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Chapter Three

FACILITY REQUIREMENTS

INTRODUCTION

This chapter identifies recommended facilities necessary to satisfy a 20-year forecast of aviation demand at the Eastern West Virginia Regional Airport (MRB). It further identifies facilities that are needed to adhere to airfield design standards promulgated by the Federal Aviation Administration (FAA) and addresses the Eastern West Virginia Regional Airport Authority's (EWVRAA) goals and objectives for the airport. Recommendations are made based on a 20-year planning period (2016-2036) with three phases: Phase I extends to year five, Phases II encompasses years 6-10, and Phase III encompasses years 11-20.

The Facility Requirements recommendations involve those airfield facilities used by general aviation users, and do not include facilities occupied by the West Virginia Air National Guard (ANG). For purposes of this analysis, MRB's facility needs are discussed based upon their role in serving MRB's airfield or landside facility functions. Airfield facility components include runways, taxiways, navigational aids, aircraft parking areas, airfield marking, signage and lighting, and facilities for special uses such as unmanned aerial systems. Landside facilities include hangars, the terminal building, airport access and automobile parking, fencing and security, and support facilities.

Chapter Three is organized to provide:

- An overview of the criteria utilized to develop general aviation facility requirement recommendations for the planning period;
- An identification of existing non-standard and non-compliant conditions; and
- Recommendations for specific airfield and general aviation terminal area improvements and/or facilities.

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Section 1 - Criteria for Planning

Part 01 | Fundamental Airfield Development

Part 02 | Existing and Future Role of the Airport

Part 03 | Existing Non-Standard Conditions and Non-Compliant Standards

From a planning perspective, airports and associated runways and taxiways are evaluated for critical aircraft, defined by the FAA as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the facility on a regular basis. Under site specific conditions, the weight, wingspan, and performance characteristics of these aircraft ultimately determine the airport's geometry in terms of runway/taxiway configurations, lengths, and separations. The types of approach aids, lighting, and navigational equipment required at an airport are determined primarily by the level of annual activity, weather, terrain characteristics, and the role of the airport within the national system of airports. The planning criteria described above are applied with the forecasted demand presented in Chapter Two to produce the resulting facility recommendations in this chapter.

3.1|Part 01 - Fundamental Airfield Development

FAA Order 5090.3C, Field Formulation of the NPIAS, provides guidelines for fundamental airfield development. Fundamental development is considered to be the basic configuration recommended for an airport in the national system and is affected by the type of activity the airport serves. It includes, but is not limited to, land acquisition, aircraft movement areas, landing and navigation aids, and aircraft parking areas.

MRB is a well developed facility. However, as MRB continues to grow it is important to consider the expansion or addition of fundamental development to support current and future demand. FAA AC 150/5300-13A, *Airport Design,* contains the standards and recommendations required by FAA-funded airports. Development determined to be necessary based upon the analysis contained in this chapter will follow these standards. Fundamental development should be recommended in accordance with the standards and criteria contained in all appropriate Advisory Circulars and Orders.

3.1|Part 02 - Existing and Future Role of the Airport

As introduced in Chapter One, the purpose of this Master Plan is to review and assess terminal area development for general aviation facilities at MRB. MRB is currently classified as a general aviation reliever local airport with an Airport Reference Code (ARC) of C-IV that is largely due to the continuous presence of the Air National Guard and the family of large aircraft operated by the National Guard. This Master Plan proposes the continuation of C-IV designation with the critical aircraft being the C-17 Globemaster III. The airfield components for Runway 8-26 for this planning period are designed to accommodate the following aircraft:

- Approach Category C Aircraft - Approach speeds of 121 knots up to, but not including, 141 knots; and
- Design Group IV Aircraft - Wingspans of 118 feet to less than 171 feet.

In addition to Runway 8-26, the civilian design criteria for Taxiway A will remain C-IV and will not be formally evaluated as part of the Master Plan.

It is sometimes appropriate for separate airside elements to have different critical aircraft determinations based on use and demand. As stated in Chapter Two, **Table 2.13**, operations by turboprop, jet, rotorcraft, and light sport aircraft are forecast to increase during the planning period. Over the 20-year planning period, the airport will continue to accommodate the general aviation fleet of piston, turboprop, and business jet aircraft; therefore, airfield improvements and/or facility enhancements are necessary. The family of aircraft that is meeting the existing general aviation demand at MRB is the small engine twin turboprop. As highlighted in Chapter Two, the Beechcraft Super King Air 200 is the aircraft that operates the most frequently at MRB and is the representative aircraft. The Beechcraft Super King Air 200 is a Category B, Group II aircraft (B-II).

Airfield components for Taxiway E, taxilanes, and the airport's general aviation terminal area facilities south of the runway are recommended to be designed to accommodate the following aircraft:

- Approach Category B Aircraft - Approach speeds of 91 knots up to, but not including, 121 knots; and
- Design Group II Aircraft - Wingspans of 49 feet to less than 79 feet.

Based on Authority preference, selected general aviation facilities have been proposed in dimensions that exceed FAA design standards for B-II facilities. The Authority understands that the FAA may require re-justification of these proposed facilities in the future.

The goals and objectives of the EWVRAA also play a significant role in determining the future facility needs and development opportunities for MRB. Through interviews with airport management and EWVRAA staff, the following specific areas of emphasis were identified for evaluation:

- Apron Pavement Rehabilitation
- Airfield Lighting System Upgrade
- Taxiway Rehabilitation
- Landside Facility Needs (e.g., airport access, perimeter fencing)
- Special Use Needs (e.g., cargo facility, Air National Guard desired military assault strip, Runway 26 Extension)

3.1|Part 03 - Existing Non-Standard and Non-Compliant Conditions

As noted in Chapter One, there are five key non-standard and non-compliant conditions identified in this evaluation that require mitigation. These non-standard and non-compliant conditions include:

1. There are four objects in the Runway Object Free Area (ROFA) that require relocation;
2. There are aircraft (wingtip) obstruction clearances for taxilanes (taxilane object free area (TLOFA)) located in hangar areas and tie-down spaces which do not meet Group I standard (79'). As hangar and apron facilities are updated or replaced, the new facilities should be developed to conform to appropriate FAA design standards;
3. The airport does not control the land within the full RPZ for each runway end. With the absence of a local zoning ordinance, this can result in land uses which conflict with the safe and efficient operation of the airport;
4. Obstructions penetrate the 14 CFR Part 77 surfaces; and
5. There are four, commercial Through-the-Fence (TTF) operations.

Non-Standard and Non-Compliant Conditions at MRB are depicted in **Figure 1.21**. Recommendations to address the conditions are detailed in **Table 3.1**; review and treatment of the four TTF operations at MRB is discussed in more detail in Section 3.7.

Table 3.1- Existing Non-Standard and Non-Compliant Conditions

FAA STANDARD	AREA OF CONCERN	ACTION
ROFA	Novak Drive; perimeter fence; supplemental wind cone for Runway 8 are located within the ROFA (1,000 ft x 600 ft x 800 ft); supplemental wind cone on Runway 26 end is on edge of ROFA	Relocate objects outside of ROFA
Taxilane Object Free Area (TLOFA)	TL's 1, 2, 3, 4, 5, 6, 7, 8 and 9 do not meet Group I TLOFA standards (79 ft)	Demolish and/or relocate T-hangars/Conventional hangars
Runway Protection Zone (RPZ)	End of Runway 8/End of Runway 26	Acquire property interest by fee simple or develop and implement land use control
14 CFR Part 77	Obstructions penetrating the approach surfaces of Runway 8 and Runway 26	Remove/mitigate the existing obstructions and protect the Part 77 surfaces through acquisition of avigation easements
TTF Operations	Air Photographics (Building 22); Former Palencar Hangar; Howard Aircraft Maintenance (Building 23); Eastern Technical Corporation (Groves) (Building 11)	Comply with FAA Order 5190.6B and FAA Modernization and Reform Act of 2012, Section 136

Source: Delta Airport Consultants, Inc. Analysis

Detailed definitions of the standards utilized in this evaluation, their application at MRB, and the nature of non-compliance with FAA standards are provided in the following sub-sections of this chapter and are considered in Chapter Four, Alternatives Analysis.

Image by Delta Airport Consultants, Inc.

Section 2 - Airfield and Airspace Capacity

The ability of an airport to accommodate aviation activity is a function of the number of runways, the runway and taxiway configuration, and the mix of aircraft using the airport. The capacity of any runway is finite with respect to the number of hourly and annual operations it may ultimately accommodate. Capacity is expressed by two principle terms: annual service volume (ASV) and hourly capacities under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR).

These variables are used to provide a quantitative breakdown of the airport's ASV and hourly capabilities (VFR and IFR). The procedures used for this analysis are detailed in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

3.2|Part 01 - Runway Capacity

Runway capacity is defined as a measure of the maximum number of aircraft operations which can be accommodated at that airport on an hourly and/or annual basis without compromising the safety of aircraft operations. This estimate accounts for differences in runway use, aircraft mix, and weather that may be encountered over the span of a typical year. A runway's ability to accommodate aircraft is largely determined by an aircraft's speed and weight. General aviation aircraft, which are lighter, typically have lower approach-to-landing speeds than commercial aircraft (passenger jets) which equates to a lower runway occupancy time. Conversely, larger and heavier aircraft typically operate at higher approach-to-landing speeds which require more deceleration time. This increased deceleration time results in a longer runway occupancy time which decreases runway capacity.

EXISTING RUNWAY CAPACITY ANALYSIS

Both VFR and IFR hourly runway capacities and the ASV were calculated for the existing, single runway system configuration at MRB. These resources support development of a reasonable estimate of the airport's hourly and annual runway

capacity. The estimates are then compared to the activity forecast for the planning period to determine if the capacity of the runway is sufficient.

For long-term planning purposes, the FAA estimates that for a single runway with 20% of aircraft operations being conducted by aircraft over 300,000 pounds the ASV is 210,000, and hourly capacity is estimated; therefore, hourly capacity is estimated to be 55 operations during VFR conditions and 53 operations during IFR conditions. Although these estimates assume optimal conditions (air traffic control, etc.), they provide a reasonable basis for approximating existing and future capacity at MRB. **Table 3.2** presents a comparison of existing demand versus existing capacity. As indicated, MRB is currently operating at 13 percent of its total ASV.

Table 3.2- Existing (2016) Demand Versus Existing Capacity

TOTAL OPERATIONS	ANNUAL SERVICE VOLUME	TOTAL OPERATING CAPACITY
26,135	210,000	13%

Source: Delta Airport Consultants, Inc. Analysis

FUTURE RUNWAY CAPACITY ANALYSIS

The future runway capacity was calculated using the same procedure as previously described using the forecasted operations determined in Chapter Two. As presented in **Table 3.3**, forecasted demand versus future runway capacity is expected to increase to 16 percent of the ASV during the planning period.

Industry and FAA guidelines recommend that runway capacity improvements be considered when actual operations reach 60 percent of the theoretical ASV. ***When annual aircraft operations reach 126,000 at MRB, a more detailed analysis should be performed to more accurately assess runway capacity, including the potential need for a parallel or crosswind runway. This level of operations is not anticipated during the current 20-year planning period. Any consideration of crosswind or parallel runway development to increase capacity is considered conceptual and would be depicted as "ultimate" development on the ALP.***

Table 3.3- Future (2036) Demand Versus Existing Capacity

TOTAL OPERATIONS	ANNUAL SERVICE VOLUME	TOTAL OPERATING CAPACITY
33,177	210,000	16%

Source: Delta Airport Consultants, Inc. Analysis

3.2|Part 02 - Taxiway Capacity

The location of the exit taxiways can also affect the overall capacity of an airport and contribute to the efficiency of aircraft circulation. Exit taxiway locations depend a great deal on the mix of aircraft, approach and touchdown speeds, point of touchdown, exit speed, rate of deceleration, condition of the pavement surface (i.e., wet or dry), and the number of exits. General design practices recommend placing exit taxiways at intervals of 1,500 feet to 2,000 feet for airports that handle a wide variety of aircraft.

FAA AC 150/5300-13A states that when design peak hour traffic is less than 30 operations, properly located right-angled exit taxiways achieve an efficient flow of traffic. It also recommends bypass taxiways be considered to provide flexibility in runway use. The use of holding bays instead of bypass taxiways can enhance capacity when runway operations exceed 30 per hour.

The level of operations at MRB is not anticipated to exceed 30 operations per hour during the 20-year planning period; therefore, sufficient taxiway capacity exists to accommodate anticipated growth during this period.

3.2|Part 03 - Airspace Capacity

As detailed in Chapter One, Class D and E airspace surrounds MRB. This airspace is a controlled area which includes airspace corridors identified as federal airways or which accommodate jet traffic at low altitudes. During the data collection effort of this Master Plan study, discussions with the Air Traffic Control Tower (ATCT), and review of the instrument approach procedures for each end of the runway, identified no airspace capacity deficiencies

Image by Delta Airport Consultants, Inc.

Section 3 - Airside Facility Requirements

Airside facility requirements are based upon, and are related to, the current and future critical design aircraft. As discussed previously, the critical aircraft determines the airport reference code (ARC) from which the airside geometrics are evaluated.

3.3|Part 01 - Runway Analysis

This section evaluates MRB's runway and its associated orientation, length, width, safety areas, object free area, visual zone, and pavement condition based on the existing and future aircraft expected to use the facility. The recommendations are based on FAA advisory circulars, specific manufacturers' aircraft performance data, and runway use limitations placed on operations such as 14 CFR Part 91K and Part 135.

