4.0 FACILITY REQUIREMENTS

This chapter documents the facilities needed to meet the demand requirements as described in **Chapter 3**, *Aviation Activity Forecasts*. Current facilities were examined to determine if they meet the existing demands of the airport. Current and future deficiencies have been identified and trigger points discussed, outlining which activity levels will result in the need for additional or expanded facilities. Certain items identified in this chapter may have multiple solutions that need to be examined, and vetted with local and federal officials. These items will be explored in **Chapter 5,** *Alternatives Analysis*.

4.1 REGIONAL AIRPORT SYSTEM ROLE

In 2005, CDOT Aeronautics Division published the Colorado Aviation System Plan (Plan). The Plan evaluated and measured the performance of the Colorado system of publically owned airports and assigned each Colorado airport to one of three functional categories: Major, Intermediate, or Minor. As a commercial service airport and the importance of the airport to the State aviation system, EGE is classified as a Major airport in the Plan.

Table 4-1details the Plan's goals for EGE, based on criteria established for similar airports. CDOT evaluated the airport's current facilities against the Plan's objectives and identified facilities and services that need improvements.

EGE meets the majority of airport specific objectives identified in the Plan; however, there are two objectives that have not been met:

- Provide a public instrument approach with vertical guidance
- Provide visual approach aids through either a Precision Approach Path Indicator (PAPI) or Visual Approach Slope Indicator (VASI)

FAA develops and approves instrument procedures based on available airport facilities and requireds aircraft operators to meet specific requirements for crew and equipment certification. While Runway 25 is equipped with a PAPI, Runway 7 is not equipped with any visual approach aid. In addition, surrounding terrain restricts the type of approach and minimum weather conditions the FAA can approve for EGE.

CDOT is currently in the process of updating the Plan with a tentative release during the spring/early summer of 2012.

TABLE 4-1 – AIRPORT FACILITIES STATUS

Airport Facility	Existing Condition	CDOT Objective	Objective Met
Runway Length	9,000 feet	To accommodate 75% of large aircraft at 90% useful load (9,400 feet)	No *Runway extended from 8,000 feet to 9,000 feet in 2009
Runway Width	150 feet	100 feet	Yes
Taxiway Type	Full Parallel	Full Parallel	Yes
Instrument Approach	Approach with Vertical Guidance[55]	Approach with Vertical Guidance	No *No public precision approach[56]
Visual Aids	Rotating Beacon Lighted Wind Cone REILs PAPI - RWY 25 MALSR – RWY 25	Rotating Beacon Lighted Wind Cone REILs PAPIs/VASIs	Yes Yes Yes No - RWY 7
Runway Lighting	HIRL	HIRL	Yes
Weather Reporting	On-site AWOS	On-site ASOS or AWOS	Yes
Terminal Building	Terminal Building	Terminal Building	Yes
Apron	Apron	Apron	Yes
Hangars	Hangars	Hangars	Yes
Auto Parking	Auto Parking	Auto Parking	Yes
Telephone	Telephone	Telephone	Yes
Restrooms	Restrooms	Restrooms	Yes
FBO	FBO	FBO	Yes
Maintenance Facilities	Maintenance Facilities	Maintenance Facilities	Yes
Jet A Fuel	Jet A and 100LL Fuel	Jet A Fuel	Yes
Rental Car Access	Rental Car Access	Rental Car Access	Yes

[55] Localizer Type Directional Aid with Glideslope (LDA/DME w/GS). Vertical guidance provided through the airport equipped Glideslope Antenna.
[56] A precision approach is provided for approved operators that have received specific training and certification from the FAA Flight Standards District Office.

4.2 AIRSIDE REQUIREMENTS

The airside components evaluated include the runway, taxiways, FAA safety standards, navigational and landing aids, airspace requirements, and obstructions.

4.2.1 RUNWAY

The ability of the runway to meet the requirements of the airport users is one of the most critical components to the success of an airport. The runway must have the capacity, length, strength, and proper orientation to the wind to meet the demands of its users. This section will examine several key factors used in the determination of the adequacy of the runway system.

4.2.1.1 Runway Capacity

Runway capacity is defined by the FAA as, "a measure of the maximum number of aircraft operations that can be accommodated on the airport or airport component in an hour."[57] Capacity is further divided into two categories: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). Utilizing guidance contained in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay,* the runway capacity for EGE has been calculated to be 55 VFR flights and 53 IFR flights per hour.

Another factor in runway capacity is Annual Service Volume (ASV), which is a reasonable estimate of the airport's annual capacity. A number of factors that may occur over the period of a year are used to determine ASV. These factors include runway use, aircraft mix, and weather conditions. ASV is calculated using the following criteria:

$ASV = C_W \times D \times H$

C_W weighted hourly capacity
D ratio of annual demand to average daily demand
H ratio of average daily demand to average peak hour demand

Using this equation, the ASV for EGE has been calculated to be a maximum of 210,000 annual operations. For 2010, total annual operations were 34,816, well below the maximum ASV.

The average delay per aircraft is another key metric used to analyze runway capacity. As airports near capacity, the average aircraft delay increases. The FAA advises that once the average delay reaches between 4 and 6 minutes per aircraft, the airport is near capacity and/or is congested. For EGE, average delay per aircraft as a result of airfield capacity is 0.1 minutes.

[57] Localizer Type Directional Aid with Glideslope (LDA/DME w/GS)

It should be noted that the capacity at EGE cannot be measured only by traditional methods used for similar airports. EGE is limited by the current airfield configuration and levels of aircraft use, as well as separation requirements between arriving and departing aircraft. This is due to the limitations of radar flight tracking available to the Denver Air Route Traffic Control Center (Denver Center). The surrounding mountainous terrain blocks the signal between the radar and aircraft, resulting in loss of positive radar contact. As a result, the Denver Center limits aircraft operations into certain Colorado mountain airports during IFR conditions. By aircraft that use EGE during inclement weather, the risk of aircraft colliding with each other and with terrain is reduced. However, this creates capacity issues and can lead to lengthy delays and potential diversions. For EGE, Instrument Meteorological Conditions[58] (IMC) exists most often from October through April. Using data obtained from the National Climatic Data Center, the percentage of IMC that occurs during this time period is calculated at an average of 3.23% each month.

Additional impacts to capacity occur through the use of a special FAA ATC procedure, known as the Special Traffic Management Programs (STMPs). STMPs are implemented during periods of high aircraft demand at specific airports and require aircraft operators to reserve the time they wish to arrive at an airport. Accordingly, unscheduled aircraft may not be able to gain IFR clearance and land at the airport. For EGE, STMPs are used in December and January, as demand for the airport is at its highest during the winter holiday season. Conversely, capacity at EGE has increased since the installation of new Air Traffic Control radar systems that allows the Denver Center to better monitor aircraft arrivals and departures.

Based on these considerations, the VFR arrival/departure rate for EGE is approximately 14 to 18 aircraft arriving/departing per hour. The maximum arrival rate per hour at EGE can range from 28-36 operations per hour, assuming ATC alternates aircraft departures and arrivals. Alternating operations are uncommon, so it is rare for the maximum operations to be reached. During IFR conditions, the arrival/departure rate is decreased to approximately 10 to 12 arrivals per hour, with a maximum of 20 to 24 operations possible per hour.

In December 2011, ATC put into use developed automatic release and line up and wait procedures, which has enhanced departure capacity and allowed EGE to average between 30 and 36 operations per hour. These improvements allowed for 305 daily operations on December 26, 2011 and January 2, 2012. These are historically peak travel days and the increased amount of traffic resulted in a maximum of 45 minutes of delay. In the past, a peak day of 299 operations resulted in up to 6 hours of delay. This reduction in delay has significantly reduced ramp congestion in comparison to years past. Ground delays are down 90% and airborne delays are down 54% from 2010 levels. It should be noted that while these

[58] Vertical guidance provided through the airport equipped Glideslope Antenna. A precision approach is provided for approved operator

improvements to departure procedures greatly improve the departure rate, they must still be balanced with arrival rates to allow for an adequate mix of aircraft operations.

Existing facilities are adequate for handling both existing and future capacity.

4.2.1.2 Runway Orientation

Runway orientation is the alignment of the runway in relation to magnetic north. This orientation is primarily influenced by wind direction. The runway orientation at an airport is one that results in the prevailing wind creating the least amount of crosswind operations. Recognizing that there is variable weather conditions, aircraft are designed to land with an acceptable degree of crosswind, referred to as the crosswind component. When conditions are above the maximum allowable crosswind component for a particular type of aircraft, said aircraft must use another runway or divert to another airport. In the case of EGE having one runway, the only option is to divert to another airport. To reduce the amount of diversions due to wind, the most ideal layout of a runway, or runways, would be one that results in an allowable crosswind component for the design aircraft 95% of the time.

The historic combined wind coverage for EGE, as discussed in **Section 2.11.7**, exceeds the 95% FAA recommended crosswind coverage for all weather, VFR, and IFR conditions with the current runway configuration.

While constraints on available airport land do not allow for the option of a crosswind runway, the current configuration meets and exceeds FAA guidelines for wind coverage.

4.2.1.3 Runway Length

The purpose of the runway length analysis is to determine if the length of the existing runway is adequate for the current and projected aircraft fleet operating at EGE. The current length of Runway 7/25, as depicted in **Figure 4-1**, is 9,000 feet. In order to meet obstruction clearance requirements for aircraft landing Runway 25, Runway 25 has a relocated threshold. This was necessary as terrain in the vicinity of the airport does not provide adequate clearance for aircraft landing on Runway 25. As a result, declared distances are in effect at EGE. The displaced threshold combined with declared distances provide the necessary obstruction clearance while considering aircraft takeoff run, takeoff distance, accelerate-stop distance, and landing distance performance requirements. Declared distances are incorporated into the approved Operations Specifications of commercial aircraft operators and they are a critical performance consideration for GA turbojet aircraft operating at EGE as well. The full runway length is still available for aircraft departing this runway

FAA defines four declared distances; takeoff run available (TORA), takeoff distance available (TODA), accelerate-stop distance available (ASDA), and landing distance available (LDA).

LDA for Runway 25 is the only affected runway distance as a result of the displaced threshold. LDA for Runway 25 is 8,000 feet.

Table 4-2 summarizes the declared distances currently in effect for Runway 7/25 at EGE.

TABLE 4-2 – EGE DECLARED DISTANCES

	Runway 7	Runway 25
TORA	9000 ft.	9000 ft.
TODA	9000 ft.	9000 ft.
ASDA	9000 ft.	9000 ft.
LDA	9000 ft.	8000 ft.

FIGURE 4-1 – RUNWAY 7/25

Source: Jviation, Inc.

Runway length is dependent on numerous factors, including: airport elevation, temperature, wind velocity and direction, ambient air temperature, aircraft design, length of haul, runway surface (wet or dry), runway gradient, presence of obstructions, and any imposed noise abatement procedures or other prohibitions. The required runway length at EGE is particularly impacted by the airfield elevation, surrounding obstructions, and runway gradient. The terrain surrounding the airport also impacts runway length as it limits the amount of space available for runway construction.

While the FAA does not provide standards for runway length, FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance to assist in determining the recommended runway length for an airport based on the above factors.

The process for determining runway length begins with analyzing the landing weight for critical aircraft, aircraft that are anticipated to regularly use the airport within the planning period. Based on their weight, aircraft are placed in three categories: aircraft that weigh less than or equal to 12,500 pounds, aircraft weighing more than 12,500 pounds but less than 60,000 pounds, and aircraft weighing 60,000 pounds or greater. Methodology for determining runway length is dependent on which category the critical aircraft belong to and is detailed in **Table 4-3**.

TABLE 4-3 – AIRPLANE WEIGHT CATEGORIZATION FOR RUNWAY LENGTH REQUIREMENTS

Airplane Weight Category Maximum Certificated Takeoff Weight (MTOW)			**Design Approach**	
≤ 12,500 Pounds	Approach Speed < 30 knots		Family groupingsof small airplanes	
	Approach Speed ≥ 30, but ≤ 50 knots		Family groupings of small airplanes	
	Approach Speed ≥ 50 Knots	With < 10 Passengers	Family groupings of small airplanes	
		With ≥ 10 Passengers	Family groupings of small airplanes	
> 12,500 pounds, < 60,000 pounds			Family groupings of large airplanes	
≥ 60,000 pounds or more, or Regional Jets*			Individual large airplanes	**EGE**

**All regional jets, regardless of their MTOW are assigned to the 60,000 pounds or more weight category.*
Source: AC 150/5325-4B, Runway Length Requirements for Airport Design

For EGE, the primary methodology used is aircraft that weigh greater than 60,000 pounds, as the critical aircraft is the Boeing 757-200. For aircraft weighing greater than 60,000 pounds, the FAA advises consulting the specific Aircraft Characteristics Manuals (ACM) for each individual aircraft that operate at an airport. For EGE, the ACMs of the Boeing 757-200 and the Boeing 737-700 aircraft along with operational weight data obtained from Jeppesen OpsData Services were reviewed. These aircraft represent the highest operational demand given the destinations where they commonly operate.

While the existing runway length of 9,000 feet does not typically limit these critical aircraft, the terrain surrounding EGE restricts aircraft from departing with a full payload (i.e. fuel/cargo/baggage/passengers). For aircraft to clear terrain in close proximity to the airfield, operators must reduce payload to allowable takeoff weights. These reduced payloads result in takeoff weights below manufacturer specified maximum certified takeoff weights, as described in **Table 4-4**.

TABLE 4-4 – CRITICAL AIRCRAFT TAKEOFF WEIGHT

Aircraft	**Temp**	**RWY 25 Limited Takeoff Weight (lb)**	**RWY 07 Limited Takeoff Weight (lb)**	**Max Certified Takeoff Weight (lb)**
Boeing 757-200*	86˚F	166,669	161,158	269,997
	32˚F	186,952	180,779	
Boeing 737-700W CFM56-7B26**	86˚F	111,995	107,585	179,998
	32˚F	118,608	113,978	
Boeing 737-700W CFM56-7B22**	86˚F	96,562	93,035	179,998
	32˚F	109,790	105,601	
			--	

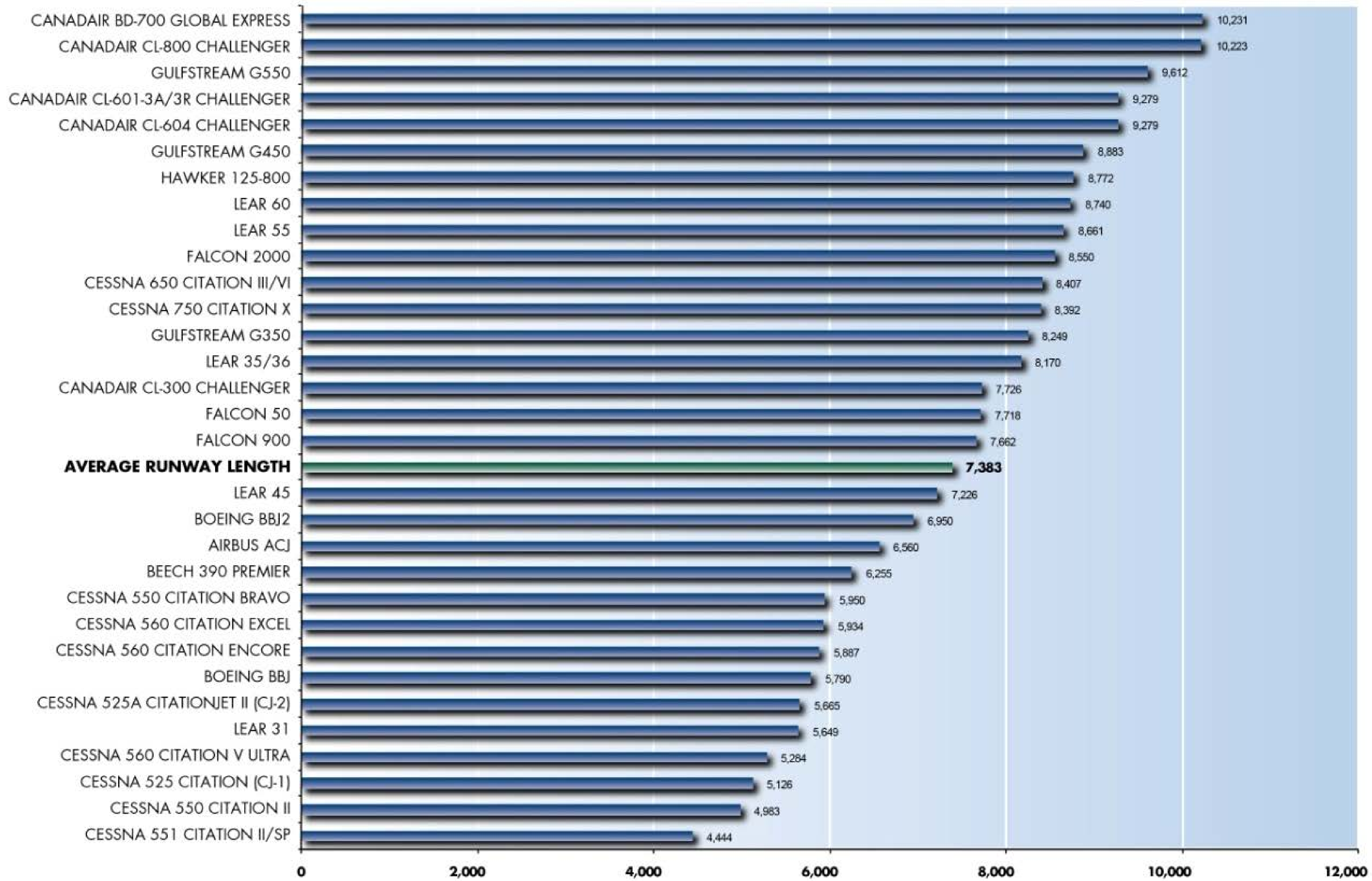
*Source: Jeppesen OpsData Center, *EGE Design Aircraft, **Engine Type*

General Aviation (GA) is a large component of EGE operations, accounting for 70% of the annual operations from 2006 through 2010. Specifically, business jets are a key component of these annual operations. The existing runway length adequately serves the majority of aircraft that routinely operate at EGE, as depicted in **Table 4-4**. For larger business jet aircraft, the runway length is below the requirements for maximum takeoff weight. However, as with commercial aircraft, the surrounding terrain is also a factor in determining allowable takeoff weight.

Aircraft performance is constantly changing, especially in regards to commercial aviation. Airlines are constantly adjusting their aircraft fleet in response to emerging trends that arise from changing economic climate and technological advancement. With a continued trend towards larger aircraft and less frequent flights, it is important for the runway to adequately serve critical aircraft and ensure minimal disruption to airport users. While the runway adequately serves existing conditions, this may not hold true in the future. Therefore, it is prudent to continue carrying forward the recommendation from previous master plans of reserving space to allow for expansion of the existing runway to 10,000 feet if the need were to arise from future aircraft use.

Runway 7/25 at EGE adequately serves existing aircraft operations. It is recommended that the future extension of the west end of Runway 7/25 continue to be depicted on the ALP. This protects the land and airspace in the event that future demand warrants the need for an extension.

FIGURE 4-2 – BUSINESS JET RUNWAY LENGTH REQUIREMENTS



Source: Jviation, Inc.

4.2.1.4 Runway Width

With an Airport Reference Code (ARC) of D-IV, the minimum required runway width for EGE is 150 feet.

Runway 7/25 is 150 feet wide, meeting the requirements for the design aircraft.

4.2.1.5 Runway Strength

The runway at EGE has pavement design strength of no greater than 75,000 pounds for Single Wheel Gear (SWG) equipped aircraft, 140,000 pounds for Dual Wheel Gear (DWG) equipped aircraft, and 225,000 pounds for Dual Tandem Wheel Gear (DTW) equipped aircraft, as described in **Table 4-5**.

TABLE 4-5 – RUNWAY WEIGHT CAPACITY

Gear Configuration	Weight (lbs)	Aircraft Classification
SWG	75,000	Most GA Aircraft including small and mid-sized business jets.
DWG	140,000	Narrowbody aircraft such as Boeing 737 and Airbus A320 aircraft.
DTG	225,000	Large narrowbody and small widebody aircraft, such as the Boeing 757.

