of uncontrolled property within the ultimate Runway 10 RPZ
- Acquisition (fee simple/easement) of approximately 14.2 acres (one-mile instrument approach minimums) or 19.9 acres (¾-mile instrument approach minimums) of uncontrolled property within the ultimate Runway 28 RPZ
- Potential relocation of a private residence
- Mitigation of overgrown vegetation and gradient incompatibilities associated with the RSA, ROFA, and ROFZ

Further analysis will be required at the time of construction of a runway extension.

Taxiway Geometry Improvements | To mitigate the existing (and unsafe) direct access from the northern and southern aircraft apron areas to Runway 10-28, this alternative considers the removal and relocation of the southern apron connector at the A4 Taxiway and construction of partial parallel Taxiway B with a 400-foot runway-to-taxiway centerline separation on the north side of Runway 10-28. Ultimately, this allows for the removal and relocation of the existing taxiway that provides direct access from the northern apron area to Runway 10-28 and eliminates a runway crossing through the high-energy-area of Runway 10-28 at existing Taxiway A3.

Additionally, this alternative considers the extension of Taxiway A to the east; Taxiway A5 is also proposed to be removed and relocated to the east to serve the extended Runway 28 end. The existing Taxiway C could also be reoriented so the holding position serving the Runway 31 end is positioned 200 feet from the runway centerline and 90 degrees perpendicular to the runway as Taxiway C connects to Runway 31.

ULTIMATE AIRSIDE ALTERNATIVE 4

Ultimate Airside Alternative 4, shown on **Exhibit 4F**, examines potential options to meet critical safety area design standards for RDC C-II-4000 while maximizing the usable runway length on Runway 10-28. A runway extension to an ultimate length of 6,100 feet is considered, which would accommodate the ultimate critical aircraft for takeoff above 90 percent useful load. This runway length also satisfies FAA requirements to accommodate 100 percent of the business jet fleet at 60 percent useful load. Additionally, this alternative examines options to create more efficient traffic flow while mitigating identified taxiway geometry deficiencies. Due to the current funding challenges and the increased safety risks associated with Runway 13-31, this scenario considers the eventual closure of the runway.

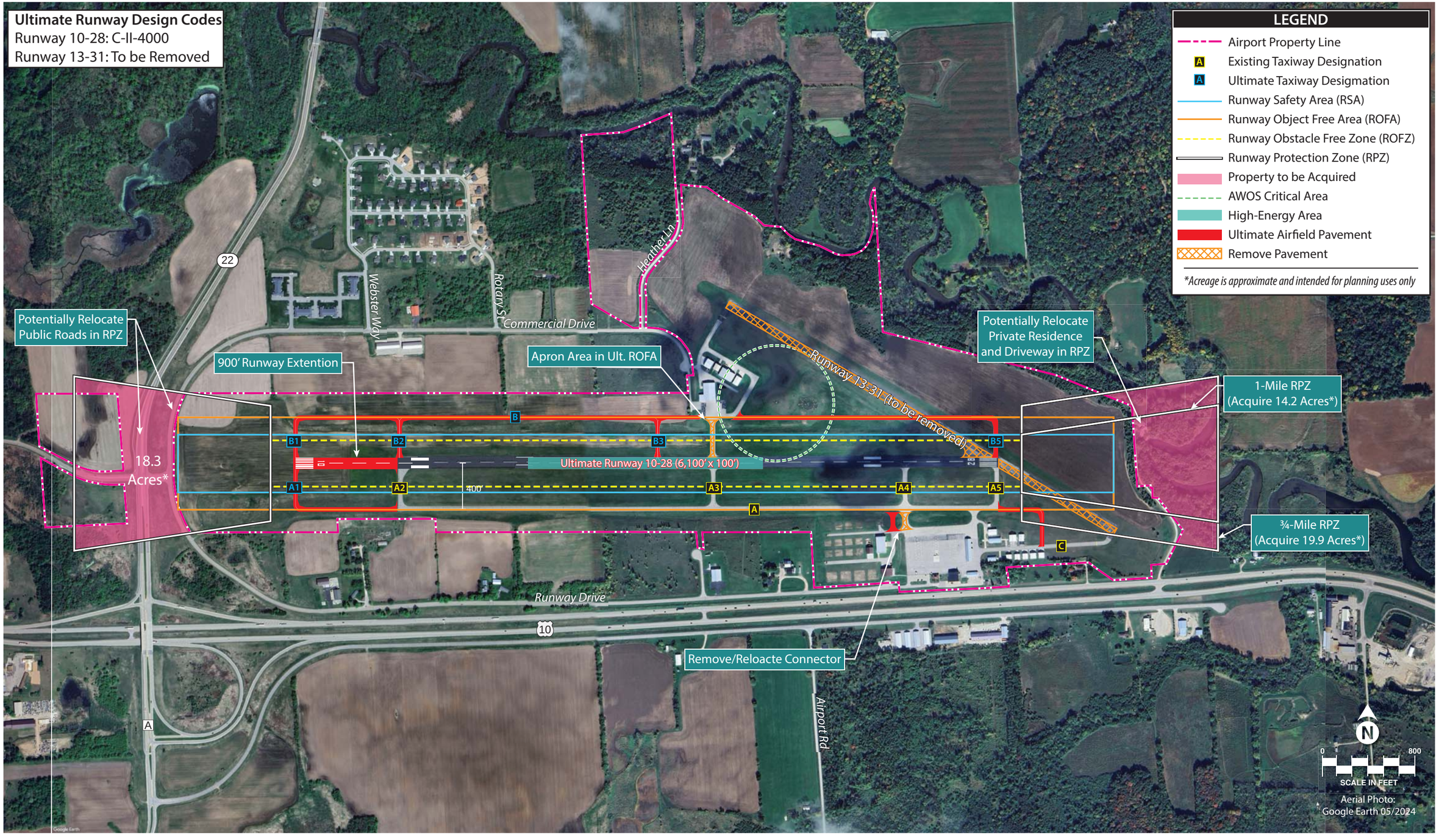
Runway 10-28 | This alternative considers extending the runway 900 feet to the west, which results in a total runway length of 6,100 feet. Primary impacts associated with a runway extension of 900 feet on the Runway 10 end include shifting the RPZ serving Runway 10 farther west, beyond the existing airport property boundary; the Runway 10 RPZ would encompass approximately 18.3 acres of uncontrolled property and would be completely traversed by Runway Drive and Highway 22. The ultimate RSA, ROFA, ROFZ remain on airport property. The ultimate RPZ serving Runway 28 remains in its existing location; however, it varies in size based on the ultimate instrument approach minimums serving Runway 28. The proposed improvements to the runway involve numerous connected projects, including the following:

