4. Facility Requirements

This chapter describes the airside and landside facility requirements necessary to accommodate existing and forecasted demand in accordance with Federal Aviation Administration (FAA) design and safety standards. The facility requirements are based upon the aviation demand forecasts presented in Chapter 2, *Forecasts*, and the guidelines provided in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, 14 Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*, and Airport Cooperative Research Program (ACRP) Report 25, *Airport Passenger Terminal Planning and Design*. The major components of this chapter are listed below:

- Airfield Capacity Analysis
- Airfield Facility Requirements
- Terminal Facility Requirements
- Air Cargo Facility Requirements
- General Aviation Facility Requirements
- Support Facility Requirements

4.1. AIRFIELD CAPACITY ANALYSIS

Airfield capacity refers to the ability of an airport to safely accommodate a given level of aviation activity. In the forecast chapter, a historical view of the various aviation demands placed on the Airport was presented along with a forecast of future demand throughout the planning period. It is imperative the Airport be able to accommodate the projected demand by providing sufficient airside and landside facilities throughout the planning period ending in 2035. If deficiencies exist in either of these two areas, they will impede the overall use and utility of the Airport; and, in turn, may hinder the economic potential of the Airport and the communities it serves. The evaluation of airfield capacity and an airport's ability to meet projected aviation demand is accomplished through a capacity and facility requirements analysis. The FAA has prepared a number of publications to assist in the calculation of airfield capacity. This report will use the methodologies described in AC 150/5300-13A, *Airport Design*, and AC 150/5060-5, *Airport Capacity and Delay*.

AC 150/5060-5 defines capacity as a measure of the maximum number of aircraft operations which can be accommodated at an airport. The AC provides a methodology that identifies separate levels of hourly capacity for visual flight rule (VFR) and for instrument flight rule (IFR) conditions. In addition, an annual measure of capacity is the annual service volume (ASV), which is defined as a reasonable estimate of an airport's annual maximum capacity. It is recommended that airports begin planning for additional capacity once 60 percent of the ASV is exceeded, with those improvements being constructed at the 80 percent ASV threshold.

4.1.1. Factors Affecting Capacity

It is important to understand the various factors that affect the ability of an airfield to process demand. Once these factors are identified, and their effect on the processing of demand is understood, efficiencies and deficiencies of the airfield can be evaluated. The airfield capacity analysis will consider several factors that affect the ability of an airport to process demand. These factors include:

- Meteorological Conditions
- Aircraft Fleet Mix
- Runway/Taxiway Configurations
- Runway Utilization
- Percent Arriving Aircraft
- Percent Touch-and-Go Operations
- Exit Taxiway Locations
- Peaking Characteristics

Meteorological Conditions

Meteorological conditions specific to the location of an airport not only influence the airfield layout, but also affect the use of the runway system. As weather conditions change, airfield capacity can be reduced by low ceilings and visibility conditions. Additionally, runway usage will shift as the wind speed and direction change, further impacting the capacity of the airfield.

To better understand the impacts of weather conditions on capacity, two types of aviation conditions must be understood. For purposes of capacity evaluation, these weather conditions are described as VFR conditions and IFR conditions[1]. According to AC 150/5060-5, VFR conditions occur when the cloud ceiling is at least 1,000 feet above ground level (AGL) and the visibility is at least three statute miles. IFR conditions occur when the reported cloud ceiling is at least 200 feet but less than 1,000 feet and/or visibility is at least one statute mile but less than three statute miles. To determine the weather conditions at an airport, wind data collected from a weather station and complied by the National Oceanic and Atmospheric Administration (NOAA) is utilized. Based upon data collected from the reporting station located at AVP for calendar years 2006-2015, VFR conditions occur at the Airport approximately 90.8 percent of the time, and IFR conditions occur approximately 8.2 percent of the time, and the airport is effectively closed as a result of weather being below minimums approximately 1 percent of the time.

Aircraft Fleet Mix

The capacity of a runway is also dependent upon the type and size of aircraft that use it. Guidance from AC 150/5060-5 identifies aircraft as being in one of four classes (A through D) for the purpose conducting capacity analyses calculations. These classifications differ from the classes used in the determination of the Airport Approach Category (AAC). These classes are based on the amount of wake vortex created when the aircraft passes through the air. Small aircraft departing behind larger aircraft must hold longer for wake turbulence separation. The greater the separation distance required, the lower the airfield's capacity.

[1] *VFR = Visual Flight Rules / IFR – Instrument Flight Rules*

For the purposes of capacity analyses, Class A consists of aircraft in the small wake turbulence class - single-engine and a maximum takeoff weight of 12,500 pounds. Class B is made up of aircraft similar to Class A, but with multiple engines. Class C aircraft are in the large wake turbulence class with multiple engines and takeoff weights between 12,500 pounds and 300,000 pounds. Class D aircraft are in the heavy wake turbulence class and have multiple engines and a maximum takeoff weight greater than 300,000 pounds. Typically, Class A and B aircraft are general aviation (GA) single-engine and light twin-engine aircraft. Class C and D consist of large jet and propeller driven aircraft generally associated with larger commuter, airline, air cargo, and military use.

The aircraft fleet mix is defined by the percentage of operations conducted by each of these four classes of aircraft at the Airport. The approximate percentage of operations conducted at AVP by each of these types of aircraft is as follows:

Aircraft Type	Percent of Operations
Class A	20%
Class B	19%
Class C	60%
Class D	1%

The mix index for an airport is determined for use in later airfield capacity analysis and is calculated as the percentage of Class C aircraft operations, plus three times the percentage of Class D operations (%C + 3D). By applying this calculation to the fleet mix percentages for AVP, a Mix Index of 63 is obtained per the following equation:

Class C Operations (60) + (3 * Class D Operations (1)) = Mix Index (63)

Runway/Taxiway Configurations

The configuration of the runway system refers to the number, location, and orientation of the active runway(s), the type and direction of operations, and the flight rules in effect at a particular time. For the purpose of this analysis, AVP has two intersecting bi-directional runways: primary Runway 4-22 and crosswind Runway 10-28.

The availability of parallel taxiway and the location of taxiway entrance and exit locations are important factors in determining the capacity of an airport's runway system. Runway capacities are highest when there are full-length parallel taxiways and ample runway entrance and exit taxiways are available, and when no active runway crossings exist. All of these components reduce the amount of time an aircraft occupies the runway. AC 150/5060-5 identifies the criteria for determining the taxiway exit factor for airfield capacity calculations. The criteria are based on the mix index and the distance the taxiway exits are from the runway threshold. Being the mix index at AVP is not anticipated to exceed 70 over the planning period only exit taxiways that are between 3,500 and 6,500 feet from the threshold and spaced at least 750 feet apart will contribute to the capacity calculations for the Airport.

Runway Utilization

Aircraft generally desire to takeoff and land into the wind. At AVP, winds often favor Runway 22 though for the most part winds are evenly distributed throughout the year. Commercial aircraft typically use 4-22 exclusively while GA aircraft often have an option which runway they utilize. Overall, the general estimate provided by Air Traffic Control Tower (ATCT) for runway utilization is as follows:

- Runway 4 44%
- Runway 22 54%
- Runway 10 1%
- Runway 28 1%

Percent Arriving Aircraft

The capacity of the runway is also influenced by the percentage of aircraft arriving at the airport during the peak hour. Arriving aircraft are typically given priority over departing aircraft. However, aircraft arrivals generally require more time than aircraft departures. Therefore, the higher the percentage of aircraft arrivals during peak periods of operations, the lower the annual service volume. According to airport management, operational activity at AVP is well balanced between arrivals and departures. Therefore, it is assumed in the capacity calculations that arrivals equal departures during the peak period.

Percent Touch-and-Go Operations

A touch-and-go operation refers to an aircraft maneuver in which the aircraft performs a normal landing touchdown followed by an immediate takeoff, without stopping or taxiing clear of the runway. These operations are normally associated with flight training and are included in the local operations figures reported by the air traffic control tower (ATCT). Approximately ten percent of the Airport's local GA operations can be attributed to touch-and-go operations. In 2015 (base year for forecasts), there were 23,716 local GA operations which included approximately 2,372 touch-and-go operations.

Exit Taxiway Locations

A final factor in analyzing the capacity of a runway system is the ability of an aircraft to exit the runway as quickly and safely as possible. The location, design, and number of exit taxiways affect the occupancy time of an aircraft on the runway system. The longer an aircraft remains on the runway, the lower the capacity of that runway and overall runway system.

Runway 4-22 offers a partial parallel taxiway with five exits. Neither of the runway thresholds is currently served by a taxiway, so back-taxi operations are required for aircraft using the full runway length for takeoff. However, a northerly extension to Taxiway Bravo is currently underway which will bring the taxiway to the Runway 22 end and is considered an existing condition for the purposes of this analysis. Runway 10-28 is served by an almost full parallel taxiway, but there are few available exits, which results in a slight reduction of the Airport's overall capacity.

Peaking Characteristics

Peak activity estimates for commercial, military, and general aviation operations were forecast in Chapter 2, *Forecasts*. Airline activity at AVP exhibits daily peaks consisting of quick (less than one hour) turns periodically throughout the day. Commercial activity is greatest during early and late summer months and between the Halloween and Thanksgiving holidays; general aviation activity is greatest during the summer; and military operations are relatively consistent throughout the year. The level of daily operational demand is relatively constant throughout the year in respect to total airport operations (seasonal peaks do not coincide for different operational types) that would impact airfield capacity.

4.1.2. Airfield Capacity Calculations

The FAA methodology for capacity analysis involves a step-by-step process that addresses the factors discussed above. From these, various measures of the airfield's capacity can be determined, including the hourly capacity of the runways and the annual service volume (ASV) of the airport.

The maximum number of operations that the airfield can accommodate in one hour is measured by the hourly capacity of the runway environment, which, of course, varies depending on prevailing weather conditions and runway usage at any given time. The FAA methodology includes a series of graphs and tables that are chosen based upon the available runway use configurations for VFR and IFR operations. The airport's aircraft mix index is also utilized; however, since it is not anticipated to increase significantly over the course of the planning period, the resulting hourly capacities for AVP are relatively constant.

During VFR conditions the airport is estimated to be capable of supporting up to 79 operations per hour. During IFR conditions this figure drops to as low as 48 operations per hour. Given these values and the information and assumptions outlined in the preceding sections, the annual service volume (ASV), or theoretical limit of operations that the Airport can support annually, was calculated to be 165,982 annual operations.

The level at which an airfield is operating can be shown by comparing the calculated ASV to the existing or forecast level of operations. Based upon FAA Order 5090.3B, "Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)," an airport should begin to address capacity related issues once the operational demand exceeds 60 percent of the ASV. The capacity levels for AVP are shown in **Table 4-1**.

Table 4-1: Airfield Capacity Levels

	Annual Operations	Annual Service Volume	Capacity Level
Base Year			
2015	47,450	165,982	28.59%
Forecast			
2020	56,351	165,982	33.95%
2025	57,595	165,982	34.70%

2035	60,658	165,982	36.54%

Source: McFarland Johnson, 2016

While the airport does not reach the 60 percent of capacity threshold to substantiate planning for airfield capacity enhancing projects within the 20-year planning period, it should be noted that the calculated ASV for the airfield is currently below its potential. This is primarily as a result of limited taxiway infrastructure and the requirement of aircraft to, at times, back taxi on an active runway. Should these items be fully rectified in the future, airfield capacity could grow as high as 200,000 annual operations.

4.2. AIRFIELD FACILITY REQUIREMENTS

Airside facility requirements address the items that are directly related to the arrival and departure of aircraft, primarily runways, taxiways, and their associated safety areas. To assure that all runway and taxiway systems are appropriately designed, the FAA has established criteria for use in the planning and design of airfield facilities. The selection of appropriate FAA design standards for the development of airfield facilities is based on the characteristics of the most demanding aircraft expected to use the airport, or a particular facility at the airport, on a regular basis. Correctly identifying the future aircraft types that will use the airport is particularly important, because the design standards that are selected will establish the physical dimensions of airport facilities, including separation distances between facilities that will impact airport development for years to come. Use of appropriate standards will ensure that facilities can safely accommodate aircraft using the airport today, as well as aircraft that are projected to utilize the airport in the future.

4.2.1. Critical Design Aircraft – Runway/Taxiway Design

As described in Section 2.13 of this master plan the Airbus A320 has been identified as the critical design aircraft for AVP, as its dimensional and maneuvering characteristics are equal to or more demanding than other aircraft currently using AVP, or having the potential to utilize AVP throughout the planning period. The Airbus A320 is an approach category C, design group III and taxiway design group 3 (TDG 3) aircraft. However, not all airport facilities will be designed to accommodate the most demanding aircraft at AVP. Certain airside and landside facilities, such as taxiways and general aviation areas that are not intended to serve large aircraft may be designed to accommodate less demanding aircraft, where necessary, to ensure cost-effective development. Presently, Runway 10-28 is utilized primarily by general aviation aircraft, including twin-engine and jet aircraft. The 2009 Airport Layout Plan Update for AVP identified Runway 10-28 as having an RDC of B-II-VIS. It is anticipated that the use of the Runway will remain unchanged in the future years, and a RDC of B-II-VIS will remain applicable, with the design aircraft represented by twin-engine turboprop aircraft such as the King Air 200 or a mid-size business jet, such as a Cessna Citation Sovereign or Falcon 20, both of which require TDG 2 taxiway design standards.

Recommendation:
Runways 4-22 and 10-28 should be designed to meet the requirements for RDC C-III-2400 and B-II-VIS, respectively. Taxiways and taxilanes supporting operations on Runway 4-22 and within the

terminal apron area should be design to taxiway design group TDG 3 standards. Taxiways and taxilanes supporting only general aviation activities utilizing Runway 10-28 should be design to taxiway design group TDG-2 standards.

4.2.2. Runway System Requirements

The following sections will explore facility requirements and safety clearances specifically for Runways 4-22 and 10-28 at AVP.

Runway Orientation

A significant factor in evaluating a runway's orientation is the direction and velocity of the prevailing winds. Ideally, all aircraft takeoff and land into the wind. A runway alignment that does not allow an aircraft to go directly into the wind creates what is known as a crosswind component (i.e. winds at an angle to the runway in use), which makes it more difficult for a pilot to guide the airplane down the intended path. The commonly used measure of degree to which a runway is aligned with the prevailing wind conditions is the wind coverage percentage, which is the percent of time crosswind components are below an acceptable velocity. Essentially, this measure indicates the percentage of time aircraft within a particular design group will be able to safely use the runway. Current FAA standards recommend that airfields provide a 95 percent wind coverage factor.

Wind data for AVP was obtained from NOAA's National Climatic Data Center for the most recent 10-year period (2006-2015) and was compiled into the All Weather and IFR Wind Roses presented in, **Figure 4-1** and **Figure 4-2**, respectively. The wind roses show the percentage of time winds at AVP originated from different directions at various velocities. These percentages were then analyzed based on runway orientation and can be seen in **Table 4-2**. Ideally, the primary instrument runway at an airport should be the runway that has the highest percentage of wind coverage under IFR conditions, during which an approach procedure is needed.

