CHAPTER FIVE:

RECOMMENDED CONCEPT

5.1 Introduction

In the last chapter, airfield and landside development alternatives were assessed using a process that considered short and long term needs as well as future growth potential. Safety, both in the air and on the ground, was given high priority in the analyses and current airport design standards were considered in evaluating each scenario. Through meetings and discussions with the Gallatin Airport Authority Board a recommended concept has evolved.

The recommended development concept for BZN represents a means by which the airport can grow in a balanced manner to accommodate commercial and general aviation demand over the planning period. In addition, the plan provides the flexibility to meet activity growth beyond the long range planning horizon.

5.2 Airport Design Standards

Airport design and safety standards are primarily based on the characteristics of the critical design aircraft expected to use the airport. The critical design aircraft is the most demanding aircraft or "family" of aircraft which will conduct 500 or more operations (take-offs and landings) per year at the airport. The primary reference for the design of airfield facilities is FAA Advisory Circular 150/5300-13A, Airport Design. Within this advisory circular, a coding system, referred to as the Aircraft Approach Category (AAC) / Airplane Design Group (ADG) has been established that identifies an airport's critical design aircraft for each runway. This code is a function of the critical design aircraft's approach speed and wingspan. The AAC/ADG was previously discussed in Chapter Three.

The current AAC/ADG for air carrier Runway 12-30 at BZN is D-III. Planning forecasts suggest that the runway should be planned for a future AAC/ADG of D-IV. Runway 11-29 is currently B-II (small), and should be planned for D-IV. Runway 3-21 is currently B-I (small) and should be planned for daytime visual use by B-II (small). All airfield facilities should ultimately comply with the design and safety standards for the runways they are associated with. **Table 5-1** summarizes the planning standards used in the ultimate design and layout of BZN.

Table 5-1 Airfield Planning Design Standards

	RW 12-30		RW 11-29		RW 3-21		Turf
	Existing	Ultimate	Existing	Ultimate	Existing	Ultimate	Existing / Ultimate
RDC	D-III	D-IV	B-II (Small)	D-IV	B-I (Small)	B-II (Small)	B-I (Small)
Approach Visibility Minimum	<3/4 mile	<3/4 mile	Visual	> 1 mile	Visual	Visual	Visual
Runway Object Free Area							
Width	800′	800′	500′	800′	250′	500′	250′
Length Beyond Runway End	1000′	1000′	300′	1000′	240′	300′	240′
Runway Safety Area							
Width	500′	500′	150′	500′	120′	150′	120′
Length Beyond Runway End	1,000	1,000	300	1,000	240	300	240
Runway Obstacle Free Zone							
Width	400′	400′	250′	400′	250′	250′	250′
Length Beyond Runway End	200′	200′	200′	200′	200′	200′	200′
Taxiway Object Free Area							
Width	186′	259′	131′	259′	89′	131′	89′
Taxiway Safety Area							
Width	118′	171′	79′	171′	49′	79′	49′
Design Criteria							
Runway Width	150′	150′	75′	150′	60′	75′	80′
Taxiway Width	75′(TDG 5)	75′(TDG 5)	35′ (TDG 2)	75′(TDG 5)	35′ (TDG 2)	35′ (TDG 2)	35′ (TDG 2)
Runway Centerline to Parallel T/W Centerline	400′	400′	240′	400′	150′	240′	150′
Runway Centerline to Holdline	295′	295′	125′	295′	125′	125′	125′
Runway Centerline to Edge of Aircraft Parking	500′	500′	250′	500′	125′	250′	125′
Taxiway centerline to Fixed or Movable Object	93′	129.5′	65.5′	129.5′	44.5′	65.5′	44.5′

5.3 Recommended Master Plan Concept

Figures 5-1, 5-2, 5-3, 5-4 and **5-5** present an overview of projects recommended for implementation within the master planning period to accommodate the previously identified requirements for airport facilities. The recommended master plan concept proposes the following elements as outlined in the previously proposed planning alternatives:

Runways

- Ultimately extend Runway 12-30 to 10,828 feet.
- Ultimately extend and widen Runway 11-29 to 8,500 feet by 150 feet.
- Ultimately extend Runway 3-21 to 5,100 feet.

Taxiways

- Remove general aviation apron access taxiway that aligns with connecting Taxiway A-2 to create a staggered layout.
- Extend all parallel taxiways with runway lengthening projects.
- Consider addition of bypass taxiways and secondary parallel taxiways to serve the existing runway system.
- Consider addition of high speed exits for capacity improvement and operational efficiency
- Increase separation between Taxiway C and Runway 11-29 to 400 feet.
- Resolve "hammerhead" taxiway issue at Runway 21 threshold.