RUNWAY ORIENTATION

Surface wind conditions affect both the orientation and functionality of MRB's runway system. When a runway is not aligned to take advantage of prevailing winds at an airport, its capacity to operate in all weather conditions is impacted. During landing and taking off, aircraft can operate on a runway properly and safely if the wind velocity perpendicular to the direction of flight (crosswind) is not excessive. The determination of the appropriate crosswind component, which is achieved through an analysis of crosswind velocity data and direction for an airport, is presented in a windrose diagram. The windrose for MRB is depicted on the Airport Layout Plan (ALP) drawing (also see **Figures 1.9 and 1.10**) and the analysis of wind coverage at MRB is discussed in Chapter One. FAA design standards stipulate

that the maximum crosswind component for C-IV runways (Runway 8-26) be a maximum of 20 knots, while runways used solely by small aircraft be a maximum of 10.5 knots.

As discussed in Chapter One, ***Runway 8-26 provides sufficient wind coverage at MRB during all-weather and IFR conditions; it is recommended that Runway 8-26 be maintained throughout the planning period.***

RUNWAY MAGNETIC DECLINATION

Based upon an analysis of the MRB runway designations contained in Chapter One, Section Three, ***Runway 8-26 will not require a designation change during the planning period.***

RUNWAY LENGTH ANALYSIS

The determination of runway length and width required for an airport is based on standards presented in FAA AC 150/5300-13A and 150/5325-4B, *Runway Length Requirements for Airport Design*. The recommended length of a runway is determined by the family of airplanes having similar performance characteristics requiring the greatest runway length, among other factors. FAA AC 150/5300-13A notes that the runway should be long enough to accommodate arrival and departure requirements for the design aircraft. All aircraft operational considerations, to include the takeoff, landing, accelerate stop distances, and obstacle clearance should be considered when determining runway length. Additional factors considered include the design aircraft approach speed, its maximum certificated take-off weight (MTOW), useful load and length of haul, the airport's field elevation above sea level, the mean daily maximum temperature at the airfield, and runway surface conditions, such as wet and slippery.

FAA RUNWAY LENGTH MODELS

For the purposes of this Master Plan, the ARC designation for Runway 8-26 remains as C-IV due to the presence of larger, military aircraft which operate at MRB, represented by the C-17 Globemaster III. **The existing runway length of 8,815 feet can safely accommodate the general aviation aircraft that are presently utilizing and are forecasted to continue utilizing the runway.** The following section depicts what the runway length of MRB would be if the military critical aircraft ceased operations at MRB, and the ARC designation for Runway 8-26 became B-II for the general aviation aircraft.

As noted previously, the general aviation critical aircraft for MRB is represented by the Beechcraft Super King Air 200, which has a MTOW of 12,500-pounds and is therefore classified as a "small" aircraft by FAA guidance. The mean daily maximum temperature (86°F at MRB) and the airfield elevation (565 MSL) are applied to Figure 2.1 from FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, to determine a runway length requirement of approximately 4,200 feet (see **Figure 3.1**).

The Authority has expressed its preference for runway extension to 11,500 feet. As this length is not currently justified, it is depicted on the ALP in the Ultimate (beyond 20 years) Phase.

Representative Airplanes	Runway Length Curves
Raytheon B80 Queen Air **Raytheon** E90 King Air **Raytheon** B99 Airliner **Raytheon** A100 King Air (Raytheon formerly Beech Aircraft) **Britten-Norman** Mark III-I Trilander **Mitsubishi** MU-2L **Swearigen** Merlin III-A **Swearigen** Merlin IV-A **Swearigen** Metro II MRB FAA	**Example:** Temperature (mean day max hot month) 90° F (32° C) Airport Elevation (msl) 1,000 feet (328 m) Recommended Runway Length 4,400 feet (1,341 m) **Note:** For airport elevations above 3,000 feet (915 m), use the 100 percent of fleet grouping in figure 2-1.

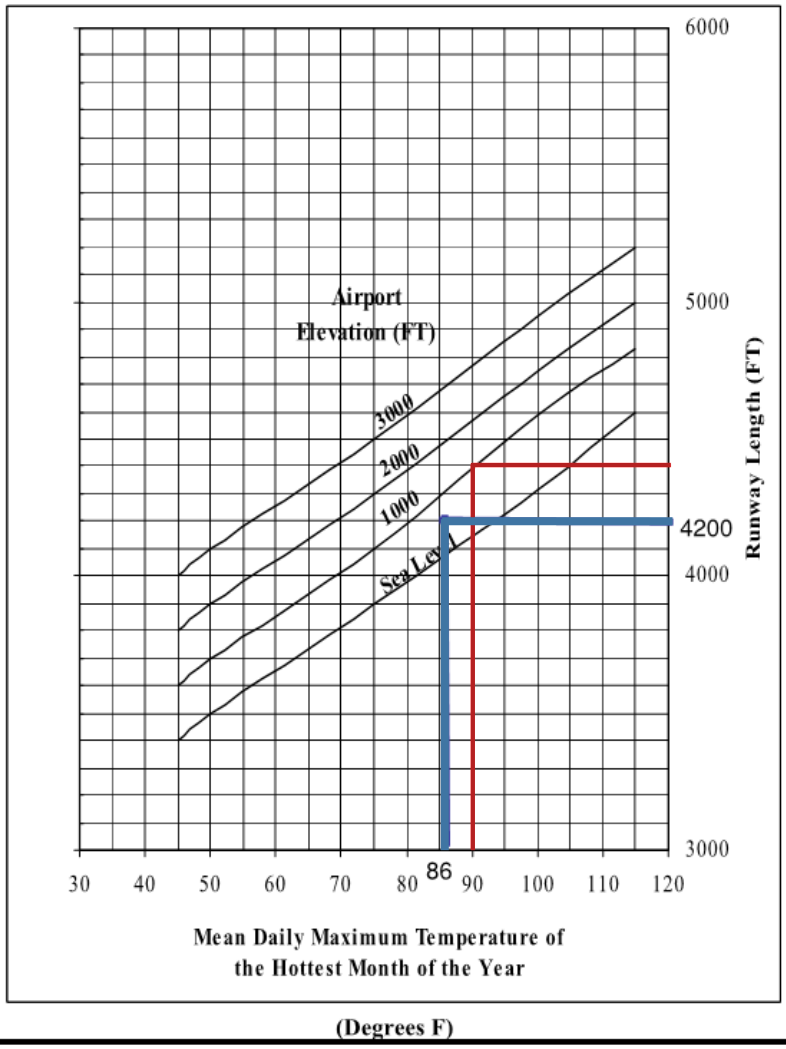

Figure 3.1- Runway Length Requirement
Source: FAA AC 150/5325-4B

RUNWAY WIDTH AND RUNWAY-TAXIWAY SEPARATION

Runway width is specified within FAA AC 150/5300-13A based on the Runway Design Code (RDC). RDC is a combination of the Aircraft Approach Category (AAC), Airplane Design Group (ADG), and approach visibility minimums. Because they are used primarily by military aircraft, Runway 8-26 and Taxiway A are assessed using C-IV design criteria, while airport facilities south of the runway (including Taxiway E, taxilanes and the general aviation terminal facility) are reviewed using B-II design criteria. The design standard width for a C-IV runway is 150 feet for all specified visibility minimums. ***The existing runway width of 150 feet meets FAA standards for a C-IV runway and should be maintained throughout the planning period.***

Taxiway A is a partial parallel taxiway along the north side of Runway 8-26 and is used primarily by military aircraft. The separation distance between the runway centerline and the centerline of Taxiway A ranges from 600 to 800 feet, which exceeds the FAA design standard separation (400 feet) for C-IV facilities with visibility minimums lower than 3/4 mile.

Taxiway E is a partial parallel taxiway along the south side of Runway 8-26 and is used primarily by general aviation aircraft, with a runway centerline-to-taxiway centerline separation distance of 420 feet; this exceeds the 400 foot separation standard for a C-IV runway.

The runway separation standard for parallel taxiways on a B-II runway is 300 feet. The standards for the C-IV runway exceed B-II standards.

The existing runway-taxiway separations exceed FAA design standards for both C-IV and B-II facilities.

RUNWAY SAFETY AREA (RSA)

The FAA defines an RSA as "*a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.*" RSAs are most commonly used by aircraft that inadvertently leave (or miss) the runway during landing or takeoff.

Pursuant to the FAA design standards, a runway safety area shall be:

- Cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;
- Drained by grading or storm sewers to prevent water accumulation;
- Capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

- Free of objects, except for objects that need to be located in the runway safety area because of their function.

The existing RSA at MRB is 500 feet wide and extends 1,000 feet beyond each runway end which meets FAA design standards for a C-IV facility (see **Figure 3.2**). ***The RSA should be maintained and kept clear of obstructions through the planning period.***

RUNWAY OBJECT FREE AREA (ROFA)

The ROFA is defined by FAA as a two-dimensional surface centered on the runway centerline. It is provided to enhance the safety of aircraft operations by having the area free of objects except for those that need to be located within the ROFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft. The FAA ROFA clearing standard requires the clearing of all non-navigation objects protruding above ground level.

Per FAA design standards for C-IV facilities with approach minimums lower than 3/4 mile, the ROFA for Runway 8-26 is 800 feet wide and extends 1,000 feet beyond the runway ends (see **Figure 3.2**). The ROFA at MRB meets this design standard.

The ROFA for Runway 8-26 is presently not clear of objects; reference **Table 3.1**.

It is recommended that these objects be relocated outside of the ROFA during the planning period, and that the ROFA be kept clear of future obstructions which are not fixed by function, throughout the planning period.

RUNWAY OBSTACLE FREE ZONE (OFZ)

Figure 3.2 also illustrates the runway obstacle free zone (OFZ), which is the volume of airspace centered above the runway centerline and is required to be clear of all objects except for frangible NAVAIDs. The elevation of the OFZ at any point is the same as the elevation of the nearest point on the runway centerline. The OFZ at MRB is 400 feet wide and extends 200 feet beyond each runway end. The OFZ is subdivided as follows:

- The Inner-Approach OFZ represents the volume of airspace centered on the approach area and applies only to runways with an approach lighting system (ALS). Consequently, this only applies to Runway 26 at MRB. The zone of airspace begins 200 feet from the runway threshold at the same elevation as the runway threshold and extends 200 feet beyond the last light unit in the ALS. Its width is the same as the runway OFZ (400 feet); and
- The Inner-Transitional OFZ represents the volume of airspace along the sides of the runway OFZ and the Inner-Approach OFZ, and applies only to

runways with approach visibility minimums lower than ¾ statute miles. Consequently, this only applies to Runway 26. This airspace begins at the edges of the ROFA and Inner Approach OFZ, then rises vertically to a height defined by the critical aircraft dimensions, then rises at a slope of 6:1 to a height 150 feet above the established airport elevation. **The Inner-Transitional OFZ is not clear of obstacles.**

Based on the above analysis, the OFZ for MRB does not comply with the FAA standards as obstructions penetrate the OFZ. It is recommended that these areas be maintained and kept clear of all obstructions throughout the planning period.

RSA, ROFA, AND RUNWAY OFZ

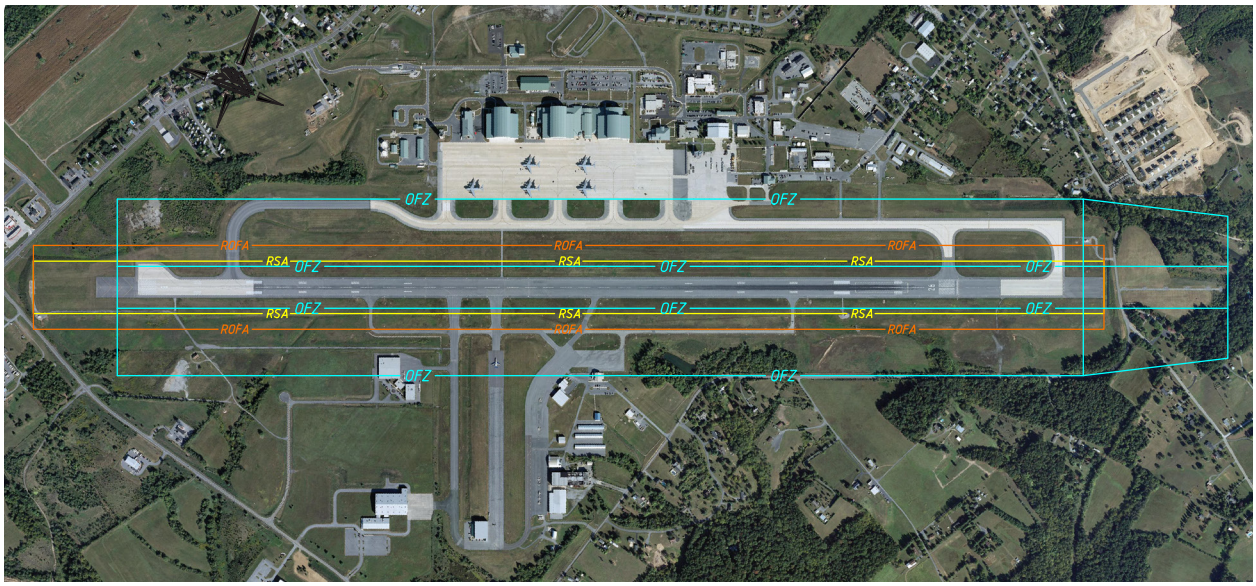

Figure 3.2- RSA, ROFA, and Runway OFZ
Source: Delta Airport Consultants, Inc.