Table 4-2: Airfield Wind Coverage

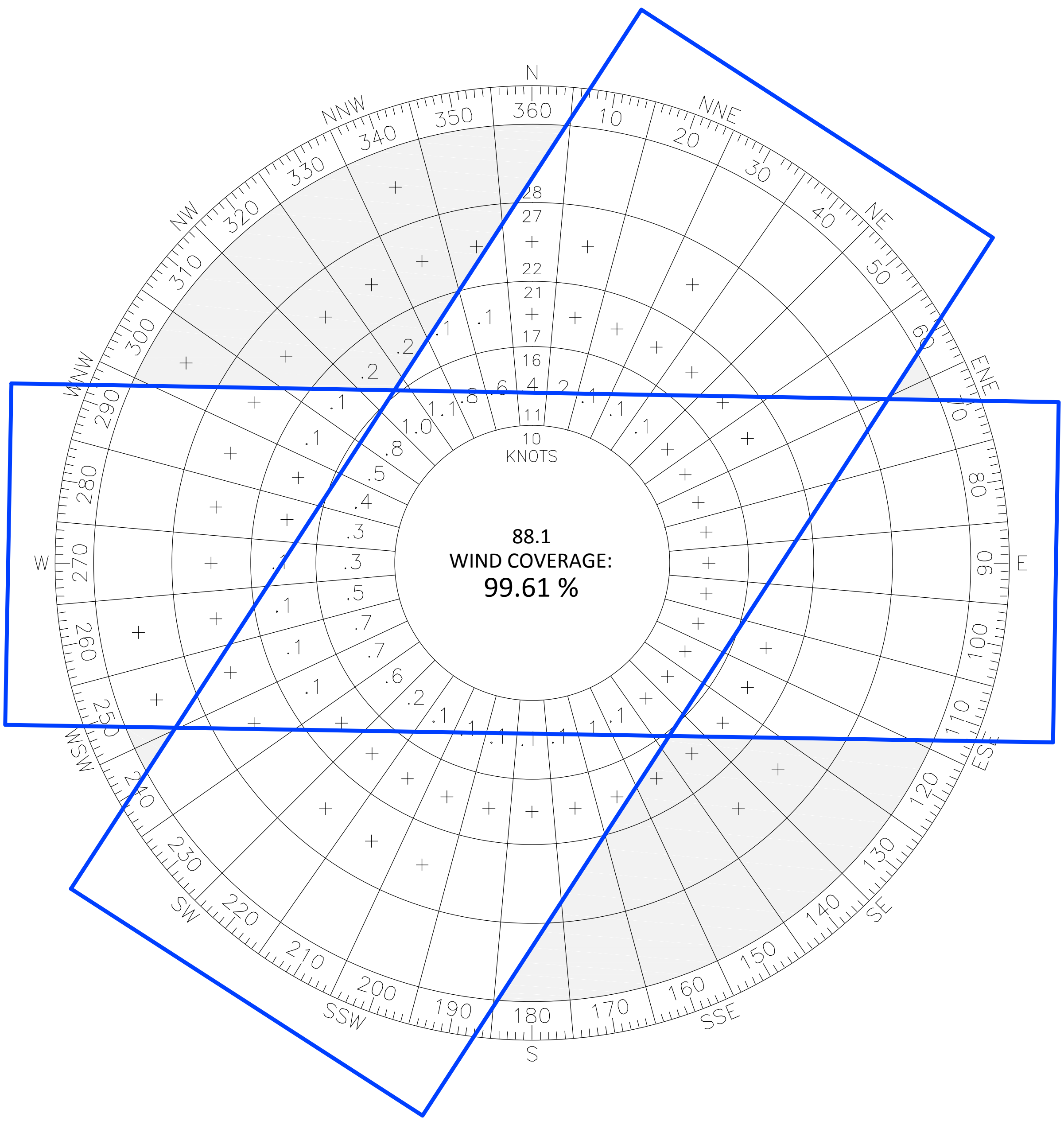
Runway	All Weather Wind Coverage [1/]			IFR Wind Coverage [2/]		
	10.5 Knot	13 Knot	16 Knot	10.5 Knot	13 Knot	16 Knot
All Runways	97.37%	99.17%	99.82%	98.13%	99.23%	99.75%
Runway 4/22	93.80%	96.67%	99.12%	96.71%	97.75%	99.16%
Runway 10/28	94.72%	97.39%	99.47%	96.21%	97.87%	99.29%
Runway 4	59.11%	60.99%	62.64%	65.57%	66.61%	67.56%
Runway 22	60.87%	61.87%	62.69%	68.64%	69.19%	69.68%
Runway 10	48.10%	48.53%	49.00%	58.00%	58.40%	58.83%
Runway 28	72.81%	75.06%	76.68%	76.30%	77.57%	78.58%

1/ All weather conditions: All ceiling and visibility conditions

2/ IFR weather conditions: Ceiling less than 1,000' and visibility below 3 miles but greater than or equal to 200' and 1 mile.

Source: National Climatic Data Center – 725130 Wilkes-Barre Scranton Airport, PA 2006-2015

Figure 4-1: All Weather Windrose



Source: National Climatic Data Center - 725130 Wilkes-Barre Scranton Airport, PA 2006-2015

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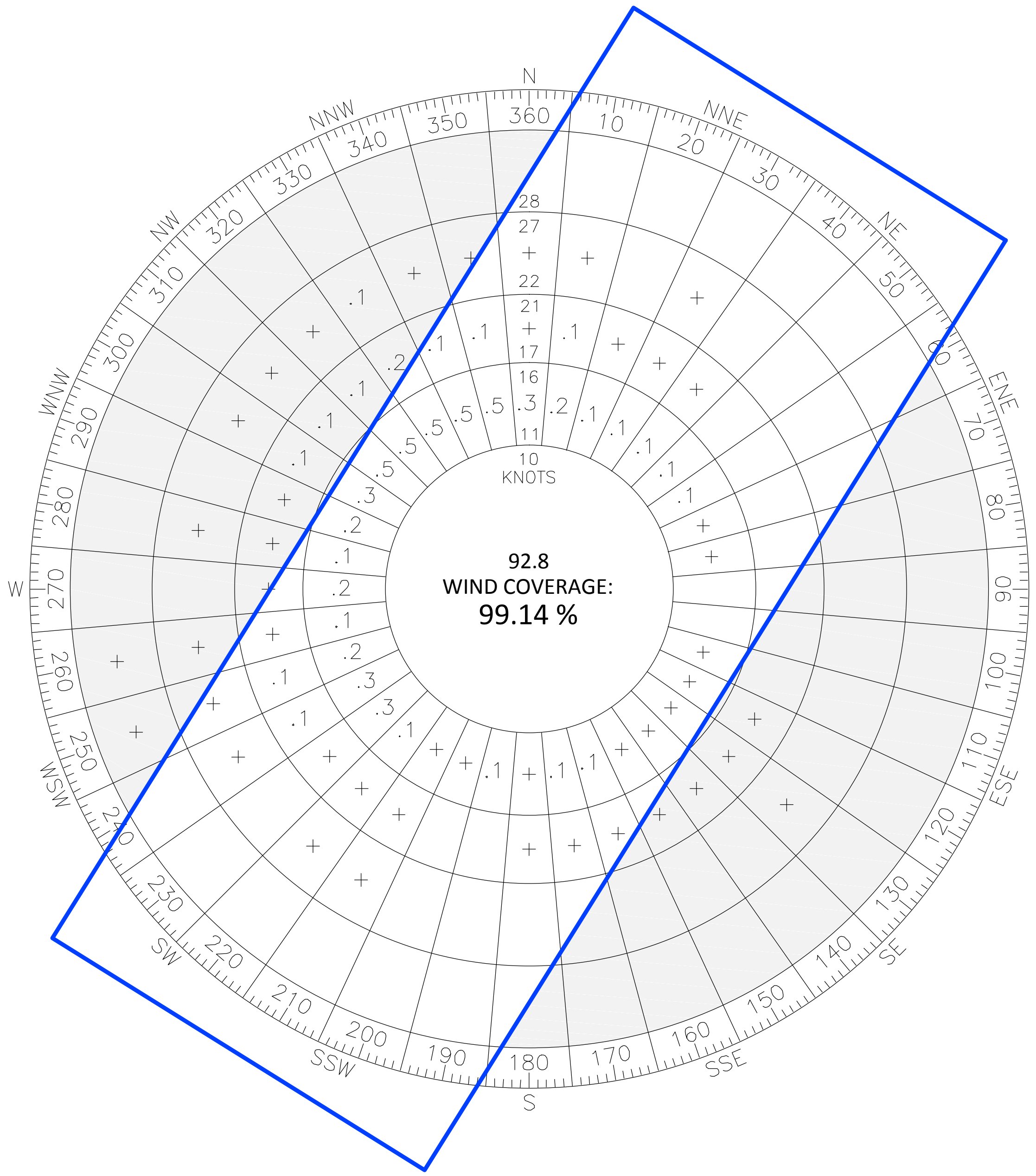
Figure 4-2: IFR Windrose



Source: National Climatic Data Center - 725130 Wilkes-Barre Scranton Airport, PA 2006-2015

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Runway Length

A wide variety of aircraft use AVP on a daily basis. As such these aircraft, both large and small, have different runway requirements. In some cases, smaller or older aircraft may require more runway length than larger or more efficient aircraft. A significant number of factors go into determining the runway performance of an aircraft such as airport elevation, aircraft weight, temperature, flap settings, payload or runway condition (wet/dry), which then dictate the runway requirements that must be met in order for an aircraft to safely utilize that runway.

The FAA has published Advisory Circular 5325-4B, *Runway Length Requirements for Airport Design*, to assist in the determination of the required runway length for both the primary and crosswind runways. The requirements for both the primary and crosswind runways are based on the performance of a specific aircraft or a family of similar aircraft.

Primary Runway

Existing operations at AVP operate safely and efficiently from the Airport when utilizing the primary runway, Runway 4-22, which measures 7,501 feet in length. In order to project future runway length needs several critical missions have been identified for AVP. These critical missions represent the more demanding aircraft and route scenarios that have reasonable potential to occur within the 20-year planning period. The critical design aircraft and associated route segment are described in detail below and summarized at the end of this section in Table 4-3.

Airbus A320 to Las Vegas, NV

Aircraft performance for an Airbus A320 from AVP to Las Vegas, NV at 1,862 nautical miles (nm), represents the longest range flight consistent with leisure-oriented service which could be reasonably anticipated at AVP in the future. Allegiant Air is acquiring the Airbus A319 and A320 with the goal of operating longer haul routes and replacing older MD-80 series aircraft. With a high density configuration, An A319 from AVP to LAS would be near the maximum range for the aircraft and the aircraft would be operating at or near maximum takeoff weight. Use of this aircraft to any east coast leisure destinations, would result in a less demanding runway requirement.

Boeing B717 to Atlanta, GA

Aircraft performance requirements for a B717 operating from AVP to Atlanta, GA (ATL) at 625nm, represents the longest likely route Delta Airlines would fly with this aircraft from AVP. Given the stage length in this scenario, the B717 could operate below MTOW thereby reducing the overall runway length required to takeoff. Takeoff performance assumptions include the aircraft departing with a takeoff weight of approximately 115,000 lbs. This weight could be achieved by maximizing the aircraft zero fuel weight and limiting overall takeoff weight by reduction in fuel weight alone to meet the 625nm stage length while also providing for the required fuel reserves. For the purpose of landing length calculations, the aircraft's maximum landing weight will be assumed.

Bombardier Canadair Regional Jet CRJ-900 to Atlanta, GA

Similar to the B717, the CRJ-900 is a common aircraft utilized by Delta for direct flights to Atlanta from AVP. Aircraft performance requirements for a CRJ-900 operating from AVP to Atlanta, GA

(ATL) at 625 NM represents the longest likely route for this aircraft when operating at the Airport. Takeoff performance assumptions include the aircraft departing with a takeoff weight of approximately 76,500 lbs. This weight could be achieved by maximizing the aircraft zero fuel weight and limiting overall takeoff weight by reduction in fuel weight alone to meet the 625nm stage length while also providing for the required fuel reserves. For the purpose of landing length calculations, the aircraft's maximum landing weight will be assumed.

Table 4-3: Airfield Capacity Levels

Aircraft	Takeoff Length Required		Landing Length Required	
	Standard Day	Standard + 15°C	Dry Runway	Wet Runway
MD83 AVP-LAS	7,100	7,800	4,500	5,200
B717 AVP-ATL	7,100	7,400	4,700	5,400
CRJ-900 AVP-ATL	6,000'	6,300'	5,700	6,500

Source: McFarland Johnson, 2016.

Crosswind Runway

As previously mentioned, the crosswind runway at AVP, (Runway 10-28) primarily facilitates GA operations to include twin-engine turboprop and business jet aircraft. The runway has, at times, been utilized by some commercial service aircraft when the primary runway was closed for maintenance, repair or some other reason. However, based on the airfield wind coverage presented in Table 4-2, Runway 10-28 is only required to bring the overall airfield wind coverage above 95 percent when calculated based on the 10.5 knot crosswind condition. However, should a 16-hour windrose be calculated from the same data by omitting nighttime wind observations from 10:00pm to 5:59am, Runway 10-28 is required to provide sufficient wind coverage up to the 13 knot crosswind component. As such, Runway 10-28 is AIP eligible to meet the standards for RDC A-I and B-I aircraft and arguably eligible to meet RDC B-II standards. As a result, any future improvements to this runway, to include routine maintenance and repairs, may have limited funding participation from the FAA. However, the existing length of Runway 10-28 is adequate to support the type of aircraft and operations currently forecast to make regular use of it.

Recommendation

Based on the analysis presented above, the existing runway lengths provided at AVP are sufficient to support forecasted demand through the planning period.

Runway Width

Both runways at AVP are 150 feet in width. The width of Runway 4-22 is consistent with the FAA standard for runways serving aircraft with an RDC of C-III[2]. However, the prescribed width of a runway serving aircraft with an RDC of B-II, such as Runway 10-28, is 75 feet when visibility minima are not lower than ¾ statue mile and 100 feet when they are. As such, the existing width of Runway 10-28 is in excess of the design standard by 75 feet given its current purpose and use.

2 Provided the critical C-III aircraft has a maximum takeoff weight of 150,000 lbs. or more.

A reduction to Runway 10-28's width may be warranted in the future, however, the majority of existing airfield pavement is identified to be in fair condition or better and should be maintained in the near-term. Further, Runway 10-28's existing width provides for enhanced operational reliability and flexibility for Airport should larger aircraft require Runway 10-28 during periods when Runway 4-22 is unavailable.

Recommendation

No changes are recommended for Runway 4-22. Consideration should be provided in subsequent chapters regarding the future width of Runway 10-28.

Pavement Strength

Pavement strength requirements are related to three primary factors: 1) the weight of aircraft anticipated to use the airport, 2) the landing gear type and geometry, and 3) the volume of aircraft operations. Airport pavement design, however, is not predicated on a particular weight that is not to be exceeded.

The current pavement at AVP could safely handle much heavier aircraft on most days, but repeated use would result in premature pavement failure. Design is based on the mix of aircraft that are expected to use the runway over the anticipated life of the pavement, usually taken to be twenty years. The methodology used to develop the runway pavement design considers the number of operations by both large and small aircraft, and reduces this data to a number of "equivalent annual operations" by a design aircraft, which is the most demanding in terms of pavement loading expected to use the airport. This may or may not be the design aircraft for planning purposes and its selection considers the type of landing gear and tire pressure in addition to weight. The outcome of the design process is a recommended pavement section that will accommodate operations by the forecast fleet mix, and withstand weather stresses without premature failure of the pavement.

The airfield pavements at the Airport most in need of repair or rehabilitation include Runway 10-28, Taxiway B and Taxiway D (east and west of Runway 4-22). These pavement sections are identified by the airfield pavement management study (APMS) to require major rehabilitation in the short-term. The APMS is found in **Appendix A.**

Based on the results of the APMS and a review of the most common distress types encountered, it is recommended that the Airport continue to implement its comprehensive crack sealing program. This program, along with localized pavement patching, has been effective in mitigating pavement distresses and maintaining pavement condition. It should be noted that PCI surveys are conservative estimates as to the current condition of the pavements. Detailed engineering analysis conducted during the design phase of a project may result in a different conclusion as to the extent of repair required.