Source: Airnav.com

The heaviest aircraft that routinely operates out of EGE is the Boeing 757-200, with a Maximum Takeoff Weight (MTOW) of 269,997 pounds. Additionally, the runway strength is capable of accommodating infrequent operations of larger aircraft like the Boeing 767. Given the amount of flights that occur daily, coupled with the fact that the aircraft rarely operate at full capacity, pavement loading is not an issue for the runway.

At this time there is no anticipated need for any runway strengthening projects as current operations are conducted below the published weights.

4.2.1.6 Runway Surface

As discussed in **Section 2.2.1**, the runway at EGE is constructed of dense graded asphalt with a grooved surface. The pavement was rehabilitated as part of the runway extension project in 2009. ***Routine maintenance, including crack seal/repair, should continue to be performed regularly to extend the pavement life of the runway.***

4.2.2 TAXIWAYS

Taxiways are designed to provide movement from the runways of an airport to the developed aviation related areas. EGE has a system that consists of a full parallel taxiway, a partial parallel taxiway, runway exit taxiways, and apron taxiway entrances. Ideally, the taxiway system should allow an aircraft to taxi to an associated runway in the most direct manner without having to change speed, or cross active runways.

Additional recommendations for taxiway layout contained in FAA's Engineering Brief 75, *Incorporation of Runway Incursion Prevention into Taxiway Design,* were recently included in Change 17 to AC 150/5300-13. As such, compliance with these recommendations is now mandatory. The taxiway and apron layouts were evaluated for compliance with the recommendations from the engineering brief, which include:

- Limit the number of aircraft crossing an active runway
- Optimize pilots' recognition of entry to the runway (increase situational awareness) through design of taxiway layout, for example:
  - Use a right angle for taxiway-runway intersections (except for high speed exits)
  - Limit the number of taxiways intersecting in one spot
  - Avoid wide expanse of pavement at runway entry
  - Ensure the taxiway layouts take operational requirements and realities into account to:
    - Safely and efficiently manage departure queues
    - Avoid using runways as taxiways
    - Use taxi strategies to reduce the number of active runway crossings
    - Correct runway incursion "hot spots"

The taxiway system at EGE meets many of the design recommendations. There is a full parallel taxiway on the south side of Runway 7/25, along with seven (7) exit taxiways connecting the runway to the adjacent taxiway system. There are access taxiways from both the Commercial FBO apron on the south side of the airport and the GA apron on the north end. Even so, the taxiway system needs some improvements. There is no direct access to the runway thresholds for aircraft located at the GA apron and runway crossings are required. Additionally, there are no high speed taxiways for Runway 7/25, nor any run-up areas or bypass taxiway connectors.

Recommendations for providing these taxiway improvements will be examined further in Chapter 5, Alternatives Analysis.

The taxiway design standards for width and separation are dictated by Airport Design Group (ADG), as discussed in **Section 2.1**. At EGE, ADG-IV (aircraft with a wingspan up to 171 feet, such as a Boeing 757-200) is used to establish the criteria for the current system and for any planned future taxiways. All taxiways require a Taxiway Safety Area (TSA) and Taxiway Object Free Area (TOFA). These standards allow for the safe movement of aircraft without the threat of striking any objects or other aircraft. For ADG IV aircraft, the TSA is 171 feet and the TOFA is 259 feet.

Taxiway A and all associated runway connector taxiways meet ADG-IV standards for width, TSA, and TOFA. Additionally, all connectors from the Commercial Apron to Taxiway A meet ADG-IV standards. The taxiways utilized by aircraft operating out of the north GA apron do not meet ADG-

IV standards as currently constructed. Smaller single and twin engine GA aircraft utilize the north apron and have much smaller wingspans. Therefore, taxiway connectors B3 and B4, which connect the north apron to Runway 7/25, are 35 feet wide (ADG II). Taxiway B, which connects between B3 and B4, is 60 feet wide, as it was originally constructed as a portion of the original Runway 8/26.

It is recommended that all taxiways remain as currently constructed. The north airfield taxiway system is not used by ADG-IV aircraft and adequately serves the existing aircraft that use this area. If, in the future, larger aircraft begin operating from the north GA apron, the taxiways should be updated accordingly.

4.2.3 FAA DESIGN STANDARDS

Table 4-6 summarizes the FAA design standards from FAA AC 150/5300-13, *Airport Design,* along with the current condition on existing Runway 7/25. As previously stated, EGE is a D-IV airport, based on its current operations. Runway and taxiway dimensional standards must meet or exceed the specified widths and clearances specific to the critical aircraft to ensure safe operation for landing, take-off, and taxi.

TABLE 4-6 – FAA DESIGN STANDARDS

	ARC D-IV	Existing Runway 7/25
Runway Safety Area		
Width	500ft	500ft/632ft
Length Beyond RW End	1,000ft	1,000ft
Runway Object Free Area Width	800ft	800ft
Taxiway Safety Area Width	171ft	171ft
Taxiway Object Free Area Width	259ft	259ft
Runway CL to Parallel TW CL	400ft	400ft
Runway CL to Aircraft Parking	500ft	>500ft
Runway Hold Line	316ft	316ft

Source: FAA AC 150/5300-13, Airport Design

4.2.3.1 Shoulders and Blast Pads

EGE currently has paved shoulders for Runway 7/25. There are no shoulders on any of the taxiways and taxiway connectors. Chapter 8 of AC 150/5300-13, *Airport Design,* recommends that all runways, taxiways, and aprons have paved shoulders for ADG-III and higher. For ADG-IV airports, standard paved shoulders should be no less than 25 feet wide.

It is recommended that shoulders be installed on all taxiway and taxiway connectors that accommodate ADG-IV aircraft.

Chapter 3 of AC 150/5300-13, *Airport Design*, recommends blast pads to be 200 feet wide by 200 feet long.

EGE currently has adequate blast pads located prior to the thresholds of Runway 7 and 25.

4.2.3.2 Runway Safety Area

The Runway Safety Area (RSA) is a defined surface surrounding the runway that is specifically prepared and suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the paved surface. The standard RSA for a D-IV airport is 500 feet wide and extends 1,000 feet beyond the end of the runway. The existing RSA for Runway 7/25 at EGE ranges from 500 to 632 feet in width and extends 1,000 feet beyond each end of the runway. The original runway was constructed using criteria from a previous version of AC 150/5300-13 that increased runway safety area width by 20 feet for every 1,000 feet above sea level. This requirement was removed by Change 15 on December 31, 2009. When the runway was extended to 9,000 feet in 2009, the RSA for the extension was built to the standard 500 foot width.

EGE meets and exceeds all RSA requirements.

4.2.3.3 Runway Hold Bars

Runway hold bars are in place to prevent aircraft or ground vehicles from entering an active runway. The hold bars are to be positioned so that no part of the aircraft or vehicle penetrates the runway safety area or other airfield airspace surfaces. AC 150/5300-13 stipulates that for airports that have an approach speed class of D, the distance the hold bar must be placed from the runway centerline increases one (1) foot for every 100 feet above sea level. EGE currently operates under approach speed class D, and, in its current condition, is designed to meet this required altitude adjustment. The existing airfield elevation is estimated at 6,548 feet above sea level. Therefore, an extra 66 feet of separation must be added to the standard 250-feet hold bar separation, creating a 316-feet separation.

All runway hold bar requirements are met.

4.2.3.4 Object Free Area

An Object Free Area (OFA) is an area on the ground that is centered on a runway, taxiway, or taxilane centerline, and is provided to enhance the safety of aircraft operations by clearing the area of above-ground objects. Acceptable objects in the OFA are objects that need to be located in that area for air navigation or aircraft ground maneuvering purposes, or are less than three inches tall. For EGE, the required OFA for Runway 7/25 is 800 feet, while the required OFA for taxiways is 259 feet.

All OFA requirements are met.

4.2.3.5 Obstacle Free Zone

The Obstacle Free Zone (OFZ) is a volume of airspace intended to protect aircraft in the early and final stages of flight. It must remain clear of object penetrations, except for frangible

NAVAIDs located in the OFZ because of their function. For runways serving large airplanes, the OFZ is 400 feet wide and extends 200 feet beyond the end of the runway.

All OFZ requirements are met.

4.2.3.6 Building Restriction Lines

The Building Restriction Lines (BRL) are lines that run parallel to the runway and offset at a distance that ensures that new construction remains outside of Terminal Instrument Procedures (TERPS) surfaces and other protected surfaces, as required under 14 CFR Part 77. The BRLs at EGE are calculated based on a 20-foot tall structure. Structures that are taller than 20 feet will requireFAA to conduct an airspace analysis to ensure compliance with Part 77 surfaces. Currently, all buildings are outside of the BRL; however, when large commercial aircraft are parked at the commercial apron, their tails can penetrate protected surfaces. These are not permanent obstructions and only occur when aircraft are parked at the gates.

Currently, all structures meet BRL requirements. Runway Line of Sight

The Runway Line of Sight standard requires that two points, five feet above the runway centerline be mutually visible for the entire length of the runway. However, if there is a parallel taxiway, the two five-foot points must be visible for one-half of the runway length.

All Runway Line of Sight requirements on Runway 7/25 are met.

4.2.3.7 Air Traffic Control Tower Line of Sight

The Air Traffic Control Tower (ATCT) must have a clear visual line of sight to all movement areas of the airport, particularly the runway ends. The location of the tower on the north side of the airfield, and its height above ground, allow for clear line of sight to both runway ends.

All ATCT Line of Sight requirements are met.

4.2.4 NAVIGATIONAL AIDS

As discussed in **Chapter 2**, *Inventory*, EGE currently has four instrument approach procedures. Approach minima for the procedures are based upon several factors, including obstacles, navigation equipment, approach lighting, and weather reporting equipment. Due to the mountainous terrain that surrounds the airport, approach minimums are relatively high.

Recent technological advancements have made possible the use of satellite-based navigation systems that rival conventional ground-based predecessors in accuracy and dependability. These capabilities are expected to further improve with the continued implementation of the FAA's NextGen program. NextGen is a complete upgrade of the National Airspace System. A focus of NextGen is the enhancement of pre-departure, departure, climb, en-route, and approach phases of a flight. More information on the NextGen program can be obtained from the FAA's website[59].

NextGen and the evolution of GPS have already had profound impacts on instrument approach capabilities at public use airports. Conventional instrument approaches, such as the ILS, require ground-based facilities on or near the airport for navigation. With NextGen and GPS, this is no longer the case and, because if this, it has become possible to develop or improve approaches at airports where in the past it was not feasible. The FAA is continuing to expand development and use of GPS for use in aircraft navigation and instrument approach procedures via Area Navigation (RNAV) and the Wide Area Augmentation System (WAAS). WAAS utilizes a network of ground-based antennas to send correcting signals to the GPS satellite constellation, allowing for ILS like accuracy.

4.2.4.1 Instrument Approach Improvements at EGE

A review of the meteorological data from the National Climatic Data Center[60] shows that total IMC conditions occur approximately 2.42% of the time, resulting in approximately 212 hours of IMC throughout the year. Most of these conditions are due to low clouds or poor visibility. As weather conditions worsen, existing higher minimums caused by the surrounding terrain begin to impact user accessibility. When minimums for the published approaches drop below those approved[61] for the nonprecision LDA/DME approach, only those aircraft operators trained and approved for the Special ILS or LOC FMS approaches can arrive at EGE

Given the mountainous terrain surrounding EGE and current approach technologies, it is believed existing instrument approach procedures provide the best level of service to aircraft operators.

It is recommended that Eagle County continue to monitor the implementation of NextGen. Continued coordination with the FAA is also recommended to ensure EGE is being considered for any and all emerging technologies that may improve instrument approach capabilities at EGE.

4.2.5 AIRSPACE REQUIREMENTS

As discussed above, 14 CFR Part 77 defines and establishes the standards for airspace, including objects and obstructions that affect airspace in the vicinity of an airport. Prior to any airport development, a Part 77 requires the proponent of construction to request an airspace evaluation to determine the impact of the proposed construction on airspace and the National Airspace System (NAS), regardless of the project scale. Part 77 defines protected airspace above and around an airport, known as imaginary surfaces. Imaginary surfaces are defined geometrically in relation to the

[59] http://www.faa.gov/nextgen/
[60] National Climatic Data Center, 10-Year Wind Rose Summary for Eagle, CO
[61] Approved minimums for the LDA/DME approach are ceilings above 8,330 feet and visibility of 3 nautical miles

airport and each runway. The size and dimensions of these imaginary surfaces are based on the category of each runway for current and future airport operations. The five imaginary surfaces, as depicted in **Figure 4-3**, are the Primary, Approach, Horizontal, Conical, and Transitional, and are defined on the following page.

Primary Surface – The Primary Surface is an imaginary obstruction-limiting surface that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are functions of types of approaches, existing or planned, for the runway.

Approach Surface – The Approach Surface is an imaginary obstruction-limiting surface that is longitudinally centered on an extended runway centerline. It extends outward and upward from the primary surface at each end of a runway, at a designated slope and distance, determined upon the type of available or planned approach by aircraft to a runway.

Horizontal Surface – The Horizontal Surface is an imaginary obstruction-limiting surface that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimension of this surface is a function of the types of approaches existing or planned for the runway.

Conical Surface – The Conical Surface is an imaginary obstruction-limiting surface that extends from the edge of the horizontal surface outward and upward at a slope of 20 feet horizontally for every one foot vertically (20:1 slope) for a horizontal distance of 4,000 feet.

Transitional Surface – The Transitional Surface is an imaginary obstruction-limiting surface that extends outward and upward at right angles to the runway centerline and the runway centerline, extended at a slope of seven feet horizontally for every one foot vertically (7:1 slope) from the sides of the primary surface.

As defined in Part 77, Runway 7 is a larger than utility runway with a visual approach. Runway 25 is a larger than utility runway with an APV and non-precision approaches and minimums of 2½ miles for localizer only approaches and 3 miles for localizer with glide slope approaches.

The current airspace designated for EGE, as well as the immediate surrounding airspace, adequately satisfies current levels of operation. Additionally, the airspace will be adequate to accommodate the level of operations outlined in the FAA approved forecasts. Because of the terrain that surround the airport, limitations on the number of aircraft that can operate at one time can be expected. With new advances in technology and the potential for more efficient use of existing airspace with future NextGen technology, these limitations may be reduced.

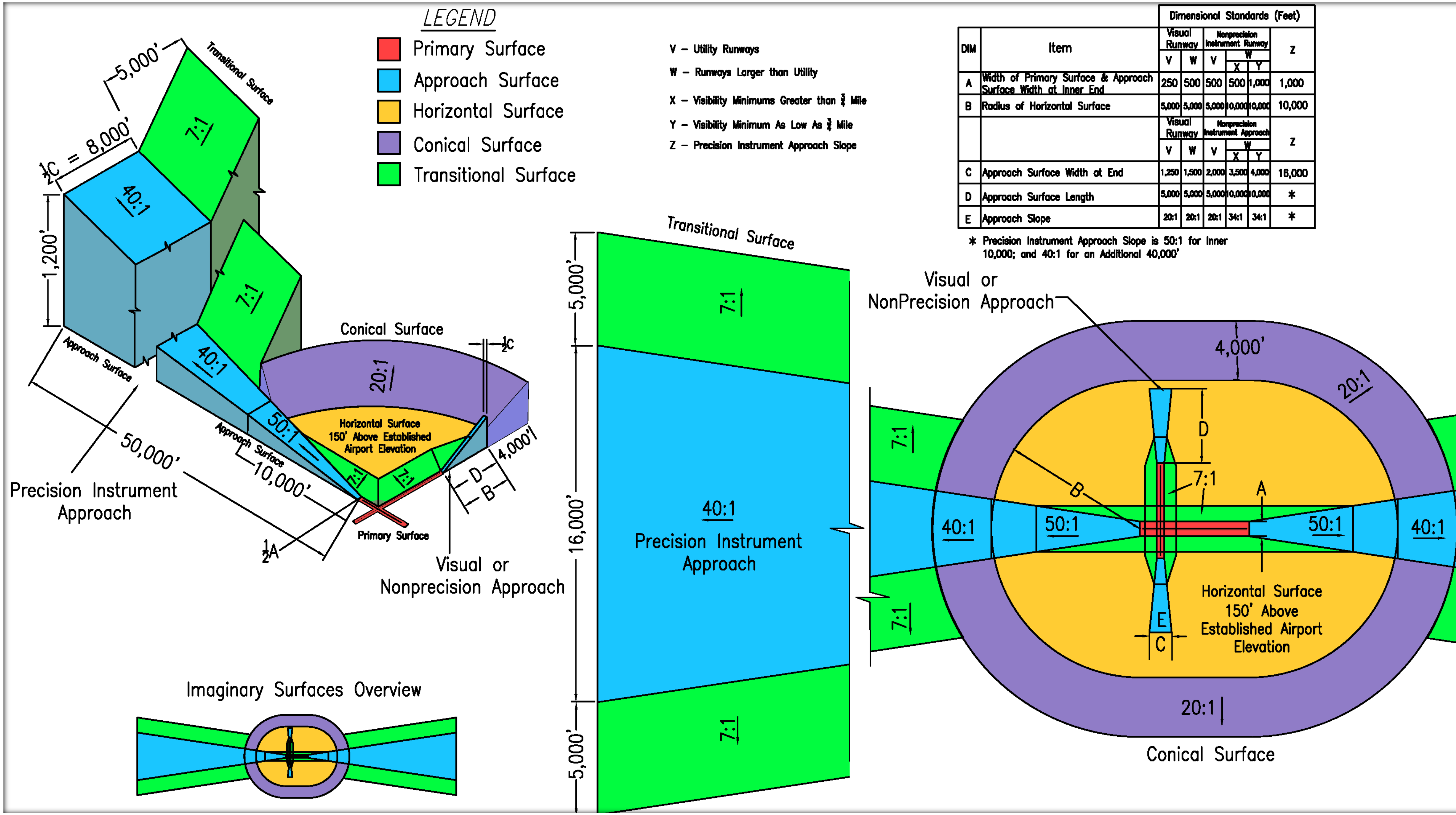
These advancements should continue to be monitored and new technologies investigated for possible use at EGE.

4.2.6 Obstructions

Obstructions are defined as any object of natural growth, terrain, permanent or temporary construction equipment, or permanent or temporary manmade structure that penetrates an imaginary surface.

As part of this master plan update, a detailed obstruction survey was conducted following guidelines in the FAA AGIS program. The obstruction study was performed on May 16, 2012, and the obstruction data obtained was used to determine the impacts to the approach and departure surfaces, including the proposed One Engine Inoperative (OEI) surface. The updated ALP set includes plan and profile depictions of obstructions for each runway end, both existing and ultimate. Additionally, the ALP provides recommendations for mitigating these airspace obstructions. Finally, all obstruction data collected under the AGIS program that is verified and approved by the National Geodetic Society is automatically forwarded on to the FAA to update existing flight procedures, if required, and for future flight procedure development.

FIGURE 4-3 – CFR PART 77 IMAGINARY SURFACES



DIM	Item	Dimensional Standards (Feet): Visual Runway V	Visual Runway W	Nonprecision Instrument Runway V	Nonprecision Instrument Runway W X	Nonprecision Instrument Runway W Y	Z
A	Width of Primary Surface & Approach Surface Width at Inner End	250	500	500	500	1,000	1,000
B	Radius of Horizontal Surface	5,000	5,000	5,000	10,000	10,000	10,000
		Visual Runway V	Visual Runway W	Nonprecision Instrument Approach V	Nonprecision Instrument Approach W X	Nonprecision Instrument Approach W Y	Z
C	Approach Surface Width at End	1,250	1,500	2,000	3,500	4,000	16,000
D	Approach Surface Length	5,000	5,000	5,000	10,000	10,000	*
E	Approach Slope	20:1	20:1	20:1	34:1	34:1	*

* Precision Instrument Approach Slope is 50:1 for Inner 10,000; and 40:1 for an Additional 40,000'

Source: Jviation, Inc.

4.3 LANDSIDE REQUIREMENTS

4.3.1 Regional Transportation Network

The roads and highways that provide access to EGE are adequate to handle both the current conditions and the future growth predicted in the approved FAA Forecast. Access to the airport from I-70 occurs both from the Town of Gypsum and the Town of Eagle. While the current configuration adequately serves airport users' needs, there is no direct access route from I-70 to the airport.