Approaches

12-30

- Pursue improvement to the minimums of Runway 12-30 with designation as a Category II Runway with a Runway Visual Range (RVR) of 1,200 feet (1/4 mile).
- As far as practicable, bring Runway 30 to the same precision approach standards as Runway 12 including the addition of ILS and approach lighting.

11-29

- Pursue publication of a "sidestep maneuver" utilizing ILS on Runway 12-30.
- Reserve appropriate setbacks and RPZ dimensions for additional future NPI RNAV/GPS approaches to Runway 11-29

Terminal Area

- Provide for automobile parking expansion through construction of parking garages and expansion of parking lots for the general public, employees, and rental car ready and return.
- Expand the terminal from the current 12 gates to 20 gates.
- Add airline ticketing offices (ATO) with the entry of new airlines.
- Expand outbound bag screening and inbound baggage makeup.
- Expand secure side holdrooms.
- Add baggage claim frontage and lobby area.
- Expand secure and non-secure side concessions.
- Add secure and non-secure side restroom space.

General Aviation

- Add storage hangars for as many as 189 additional storage positions, for both small and large aircraft.
- Add apron space and parking positions throughout the planning period.

Airport Support

- Expand the Airport's ARFF Building with the acquisition of additional equipment.
- Expand snow removal and equipment storage buildings with the addition of new maintenance and snow removal equipment, as required.
- Plan for additional fuel storage facilities.

The recommended master plan concept provides for anticipated aviation facility needs for the Bozeman area throughout the 20-year planning horizon. The following sections provide a brief discussion of the major improvements planned for the airport throughout the planning period.

5.4 Airside Recommendations

Airside recommendations include improvements to the runway, new taxiway construction, and airfield lighting. These improvements are summarized as follows:

Runway 12-30

Runway 12-30 is the primary runway with a length of 8,994 feet and a width of 150 feet. As shown in **Figure 5-1**, the master plan calls for ultimate lengthening of Runway 12-30 to 10,828 feet, maintaining its current width of 150 feet. The ability to ultimately extend the runway will be preserved by protecting future approach and departure clearances. Because the southwest threshold of Runway 30 is offset from the threshold of Runway 29, it is recommended that the threshold be relocated 328 feet east to provide a more direct taxi route to the Runway 29 threshold regardless of future runway length requirements. Runway pavement strength is planned to be maintained at its current Pavement Classification Number (PCN) level of 123/F/A/X/T and 120,000 pounds single wheel loading (SWL), 250,000 pounds dual wheel loading (DWL) and 550,000 pounds dual tandem gear loading (DTG). The approaches to Runway 12-30 should be protected in accordance with precision approach geometry to allow for the development of a precision approach to Runway 30 in the future.

Runway 11-29

Parallel Runway 11-29 currently serves as a general aviation runway, separating small general aviation from larger and faster commercial airplane classes on the airfield. The analysis of airfield capacity indicated that future planning for the runway should establish it as an additional primary runway, with standards, to the extent practicable, comparable to Runway 12-30. Existing constraints on the ground limit the extension of Runway 11-29 to an ultimate length of 8,500 feet and a width of 150 feet. The ultimate lengthening of the runway requires the relocation of Airport Road and the existing VOR. Runway pavement strength is planned to be increased to match Runway 12-30 at a PCN of 123/F/A/X/T and 120,000 pounds SWL, 250,000 pounds DWL and 550,000 pounds DTG. Because the separation of Runway 12-30 and Runway 11-29 is not sufficient to allow simultaneous instrument approaches, the approaches to Runway 11-29 should be protected in accordance with non-precision approach geometry.

Runway 3-21

Crosswind Runway 3-21 is 2,650 feet long by 75 feet wide. The analysis of airfield capacity calls for the ultimate extension of the runway to 5,100 feet. This length would provide adequate crosswind coverage for all small airplanes up to RDC B-II. The runway width and pavement strength of 12,500 pounds SWL will be adequate for the planning period. The approaches to Runway 3-21 should continue to be protected in accordance with visual approach geometry.

Taxiways

Taxiway A is the full length parallel taxiway serving Runway 12-30. The runway / taxiway centerline separation of 750 feet is adequate for the current RDC of D-III and would be adequate for the future RDC of D-IV. A second partial parallel taxiway is planned north of the Taxiway A centerline to permit a dual system. This will improve ground circulation as operations increase. The taxiways serving Runway 12-30 should continue to be planned 75 feet wide and have the same pavement strength as the runway. High speed exits have been planned for both landing directions and bypass taxiways are planned at both runway ends.