RUNWAY PROTECTION ZONES (RPZs)

Runway protection zones (RPZs) are trapezoidal in shape, centered on the extended runway centerline, and typically begin 200-feet beyond the end of the area usable for take-off and landing. The function of a RPZ is to enhance the protection of people and property on the ground, which is ideally achieved through airport owner control over these land areas. Such control includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. The FAA prefers the airport owner to control the defined RPZ area in fee simple and discourages the presence of public roads within RPZs. The RPZs are illustrated in **Figure 3.3.**

The airport does not currently own all of the land within the existing RPZs. Approximately 15 ± acres within the Runway 26 Approach RPZ and approximately 2 ± acres in the Runway 26 Departure RPZ are not controlled by EWVRAA via fee simple. The Airport's Property Map, prepared in 2014, notes that there is approximately 3.39 ± acres within the Runway 26 RPZ that may be controlled by the airport with an avigation easement; however the instrument is noted as "out for conveyance". There are several residences within the RPZ to Runway 26, as well as the intersection of Airport Road and Paynes Ford Road. The FAA discourages roads within RPZs because they present a public safety issue.

The existing Runway 8 RPZ is also not entirely controlled by the airport. Approximately 24 ± acres of the Runway 8 RPZ are located outside of the airport property boundary line. This acreage is not controlled by the EWVRAA via fee simple or by an avigation easement. Located within the Runway 8 RPZ is the existing intersection of Business Park Drive/Novak Drive and U.S. Route 11/Winchester Avenue. The existing Berkeley County right-of-way and West Virginia Department of Transportation right-of-way do not immediately present an incompatible land use. However, if the existing rights-of-way located within both the Runway 8 and Runway 26 RPZ are vacated for future development, consideration of potential incompatible land uses may warrant the EWVRAA to acquire the property interest via fee simple.

It is recommended that the EWVRAA acquire the appropriate property interest within the existing RPZs in Phase I, to prevent incompatible land uses from encroaching on airport operations.

RUNWAY PROTECTION ZONES (RPZS)

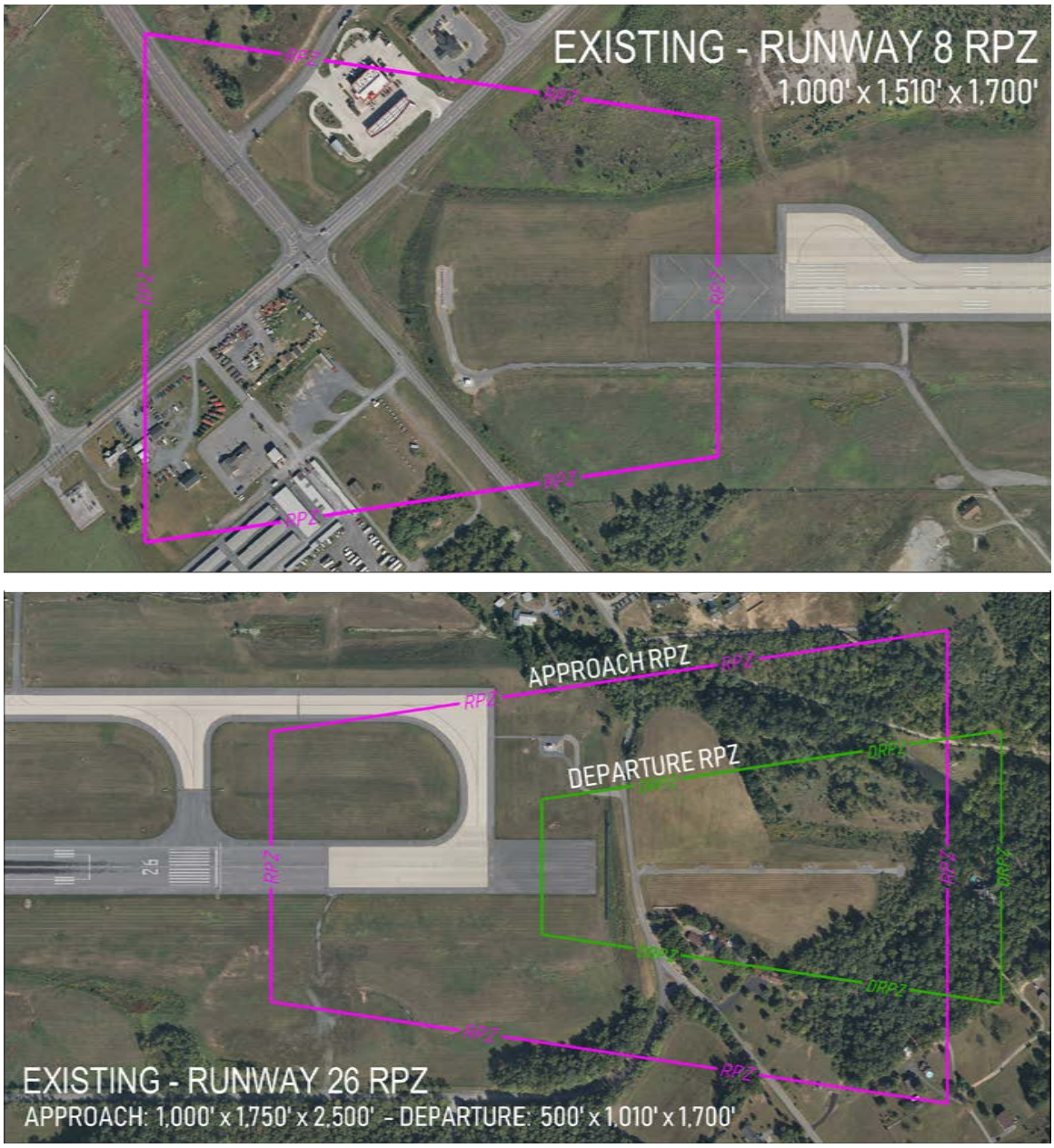

Figure 3.3- Runway Protection Zones (RPZs)
Source: Delta Airport Consultants, Inc.

3.3|Part 02 - Pavement Strength and Condition

The airfield pavement at MRB is required to be maintained in accordance with FAA grant assurances. **Table 1.6** in Chapter One provides a summary of the pavement conditions at MRB.

Pavement conditions for Runway 8-26 and Taxiway A were formally assessed by the Air Force Civil Engineer Center in 2015; both were rated as in "Good" condition using the PCI scale, which ranges from 0 to 100, where a PCI of 100 represents a pavement with no distress. ***It is recommended that Runway 8-26 and Taxiway A continue to be monitored, evaluated, and preserved using regular maintenance practices throughout the planning period.***

As part of this Master Plan Update a Pavement Conditional Index (PCI) Analysis was conducted on pavements within the terminal apron and Taxiways B, C, and D (see **Appendix C)**. Pavements not formally evaluated include the general aviation apron (transient and based); Taxiway B (south of the terminus of terminal apron to general aviation apron); and Taxiway E (includes connector Taxiways E1-E4).

The pavements evaluated were rated either in "Good" or "Satisfactory" condition, with the exception of a portion of Taxiway C, which is in "Poor" condition (see **Figure 3.4**). Overall, the pavement sections were given a "Satisfactory" rating (PCI of 76). The overall weighted rating for the pavements is anticipated to drop to "Fair" (PCI of 69) by 2021 (see **Figure 3.5**).

In general, pavements with a PCI rating above 65 that are not exhibiting significant load-related distress will benefit from preventative maintenance actions, such as crack sealing. Pavements with a PCI of between 40 and 65 are generally candidates for rehabilitation activities such as an overlay. Pavements with PCI of under 50 should be reconstructed.

It is recommended that the section of Taxiway C in "Poor" condition be rehabilitated in the short term (Phase I). The sections of Taxiways B and D which are projected to deteriorate to a "Fair" condition by 2021 should be rehabilitated in the long-term (Phase III).

It is recommended that the EWVRAA engage in a comprehensive pavement review and analysis of all of the pavement surfaces at MRB during the planning period (see Figure 3.6). This will allow the airport to develop a comprehensive pavement management plan and allow the airport to fiscally plan for current and future pavement maintenance needs. A segment of Taxiway C (see Figure 3.6) is in need of major rehabilitation and it is recommended that the rehabilitation be completed during the planning period as Airport Management intends for this area to serve as an apron for future hangars.

PAVEMENT CONDITION INDEX (PCI)

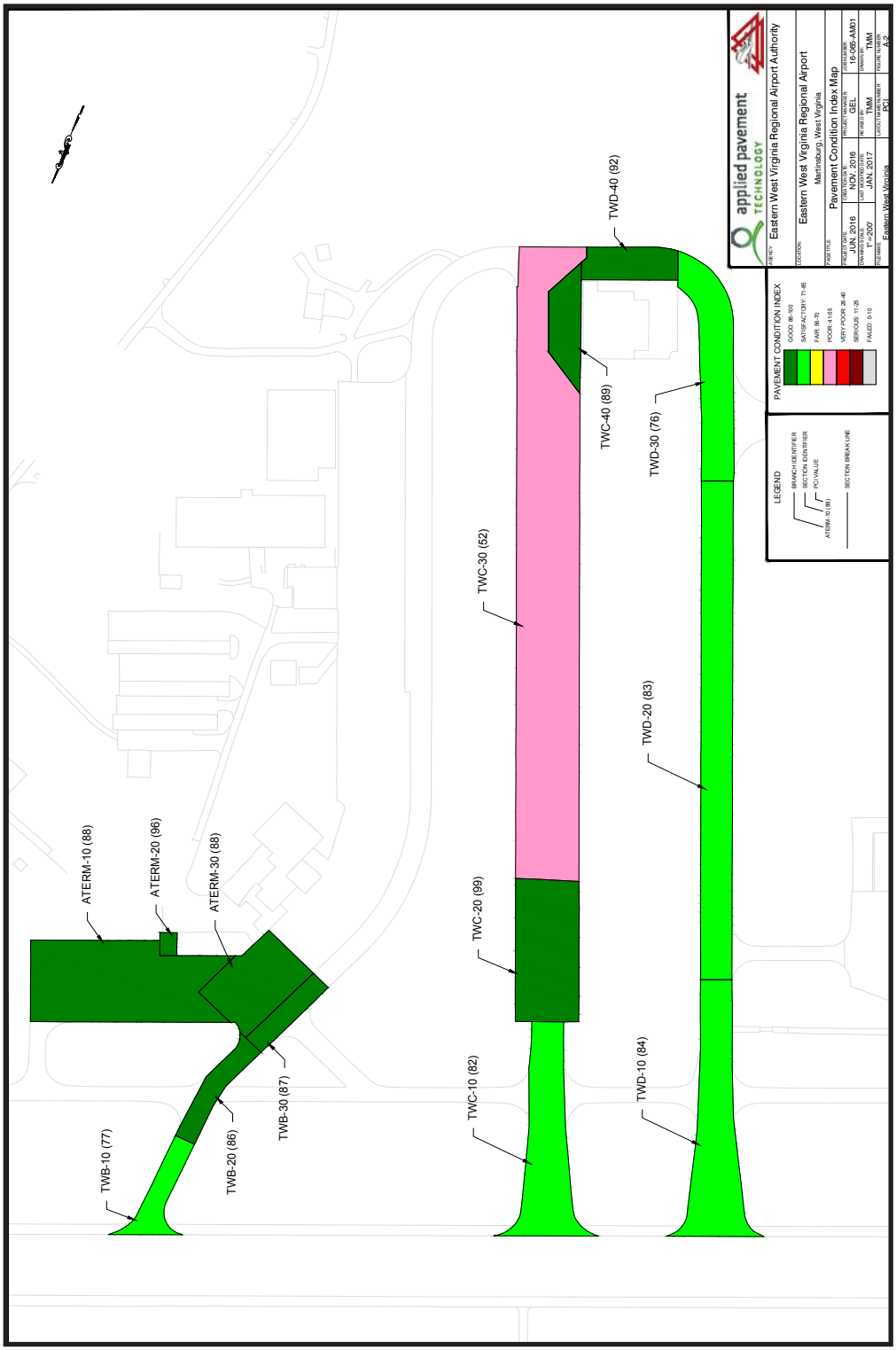

Figure 3.4- Pavement Condition Index (PCI)
Source: Applied Pavement Technology, Delta Airport Consultants, Inc.