Land that could be use for a potential I-70 interchange connecting I-70 to Cooley Mesa Road was purchased by the County with financial assistance from the FAA. This interchange is depicted on the current Airport Layout Plan and research on feasibility continues.

To protect direct access for the future it is recommended that the I-70 Interchange continue to be depicted on the Airport Layout Plan.

4.3.2 On-Airport Circulation Roadways

The majority of on-airport circulation roadways meet current demands during periods of peak capacity. During peak periods of travel at the airport, the passenger drop-off, as depicted in **Figure 4-4**, can get crowded. Curbside check-in, discussed further in **Section 4.10.3.2**, is the major choke point, especially during the peak departure period of the day. Traffic management is required to prevent complete roadway obstruction during these periods. Adjacent to baggage claim, vehicles tend to accumulate, with cars sometimes parked two deep and even occasionally three deep, causing constraints on the remainder of the terminal curbside roadway.

It is recommended that routine roadway maintenance continue to be performed. Alternatives for curbside check-in and baggage claim will also consider impacts on roadways.

FIGURE 4-4 – EGE PASSENGER PICK-UP AND DROP-OFF

Source: Eagle County Regional Airport

4.3.3 Parking

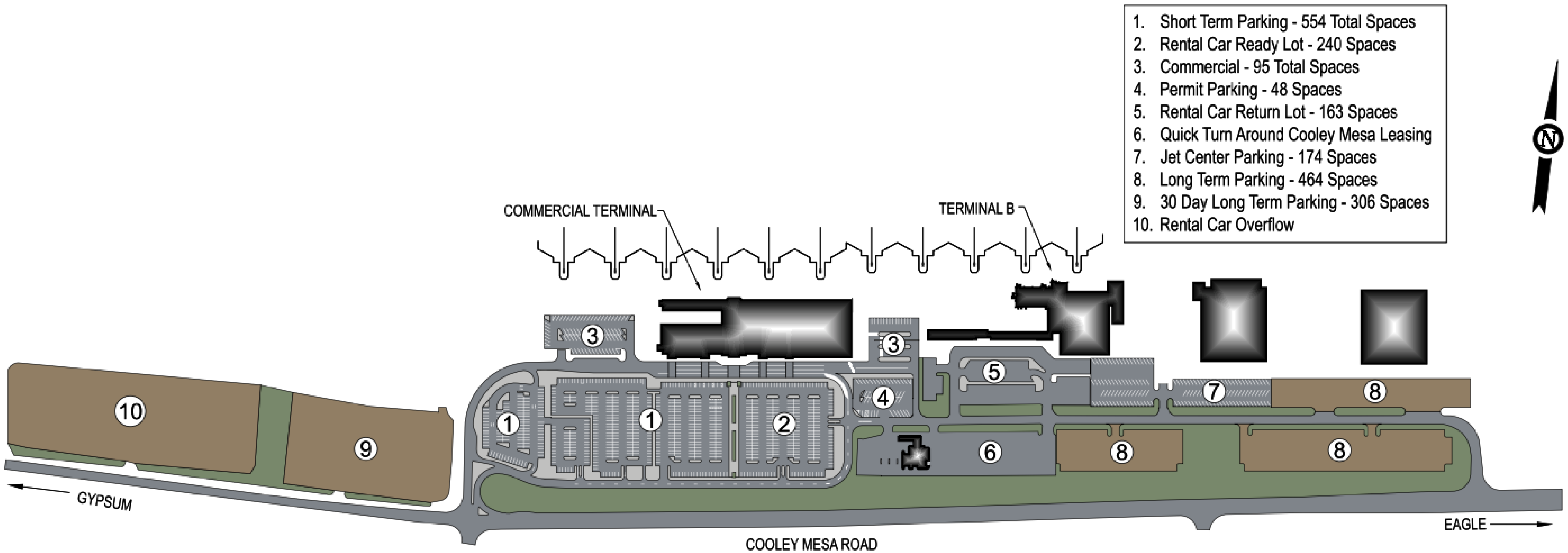
Parking at EGE, as depicted in **Figure 4-5**, is currently adequate for meeting the existing passenger demand level. There are times in the peak travel period, during the ski season, where parking nears or exceeds capacity. During these times, an overflow lot is used to handle the increase in traffic. During off-peak seasons, parking is more than adequate to meet the needs of airport users.

Currently, parking is free of charge to the majority of users. There is one lot designated as a paid permit lot for airport users. Parking is a major revenue generator for airports and this would be the case for EGE, especially during the peak travel season. However, the presence of free parking is appealing benefit for airport users, as identified in comments received from surveys from local businesses.

Several parking lots remain unpaved, including long term parking, winter overflow parking, and rental car overflow lots. Gravel parking lots do not provide for an efficient layout of parking as it is difficult to maintain proper parking separation and layout, as compared to paved parking. Additionally, unpaved parking does not provide for the best experience for airport users as conditions during inclement weather can deteriorate the parking lots. At a minimum long term parking should be paved, while both overflow lots can remain.

Existing parking spaces are adequate to meet future air carrier demand. It is recommended that paid parking be implemented as funding and revenue sources allow. Additionally, it is recommended to pave all unpaved long term parking lots.

FIGURE 4-5 – EXISTING AIRPORT PARKING



Source: Jviation, Inc.

4.4 GENERAL AVIATION

The number and types of projected GA operations and based aircraft can be converted into a generalized projection of GA facility needs. GA facilities include the FBO, hangars, apron, and tie-down space.

A major component of GA facilities is apron space. Apron frontage is considered premium airport space and should be strategically utilized. This is particularly important for EGE. During peak operations, during the ski season, the GA apron is often at or near capacity. Apron layout design should take into account the location of airport terminal buildings, FBO buildings, and other aviation related access facilities at an airport. Aprons provide parking for based and transient airplanes, access to the terminal facilities, fueling, and surface transportation. FAA AC 150/5300-13, *Airport Design, Appendix 5,* provides guidelines in assisting with the determination of the layout and design of airplane parking apron(s) and tie-down area(s) for based and transient aircraft.

4.4.1 TRANSIENT AIRCRAFT APRONS

Transient aircraft aprons, as depicted in **Figure 4-6**, provide access to parking, terminal facilities, fueling, and surface transportation for aircraft that are not based at an airport. Appendix 5 of AC 150/5300-13, *Airport Design*, establishes methodology for determining capacity needs for transient parking. This method involves the analysis and estimation of the demand for transient airplanes and utilizes forecasting numbers from numerous tables mentioned throughout **Chapter 3**, *Aviation Activity Forecasts.*

FIGURE 4-6 – TRANSIENT AIRCRAFT PARKING

Source: Jviation, Inc.

Section 3.8.4, *EGE GA Operations,* indicates that in 2030 there will be 29,965 GA operations at EGE. **Section 3.8.10**, *Peak Period Operations*, specifies that in 2030 an estimated 109 GA and military operations will occur on the airport's peak day of operation. Per AC 150/5300-13A,of the peak day operations are used to calculate apron space for transient aircraft. This equates to a peak of 55 aircraft using the apron at once, resulting in 3,240 square feet needed for each transient aircraft. The result is roughly 180,000 square feet of desired apron space required for transient aircraft in 2030. This space takes into account taxilane OFA width criteria (per AC 150/5300-13A) and other necessary space for fueling, parking, and other SPEARATION REQUIREMENTS. **Table 4-7** summarizes the current space available, along with the minimum apron space required, using the above calculations for the years 2011, 2020, and 2030.

While there is a surplus of transient apron space the apron can still become crowded during peak periods of traffic. During these times the apron can be expanded by moving the temporary security boundary line on the apron used for air carrier operations (see **Section 4.4.1**).

TABLE 4-7 – TRANSIENT AIRCRAFT APRON REQUIREMENTS

Year	General Aviation Operations	Peak Day Operations – GA & Military	Minimum Apron Space Required (square feet)	Current Apron Space (square feet)	Surplus or Shortfall (square yards)
2011	27,226	95 total – 48 transient aircraft	155,520	406,278	+ 250,758
2020	30,899	100 total – 50 transient aircraft	162,000	406,278	+ 244,278
2030	37,010	109 total – 55 transient aircraft	180,000	406,278	+ 226,278

Source: Jviation, Inc.

With the current surplus of transient aircraft apron, no additional space is required. Ramp congestion can occur during periods of peak traffic. New ATCT procedures recently enacted have helped offset this congestion.

4.4.2 BASED AIRCRAFT PARKING APRONS

. Currently, EGE has 24 based aircraft using tie downs on the apron, and 69 based aircraft are housed inside a hangar/shelter. Apron space utilized for based airplanes should be separate from that of transient airplanes and typically, apron space needed for based aircraft is less than transient aircraft as the type of aircraft and its separation requirements is known.

The FAA has established a method in determining apron needs for based airplanes, which uses previously discussed forecasting numbers found in **Chapter 3**, *Aviation Activity Forecasts*. This method assumes that 2,700 square feet of apron space is necessary for each aircraft. This area should be adequate for all single engine and light twin engine airplanes based at EGE. This space also takes into account taxilane OFA width criteria and any other necessary space for fueling, parking, and aircraft separation requirements. Assuming the same ratio of based aircraft that are tied down today will continue into the future, estimated based aircraft apron requirements have been developed. **Table 4-8** summarizes the projected EGE based aircraft that will require apron tie-downs and apron space for the years 2011, 2020, and 2030.

TABLE 4-8 – BASED AIRCRAFT APRON REQUIREMENTS

Year	Projected Tied Down Based Aircraft	Minimum Apron Space Required (square feet)	Current Apron Space (square feet)	Surplus or Shortfall (square feet)
2011	24	64,800	96,030	+31,230
2020	28	75,600	96,030	+20,430
2030	34	91,800	96,030	+4,230

Source: Jviation, Inc.

With a surplus of based aircraft apron, no additional space is required.

4.4.3 APRON PAVEMENT

Design for the rehabilitation of the south Commercial Apron has begun and the project will be completed in multiple phases over the next five years. The pavement on both the south GA Apron and north GA Apron is deteriorating and in need of rehabilitation and/or reconstruction. Design has not begun for replacing pavement on the north GA Apron; however the Army National Guard HAATS facility has begun to expand its facilities. This expansion includes new pavement to support its expanded operations. The remainder of the GA Apron pavement will not be included in the HAATS project.

The north and south GA Apron pavement is found to be in poor condition by both CDOT and Jviation. Planning for rehabilitation of this pavement is recommended. It is also recommended that the pavement maintenance plan be continued to ensure pavement life.

4.4.4 AIRCRAFT STORAGE REQUIREMENTS

The airport is equipped with both aircraft hangars and hangar shelters. Aircraft storage at EGE is highly sought after, especially during the ski season and periods of inclement weather. During the ski season, when hangar storage is at capacity, it is not uncommon for transient aircraft to drop off passengers and depart for other nearby airports with available aircraft storage.

Currently, the airport owns three (3) hangars and ten (10) T-Hangar shelters. The remaining hangars are either owned by the VVJC or by other private parties. In total, EGE has 212,315 square feet of hangar space (14 Hangars and 10 T-Hangars). The majority of the hangars are for current based aircraft, with hangar space at the VVJC reserved for transient aircraft operations. By dividing the 212,315 square feet of existing hangar space by the 69 aircraft in existing hangars results in approximately 3,077 square feet of hangar for each based aircraft. Specific demand will be based on the actual size of aircraft that ultimately will be based at EGE and will require new hangar construction; however, for planning purposes it is assumed that the current ratio of 3,077 square feet per aircraft will continue, as shown in **Table 4-9**. Currently, the airport has insufficient aircraft hangar space and this deficiency is forecast to increase.

TABLE 4-9 – BASED HANGARED AIRCRAFT REQUIREMENTS

Year	Based General Aviation Aircraft	Based General Aircraft Using Tie-downs	Minimum Hangar Space Required (square feet)	Current Hangar Space (square feet)	Surplus or Shortfall (square feet)
2011	93	24	212,313	212,315	2
2020	108	28	246,160	212,315	-30,845
2030	131	34	298,469	212,315	-86,145

Source: Jviation, Inc.

With aircraft storage nearing capacity, hangar development is recommended and will be investigated in Chapter 5, Alternatives Analysis.

4.4.5 Fixed Base Operator (FBO) Facility Needs

EGE is currently serviced by the privately owned Vail Valley Jet Center (VVJC), which provides FBO functions such as aircraft fueling services, management of the transient aircraft apron, aircraft maintenance services, and a large portion of the hangar storage on the airfield. In addition, the facility provides space for other basic functions such as a pilot lounge, flight planning room, crew rest rooms, and bathrooms. Catering is also provided on-site, along with meeting and conference rooms. The Vail Valley Jet Center is an award winning FBO, recognized throughout the nation as one of the top FBO's. Comments from recent airport surveys indicate that airport users are very satisfied with VVJC's customer service and ability to handle high amounts of volume during peak periods of operation.

EGE, like many airports, is served by a single FBO. This may be the result of current economic conditions or a lack of interest by other FBOs. If in the future another FBO desires to operate at EGE, existing airport minimum standards, as discussed below, will establish the requirements for operating a business at EGE. Further, Federal grant assurances establish criteria for obligated airport sponsors, such as EGE, in considering and approving new airport tenants.

The requirements for commercial activities at EGE are found in the *Minimum Standards and Requirements for the Provision of Commercial Aeronautical Services* (adopted May 28, 2002).

FBO interest in EGE will be influenced by such factors as future aircraft demand, the existing and projected volume of fuel sales, the capital cost of building new facilities to comply with the *Airport Minimum Standards*, and projected return on investment. Because the introduction of one or more FBOs typically does not induce additional aircraft operations, FBOs also are influenced by tangible and intangible considerations such as their ability to offer competitive pricing, volume discounts, different services, and better customer service. For example, Eagle County has determined that, in order to sell fuel at EGE, each FBO must provide a range of aeronautical products and services. Typically, the most profitable component of the FBO business model is fuel sales.

4.5 AVIATION SUPPORT FACILITIES

In addition to FBOs, other businesses may locate at EGE to satisfy identified and perceived demand. The *Airport Minimum Standards* prescribe requirements for Specialized Aviation Services Operators (SASOs) to provide such services as flight training, aircraft maintenance and repair, aircraft sales and rental, and air charter and taxi.

4.5.1 AIR CARGO FACILITIES

Currently, there is limited air cargo activity at EGE and is primarily associated with cargo transported via commercial airlines. This typically involves the US Postal Service; however, other cargo may be contracted to be shipped via the airlines. The majority of cargo typically handled by UPS or FedEx is shipped to Grand Junction, Colorado.

Existing facilities adequately meet the demand of existing cargo operation and for levels forecasted in the future.

If cargo were to increase, or if UPS or FedEx were to shift their operations to EGE, facilities should be reexamined to ensure an adequate level of service is maintained.

4.5.2 GROUND SERVICE EQUIPMENT

Ground support equipment (GSE) at EGE is provided by Skywest (United Airlines/United Airlines Express), G2 (American Airlines), the VVJC, and Worldwide Flight Services. GSE includes aircraft tugs, deicers, ground power units, baggage carts and belt loaders, and serving vehicles. The majority of GSE is staged on the edge of the apron between the GA and Commercial Terminals. There is additional space on the Commercial Apron south of aircraft parking Spots 1 and 2. The amount of needed is determined by the individual operators based on demand and is currently at a level that adequately meets the demand of existing operations. Existing parking for GSE is also adequate for existing operations. Due to a lack of dedicated space, all maintenance and vehicle service work is currently done outside on the existing apron. Service work can be hindered by inclement weather, cold, and the presence of snow and ice. Additionally, there is no system to protect from hazardous materials.

As demand increases, staging areas for this equipment should be monitored to ensure that adequate facilities are provided. It is recommended that dedicated space be given for maintenance on GSE Equipment.

4.5.3 WINTER OVERFLOW AIRCRAFT PARKING

Winter overflow parking is located on the Commercial and GA aprons. When overflow occurs on the Commercial Apron, the Secure Identification Display Area (SIDA) line is shifted to the east, as depicted in **Figure 4-7**. This allows for additional commercial aircraft parking, while allowing EGE to comply with access control requirements per 14 CFR Part 1540, *Civial Aviation Security*. Part 1540 requires an airport operator serving air carriers to designate areas of the airfield where airport-approved security identification must be displayed and holders of such identification must pass certain security background checks.

FIGURE 4-7 – MOVING SIDA LINE

Source: Jviation, Inc

When the SIDA area is expanded, it reduces the size of the GA Apron and the amount of parking available for GA aircraft. Due to the nature of commercial flights, these expansions are typically only necessary for relatively short periods of time. When not in use, this area can be used for additional parking for GA aircraft which adds to the capacity of the GA Apron during periods of peak operations.

The Commercial and GA aprons are also used for aircraft parking resulting from irregular operations. In extreme or prolonged cases, the airport has staged aircraft next to the ATCT on closed Runway 8/26.

The Commercial and GA aprons adequately handle the level of operations that occur during peak periods of travel, during the ski season. It was indicated in the airport user surveys that during high traffic periods, when STMP restrictions are in place, the GA Apron can get congested.

Any shift in airline fleet mix could impact the capacity of the commercial apron especially if the Boeing 757 is replace with the Boeing 737, which may require additional flights. During the high traffic times from 11:00am to 2:00pm any impacts could reduce the amount of apron available for overflow parking.

For the level of operations forecasted in the 20 year planning period, the existing apron facilities adequately accommodate overflow and aircraft parking resulting from irregular activity. Future changes to aircraft fleet mix could impact apron use during peak operating periods

4.6 AIRPORT SUPPORT FACILITIES

4.6.1 AIRPORT ADMINISTRATION

The airport administration offices are located on the second floor of the Aircraft Rescue and Fire Fighting (ARFF)/Snow Removal Equipment (SRE) building. There is also office space for on duty Operations/ARFF personnel on the first floor adjacent to the vehicle bays. This building adequately serves existing staff; however, as a whole, the e layout of the existing administration offices does not allow for privacy and do not permit future growth.

Airport administration functions will be considered in all options for addressing the capacity issues of the ARFF/SRE building.

4.6.2 AIRCRAFT RESCUE AND FIRE FIGHTING

As discussed in **Section 2.12.1**, Part 139 requires airport operators to comply with safety and emergency response requirements, including aircraft rescue and fire fighting (ARFF) services. ARFF requirements are grouped into indexes and the type of ARFF services required for each index depends on the type of air carrier aircraft serving the airport. ARFF Index is divided into five categories based on air carrier length groupings, **Table 4-10**.

TABLE 4-10 – ARFF INDEX CATEGORIES

ARFF Index	Length(feet)
A	< 90’
B	≥ 90’ and < 126’
C	≥ 126’ and < 159’
D	≥ 159’ and < 200’
E	≥ 200’

Source: 14 CFR 135.315 (2011)

The ARFF Index for EGE is Index C, based on the Boeing 757-200, with a length of 155.3 feet. to comply with Index C requirements, the airport operator must provide a minimum of two (2) response vehicles that are capable of carrying a total of 3,000 gallons of water for foam production and either 500 pounds of Halon 1211 or 450 pounds of potassium-based chemical agents. EGE has four active ARFF response vehicles for aircraft emergencies. These include one 2006 Oshkosh Striker 3000, one 1988 Oshkosh T-1500, and one 2004 Tote ARFF foam trailer. EGE is currently in the process of procuring an additional ARFF response vehicle having just recently awarded the bid to Oshkosh for a Striker 1500-gallon response vehicle.

EGE meets all Index C requirements with additional reserve units to ensure coverage. The ARFF/SRE building needs additional capacity for equipment. These facilities will be investigated in Chapter 5, Alternatives Analysis.

4.6.3 AIRPORT MAINTENANCE FACILITIES

All airport maintenance facilities are located in the ARFF/SRE building. Vehicle maintenance work is done inside the vehicle bays, along with storage of tools and equipment. With the ARFF/SRE building at capacity, it has become necessary to store additional vehicles and equipment outside. Snow plows, tractors, mowers, and maintenance trucks are all stored around the building and on an adjacent apron area to the north. Storing this equipment outside exposes the valuable equipment to the elements, which creates additional wear and tear. In the winter, there are frequent periods of extreme cold with snow and ice, which can create additional maintenance issues.

Options for creating additional storage for airport equipment will be investigated in Chapter 5, Alternative Analysis.

