

03





Facility Requirements

The Granbury Regional Airport Master Plan establishes a strategy for the development of the Airport over the next 20 years.

Using data gathered during the Inventory and Forecast development, this section provides a comprehensive review of all existing facilities at Granbury Regional Airport. This review will gauge the ability of these facilities to accommodate growth throughout the planning period, culminating in 2040. The analysis completed in this section will lay the foundation for the Development of Alternatives which will ultimately provide a “roadmap” for the future development of the Airport.



OVERVIEW

A key step in the master planning process is developing requirements of airport facilities, which will allow for airside and landside evolution over the term of the planning period. By comparing the existing conditions of the airport to forecast aviation activity based upon both existing and future aircraft usage, the requirements for runways, taxiways, aprons, terminal, and other related facilities to accommodate growth over the short, intermediate, and long-term planning periods can be determined. Demand-capacity analyses aid in the identification of airport deficiencies, surpluses, and opportunities for future development.

This chapter of the master plan will analyze the ability of the current facilities at Granbury Regional Airport (GDJ) to meet the forecast planning activity shown in Chapter 2, *Forecast of Aviation Demand*. Using Federal Aviation Administration (FAA) methodologies and typical sizing factors, the aviation projections are converted into facility requirements over the 20-year planning period.

The following facility requirements were developed based on the assumption that the existing Runway 14/32 will be decommissioned and converted to a taxiway following the completion of the 5,200' x 75' Runway 01/19.

An essential step in the process of estimating airport needs is the determination of an airport's current capacity to accommodate anticipated demand. Demand-capacity analyses yield information that is ultimately used to design the airport layout plan and state facility development. This chapter will examine the ability of GDJ to accommodate anticipated aviation demand and outline specific facility requirements necessary to address any deficiencies in the existing airport system. Specifically, this analysis will extend into the following areas:

- Airfield Capacity, Runway Orientation, Design Standards including Runway and Taxiway System
- Approach and Navigational Aids
- Airfield Lighting, Signage, and Pavement Markings
- Aircraft Parking Aprons
- Aircraft Storage Hangars
- Aircraft Fuel Storage
- Airport Terminal Building
- Public Automobile Parking
- Ground Access
- Airport Security and Fencing

The major components of the airfield system to be considered when determining capacity include runway orientation and configuration, runway length, and runway exit locations. Additionally, the capacity of a given system is affected by operational characteristics such as fleet mix, climatology, and air traffic control (ATC) procedures. Each of these components has been examined as part of the airside capacity analysis. Runway orientation and the degree to which it meets wind coverage requirements influence how the runway system is utilized. Design standards established by the FAA set geometric clearance guidelines for airfield components. Upon completion of analysis of these elements, a review of existing facilities is performed, and any additional requirements necessary to meet the forecasted demand and identified in this chapter.

FAA guidance for airfield capacity is contained in AC 150/5060-5, *Airport Capacity and Delay*. According to the FAA, airfield capacity is generally defined as the number of aircraft operations that can be safely accommodated on both the runway and taxiway system at a given point in time before an unacceptable level of delay is experienced. The method of analysis for determining airside capacity is Annual Service Level (ASV). The ASV identifies the maximum number of annual that can be accommodated at the airport without excessive delay. To determine ASV, the following determinate specific to GDJ need to be identified.

- Predominant Meteorological Conditions
- Runway Use Configuration
- Aircraft Mix (based on existing aircraft group demand)
- Percentage of Arrival Operations
- Touch and Go Operations

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Using the guidance from FAA AC 150/5060-5, the ASV for the existing runway layout at GDJ is calculated to be approximately 230,000 operations, with VFR capacity of 98 operations per hour and an IFR capacity of 59 operations per hour. For the base year 2020, the recorded operations at Granbury Regional Airport were calculated at 33,200 with a forecast of 44,700 by 2040. This number accounts for approximately 19 percent of the current ASV. Based on the current level and forecast level of demand at GDJ, no capacity enhancement projects will be needed during the planning period of this Airport Master Plan.