PROJECTED 2021 PAVEMENT CONDITION INDEX

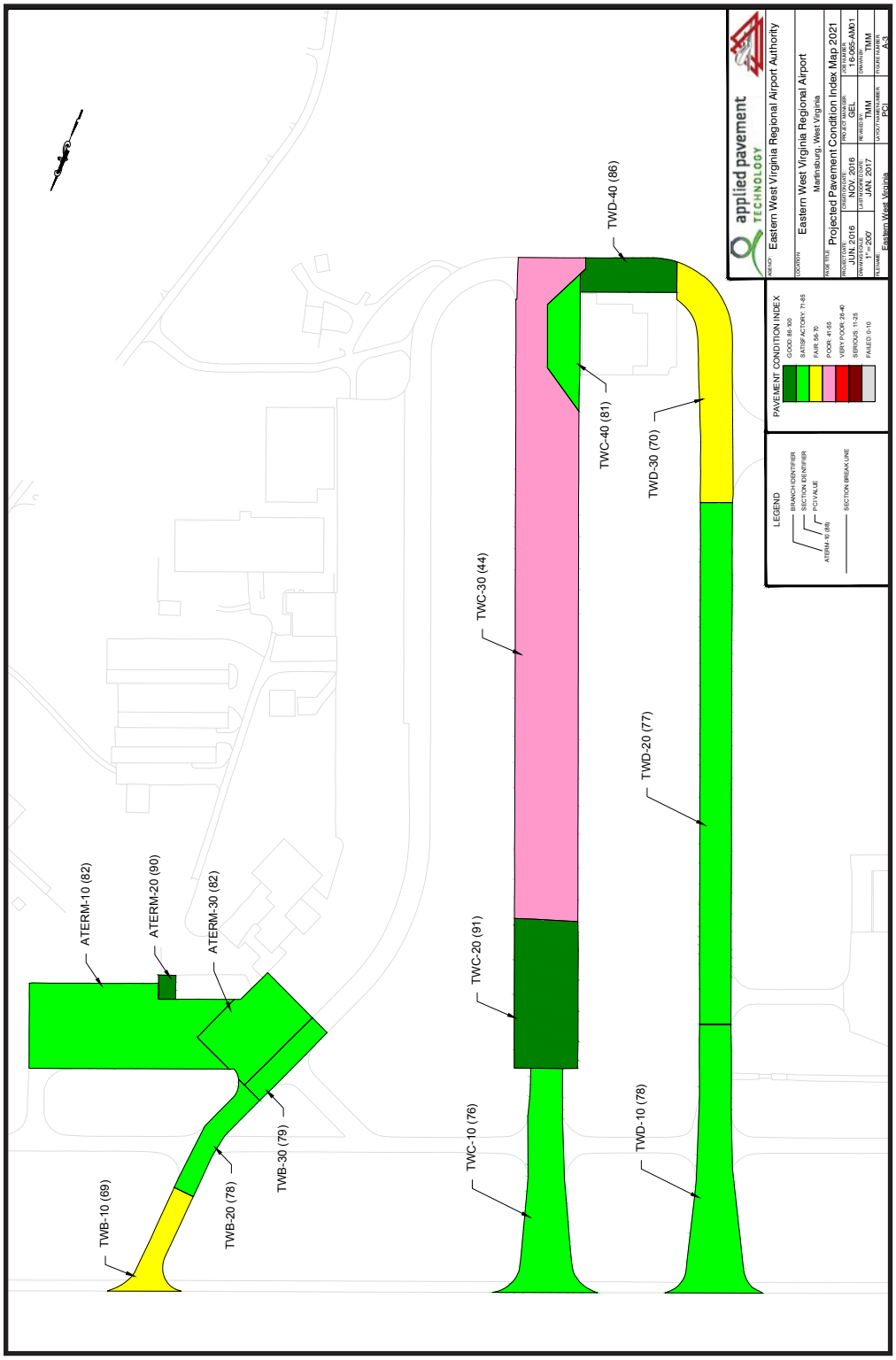

Figure 3.5- Projected 2021 Pavement Condition Index
Source: Applied Pavement Technology, Delta Airport Consultants, Inc.

PAVEMENT TO BE EVALUATED

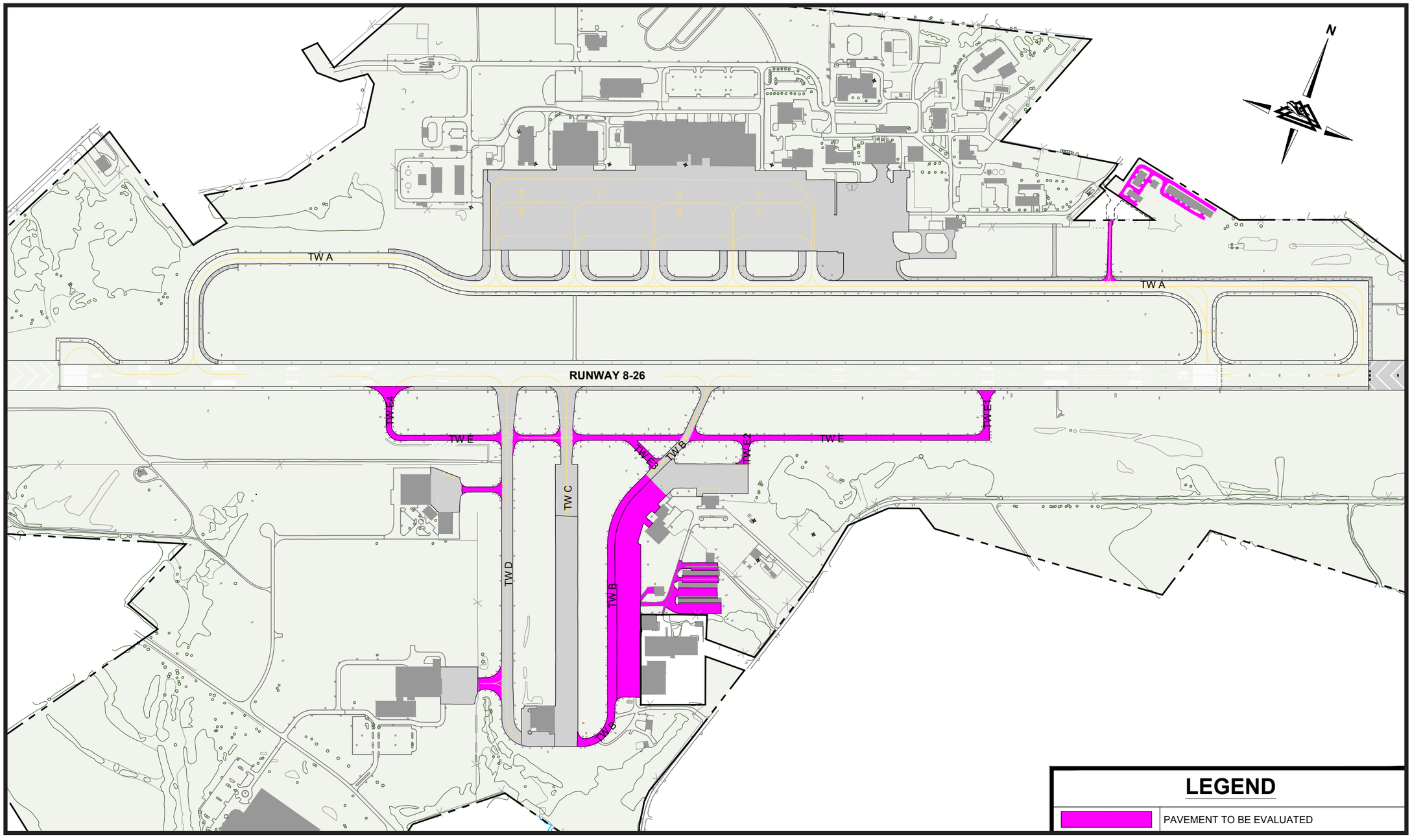

Figure 3.6- Pavement to be Evaluated
Source: Applied Pavement Technology, Delta Airport Consultants, Inc.

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3.3|Part 03 - Taxiway and Taxilane Analysis

FAA AC 150/5300-13A presents design standards for taxiway and taxilane development. A taxiway is defined as a path established for the taxiing of aircraft from one part of the airport to another. A taxilane is defined as the portion of the aircraft parking area used for the access between taxiways and aircraft parking positions.

Additions or improvements to an airport taxiway system are typically undertaken to increase airport capacity, enhance operational efficiency, or improve safety. An efficient taxiway system will increase an airport's ability to handle arriving and departing aircraft, as well as expedite ground movements between the runway and terminal areas.

TAXIWAYS

The existing MRB taxiway system is depicted in **Figure 3.7** and consists of two partial parallel taxiways (A and E), and three connector taxiways (B, C, and D).

The current edition of FAA AC 150/5300-13A bases taxiway design on Taxiway Design Groups (TDG). The TDG takes into account the overall Main Gear Width (MGW) and Cockpit to Main Gear Distance (CMG) of the airplane. Taxiways are designed for "cockpit over centerline" taxiing with pavement being sufficiently wide to allow a certain amount of deviation from the centerline markings. The critical design aircract for general aviation facilities at MRB, the Beechcraft Super King Air 200, is a TDG 2 aircraft, which corresponds to a 35 foot wide taxiway.

Taxiway A was designed to accommodate the critical aircraft based with the ANG, the C-17 Globemaster III (a C-IV aircraft). However, it is sometimes used by general aviation aircraft accessing facilities east of the ANG. Its width of 75 feet exceeds the required width of 35 feet for TDG 2 aircraft (representative of general aviation activity).

General aviation aircraft regularly use Taxiways B, C, and D and the partial parallel Taxiway E.

Taxiway B is 50 feet wide and provides access for general aviation aircraft to both the terminal apron and the general aviation aprons. The segment of Taxiway B south of the general aviation apron (transient) is closed to prevent conflicts between aircraft and ground vehicles. The taxiway and its associated apron and tie-down space is proposed to continue to serve general aviation aircraft. The current width of Taxiway B, 50 feet, exceeds FAA design standards for TDG 2 aircraft. The Authority has stated its intent to accommodate B-II aircraft on Taxiway B. ***It is recommended***

that the taxiway be remarked to narrow its width to 35 feet to meet FAA design standards; alternatively, the Authority may opt to retain the existing taxiway dimensions with the understanding that future maintenance or rehabilitation projects on Taxiway B may require justification if AIP funding is requested.

Taxiway C has been repurposed from a previous runway, Runway 17-35, which no longer exists; as a result, its width (which ranges from 75 to 150 feet) is significantly more than typical taxiways designed to FAA standards. Taxiway C provides direct access to the Arcadia Aviation Hangar, located at the southern end of the taxiway. Airport Management reports that this privately-owned hangar has been used in the past to serve aircraft as large as the Bombardier Global Express Jet. The facility was designed and built with the primary intention of serving large business jet aircraft, which should therefore be accommodated along the length of Taxiway C. The Global Express is a B-III aircraft with a TDG of 2, which corresponds to a 35-foot-wide taxiway. The Airport Authority has expressed its intent to maintain the full pavement width to also accommodate parking by larger aircraft which use the taxiway.

Taxiway D provides access to the FBO, Aerosmith, and its facilities as well as to one conventional hangar. The taxiway is 75 feet wide, which exceeds TDG 2 standards. Aircraft Management reports that Taxiway D is anticipated to be used by aircraft such as the Boeing 767, which is a C-IV aircraft with a TDG of V. This TDG corresponds to a 75-foot-wide taxiway. The Airport Authority has expressed its intent to maintain the full width of this taxiway to serve the larger aircraft anticipated to use this taxiway during the planning period.

Parallel Taxiway E is 35 feet wide and serves the general aviation aircraft which use the runway. The Airport Authority has expressed its intent to widen this taxiway to 50 feet in Phase II, which exceeds the 35-foot width suitable for TDG 2 aircraft.

In summary, Taxiways B, C, D and E at MRB meet or exceed FAA design standards for TDG 2 aircraft, which is the design standard to serve the critical design aircraft for general aviation operations. In some cases, to serve specific aircraft types which use, or which are anticipated to use, certain taxiways, the Authority has expressed its intent to develop or maintain facilities which exceed TDG 2 design standards. The Authority understands that additional justification for these facilities may be required in the future, should AIP funding be requested.

As noted in Section One, FAA Order 5030.3C lists the basic configuration for an airport in the national system, including a full parallel taxiway. Full length parallel taxiways are also required when an airport has instrument approach procedures with visibility minimums below one mile. MRB presently has instrument approach procedures with visibility minimums below one mile. FAA AC 150/5300-13A states that each runway end must be served by an entrance taxiway, which also serves as the final exit taxiway for operations in the opposite direction. ***It is recommended that Taxiways A and E be extended to become full parallel taxiways during the planning period.***

In order to reduce runway incursions, FAA AC 150/5300-13A does not recommend direct, straight line access from runways to aircraft aprons and encourages airport operators to locate taxiways in such a manner as to preclude this type of access. Taxiway B is an angled Runway 8-26 exit that crosses Taxiway E and has direct access to the terminal apron. Taxiway C also provides direct access to Runway 8-26 from the aircraft parking apron (former Runway 17-35). Taxiway C also intersects with Taxiway E. According to the Airport, the existing width of Taxiway C (75 feet) allows large and heavy aircraft (for example, the Boeing 757 and 767 and the C-17 Globemaster, Lockheed C-5 Galaxy, or larger) to access the terminal area and park on the pavement that was formerly Runway 17-35. ***It is recommended that the segment of Taxiway C and Taxiway D between Runway 8-26 and Taxiway E be removed to facilitate compliance with FAA AC 150/5300-13A. To accommodate large and heavy aircraft access from Runway 8-26 to the apron (former Runway 17-35), it is the Authority's preference that Taxiway E be widened to 50 feet during the planning period, with the understanding that the FAA may require rejustification in the future. The ALP depicts the construction of full, parallel Taxiway E in Phase I, to occur before the connector taxiways C and D are removed in Phase III. It is also recommended that the segment of Taxiway B between Runway 8-26 and Taxiway E3 be closed to prohibit aircraft from having direct access to the terminal apron areas during the planning period.***

There is an unnamed taxiway connector from Taxiway A to the EWVRAA Box/T-hangar apron located on the north side of the airfield and east of the Air National Guard Facility. This existing taxiway connector is 25-feet wide. A review of the airport data indicates that this area of the airport serves primarily small aircraft (A-I), which are aircraft with a wingspan of less than 49 feet. ***If it is the airport's intent to restrict this area to small aircraft (A-I), then it is recommended that airfield guidance signs be installed that instruct pilots that aircraft with a wingspan of 49 feet or greater are prohibited and apply the appropriate markings to the taxiway. If this option is pursued, then the existing taxiway connector complies with minimum taxiway width for ADG I/TDG 1.***

If it is the airport's intent to allow aircraft in this area that have a wingspan greater than 49 feet, then the existing taxiway connector may be required to be reconstructed to meet B-II design standards.