- Extension of Taxiway A
- Relocation of the REILs and PAPI systems serving Runway 10-28
- Extension of MIRL and MITL
- Acquisition (fee simple/easement) of approximately 18.3 acres of uncontrolled property within the ultimate Runway 10 RPZ
- Acquisition (fee simple/easement) of approximately 14.2 acres (one-mile instrument approach minimums) or 19.9 acres (¾-mile instrument approach minimums) of uncontrolled property within the ultimate Runway 28 RPZ
- Potential relocation of public roadways
- Potential relocation of a private residence
- Mitigation of overgrown vegetation and gradient incompatibilities associated with the RSA, ROFA, and ROFZ

Further analysis will be required at the time of construction of a runway extension.

Taxiway Geometry Improvements | To mitigate the existing (and unsafe) direct access from the northern and southern aircraft apron areas to Runway 10-28, this alternative considers the removal and relocation of the southern apron connector at the A4 Taxiway and construction of full-length parallel Taxiway B with a 400-foot runway-to-taxiway centerline separation on the north side of Runway 10-28. Ultimately, this would allow for the removal and relocation of the existing taxiway connection that provides direct access from the north apron area, which would also eliminate the runway crossing through the Runway 10-28 high-energy-area at Taxiway A3. Finally, Taxiway A could be extended to the east to provide more convenient access to Taxiway C and the existing landside development.

Ultimate Runway Design Codes
Runway 10-28: C-II-4000
Runway 13-31: To be Removed



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AIRSIDE SUMMARY

This section has addressed four planning alternatives (two interim and two ultimate) for the airside facilities at PCZ. The primary issues to consider on the airfield include addressing non-standard airfield geometry and increasing operational utility at the airport. It is important that the PAC, the City of Waupaca, and the public offer feedback so the best combination of these alternatives is selected. Following discussion and review with these entities, a preferred recommended airside development concept will be drafted and presented in the next chapter.

LANDSIDE PLANNING CONSIDERATIONS

Generally, landside issues are related to the facilities necessary or desired for the safe and efficient parking and storage of aircraft, the movement of pilots and passengers to and from aircraft, airport support, and overall revenue support functions. Landside planning considerations (summarized previously on **Exhibit 4B**) focus on strategies that follow a philosophy of separating activity levels. To maximize airport efficiency, it is important to place facilities intended to serve similar functions near one another. The best approach to landside facility planning is to treat the development like that of a community, for which land use planning is the guide. For an airport, land use in the terminal area should generally be dictated by aviation activity levels. Due to the amount of potentially developable land available at PCZ, some consideration is also given to non-aviation uses that can provide additional revenue support to the airport and bolster economic development for the City of Waupaca.