4.6.4 AIRPORT PERIMETER FENCE AND ACCESS CONTROL

The perimeter of the airport is protected by a 12 foot tall perimeter fence with three (3) strands of barbed wire. Vehicle access to the Airport Operations Area (AOA) is protected by secured access gates that require airport identification.

Doors providing access from buildings onto the secured area are protected by card readers that must be swiped with airport identification to verify and track access. Buildings that provide access to the non-secured portions of the airport are the responsibility of the building occupants.

All airport perimeter fence and access control measures meet TSA and FAA Guidelines.

4.6.5 AIRPORT TRAFFIC CONTROL TOWER

Airport Traffic Control Tower (ATCT) services are provided through the FAA Contract Tower Program. This program provides air traffic control services through the use of private employees and is overseen by the FAA.

The FAA and the airport share in the cost to maintain and run the tower. The airport has a responsibility to pay for upkeep and upgrades to equipment.

The airport is obligated to pay for a portion of the contract tower program and should continue to maintain and upgrade the facilities as needed.

4.7 FEDERAL AGENCY FACILITY NEEDS (FAA, TSA, USCBP, ICE)

Federal agencies that operate at the airport are FAA, TSA, and the U.S. Customs and Border Patrol (CBP). The FAA is primarily represented through the Contract Tower Program and their offices are located inside the control tower. FAA personnel responsible for maintaining radar and navigational equipment and managing Federally-funded development projects periodically visit the airport. TSA personnel operate inside the Commercial Terminal, the adjacent baggage handling facility, and lease space for offices and other support rooms from the airport.

Other federal agencies that operate at the airport include FAA, TSA, and the U.S. Customs and Border Patrol (CBP). The FAA is represented through the Contract Tower Program and their offices are located inside the control tower. TSA personnel operate inside the Commercial Terminal, the adjacent baggage handling facility, and lease space for offices and other support rooms from the airport.

CBP personnel operate from the VVJC and are available Thursday through Monday, or by appointment. EGE is not considered a port of entry so there is a charge for all services.

Existing facilities adequately meet the needs of the respective Federal agencies. Changes to Federal regulations have the potential to impact facility and staffing needs.

It is recommended that facilities be monitored to ensure they continue to provide an adequate level of service and comply with Federal requirements.

4.8 FUEL STORAGE REQUIREMENTS – 100LL, JET A, AND SELF FUELING

As discussed in **Section 2.7.2,** there is a current capacity of 209,000 gallons of fuel storage, with the capacity of 197,000 gallons of Jet A and 12,000 gallons of Avgas fuel. These fuel tanks are owned and operated by the VVJC, with the majority of fuel storage located on the main GA Apron east of the FBO Terminal. The 12,000 gallon Avgas tank is a self-serve tank located on the north GA Apron in support of the based GA aircraft. There is an additional 12,000 gallon Jet A fuel tank located on the north GA Apron, mainly to serve the HAATS' helicopter operations.

Existing fuel storage exceeds the airports minimum standards. These standards currently mandate that a FBO have, at a minimum, one 20,000 gallon Jet A and one 10,000 gallon Avgas tank.[62] The majority of fuel storage dedicated to Jet A fuel is due to the high demand for this fuel.

Based on fuel data provided by the VVJC, an average of 5.9 million gallons of fuel was dispensed annually from 2007 through 2010.

[62] Eagle County, Colorado *Minimum Standards and Requirements for the Provision of Commercial Aeronautical Services* (2002) 2002-076

The average annual operations for the same time period were approximately 38,000 operations per year. Measuring fuel flowage against annual operations equates to approximately 156 gallons of fuel per operation. Comparing the average 156 gallons per operation against peak month operations from **Chapter 3,** *Aviation Activity Forecasts*, the existing fuel storage capacity at EGE provides approximately 10 days storage for current operations and just over 8 days storage in 2030, as detailed in **Table 4-11**.

TABLE 4-11 – FUEL STORAGE CAPACITY

	2010	2015	2020	2030
Peak Month Operations	4,023	4,184	4,376	4,859
Average Day Peak Month	134	139	145	162
Gallons Per Operation	156	156	156	156
Average Day Peak Month Fuel (gal)	20,904	21,684	22,620	25,272
Existing Fuel Storage	209,000	209,000	209,000	209,000
Days of Fuel	10	9.64	9.23	8.27

Existing storage provides an adequate level of service for existing and future operations forecasted for the 20 year planning period. Existing storage capacity also provides for possible delays in fuel delivery, which could occur given the location of the airport.

4.9 DEICING FACILITIES

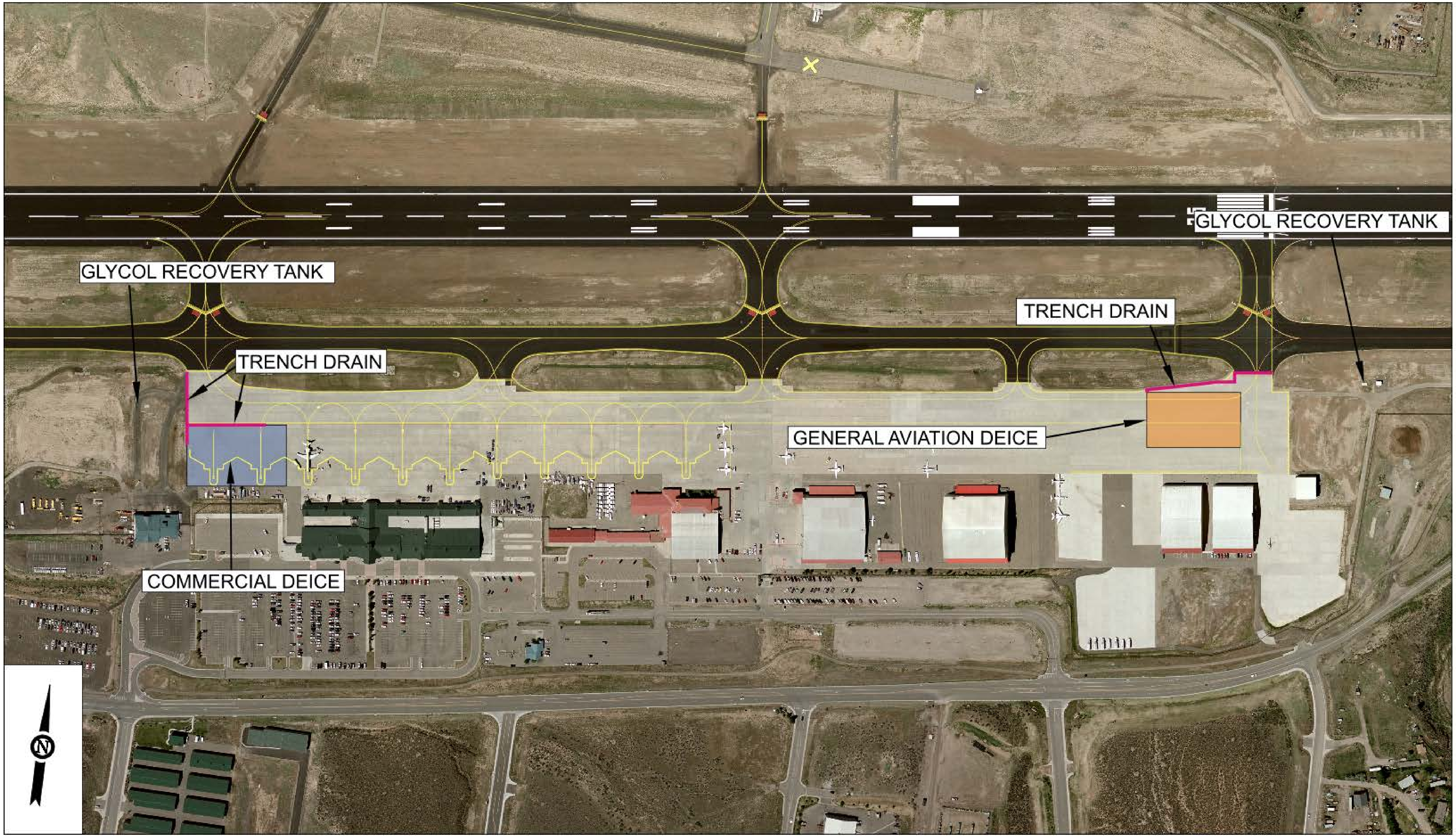
Deicing of aircraft is essential in climates like that of EGE, due to the propensity of frost, ice, and snow to accumulate on aircraft surfaces. Ice buildup diminishes the aerodynamic qualities of aircraft and can result in loss of lift and stability. There are two types of deicing fluid that are applied to aircraft at EGE:

Type I – Type I is a mix of Propylene Glycol and water, typically at a 50% ratio, which is heated and used to remove accumulated ice and snow from an aircraft. This fluid type is typically used during precipitation events, or in the morning following a snow event or the development of frost. Type I fluid is what is known as a *deicing* mixture.

Type IV – Type IV is a partially thickened version of undiluted Propylene Glycol that is sprayed on aircraft after they have been deiced, but prior to departure, to prohibit the additional accumulation of ice. This fluid adheres to flight surfaces until it is subjected to aerodynamic sheering forces on takeoff that remove the fluid, resulting in a clean, non-iced aircraft. Type IV fluid is commonly called an *anti-icing mixture*.

The deicing of aircraft at EGE is performed by the staff of the respective airlines and the VVJC for GA operators. Presently, passenger airline deicing occurs on the West Deice Pad which is located on the west edge of the Commercial Apron. GA deicing operations occur on the east end of the main GA Apron, near the A2 Taxiway Connector, as depicted in **Figure 4-8**. Deicing runoff from both pads is captured via a trench drain where it then flows to a glycol recovery tank and is stored for future disposal.

FIGURE 4-8 – DEICE PAD LOCATIONS



Source: Jviation, Inc.

4.9.1 Deicing Capturing Regulation

In Colorado, water quality is regulated by both Federal and state laws. Federal regulation is through the Clean Water Act (CWA) using the National Pollutant Discharge Elimination System (NPDES). In Colorado, the NPDES is assumed under the Colorado Water Quality Control Act via the Colorado Discharge Permit System (CDPS). EGE operates under a heavy industrial activity permit issued through the CDPS. As part of this permit, the airport uses a Stormwater Management Plan (SWMP), which identifies Best Management Practices (BMPs) to address impacts on water quality associated with airport operations. The airport is also required to monitor deicing activities to ensure the BMPs are addressing potential impacts. Sampling is required on an annual basis and must occur within 72 hours of a storm event with greater than 0.1 inch of rainfall. Runoff can be from rain storms or melting snow.

On August 28, 2009, the EPA issued their proposed rule 40 CFR 449, entitled *Effluent Limitation Guidelines and New Source Performance Standards for the Airport Deicing Category,* in the Federal Register. It was originally proposed that the rule would require that airports over a certain size, as determined by the number of operations, collect either 20% or 60% of Aircraft Deicing Fluid (ADF), depending on the total amount of gallons dispensed per year. However, the final published rule, after undergoing an extended comment period, removed many of these collection requirements. As currently published, existing airports with 1,000 or more annual jet departures that generate wastewater associated with airfield pavement deicing are to use non-urea-containing deicers, or alternatively, meet a numeric effluent limitation for ammonia.[63]

The facilities at EGE currently meet the demand of both existing and forecasted deicing operations.

4.10 TERMINAL REQUIREMENTS

EGE's commercial airport terminal, as depicted in **Figure 4-9**. The commercial terminal is an area most susceptible to major impacts arising from minor changes. For example, an airline scheduling change of just 30 minutes has the potential to require an additional gate, significantly add to the hourly throughput of passenger screening, and overload a secure holdroom. At EGE, this is magnified during the ski season. During peak periods of travel the facilities are nearly at capacity. Any delay or change in schedule can create a constraint on facilities and significantly impact hourly throughput. In between these heavy schedule banks, the terminal is more than adequate to accommodate airport traffic. Aircraft schedules cannot be accurately tracked and predicted both in the short- and the long-term. For this reason, annual enplanements and peak activity based on today's operation carried forward are the most reasonable indicators of future activity levels. Airport management should continue to evaluate the adequacy of each functional area of the terminal and analyze airline scheduling changes for their impact to these areas.

[63] United States Environmental Protection Agency, Fact Sheet: Effluent Guidelines for Airport Deicing Discharges, April 2012.

FIGURE 4-9 – COMMERCIAL TERMINAL

Source: Eagle County Regional Airport

The following discussion of the various functional components will outline how the particular areas are performing at current peak passenger levels, how they are anticipated to perform under the forecast for the planning period, and which areas may require future expansion or renovation.

4.10.1 Level of Service

The FAA, along with the International Air Transportation Association (IATA), has developed standards for use in analyzing space requirements at airports. IATA defines standards in relation to the "Level of Service" that should be maintained by the airport operator. These service levels are discussed as a means to assess the ability of the particular areas to comfortably perform their intended purpose. The service levels are as follows:

- **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 of time, 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 breakdowns, and unacceptable delays; an unacceptable level of comfort.

The Level of Service indicators for the passenger terminal at EGE were estimated for each of the terminal's functional areas. These assessments were made from a review of the drawings from the terminal's original construction, several site visits to observe passenger flows, and detailed analysis using industry standard planning factors. All of this information has been compiled below to present a picture of the performance of the different functional areas of the terminal under the current load demands placed on each area.

As a seasonal airport, the use of the terminal fluctuates dramatically throughout the year. During the summer months, the terminal operates at an "A" level of service and often appears oversized and has ample space for all activities. The majority of passengers utilize the airport during the ski season. The activity level during a peak travel day in the winter is extremely heavy with many areas of the terminal congested and operating at a "D" or "E" level, which can drop to an "F" when there are weather delays and other complications.

The following sections describe and analyze each functional area of the terminal building and assign a level of service to that function. Given the growth projections, maintaining a Service Level of "C" or greater during the peak periods in all areas of the terminal may prove to be cost prohibitive and result in oversized spaces for the better part of the year. Depending on the future economic climate, it may be appropriate to accept temporary drops in the Service Level to a "D" in certain areas for limited times. When service levels start to degrade to unacceptable levels, consideration should be given to the addition or change of services in the terminal.

Using industry standards tailored for EGE's specific situation, conceptual planning factors have been determined for each functional area. Planning factors are the "units of facility", such as square feet or linear feet that adequately serve a "unit of demand", such as a passenger who is either arriving or departing. These planning factors were specifically derived to reflect the unique operations of EGE. The planning factors used are customized in order to balance adequate performance of the building during rush and off-peak hours, for each of the spaces within the building to optimize performance.

Activity levels at an airport are represented as Annual Enplaning Passengers (ANNEP), Peak Hour Originating Passengers (PHOP), Peak Hour Terminating Passengers (PHTP), and Peak Hour Passengers (PHP). These activity levels were described in detail in **Section 3.5.2**. While annual traffic (ANNEP) is a useful benchmark for describing the activity from year to year, peak hour (PHOP and PHTP) activity is most important to determine the size of terminal facilities. For example, ticket counters and outbound baggage facilities primarily serve PHOP, whereas baggage claim areas serve only PHTP. Some facilities, like restrooms, serve all types of passengers and are sized to handle the highest peak hour passenger demand (PHP). Peak flight arrivals at 20-minute intervals are considered in determining the sizing of baggage claim areas and the number and type of baggage claim devices.

Based on historical airport activity, virtually all passengers at the airport are assumed to be origination and destination (O&D) passengers. Connecting activity is expected to be minimal. Consequently, PHOP will, for practical purposes, equal PHTP.

Using these planning factors as a tool for analysis, the varying demands placed on the different components of the Commercial Terminal can be studied. Based on this study, certain areas are likely to become crowded and need expansion at different timeframes.

4.10.2 Building Systems / Code Compliance Analysis

The International Building Code (IBC) determines the maximum occupancy of a building, or portion of a building, based on the function of that space. Eagle County has has adopted IBC as the local building code and per IBC 402.2, the terminal building fits into the Occupancy Classification for a "Covered Mall." Based on this criteria, the commercial terminal was evaluated for compliance with building occupation and safety codes. The emergency evacuation plan, as depicted in **Figure 4-10**, is annually reviewed with the building officials from the Town of Gypsum, to assure that the egress paths, illumination, alarm system, and first aid equipment are adequate to maintain a safe facility.

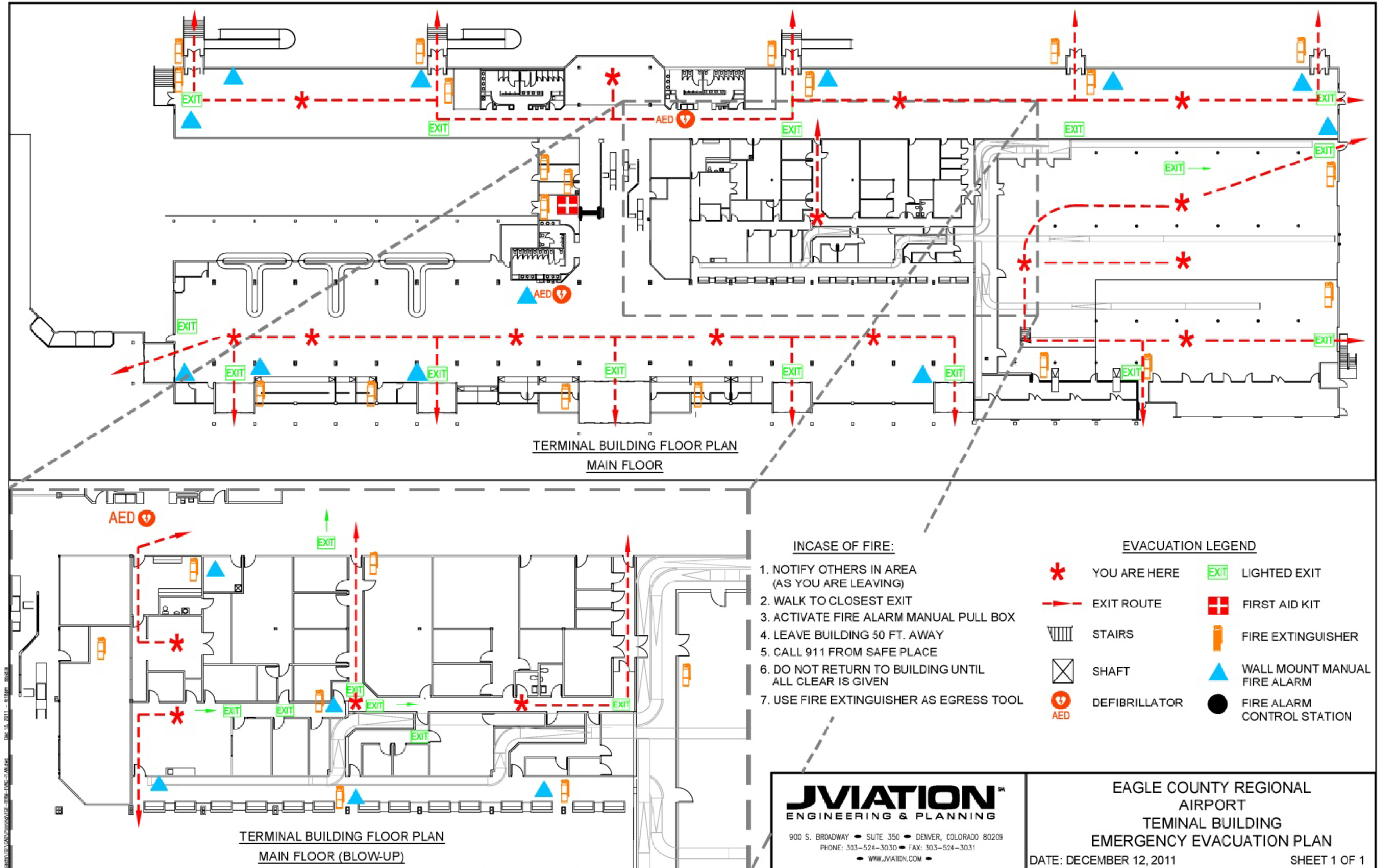
There are fire extinguishers placed throughout the facility, as well as a built-in automated fire suppression sprinkler system in the terminal and in the baggage make up area. The location of existing fire separations and fire rated wall assemblies, which are installed as part of the building's construction, were not evaluated as part of this study. First aid kits and defibrillators are located strategically throughout the facility. Exits are clearly marked and placed throughout the facility to decrease the travel distance from any point in the terminal to an exit. Current building codes require that at no point within the building is a person more than 200 feet from a point of egress (IBC 402.4.4). This is currently satisfied. The egress requirements are achieved in part due to the boarding gate doors at the holdrooms, which can serve as emergency exits, and the six airlock vestibules opening to the curb front.