TAXIWAY OBJECT FREE AREA (TOFA)

Similar to a runway, taxiways also have object free areas. The TOFA clearing standards prohibit service vehicle roads, parked airplanes, and above ground objects, except for objects that need to be located in the TOFA for air navigation or aircraft ground maneuvering purposes. The TOFA is centered on the taxiway and, for ADG II aircraft, the TOFA is 131 feet wide. ***The existing TOFAs at MRB meet design standards for ADG II aircraft and should be maintained throughout the planning period. The TOFAs for Taxiways C and D meet design standards for ADG III and IV, respectively, and should be maintained throughout the planning period.***

TAXILANE & TAXILANE OBJECT FREE AREA (TLOFA)

Taxilanes provide access to aircraft parking areas, fueling areas, and hangars and have less restrictive object free area standards than taxiways. For ADG II aircraft, the standard TLOFA width is 115 feet. Existing taxilanes at MRB are located primarily on the south side of the Runway 8-26 that provide access to existing T-hangars and conventional hangars adjacent to the general aviation parking apron for transient and based aircraft. There are also taxilanes located on the north side of the airfield that provide access to both T-hangars and conventional hangars located adjacent to the North Civilian (Howard) Apron (see **Figure 3.7**). All of these taxilanes are utilized by both ADG I and II aircraft and do not meet minimum TLOFA standards. Aircraft move slowly in these areas and, in some cases, Group II aircraft cannot be safely accommodated. ***The existing TLOFAs at MRB do not meet design standards for ADG I and II aircraft. It is recommended that at the end of their useful facility lives, hangars and their associated taxilanes that do not meet ADG I design standards be removed, replaced, or reconstructed to meet the appropriate design group standard for their intended use. It is also recommended that new hangars and their associated taxilanes be designed and constructed to meet FAA design standards, as appropriate.***

TAXIWAY SYSTEM

Figure 3.7- Taxiway System
Source: Delta Airport Consultants, Inc.

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3.3|Part 04 - Navigational Aids (NAVAIDs)

NAVAIDs is a collective term to describe electronic and visual aids that assist pilots with navigating their aircraft in a safe and orderly manner during take-off, approach, and landings. While most NAVAIDs are ground based equipment that are installed on an airfield, satellite-based equipment that provides signals to properly equipped aircraft is becoming more prevalent. With the advent of Global Positioning Systems (GPS), air navigation is now an economic and efficient system that can allow every airport in the country to have a navigational aid without requiring ground based equipment. The Wide Area Augmentation System (WAAS) is an expansion and enhancement of GPS that includes integrity broadcasts, differential corrections, and additional ranging signals. Recommendations related to the pursuit of additional navigational support at MRB are presented in the following sections.

INSTRUMENT APPROACH PROCEDURES

As noted in Chapter One, there are three published instrument approaches at MRB. Runway 26 has a published Category I Instrument Landing System (ILS) approach. The ILS approach is designed to provide lateral and vertical guidance to an aircraft approaching Runway 26. Runways 8 and 26 also have published non-precision RNAV/GPS approaches, providing aircraft equipped with GPS receivers lateral and vertical navigational guidance quite similar to the ILS.

The ILS approach to Runway 26 provides minimums as low as 200 feet above the threshold and ½ mile visibility (see **Figure 1.16**). These represent the best minimums available for a Category I ILS approach.

There is also currently an RNAV (GPS) instrument approach to Runway 8 with established localizer performance with vertical guidance (LPV) minimum of 815 mean sea level (MSL) (250 feet AGL) and ¾ mile visibility. Should EWVRAA pursue an LPV approach with visibility minimums lower than ¾ mile for Runway 8, then a much larger RPZ area would be required and land use control would need to be obtained for the entire RPZ area (see **Figure 3.8**). The RNAV (GPS) instrument approach to Runway 26 has established LPV minima of 798 MSL (250 feet AGL) and ½ mile visibility.

To achieve the full efficiency and utility of existing Runway 8-26 and allow for the full use of the existing runway pavement by removing the displaced threshold, it is recommended that the airport engage in the removal of the existing penetrations to the 14 CFR Part 77 approach surfaces during the planning period. By removing the penetrations to the Part 77 surfaces, the airport may be able to improve the LPV minima for Runway 8.

EXISTING AND ULTIMATE RUNWAY PROTECTION ZONE (RPZ) FOR RUNWAY 8

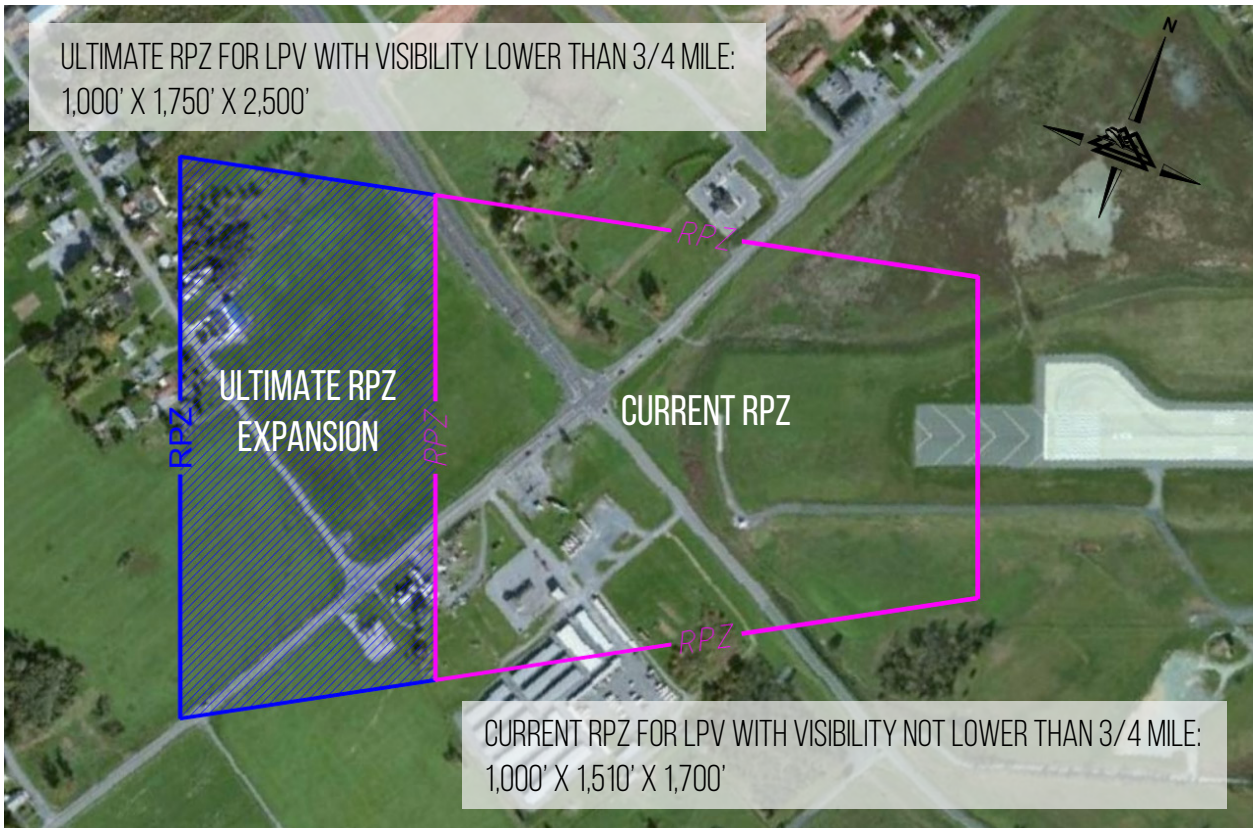

Figure 3.8- Existing and Ultimate Runway Protection Zone (RPZ) for Runway 8
Source: Delta Airport Consultants, Inc.

3.3|Part 05 - Airfield Lighting System and Visual Approach Aids

AIRPORT BEACON

A rotating beacon is installed at an airport to indicate its location to aircraft pilots at night. It is typically mounted on top of a tower structure and sometimes atop a control tower, if one exists, or other buildings of an airport. It produces flashes not unlike that of a lighthouse. MRB's rotating beacon is located approximately 950 feet from the Runway 8-26 centerline, east of the terminal building. The airport's rotating beacon is in good working condition and is operable from dusk to dawn. ***It is recommended that routine and preventative maintenance measures for the beacon be maintained throughout the planning period.***

VISUAL APPROACH AIDS

RUNWAY 8-26

Runway 8 presently does not have visual approach aids. Runway 26 is equipped with a Medium Approach Light System with Runway Alignment Indicator Lights (MALSR) with embedded runway lights that are in good condition and owned and maintained by the FAA. The service road leading to the MALSR equipment shelter is within the ROFA for Runway 8-26; however, this is permitted by FAA design standards. ***The MALSR system should be maintained throughout the planning period.***

Runway 26 is also equipped with a four-box Visual Approach Slope Indicator (VASI) unit. ***It is recommended that the VASI System on Runway 26 be replaced with a 4-box unit Precision Approach Path Indicator (PAPI) system for both Runway 8 and 26 during the planning period.***

SEGMENTED CIRCLE AND WIND CONES

The primary lighted wind cone is located approximately 660 feet south of the Runway 8-26 centerline, near the terminal building. There is no segmented circle installed around the primary wind cone. There are two lighted supplemental wind cones located at the approach ends of Runway 8 and Runway 26. The Runway 8 supplemental wind cone is positioned inside the ROFA and the Runway 26 supplemental wind cone is positioned on the edge of the ROFA. ***It is recommended that a segmented circle be added to the primary wind cone during the planning period; and the supplemental wind cones be moved out of the ROFA.***

DISTANCE MEASURING EQUIPMENT (DME)

As there is no DME currently in place at MRB, ***it is recommended that DME be installed on the existing localizer during the planning period to improve pilot situational awareness and to help establish a final approach fix to the airport.***

AIRFIELD GUIDANCE SIGNS

MRB owns, operates, and maintains 22 lighted airfield guidance signs and six runway distance remaining signs. A comprehensive evaluation of the airfield signs was completed during the airport-wide electrical assessment (see **Appendix D**). As noted in the Electrical Assessment report, FAA standards require that runway exit and mandatory hold signs be powered by the runway edge lighting system. There are 12 existing signs at MRB which are currently powered from the taxiway circuits; these should be transferred to the runway edge lighting circuit. ***It is recommended that the airfield guidance signs be upgraded with the next pavement rehabilitation and/or electrical rehabilitation project within the planning period, and they be replaced with FAA-approved LED signs to lower operation and maintenance costs.***

AIRFIELD MARKINGS

The type of approach procedure established for each runway determines how the runways are marked. Runway 8-26 has precision markings on both ends. ***The runway markings are in good condition and should be maintained throughout the planning period.***

AIRFIELD ELECTRICAL VAULT

The airfield electrical vault is located in the basement floor of the terminal building. This electrical room is well laid out and in good condition. The runway and civilian side of the airfield are powered by five active constant current regulators. The Air National Guard owns, operates, and maintains the two constant current regulators for the north side of the airfield (Taxiway A). Two of the airport-owned constant current regulators have excessive loads for their size. ***The existing field wiring system is in a deteriorated state as detailed in the Airfield Electrical Assessment attached in Appendix D. Prompt rehabilitation of the field wiring system and electrical vault is recommended.***

RUNWAY AND TAXIWAY LIGHTING

Runway 8-26 is equipped with High Intensity Runway Lights (HIRLs). All taxiways have Medium Intensity Taxiway Lights (MITLs). ***The majority of light fixtures for the HIRLs and MITLs are nearing the end of their useful life. The existing field wiring system is in a deteriorated state as detailed in the Airfield Electrical Assessment attached in Appendix D. Prompt rehabilitation of the HIRLs and MITLs is recommended.***

3.3|Part 06 - General Aviation Aircraft Apron

General aviation aircraft parking requirements vary widely at airports such as MRB and are dependent upon the number of transient aircraft using the airport, as well as the number of permanently based and seasonally based aircraft owners who choose to tie-down their aircraft on the ramp in lieu of leasing hangar space. **Table 1.7** and **Figure 3.9** detail the various general aviation apron areas at MRB, which includes:

- Northeast Civilian (Howard)
- Aero-Smith West (FBO)
- Terminal
- General Aviation (Transient North)
- General Aviation (Permanent South)

GENERAL AVIATION APRONS

Figure 3.9- General Aviation Aprons
Source: Delta Airport Consultants, Inc.

TRANSIENT AIRCRAFT PARKING REQUIREMENTS

Transient aircraft parking requirements typically comprise the largest demand for apron space requirements. Transient aircraft are defined as those aircraft not based at the facility. For this analysis, peak day operations were used to determine apron space requirements.

On-site observations during this planning process and interviews with Airport Management documented current transient operational activity. Transient aircraft are generally concentrated at the Aero-Smith West FBO and the General Aviation Transient aprons. **Table 3.4** details the anticipated peak transient aircraft activity for the planning period.

Table 3.4- Transient Aircraft Activity

	BASE 2016	2021	2026	2036
Transient OPS/Busy Day	29	31	33	39
Transient Aircraft/Busy Day	15	16	17	20
Single Engine Piston	4	4	4	5
Multi-Engine Piston	1	1	2	2
Turbo-Jet	9	10	10	12
Rotorcraft	1	1	1	1

Source: Delta Airport Consultants, Inc. Analysis

Apron space allocations for the footprint of typical transient aircraft at MRB are estimated at 250 square yards (SY) for single engine aircraft, 500 SY for multi-engine (piston)/turbo-prop aircraft, 900 SY for turbo-jet aircraft, and 200 SY for other aircraft (rotorcraft); these allocations do not include the Group II circulation space required for taxiing to, from, and around the parking area. For the purpose of this analysis, it is assumed that as specified in FAA AC 150/5300-13A, 50 percent of the daily transient aircraft will be on the apron simultaneously during a busy day. **Table 3.5** presents the apron requirements for transient aircraft for the 20-year planning horizon. These calculations do not reflect the impact of seasonal aircraft operations at MRB.