Landside planning issues include facility-locating strategies that follow a philosophy of separating activity levels; therefore, it is important to plan for an appropriate mix of smaller T-hangars, executive hangars, and larger conventional hangars at PCZ.

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

The alternatives presented are not the only options for development. In some cases, a portion of one alternative could be intermixed with another, and some alternative development concepts could be replaced with others. The final recommended plan only serves as a guide for the airport to aid in its strategic planning of available properties. Airport operators often change their plans to meet the needs of specific users. The goal in analyzing landside development alternatives is to define a schematic approach to accommodate appropriate future development so the airport property can be maximized.

REVENUE SUPPORT LAND USES

If the amount of land on airport property exceeds the space needed for forecasted aviation demand, consideration could be given for PCZ to utilize portions of its property for indirect or non-aviation purposes, which could include commercial, industrial, or manufacturing development.

It should be noted that the airport does not have the approval to use undeveloped property for non-aviation purposes at this time; specific approval from the FAA will be required to utilize undeveloped airfield property for non-aviation uses. This planning document does not confirm any regulatory approval for non-aviation uses, even if these uses are ultimately included in the master plan and on the ALP. A separate request justifying the use of airport property for non-aviation uses will be required for FAA approval; however, the information contained in this document can be a source for developing that justification.

An environmental determination will also be required. While FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, states that the release of an airport sponsor from federal obligations is normally categorically excluded and would not typically require an environmental assessment (EA), the issuance of a categorical exclusion is not an automatic action; the FAA must determine that no extraordinary circumstances exist at the airport. Extraordinary circumstances would include a potentially significant environmental impact to any environmental resources governed by federal law. An EA may be required by the FAA if extraordinary circumstances are identified at PCZ. The following generalized land use conditions outline topical subject areas that could present themselves on the airport.

ON-AIRPORT LAND USE OBLIGATIONS

The airport has accepted grants for capital improvements from the FAA in the past; as such, the City of Waupaca (airport sponsor) has agreed to certain grant assurances. Grant assurances related to land use guarantee that airport property will be reserved for aeronautical purposes. If the airport sponsor wishes to sell (release) airport land or lease airport land for a non-aeronautical purpose (land use change), the airport sponsor must petition the FAA for approval. The ALP and the airport property map must then be updated to reflect the sale or land use change of the identified property.

Release of Airport Property

A release of airport property would entail the sale of land that is not needed for aeronautical purposes currently or in the future. The following documentation is required to be submitted to the FAA for consideration of a land release:

1. What is requested?
2. What agreement(s) with the United States is/are involved?
3. Why is the release, modification, reformation, or amendment being requested?
4. What facts and circumstances justify the request?
5. What requirements of state or local law or ordinance should be provided for in the language of an FAA-issued document if the request is consented to or granted?
6. What property or facilities are involved?
7. How was the property acquired or obtained by the airport owner?

8. What is the present condition and what present use is made of any property or facilities involved?
9. What use or disposition will be made of the property or facilities?
10. What is the appraised fair market value of the property or facilities, and what appraisals or other types of evidence are required to establish fair market value?
11. What proceeds are expected from the use or disposition of the property, and what will be done with any net revenues derived?
12. What is the relative advantage or benefit to the airport from the sale or other disposition, compared to retention for rental income?

Each request should have a scaled drawing attached that shows all airport property and facilities that are currently obligated for airport purposes by agreements with the United States. Other exhibits that support or justify the request (such as maps, photographs, plans, and appraisal reports) should be attached as appropriate. No areas of Waupaca Municipal Airport property are currently planned for release from obligation and/or sale.

Land Use Change

A land use change permits land to be leased for non-aeronautical purposes; it does not authorize the sale of airport land. Leasing airport land to produce revenue via non-aeronautical uses allows the land to earn revenue for the airport and serve the interests of civil aviation by making the airport as self-sustaining as possible. Airport sponsors may petition for a land use change for the following purposes:

- So that land not needed for aeronautical purposes can be leased to earn revenue from non-aviation uses; this is land that is clearly surplus to the airport's aviation needs
- So that land that cannot be used for aeronautical purposes can be leased to earn revenue from non-aviation uses; this is land that cannot be used by aircraft, or where barriers or topography prevent an aviation use
- So that land not presently needed for aeronautical purposes can be rented on a temporary basis to earn revenue from non-aviation uses

A land use change will not be approved by the FAA if the land has a present or future airport or aviation purpose (clear aeronautical use); however, if 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 or intermediate-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 cannot be diverted to the airport sponsor's general fund or for general economic development unrelated to the airport.