By using this measure, it is easy to compare current and projected annual operations numbers and analyze capacity. Although not always viable for hourly capacity or delay peak periods, this guideline is helpful for long-range 20-year planning horizons. Planning guidelines typically assume that when an airport meets 60 percent capacity, planning for capacity enhancements should begin. At 80 percent capacity, construction for those projects should begin. If 100 percent capacity is reached, serious impacts to airport operations may occur resulting in increased delay.



The design or critical aircraft is defined as the largest aircraft family or single aircraft anticipated to utilize an airport on a regular basis. A “regular basis” is defined by the FAA as conducting at least 500 annual itinerant operations, with an operation classified as either a take-off or landing. The selection of the design aircraft allows for the identification of the Airport Reference Code (ARC).

RUNWAY DESIGN CODE (RDC)

The RDC is a coding system developed by the FAA to relate airport design criteria to the operational and physical characteristics of the airplane types that will operate at a particular airport. The RDC has three components relating to the airport design aircraft. The first component, depicted by a letter, is the aircraft approach category and relates to airplane wingspan. The third component relates to the designated, or planned, visibility minimums expressed by runway visual range (RVR) values in feet.

Generally, aircraft approach speed applies to runways and runway length related features. Airplane wingspan primarily relates to separation criteria and width-related features. Airports expected to accommodate single-engine airplanes normally fall into Airport Reference Code A-I or B-I. Airports serving larger general aviation and commuter-type planes are usually Airport Reference Code B-II or B-III. Small to medium-sized airports serving air carriers are usually Airport Reference Code C-III, while larger air carrier airports are usually Airport Reference Code D-VI or D-V. As established in the forecast chapter of this study, the RDC at Granbury Regional Airport is B-II-5000. **Table C.1** details the FAA Runway Design Code guidelines. Based on existing and ultimate operations at the airport and the existing and ultimate critical aircraft, the current B-II ARC is deemed appropriate for the 20-year planning period.

TAXIWAY DESIGN GROUP (TDG)

Similar to runways, taxiways are also required to be designed to certain limitations and offer a set of criteria referred to as Taxiway Design Group (TDG). TDG is based on guidance that established requirements based on overall Main Gear Width (MGW) and the Cockpit to Main Gear Distance (CMG) for all aircraft operating at the airport. This criterion helps to establish design guidance for fillets and edge safety margins to help limit pilot error and use a consistent taxi method throughout the airport. FAA Advisory Circular 150/5300-13A, *Airport Design*, **Table C.2**, provides the essential requirements for taxiway design and the associated groups.

TABLE C.1 – RUNWAY DESIGN CODE

Aircraft Approach Category (AAC)		
AAC	Approach Speed	
A	Less than 90 knots	
B	91 knots or more but less than 121 knots	
C	121 knots or more but less than 141 knots	
D	141 knots or more but less than 166 knots	
E	166 knots or more	

Airplane Design Group (ADG)		
Group	Tail Height (ft)	Wingspan (ft)
I	< 20'	< 49'
II	20' - < 30'	49' - < 79'
III	30' - < 45'	79' - < 118'
IV	45' - < 60'	118' - < 171'
V	60' - < 66'	171' - < 214'
VI	66' - < 80'	214' - < 262'

Approach Visibility Minimums	
RVR (ft)	Flight Visibility Category (statute mile)
5000	Not lower than 1-mile
4000	Lower than 1-mile but not lower than ¾-mile
2400	Lower than ¾-mile but not lower than ½-mile (CAT-I)
1600	Lower than ½-mile but not lower than ¼-mile CAT-II)
1200	Lower than ¼-mile (CAT-III)

RVR – Runway Visual Range. The approximate visibility (in feet) as measured by the RVR light transmission/reception equipment or equivalent weather observer report.