Recommendation

Plan for major rehabilitation to Runway 10-28 and portions of Taxiway Bravo and Delta, and continue a regular preventative pavement maintenance as outlined in the AMPS.

Runway Object Clearing Requirements, Land Use Protection and Resultant Airfield Utility

Airports are required to clear and/or grade a number of defined areas around runways for a variety of safety-critical reasons. Additional FAA guidance for runway protection provides municipalities the information to make knowledgeable land use and zoning decisions supporting both the community and the airport. Should appropriate clearance, grading and local environmental conditions not be met, runway utility could be impacted. This section will explore each of the object clearing areas as well as the runway protection zones at AVP and review how each impacts runway utility, if at all.

Runway Safety Areas

The runway safety area (RSA) is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. The RSA is required to be cleared of any potentially hazardous ruts or humps and graded and suitable to support the weight of the critical aircraft and/or firefighting and rescue vehicles. The RSA should be free of objects, except for objects that need to be located within the RSA because of their function. Objects higher than three inches above grade must be frangible mounted with a frangible point no higher than three inches above grade.

The runway safety area at AVP is defined by a C-III RSA with engineered material arresting systems (EMAS) on both ends of Runway 4-22 and a standard B-II RSA for Runway 10-28. The RSA for Runway 4-22 is 500 feet wide and extends 400 feet beyond the Runway 4 departure end and approximately 200 feet beyond the Runway 22 departure end. While the RSA for Runway 4-22 meets the width requirements its non-standard length beyond each runway end (typically 1,000 feet) is mitigated by the EMAS systems in place which are designed to safely decelerate an aircraft in the event of an overrun within a given longitudinal distance. To meet B-II design standards Runway 10-28 is required to have an RSA 150 feet wide and 300 feet beyond each runway end. Presently the RSA for Runway 10-28 meets the width requirements as the runway pavement is 150 feet wide and the 300-foot length requirement beyond both runway ends.

Runway Object Free Areas

The runway object free area (ROFA) is centered about the runway centerline. The ROFA clearing standards requires clearing the ROFA of above-ground objects protruding above the nearest point of the RSA. Except where precluded by other clearing standards, it is acceptable for objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes to protrude above the nearest point of the RSA, and to taxi and hold aircraft in the ROFA. To the extent practicable, objects located in the ROFA should meet the same frangibility requirements of those within the RSA. Objects non-essential for air navigation or aircraft ground maneuvering purposes must not be placed in the ROFA. This includes parked aircraft and agricultural operations.

The runway object free area at AVP is 800 feet wide when centered about each runway and extends past each runway end to the outer limits of the RSA. No structures or other object of height exist within the defined ROFA area at AVP other than those fixed-by-function.

Runway Object Free Zones

The runway object free zone (ROFZ) is a defined volume of airspace centered above the runway centerline, above a surface whose elevation at any point is the same as the elevation of the nearest point of the runway centerline. For runways at AVP the ROFZ is 400 feet wide and extends 200 feet beyond each runway end. Being Runway 4 at AVP has an approach lighting system (1,400 foot MALSR) and approach minima below ¾ statute mile (currently at ½ statute mile), the inner-approach OFZ, the inner-transitional OFZ, and the precision OFZ (POFZ) are also required to remain clear.

The inner-approach OFZ is a defined volume of airspace centered on the approach area beginning 200 feet from the runway threshold and extending 200 feet beyond the last light of the approach lighting system and maintains the same 400-foot width of the ROFZ. The inner-approach OFZ initiates at the threshold elevation and rises at a slope of 50 (horizontal) to 1 (vertical) until it ends.

The inner-transitional OFZ is a defined volume of airspace along the sides of the ROFZ and inner-approach OFZ. It applies only to runways with lower than ¾ statute mile approach visibility minimums (Runway 4). As a CAT I approach runway, Runway 4's inner-transitional ROFZ begins at the edges of the ROFZ, goes straight up 47 feet, then expands outward and upward at a 6 (horizontal) to 1 (vertical) slope. Aircraft tails may not violate the surface and an increase of runway to taxiway separation may be warranted.

Lastly the POFZ is a defined volume of airspace above an area beginning at the threshold and centered on the extended runway centerline (200 feet long by 800 feet wide). The POFZ is only in effect at the Runway 4 approach end when visibility is less than ¾ statue mile and an aircraft is on final approach and within 2 miles of the runway threshold. During this time the wing of an aircraft holding on the taxiway waiting for runway clearance may penetrate the POFZ; however, neither the fuselage nor the tail may penetrate the POFZ. Vehicles up to 10 feet in height necessary for maintenance are also permitted within the POFZ.

Presently the runway object free zones in effect at AVP are free and clear of incompatible objects or activities. Should Taxiway B be extended to the south in the future to provide access to the Runway 4 threshold, consideration should be given to the locations of the hold position marking so as to not encroach the POFZ in place at that runway end.

Runway Visibility Zones

Runway line of sight requirements facilitate coordination among aircraft, and between aircraft and vehicles that are operating on active runways. This allows departing and arriving aircraft to verify the locations and actions of other aircraft on the ground which could create a conflict.

When runways intersect the runway visibility zone is used to define an area within which an object five feet above the ground should be mutually visible at any other point within the RVZ five feet above the ground. Visual obstructions should be removed from these areas entirely.

The existing RVZ at AVP is clear of buildings, trees, terrain, or any other visual obstruction.

Runway Protection Zones

RPZs are large trapezoidal areas on the ground off each runway end that are within aircraft approach and departure paths. The RPZ begins 200 feet beyond the end of the runway. The dimensions of the RPZ for each runway end are dependent on the type of aircraft and the approach visibility minimums associated with operations on that runway.

The RPZ is intended to enhance the protection of people and property on the ground. Many land uses (i.e. residential, places of public assembly, fuel storage) are prohibited by FAA guidelines within these areas. However, these limitations are only enforceable if the RPZ is owned or controlled by the airport sponsor. Airport control of these areas is strongly recommended and is primarily achieved through airport property acquisition, but can also occur through easements or zoning to control development and land use activities.

RPZ dimensions can vary for each runway end based on the runway design code and approach visibility minimums associated with operations on that runway. The approach visibility minima for Runway 4 is below ¾ statute mile while the minima for approaches to Runway 22 are not. As a result, the Runway 4 RPZ is slightly larger than the Runway 22 RPZ, 78.9 acres and 48.9 acres, respectively. The Runway 10 and Runway 28 RPZs are both 13.8 acres in size, as required for the visual approaches to those runway ends. In the future, should reduce visibility minima be achieved on Runway 22 or instrument approaches be established to Runways 10 or 28 with visibility minima below one mile, these RPZs could increase in size.

Although an avigation easement is in place near the Runway 28 end to allow for Airport control over 11.6 acres of the Runway 28 RPZ which exist outside the Airport's boundary, portions of the remaining runway's RPZ at AVP fall outside of airport property and are not controlled through easements. Specifically, 26.4 acres of the Runway 4 RPZ, 6.7 acres of the Runway 10 RPZ and 39.5 acres of the Runway 22 RPZ extend into properties not owned or controlled by the Airport. As a result, a number of incompatible land uses can be identified within the Airport's RPZ. Only the Runway 28 RPZ is free of developments or activities incompatible with airport activity. It is recommended that the Airport acquire interest for all areas within RPZs that are not currently under airport control so as to, at the very least, enable the airport to manage for height and hazard type obstructions within the limits of the RPZs and the inner portion of the approach zones.

Declared Distances

Declared distances is a process whereby an airport owner declares only a certain portion of a runway as being available for take-off or landing to meet RSA, ROFA, or airspace requirements in a constrained environment. Consequently, this usually results in a portion of the runway not being used for take-off or landing calculations. Declared distances include the distances the airport owner declares available for an airplane's take-off run (TORA), take-off distance (TODA), accelerate-stop distance (ASDA), and landing distance (LDA) requirements.

Presently AVP publishes full runway lengths for all declared distances indicating no operational limitations exist on runway pavement. This is validated through the above analysis which identified no obstructions to the RSA or ROFA areas. Airspace limitations, if any, will be explored in subsequent sections of the report. The airport layout plan (ALP) set will include a declared distance table, updated if required.

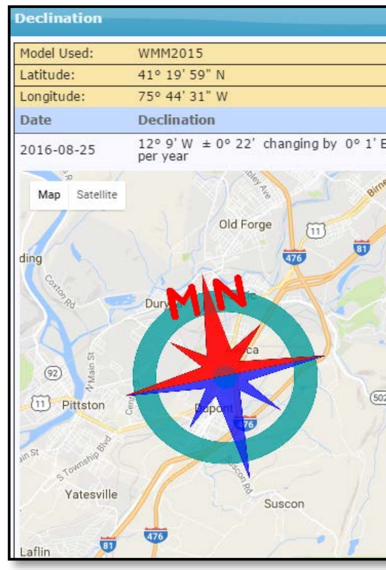
Runway Pavement Markings

Runway Instrument Approach Markings

Both runways at AVP are outfitted with instrument approach markings. Runway 4-22 is marked with precision instrument markings while Runway 10-28 is marked with non-precision markings. Currently no instrument approach is available to Runway 10-28, and, while a precision approach to either end of Runway 10-28 is not recommended, there may be purpose to explore a non-precision approach to either or both ends of Runway 10-28 in the future. As such, the primary and crosswind runway markings at AVP are appropriate for their current and future approach requirements.

Runway Designations

A runway is identified by the whole number nearest the magnetic azimuth of the runway when oriented along the runway centerline, as if on approach to that runway end, and designated as such through painted markings. This number is then rounded off to the nearest unit of ten. Magnetic azimuth is determined by adjusting the geodetic azimuth associated with a runway to compensate for magnetic declination. Magnetic declination is defined as the difference between true north and magnetic north, which varies over time and relative to any specific location on earth. Magnetic declination is a natural process and does periodically require the re-designation of runways.



The current magnetic declination for the Wilkes-Barre/Scranton area was derived from the National Geophysical Data Center in August of 2016 and calculated to be 12° 9' West (±22') changing by 1' East per year. Using the information provided through the aeronautical survey conducted for this study effort, the true bearing of each runway was calculated. Using the method of West is best – East is least, the declination of 12°9' West would need to be added to each runway's true bearing to determine its magnetic bearing and subsequently the appropriate runway designation. **Table 4-4** conducts this calculation and identifies that all runways are appropriately designated.

Table 4-4: Runway Designation Calculations

Rwy	True Bearing	Magnetic Declination	Magnetic Bearing	Rwy Designation
4	31° 21' 33.7"	+ 12°09' West	43° 30' 33.7"	4
22	211° 21' 33.7"	+ 12°09' West	223° 30' 33.7"	22
10	89° 37' 7.7"	+ 12°09' West	101° 46' 7.7"	10
28	269° 37' 7.7"	+ 12°09' West	281° 46' 7.7"	28

Source: National Geophysical Data Center, 2016; McFarland Johnson, 2016

4.2.3. Taxiway System Requirements

The purpose of any taxiway system is to support the operational activity and enhance the safety of aircraft ground movements. Additionally, taxiways have the ability to enhance the capacity of the runway system when thoughtfully designed in a way to minimize runway occupancy time and unnecessary runway crossings. A quality taxiway system is designed to provide freedom of movement to and from the runways and between aviation facilities at the airport while simultaneously minimizing the potential for inadvertent runway crossings and runway incursions. Additionally, as the connection between landside facilities and the runway, taxiways often drive development activities at the airport by providing airside frontage. Taxiway systems include parallel taxiways, entrance/exit taxiways, by-pass taxiways, taxiway run-up areas, hangar taxilanes, and apron taxilanes.

Taxiway Design Groups

Planning standards for taxiways include; taxiway width, taxiway safety areas, taxiway object free areas, taxiway shoulders, taxiway gradient, and for parallel taxiways, the distance between the runway and taxiway centerlines. The dimensions of each standard vary based on the identified Airplane Design Group (ADG) and Taxiway Design Group (TDG) for each taxiway. The ADG is based on the wingspan and tail height of an aircraft, while the TDG is based on the distance between an aircraft's cockpit to main gear, as well as the width of the main gear. There are six ADG groups, and seven TDG groups. Details regarding the various dimensions follow in **Table 4-5** and **Table 4-6**.

Table 4-5: Taxiway Requirements – Airplane Design Group

Design Standard	ADG I	ADG II	ADG III	ADG IV	ADG V	ADG VI
Taxiway Safety Area	49	79	118	171	214	262
Taxiway Object Free Area	89	131	186	259	320	386
Runway/Taxiway Separation	225-400*	240-400*	300-400*	400	400	500*

Source: FAA Advisory Circular 150/5300-13A

** - Runway/Taxiway Separation vary based on approach visibility minimums.*

Table 4-6: Taxiway Requirements – Airplane Design Group

Design Standard	TDG 1	TDG 2	TDG 3	TDG 4	TDG 5	TDG 6	TDG 7
Taxiway Width	25	35	50	50	75	75	82
Taxiway Shoulder Width	10	10	20	20	25	35	40

Source: FAA Advisory Circular 150/5300-13A

As taxiways are constructed or rehabilitated, design should carefully consider the recently updated guidance for taxiway design as published in FAA Advisory Circular (AC) 150/5300-13A, Airport Design. The new requirements include the design of taxiways for "cockpit over centerline" taxiing as opposed to "judgmental oversteering". This change particularly impacts curves and intersections, which will require changes to accommodate the "cockpit over centerline" taxiing. The dimensions of intersection fillets and taxiway curves are based on the associated TDG for each taxiway.

The selection of the A320 as the future design aircraft for Runway 4-22 and Cessna Citation Sovereign as the future design aircraft for Runway 10-28 suggest that TDG 3 and TDG 2 standards should be followed across the airfield. Further, ADG III standards should apply to taxiways supporting operations on Runway 4-22 or in/around the terminal area and ADG II standards should apply to taxiways only supporting operations on Runway 10-28. Presently all taxiways at AVP meet or exceed taxiway width and safety/object free area requirements.

Other taxiway requirements and recommendations include avoiding wide expanses of pavement, limiting runway crossings, increasing pilot situational awareness (including the elimination of taxiways direct from aprons to taxiways that cross a parallel taxiway and/or access the runway), and the elimination of dual purpose pavements. Overall, these comprehensive taxiway requirements indicate the need for some changes to the taxiway system at AVP as identified in **Figure 4-3**.

Recommendations

In the future, Taxiway B should be extended to become a full length parallel taxiway to Runway 4-22. This would eliminate the need for aircraft to back-taxi on the runway in order to access a runway end for takeoff, thereby reducing runway occupancy time and increasing the airports capacity as well as providing for a safer operating environment. Additionally, runway incursion hot spots were identified on Taxiway A, Taxiway B3, Taxiway C, and Taxiway E. Each of these taxiways provide direct access from an aircraft apron to a runway. Current FAA guidance suggests the safest geometric layout of an airfield should minimize such conditions. Chapter 5 presents alternatives to correct these nonstandard conditions.

4.2.4. Airfield Equipment Requirements

A number of facilities are necessary to support the operations of the airfield including instrument approaches, airfield lighting, airfield signage and markings, and communications equipment. Each of these are described in the following sections.