Generally, a land use change of airport property will 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 areas that are likely eligible for release from obligation.

AVIATION ACTIVITY LEVELS

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

The medium-activity use category defines the next level of airport use and primarily includes smaller corporate aircraft, the owners of which may desire private executive hangar storage on the airport. The best location for medium-activity use is off the immediate flight line but still readily accessible to aircraft, including corporate jets. Due to an airport's layout and other existing conditions, if this area is planned to be located along the flight line, it is best to keep it out of the mid-airfield area of the airport to avoid causing congestion with transient aircraft utilizing the airport. Parking and utilities (such as water and sewer) should also be provided in this area.

The low-activity use category defines the area for storage of smaller single- and multi-engine aircraft. Low-activity users are personal or small business aircraft owners that prefer individual space in linear box hangars or T-hangars. Low-activity areas should be located in less conspicuous areas. This use category requires electricity but generally does not require high-volume water or sewer utilities.

In addition to the functional compatibility of the aviation development areas, the proposed development concept should provide a first-class appearance for PCZ. The airport serves as a vital link to the entire region for both business and recreational visitors. Consideration to building and landscape design, construction, and maintenance should be given high priority in all public areas, as the airport may serve as a visitor's first impression of the community.

To allow for maximum development of the airport while continuing to meet mandated safety design standards, it is crucial to devise an airport layout plan that allows for the orderly development of airport facilities. An airport will typically reserve property adjacent to the runway system exclusively for aviation-related activity, which allows for the location of taxiways, aprons, and hangars.

HANGAR DEVELOPMENT

Analysis in Chapter Three indicated that the airport should plan for the construction of additional aircraft hangars over the next 20 years. Hangar development can occur in a variety of sizes that correspond with several different intended uses.

Commercial general aviation activities are essential to providing the necessary services on an airport, which include privately owned businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, skydiving, and aircraft fueling. These types of operations are commonly referred to as fixed base operators (FBOs) or specialized aviation service operators (SASOs).

The facilities associated with such businesses are often large, conventional-type hangars that hold several aircraft. High levels of activity often characterize these operations, along with a need for apron space for the storage and circulation of aircraft. These facilities are best placed along ample apron frontage with unobstructed visibility from the runway system for transient aircraft. Utility services and vehicle parking areas are necessary support uses for these types of facilities.

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

Other types of hangar development can include executive hangars to accommodate either individual large aircraft or multiple small aircraft. These types of hangars are typically used by corporations with company-owned aircraft or by an individual or group of individuals with multiple aircraft. These hangar areas normally require all utilities, as well as segregated roadway access.

Table 4C summarizes the aircraft hangar types and the corresponding sizes and aviation uses typically associated with each facility. Approximately 109,900 square feet of hangar space (including maintenance area) is currently provided on airport property, comprised of a combination of the previously discussed hangar types.

TABLE 4C | Aircraft Hangar Types

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

FBO = fixed base operator
SASO = specialized aviation service operator

Currently, the primary areas that are ideal for potential general aviation-related development include the main terminal area along the primary aircraft apron. Development could be continued along the main aircraft apron area on the south side of Runway 10-28 and on the west side of Runway 13-31 near each runway end. Given the development potential for these portions of existing airport property, the following alternatives detail development options for the areas identified.

LANDSIDE ALTERNATIVES

This section describes a series of landside alternatives as they relate to the previously detailed considerations. These alternatives focus on current hangar developments and generalized land use. A generalized land use concept is beneficial because it allows flexibility in site development, which enables it to meet the needs of clients without predetermined layout constraints. Variations of future hangar developments are also presented to help visualize how these facilities could be integrated into the airport campus or complex.

Three alternatives have been prepared for the landside development area. The existing airport property located near the primary apron area is developed; however, there is still potential for additional infill and future development. The potential for new development is primarily located on the north and south sides of Runway 10-28 and along the west side of Runway 13-31 near each runway end. The alternatives provide potential development plans aimed at meeting the needs of general aviation through the long-term planning period and beyond.