Taxiway C is the parallel taxiway serving Runway 11-29. At 35 feet wide and with 307.5 feet separation from the runway, it is adequate to serve the current Taxiway Design Group (TDG) 2 aircraft associated with the RDC of B-II small for Runway 11-29. At the time Runway 11-29 is upgraded to accommodate D-IV aircraft, Taxiway C will be relocated to an offset of 400 feet. To meet the new design standard for the runway, a width of 75 feet and the same pavement strength as the runway is planned.

Partial parallel Taxiway H is located 675 feet southwest of the centerline of crosswind Runway 3-21 and is 35 feet wide. This meets the current and future design standards for the runway. A partial parallel taxiway is planned between Taxiway H and the runway to improve circulation along the general aviation flightline. The new taxiway is planned at a 240 feet separation from the runway. This taxiway is planned at 35 feet wide and will provide increased operational safety and efficiency to taxiing aircraft.

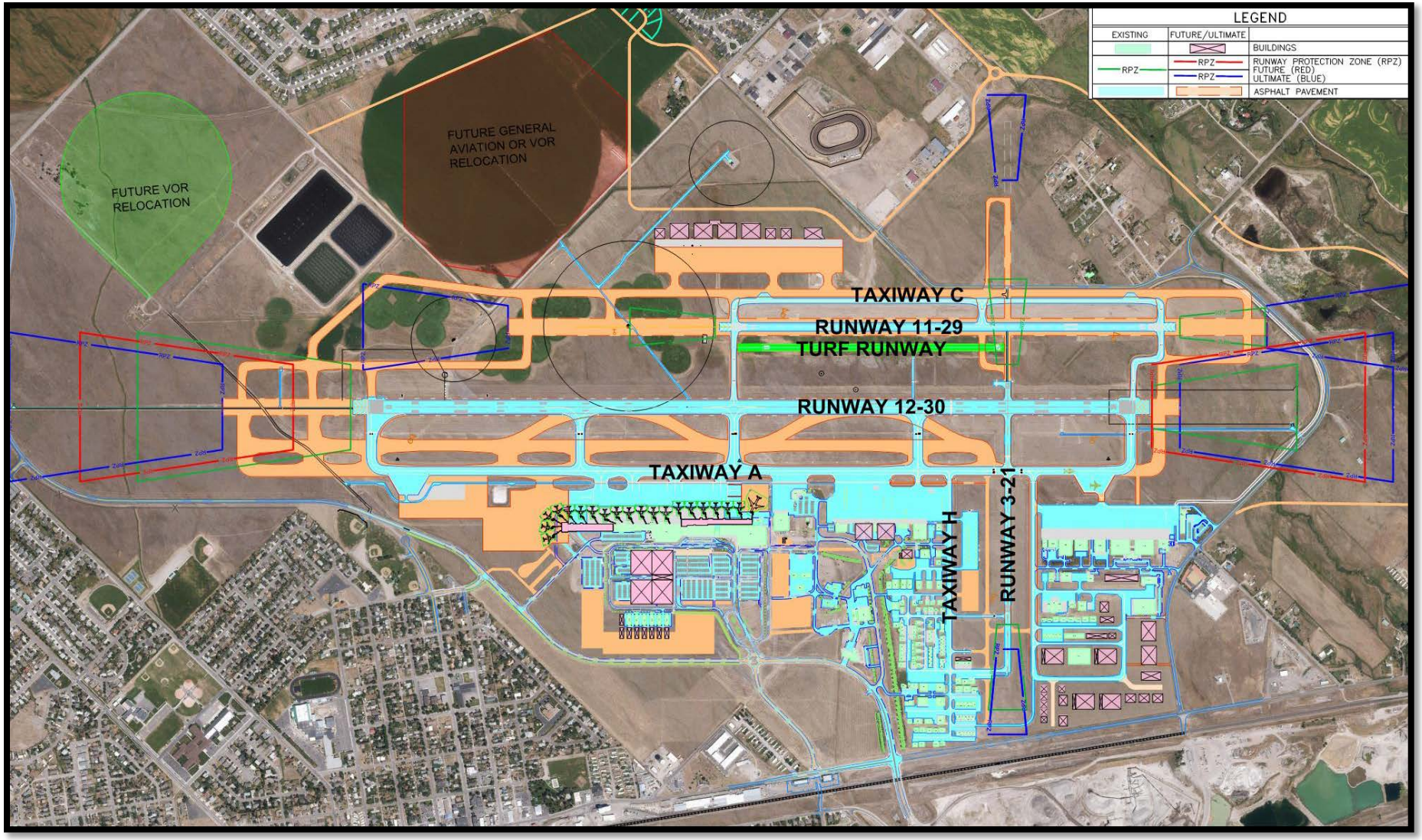

Figure 5-1: Recommended Master Plan Concept - Airside

5.5 Landside Recommendations

Landside recommendations include the passenger terminal, aircraft parking aprons and tiedown areas and aircraft storage hangar facilities. Planned improvements to landside facilities are summarized as follows:

Passenger Terminal Complex

Chapter 3, Facility Requirements evaluated each of the functional areas of the terminal against current and future demand requirements. Future needs were determined based on peak hour requirements. Airline schedules at BZN are steadily increasing gate utilization. In addition, forecasts indicate that the critical aircraft will transition from D-III to larger capacity D-IV commercial aircraft. The sustained growth in passenger enplanements forecast over the planning period results in peak hour passenger loads which exceed capacity for certain functional areas of the terminal in both the immediate term and in the long term planning horizon.

The preferred future passenger terminal complex layout incorporates a linear expansion of the terminal to the northwest from the current 12 gates to 20 gates ultimately. Inside, the building expansion includes addition of airline ticketing offices (ATO, provision for expanded outbound bag screening and inbound baggage makeup, holdroom expansion, additional baggage claim frontage and lobby area, expanded secure and non-secure side concessions and additional secure and non-secure side restroom space. Plans are phased to accomplish remodeling and expansion incrementally as needed according to demand.

The linear expansion of the terminal is accompanied by expansion of the commercial aircraft parking apron to the west to accommodate 20 aircraft parking positions and a consolidated de-icing apron.

Expansion of terminal auto parking areas includes a phased multi-level parking structure as well as new paved surface lots for long term passenger parking and rental car ready and return.

A future fuel farm is also planned in the northwest corner of the landside terminal development area.

A conceptual layout for the long term development of the passenger terminal complex is provided in **Figure 5-2.**