Instrument Approach Needs

As identified in Section 1.5.4, Runway 4 and Runway 22 at AVP are both supported by ILS precision approaches and GPS-based non-precision approaches. Table 4-2 reveals that Runway 4-22 provides adequate (above 95 percent) wind coverage during IFR conditions for all aircraft types which negates need for any future instrument approaches to Runway 10-28. As such, no new instrument approaches are recommended. Further, the existing approach visibility minima available for the approaches to Runway 4 and 22 is considered adequate to support operations throughout the planning period.

Figure 4-3: Taxiway Geometry

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Approach Lighting

To support the existing precision approach to Runway 4, the approach zone to that runway is equipped with a 1,400-foot medium intensity approach lighting system with Runway alignment indicator lights (MALSR). Runway 22 approach is not supported with an approach lighting system.

The current approach lighting system on both ends of Runway 4-22 meet the standards for ILS Category (CAT) I approaches and meets existing needs at AVP. Future needs for the airport could include the improvement of an ILS approach on Runway 4 from CAT I to CAT II. The development of a CAT II approach would require the replacement of the existing MALSR with an Approach Lighting System with Sequenced Flashing Lights in an ILS CAT II Configuration (ALSF-2). The development of a CAT II approach would also require installation of touchdown zone lights to support the RVR minimums less than 2,400 feet. In addition, the installation of runway guard lights, taxiway centerline lights, and taxiway clearance bar lights, and additional transmissometers would also be required as part of a CAT II approach.

Visual Approach Aids

Existing visual approach aids at AVP are described in Section 1.5.5 and include a 4-box PAPI system to Runway 4, a 4-box VASI system to Runway 22 and a 2-box PAPI system to Runway 10. As replacement of the existing VASI becomes necessary, the installation of the more commonly utilized PAPI should be considered. Additionally, a 2-box or 4-box PAPI system should be considered for Runway 28 to improve overall pilot awareness while on approach to that runway.

Airfield Lighting

As described in Section 1.5.4, runway and taxiway edge lights are provided for all runways and taxiways at AVP. High intensity runway lights (HIRL) and medium intensity runway lights (MIRL) are installed on Runway 4-22 and Runway 10-28, respectively, and all taxiways are equipped with medium intensity taxiway lights (MITL). Existing airfield lighting should be maintained throughout the planning period and expanded upon with any airfield development initiatives, as required.

4.2.5. Airfield Facility Requirements Summary

Several requirements for airside facilities have been identified and discussed in the preceding sections. A summary of the key requirements identified can be found in **Table 4-7**.

Table 4-7: Summary of Airfield Facility Requirements

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Runway Length	Runway 4-22 – 7,501' Runway 10-28 – 4,300'	Runway 4-22 – 7,501' Runway 10-28 – 4,300'	None
Runway Width	Runway 4-22 – 150' Runway 10-28 – 150'	Runway 4-22 – 150' Runway 10-28 – 75'	None
Runway Safety Areas	Runway 4-22 – EMAS Runway 10-28 – Standard	Runway 4-22 – Provide EMAS Runway 10-28 – Provide Standard	None
Runway Object Free Areas	Standard on all Runways	Provide Standard ROFA on all Runways	None
Runway Protection Zones	Partially Under Airport Control through Ownership or Avigation Easements	Under Airport Control through Ownership or Avigation Easements	Control of All RPZs through Ownership or Avigation Easements
Runway Visibility Zone	Standard	Standard	None
Runway Lighting	Runway 4-22 – HIRLs Runway 10-28 – MIRLs	Runway 4-22 – HIRLs Runway 10-28 – MIRLs	None
Runway Visual Aids	Runway 4 – PAPI4, MALSR Runway 22 – VGSI4, REIL Runway 10 – PAPI2, REIL Runway 28 – REIL	Runway 4 – PAPI4, MALSR Runway 22 – PAPI4, REIL Runway 10 – PAPI4, REIL Runway 28 – PAPI4, REIL	Runway 22 – PAPI4 Runway 10 – PAPI4 Runway 28 – PAPI4
Instrument Approaches	Runway 4 – ILS/LOC, GPS(LPV) Runway 22 – ILS/LOC, GPS(LPV) Runway 10 – Visual Runway 28 – Visual	Runway 4 – ILS/LOC, GPS(LPV) Runway 22 – ILS/LOC, GPS(LPV) Runway 10 – Visual Runway 28 – Visual	NONE
Taxiways	Runway 4-22 – Part Parallel Runway 10-28 Part Parallel Taxiway Geometry Issues	Runway 4-22 – Full Parallel Runway 10-28 – Partial Parallel Taxiway Geometry Compliance	Runway 4-22 – Full Parallel Taxiway Hotspots
Taxiway Width	50 – 75 Feet	50 – 75 Feet	None
Taxiway Lighting	All Taxiways – MITL	All Taxiways – MITL	None

Source: FAA Advisory Circular 150/5300-13A

** - Runway/Taxiway Separation vary based on approach visibility minimums.*

4.3. TERMINAL FACILITY REQUIREMENTS

4.3.1. Terminal Building

Basis of Analysis

This section summarizes general planning factors and assumptions used to analyze facility requirements for key functional areas of the passenger terminal. Requirements were analyzed based on a variety of relevant factors. The primary tool for the analysis was ACRP Report 25, Airport Passenger Terminal Planning and Design, Volume 2: Spreadsheet Models and User's Guide (Model). However, other methods were also utilized including industry-wide trends, facilities provided at comparable airports, and guidelines published in the following publications: International Air Transport Association's (IATA's) Airport Development Reference Manual, FAA AC 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities, FAA AC 150/5360-9, Planning and Design of Airport Terminal Facilities at Non-Hub Locations, and FAA AC 150/5300-13A, Airport Design.

Terminal facility requirements were generated for aircraft gates/parking positions, holdrooms, ticketing and check-in positions, passenger security screening, and baggage handling facilities. Additional consideration was given to other terminal requirements including airline operational space, public circulation, both secure and non-secure, concessions, administration space, and terminal support space.

Methodology

Utilizing the Model and standards listed above, the following passenger processing functions were examined:

- Terminal curb/vehicle processing
- Airline check-in and ticketing
- Checked baggage screening system
- Outbound baggage makeup
- Passenger and employee screening
- Holdrooms
- Inbound baggage system
- Terminal circulation
- Gates

Application of the ACRP Model

The ACRP Model is designed to determine terminal requirements by functional areas based on historical and forecasted annual enplanements, departures, and gate utilization. The Model uses these inputs (along with a variety of assumptions) to identify peak hour activity. From this point, the Model relies on peak hour activity levels to produce space requirements that can accommodate demand as it grows. In this way, the Model serves as "top down" analysis, starting with annual demand to hone in on peak activity demand.

Facility requirements at AVP were determined using the assumptions shown in **Table 4-8** for peak hour departures, which corresponds to the baseline forecast assessment presented in

Chapter 2, Forecast, and expresses steady growth in annual arriving and departing (A&D) passenger activity.

Table 4-8: Peak Hour, Daily & Annual Activity Assumptions

Departures & Passengers	2015	2020	2025	2035
Peak Hour Arriving/Departing Passengers	298	335	376	457
Daily Arriving/Departing Passengers	662	744	836	1,106
Annual Arriving/Departing Passengers	218,219	245,183	275,479	335,032

Source: McFarland Johnson, 2016

Level of Service Standards

The International Air Transport Association (IATA) has developed and refined a comprehensive set of standards for planning various passenger processing functions for airport terminal buildings and is typically used as the standard for most terminal space planning calculations. These standards are presented in the IATA Airport Development Reference Manual, 9th Edition, published in January 2004. These standards apply primarily to calculation of passenger queuing areas and circulation space and are intended to control passenger densities to enhance individual passenger comfort overall. Based on general planning guidelines a minimum of service level C will be provided for in the ACRP model for the purpose of future terminal improvement programing.

- A – Excellent level of service. Conditions of free flow, no delays, and excellent levels of comfort
- B – High level of service. Conditions of stable flow, very few delays, and high levels of comfort
- C – Good level of service. Conditions of stable flow, acceptable delays, and good levels of comfort
- D – Adequate level of service. Conditions of unstable flow, acceptable delays for short periods and adequate levels of comfort
- E – Inadequate level of service. Conditions of unstable flow, unacceptable delays and inadequate levels of comfort
- F – Unacceptable level of service. Conditions of cross-flows, system breakdown and unacceptable delays, unacceptable level of service

Table 4-9 below provides the IATA Level of Service Area Standards and Definitions for various passenger processing conditions included in this analysis.

Table 4-9: IATA Space Standards with LOS Definitions (in Square Feet)

Functional Area	A	B	C	D	E	F
Check-in Queuing	19	17	15	13	11	Unserviceable
Wait/Circulate	29	25	20	16	11	Unserviceable
Holdroom	15	13	11	9	6	Unserviceable
Bag Claim	22	19	17	15	13	Unserviceable

Source: International Air Transport Association "Airport Development Reference Manual," 2004.

Assumptions

Percentage of Outgoing Passengers

For purposes of analyzing passenger terminal space requirements, it is assumed that 100 percent of enplaned passengers are originating at AVP. The originating passenger percentage is used to determine the number of passengers who pass through check-in processing and security screening thereby affecting facility capacity requirements.

Load Factor

Typically, aircraft load factors for the peak month and the average day of the peak month (ADPM) are greater than the annual averages, reflecting increased demand during seasonal peak travel. For the purpose of analyzing passenger terminal space requirements, a load factor of 85 percent was applied to calculations in the Model based on the standard recommendation for facilities designed to accommodate LOS C conditions.

Vehicle Demand at Terminal Curb

Vehicle demand in the Model is comprised of a range of types utilized by passengers as ground transport to an airport for departing flights. These include everything from private automobiles carrying one to three passengers to tour buses carrying large groups of passengers. For this analysis, a focus was placed on private autos, taxis, and hotel shuttles, followed by limousines, and buses. **Table 4-10** illustrates the assumed breakdown of peak vehicle demand at the curb.

Table 4-10: Peak Hour Vehicle Volume Assumptions

Vehicle Type	Peak Hour
Private Auto	204
Taxi[1]	11
Hotel Shuttle	4
Limousines	1
Bus	2
Total	222

Note: 1/ includes rideshare options such as Uber and Lyft.

Source: McFarland-Johnson Analysis, 2016

The number of vehicles is based on the assumption that limousines and taxis will carry one passenger each, private autos will average just under two passengers per vehicle, all shuttles will carry approximately three passengers, and tour buses will average 20 passengers. It is assumed, based on a typical dwell time between one and five minutes identified in the Model, that the average private auto will dwell for four minutes at the curb, while hotel shuttles and busses will dwell for five minutes, and taxis and limousines will dwell for only three minutes. Further, the model assumes no pedestrian disruption of vehicular traffic and provides no allowances for excessive dwell time.

Passenger Check-in Preferences

In order to analyze passenger processing requirements for check-in facilities, it is necessary to determine how this demand will be distributed between staffed airline counters, kiosks, and online transactions. For the purpose of analyzing the Terminal's capacity over the forecast period, it was assumed a steady distribution as follows:

- Staffed Counter Position Use 35%
- Kiosk Position Use 40%
- Online Check-in/Off-site Use 25%

The above assumption for passenger check-in preferences are considered to be rather conservative across the planning period as the trend towards off-site check in is likely to continue over the coming decades.

Passenger Security Screening Checkpoints

The following assumptions were utilized to analyze the future demand for security screening of departing passengers. The assumed processing rate for the analysis is 150 persons per lane per hour, which is typical of TSA security checkpoints at U.S. airports. The percentage assumed for non-passenger traffic such as employees and crew is 10 percent, which was added to the design peak hour passenger screening demand and is based on recent experience at other airports.

Peak 30-minute originating passengers from check-in for 20-year forecast period was set at 250, or roughly 55 percent of design hour passenger activity.

In terms of existing conditions, a security queue depth of 25 feet was assumed along with a 20-foot width per lane, an overall length of 60 feet, and a reconciliation depth area of 10 feet. Based on a LOS C, the passenger space required was set at 10.8 square feet per passenger.

Outbound Baggage & Checked Bag Screening Assumptions

In terms of Explosive Detection System (EDS), On-Screen Resolution (OSR), and Explosives Trace Detection (ETD) equipment requirements, the analysis assumed a Level 1 EDS screening rate of 200 bags per hour, with an alarm rate of 25 percent. Level 2 OSR rate was set at 120 bags per hour per operator, with 80 percent of OSR bag reviews being resolved. For Level 3 ETD screening, the TSA suggests 24 bags per hour per operator.

Baggage screening space requirements contained in the Model were utilized here, and are as follows:

- Level 1 Area: 800 sf per EDS Unit
- Level 2 Area: 40 sf per OSR Station
- Level 3 Area: 100 sf per ETD Unit

For outbound baggage volume the following assumptions in **Table 4-11** were used.

Table 4-11: Outbound Baggage & Screening System Assumptions

Item for Analysis	Assumption
Peak Hour Passengers Checking Bags	75% of Design Hour Enplanements
Checked Bags Per Passenger	1.5
Bag Size – Standard	95%
Bag Size – Oversized	5%

Source: McFarland-Johnson Analysis, 2016

In terms of checked baggage make-up, the analysis assumed two baggage carts are staged for each peak hour departure aircraft. The Model recommends that each cart will require 600 square feet of space for staging, maneuvering and loading. An additional 15 percent of square footage is included for baggage train circulation.

Inbound Baggage

Related to inbound baggage, the Model considers not just terminating passengers with checked baggage but also includes an allowance for additional people at baggage claim who are meeting/greeting travelers, but also acknowledges that not all members of a travelling party will be standing at the baggage claim waiting to claim checked baggage. The average party size utilized in the Model is 1.3 people. The industry standard for planning baggage claim area is to assume that one member of each travelling party that has checked bags will wait at the baggage claim, and an additional 20-30 percent above the volume of those waiting for checked bags will be added to accommodate additional members of the travelling party and "meters/greeters." The following assumptions in **Table 4-12** were used to analyze the future demand for inbound baggage claim devices and passenger waiting area.

Table 4-12: Inbound Baggage System Assumptions

Item for Analysis	Assumption
Percent of passengers checking bags	75%
Bags per passenger[1]	2
Ratio of Meter/Greeter & Additional Traveling Party Members	20%

Source: McFarland-Johnson Analysis, 2016

Notes: 1 It has been identified that certain legacy airlines are currently observing lower 'checked bag per passenger' quantities; For planning purposes, the higher quantity has been used

The analysis assumed 50 percent of passengers will deplane in a peak 20-minute period, with 100 percent of passengers terminating their travel at AVP.

The Model for baggage claim area requirements also includes an estimate of use time per flight. To do so, the Model uses inputs previously noted - 2 bags for 75 percent of passengers. To account for bags not retrieved on the first rotation of the claim unit a buffer of up to 10 minutes is considered typical. An unload rate of 10 bags per minute is also included.

Holdrooms

Holdroom seating demand was based on the load factor noted (80 percent) for flights and carriers operating at AVP. Seating was estimated to be provided for 75 percent of passengers with additional standing space for the remaining 25 percent of passengers. Space planning factors of 15 square feet per seated passenger and 10 square feet per standing passenger were used based on LOS C conditions. The Model also includes square footage increase and decrease allowances that can be used to adjust holdroom area based on the specific use of an airport. For example, an increase of 10 percent was included to accommodate amenities such as work stations, charging stations, children's play areas, gate check-in podium, and boarding queue/gate egress area. To balance this increase and account for the current configuration of the holdrooms (one large room used by all passengers, excluding the two ground boarding holdrooms), a decrease of 20 percent reflects the sharing of holdroom seating and standing areas by passengers for several flights.