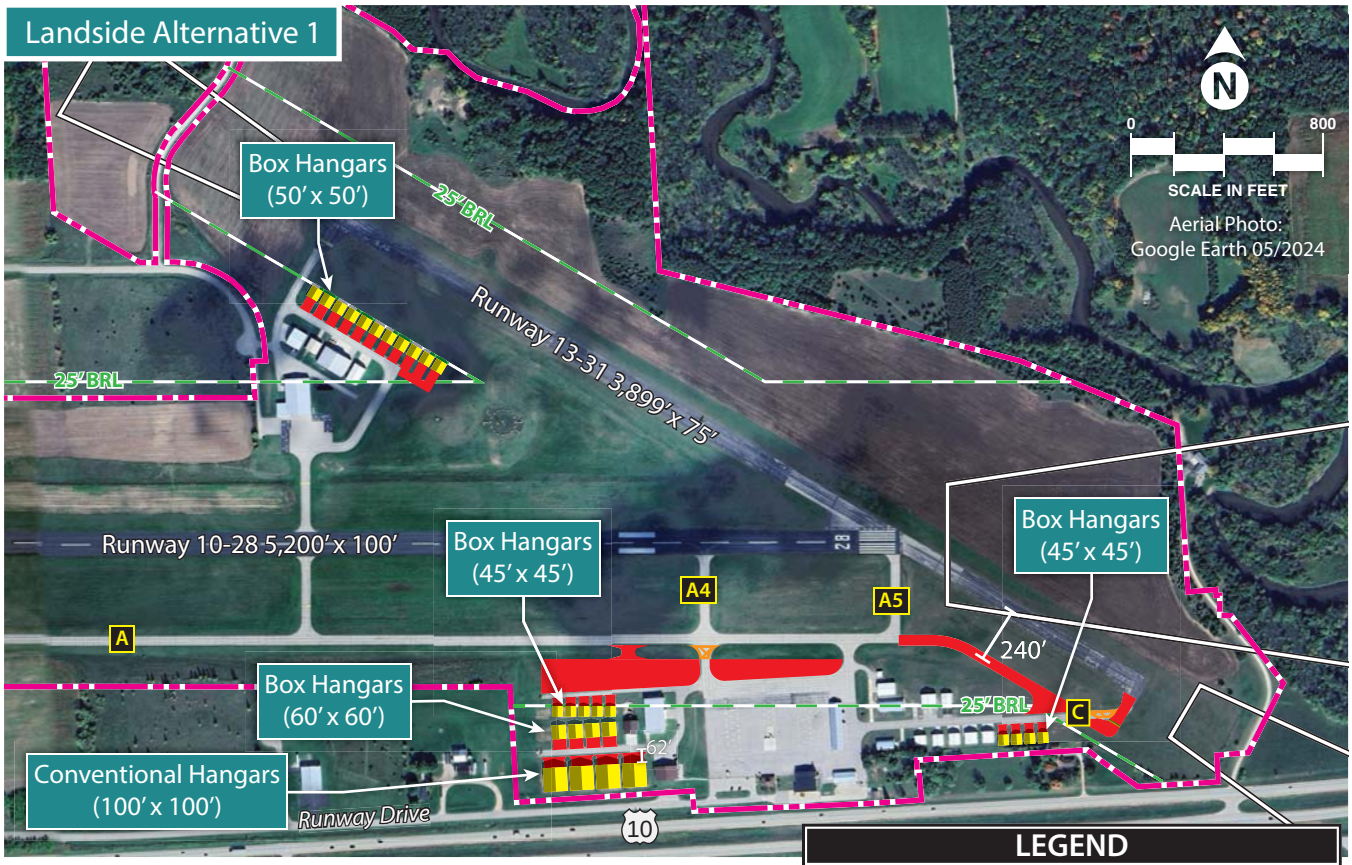
The alternatives presented are not the only reasonable options for development. In some cases, a portion of one alternative could be intermixed with another, and some development concepts could be replaced with others. The overall intent of this exercise is to outline basic development concepts to spur collaboration for a final recommended plan. Even then, the final recommended plan only serves as a guide to aid the City of Waupaca 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 bring future development into focus so that airport property can be maximized and aviation activity can be protected.