People in a terminal do not tend to be evenly disbursed throughout the building. While the building code assumes an average number of people spaced evenly throughout the square footage of the building, the actual peak passenger loading tends to come in surges. When a large plane arrives, it sends a wave of passengers through the terminal toward the baggage claim, restrooms, and exits. At certain times, parts of the terminal may be experiencing high traffic volume, while other areas are empty. Emergency exits have been designed to allow these surges of people egress to safety regardless of where in the building they may happen to be when there is an emergency.

The EGE commercial terminal was constructed according to the applicable codes at the time of construction and remains a safely functioning public building. Eagle County currently has adopted the 2009 International Building Code with specific amendments. In the event of a significant remodel or addition, the overall code compliance of the terminal may need to be re-evaluated in light of the current codes.

The existing terminal currently meets all code requirements at this time. As the building expands in the future, it will be required to meet the current standards at that time.

FIGURE 4-10 – EMERGENCY EVACUATION PLAN



Source: Jviation, Inc.

4.10.3 Airline Functions

Terminal areas dedicated to airline functions, as detailed in **Table 4-12,** are those locations that directly support airline operations. These spaces include ticketing and check-in, baggage, passenger holdrooms, and airline office space.

TABLE 4-12 – AIRLINE FUNCTIONS AREAS

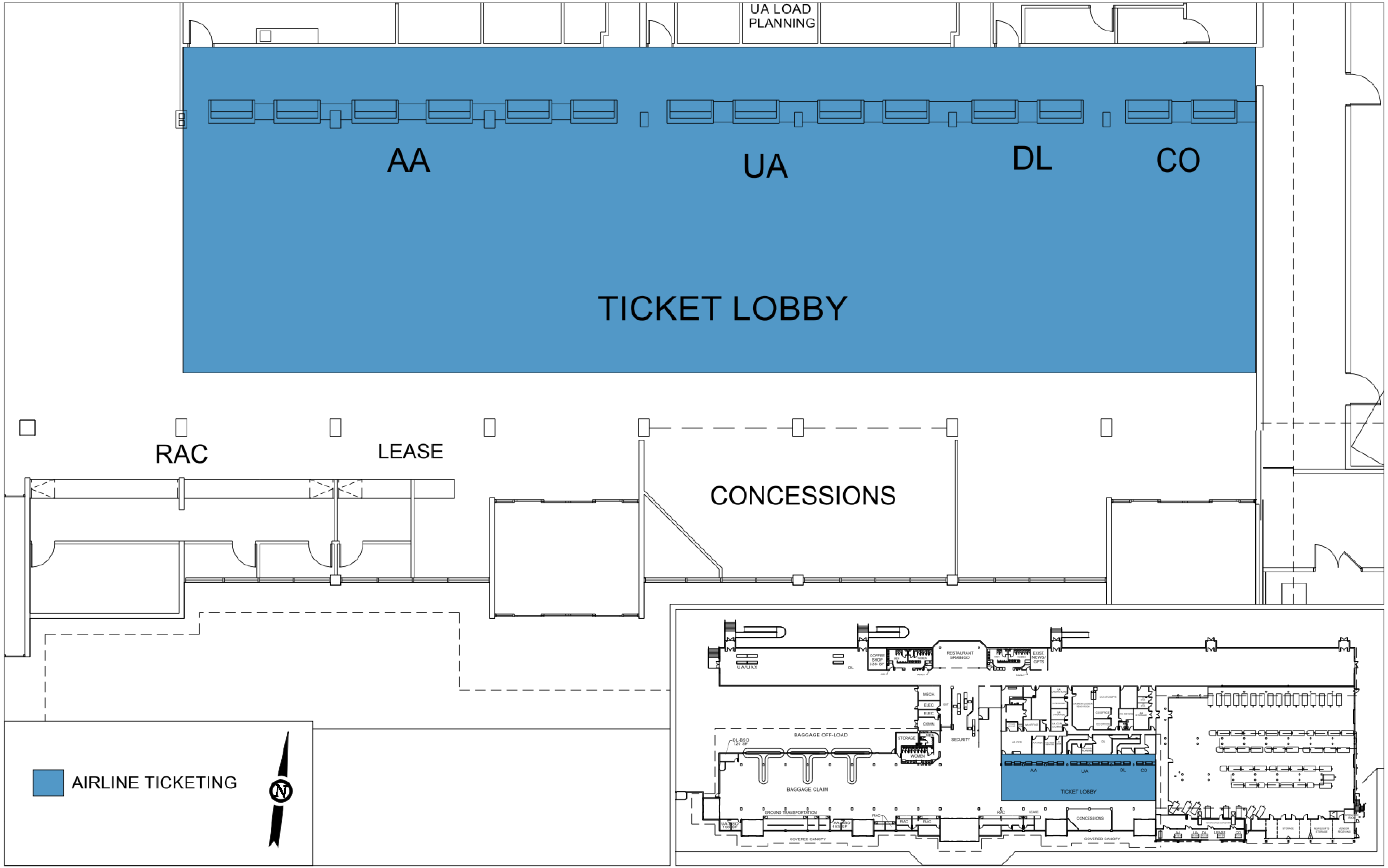
Type of Occupancy – Apron Level	Existing Square Footage	Conceptual Planning Factor		2010	2015	2020	2030
AIRLINE FUNCTIONS							
Ticket Counter Area	2,818	5.0	SF/PHOP	2,560	2,920	3,170	3,735
Ticket Counter Length	*140*	*0.27*	LF/PHOP	138	158	171	202
Ticketing Kiosks	350	0.75	SF/PHOP	384	438	476	560
Ticket Counter Queuing	2,416	7.50	SF/PHOP	3,840	4,380	4,755	5,603
Inbound Baggage / Baggage Off Load	3,650	8.0	SF/PHTP	4,096	4,672	5,072	5,976
Tug circulation	7,500	12.25	SF/PHTP	6,272	7,154	7,767	9,151
Outbound Baggage	11,900	12.25	SF/PHOP	12,544	14,296	15,521	18,302
Mezzanine Level	0						
Tug circulation	7,900	12.25	SF/PHOP	6,272	7,154	7,767	9,151
Baggage Claim Area	4,798	12.25	SF/PHTP	6,272	7,154	7,767	9,151
Baggage Claim Frontage	*230*	*1.20*	LF/PHTP	614	701	761	896
Baggage Claim Service Office	586	1.45	SF/PHOP	742	847	919	1,083
Curbside Baggage Check Counters	800	2.50	SF/PHOP	1,280	1,460	1,585	1,868
Curbside Checking Frontage	*80*	*0.50*	LF/PHTP	256	292	317	374
Airline Office Space	6,018	12.0	SF/PHOP	6,144	7,008	7,608	8,964
Employee Restrooms	171	0.12	SF/PHP	123	140	152	179
Holdrooms	8,223	825.0	SF/Gate	8,250	8,250	8,250	8,250
Holdrooms Utilized Space				*78.4%*	*89.4%*	*97.0%*	*114.3%*
Space for Sitting Passengers – 50%		*15.0*	SF/PHOP	3,840	4,380	4,755	5,603
Space for Standing Passengers – 50%		*10.25*	SF/PHOP	2,624	2,993	3,249	3,828
Airline Function Subtotal	**57,130**			**58,779**	**65,873**	**70,807**	**81,971**

Source: Jviation, Inc.

4.10.3.1 Ticketing Area

The airline ticketing area includes ticketing counters, passenger queuing, airline ticket offices, and outbound baggage handling operations, depicted in **Figure 4-11**. Until recently, the temporary placement of the TSA baggage scanning equipment in the ticket lobby greatly restricted the space and cluttered the circulation and queuing. The mezzanine addition in the outbound baggage room has allowed TSA to relocate all of their baggage scanning equipment and has greatly freed up the space in the ticket lobby. In general, this functional area operates at a Service Level of "C" during peak hour. The addition of the curbside check-in and the kiosks has alleviated much of the crowding in this area. However, the relocation of the concessions from secured areas has increased the traffic and duration passengers spend in this area. As enplanements increase in the future, and ticketing technology advances, the ticketing area will need to adapt to these changes.

FIGURE 4-11 – AIRLINE TICKETING



Source: Jviation, Inc.

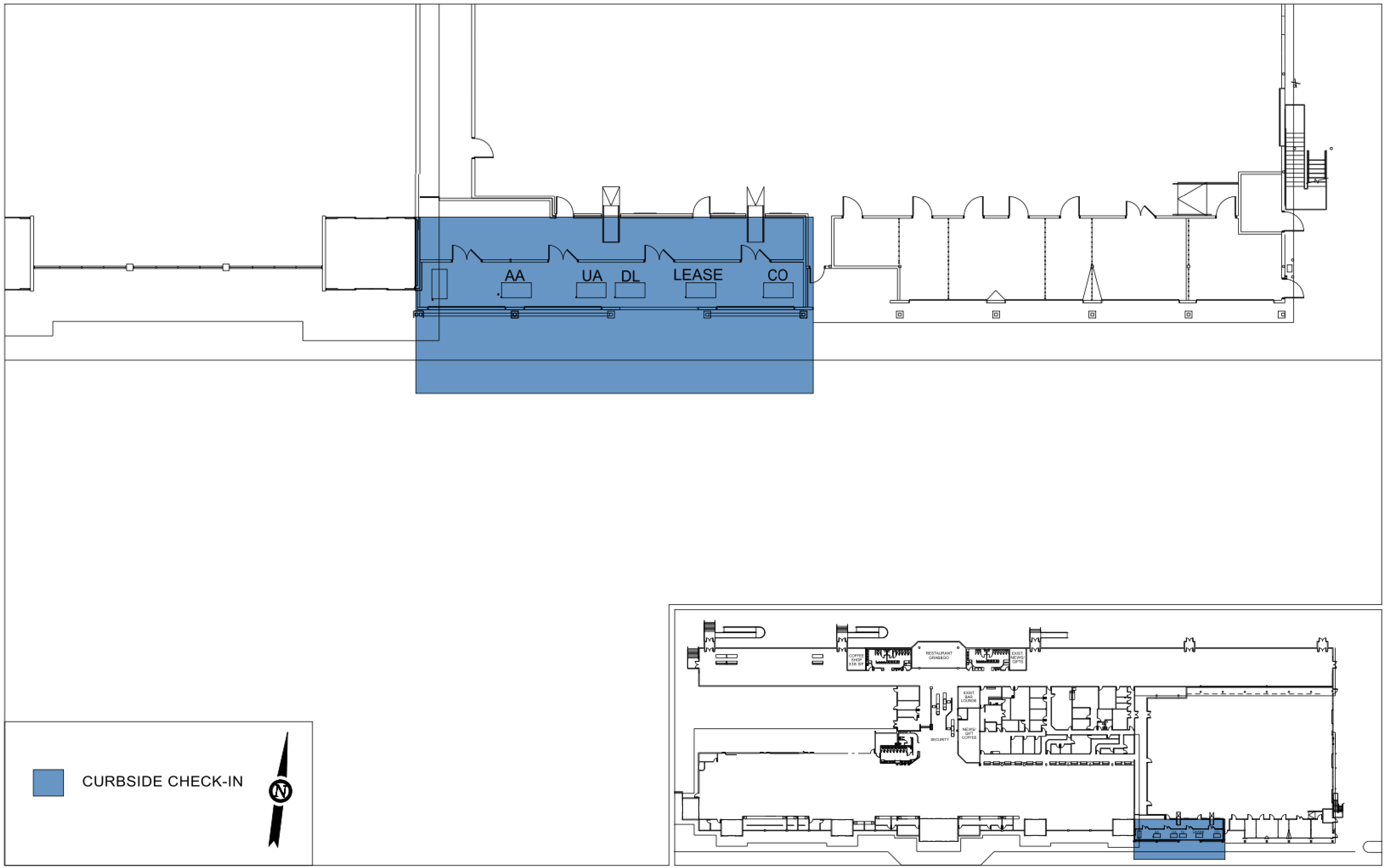
4.10.3.2 Curbside Check-in

There are four curbside check-in stands that accommodate a maximum of five ticketing stations. Currently four of the positions are in use by the airlines, with one position available for lease, as depicted in **Figure 4-12**. These stands provide a total of 80 linear feet of curbside check-in frontage. This part of the terminal is heavily used during the peak travel months, with queuing often spilling onto the street. It is estimated that over 35% of the passengers utilize the curbside check-in. This number is reduced due to the absence of curbside check-in services by United Express and inconsistent use by United Airlines. On peak travel days, a typical wait time at the curbside check-in was measured to be approximately 10 minutes.

Based on the current high level of usage, high demand for this service, and limited number of stations provided, it appears to function with a Service Level "E" during peak travel days. Though the wait time was not incredibly excessive, the lack of queuing space for this function and lack of room for luggage become apparent at peak travel times.

The existing curbside check-in is undersized, and there is enough seasonal demand to support additional curbside check-in stations with additional queuing space. Recommendations for expanding curbside check-in will be examined further in Chapter 5, Alternatives Analysis.

FIGURE 4-12 – CURBSIDE CHECK-IN



Source: Jviation, Inc.

4.10.3.3 Kiosks

There are currently 13 check-in kiosk locations, each with significant available space for queuing. The kiosk area has 350 square feet devoted for the kiosks and queuing. This functional area is currently at a Service Level of "C". Given the industry trend of greater use of both internet check-in and kiosk self check-in stations, there might be technological drivers pushing for increased high tech check-in methods that may continue to change how this part of the terminal functions.

The terminal has adequate space to add additional check-in kiosks as needed.

4.10.3.4 Ticket Counters

The ticket counter area is currently at a Service Level "C". The length of the ticket counter is a function of the number of passengers (PHOP) who use the counter for ticketing and baggage check-in. The existing terminal facilities have a total of 14 ticket stations, comprising of 140 linear feet of ticketing counter frontage available. Two of the existing ticketing locations are not currently leased by any of the airlines. This allows some room to accommodate anticipated growth at the airport in the short term. On peak travel days, a typical wait time at the ticket counters was measured to be 10 minutes.

There is an average depth of 10 feet from the rear wall behind the ticket counter to the front of the counter. Three and half feet of this space is taken up with baggage conveyors. The remaining space is where the ticketing agents operate during the check-in procedures. Likewise, this area is sufficient to accommodate the anticipated limited growth of the airport.

No additional ticket counter space is needed at this time.

4.10.3.5 Ticketing – Queuing Area

The existing passenger queuing area extends approximately 20 feet in front of the counters. Since there is existing counter space that is unused, and since the removal of the TSA equipment from the ticket lobby, the existing queuing space is more than adequate. Furthermore, during peak hours when more queuing space is needed, there is circulation space immediately adjacent to the current queues where queuing needs may expand. The higher usage of the curbside check-in alleviates some of the congestion in this area.

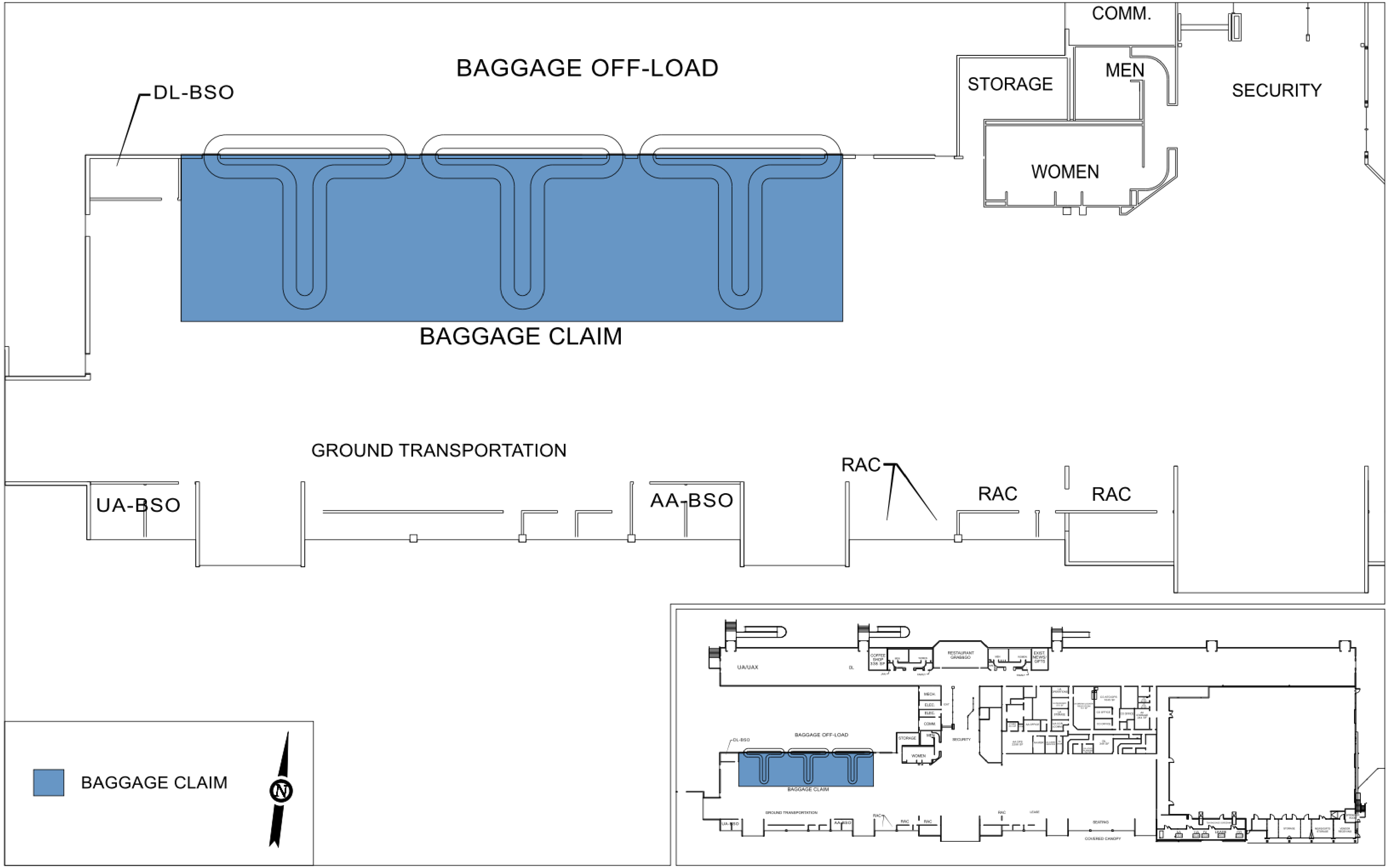
No additional queuing space is needed at this time.

4.10.3.6 Baggage Claim

Due to the checked bag fees imposed by most airlines, the current trend in the industry has been to check fewer bags. Nationally, the average passenger is carrying on more and checking less. As a resort airport, despite the national trend, the checked bag counts remain considerably high and have recently increased with a greater amount of international travelers visiting for longer periods of time. There are three existing baggage carousels on the west end of the terminal, as depicted in **Figure 4-13**. The area around these three carousels is 4,798 square feet; the baggage claim frontage presents 230 linear feet, significantly less than comparable airports. Considering the higher than average bag count per passenger, the space in the baggage claim is not sufficient. On peak travel days, the typical wait time for bags to arrive at the conveyors from the arriving aircraft was observed to be 15 minutes. However, it was also observed that one flight required multiple tugs, the first series of bags arrived 16 minutes after arrival and the remainder of bags arrived 23 minutes later. The baggage area is currently at a Service Level of "E". There is an additional unassigned 1,874 square feet of circulation space around the baggage claim area where mingling, waiting, and collecting activities can spill over. The current configuration is strained at the peak demand for the largest aircraft served by the airport with confined space for passengers and meet and greeters.

Additional baggage claim space is recommended and will be examined further in Chapter 5, Alternatives Analysis.

FIGURE 4-13 – BAGGAGE CLAIM



Source: Jviation, Inc.