Table 3.5- Transient Aircraft Apron Space Allocations

AIRCRAFT TYPES	2016 (NO.) (SY)	2021 (NO.) (SY)	2026 (NO.) (SY)	2036 (NO.) (SY)
Single Engine	(2) 500	(2) 500	(2) 500	(3) 750
Multi-Engine Piston	(1) 500	(1) 500	(1) 500	(1) 500
Turbo-Jet	(5) 4,500	(5) 4,500	(6) 5,400	(6) 5,400
Rotorcraft	(1) 200	(1) 200	(1) 200	(1) 200
Total Requirements	(9) 5,700	(9) 5,700	(10) 6,600	(11) 6,850

Source: Delta Airport Consultants, Inc. Analysis

BASED AIRCRAFT APRON PARKING REQUIREMENTS

Based aircraft, as opposed to transient aircraft, are permanently stored at the airport. At MRB, based aircraft typically locate on the General Aviation Based aircraft apron, and the Northeast Civilian (Howard) grass parking area. For those owners not requiring hangar storage, adequate space for parking and storage of these aircraft on the apron should be provided. These based aircraft storage spaces are part of the total apron tie-down area. Historically, based aircraft types which are routinely stored or parked on the apron are the less expensive, single engine aircraft types. The larger and more expensive aircraft, such as the multi-engine aircraft types, are normally stored in hangars. The square yardage (SY) per based aircraft used for this analysis is the same as the transient aircraft formula and does include Group II circulation requirements. Based on industry standards it is estimated that approximately 5 percent of the based single engine aircraft will require apron tie-down space. Utilizing the based aircraft forecast and projected fleet mix, based aircraft tie-down requirements were forecasted for the planning period. These requirements are represented in **Table 3.6.**

Table 3.6- Based Aircraft Tie-Down Requirements (SY)

	2016	2021	2026	2036
Single Engine (spaces)	3	3	3	3
Tie-Down Requirement (SY)	750	750	750	750

Source: Delta Airport Consultants, Inc. Analysis

TOTAL GENERAL AVIATION APRON SPACE REQUIREMENTS

The preceding discussions have identified the total demand for both based and transient aircraft apron space for the planning period based upon the Forecast of Aviation Demand presented in Chapter Two. **Table 3.7** presents the apron requirements for the planning period based on these forecasts.

Table 3.7- General Aviation Apron Requirements

AIRCRAFT TYPES	2016 (NO.) (SY)	2021 (NO.) (SY)	2026 (NO.) (SY)	2036 (NO.) (SY)
Transient Aircraft				
Single Engine	(2) 500	(2) 500	(2) 500	(3) 750
Multi-Engine Piston	(1) 500	(1) 500	(1) 500	(1) 500
Turbo-Jet	(5) 4,500	(5) 4,500	(6) 5,400	(6) 5,400
Rotorcraft	(1) 200	(1) 200	(1) 200	(1) 200
Sub-Total	(9) 5,700	(9) 5,700	(10) 6,600	(11) 6,850
Based Aircraft				
Single Engine	(3) 750	(3) 750	(3) 750	(3) 750
Total Apron Parking Area Requirements (SY)	6,450	6,450	7,350	7,600
Existing Apron Parking Area (SY)	54,729	54,729	54,729	54,729
Deficiencies (-)/Capacity (+)	+48,279	+48,279	+47,379	+47,129

Source: Delta Airport Consultants, Inc. Analysis
Note: () = Number of aircraft spaces

It is assumed, for the purposes of determining the necessary apron parking area, an equivalency exists between the amounts of space needed to park varying sizes of aircraft. Everything is measured in standard (Small Piston Single-Engine) tie-downs, which differ from parking positions in that larger aircraft may take up multiple tie-down positions. One position is equivalent to the space needed to park a single engine aircraft; multi-engine aircraft will require 2½ positions, turbo-jets will require 3, and rotorcraft will require 2. **Table 3.8** details the conversion and capacity of needed parking positions.

The analysis indicates that the number of based and transient parking spaces is adequate to meet the demand generated by existing based and transient aircraft. Because the layout of these parking and tie-down areas does not meet B-II design standards, it is recommended that the existing layout be reconfigured during the planning period to meet FAA design standards.

Table 3.8- General Aviation Apron Requirements

AIRCRAFT TYPES	2016 (NO.) (SY)	2021 (NO.) (SY)	2026 (NO.) (SY)	2036 (NO.) (SY)
Transient Aircraft				
Single Engine	(5) 5	(5) 5	(5) 5	(6) 6
Multi-Engine Piston	(1) 3	(1) 3	(1) 3	(1) 3
Turbo-Jet	(7) 21	(7) 21	(8) 24	(8) 24
Rotorcraft	(1) 2	(1) 2	(1) 2	(1) 2
Sub-Total	14	14	15	16
Total Equivalent Tie-Down Positions	31	31	34	35
Existing Tie-Down Positions	41	41	41	41
Deficiencies (-)/Capacity (+)	+10	+10	+7	+6

Source: Delta Airport Consultants, Inc. Analysis
Note: () = Number of aircraft spaces

Although the above analysis does not forecast the need for additional apron area for tie-downs, the layout and geometrics of the MRB apron area for tie-downs as well as the taxilanes serving the following areas do not meet the TLOFA requirements specified in FAA AC 150/5300-13A for the wingspan of the design aircraft stored in these areas, which range from ADG A-I to ADG B-II:

- T-hangars (EWVRAA and EAA Chapter 1071) located east of the General Aviation (Transient North/Permanent South) apron; and
- EWVRAA Box and T-hangars located adjacent to the Northeast Civilian (Howard) apron.

It is recommended that the taxilanes within the hangar areas be reconfigured and upgraded to meet current taxilane TLOFA standards for the design aircraft utilizing these areas during the planning period.

The existing tie-downs located on the main apron (general aviation apron – Transient North/Permanent South) do not penetrate the Group II TLOFA of the main apron; however, the layout of the existing tie-downs on each apron area do not meet the standards for the design aircraft utilizing the apron areas. ***It is recommended that the tie-down layout be reconfigured to meet ADG II geometric standards during the apron rehabilitation in the planning period.***

3.3|Part 07 - Hangar Facilities

Hangar space requirements include demand generated by based aircraft, seasonal based aircraft, normal fixed base operations, and corporate use. The following assumptions were made to determine hangar space requirements through the planning period for based and seasonal based aircraft at MRB:

- 95 percent of all single engine aircraft will require hangar space
- 100 percent of all multi-engine aircraft will require hangar space
- 100 percent of all turbojet aircraft will require hangar space
- 100 percent of all others (i.e., rotorcraft) will require hangar space

MRB currently has six T-hangar structures offering a total of 45 storage units: one 13-unit, one 10-unit, one 8-unit, one 7-unit, one 4-unit, and one 3-unit; as well as 11 conventional "box hangars". All private use conventional hangars and T-hangars were included in the calculation of existing available hangar space. Planning ratios for each type of aircraft are illustrated in **Table 3.9.**

Table 3.9- Hangar Planning Ratios

AIRCRAFT TYPES	CONVENTIONAL HANGARS	T-HANGARS/SHADE HANGARS
Single Engine	30%	65%
Multi-Engine Piston	25%	75%
Turbo-Prop	100%	0%
Business Jet	100%	0%
Rotorcraft	100%	0%

Source: Delta Airport Consultants, Inc. Analysis

Chapter Two anticipated that there will be 67 single-engine based aircraft and 13 multi-engine based aircraft throughout the planning period. From the planning ratios as referenced in **Table 3.9**, 44 single-engine and 10 multi-engine aircraft may require T-hangars; and 20 single-engine and three multi-engine aircraft may require conventional hangars. A total of 54 combined single-engine and multi-engine aircraft may require T-hangars and 23 combined single-engine and multi-engine aircraft may require conventional hangars. The remaining three single-engine based aircraft are assumed to be stored at apron tie-downs.

The conventional hangar space standards that were used for each of the aircraft types to determine the required hangar space are shown in **Table 3.10**. These space standards represent the optimum space required for aircraft storage. They do not include additional spacing required for related hangar operations or aircraft maneuvering. The total hangar requirements are highlighted in **Table 3.11.**

Table 3.10- Hangar Space Standards

AIRCRAFT TYPES	CONVENTIONAL HANGARS (SF)
Single Engine	1,200
Multi-Engine Piston	1,400
Turbo-Prop	2,400
Business Jet	3,600
Rotorcraft	1,200

Source: Delta Airport Consultants, Inc. Analysis

Table 3.11- Total Hangar Requirements

	2016	2021	2026	2036
T-hangar (Units)				
T-hangar Demand	54	54	54	54
Existing T-hangars Units	45	45	45	45
Deficiency(-)/Capacity (+)	-9	-9	-9	-9
Conventional Hangar Area (SF)				
Single Engine	24,000	24,000	24,000	24,000
Multi-Engine Piston	4,200	4,200	4,200	4,200
Turboprop	4,800	7,200	9,600	14,400
Business Jet	0	3,600	7,200	14,400
Other (Rotorcraft, ultralights, gliders)	1,200	3,600	6,000	12,000
Total SF Required	34,200	42,600	51,000	69,000
Existing Space	118,750	118,750	118,750	118,750
Deficiency(-)/Capacity (+)	+84,550	+76,150	+67,750	+49,750

Source: Delta Airport Consultants, Inc. Analysis

Based upon the above analysis, a deficiency in T-hangar space and a surplus in conventional hangar space exists at MRB. This table shows a deficiency of nine T-hangars as the forecast in Chapter Two assumed there will be zero growth in single-engine and multi-engine piston aircraft. It is possible that many small aircraft are currently tied down on aprons or based in conventional hangars due to the T-hangar deficit. Based on the age and condition of some of the existing T-hangars, there is a need to replace existing units.

Chapter Two indicated that during the planning period the airport may see an increase in based aircraft, notably jets. Though the data indicates that MRB has enough capacity for conventional hangars, discussions with airport staff indicate that there is a need for additional conventional hangars to serve general aviation and corporate aircraft. The existing square footage for conventional hangars does not lead to the efficiency of space needed for the future demand of aircraft operating and or based at MRB. In addition, there are some conventional hangars that need rehabilitation and are associated with facilities that may have industrial and/or retail applications.

As previously noted in the aircraft parking apron section of this chapter, the location of some existing conventional and T-hangar units do not comply with FAA AC 150/5300-13A relative to clearance requirements for TLOFAs. ***Based on the existing deficit and physical condition of T-hangars, it is recommended that additional T-hangars be constructed during the planning period to meet existing and future demand as well as to achieve compliance with FAA geometric standards. It is recommended the condition of existing conventional hangars be monitored and maintained throughout the planning period; and that additional conventional and corporate hangars be provided during the planning period to meet future aviation demand. As new hangars are needed or existing hangars outlive their useful facility life, it is recommended that new hangar areas be developed that provide efficient maneuvering space, consistent with FAA geometric standards.***

Image by Delta Airport Consultants, Inc.

Section 4 - Landside Facility Requirements

Landside facilities include airport buildings, general aviation terminal building, automobile parking, and perimeter fencing. The landside facility requirements were developed from a review of Chapters One and Two of this study, FAA and industry guidelines, as well as guidance from Airport Management.

3.4|Part 01 - Terminal Building

The existing terminal building at MRB was constructed in 2004/2005. The building serves as the focal point for the efficient transfer of pilots and passengers between ground transportation and aircraft. The facility includes a lobby museum, pilot's lounge with flight planning facilities, 2,400 square feet of restaurant space with a full-service kitchen, office space for airport staff, general office space, and a conference room.

For general aviation airports such as MRB, the terminal building serves as the focal point of activity and a source of connectedness with the greater community. Modern, appropriately-sized, and comfortable amenities offered through these facilities provide a convenient connecting point for passengers, meeters/greeters, pilots, and other airport users. Terminal buildings also serve as the "front-door" of a region providing a means for guests and visitors to develop positive first and last impressions of a community and spur opportunities for further travel/tourism or business activity. On a more fundamental level, efficient and modern terminal building space affords greater opportunity for air commerce and aviation activity to occur in a more productive manner.

Absent guidance from the FAA on space allocation standards for general aviation terminal buildings, it is typical for the industry to arrive at recommendations for such space through use of the following formula:

Recommended Building Size = (Peak hour operations) x (2.5) x (125 square feet)

In this calculation, 2.5 represents the average number of passengers and pilots per general aviation flight while 125 square feet is the amount of space determined to be appropriate per passenger to accommodate their circulation through the building and to provide support amenities including restrooms, waiting area, customer service functions, flight planning, a pilot's lounge, airport administration functions, vending/concession space, conference room, and mechanical/electrical/plumbing support space. The results of this formula for MRB are depicted in **Table 3.12**.

Based on the analysis, the existing terminal building is of sufficient size. It is recommended that FBO operations be incorporated within the facility to allow for enhanced functionality and efficiency to meet the needs of airport users, visitors, and guests within the planning period.

Table 3.12- General Aviation Terminal Building Minimum Space Requirements

	2016	2021	2026	2036
Peak Hour Operations	12	13	14	15
Peak Hour Pilots/Passengers	30	33	35	38
Total Building Area Required (SF)	3,750	4,125	4,375	4,750
Existing Building (SF)	12,000	12,000	12,000	12,000
Deficiency(-)/Capacity(+)	+8,250	+7,875	+7,625	+7,250

Source: Delta Airport Consultants, Inc. Analysis

3.4|Part 02 - Airport Access and Automobile Parking

AIRPORT ACCESS

MRB and its immediate vicinity is served by Interstate 81 and West Virginia State Highway Route 9. Primary access to the airport terminal building and aeronautical services are via Interstate 81 to Business Park Drive/Novak Drive to Airport Road to Aviation Way; secondary access can be obtained from U.S. Route 11 via Paynes Ford Road and Airport Road. Landside access to the general aviation facilities located near the Northeast Civilian (Howard) Apron is obtained from U.S. Route 11 via Paynes Ford Road and Air Guard Road. Landside access to the FBO facilities is from Novak Drive to the Industrial Park Access Road (Pilot Way), see **Figure 3.10**.