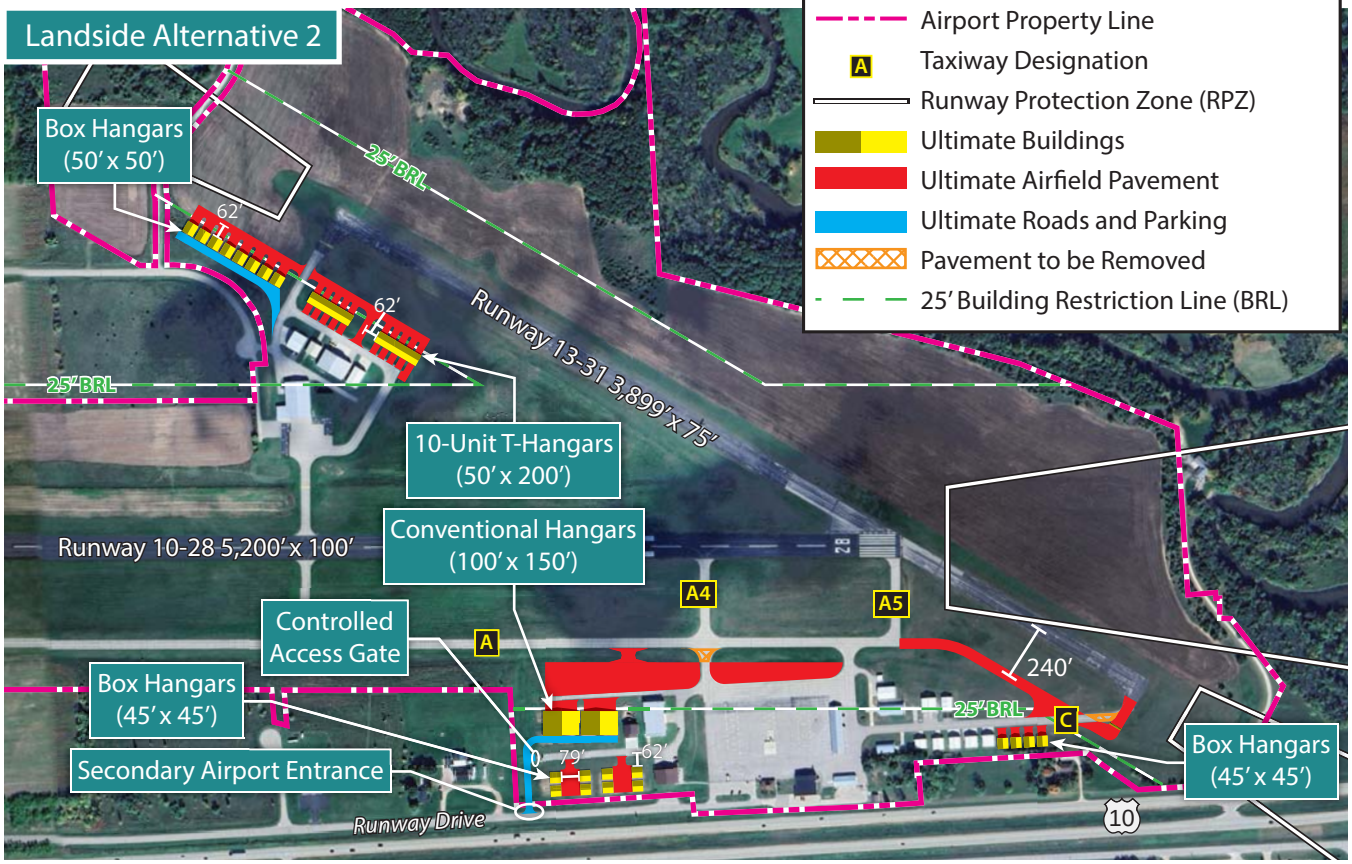
The existing airport landside infrastructure is located on the north and south sides of the airfield, along the north and south sides of Runway 10-28. Automobile access is provided on the south side of the airfield via Runway Drive and existing vehicle parking is provided in various locations near the hangar facilities close to the airport entrance. A secondary entrance provided via Commercial Drive allows access to the existing hangar development on the north side of Runway 10-28. The existing level of airside and landside access makes these areas of airport property ideal locations for continued airport development. The alternatives analysis presented on **Exhibit 4G** examines the potential options for continued landside development of PCZ.

LANDSIDE DEVELOPMENT ALTERNATIVE 1

Alternative 1, shown on **Exhibit 4G**, presents a potential layout that primarily carries forward a similar development to what is proposed on the current ALP. On the south side of the development area, nine 45- by 45-foot executive box hangars, four 60- by 60-foot executive box hangars, and four 100- by 100-foot conventional hangars are proposed. These hangars would continue the existing development trend on the south side of Runway 10-28 to maximize hangar development potential on the south side of the airfield. Airside access to these hangars could be provided via the existing taxilane structure. Additionally, Taxiway A is extended to the southeast to connect with existing Taxiway C, which would ultimately alleviate congestion for aircraft transitioning from Taxiway C to parallel Taxiway A. This alternative also considers an additional 13,600 square yards (sy) of apron area, along with potential taxiway geometry enhancements, as previously discussed.