Concourse Circulation

For estimating terminal circulation, the Model offers options for a single-loaded versus double-loaded concourse, offers an "Airport Hubbing Activity Factor," and also includes an allowance for moving walkways. For AVP, a double-loaded concourse was selected, the hubbing factor was set to zero, and no allowance was included for moving walkways. In total, 80 percent of the concourse is estimated to be usable by passengers.

Federal Inspection Services

Though not currently required at AVP, a federal inspection services (FIS) area would be required to support international air carrier operations. An FIS facility is a single processing complex that consolidates and integrates the functions of U.S. Customs and Border Protection (CBP), immigration, and agriculture operations, offices, and support functions. The FIS facility unifies both passenger processing and baggage/cargo processing for safe and efficient flow of passengers and goods into and out of the United States. The FIS facility includes a CBP security area to accommodate international air commerce designated for processing passengers, crew, baggage and effects arriving from, or departing to, foreign countries, as well as aircraft deplaning, ramp areas, and other restricted areas designated by the local CBP port director.

For the purpose of analyzing future FIS spatial requirements for primary passenger processing using the ACRP model the following assumptions were made:

- Two single sided passenger processing booths will be maintained throughout the planning period allowing for two primary processing positions.
- An unload rate of 20 passengers per minute and processing rate of 100 passengers per hour will be utilized.
- Queuing space of 18 square feet per passenger will be utilized in the calculations.

Results of Analysis

The results of AVP's terminal capacity assessment were organized by functional area in Table 4-13 through Table 4-22, and are accompanied by descriptions in the sections that follow:

- Terminal Curb
- Airline Check-in, Ticketing, and Operations

- Outbound Baggage System and Baggage Make-up
- Passenger Security Screening
- Holdrooms
- Inbound Baggage Systems and Baggage Claim
- Concourse and Circulation Areas
- Federal Inspection Services
- Gates
- Concessions

Terminal Curb

The initial task of accommodating passenger activity levels at AVP is servicing vehicle traffic for departing passengers at the terminal curb. Incoming traffic is comprised of a range of different vehicles, and the Model incorporates assumptions regarding the total volume, peak 15-minute volume, dwell time by type of vehicle, and vehicle length. Utilizing the assumptions for peak hour vehicle volumes by type used in the analysis shown in Table 4-10, the Model determines the terminal curb's ability to accommodate peak hour departing passengers. The length of the existing usable curb area was measured at approximately 350 feet. The analysis considers only vehicles directly dropping off and picking up users of the airport. The Model does not consider private vehicles that are idling and waiting for passengers at the curb for pickup, as private automobiles are prohibited from idling in front of the terminal due to airport security requirements. Private vehicles must either park or circle the terminal loop road while awaiting the pickup of their passenger. However, this is not always the case at AVP and vehicles often dwell at the curb longer than the three-minute maximum accounted for in the model. Furthermore, the model does not take into account the impact pedestrians using the crosswalk from the parking facilities have on the efficient movement of vehicles about the terminal curb. As such, the required curb length was increased by 25 percent to provide an appropriate contingency buffer to account for such conditions. Alternatively, improvements to minimize the effect of these factors should be explored in the future.

As a percentage of total vehicle demand, it was assumed that 35 percent would utilize the curb in the busiest 15-minute period. **Table 4-13** displays the Model's curb performance results.

Table 4-13: Terminal Curb Performance

Curb Requirements	Peak Hour
Design Hour Demand in Vehicles	222
Existing Curb Length	350 Feet
Required Curb Length for LOS C	287-340 Feet
Required Curb Length for LOS C + Contingency Buffer	359-425 Feet
Performance	LOS B

Source: McFarland-Johnson Analysis, 2016

As shown, the existing length of usable curb outside the terminal building is constrained during times of peak activity as vehicles queue on two lanes and occasionally push into the outermost movement lane. Opportunity exists, however, for the Airport to slightly realign a portion of Terminal Road and provide some additional curb frontage near ticketing after the demolition of the old airline terminal located just south of the existing terminal. Such improvements should be explored, as appropriate, with the creation of any redevelopment alternatives for the old terminal area. Adding additional curb frontage will support flexibility in airport operations and improve overall passenger experience during times of above average utilization. Additionally, physical reconfiguration of pedestrian crosswalks and improvements to the curb front operation (i.e. reduction vehicle dwell and pickup/drop-off times) should be sought in conjunction with physical expansion of the curb front.

Airline Check-in, Ticketing and Operations

Once passengers enter the terminal building, it is important for airline check-in and ticketing facilities to be able to adequately serve demand during peak travel times. The results of the Model analysis are presented in **Table 4-14**.

Table 4-14: Airline Check-In/Ticketing

Staffed Counted Positions	Peak Hour
% Passengers Using Staffed Counted Positions	50%
Existing Staffed Counter Positions	12
Required Staffed Counter Positions	6
Performance	LOS A
Existing Passenger Queue Area per Counter Position	288 sq. ft.
Required Passenger Queue Area per Counter Position	238 sq. ft.
Performance	LOS A
Kiosks	**Peak Hour**
% Passengers Using Kiosks	40%
Existing Kiosks	6
Required Kiosks	6
Performance	LOS A
Existing Passenger Kiosks Queue Area	264 sq. ft.
Required Passenger Kiosks Queue Area	200 sq. ft
Performance	LOS A

Source: McFarland-Johnson Analysis, 2016

As evidenced by the analysis above, the total existing ticket counter frontage and passenger queue area is sufficient to support airline check-in practices through the 20-year forecast period. As described in the previously outlined explanation of assumptions, this is based on a level of constant use by 50 percent of passengers through the forecast period. This is based on a weighted calculation which assumes ticket counters are utilized by 75 percent of allegiant traffic and 35 percent of other airline traffic. However, it can be expected that increasing use of advance ticket purchase and off-site check-in options will lead to a general reduction in need for traditional staffed ticket counter positions.

In terms of kiosk check-in, the Model indicates that existing kiosk units (six) will also be adequate through the forecast period.

Additionally, Airline Ticketing Operation (ATO) Office Space is provided for airlines utilizing the airport. The Model indicates that ATO space shall be designated to match the length of the ticketing counter, with a depth of at least 20 feet. Based on the requirements identified, approximately 2,400 square feet of ATO space are required based on a required counter length of 12 linear feet. Presently, approximately 2,450 square feet of ATO space is provided and no additional ATO space is required. Further, an additional 5,210 square feet of airline office space is provided on the first floor below the jet boarding area.

Outbound Baggage System and Baggage Make-Up

Outbound baggage systems are comprised of equipment that supports baggage operations for airline departures; these include the conveyors that transport baggage from the outbound make-up bag rooms and the TSA equipment that screens all outbound baggage. To explore system requirements, the Model links spatial and equipment requirements for outbound baggage to design hour departing passengers.

Additionally, since baggage handling systems work most efficiently under a certain threshold (e.g. ~80 percent of capacity), the Model applies a TSA surge factor. This surge factor takes into consideration unforeseen increases in baggage check-in, such as a tour group checking-in, and builds in some extra capacity to facilitate such atypical but predictable situations so as to better ensure operational reliability of the system. Per TSA's Planning Guidelines and Design Standards (PGDS) for Checked Baggage Inspection Systems (CBIS), a surge factor of 1.26 is applied to the Peak Hour Baggage Volume.

Baggage Security Screening – Explosives Detections Systems

The TSA baggage screening process is defined as a three stage process. In the first level of screening, bags pass through an Explosives Detection System. After passing through the machine, a portion of the bags will be cleared and routed to the baggage make-up operations, while the remainder will continue to be transported on conveyors and a second screening operation takes place. The second level of screening is called On-Screen Resolution where further examination of baggage images takes place. At the completion of the Level 2 screening, a portion of the bags will be cleared and diverted toward the baggage make-up operation. The remainder of the bags that have not been cleared through the OSR process will be routed into the Checked Baggage Reconciliation Area (CBRA) for Level 3 screening. In CBRA, TSA will utilize Explosives Trace Detection to examine bags even further as required.

Presently, AVP has one Level 1 EDS Screening system in place and operating. The results of the baggage screening capacity assessment are shown in **Table 4-15**.

Table 4-15: Baggage Screening Performance

Baggage Screening	Peak Hour
Existing Area for Levels 1, 2, & 3 Screening	1,255 sf
Required Area of Levels 1, 2, & 3 Screening	2,620 sf
Performance	Less than LOS C

Source: McFarland-Johnson Analysis, 2016

As shown, spatial requirements for baggage security screening will exceed current space allocations within the planning period. Additionally, based upon assumptions for the number of passengers checking bags (75 percent) and the average number of bags per passenger (one), three Level 1 EDS units are required to accommodate peak hour passenger activity. This will occur when peak hour enplanements surpass 380 passengers per hour, forecasted to occur as early as 2025. Further, the Model suggest that a total of three Level 2 OSR units will be required once design hour passengers checking in exceed 442 (as early as 2032) and a single Level 3 ETD unit will consistently be required over the planning period.

Presently, AVP is equipped with a single EDS, OSR, and EDT unit confined to a small space behind the airline ticket counters. In the future, two more level 1 EDS units and two more level 2 OSR units will be required, as will an increased area. Current delays and backups are already being experienced during times of peak activity.

Table 4-16: Baggage Screening Performance

Baggage Screening Equipment	Required Baggage Screening Equipment	Deficit
1 Level 1 EDS Unit	3 Level 1 EDS Unit	2 Level 1 EDS Unit
1 Level 2 OSR Unit	3 Level 2 OSR Unit	2 Level 2 OSR Unit
1 Level 3 EDT Unit	1 Level 3 EDT Unit	None

Source: McFarland-Johnson Analysis, 2016

Outbound Baggage Make-Up

The key component of the outbound baggage system is the make-up operation, in which screened baggage is transferred from check-in via a belt system to the loading area where carts are grouped by airline and flight. Using the assumptions outlined previously, **Table 4-17** presents the result of the Model analysis for baggage make-up.

Table 4-17: Baggage Make-Up Performance

Baggage Make-Up	Peak Hour
Existing Area for Baggage Make-Up	4,600 sf
Required Area for Baggage Make-Up	6,400-7,400 sf
Performance	Deficient 1,800-2,800 sf

Source: McFarland-Johnson Analysis, 2016

As shown, the Model indicates that AVP's existing baggage make-up area will experience capacity constraints based on the projected level of demand at the end of the 20-year forecast period. In fact, capacity constraints are already being experienced during weekday mornings when activity peaks as a result of multiple departing flights occurring nearly simultaneously. During these times significant backups and bag sorting issues arise as a result of the existing layout and access of baggage carts to the outbound baggage belt.

Passenger Security Screening

As previously described, the Model evaluates passenger security screening capability based upon: originating passenger volume during a peak 30-minute period, percentage of additional traffic (non-passenger, crew, and employees), an assumed capacity or throughput rate and a maximum target wait time. The results of this analysis are shown in **Table 4-18**.

Table 4-18: Security Screening Performance

Security Screening Lanes	Peak Hour
Peak Hour Traffic per Screening Lane	250
Existing Screening Lanes	2
Required Screening Lanes	2
Performance	No Additional Lane Required
Security Queue	**Peak Hour**
Existing Security Queue	320 sf
Required Security Queue	980 sf[1] / 120sf[2]
Performance	Insufficient Queue Area

Source: McFarland-Johnson Analysis, 2016

Note: 1/ based on one operational security screening lane. 2/ based on two operational security screening lanes.

As identified, no additional security lane will be required within the planning period based on forecasted demand and usage patterns. However, the need for more security queue is also strongly represented in the Model which reflects the needs for an additional 980 square feet of dedicated security queuing space until a second security screening lane is operational, at which time a total queuing space of 120 square feet at a minimum will be required.

The need for additional security queue is a notable event today. During weekday mornings when passengers departing on multiple flights arrive near simultaneously, the security queue quickly fills and passengers awaiting security overflow the existing queuing area and back up into the lobby corridor. When this occurs, other areas of the terminal suffer from the congested lobby space; including, the Pocono Club & Business Center, Destinations Arcade, Northeast PA News & Gift, and Lucky's Restaurant, for which access can be obstructed by the overflowing queue. An existing project to relocate the TSA checkpoint towards the escalators is currently in design. The intention of this improvement is to not only provide a more appropriate queuing area and prescreen checkpoint area, but also to ensure the restaurant and bar are located on the secure side of the terminal where passengers are more likely to frequent the concessionaire. Initial design alternatives for this relocation show the reallocation of the existing business center space and relocation of that space post-security as well as the reutilization of the existing arcade area as TSA offices. Once completed, the relocated TSA checkpoint will provide an expanded queuing area out of the way of passenger flow, two security lanes, a single millimeter wave scanner and a dedicated private screening area.

Holdrooms

As previously noted, the evaluation of current holdroom capacity is based on the latest IATA space planning standards utilizing an 80 percent load factor for assigned aircraft. The results of AVP's holdroom performance in the Model are shown in **Table 4-19** and reflects per gate holdroom performance.

Table 4-19: Holdroom Performance

Holdrooms	Peak Hour
Existing Holdroom Area	1,370 sf
Required Holdroom Area	2,100 sf
Performance	Deficient 730sf/holdroom

Source: McFarland-Johnson Analysis, 2016

Going strictly by the numbers, the Model suggests an additional 730 square feet of holdroom area will be required in each holdroom by 2035. However, in exploring the sensitivity of the terminal spatial planning model for AVP it was discovered that should the holdroom sharing factor, which provides for passengers to sit in another gates holdroom while awaiting their flight, be increased from 20 percent to 40 percent, that the required holdroom area is calculated to be 1,400 square feet. As such, it is assumed that in the future, excess capacity of all the terminal holdrooms will mitigate any deficiency encountered at a single gate and that no additional holdroom space will be required within the planning period until such time as the majority of gates are being used simultaneously. The Airport should plan for holdroom expansion in the future, but can mitigate holdroom capacity issues in the short run by encouraging full utilization of the concourse area by passengers awaiting boarding.

Inbound Baggage Systems and Baggage Claim

The existing inbound baggage system and claim hall at AVP is comprised of approximately 7,000 square feet of area. The system includes two 'T'-shaped flat panel conveyor. The capability of the baggage system and baggage claim area were analyzed with the results of the analysis shown in Table 4-20.

Table 4-20: Baggage Claim Performance

Baggage Claim	Peak Hour
Total Linear Feet per Person at Claim	2
Average People at Claim	140
Existing total Baggage Conveyor Frontage	210 lf
Required Linear Feet per Flight	280 lf
Performance	More Needed

Source: McFarland-Johnson Analysis, 2016

As indicated, the Model estimates that the existing baggage carousel frontage will not be adequate to accommodate peak hour passenger demand through the 20-year planning period and that an additional 70 linear feet of carousel is likely to be required by 2035. As such, terminal improvement alternatives should consider the feasibility of expanding upon existing baggage carousel's or adding a third unit. Lastly, the Model suggest that while facilitating peak hour demand that baggage claim use time could run anywhere from 34-43 minutes depending on the unload rate of ramp personnel. This use time is inclusive of the time it takes passengers to deplane the aircraft and make their way to the baggage claim area itself and is considered acceptable for peak hour activity.

Concourse Circulation Area

Public spaces include most of the non-revenue producing areas in the passenger terminal including: queuing areas, seating and waiting areas (exclusive of holdroom seating), and circulation corridors (secure and non-secure). The size and/or area of some of the public space is directly related to requirements imposed by the peak hour volume of passengers handled, such as allowance for common circulation areas in the ticket lobby and baggage claim, while other circulation space is required to access remaining functional areas. In either case, space must be sufficient to meet applicable life safety codes, avoid pinch points that lead to congestion of passenger flow, and provide additional space as necessary wherever cross circulation cannot be avoided.