4.10.3.7 Outbound Baggage, Baggage Make-up

The outbound baggage and baggage make-up areas are currently at a Service Level of "B". The covered baggage make-up area was a part of the 2007 terminal addition. This addition took into consideration the future indoor mezzanine addition for the TSA baggage screening equipment. As a resort airport, passengers at EGE tend to have a high average baggage count and a higher oversize baggage count than other airports. Based on the anticipated passenger loads over the planning period, the airport may need to expand the baggage make-up area near the end of the 20-year planning period as passenger counts increase.

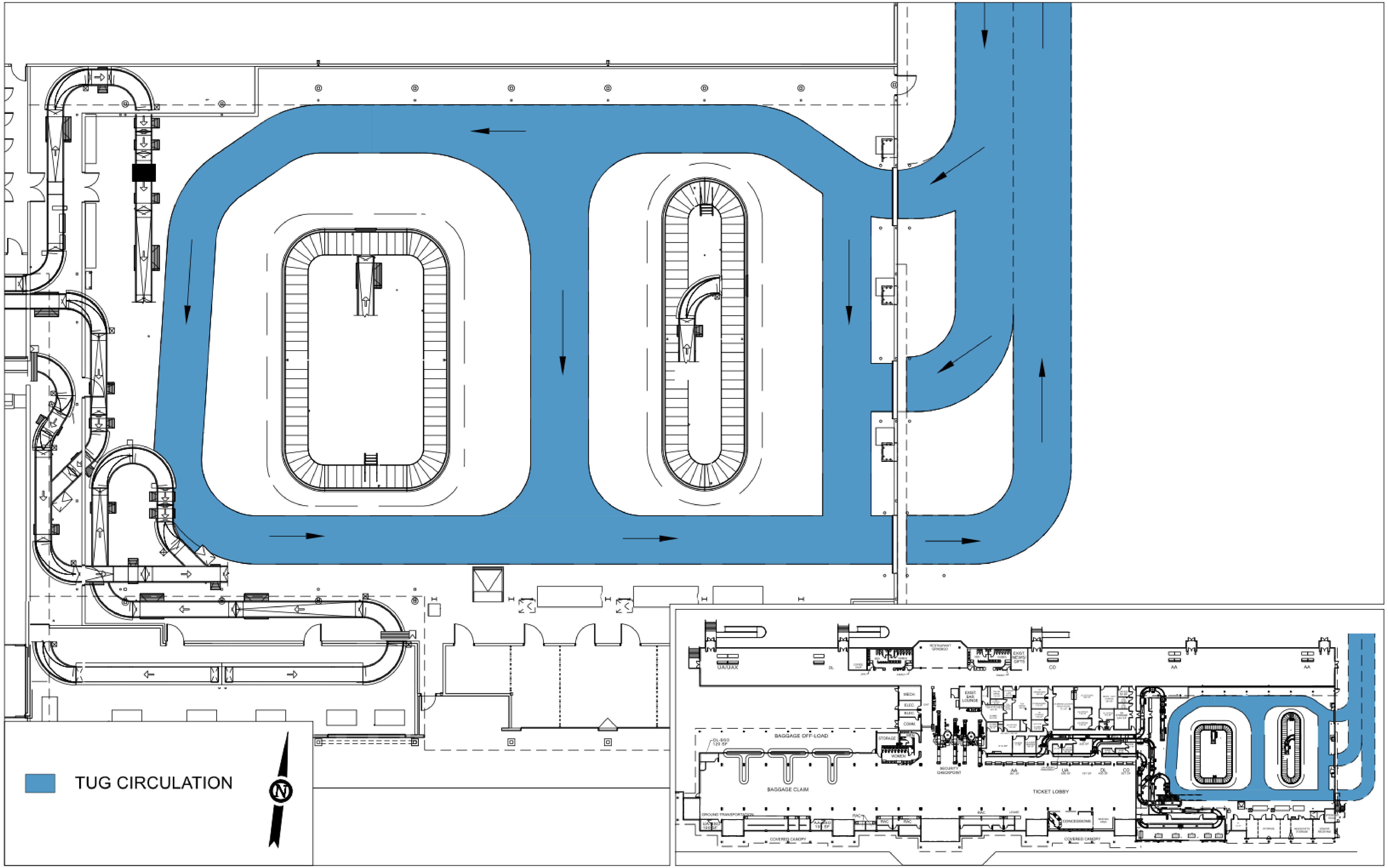
No additional baggage make-up space is needed at this time.

4.10.3.8 Circulation – Tugs

The tug circulation area, depicted in **Figure 4-14**, is currently at a Service Level of "B". There is sufficient room in this area to reconfigure the baggage make-up to work in concert with the revised TSA baggage screening equipment. Though parts of the terminal are cramped at peak hours, there is ample room on the apron for storage and staging of the ground equipment. The heated and covered addition of the baggage make-up area now offers a heated area for employees as well. There is enough room for the tug trains to stage, load, unload, and pass each other with a safe amount of clearance.

No additional tug circulation improvements are needed at this time.

FIGURE 4-14 – CIRCULATION – TUGS



Source: Jviation, Inc.

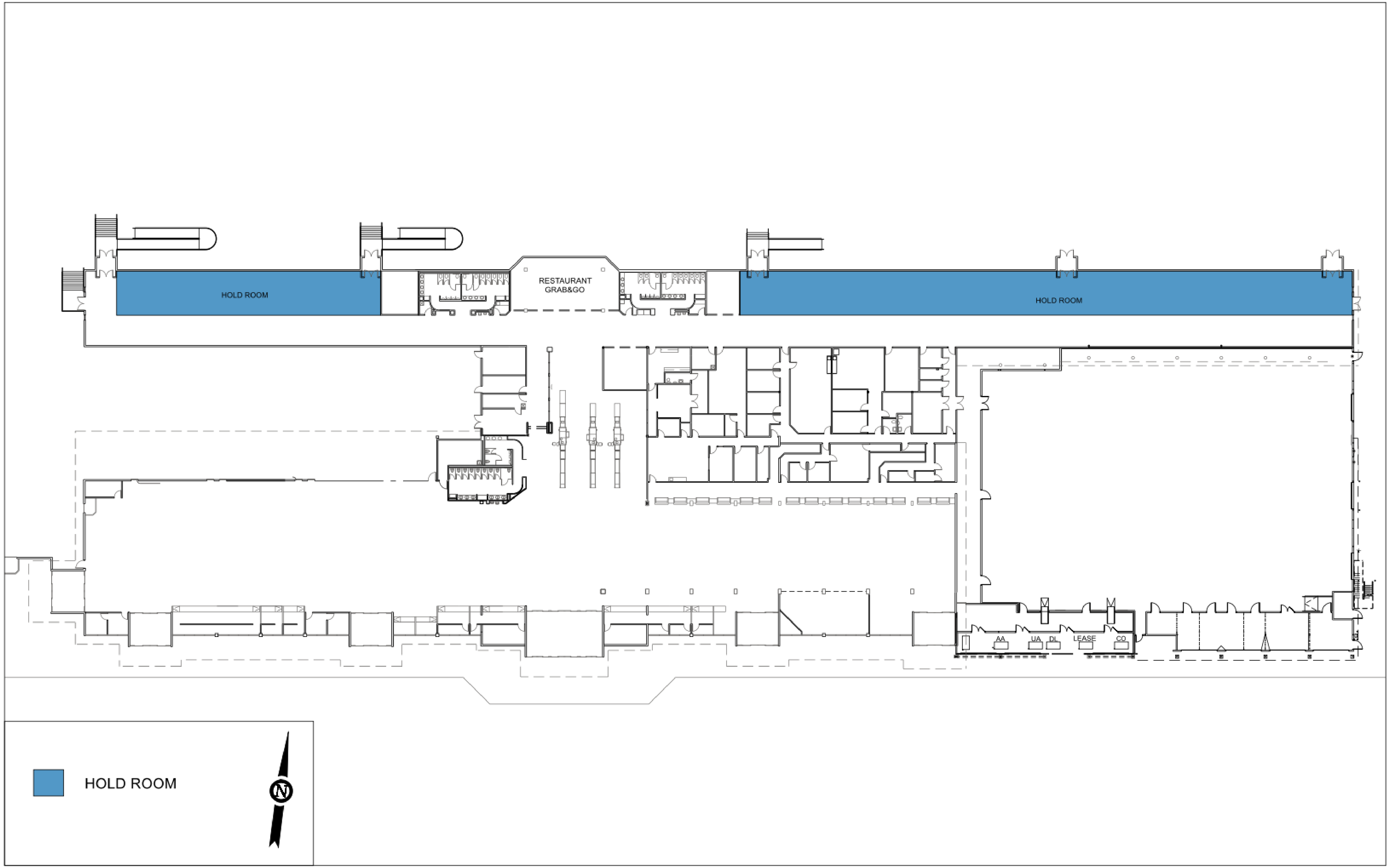
4.10.3.9 Holdrooms

Holdrooms, depicted in **Figure 4-15**, are located inside the secured terminal area and provide a location for passengers to gather for their departing flight. On average, the holdrooms adequately manage passenger demand within the space provided; therefore, the current space allocation was used as a baseline to determine future needs.

As annual enplanements approach 240,000, the Level of Service of the departure lounges begins to decrease. In 2010 during the hours of peak loading, assuming 50% of the passengers in the holdroom are standing (at 10.25 square feet per passenger), and 50% of the passengers are seated (taking up 15.00 square feet each), 78.4% of the space is occupied. According to the IATA standards, 80% occupation is synonymous with a Service Level of "D". This level of service is considered the worst case scenario, as passenger levels are constantly in flux, with a constant mix of passengers entering the holdroom while others exit. It is only under conditions of weather delays where the occupancy of the holdroom increases without relief. In addition, industry trends are for airlines to fly aircraft that accommodate greater passenger load. As this continues, an additional strain will be put on the holdrooms during peak hours. Using this same formula, the anticipated peak hour originating passenger count in 2020 will increase to 97% of the holdroom space and approach a Service Level of "E", eventually falling to a Service Level of "F".

Additional holdroom space is recommended to address the existing level of service and will be examined further in Chapter 5, Alternatives Analysis.

FIGURE 4-15 – HOLDROOMS



Source: Jviation, Inc.

4.10.3.10 Airline Offices

Airline operation spaces, depicted in **Figure 4-16**, include employee facilities, administrative offices, maintenance, catering, and storage. The space requirements of these facilities are affected by the total number of passengers coming and going from the airport. Therefore, ANNEP is used in determining the needed space. This functional area is currently at a Service Level of "B". The current space is well utilized and sufficient for its purpose. However with the TSA now occupying previously vacant offices, there is very limited room for storage and growth. With the industry trending towards air carrier mergers, and therefore reduction of redundancy, the existing configuration is anticipated to be adequate through the near future.

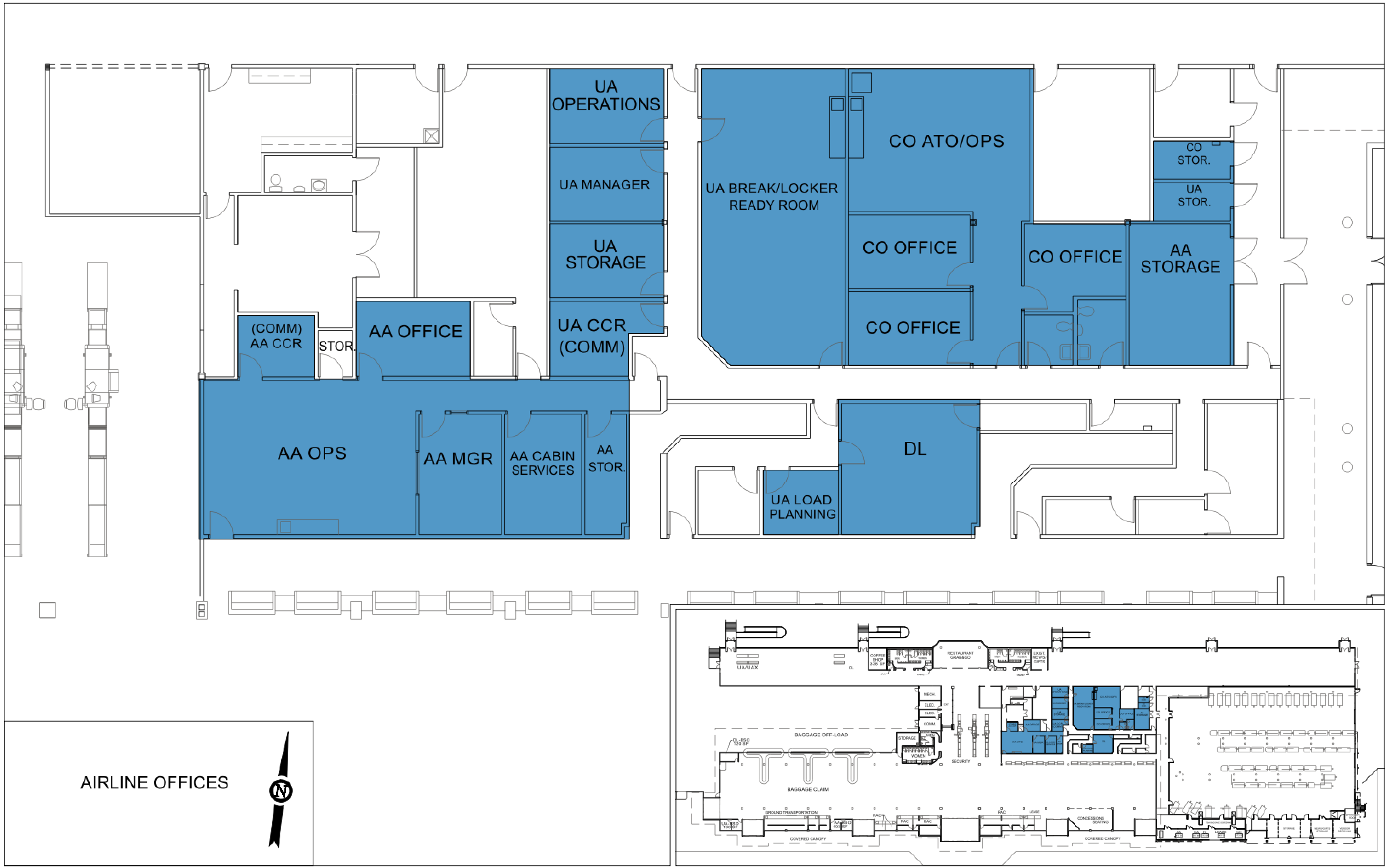
No additional airline office space is needed at this time. Continued review of current space for additional efficiencies is recommended.

4.10.3.11 Loading Dock

Currently, there is not a designated loading dock for the terminal, but it is a recognized need. Deliveries are either brought through the terminal from the east doors, or unloaded into the concession storage areas adjacent to the curbside check-in. The existing method for receiving deliveries requires utilization of the existing passenger circulation patterns, which can be difficult, especially during peak surges.

A designated loading dock space is recommended and will be examined further in Chapter 5, Alternatives Analysis.

FIGURE 4-16 – AIRLINE OFFICES



Source: Jviation, Inc.

4.10.4 Concessions

Terminal concession spaces are for food and beverage vendors, news and gift shops, rental car agencies, and travel agents that primarily serve passengers using the terminal. As a resort airport, the concessions are highly cyclical. The vendors typically do a significant amount of business during the ski season, by ramping up their staff and service offerings, and diminishing their operations through the remaining seasons.

Planning factors, as detailed **Table 4-13**, for food and beverage, news and gift, rental car, ground transportation, and other concessions are based on ANNEP, since their annual revenue potential is tied to total volume of passenger traffic. In seasonal airports of this variety, the bulk of the business for the retailers is accomplished during peak months. The staffing and services available at the various retailers fluctuates with the seasonal tides. Concessions are also separated into non-secure and secure categories. Once through screening, passengers typically do not return to the non-secure portion of a terminal, providing concessions to both areas of a terminal ensures all passengers are adequately served.

TABLE 4-13 – CONCESSION AREAS

Type of Occupancy – Apron Level	Existing Square Footage	Conceptual Planning Factor		2010	2015	2020	2030
CONCESSIONS							
Concessions (Non-Secure)	1,014	0.0020	SF/ANN	803	871	946	1,115
Concessions (Secure)	2,596	0.0070	SF/ANN	2,809	3,050	3,311	3,903
Concessions – Storage	766	0.0016	SF/ANN	642	697	757	892
Ground Transportation	820	0.0022	SF/ANN	883	958	1,041	1,227
Rental Car Counter Area	1,540	0.0040	SF/ANN	1,605	1,743	1,892	2,230
Rental Car Counter Length	*110*	0.0004	SF/ANN	140	152	166	195
Rental Car Queuing Area	929	0.0025	SF/ANN	1,003	1,089	1,183	1,394
Concession Subtotal	**7,665**			**7,744**	**8,408**	**9,129**	**10,762**

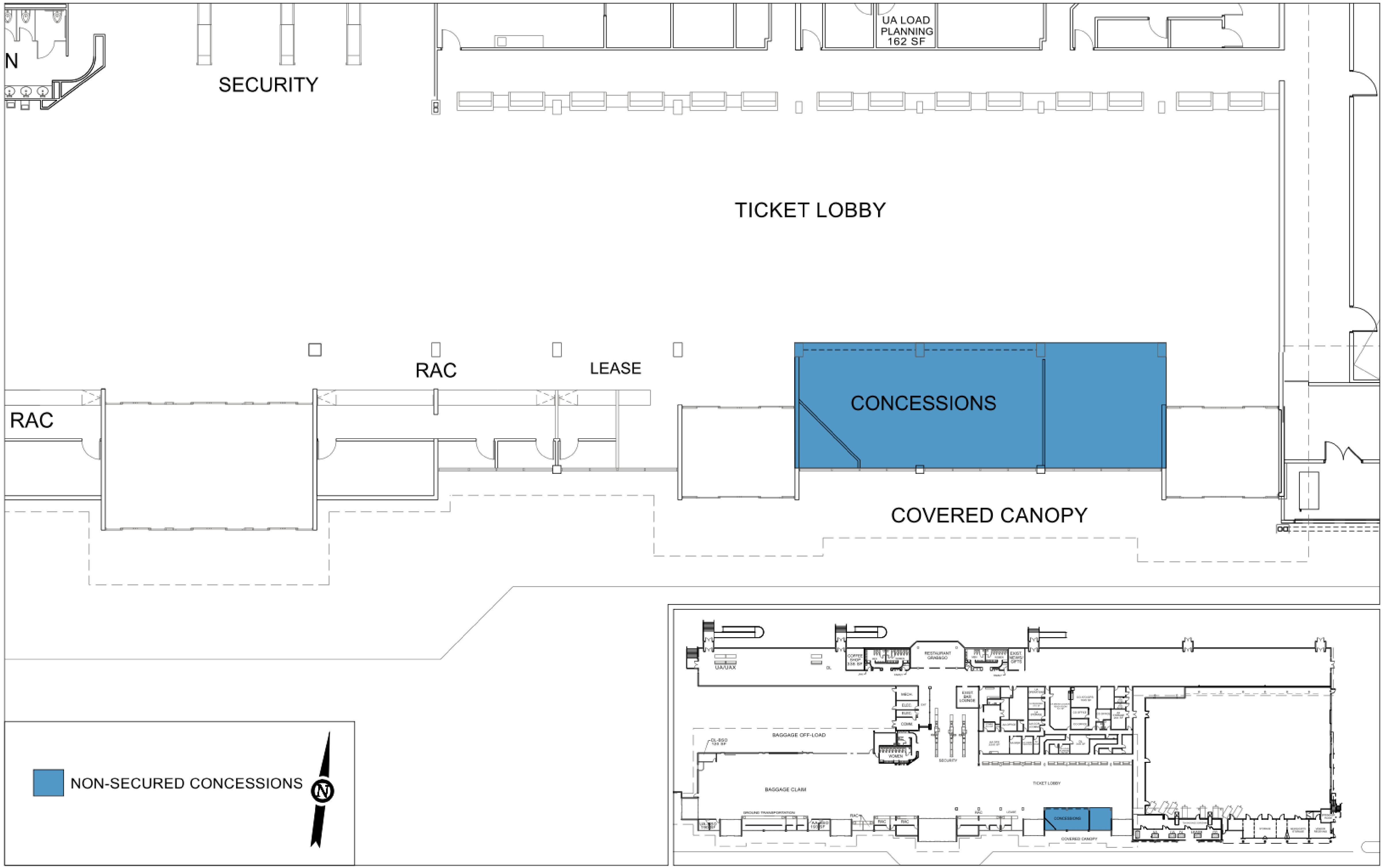
Source: Jviation, Inc.