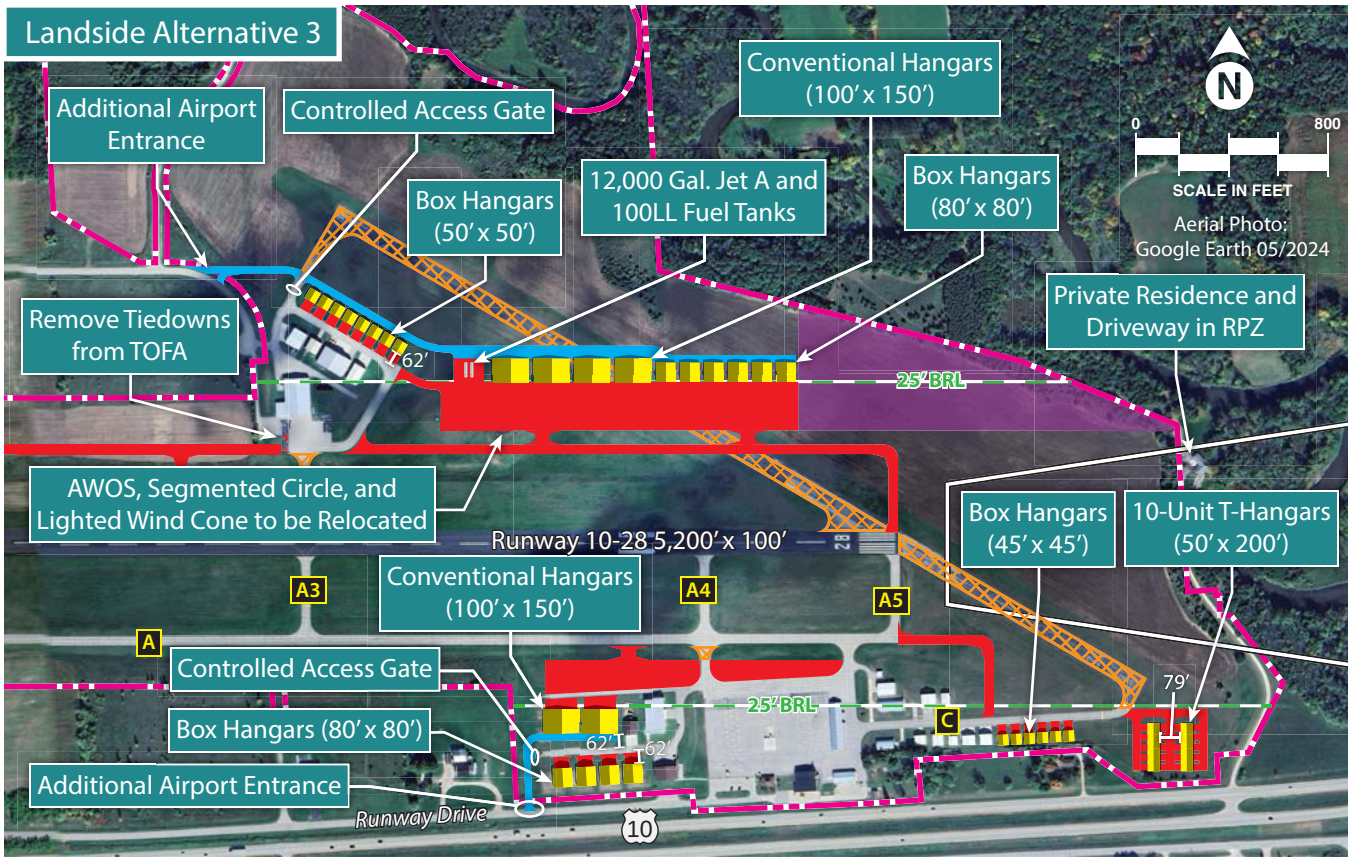
Within existing hangar development, there is minimal opportunity for infill with additional hangar development, so further development is considered on the north side of Runway 10-28, west of Runway 13-31. The proposed development in this area considers the construction of 11 50- by 50-foot executive box hangars. Each proposed hangar development is served by an aircraft apron.





LEGEND

- Airport Property Line
- A — Taxiway Designation
- Runway Protection Zone (RPZ)
- Ultimate Buildings
- Ultimate Airfield Pavement
- Ultimate Roads and Parking
- Pavement to be Removed
- 25' Building Restriction Line (BRL)



LEGEND

- Airport Property Line
- A — Taxiway Designation
- Runway Protection Zone (RPZ)
- Ultimate Buildings
- Ultimate Airfield Pavement
- Ultimate Roads and Parking
- Pavement to be Removed
- 25' Building Restriction Line (BRL)
- Aviation Development Reserve

LANDSIDE DEVELOPMENT ALTERNATIVE 2

As depicted on **Exhibit 4G**, Landside Development Alternative 2 emphasizes additional development of large conventional and executive hangars and T-hangars on the north and south sides of Runway 10-28, as well as on existing developable airport property along the west side of Runway 13-31.