Table 4-21 depicts the ability of existing concourse and circulation areas to accommodate passenger demand through the 20-year forecast period.

Table 4-21: Concourse/Circulation Performance

Concourse/Circulation	Peak Hour
Existing Concourse Circulation Area	5,700 sf
Required Concourse Circulation Area	5,700 sf
Performance	Adequate

Source: McFarland-Johnson Analysis, 2016

The Model suggests that no additional concourse circulation space will be required over the planning period, yet also suggests that no extra capacity is available within the concourse to reallocate any circulation space for any ancillary uses in the future. Should additional uses (such as the relocation of Lucky's Restaurant and Bar) be desired in the concourse area, serious consideration should be given to that uses impact to the existing circulation area and the needs for expanded circulation area. Any expansion of terminal holdrooms or concourse amenities will likely necessitate expanded concourse circulation.

Federal Inspection Services

The existing FIS area at AVP not regularly utilized and does not meet current federal guidelines. The facilities are located adjacent to the two ground boarding gates (Gate 1 and Gate 2) and provides approximately 1,600 square feet of area dedicated to inspection services, CBP offices and support spaces, 900 square feet of which is reserved specifically for the two inspection stations and their required queuing area.

Based on single arrival processing requirements using the assumption previously outlined a total primary processing area of 1,100 square feet is suggested by the Model. Should multiple international flights require FIS services within the same time period, additional processing stations and an increased queuing area will be required. Any future growth in international activity would require expansion of the FIS.

Gates

As described in Section 1.7.3, the gate area at AVP encompasses roughly 15,000 square feet of seating and circulation space for a total of eight departure gates, six of which are equipped with jet bridges capable of serving most narrow body, and some widebody mainline aircraft. The remaining two gates are for ground level boarding of turboprop aircraft. **Table 4-22** depicts the results of the analysis for gates at the airport.

Table 4-22: Gate Performance

Concourse/Circulation	Peak Hour
Existing Gates	8[1]
Required Gates	7
Performance	Adequate

Source: McFarland-Johnson Analysis, 2016

Note: 1/ Only six of the eight existing gates are equipped with boarding bridges. Gates 1 and 2 are designed for ground level boarding of turboprop aircraft.

While the Model suggests that no additional gates will be required to facilitate forecasted demand over the planning period, it would be prudent to plan for an additional boarding bridge equipped gate in the future. As existing propeller driven commercial service aircraft, such as the Dash 8 currently in use at AVP, are replaced by regional jets (a trend already taking place within the industry and currently planned for by airlines operating at AVP), utilization of the existing gates will increase and could create conflicts with existing gate capacity. Further, additional gate and apron flexibility should be explored in future development options in order to accommodate aircraft diversions or overflow situations so as to improve operational reliability of the terminal complex especially during times of inclement weather.

Concessions

A number of tenants currently occupy space within the AVP commercial terminal building. Lucky's Restaurant & Bar, Northeast PA News & Gift, and Destinations Arcade operate on the terminal's second level just prior to security. A Lucky's kiosk operates on the second level in the jet boarding area, and multiple rental car counters are located near baggage claim on the terminal's first floor. FAA guidelines do not specifically address the requirements for various types of concessions space within a terminal as demand is typically market driven with variation between locations. However, FAA Advisory Circular 150/5360-9, Planning and Design of Airport Terminal Facilities at Non-Hub Locations, does provide an approximation of space requirements for food, beverage and miscellaneous (including newsstands and gift shops) concessions at airports similar to AVP. These recommendations, based on the peak hour passengers for the airport (arriving and departing), indicate a requirement for between 3,000 to 4,000 square feet of space for these functions. Presently more than 4,000 square feet of terminal space is dedicated for such uses. For rental car facilities, requirements can vary significantly. It is recommended that a minimum of approximately 50 square feet per rental car counter be provided for counter, with additional office space, as well as an additional 60 square feet for queuing. These facilities are recommended to be located close to the rental car parking area. Appropriate space exists for rental car counters, offices, and queue.

In addition to having the appropriate volume of space for the various forms of terminal concessions the location and accessibility of those spaces is critically important. Presently, the primary restaurant and bar area (Lucky's) is located within the non-secure section of the terminal which is not typical of modern airport terminals similar in size to AVP's. Since the introduction of post-9/11 security requirements passengers are more likely to seek such amenities after clearing the security checkpoints. The upcoming relocation of the TSA security checkpoint previously described will ensure the restaurant area is behind security. Not only will such an improvement better serve passengers with dining and concession options but also reduce interaction between the restaurant and security checkpoint. Furthermore, rental car counters are appropriately located near the baggage claim area, however, are some distance from the rental car lot itself. Consideration should be giving to collocating these facilities in the future as much as possible to limit walking distances for passengers moving from the rental car counter to the rental car.

4.3.2. Terminal Apron Requirements

The commercial terminal apron at AVP is constructed primarily of reinforced concrete around the terminal building and asphalt adjacent to ground boarding gates (Gate 1 and 2) and the apron taxilane. Findings from the gate analysis suggest that no additional gates are likely to be required within the planning period. Further, being no major changes are anticipated with respect to commercial air carrier fleet mix over the planning period, the existing dimensions of the terminal apron will remain sufficient. However, asphalt sections of the terminal apron will need to be upgraded to concrete due to the sever rutting that exists from repeated operations of aircraft and the increased wear from larger aircraft introduced in recent years.

4.3.3. Auto Parking Requirements

Automobile parking facilities are an integral component of any commercial service airport terminal. All airports strive to provide convenient and economical parking options for passengers as parking revenue is often a significant, if not the primary, revenue generator from commercial passenger activities. Undersized or inconvenient parking facilities will result in fewer passengers and/or the creation of off-airport parking facilities leading to reduced passenger comfort and reduced airport revenue.

As described in Section 1.8 of this report the AVP parking garage and surface lot were both constructed in 2003 and provide for 640 and 480 parking spaces, respectively. Additionally, an employee lot (154 spaces) and a rental car parking lot (117) spaces are also provided.

Public Parking

Parking Factor

Enplanements at AVP consist of both local passengers as well as passengers with itineraries originating in other areas; in addition, not all local passengers are parking at the airport. Based on passenger trends at AVP and those commonly seen at similar non-hub airports, it is assumed that approximately 60 percent of passengers are local originating passengers of which approximately 80 percent park at the Airport. This parking factor is considered to be a conservative effort and appropriate for long term planning of parking facilities.

Parking Lot Utilization and Peak Seasons

Automobile parking data was analyzed for a five-year period (2010-2015) to explore the monthly and seasonal variations in parking lot utilization and revealed peak parking demand is primarily experienced in the spring months (March-May) and in the fall (September-October). It was further identified that parking demand is lowest during the late summer months (July-August) and winter months (December-January). Peak months are typically 12-15 percent greater than the typical month. However, it was evident that the utilization of the Airport's surface lots and parking garage vary considerably over the year. Although the parking garage is always more utilized than the surface lots, the garage sees its highest utilization in the winter months (January-March), whereas the surface lots are most utilized in the spring and fall months. The analysis revealed that surface lots are, on average, approximately 48 percent full and the parking garage is normally about 53 percent full. Monthly average utilization rates, however, has been as high as 57 percent and 67 percent for the surface lots and parking garage, respectively, and peak days within the month can push even higher. The parking garage for example often reaches 80 percent capacity or higher during peak periods on peak days during the winter months, and the surface lots regularly reach 75 percent capacity. Evidence of this has been reported by airport management in the first months of 2017 as the reduction in airline service at Greater Binghamton Airport (BHM) has been fully realized and AVP has absorbed some of that unmet demand. As such, both garage and surface lots regularly reach 95-100 percent capacity during peak weekday utilization. Furthermore, as a means to provide better customer service and customer experience on-site rental car companies desire to store pickup ready rental cars in the garage area which would only exacerbate the existing capacity constraints of the parking facility.

Table 4-23 presents a synthesis of parking utilization for the most recent five years of parking data at AVP.

Table 4-23: Passenger Auto Parking Utilization Characteristics

Month	Surface Lot Peak Utilization	Garage Peak Utilization	Total Peak Utilization
January	39.8%	58.8%	50.9%
February	49.6%	69.3%	59.3%
March	61.5%	65.1%	60.7%
April	65.6%	58.4%	60.4%
May	61.8%	53.6%	56.8%
June	61.7%	54.6%	57.4%
July	54.3%	49.4%	51.3%
August	55.7%	47.7%	50.8%
September	63.8%	55.5%	58.8%
October	61.6%	58.8%	59.5%
November	57.0%	55.1%	55.3%
December	47.4%	51.2%	49.7%

Source: McFarland-Johnson Analysis, 2016

Since parking lot occupancy can be higher on certain days and especially as the departing and arriving passengers for a particular flight will overlap, a planning threshold of 80% was applied to the theoretical parking lot capacity. As parking lots approach capacity, it becomes increasingly difficult to find available spaces as well as keep spaces free of snow and ice, which decreases the level of customer service.

As commercial activity grows at the airport, so too will the demand for parking facilities. As presented in Chapter 2, *Forecasts*, airline enplanements are anticipated to grown from 218,219 in 2015 to 368,086 in 2035, representing an average annual growth rate of 2.65 percent. Projecting this increased activity in terms of additional parking facilities required to maintain the existing level of service, which as shown above is just slightly below capacity thresholds, indicates approximately 500 additional surface lot parking spaces and 675 parking garage spaces will be required by 2035. Furthermore, future garage parking positions for rental cars are not accounted for here. Should the exiting rental car parking lot be relocated to the garage, an additional 117 spaces would be required. Also, it should be noted that uncovered spaces located on top of the parking garage are generally not as desirable as covered garage spaces and should therefore be counted as surface lot positions so as to ensure the appropriate level of parking spaces are provided for to maintain a high level of passenger satisfaction.

Employee Parking

As the number of terminal activity and tenants increase, so too will the demand for employee vehicle parking. FAA guidance suggests that 250 to 400 employee parking spaces be provided per million annual enplanements. For planning purposes, the higher metric of 400 employee parking spaces per million passenger enplanements has been utilized to determine employee parking requirements. Based on the enplanement forecast, approximately 125 parking spaces would be required by 2035. The existing employee parking lot providing 154 spaces will remain adequate over the planning period.

Rental Car Facilities

Presently the rental car parking area is located directly southeast of the parking garage and provides 117 vehicle parking spaces. This area is used for both rental car pickup and drop-off. Generally, rental car facilities at commercial service airports are located convenient to the baggage claim area so as to minimize the distance between a passengers' bag pick up and their rental car location. At AVP rental cars are located as close to baggage claim as existing topography will allow, a distance of 400+ feet. Additionally, the existing rental car parking lot is regularly full. Based on enplanement projections an additional 40 to 50 rental car parking spaces could be require by 2035. Lastly, the servicing and cleaning of rental cars occurs at a facility off Navy Way Road. Through the creation of development alternatives, consideration should be given to consolidating all rental car functions to a common area in the future, preferably in near proximity to the baggage claim and rental car counters within the terminal building.

4.3.4. Terminal Roadway System

Terminal Drive provides direct access from Interstate 81 and Airport Road to the terminal building and its parking areas. Vehicles needing to recirculate must use a portion of Spruce Street to complete the terminal loop. This situation is not ideal as Spruce Street is a residential street providing access to a number of homes. Typically, airports of AVP's caliber have internal circulation roads supporting their commercial terminal allowing airport vehicle traffic to be isolated from other local surface traffic. The terminal roadway system is also burdened, at times, by vehicular traffic accessing the air cargo area as that area is only accessible via the terminal loop road. The terminal loop road could be slightly disburdened in the future should a cell phone waiting lot be constructed as the need for vehicles to regularly recirculate would be significantly reduced. As identified in the Inventory chapter and realized through the stakeholder engagement and public outreach process, signage and wayfinding could be improved on the terminal loop road to provide more clear and consistent guidance to vehicles. Furthermore, opportunities for the separation of local and Airport related surface traffic should be considered in future development alternatives.

4.3.5. Passenger Terminal Facility Requirements Summary

Table 4-24 presents a summary of the terminal facility requirements as outlined in the preceding sections.

Table 4-24: Passenger Terminal Facility Requirements Summary

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Terminal Curb	350 lf	287-340 lf	Expand curb as able
Airline Check-in & Ticketing Operations	288 sf /counter 264 sf /kiosk	129 sf/counter 200 sf/kiosk	None
Outbound Baggage System and Baggage Makeup	1 Lvl 1 EDS 1 Lvl 2 OSR 1,255 sf 1 Lvl 3 EDT 4,600 sf Bag Makeup	1 Lvl 1 EDS 1 Lvl 2 OSR 1,255 sf 1 Lvl 3 EDT 6,400-7,400 sf Bag Makeup	1 Lvl 1 EDS 1 Lvl 2 OSR 1,255 sf 1 Lvl 3 EDT 1,800-2,800 sf Bag Makeup
Passenger Security Screening	2 security lanes 320 sf queue	2 security lanes 440 sf queue	0 security lanes 120 sf queue[1]
Holdrooms	1,370 sf/gate	2,100 sf/gate	730 sf/gate[2]
Inbound Baggage Systems and Baggage Claim	210 lf	280 lf	70 lf
Concourse and Circulation Area	5,700 sf	5,700 sf	None
Federal Inspection Services	900 sf	1,100 sf	200 sf
Gates	8	7	None
Concessions	>4,000 sf Non sterile restaurant	3,000-4,000 sf Sterile restaurant	3,000-4,000 sf Sterile restaurant
Terminal Apron Requirements	~30,000 sy	~30,000 sy	None
Auto Parking Requirements	640 Garage Stalls 480 Surface Stalls 154 Employee Stalls 117 Rental Stalls	1315 Garage Stalls 980 Surface Stalls 167 Employee Stalls 167 Rental Stalls	675 Garage Stalls 500 Surface Stalls 0 Employee Stalls 50 Rental Stalls

Source: McFarland-Johnson Analysis, 2016

Note: 1/ Based on two operational security lanes. With only one security lane a total queue area of 980 sf is required.
2/ Some additional capacity can be made up through available holdroom space at neighboring gates, as required.

4.4. AIR CARGO REQUIREMENTS

Air Cargo is classified as either belly cargo or freight (domestic and international). Belly cargo is a by-product of the passenger airlines that have space to carry cargo in the under-side baggage compartments of their scheduled passenger flights. This type of cargo is typically handled by the airlines themselves, or by a third-party contractor that may offer a variety of handling services, including delivery.

Freight carriers operate aircraft that only carry cargo and provide air transportation as part of a single, seamless, door-to-door product that includes pickup, transportation, and delivery; insurance; tracking; Customs clearance; and other functions.

The purpose of this section is to identify the facilities required to support air cargo operations at the Airport. As indicated in the forecast, air cargo is anticipated to increase throughout the planning period. To ascertain the facilities required to support this activity at the Airport, it is necessary to understand the current operations, and be able to project future facility requirements for three primary areas associated with Air Cargo operations: the air cargo processing facility, the aircraft apron, and the landside area (automobile and transport truck parking/unloading areas). For the purposes of this master plan the landside area was not analyzed separately as those facilities tend to be in proper ratio to building development. In the case of AVP there is sufficient landside area through the planning period. However, existing vehicular cargo traffic must utilize the terminal loop road to access cargo facilities.