Aviation Way, Pilot Way, and the existing associated network of roads have sufficient capacity to provide adequate ground transportation to MRB throughout the planning period. The roadway pavement for Pilot Way is in fair to good condition and should be maintained throughout the planning period. The Authority has proposed that the pavement section of Aviation Way be widened and improved from 19 feet to 24 feet during the Phase I.

AIRPORT ACCESS

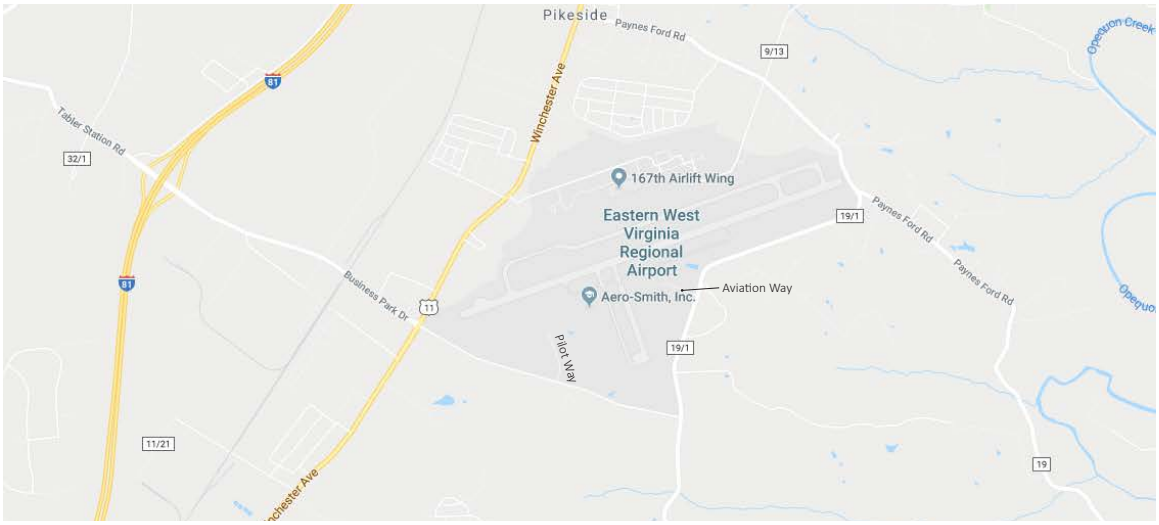

Figure 3.10- Airport Access
Source: Delta Airport Consultants, Inc.

Automobile Parking

The existing parking lot is located south and adjacent to the terminal building and is accessed from Aviation Way. The parking lot contains 64 paved parking spaces, including three designated handicapped for parking.

For planning purposes, the number of automobile parking spaces required for MRB equals the number of peak hour operations factored by 2.5 which represents the average number of passengers and pilots per general aviation flight. The results shown in **Table 3.13** indicate that the number of public automobile parking spaces is sufficient for current and future demand.

As these parking spaces are located immediately in front of the terminal, it is important for the EWVRAA, from an airport marketing standpoint, to maintain them structurally and visually. ***The existing parking lot pavement is in good condition and should be maintained throughout the planning period.***

Table 3.13- Public Automobile Parking Requirements

	2016	2021	2026	2036
Peak Hour Operations	12	13	14	15
Total Spaces Required	30	33	35	38
Total Existing Spaces	64	64	64	64
Deficiency (-)/Capacity (+)	+34	+31	+29	+26

Source: Delta Airport Consultants, Inc. Analysis

3.4|Part 03 - Perimeter Fencing

The airport property is secured by a six-foot tall fence, with three-strands of barbed wire for a total fence height of 7.5-feet, which is in fair to good condition. There are multiple access control locations and a series of vehicle gates located along the length of the fence (see **Figure 3.11**). Several existing, unsecured access points to airport property warrant improvements. For example, there is a vehicular/pedestrian gate that controls access from the Triumph Property Group (TPG) (former Sino-Swearingen) Hangar located at the eastern boundary of the apron. When the facility is in use there is a possibility for uncontrolled access onto an active taxiway.

The Aero-Smith West FBO facility (Building 16) has two gate locations that restrict vehicular and pedestrian access. There are three controlled access gates near the terminal building and aircraft maintenance facility. The airport can also be accessed from two vehicular gates from Aviation Way; one of the gates is located off airport property and provides access to the Eastern Technical Corporation property (Building 11), which is an existing through-the-fence operation. Once through that gate and onto private property, there is uncontrolled access to the airport. According to Airport Management, a proposed fencing project is expected to remedy this uncontrolled access by fall/winter 2018. Finally, the Air National Guard controls, monitors, and maintains two access gates on the northwest and northeast end of the Air National Guard facility.

Access points to the airport from the industrial park via the Triumph Property Group (TPG) (former Sino-Swearingen) Hangar and the Eastern Technical Corporation property should be secured during the planning period. It is recommended that the Air National Guard continue to maintain the access points located on the eastern boundary of the airport property. It is further recommended that the airfield perimeter fence system and the access control locations near the terminal facility be maintained throughout the planning period.

PERIMETER FENCING

Figure 3.11- Perimeter Fencing
Source: Delta Airport Consultants, Inc.

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Image by Delta Airport Consultants, Inc.

Section 5 - Support Facilities

Support facilities play a vital role in the operation of MRB. The sizing, location, and phasing of these facilities must provide flexibility to accommodate the dynamic aviation industry. Support facilities that will be discussed in this section include the following:

- Aviation Fuel Storage
- Airfield Maintenance Building
- Automated Surface Observing System (WX-ASOS)

3.5|Part 01 - Aviation Fuel Storage

The MRB fuel farm is located on the south end of the general aviation apron and is accessible from Taxiway B. There are three above ground storage tanks (one 12,000 gallon 100LL; one 12,000 gallon Jet A; and one 275 gallon unleaded), which serves the automobile fleet operated by the fixed base operator (FBO), Aero-Smith, Inc. All of the tanks are owned by Aero-Smith, Inc. Bollards are installed around the perimeter of the tank storage area. The tank storage area does not have security fencing nor does the area meet the minimum safety standards for signage.

Above-Ground Fuel Storage Tanks
Image by Delta Airport Consultants, Inc.

In addition to the fuel tanks, Aero-Smith, Inc. owns a 1,500 gallon above ground oil furnace tank. This tank is located near the Aero-Smith, Inc. East building, adjacent to the General Aviation-Transient apron. Aircraft fuel is dispensed via three trucks owned or leased by the FBO (two 3,000 gallon Jet A trucks and one 1,500 gallon 100LL truck). There are no dedicated fuel truck parking bays within the general aviation terminal area.

The MRB fuel tank storage area is in good condition and has sufficient capacity to meet the general aviation demand. The fuel tanks should be maintained throughout the planning period. It is recommended that the fuel storage area be fenced for security and that appropriate signage be installed during the planning period. It is also recommended that dedicated fuel truck parking bays be constructed in the planning period.

3.5|Part 02 - Airfield Maintenance Building

Airfield Maintenance Building
Image by Delta Airport Consultants

Airfield maintenance equipment and snow removal equipment (SRE) are currently stored in two metal Quonset hut structures located on the south end of Taxiway B, adjacent to the aviation fuel storage area (in Buildings 13 and 14). FAA AC 150/5220-18A, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, defines MRB as a "Very Large" airport for SRE calculations, having at least 1,000,000 square feet of total paved runway. **Figure 3.12** (Table 3-3 from FAA AC 150/5220-18A) notes typical storage space allocations for support items for small, medium, and large/very large airports.

As noted in the figure, a total building size of approximately 9,500 square feet is recommended for very large airports to accommodate each support area as well as additional space to store the SRE and snow and ice control materials. Also, the recommended building size anticipates a 10 to 15 percent future growth with respect to personnel space and SRE parking as noted in the AC. Buildings 13 and 14 total approximately 4,850 square feet.

The Airport Joint Use Agreement (AJUA) between the ANG and the Airport Authority states that EWVRAA is responsible for performing snow removal for the airport; however, currently ANG removes snow from Runway 8-26, Taxiway A, and the ANG apron, as MRB does not have the personnel or equipment to perform full snow removal operations in a timely manner required by the ANG's mission. MRB removes the snow on structures south of Runway 8-26. In consideration of the fact that the ANG has assumed the responsibility for snow removal on a significant portion of the airfield, a 5,000 SF facility should be adequate to meet the SRE storage needs of MRB. ***It is recommended that a new 5,000 SF facility be constructed that meets FAA sizing guidelines for a small to medium sized airport, and that the existing two storage buildings be removed.***

Martinsburg, West Virginia reports an average annual snowfall of 26 inches. FAA AC 150/5220-20A, *Airport Snow and Ice Control Equipment*, notes that non-commercial airports having over 10,000 operations and an annual accumulation greater than 15 inches of snow should have a minimum of one high-speed rotary plow supported by two snow plows of equal capacity. MRB currently maintains one Oshkosh plow; one Komatsu rubber tire loader with angle blade and bucket; one New Holland tractor with full cab 100hp with bucket; and one Ford F-350 with western plow. ***It is recommended that the EWVRAA maintain its existing SRE equipment and purchase an additional snow plow and sweeper. It is also recommended that the AJUA be amended to state that the ANG will complete the removal of snow from Runway 8-26, Taxiway A, and the ANG apron operational areas.***

3.5|Part 03 - Automated Surface Observing System (WX-ASOS)

MRB has an Automated Surface Observing System (WX-ASOS). The system reports altimeter readings, barometric pressure, density altitude, wind directions/speed/gusts, visibility, precipitation type, sky cover/condition, temperature, and dew point. The system provides detailed data to pilots via a recorded message accessed by a specified radio frequency or telephone contact. The MRB WX-ASOS frequency is 119.925 MHz and the system is located on the south side of Runway 26. The WX-ASOS is owned and maintained by the FAA. ***It is recommended that the WX-ASOS be maintained throughout the planning period.***

TYPICAL STORAGE SPACE ALLOCATIONS FOR SUPPORT ITEMS

Items under Support Area	Airport Size [1]		
	Small-Sized Airport [2] Square feet (m)	Medium-Sized Airport Square feet (m)	Large and Very Large-Sized Airports Square feet (m)
Snow Desk [4]	100 (9)	144 (13)	200 - 400 (19 - 37)
Supervisor's Office [4]	120 (11)	140 (13)	140 (13)
Mechanic's Office	100* (9)	150 (14)	150 (14)
Administrative Area [4]	200* (19)	200 (19)	400 (37)
Training Room [4]	300 (28)	400 (37)	400 (37)
Lunch Room [4]	Combine with training room	300 (28)	600 (56)
Kitchen [4]	Combine with training room	Combine with lunch room	200 (19)
Rest Room/Lavatory for Men and Women (or local building code) [4]	300 (28)	500 (46)	700 (65)
Lockers [4]	Combine with Rest Rooms	500 (46)	700 (65)
Sleeping Quarters [3] Bunk area per person	56 (5)	56 (5)	56 (5)
Parts Area associated with snow removal operation	600* (56)	800 (74)	1000 (93)
Parts Area associated directly to snow vehicles	200 (19)	300 (28)	400 (37)
Lubrication, Oil, Grease Storage	100-150 (9 - 14)	150 - 200 (14 - 19)	150 - 200 (14 - 19)
Welding Area	200* (19)	200 (19)	400 (37)
Recycled Oil and Used Anti-freeze	150 (14)	200 (19)	200 (19)
Mechanic's Bench Area (along walls)	100 (10)	200 (19)	400 (37)
Repair Bay – Number of Bays and square footage per repair bay	1* 600 (56)	1 1000 (93)	2 1000 (93)
Cleaning Bay	600* (56)	1000 (93)	1000 (93)
Emergency First Aid Room[4]	Combine with lunch room	Combine with training room	75 (7)

Notes:

1. See paragraph 1-2 of Chapter 1 for definition of airport sizes.
2. Airports with less than 225,000 square feet (20,910 m^2) of total paved runway will not necessarily need items marked with an asterisk (*).
3. Certain airport operators may deem it necessary to have sleeping quarters.
4. Small airports may have a separate building that houses and services equipment, chemicals while another building, such as the terminal, houses administrative functions and crew facilities.

Figure 3.12- Typical Storage Space Allocations for Support Items
Source: FAA AC 150/5220-18A, Table 3-3

Image by Delta Airport Consultants, Inc.

Section 6 - Zoning and Land Use

Zoning is arguably one of the most powerful tools that a municipality can use to protect public safety and to ensure noise compatibility around airports. Since there is no regulatory zoning document in Berkeley County, land use is controlled and managed by land use regulations in Chapter 8A of the West Virginia Code. Additionally, in 2004, Berkeley County enacted an "Ordinance to Limit Height of Objects and to Regulate Placement of Certain Structures Within Specific Areas of Noise Level Around Eastern West Virginia Regional Airport" (Ordinance). The intent of the Ordinance is to regulate placement of obstructions on and around the airport property as well as regulate the construction of noise-sensitive uses (such as residential) within airport environs. As of fall 2018, an updated ordinance has been proposed by the County.

One of the primary causes of incompatibility between airports and surrounding communities is noise. Noise is measured in decibels (dB). The Day Night Average Sound Level (DNL) is an average, cumulative sound level that provides a measure of the total sound energy during a 24-hour period. Generally, FAA considers 75 DNL or higher to be incompatible with most land uses, while below 65 DNL is compatible with most land uses. Above 65 DNL, noise sensitive land uses are typically discouraged.