Beginning on the south side of Runway 10-28, the proposed development includes two 100- by 150-foot conventional hangars and 12 45- by 45-foot executive box hangars. Automobile access to the proposed conventional hangars could be provided by a secondary airport entrance from Runway Drive. Additionally, a controlled access gate is proposed for enhanced safety and security prior to entering the active aircraft operations area. Similar to the previous alternative, Taxiway A is extended to the southeast to connect with existing Taxiway C to alleviate congestion for aircraft transitioning from Taxiway C to parallel Taxiway A. This alternative also considers an additional 13,600 sy of apron area, along with potential taxiway geometry enhancements, as discussed in the Airside Alternatives section.

Options to continue development on the north side of Runway 10-28 are also considered. The proposed development directly adjacent to existing hangars and continuing north along Runway 13-31 includes two 10-unit T-hangars and eight 50- by 50-foot executive box hangars. Supporting aircraft apron areas are considered for the proposed executive box hangars, as well as automobile parking and access.

LANDSIDE DEVELOPMENT ALTERNATIVE 3

The third and final alternative option, presented on **Exhibit 4G**, explores a landside development scenario under ultimate C-II-4000 design standards and considers the potential closure of Runway 13-31, which would ultimately allow for significant landside development if demand warrants.

On the south side of Runway 10-28, the proposed development includes two 100- by 150-foot conventional hangars, four 80- by 80-foot executive box hangars, six 45- by 45-foot executive box hangars, and two 10-unit T-hangars. Automobile access to the proposed conventional hangars could be provided by a secondary airport entrance from Runway Drive. Additionally, a controlled access gate is proposed for enhanced safety and security prior to entering the active aircraft operations area. Similar to the previous alternative, Taxiway A is extended to the southeast to connect with existing Taxiway C to alleviate congestion for aircraft transitioning from Taxiway C to parallel Taxiway A. This alternative also considers an additional 13,600 sy of apron area, along with potential taxiway geometry enhancements, as discussed in the Airside Alternatives section.

This alternative continues development on the north side of Runway 10-28 with the addition of eight 50- by 50-foot executive box hangars, four 100- by 150-foot conventional hangars, and six 80- by 80-foot executive box hangars. The east side of the proposed hangars could be reserved for future development if demand dictates. Additional 12,000-gallon 100LL and Jet A fuel tanks are also considered for the north side development area, as well as a 29,700-sy aircraft apron area. The proposed fuel tanks could be situated with a self-service credit card reader or used to service fuel trucks for full-service fueling. Each proposed hangar development is served by automobile parking and access. An additional airport access point is considered on the north side of the airfield and vehicle access to the airfield operations area could be limited through a controlled gate.

LANDSIDE SUMMARY

The landside alternatives presented in this section are intended to accommodate an array of aviation activities that either currently occur or could be expected to occur at PCZ in the next 20 years. There is existing demand for new facilities at PCZ; with a changing fleet mix of aircraft that includes more sophisticated airframes, this document will help the City of Waupaca refine its approach to developing its property in an organized and thoughtful way. Each of the three development options considers a long-term vision that would extend beyond the 20-year scope of this master plan, in some cases; nevertheless, it is beneficial to provide a long-term vision to ensure the airport will adequately serve the City of Waupaca community for years to come.

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 generated by projections of aviation demand growth and/or the need to resolve non-standard airport conditions. FAA design standards are frequently updated with the intent of improving the safety and efficiency of aircraft movement on and around airports, which can lead to certain pavement geometries currently being classified as non-standard when they previously met FAA design standards.

Several development alternatives related to both the airside and the landside facilities have been presented. For the airside, the major considerations involve correcting non-standard taxiway conditions and extending the length and/or upgrading the RDC of Runway 10-28. For the landside, the alternatives presented include the previously planned hangar development and propose additional aviation development near the terminal area and on the north and south sides of Runway 10-28. As the airport's fleet mix transitions to include more jets and turboprops, it will be important to clearly delineate development areas for facilities to accommodate those aircraft; segregating jet and turboprop traffic from small aircraft operators contributes to operational safety and creates a more organized and efficient airport.

The next step in the master plan process is to arrive at a recommended development concept. Participation of the PAC and the public will be important to the determination of the ultimate concept. Additional consultation with the FAA and WisDOT BOA may also be required to ensure improvements are satisfactorily delineated and presented. Once a final development plan is identified, a 20-year airport capital improvement program will be presented, including a list of projects prioritized according to aviation demand and/or necessity. Finally, a financial analysis will be presented to identify potential funding sources and quantify the approximate contribution needed from the City of Waupaca to implement each project. In this manner, the City of Waupaca can adequately program matching funding in its five-year capital improvement plan.