4.4.1. Air Cargo Apron and Pavement

As the volume of cargo is anticipated to increase over the planning period, it can also be assumed that the lift capacity must also increase to meet that increased demand. An increase in lift capacity can be accomplished either by increasing the number of flights or increasing the size of aircraft, or a combination of the two. As identified in Section 2.9, the majority of all cargo, as high as 95 percent, is transported via freight carriers at AVP and not in the belly of commercial service aircraft. As such, the ability of cargo operators to respond quickly to shifts in cargo demand to/from AVP is high. Currently three cargo operators (UPS, FedEx, and DHL) operate at AVP using Cessna 208 Caravan and Merlin 120 aircraft.

The aircraft apron required to simultaneously “park” the projected mix of aircraft, and also provide ample maneuver area for loading and unloading air cargo, may be determined in a variety of ways. For the purpose of determining planning level facility requirements, the following areas per aircraft, which take into account “power-in and power-out operations”, FAA clearance requirements, and basic vehicle maneuvering areas, have been approximated as 1,200 square yards (10,800 square feet) per aircraft. Based on those general area requirements per aircraft the current cargo apron has an approximate capacity of 11 Group II turboprop aircraft. Based on the forecast of air cargo demand and the capacity of existing cargo aircraft making use of the facility, no increase in air cargo apron area is warranted. Should air cargo operators alter the type of aircraft operating at AVP the existing apron will easily accommodate aircraft up to and including large narrowbody and widebody aircraft. Based on the pavement condition report developed as part of this study, the existing cargo apron is in satisfactory condition and, with regular maintenance, will support aeronautical activity across the planning period.

4.4.2. Air Cargo Buildings

As cargo volumes increase during the planning period, the associated sort facilities and the landside areas may require expansion. The current air cargo facility processed approximately 362.5 tons of total cargo in 2015, which is approximately 181 pounds per square foot. During 2010, the most recent peak year for air cargo volume according to Airport records, the facility processed 551.5 tons of cargo, which equates to approximately 276 pounds per square foot. The industry planning metric 1,000 pounds (0.5 tons) of cargo per square foot of cargo building has been utilized to establish the facility requirements for the Air Cargo processing building. **Table 4-25** provides a summary of the cargo facilities expected to be required within the planning period.

Table 4-25: Air Cargo Sort Facility Demand

	Base Year	Forecast			
	2015	2020	2025	2030	2035
Air Cargo (Tons)	362.38	382.76	404.28	427.01	450.92
Existing Cargo Building (sf)	4,000	4,000	4,000	4,000	4,000
Required Cargo Building (sf)	725	766	809	854	902
Performance	Adequate Across Planning Period				

Source: McFarland-Johnson Analysis, 2016

The existing cargo sort facility is expected to meet the air cargo demands throughout the planning period. It must be stated that although there is a surplus of building space, a new all-cargo operator may want to locate their operations on the Airport's east side as all-cargo operations do not need to be in proximity to the terminal area and available land is more abundant on the Airport's east side. Also, future changes in sort and processing technology and/or needs may require modification to the cargo facility.

4.4.3. Air Cargo Facility Requirements Summary

Table 4-26 details the future air cargo facility requirements based on the analysis presented in the preceding sections.

Table 4-26: Air Cargo Facility Requirements Summary

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Cargo Apron Capacity	11 twin-engine turboprops, 2 narrow-body OR 1 widebody cargo plane	3 twin-engine turboprops OR 1 narrowbody cargo plane	None
Cargo Apron Pavement Condition	Satisfactory (PCI 75)	Satisfactory (PCI 70+)	None
Air Cargo Sort Facility	4,000 sf	902 sf	None

Source: McFarland-Johnson Analysis, 2016

4.5. GENERAL AVIATION REQUIREMENTS

The following sections will compare the projected general aviation demand, as established in Chapter 2, to the existing capacity of general aviation facilities available at AVP. This comparison is then used to determine future facility requirements and ensure the Airport is positioned to serve forecasted activity levels over a 20-year planning horizon. To accomplish this, four distinct elements are examined and include:

- Aircraft Storage Hangars
- Aircraft Aprons
- General Aviation Terminal & FBO Facilities
- General Aviation Access and Auto Parking

4.5.1. Aircraft Storage Hangars

Hangars are one of the most desirable means for aircraft storage at any airport when offered at reasonable rates. Most hangar space is utilized by the aircraft based at the airfield with some smaller portion of the hangar space reserved for itinerant traffic – generally for maintenance or overnight stays. As such, general aviation hangars are planned for both based an itinerant aircraft. Requirements are calculated based on the size and quantity of aircraft based at and regularly visiting the airport.

As described in Section 1.6.1 a total of five conventional hangars exist at AVP. Four of these are used for aircraft storage while the other supports the FBO's maintenance operation. Records show that anywhere from 55 to 65 percent of based single-engine and multi-engine aircraft are stored within a hangar while the remainder reside on the apron full-time. All jet and rotor aircraft are stored in hangars. These conditions are anticipated to remain throughout the planning period. As such, the Airport should provide hangar space for 60 percent of all future based single-engine and multi-engine aircraft, and all based jet and rotorcraft. Although each aircraft at the airport will vary in size, the following planning factors were used to calculate the future hangars space requirements at AVP;

- 1,200 Square Feet for Single-Engine and Rotor Aircraft
- 1,600 Square Feet for Multi-Engine Aircraft
- 3,200 Square Feet for Jet Aircraft

The forecast for based aircraft reflects stable growth for all aircraft types over the planning period. Single-engine and jet aircraft, however, are anticipated to account for the majority of based aircraft growth at the airport being projected to increase from 28 to 34 and three to four, respectively. If fact, the on-site FBO is actively working to attract a large corporate hangar tenant for a large business class jet aircraft such as the Gulfstream G-650 or similar. Should such pursuit prove successful, growth of based jet aircraft at AVP could outpace forecast expectations. Further, to provide for the indoor storage of up to four (4) transient jet aircraft, an additional 13,000 square feet of conventional hangar space is factored in.

When considering existing conventional hangar space at AVP available for the long-term storage of aircraft, just over 50,000 square feet is available between four approximately 12,500 square foot storage hangars. In the future it is assumed that demand for aircraft hangars will likely be satisfied by conventional clearspan hangars and that t-hangar or individual box units would likely be difficult to construct as a result of existing land limitations. The overall hangar requirements are presented in **Table 4-27**.

Table 4-27: Aircraft Hangar Demand

	2016	2020	2025	2035
Based Aircraft	44	49	52	55
Based Aircraft in Conventional Hangar	28	31	34	35
Single Engine Aircraft – Sq. Ft. Required	20,160	22,320	23,760	24,480
Multi-Engine Aircraft – Sq. Ft. Required	11,520	12,480	12,480	13,440
Jet Aircraft – Sq. Ft. Required	9,600	9,600	12,800	12,800
Helicopter – Sq. Ft. Required	1,200	2,400	2,400	2,400
Total Sq. Ft. Required	42,480	46,800	51,440	53,120
Plus Transient Need (13,000 Sq. Ft.)	55,480	59,800	64,440	66,120
Existing Hangar Sq. Ft.	50,000	50,000	50,000	50,000
Surplus/(Deficiency) Sq. Ft.	(5,480)	(9,800)	(14,440)	(16,120)

Source: McFarland Johnson, 2016

Recommendation

Based on the analysis presented above, an additional 16,120 square feet of hangar capacity is expected to be required by 2035, with an immediate need of 5,480 square feet identified. Although an 11,000 square foot hangar is currently being developed on the south GA apron by the Pennsylvania State Police, it will be a private hangar and not accessible by future projected based aircraft accounted for in the table above. As such, space should be reserved for at least 16,000 square feet of hangar space for collocated based aircraft.

4.5.2. Aircraft Parking Apron

Given the wide variety of aircraft that can be categorized as general aviation, the planning of general aviation (GA) aprons is largely dependent on aircraft parking demand and aircraft movements. There are four components that typically determine the required apron area for general aviation uses. These are: based-aircraft parking, itinerant aircraft parking (transient apron), aircraft fueling apron, and staging and maneuvering areas. The sum of these components determines the total area of apron required to meet the forecasted level of general aviation demand at AVP.

Based and Itinerant Aircraft Parking

For planning purposes, based and itinerant general aviation aircraft apron requirements are usually considered separately since they serve different functions and support users with varying levels of familiarity with the airfield and its GA facilities. Historically, a significant number of based single- and multi-engine aircraft have been stored on the apron. Records show that anywhere from 35 to 45 percent based single-/multi-engine aircraft could be stored on the apron at any given time. As such it is assumed for the purpose of planning apron space requirements that 40 percent of future based single-/multi-engine aircraft will regularly require apron space. No based jet or rotorcraft are anticipated to require regular apron space for storage purposes.

Planning metrics to estimate the apron space required for itinerant aircraft parking are provided in Airport Cooperative Research Program (ACRP) Report 96, Apron Planning and Design Guidebook. This report identifies that roughly 110 square yards of apron space should be provided for ADG I aircraft and 165 square yards for ADG II aircraft when an adjacent taxilane is provided. However, to account for this maneuvering space on the apron these values were increased to 300 square yards for ADG I aircraft and 600 square yards for ADG II aircraft when providing for Group II separation.

As detailed in Section 1.6.1 of this report, two general aviation apron areas exist at AVP, including the general aviation apron and the south general aviation apron (see Figure 1-8). The General Aviation Apron measures 968 feet long by 370 feet deep providing 39,795 square yards of total area. The South General Aviation Apron measures 440 feet wide and 293 feet deep providing an additional 14,325 square yards of apron bringing the total GA apron area to 54,120 square yards of pavement. Not all of this pavement, however, is intended for the parking or maneuvering of aircraft but rather to provide additional utility to apron-fronting hangars. FAA guidance suggest providing an apron area equal to a hangars size. As such, 12,000 square yards of existing apron space is discredited in this analysis since it is required to serve adjacent hangars. Table 4-28 explores the required GA apron space strictly for the parking and tying down of aircraft at AVP using the following assumptions:

- Adequate apron area must be reserved for all aircraft based that are not stored in hangars, as well as peak period itinerant aircraft, without limiting access to or utility of the hangars adjacent to the apron area.
- The percentage of based single-/multi-engine aircraft not stored in hangars (40%) will be maintained throughout the forecast period.
- The peak period for apron utilization is calculated by applying a multiplier of two (2) to the peak hour calculation for itinerant aircraft to account for peak periods which extend beyond a single hour.
- Group I aircraft represent 40 percent of the total aircraft calculated to require apron space during the peak period and require 300 square yards of apron space each to provide for tie-down area, safety clearances, and movement area.
- Group II aircraft represent 60 percent of the total aircraft calculated to require apron space during the peak period and require 600 square yards of apron space each to provide for tie-down area, safety clearances, and movement area.
- As apron space is an imperative element to overall airfield utility and capacity, a 20 percent buffer will be applied to the calculation of apron requirements so as to ensure ample apron space is provided over the planning period and enable flexibly for periods of above average demand.

Table 4-28: General Aviation Apron Space Requirements – Parking & Tie Down

	2016	2020	2025	2035
Based Aircraft	44	49	52	55
Based Aircraft on Apron (40% of BA less Jet & Helo)	20	23	24	25
Itinerant Aircraft – Peak Period (2*Peak Hour)	8	8	9	10
Total	28	31	33	35
Total Required GA Apron (Sq. Yd.)	13,440	14,688	16,032	16,896
Total Required GA Apron + 20% Buffer (Sq. Yd.)	16,128	17,626	19,238	20,275
Existing GA Apron (Sq. Yd.)	42,120	42,120	42,120	42,120
Surplus/(Deficiency) (Sq. Yd.)	25,992	24,494	22,882	21,845

Source: McFarland Johnson, 2016

As a means to better facilitate parking requirements of larger GA jet aircraft, concrete apron areas should be provided. The asphalt apron currently provided allows such aircraft to sink into the pavement creating runts that impact the control of aircraft and diminish the lifespan of the apron itself. Over the past few years the Airport has had to repair many apron sections impacted by larger GA aircraft.

Aircraft Fueling Apron

Presently GA aircraft are fueled through the use of fuel trucks owned and operated by the FBO, Aviation Technologies. As a result of spatial limitations and safety concerns, a self-service fueling facility is not recommended at AVP.

Staging and Maneuvering Areas

Adequate space for the safe maneuvering of aircraft to and from aprons, hangars, and taxiways must also be included in any forecast of apron requirements. Staging and maneuvering is most closely associated with the provision of space in front of conventional clearspan hangars. Currently, sufficient staging and maneuvering space is available on each of the aprons providing access to hangars at AVP. Should additional hangars be constructed at the Airport in the future, it is recommended that they be provide sufficient staging and maneuvering apron, comparable to the size of the hangar, while not significantly impacting the layout and the availability of space for aircraft parking. Based on the facility requirement for aircraft hangars at the airport and the availability of existing GA apron area, no additional apron for staging and maneuvering of aircraft in and around hangars is anticipated.

4.5.3. General Aviation Terminal

A general aviation terminal provides space for offices, waiting areas, flight planning, concessions, storage, and other amenities for pilots and passengers. General aviation terminals also provide the first and last impression of the airport and local area that GA pilots and passengers experience. The following analysis was conducted to estimate what amount of space should be considered to accommodate the pilots/passengers expected during the planning period. For this, an estimate of the peak hour GA pilots/passengers is necessary to determine the number of people that would use the general aviation terminal facilities during a one-hour period. To estimate the peak hour pilots/passengers, the following methodology was applied with the results shown in **Table 4-29**.

- The number of operations conducted during the peak hour of the average day during the peak month was calculated using data from the forecast chapter. It was assumed that arriving and departing general aviation pilots/passengers could use the terminal at the same time. Likewise, both local and itinerant operations would require GA terminal space at the Airport.
- The number of peak hour operations was reduced by 25 percent to eliminate most of the activity attributed to touch and go operations. While training operations require terminal space (flight planning, meeting with flight instructor, restrooms, etc.), not all have a direct relationship.
- The adjusted peak hour operations (arriving or departing) were estimated to have an average of 2.5 people on board (pilots and passengers). A staff assumption of six is added in as well.
- An area of 150 SF was used for each peak hour pilot/passenger to determine the terminal space requirements. This value accommodates all functions of a full service general aviation terminal building including FBO counter space, waiting area, snack room, office space, pilot's lounge, restrooms, training area, circulation space, etc.

Table 4-29: GA Terminal Gross Area Analysis

	2016	2020	2025	2035
Peak Hour Operations	10	11	12	13
Adjusted Operations	8	8	9	10
Number of People	19	21	23	24
Total GA Terminal Space Demand (Sq. Ft.)	2,813	3,094	3,375	3,656
Existing GA Terminal Space (Sq. Ft.)	2,300	2,300	2,300	2,300
Surplus/(Deficiency)	(513)	(794)	(1,075)	(1,356)

Source: McFarland Johnson, 2016

4.5.4. General Aviation Access and Auto Parking

As described in Section 1.8, general aviation facilities at AVP are accessible from Terminal Road via Hangar Road. General aviation automobile parking is provided at the FBO and alongside Hangar Road, with over flow parking provided off of Navy Way Road. In total approximately 55 vehicle parking spaces are utilized by the FBO including both a short-term lot, 27 spaces near the FBO, and a long-term/overflow lot, 23 spaces off of Navy Way Road. Additionally, approximately five parking spaces exists in between existing hangars.