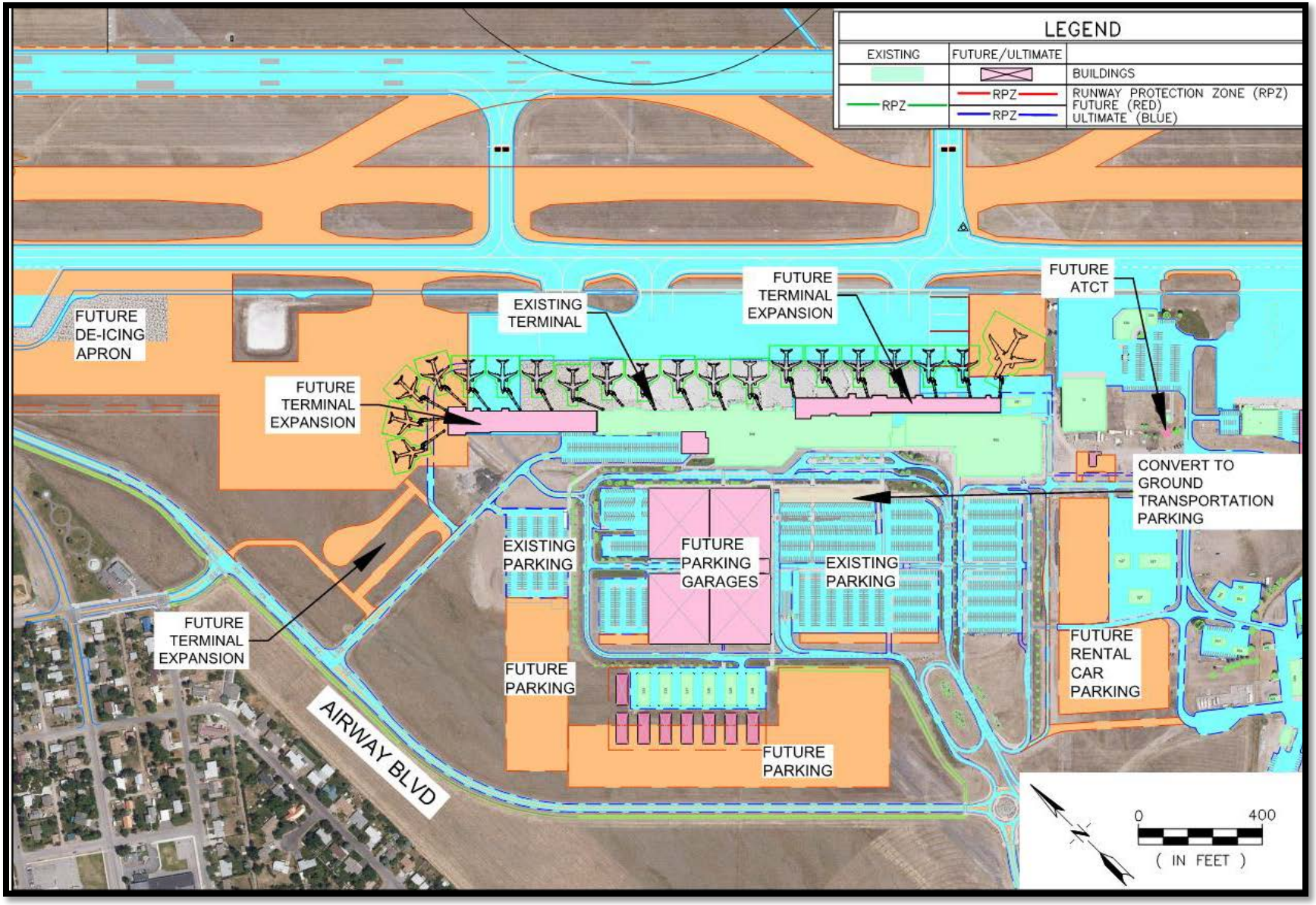

Figure 5-2: Recommended Alternative Passenger Terminal Complex

General Aviation Areas

The planned development configuration of future landside general aviation facilities at BZN are depicted on **Figures 5-3**, **5-4** and **5-5**. The plans represent the buildout of the historic general aviation area and the east ramp. Development of a new general aviation area north of Runway 11-29 is also planned. Plans include construction and expansion of aprons serving commercial, general aviation and corporate aircraft. A mixture of small general aviation and large executive hangars are planned in all three general aviation development areas.