4.10.4.1 Non-Secure: News, Gift, Coffee

There are currently 1,014 square feet of space allocated to the non-secure news, gift, and coffee shop adjacent to the ticketing lobby, depicted in **Figure 4-17**. The TSA passenger screening expansion project caused these concessions to be relocated to an underutilize part of the terminal. The relocation allowed for a slight increase in the area allocated to concessions. During peak passenger times, the influx of passengers in the circulation space in front of the shop is a “hot spot” of activity. The positioning of the concessions near the ticket lobby has increased the time passengers spend in this area. This functional area is currently at a Service Level of “C”, and it is adequately supplying the services demanded by the travelers.

No additional non-secure concession space is needed at this time.

FIGURE 4-17 – NON-SECURED CONCESSIONS



Source: Jviation, Inc.

4.10.4.2 Secure: News, Gift, Coffee, Restaurant, Lounge

There are currently 2,596 square feet of space allocated to the secure concessions, depicted in **Figure 4-18**. This functional area is currently at a Service Level of "D". Discussions with airport management determined that secure concessions are in high demand during peak travel periods. During peak passenger times, the circulation areas adjacent to the secure concessions and restrooms become congested.

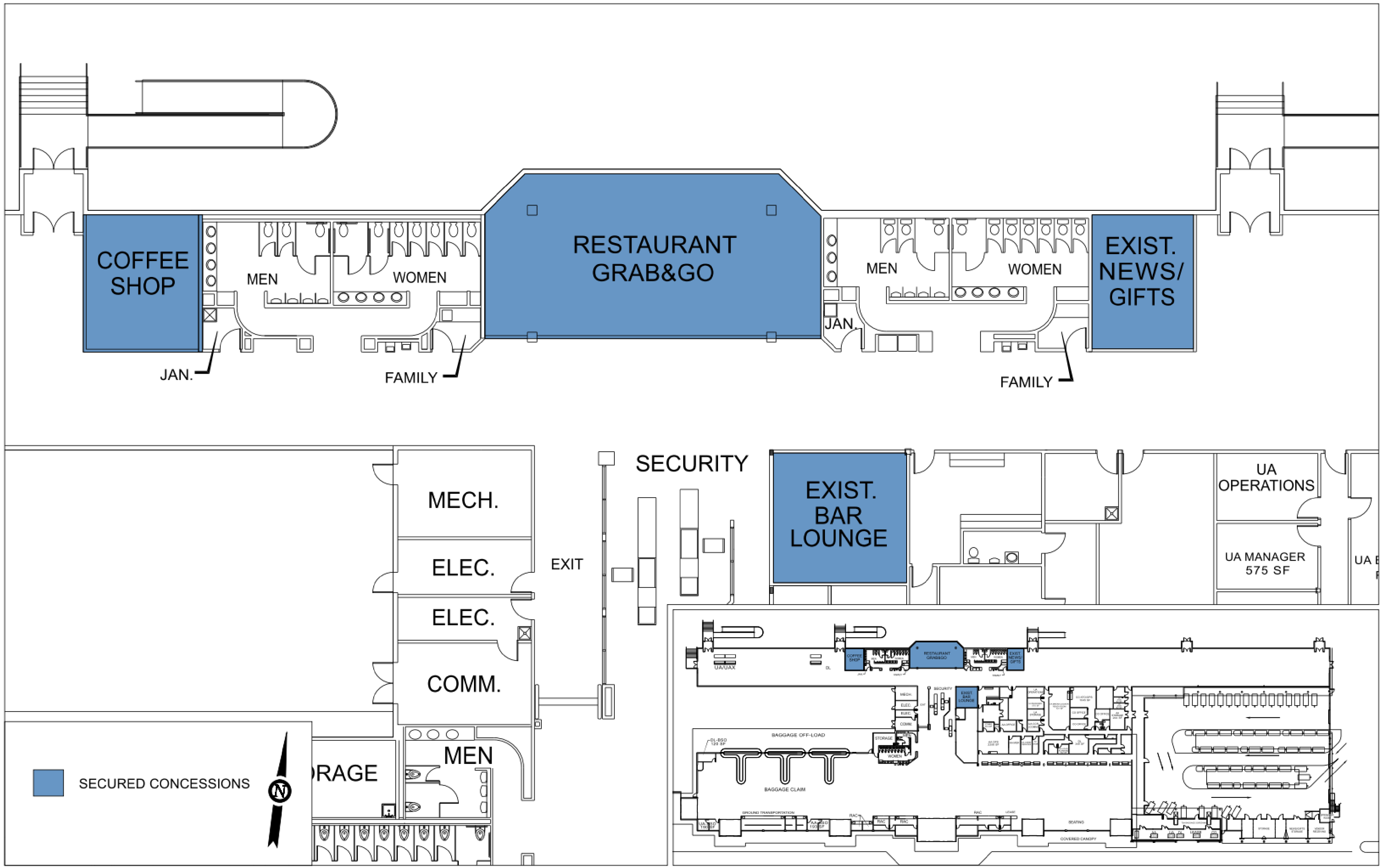
Additional secure concession space is recommended and will be examined further in Chapter 5, Alternatives Analysis.

4.10.4.3 Rental Cars

There are currently 1,540 square feet of space assigned to the rental car counters, depicted in **Figure 4-19**, with 110 linear feet of rental car counter length. There are currently 929 square feet of space in the main lobby that is primarily utilized for rental car vendor queuing and non-secure news and gift shop. This functional area is currently at a Service Level of "D". During busy hours the queuing area for the rental cars creates congestion that interferes with circulation through the lobbies. Based on the observed function of this site, and the typical spaces allotted for rental car services at resort airports, it appears to be slightly undersized for present conditions. This is expected to continue to degrade over the next 20 years. Increased passenger levels may drive the need for additional space for vendors.

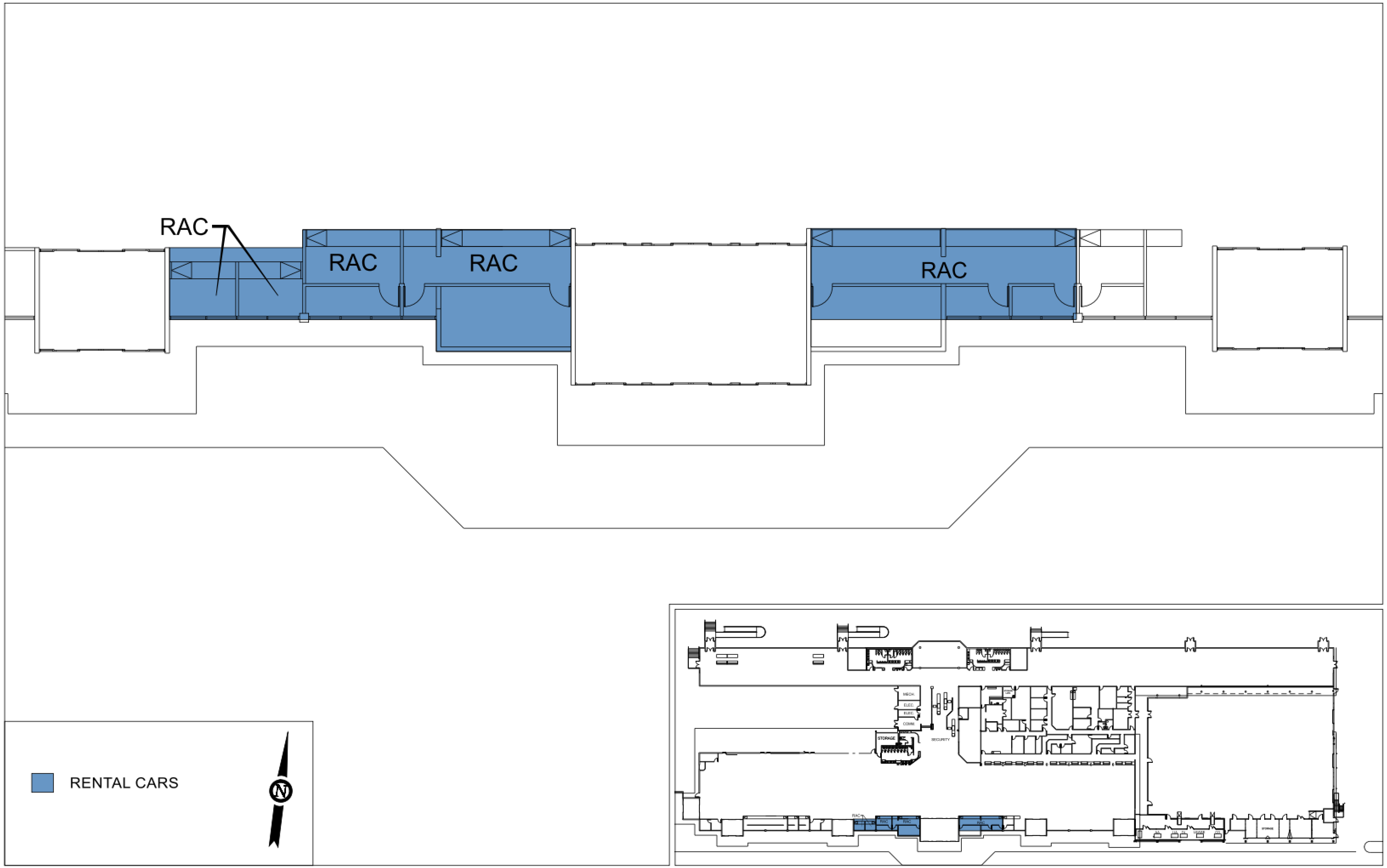
Additional space for counters and queuing is recommended.

FIGURE 4-18 – SECURED CONCESSIONS



Source: Jviation, Inc.

FIGURE 4-19 – RENTAL CARS



Source: Jviation, Inc.

4.10.5 Circulation

Circulation area is space identified for passengers to transition from one location of the terminal to another. These areas, as detailed in **Table 4-14,** must be kept as clear as possible to allow the terminal and its components to operate effectively.

TABLE 4-14 – CIRCULATION AREAS

Type of Occupancy – Apron Level	Existing Square Footage	Conceptual Planning Factor		2010	2015	2020	2030
CIRCULATION AREAS							
Circulation - General	8,668	0.025	SF/ANN	10,031	10,891	11,825	13,941
Circulation -Ticketing	1,833	4.25	SF/PHOP	2,176	2,482	2,695	3,175
Circulation - Baggage Claim	1,874	4.25	SF/PHTP	2,176	2,482	2,695	3,175
Circulation – Secured	8,131	0.020	SF/ANN	8,025	8,713	9,460	11,152
Circulation Area Subtotal	**20,506**			**22,408**	**24,560**	**26,675**	**31,443**

Source: Jviation, Inc.

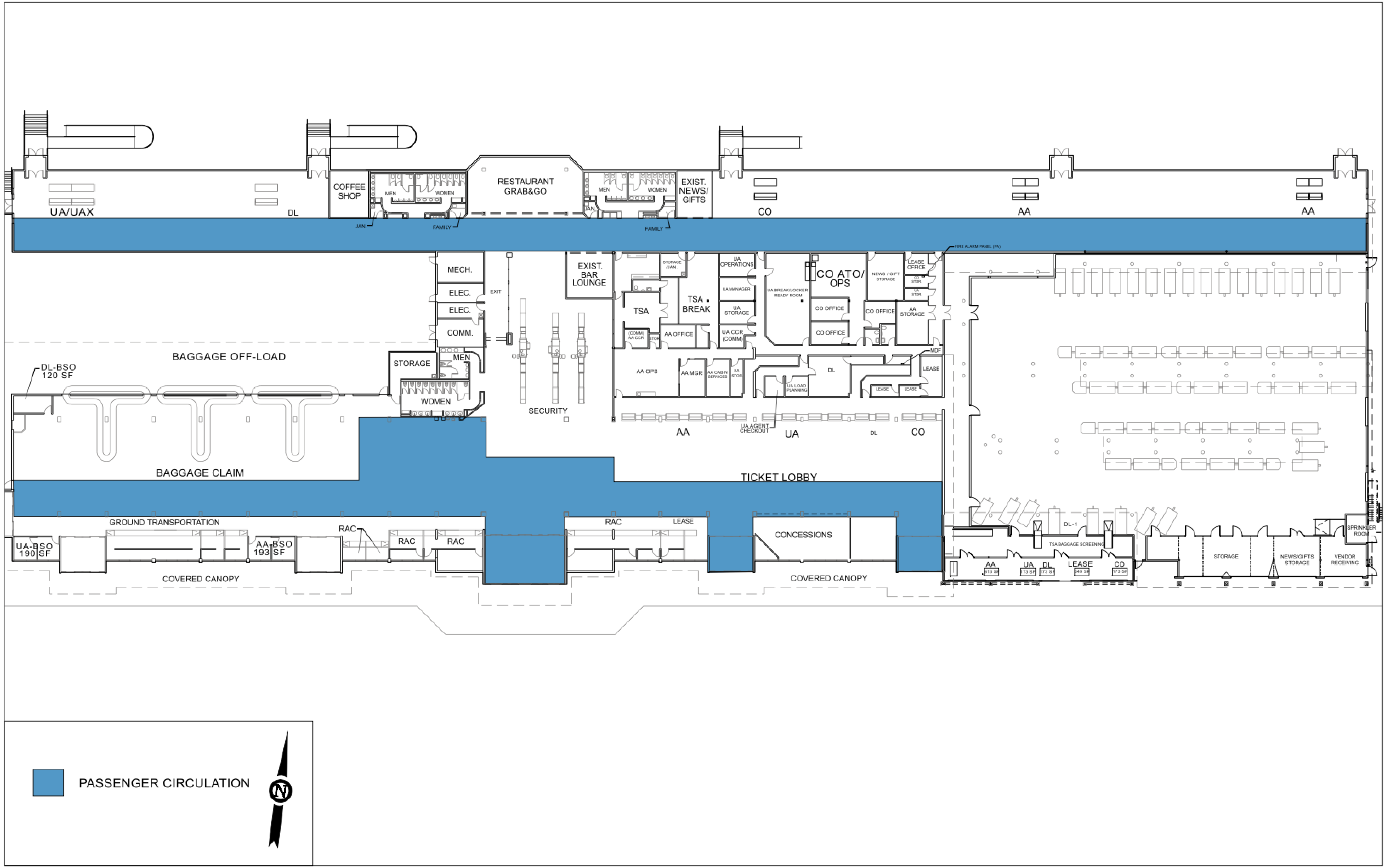
In general, the circulation space in the terminal, as depicted in **Figure 4-20**, is nearing capacity, with various congested areas that slow down the passenger flow and decrease the Level of Service at specific locations.

The unassigned circulation area is a valuable space as it affords versatility to the other spaces. Circulation areas provide room for the overflowing queuing and waiting spaces to spill into, which relieves constraints resulting from peak hour demands.

Overall this functional area is generally at a Service Level of "D". However, there are various areas of converging traffic flows near the center of the terminal where many people cross paths that generally function closer to a Service Level of "E". The critical areas to monitor are the circulation areas immediately before and after the TSA passenger screening lanes. It was observed that at peak hours the TSA queuing maze was full and the line extended 75 feet into the main lobby.

There is currently no need for additional public circulation space, but as terminal additions are made, circulation patterns can be improved to alleviate congested areas.

FIGURE 4-20 – CIRCULATION



Source: Jviation, Inc.

4.10.6 Passenger Security

Areas within the terminal identified for passenger security are those that directly facilitate or support all functions related to security operations. These areas, as detailed in **Table 4-15,** include passenger and baggage screening, TSA operating space, and space for passenger queuing before and after screening.

TABLE 4-15 – PASSENGER SECURITY AREAS

Type of Occupancy – Apron Level	Existing Square Footage	Conceptual Planning Factor		2010	2015	2020	2030
SECURE PUBLIC AREAS							
TSA Security Screening	2,786	1200.0	SF/chkpt	3,600	3,600	3,600	3,600
TSA Security Queuing	940	1.45	SF/PHOP	742	847	919	1,083
TSA Bag Screening Area (bag make-up)	1,606	800.00	SF/MAC	1,600	1,600	2,400	2,400
TSA Bag Screening Area (ticket lobby)	2,400	1200.0	SF/MAC	2,400	N/A	N/A	N/A
TSA Reconciliation Area / Secure Exit	742	1.45	SF/PHOP	742	847	919	1,083
TSA Offices / Breakroom	2,296	2.25	SF/PHOP	1,152	1,314	1,427	1,681
Secure Public Area Subtotal	**10,770**			**10,237**	**8,208**	**9,266**	**9,848**

Source: Jviation, Inc.

4.10.6.1 TSA Checkpoint

It is the desire of the airport to make the screening process as streamlined and convenient for passengers as possible. Given the size and traffic of the airport, the Service Levels for the TSA checkpoint are largely dependent on maximum queuing wait time:

Service Level "A" – 5 minutes

Service Level "B" – 10 minutes

Service Level "C" – 15 minutes

Service Level "D" – 20 minutes

The functional layout of four screening lanes should theoretically provide a short wait time of less than 15 minutes during peak hours and allow for a Service Level of "C" to be satisfied. However, the actual passenger experience can vary between a Service Level of "B" and "D", based on TSA staffing levels and screening efficiency. On peak travel days, the maximum observed wait time at the TSA screening queue was 15 minutes. Frequently the wait time was under 10 minutes. However, prior to the widening of the TSA checkpoint, during the maximum wait times the space dedicated for queuing was insufficient and passengers waiting to be screened spilled into the main lobby. In the past, the line was observed extending in excess of 75 feet towards the baggage claim carousels and passengers would wait 30 minutes or more for screening. It is anticipated that widening of the checkpoint and additional dedicated queuing area will alleviate some of the pressures previously placed on the adjacent spaces.

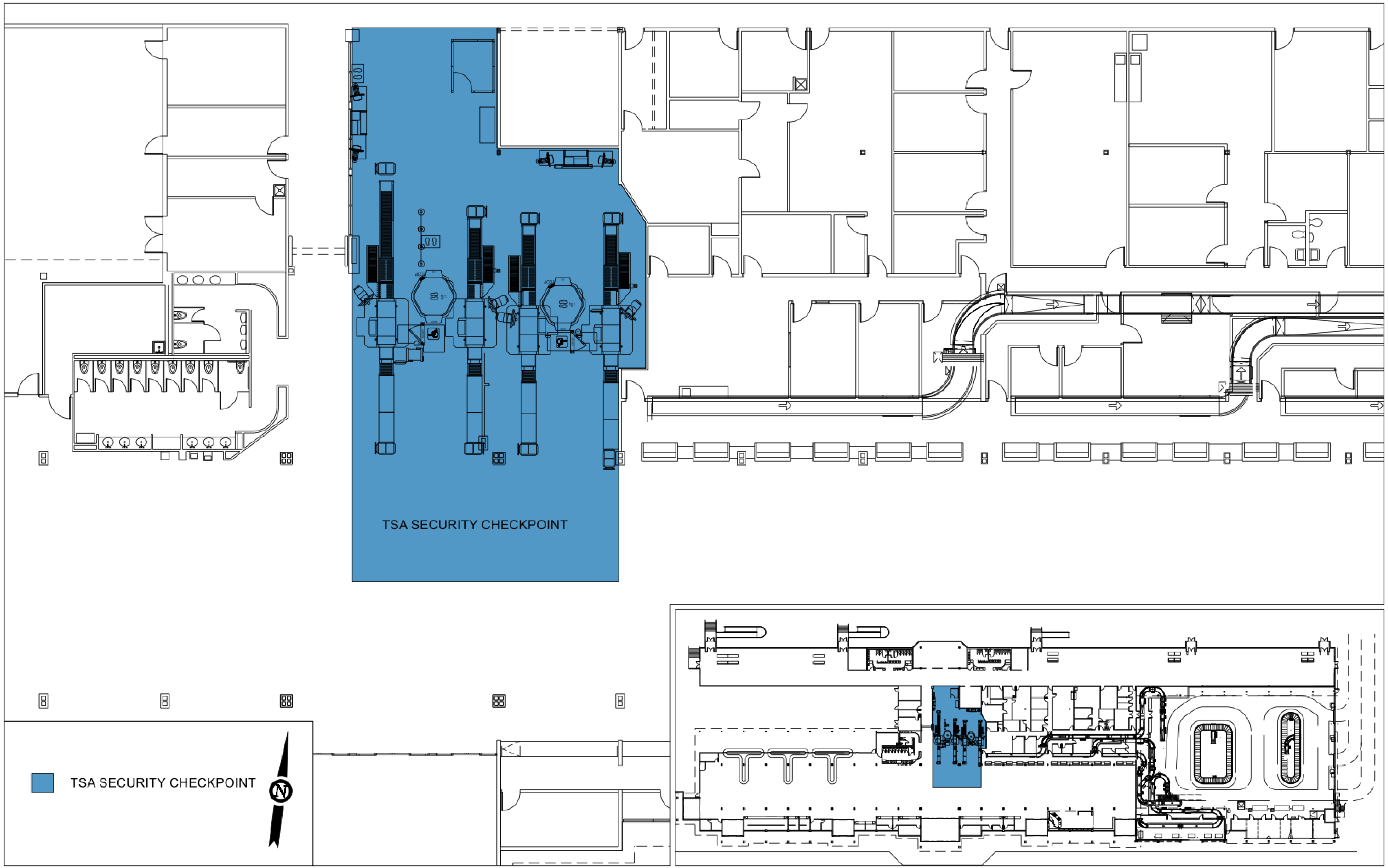
The original terminal was designed before the TSA screening requirements. After the new requirements were implemented, the only logical point to expand was the existing security checkpoint at the center of the building. From here, the terminal is delineated into two halves: one half being secure and the other being non-secure. This has constricted the passenger flow through the terminal and has created ripple effect on many of the adjacent spaces. Furthermore, TSA security requirements have resulted in passengers spending more time in the terminal area for a given flight. Passengers arrive earlier, anticipating the extra screening time, and potentially end up spending more time waiting in the secure side as a result.