The methodology used below is based on a previously completed Aircraft Owners and Pilots Association Survey that found an average of 2.5 persons aboard the typical general aviation operation and vehicle parking requirements for GA activities are displayed in **Table 4-30**. Additionally, assumptions employed in the methodology include:

- Determine the number of peak hour GA operations for based aircraft by taking 35 percent of the peak month average day itinerant operations and 100 percent of peak month average day local operations and assuming 12 percent of those operations occur within the peak hour.
- Determine the number of peak hour GA operations for transient aircraft by taking 65 percent of the peak month average day itinerant operations and assuming 12 percent of those operations occur within the peak hour. It is assumed that these aircraft, while not based at AVP, will be picking up passengers at the airport and will require parking spaces.
- Determine the number of peak-hour pilots and passengers by multiplying the number of peak hour operations by 2.5
- Estimate the number of parking spaces in use by assuming that parking demand will be half the number of pilots and passengers, since parking spaces will be utilized only by departing pilots and passengers
- Multiply by a contingency factory of 1.30 to account for on-site employees requiring use of the GA parking area and also to allow for parking flexibility during times of above average demand.

Table 4-30: Vehicle Parking Space Requirements for General Aviation Users

	2016	2020	2025	2035
GA Peak Hour Operations	75	91	93	98
GA Peak Hour Operations (Based)	26	32	33	34
GA Peak Hour Operations (Itinerant)	49	59	60	64
Pilot & Passenger Parking Demand	62	74	75	80
+ 20% Contingency	12	15	15	16
Total Parking Demand	74	89	90	96
Existing Parking Spaces	55	55	55	55
Surplus(Deficiency)	(19)	(34)	(35)	(41)

Source: McFarland Johnson, 2016

4.5.5. General Aviation Facility Requirement Summary

Table 4-31 summarizes the general aviation facility requirements as outlined in the previous sections.

Table 4-31: General Aviation Facility Requirement Summary

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Aircraft Storage Hangars	50,000 sf	66,120 sf	16,120 sf
Aircraft Parking Apron	42,120 sy GA Apron	21,845 sy GA Apron	None
General Aviation Terminal	2,300 sf	3,656 sf	1,356 sf
GA Access and Auto Parking	55 Stalls	96 Stalls	41 Stalls

Source: McFarland-Johnson Analysis, 2016

4.6. SUPPORT FACILITY REQUIREMENTS

This section addresses the facility requirements associated with facilities that fulfill support functions at the Airport. These support functions include the following:

- Air Traffic Control
- Aircraft Rescue and Fire Fighting
- Airfield Maintenance Facility and Equipment
- Fuel Facilities
- Utilities
- Airport Recycling

4.6.1. Air Traffic Control

As described in Section 1.11.2, the air traffic control tower (ATCT) cab at AVP was recently constructed in 2012 at 92 feet AGL on the east side of the airfield. There are no existing or anticipated line-of-site issues from the ATC cab or other operational limitations which would warrant an improved or relocated ATCT within the planning period. However, consideration should be given to the potential for future development initiatives at the Airport to adversely impact ATCT line-of-site to airfield movement areas and steps taken to avoid such conditions.

4.6.2. Aircraft Firefighting and Rescue

The FAA has established specific requirements for ARFF equipment as part of Title 14 of the Code of Federal Regulations, Part 139, Certification of Airports. The requirements vary depending on the frequency and size of aircraft that regularly use the airport for scheduled commercial airline service. The requirements are categorized in to five categories based on the length of the largest scheduled aircraft. If the frequency of the largest scheduled aircraft is less than five departures daily, the requirements for ARFF equipment revert to the next lowest index.

Currently, the design aircraft at AVP is the Airbus A320 series with a length of approximately 123.3 feet. Combined with operations by other aircraft that regularly utilize AVP, including the Boeing B717 and the CRJ-900, this would place the Airport within the Index B ARFF classification.

As identified in Section 1.9.2, Index B requirements can be met through two methods. One method is to utilize one vehicle carrying at least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent and 1,500 gallons of water and the commensurate quantity of aqueous film forming foams (AFFF) for foam production. The second method is to utilize two vehicles, with one vehicle carrying the extinguishing agents as specified previously, and a second vehicle carrying an amount of water and the commensurate quantity of AFFF so the total quantity of water for foam production carried by both vehicles is at least 1,500 gallons. Presently AVP meets these requirements and can even provide Index C ARFF services upon request[3].

The ARFF facility was constructed in 1999 and is still in good condition. The ARFF Facility is fully capable of supporting the storage and emergency dispatch of ARFF Index B equipment and is well positioned to ensure timely response from ARFF personnel to any portion of the airfield. Beyond regular maintenance no specific improvements or capacity enhancing projects are likely to be required within the planning period.

4.6.3. Airfield Maintenance Facility and Equipment

As identified in Section 1.9.3, AVP's airfield maintenance facility was constructed in 2001 on the north side of Runway 10-28 and provides indoor storage for a wide variety of vehicles and equipment used and the operation and maintenance of the airport. Discussions with Airport staff reveal that with the addition of any priority one snow clearing area, such as taxiway segments to the approach of Runway 4 or other safety critical airfield pavement, larger and/or additional snow removal equipment would be required for which space is not currently available in the existing maintenance facility. Furthermore, the Airport is considering transitioning to a liquid deicing operation which would require a specialized piece of equipment and a storage tank. Therefore, space should be reserved to expand the existing maintenance facility in the future to accommodate such growth.

4.6.4. Fuel Facilities

The Airport's existing fuel facilities are discussed in Section 1.9.1 which identifies four aviation fuel tanks having a total Jet-A capacity of 50,000-gallons and 12,000-gallon capacity for avgas. Fuel flowage information was provided by the FBO, currently the sole purveyor of fuel at the airfield, and was used to project fuel demand over the planning period (includes a 7-day storage requirement). Although the Airport may receive fuel deliveries more readily than every seven days, planning for such on-site capacity builds in operational reliability to the airfield during times of fuel shortage or unforeseen logistical issues related to the delivery of fuel. Based on fuel flowage projections it is estimated that over 3.3 million gallons of Jet-A and over 65,000 gallons of AvGas will be sold at AVP annually by 2035. These calculations are developed by calculating the 2015 gallons per operation value and applying it to forecast annual activity levels. The results of this analysis are depicted in Table 4-32 and Table 4-33.

[3] ARFF Index C includes an additional 1,500 gallons of water/foam production beyond Index B.

Table 4-32: Airport Fuel Sale Projection – Jet-A

Year	Annual Operations	Gallons/ Operation	Annual Fuel Demand	Daily Operations		7-Day Storage Requirment (Gal.)	
				Avg.	Peak	Avg.	Peak
2015	47,450	55.485	2,632,974.70	154	210	50,495	81,569
2020	56,351	55.485	3,126,886.35	154	250	59,963	97,099
2025	57,315	55.485	3,180,378.19	157	255	60,989	99,041
2035	60,658	55.485	3,365,879.44	166	269	64,546	104,478

Source: McFarland Johnson, 2016.

Table 4-33: Airport Fuel Sale Projection – AvGas

Year	Annual Operations	Gallons/ Operation	Annual Fuel Demand	Daily Operations		7-Day Storage Requirment (Gal.)	
				Avg.	Peak	Avg.	Peak
2015	47,450	1.084	51,563.30	154	250	986	1,593
2020	56,351	1.084	61,105.27	154	250	1,171	1,897
2025	57,315	1.084	62,150.60	157	255	1,192	1,935
2035	60,658	1.084	65,775.64	166	269	1,261	2,041

Source: McFarland Johnson, 2016.

As indicated above, AVP does not currently possess the Jet-A fuel capacity to service a seven-day demand during peak period or even during average airport utilization. One to two additional 20,000 gallons Jet-A storage tanks would ensure AVP can maintain a consistent fuel supply without such regular reliance on fuel delivery trucks. Oppositely, the Airport has ample capacity for AvGas storage to facilitate an average or peak period seven-day demand.

4.6.5. Utilities

Section 1.9.4 of this report provides a general description of the available utilities at the Airport and the providers of those systems. Based on that information, the Airport's utility services – electric/natural gas, water, telecommunications, storm drainage, and sewer – is adequate to meet the existing needs of the facilities. As aviation and non-aviation development initiatives are pursued in the future, a review of utilities and their respective capacities should be taken into account. It is likely that continued development within the airport terminal and GA areas will not negatively impact the overall capacity of utility systems on the Airfields west side or require the need to significantly expand utility offerings in that area. On the east side of the airfield, however, no utilities exist north of the ATCT. Any development in this area would require the extension of required utilities.

Also of interest when considering on-airport utilities is the ability of the airfield to process stormwater and minimize the possibility of water inundation to the airfield or airfield systems. Being AVP is located atop a natural mesa, processing stormwater runoff is not overly difficult. AVP has several detention ponds (two above ground and two below) and numerous swales to direct and process stormwater.

4.6.6. Support Facility Requirements Summary

The preceding sections reviewed a variety of support facilities at AVP, **Table 4-34** summarizes their future requirements.

Table 4-34: Support Facility Requirements Summary

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Air Traffic Control Tower	Clear LOS	Clear LOS	None
Aircraft Firefighting/Rescue	ARFF Index B/C	ARFF Index B	None
Airfield Maintenance	Equipment Enclosure	Expanded Equipment Enclosure	Expand as required
Fuel Facilities	50,000 Jet-A 12,000 AvGas	75,000 Jet-A 2,000 AvGas	25,000 Jet-A None
Utilities	Electric, Natural Gas, Water, Tele/Cable, Sewer, Internet to developed areas of property	Electric, Natural Gas, Water, Tele/Cable, Sewer, Internet to development areas	Extend as required
Airport Recycling	Recycling Program	Recycling Program	None

Source: McFarland-Johnson Analysis, 2016

4.7. SUMMARY OF FACILITY REQUIREMENTS

Several requirements for airside, landside, and support facilities have been identified and discussed in the preceding sections. A summary of the key requirements identified can be found in **Table 4-35**.

Table 4-35: Summary of Facility Requirements

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Runway Length	Runway 4-22 – 7,501' Runway 10-28 – 4,300'	Runway 4-22 – 7,501' Runway 10-28 – 4,300'	None
Runway Width	Runway 4-22 – 150' Runway 10-28 – 150'	Runway 4-22 – 150' Runway 10-28 – 75'	None
Runway Safety Areas	Runway 4-22 – EMAS Runway 10-28 – Standard	Runway 4-22 – Provide EMAS Runway 10-28 – Provide Standard	None
Runway Object Free Areas	Standard on all Runways	Provide Standard ROFA on all Runways	None
Runway Protection Zones	Partially Under Airport Control through Ownership or Avigation Easements	Under Airport Control through Ownership or Avigation Easements	Control of All RPZs through Ownership or Avigation Easements
Runway	Standard	Standard	None

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Visibility Zone			
Runway Lighting	Runway 4-22 – HIRLs Runway 10-28 – MIRLs	Runway 4-22 – HIRLs Runway 10-28 – MIRLs	None
Runway Visual Aids	Runway 4 – PAPI4, MALSR Runway 22 – VGSI4, REIL Runway 10 – PAPI2, REIL Runway 28 – REIL	Runway 4 – PAPI4, MALSR Runway 22 – PAPI4, REIL Runway 10 – PAPI4, REIL Runway 28 – PAPI4, REIL	Runway 22 – PAPI4 Runway 10 – PAPI4 Runway 28 – PAPI4
Instrument Approaches	Runway 4 – ILS/LOC, GPS(LPV) Runway 22 – ILS/LOC, GPS(LPV) Runway 10 – Visual Runway 28 – Visual	Runway 4 – ILS/LOC, GPS(LPV) Runway 22 – ILS/LOC, GPS(LPV) Runway 10 – Visual Runway 28 – Visual	NONE
Taxiways	Runway 4-22 – Partial Parallel Runway 10-28 Partial Parallel	Runway 4-22 – Full Parallel Runway 10-28 – Partial Parallel	Runway 4-22 – Full Parallel
Taxiway Width	50 – 75 Feet	50 – 75 Feet	None
Taxiway Lighting	All Taxiways – MITL	All Taxiways – MITL	None
Terminal Gates	8 Total 6 w/ Boarding Bridges 2 Ground Boarding	7 Total	1 Gate / Boarding Bridge
Terminal Curb	350 lf	287-340 lf	Expand curb as able
Airline Check-in & Ticketing Operations	288 sf /counter 264 sf /kiosk	129 sf/counter 200 sf/kiosk	None
Outbound Baggage System and Baggage Makeup	1 Lvl 1 EDS 1 Lvl 2 OSR 1,255 sf 1 Lvl 3 EDT 4,600 sf Bag Makeup	1 Lvl 1 EDS 1 Lvl 2 OSR 1,255 sf 1 Lvl 3 EDT 6,400-7,400 sf Bag Makeup	1 Lvl 1 EDS 1 Lvl 2 OSR 1,255 sf 1 Lvl 3 EDT 1,800-2,800 sf Bag Makeup
Passenger Security Screening	2 security lanes 320 sf queue	2 security lanes 440 sf queue	0 security lanes 120 sf queue[1]
Holdrooms	1,370 sf/gate	2,100 sf/gate	730 sf/gate[1]
Inbound Baggage	210 lf	280 lf	70 lf

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Systems and Baggage Claim			
Concourse and Circulation Area	5,700 sf	5,700 sf	None
Federal Inspection Services	900 sf	1,100 sf	200 sf
Gates	8	7	None
Concessions	>4,000 sf Non sterile restaurant	3,000-4,000 sf Sterile restaurant	3,000-4,000 sf Sterile restaurant
Terminal Apron Requirements	~30,000 sy	~30,000 sy	None
Auto Parking Requirements	640 Garage Stalls 480 Surface Stalls 154 Employee Stalls 117 Rental Stalls	1315 Garage Stalls 980 Surface Stalls 167 Employee Stalls 167 Rental Stalls	675 Garage Stalls 500 Surface Stalls 0 Employee Stalls 50 Rental Stalls
Cargo Apron Capacity	11 twin-engine turboprops 2 narrow-body OR 1 widebody cargo plane	3 twin-engine turboprops OR 1 narrowbody cargo plane	None
Cargo Apron Pavement Condition	Satisfactory (PCI 75)	Satisfactory (PCI 70+)	None
Air Cargo Sort Facility	4,000 sf	902 sf	None
Aircraft Storage Hangars	50,000 sf	66,120 sf	16,120 sf
Aircraft Parking Apron	42,120 sy GA Apron	21,845 sy GA Apron	None
General Aviation Terminal	2,300 sf	3,656 sf	1,356 sf
General Aviation Access and Auto Parking	55 Stalls	96 Stalls	41 Stalls
Air Traffic Control Tower	Clear LOS	Clear LOS	None
Aircraft Firefighting/ Rescue	ARFF Index B/C	ARFF Index B	None

Item/Facility	Existing Facility or Capacity	Ultimate Requirement	Deficit
Airfield Maintenance	Equipment Enclosure	Expanded Equipment Enclosure	Expand as required
Fuel Facilities	50,000 Jet-A 12,000 AvGas	75,000 Jet-A 2,000 AvGas	25,000 Jet-A None
Utilities	Electric, Natural Gas, Water, Tele/Cable, Sewer, Internet to developed areas of property	Electric, Natural Gas, Water, Tele/Cable, Sewer, Internet to development areas	Extend as required
Airport Recycling	Recycling Program	Recycling Program	None

Source: FAA Advisory Circular 150/5300-13A

** - Runway/Taxiway Separation vary based on approach visibility minimums.*

Note: 1/ Based on two operational security lanes. With only one security lane a total queue area of 980 sf is required.

2/ Some additional capacity can be made up through available holdroom space at neighboring gates, as required.