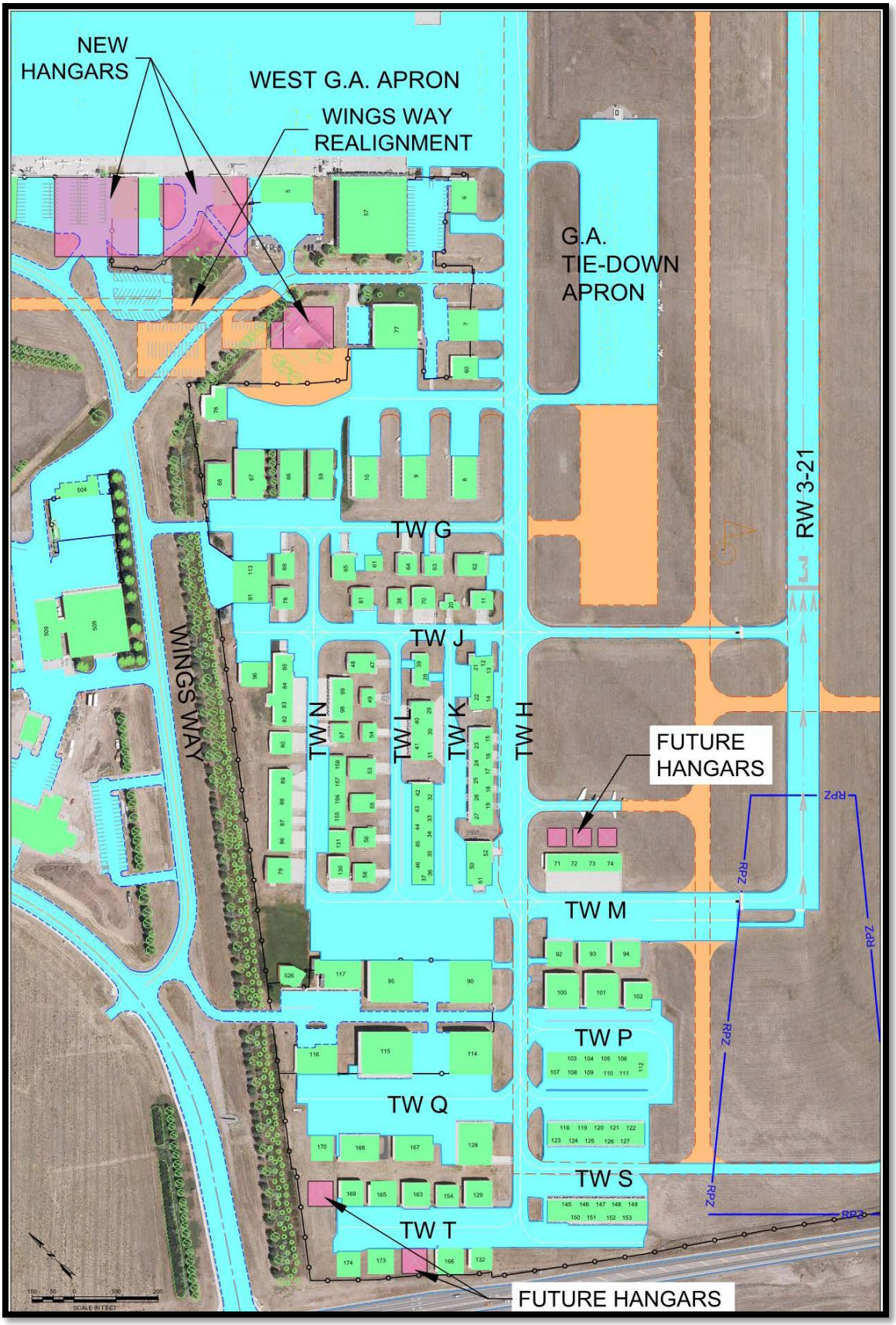

Figure 5-3: Recommended Alternative Historic General Aviation Area

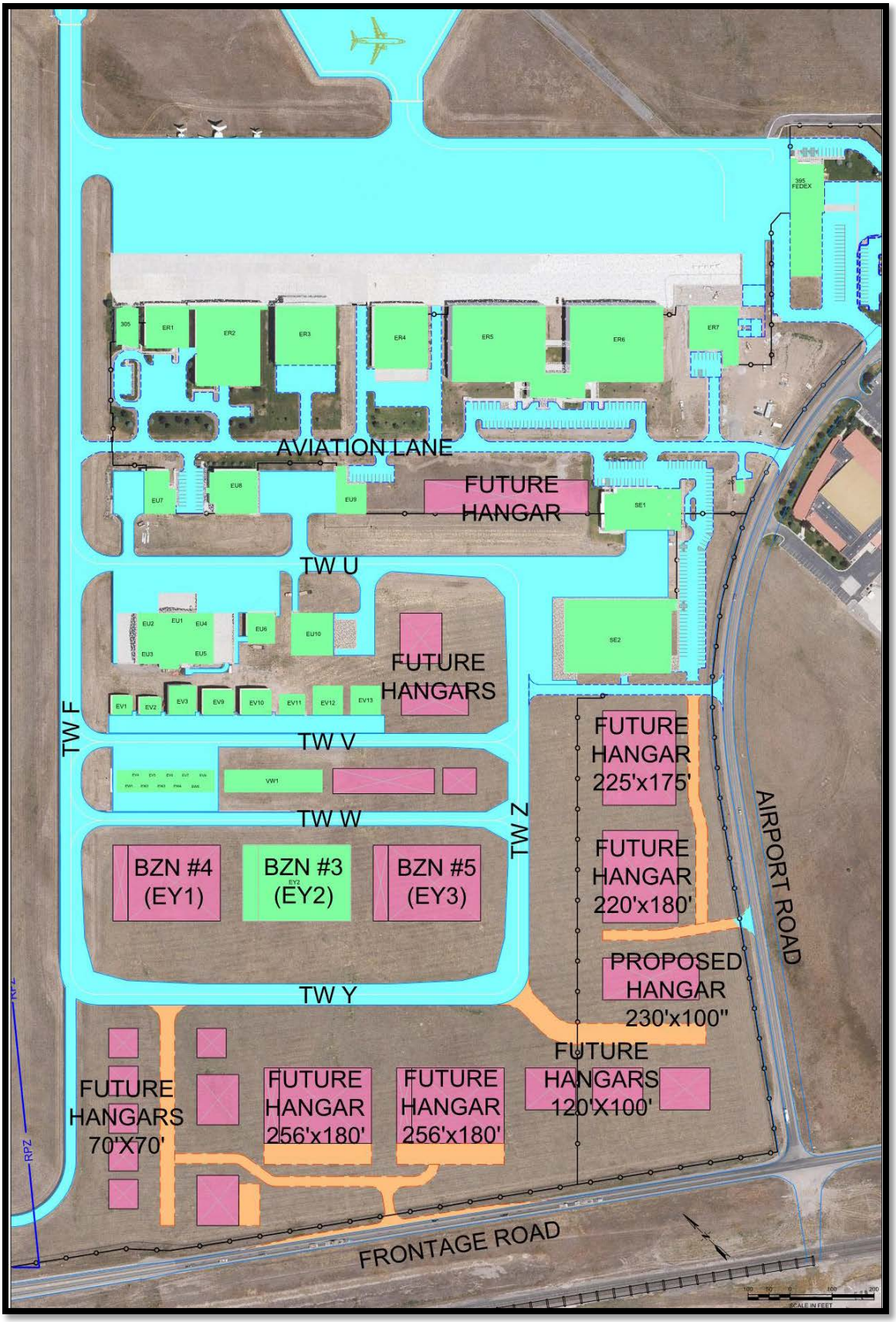

Figure 5-4: Recommended Alternative East Ramp Area

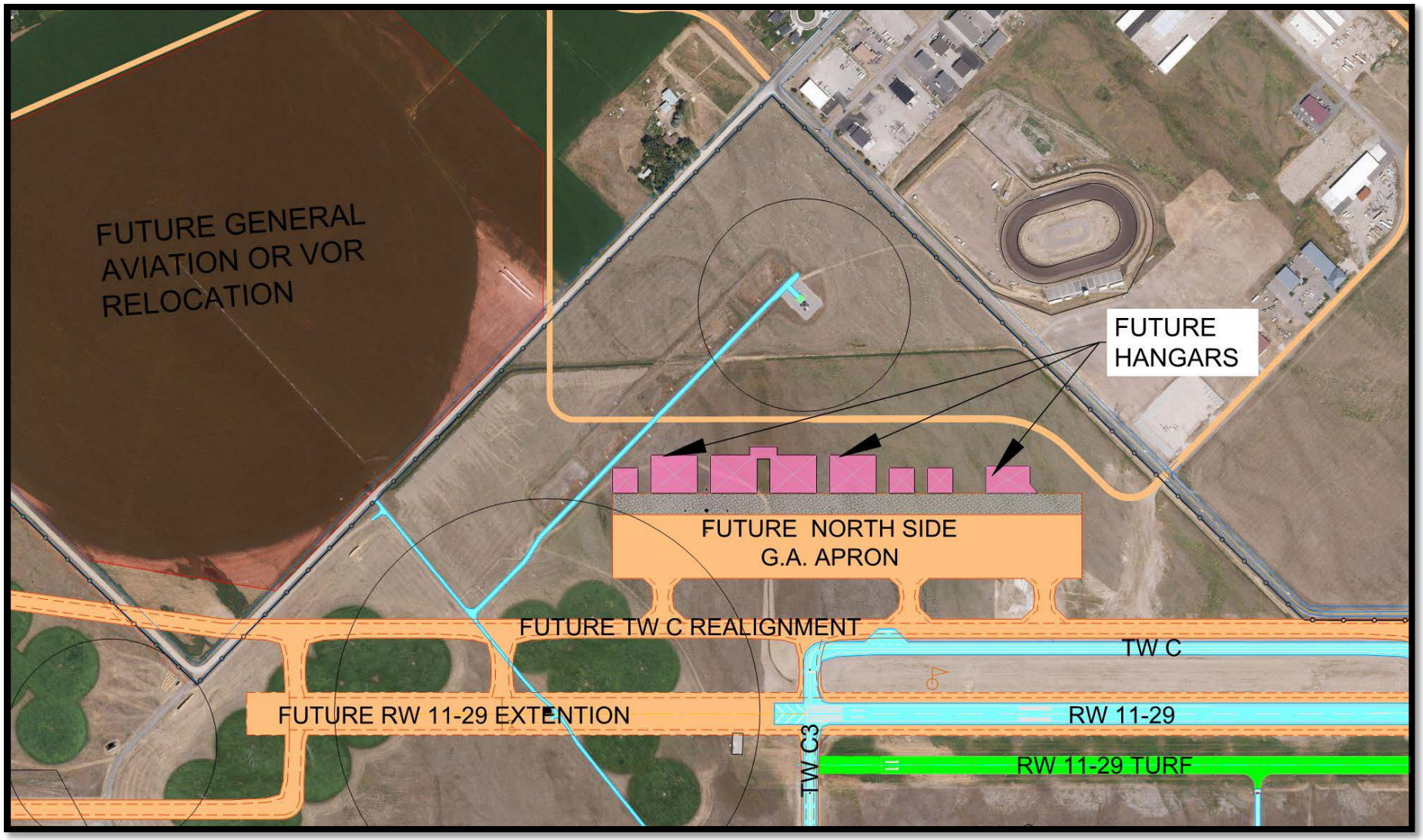

Figure 5-5: Recommended Alternative North General Aviation Area

5.6 Airport Layout Plan

From the recommended master plan concept, the airport's Airport Layout Plan set will be updated to depict the planned improvements to the airfield and terminal area. This set of plans includes:

- Airport Layout Drawing
- Part 77 Airport Airspace Drawings
- Inner Approach Surfaces and Profiles Plans
- Terminal Layout Plan
- General Aviation Area Plans
- Departure Surfaces Plans
- Land Use Plan
- Airport Property Map

The airport layout plan set has been updated on a computer aided drafting system for future ease of use. The computerized plan set provides detailed information on existing and future facility layout on multiple layers that permit the user to focus on any section of the airport at any desired scale. The plan can be used as base information for design and can easily be updated in the future to reflect new development and more detail concerning existing conditions as made available through design surveys. The following is a description of the sheets in the airport layout plan set:

Airport Layout Drawing

The Airport Layout Drawing (ALP) graphically presents the existing and the ultimate airport layout. It depicts the recommended improvements which will enable the airport to meet forecast aviation demand. The ALP also shows areas of land acquisition to meet development standards and other requirements. Detailed airport and runway data are provided on the ALP to facilitate the interpretation of the master planning recommendation.