The 2004 Ordinance defines airport zones that include all the land lying beneath the approach surfaces, transitional surfaces, horizontal surface, and conical surface as they apply to MRB, see **Figure 1.7**. Within the airport zones, the Ordinance further restricts uses that interfere with pilot navigation or visibility, create bird strike hazards, or otherwise endanger or interfere with aircraft operations.

Moreover, the Ordinance discourages the establishment of noise-sensitive land uses (such as residential) within areas where noise is, or expected to reach, 65 dB or higher. However, the Airport Protection Map accompanying the ordinance does not depict the limits of noise contours, potentially making the ordinance difficult to enforce.

In consideration of the lack of comprehensive land use controls around the airport, and the regular operation by large, military aircraft by the ANG, ***it is recommended that EWVRAA initiate a Noise Study for noise control and compatibility planning as outlined in AC 150/5020-1. Upon completion of the Noise Study, it is recommended that the Airport Protection Map associated with the 2004 Ordinance be updated to reflect current noise contour limits.***

It is also recommended that existing, identified obstructions to airspace (see Figure 1.21) be removed to remain in compliance with 14 CFR Part 77 and FAA grant assurances, as well as the 2004 ordinance. EWVRAA should coordinate with Berkeley County to ensure that the 2004 ordinance reflects the current version of 14 CFR Part 77.

In terms of public safety, the RPZ on each runway end should be kept clear of people and property on the ground. Airports are required by the FAA to control to the greatest extent possible the land within an RPZ to prevent the creation of hazards to landing and departing aircraft. The FAA's preferred method of "control" is fee-simple ownership and the clearing and maintenance of incompatible objects and activities. As noted previously and as depicted in **Figure 1.21**, MRB does not fully control the land within the RPZs on both runway ends. ***It is recommended that MRB gain control over its existing RPZs to prevent incompatible land uses and to enhance public safety.***

Image by Delta Airport Consultants, Inc.

Section 7 - Through-the-Fence Operations

3.7|Part 01 - FAA Policy

The FAA's *Airport Compliance Manual,* Order 5190.6B, states that the FAA does not support Through-the-Fence (TTF) agreements. TTF agreements grant access to the airport to aircraft stored and serviced off-site, on adjacent property.

FAA policy permits sponsors of publicly-owned general aviation airports to establish residential through-the-fence (RTTF) agreements that comply with specific terms and conditions and are subject to FAA review and approval. In 2014, the Airport Cooperative Research Program (ACRP) published ACRP Report 114 *Guidebook for Through-the-Fence Operations,* which acknowledges that an airport may adopt a policy that permits TTF commercial operations as long as the policy is part of the airport's minimum standards. This approach is consistent with current FAA guidance.

3.7|Part 02 - MRB Conditions

As indicated in Chapter One, there are four existing commercial-use TTF operations at MRB (see **Figure 1.21**):

- Air Photographics (Building 22)
- Former Palencar Hangar
- Howard Aircraft Maintenance (Building 23)
- Eastern Technical Corporation (Groves)-(Building 11)

These four facilities are located outside of airport property. The Air Photographics and Howard Aircraft Maintenance buildings are north of the runway and have access to the airfield via an unnamed taxiway. The former Palencar hangar and the Eastern Technical Corporation (Groves) hangar are located adjacent to the general aviation apron and have immediate access to the apron. Airport records

show that the Howard Aircraft Maintenance and Eastern Technical Corporation have existing TTF agreements; the Eastern Technical Corporation also holds an easement which permits access from Aviation Way through the terminal apron. The Air Photographics and Former Palencar Hangar, however, do not have formal TTF agreements with the Airport.

In reviewing MRB's adopted Minimum Standards, there is policy language specific to off airport access (TTF operations). The policy permits TTF operations subject to the following conditions:

- Existing through-the-fence operations will be given no more than a one year agreement at a time upon expiration of an existing lease;
- No new through-the-fence operations will be permitted; and
- Existing through-the-fence operators will pay lease fees equal to the fees that on-field operations are required to pay.

The Airport's Minimum Standards should be enhanced to establish minimum qualifications and requirements that must be met as a condition for the right to conduct a commercial aeronautical TTF activity. For example, standards for TTF activities should be consistent with the standards as established for on-airport FBOs and Specialized Aviation Service Operations (SASOs).

In an effort to comply with the FAA's mandate on TTF operations, it is recommended that during the planning period, MRB:

1. ***Request that the FAA review each TTF agreement to ensure that each agreement is consistent with FAA grant assurances; review the existing Minimum Standards to ensure TTF operations for commercial aeronautical uses are consistent with FAA guidance; and, review each TTF agreement to ensure that each agreement is being enforced pursuant to the adopted airport policy in the Minimum Standards; or***
2. ***Pursue fee simple acquisition of each property on which TTF operations are being conducted, to ensure that no future land use conflicts may occur with the safe operation of the airport facility.***

Image by Delta Airport Consultants, Inc.

Section 8 - Other Facilities

3.8|Part 01 - International Air Cargo Facility

As introduced in Chapter One, the Authority has expressed interest in pursuing the development of an intermodal transportation facility at MRB, which would be known as the International Air Freight Terminal Complex. The Authority anticipates cargo operations would be conducted by the Boeing 777-200 or similar aircraft.

Boeing 777-200 air cargo operations may be weight-restricted with the existing 8,815-feet offered by Runway 8-26, depending on density altitude. According to aircraft performance charts, operating with 7,800-feet of usable runway length would require the Boeing 777-200 to operate at 560,000 pounds, 85 percent of its maximum takeoff weight. This analysis is based on a dry runway with zero wind, zero runway gradient, the air-conditioning in the aircraft off, optimum flap setting, and a 59 degree day.

Upon implementation of air cargo operations at MRB, a formal analysis should be conducted to determine if the aircraft usage is of a frequency to warrant a change in the critical aircraft. The removal of existing obstructions to Runway 26, and the re-routing of Airport Road, could permit the displaced threshold to be removed, increasing the amount of usable runway for air cargo operations.

During the preparations of the Master Plan, Airport Management was actively working with private developers on development opportunities for an air cargo facility. As such, two general locations, one identified for development in the short-term (Phase I) and the other for the long-term (Ultimate Phase), are noted in Chapter Four on the Preferred Airport Development Plan – Future and Ultimate (see **Figure 4.7)**.

3.8|Part 02 - Military Assault Strip

An assault strip is a runway used for military training. The West Virginia ANG previously had an assault strip at MRB which was parallel to Runway 8-26 and was used by the C-130 Hercules aircraft stationed at MRB. The C-130 was replaced with the C-5 Galaxy as part of an ANG expansion project. According to Airport Management, the expansion project required the reconfiguration of Taxiway A to accommodate the larger object free zone required for the C-5, which led to the removal of the assault strip. The ANG has indicated its preference for an assault strip to support the current and future C-17 training operations at Johnstown, Pennsylvania.

As noted by the West Virginia ANG "assault landings require aircraft to touch down on a runway within 500 feet and come to a complete stop on the remaining 3,000 feet. The purpose is to land in a small zone quickly." In order to support this requirement, it is estimated that a military assault strip may be 3,500 feet long and 90 feet wide. At the Authority's request, planning was conducted for the installation of an assault strip on airport property. Airport Management requested that the assault strip be located to the eastern side of the airport near Snooks Lane and Salvage Drive in a crosswind orientation so that it does not interfere with the business park. The assault strip may also have a second function of serving as a crosswind runway for general aviation aircraft; therefore, the military assault strip/crosswind runway would serve the needs of both civilian general aviation operators and provide a regional training site useful to military bases that have C-17 aircraft in the northeast and mid-Atlantic region.

There is no indication of funding from the military at this time for this requirement and no justification for a crosswind runway during the planning period. As a result, a conceptual layout for an assault strip in the Ultimate Phase was considered during the planning process, but the Authority chose not to proceed with its inclusion in the Preferred Development Layout (Chapter Four). The conceptual layout is available in **Appendix F**.

3.8|Part 03 - Runway Extension

Airport Management has identified a future need for extending Runway 26 and Taxiway A by 2,685 feet to support potential air cargo and military operations. ***A formal runway extension analysis is recommended within the planning period. There is no indication of funding or justification for a runway extension at this time; it is depicted on the ALP drawing in the Ultimate Phase should the extension become justified and funding become available.***

3.8|Part 04 - Access Road

During the planning effort, Airport Management requested a conceptual analysis of a proposed road connector to improve access to the Airport from West Virginia Route 9. An exhibit was prepared which depicts an eastward extension of Novak Drive and Pond Lane. While this development concept was ultimately not carried forward into the Preferred Alternative, it is included in **Appendix F** to document the planning conducted.

Image by Delta Airport Consultants, Inc.

Section 9 - Stormwater Management

A Stormwater Management Study was conducted as part of this planning effort to identify the stormwater management requirements for the proposed development projects at MRB. The goal of this study was to provide a more proactive approach to stormwater solutions at the airport. After several site visits to the airport property to map on-airport drainage areas and conduct stormwater infiltration testing in select areas, a conceptual stormwater management layout was designed based upon the proposed development in Phases I through III. Stormwater improvements were not calculated for projects proposed in the Ultimate Phase, due to the length of time before the projects would be constructed. However, consideration was provided to the Ultimate development items when stormwater facilities were sited to ensure no overlap.

The study recommended a combination of stormwater improvements associated with the proposed development, including bio-retention facilities, a rain garden, and a below-ground infiltration trench. For the proposed development items which remain conceptual in nature (namely, the Non-Aeronautical development area north of Runway 8, and the Air Caro Operations area in the South Apron development area), minor evaluations of the proposed improvements were completed to provide a potential, rough-size recommendation for stormwater facilities. Detailed study and site testing is recommended when development of these areas takes place.

The full Stormwater Management Study is included as **Appendix G**.

Image by Delta Airport Consultants, Inc.

Section 10 - Facility Requirements Summary

This chapter presented the facility requirements for the continued development of MRB. Facility requirements were predicated using existing and forecasted aviation demand developed in Chapter Two, Forecast of Aviation Demand, and from input from Airport Management. Recommendations contained herein are intended to optimize the operational efficiency, effectiveness, flexibility, and safety of the airport.

Chapter Four, Alternatives Analysis, will discuss and illustrate the facility development that is most appropriate to accommodate the facility requirements. Phasing for each recommended project is described in **Table 3.14** and are categorized by Terminal Area Need, Airfield Need, and those projects recommended in the Ultimate Phase.

Prior to construction, projects will require an environmental evaluation to satisfy the requirements of the National Environmental Policy Act (NEPA). In addition to facility requirements, there are additional local planning initiatives that are recommended to be accomplished during the planning period. These planning initiatives include:

- Develop/Implement a Noise Study;
- Repeal/Replace Berkeley County Zoning Ordinance and Airport Protection Map;
- Review all TTF agreements/existing operations for FAA and Minimum Standards compliance; and
- Review/Update Minimum Standards for TTF operations with commercial aeronautical uses.

Table 3.14- Facility Requirements Summary

	PROJECT DESCRIPTION	PHASE I	PHASE II	PHASE III	ULTIMATE
TERMINAL AREA NEED	Environmental Assessment	•	•	•	
	Land Acquisition for Runway 8-26 RPZs, Part 77 Surfaces, TTF Operations, and Aeronautical Development	•	•	•	
	Obstruction Removal from OFZ/RPZ/Part 77 Surfaces	•			
	Complete Pavement Condition Analysis and Pavement Management Program for General Aviation Apron (transient & based); Taxiway B (South of Terminus of Terminal Apron to General Aviation Apron); Taxiway E (Including Connector Taxiways E1-E4)	•			
	Rehabilitate and Widen Aviation Way	•			
	Construct Air Cargo Facility	•			
	Construct T-hangar Building	•	•		
	Rehab/Reconstruct and/or Relocate Unnamed Taxiway to North Apron		•		
	Relocate Grass Apron to On-Airport Property		•		
	Fuel Farm Improvements (Fuel Truck Parking Bays)			•	
AIRFIELD NEED	Replace Airfield Guidance Signs	•			
	Rehabilitate Airfield Electrical Vault in Terminal Area	•			
	Rehabilitate HIRLs for Runway 8-26	•			
	Rehabilitate MITLs on taxiway system	•			
	Install Segmented Circle to Primary Wind Cone	•			
	Remove VASIs and Install 4-box unit LED PAPIs on Runway 8-26		•		
	Install DME on Runway 8-26		•		
	Relocate Perimeter Fence and/or Install Secure Access Gates for TPG Hangar and Eastern Technical Corporation Hangar		•		
	Relocate Perimeter Fence from Runway 8 ROFA		•		
	Widen and Extend Taxiway E		•		
	Relocate Supplemental Wind cone from Runway 8 ROFA			•	
	Close Connector Taxiways (B, C, D, and E3)			•	

Table 3.14. Facility Requirements Summary - Continued

	PROJECT DESCRIPTION	PHASE I	PHASE II	PHASE III	ULTIMATE
BEYOND 20 YEARS	Relocate Segment of Novak Drive from Runway 8 ROFA				•
	Extend Taxiway A to Full Parallel Taxiway				•
	Relocate FBO facility to Terminal Building				•
	Replace SRE Building				•
	Construct Conventional Hangars and T-hangars (Multi-Aircraft)				•
	Reconstruct Hangar Apron for Large/Heavy Aircraft (Former Runway 17-35)				•
	Extend Runway 8-26				•
	Construct Air Cargo Facilities				•
	Self-Serve Fuel Pump				•
	Land Acquisition for Ultimate RPZs				•

Source: Delta Airport Consultants, Inc. Analysis

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