The security checkpoint, as depicted in **Figure 4-20**, has two stations for identification verification and four lanes, with two metal detectors. The existing checkpoint contains three X-Ray machine lanes, which act as the constricting point in the process. These are followed by a compressed reconciliation area for passengers to recollect their belongings.

Each of the TSA screening lanes have been widened to accommodate close to the recommended size. The TSA recommends 1,200 square feet per security lane, including queuing and reconciliation areas. The length and width of the lanes themselves are somewhat less than ideal, and the reconciliation area is constricted; however the recent expansion has made EGE one of the more successful retrofitted airports.

This area of the terminal is adequate with the recent widening to the TSA Security Checkpoint

FIGURE 4-21 – SECURITY CHECKPOINT



Source: Jviation, Inc.

4.10.6.2 TSA Baggage Screening

TSA baggage security screening takes place in the new mezzanine addition in the covered outbound baggage area, depicted in **Figure 4-22**. This functional area is currently at a Service Level of "A". The TSA has ample space for their four in-line baggage screening units. This is an ideal set up for a resort town since it is able to efficiently process the oversized bags common to skier traffic.

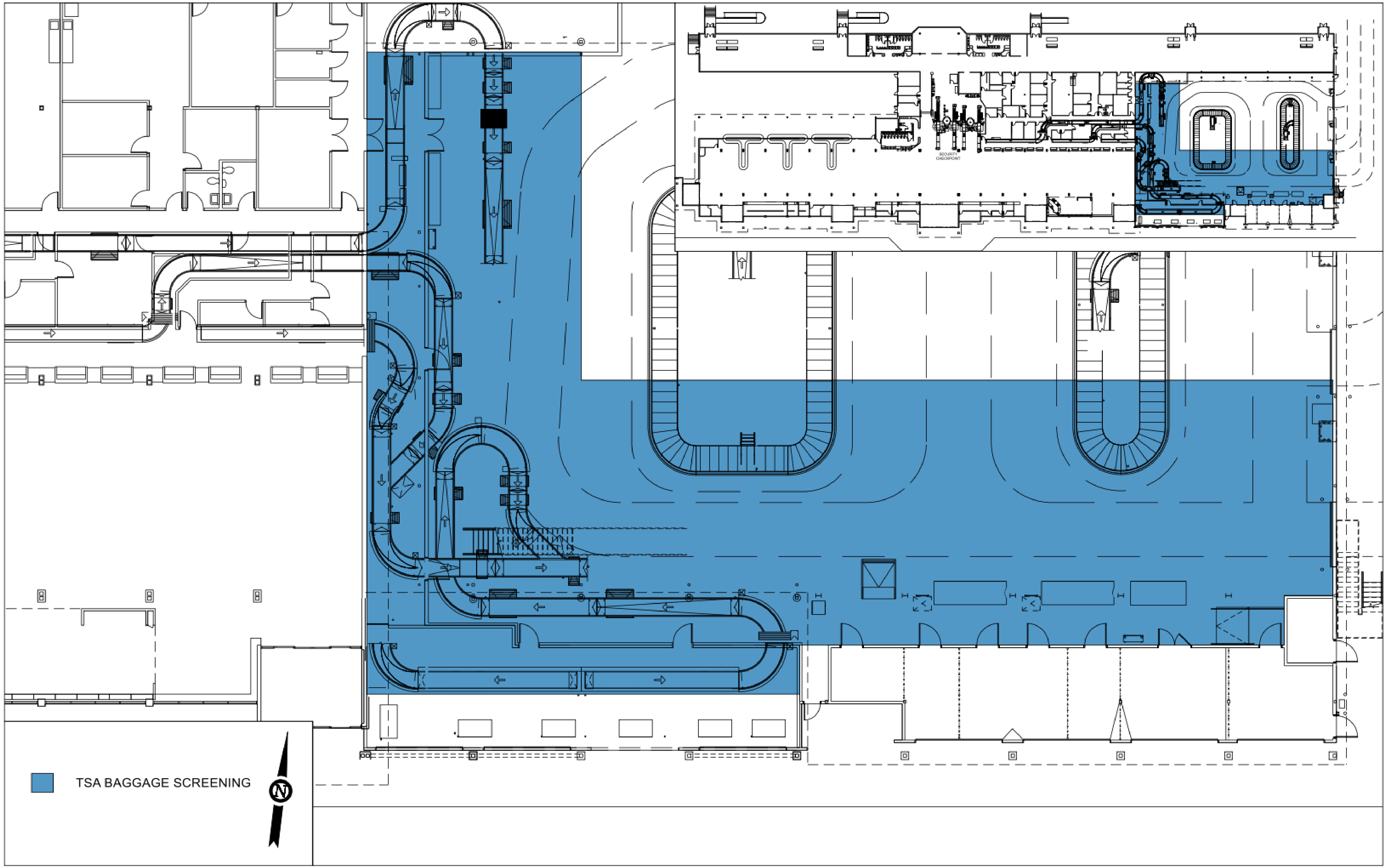
TSA space is currently occupied by one CT 80, two CT 80 DR, and one CT80 DRXL machine to scan the checked luggage, along with manual scanning stations to scan baggage that requires further searching. The TSA screening area is spacious, allowing adequate room to perform all necessary functions. Recent construction to the baggage facility adds screening to a mezzanine level centralizing all in-line baggage screening. This addition does not permit for future growth; however, it is anticipated that these machines will eventually be replaced by smaller and more efficient models.

4.10.6.3 TSA Offices, Break room, Miscellaneous

The recent TSA expansion project has increased the TSA offices and break room area from 1,480 square feet to 2,296.

No additional TSA office space is needed at this time.

FIGURE 4-22 – TSA BAGGAGE SCREENING



Source: Jviation, Inc.

4.10.7 BUILDING SERVICE AREAS

Building service areas, as detailed in **Table 4-16**, are portions of the terminal that support the operation and functionality of the building. Included in this are rooms for storage, maintenance, and mechanical equipment.

TABLE 4-16 – BUILDING SERVICE AREAS

Type of Occupancy – Apron Level	Existing Square Footage	Conceptual Planning Factor		2010	2015	2020	2030
BUILDING SERVICE AREA							
Storage	1,253	0.014	SF/Total	1,233	1,233	1,233	1,233
Mechanical/Electrical/Building Systems	929	0.010	SF/Total	880	880	880	880
Building Service Area Subtotal	**2,182**			**2,113**	**2,113**	**2,113**	**2,113**

Source: Jviation, Inc.

4.10.7.1 Maintenance and Storage

The maintenance and storage area is currently at a Service Level of "D". There is 1,253 square feet of storage space available in the terminal, depicted in **Figure 4-23**. As at any heavily utilized facility, storage space is at a premium. With increased activity and use, tools, equipment, files, and supplies tend to accumulate and take up a great deal of space. For the most part, the adjacent buildings are supplying the maintenance and storage needs for the terminal. The ARFF building houses the majority of the airport operations equipment. The ground support equipment (GSE) is housed in sheds adjacent to the terminal to the west and in the old terminal building to the east.

As the building grows, more storage is needed. The justification for GSE indoor storage is that all work and storage is currently done outside, which exposes the equipment to elements without any environmental protection.

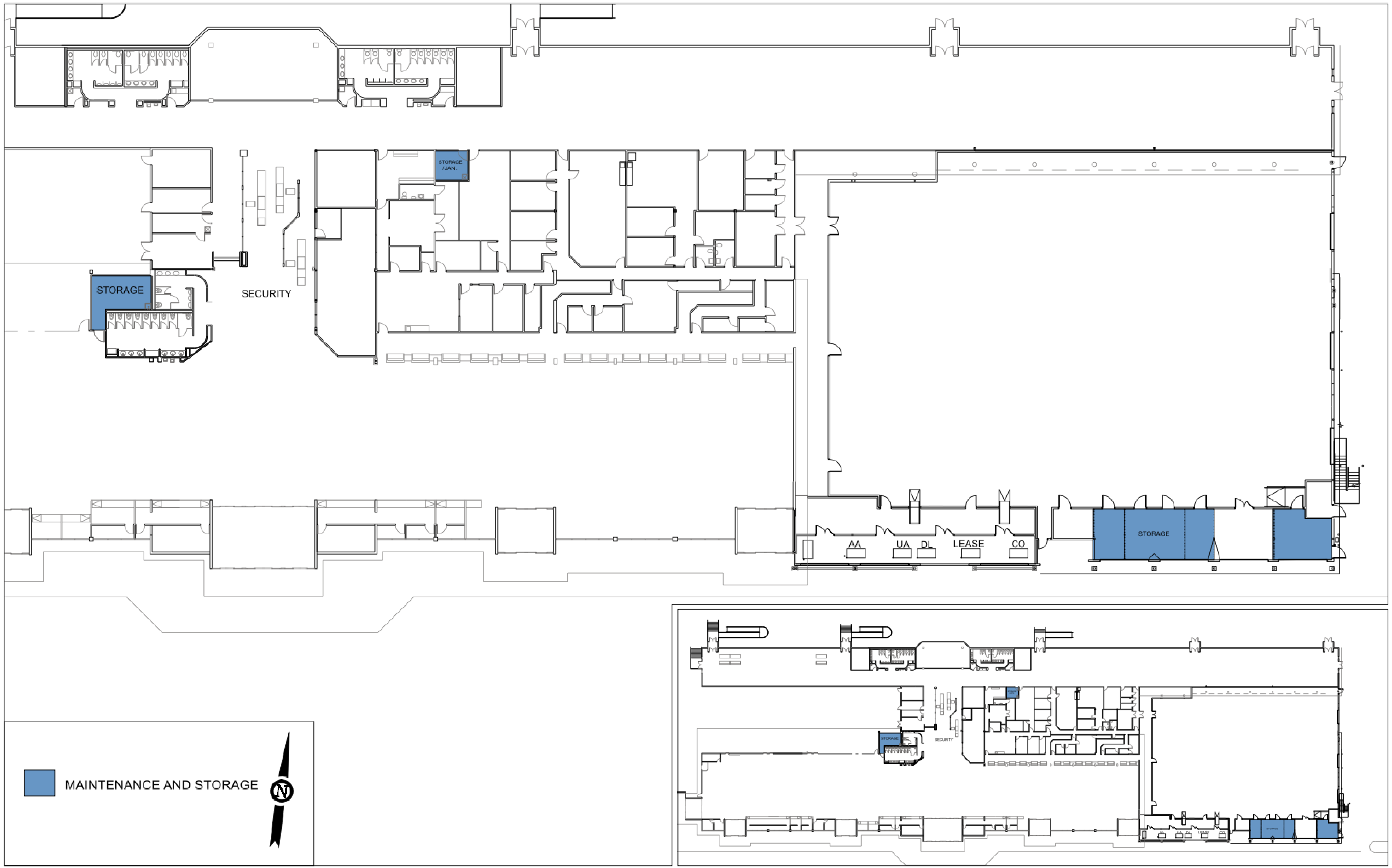
It is recommended that additional storage space be added to the terminal building, to improve the efficiency of the operations staff.

4.10.7.2 Mechanical, Electrical, and Building Systems

The mechanical, electrical, and building systems areas, depicted in **Figure 4-24** are currently at a Service Level of "B". The heating, ventilation and air conditioning are supplied by 15 air handling units, with the majority of the units located on the rooftop. This does not take up valuable square footage inside the building. An added benefit of the rooftop units is that EGE does not have to attempt to retrofit existing spaces, a detriment most airports face while upgrading equipment. Portions of the terminal were recently upgraded with a Trane control system. The system has been balanced and is operating at a high level of efficiency. This system will continue to be improved in phases through 2014. Given the total square footage of the terminal, the net mechanical, electrical, communication, and building system components utilize less area than industry standard planning factors.

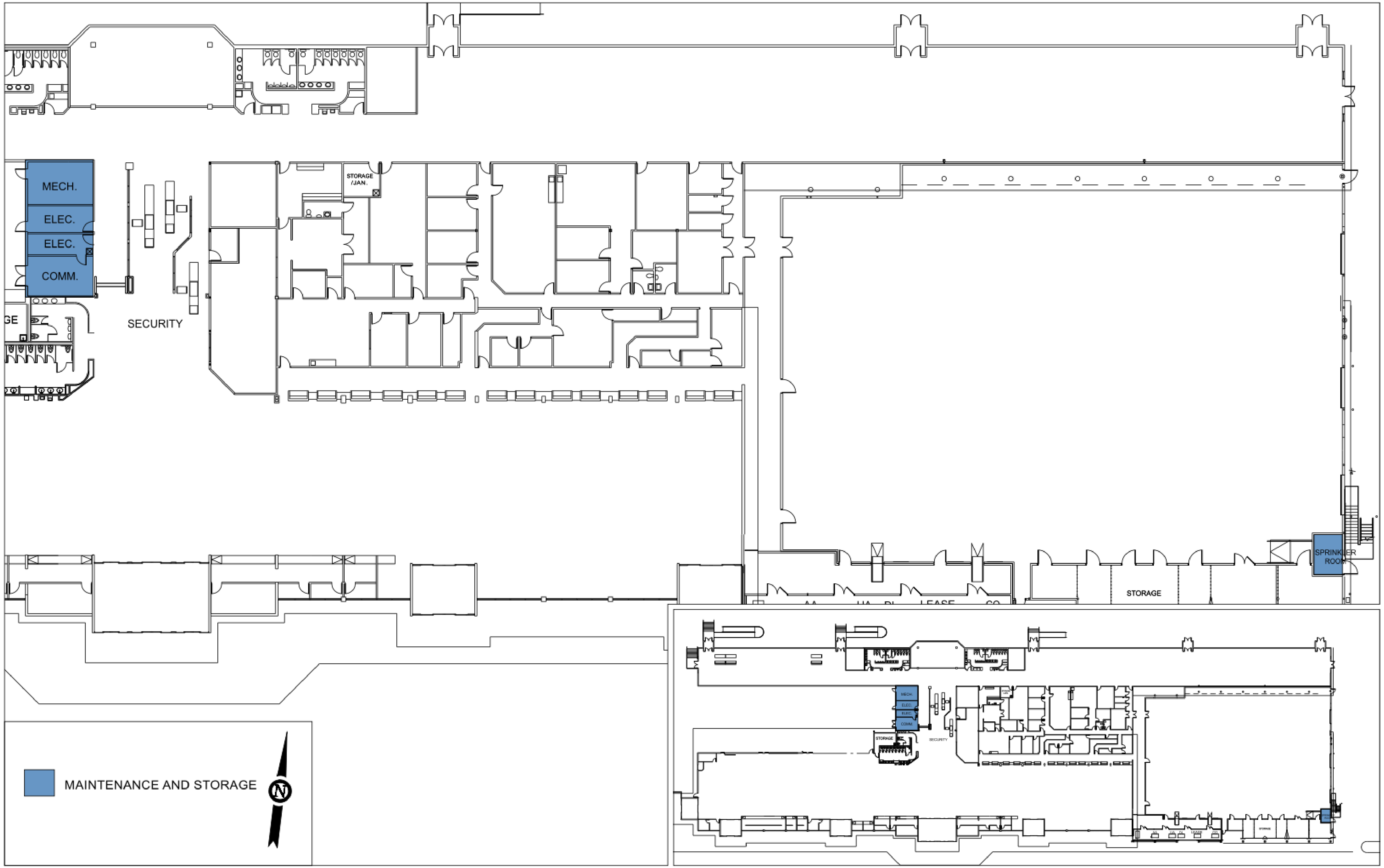
No substantial Mechanical, Electrical, and Building System improvements are needed through the 20-year planning range

FIGURE 4-23 – MAINTENANCE AND STORAGE



Source: Jviation, Inc.

FIGURE 4-24 – MECHANICAL, ELECTRICAL, AND BUILDING SYSTEMS



Source: Jviation, Inc.

4.11 UTILITIES

Utilities provide the airport with potable water, sanitary sewer, fiber optics and phone, electric, cable, storm water, and natural gas. Currently, all of the existing utilities are adequate to meet the existing demand.

Water and sewer needs for EGE are serviced through the Town of Gypsum. In 2009 Eagle County conducted a water needs analysis as part of the annexation to the Town of Gypsum. The result of this study determined that the airport currently uses 25 Equivalent Residential Units (EQRs) and will require 80 EGRs at full build-out. These water needs are for Eagle County specific purposes and exclude those used by HAATS and the VVJC.

With the fees for water and taps expected to increase, Eagle County prepaid for an additional 55 EQR and 20 taps. This purchase allowed Eagle County to lock in lower rates by committing the Town of Gypsum to serving the airport at the prepaid amount. This transaction helps ensure that water is sufficient for future growth of the airport.

The utilities need to be accessed to accommodate the requirements of any future development at the airport (i.e. hangar development, apron expansion, new facilities, facility expansion, etc.). Each utility will be further evaluated throughout the recommended developments and improvement for the airport in **Chapter 5**, *Alternatives Analysis*.

4.12 FACILITY REQUIREMENTS SUMMARY

A summary of the recommended improvements are provided in **Table 4-17**. Certain improvements will be further examined in **Chapter 5**, *Alternatives Analysis,* to evaluate options to accommodate the facility requirements.

TABLE 4-17 – FACILITY REQUIREMENTS SUMMARY

Facility	Improvements Recommended
Runway Capacity	No improvements needed
Runway Orientation	No improvements needed
Runway Length	No improvements needed
Runway Width	No improvements needed
Runway Surface	No improvements needed – continue routine maintenance
Taxiways	Bypass taxiways or holding bay for Runway 25 High speed taxiway exit Parallel taxiway for north airfield Continue routine maintenance
Shoulders and Blast Pads	Paved shoulders for all taxiways that accommodate ADG-IV aircraft
FAA Safety Standards	No improvements needed
Navigational Aids	No improvements needed
Airspace Requirements	No improvements needed
Landside Requirements	Continue routine maintenance to all roadways Pave all long term parking lots
Terminal Requirements	Expand curbside check-in Install dedicated loading dock Expand of holdrooms Expand baggage claim Expand secured concessions Expand rental car counters and queuing Expand TSA Security Checkpoint Expand terminal storage space Install Passenger Boarding Bridges
General Aviation	Rehabilitate GA apron pavement Additional aircraft storage Additional private facilities and services based on demand
Aviation Support Facilities	Location for Dedicated facility for GSE Maintenance
Airport Support Facilities	Expand ARFF/SRE Building Expand equipment and vehicle storage
Other Federal Agency Facility Needs	No improvements needed
Fuel Storage Requirements	No improvements needed
Deicing Facilities	No improvements needed

Source: Jviation, Inc.