Part 77 Airport Airspace Drawings

The airspace plan for BZN is based on Federal Aviation Regulations (F.A.R) Part 77 Objects Affecting Navigable Airspace. In order to protect the airspace and approaches to each runway from hazards which would affect the safe and efficient operation of the airport, federal criteria has been established F.A.R. Part 77 for use by local planning and land use jurisdictions to control the height of objects in the vicinity of the airport.

The F.A.R. Part 77 Airspace Plan drawings are also used to indicate obstructions which are located within the imaginary surfaces applicable to BZN. The Part 77 Airspace Plan assigns three-dimensional imaginary areas to the runways. These imaginary surfaces emanate from the runway centerline and are dimensioned to protect approaching and departing aircraft from the potential hazard of obstructions. The Part 77 imaginary surfaces include the primary surface, approach surfaces, transitional surface horizontal surface and conical surface applicable to all airport runways.

Inner Approach Surfaces and Profile Plans

The Runway Protection Zones (RPZ) are depicted on the Inner Approach Surface Drawings. These drawings consist of a large scale plan and profile view of the inner portion of the runway approach surfaces. This plan facilitates identification of obstructions, roadways and buildings that lie within the confines of the critical approach area located off the end of each runway.

Terminal Layout Plan

The Terminal Layout Plan represents the planned development configuration of future landside facilities within the terminal area at BZN. Existing facilities and future

facilities required to meet anticipated demand are shown.

General Aviation Area Plans

The general aviation plans depict the planned development configuration of future general aviation facilities at BZN. Existing facilities and future facilities required to meet anticipated demand for each of the three general aviation development areas are shown.

Departure Surfaces Plans

Departure Surfaces Plans provide a profile representation of the departure surfaces of each runway end. The drawings depict the physical features in the vicinity of each runway end including topographic changes, roadways, drainage ditches and trees.

Land Use Plan

The objective of the Airport Land Use Plan is to coordinate uses of the airport property in a manner which is functional with the design of the airport and compatible with the airport environs. Therefore, both on and off airport land uses are presented on this plan. In addition, noise exposure contours are overlaid to depict compatibility of the airport operations with the airport environs.

On Airport Land Use

Airport land use planning is important for the orderly development and efficient use of available space. There are two primary considerations for on-airport land use planning. These are, first, to secure those areas essential to the safe and efficient operation of the airport; and, second, to determine compatible land uses for the balance of the property which would be most advantageous to the airport and community. The plan depicts the recommendations for ultimate land use development on the airport. When development is proposed it should be directed to the appropriate land use area depicted on this plan. Several on-airport land use categories have been identified including:

- Runway and Taxiway Facilities
- Airport Support
- Air Cargo
- Commercial Aviation
- General Aviation
- Open Space

Off Airport Land Use

The airport land use plan typically depicts surrounding land uses in relation to the airport that are within the 65 DNL noise exposure contour. The BZN land use plan includes land use designations from adjoining jurisdictions in the vicinity of the airport that are beyond the 65 DNL noise contour for reference by airport personnel and government agencies in making land use decisions. Off-airport land use categories identified on the plan include:

- Government Agencies
- Highway Business
- Open Space
- Agriculture Suburban – Belgrade Zoning
- Public Lands & Institutions – Belgrade Zoning (PLI)
- Residential – Belgrade Zoning
- Business Park – Belgrade Zoning (BP)
- Light Manufacturing – Belgrade Zoning (M-1)
- Manufacturing & Industrial – Belgrade Zoning (M-2)
- Commercial – East Gallatin Zoning
- Residential – East Gallatin Zoning
- Density Restricted - Covenants

Airport Property Map

The primary purpose of the Airport Property Map is to provide information on the acquisition and identification of all land tracts for analyzing the current and future aeronautical use of land acquired with federal funds. Existing and future airport features (i.e. runways, taxiways, apron, runway protection zones, hangars, terminal facilities, etc.) are depicted which indicate the aeronautical need for existing and future property limits. The plan indicates how various tracts of land were acquired (i.e. Federal funds, surplus property local funds only, etc.) Also shown on this plan are easement interests in areas outside the fee property line.

Attach ALP Plan Set