Source: FAA A/C 150/5300-13A, *Airport Design*, Change 1

TABLE C.2 – TAXIWAY DESIGN GROUP (TDG) CRITERIA

Item	Taxiway Design Group							
	1A	1B	2	3	4	5	6	7
Taxiway Width	25'	25'	35'	50'	50'	75'	75'	82'
Taxiway Edge Safety Margin	5'	5'	7.5'	10'	10'	15'	15'	15'
Taxiway Shoulder Width	10'	10'	15'	20'	20'	30'	30'	40'

Source: FAA Advisory Circular 150/5300-13A



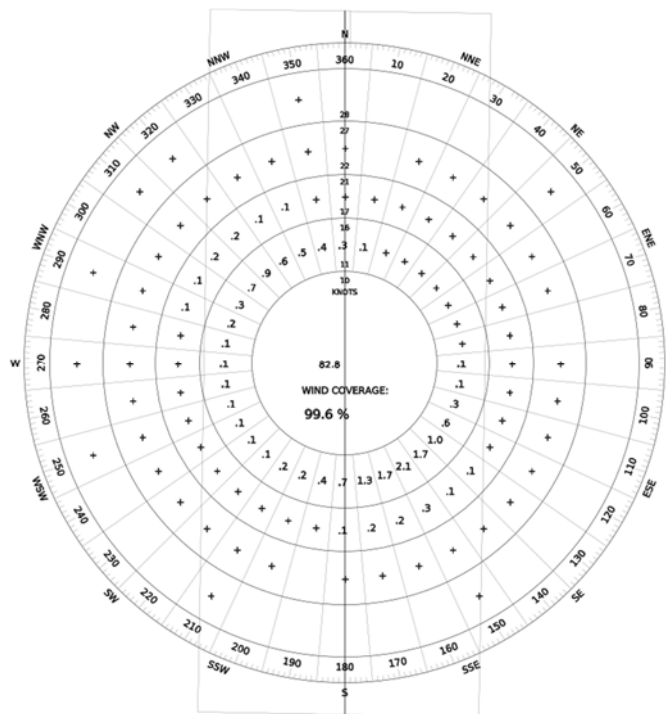
RUNWAY ORIENTATION / WIND ANALYSIS

Surface wind conditions have a direct effect and impact on airport functionality. Runways that are not oriented to take the fullest advantage of prevailing winds will restrict the capacity of the airport to varying degrees. When landing and taking off, aircraft are able to operate on a runway properly and safely as long as the wind velocity perpendicular to the direction of flight (i.e. crosswind) is not excessive. The wind coverage analysis translates the crosswind velocity and direction into a “crosswind component”. Smaller aircraft are more easily affected by crosswinds than larger aircraft, thus, they have a smaller crosswind component.

The determination of the appropriate crosswind component is dependent upon the RDC, as described above, is B-II for Runway 01/19 at GDJ. According to AC 150/5300-13A, *Airport Design, Change 1*, the maximum crosswind component used for RDC’s A-I and B-I is 10.5-knots, a 13-knot crosswind component is used for RDC A-II and B-II, and for RDC’s C-I and C-II, a 16-knot maximum crosswind component is used.

Accurate and timely wind velocity and directional data during all weather conditions were obtained from the National Climate Data Center (NCDC), which compiles the data provided by the on-field Automated Weather Observing System (AWOS-3). Using this data, an all-weather wind rose was constructed and is presented in the following **Exhibit C.1**.

EXHIBIT C.1 – ALL-WEATHER WIND ROSE



Source: National Climate Data Center, Station 720286, Granbury Regional Airport, Period 2011-2020

The following **Table C.4** presents wind coverage analysis provided during IFR meteorological conditions (i.e. weather conditions having a ceiling less than 1,000 feet, but equal to or greater than 200 feet and / or visibility less than 3-miles, but equal to or greater than 1/2-mile). The table quantifies the wind coverage provided by Runway 01/19 and the individual runway ends. From this analysis, it can be concluded that Runway __ provides the best wind coverage for all crosswind components, which coincides with the existing approach procedures.

TABLE C.4 – IFR WIND COVERAGE SUMMARY

	10-5 Knot	13-Knot	16-Knot
Runway 01	94.63%	97.05%	98.11%
Runway 19	91.52%	94.68%	96.54%
Runway 01/19	95.73%	98.49%	99.62%

Source: National Climatic Data Center, Station 720826, Granbury Regional Airport, Period 2011-2020

RUNWAY LENGTH

As outlined in FAA AC 150/5325-4B, Runway Length Requirement for Airport Design, the runway length necessary for an airport is dependent on several factors including; airport elevation, temperature, wind velocity, aircraft operating weight and configurations, runway surface condition (wet or dry), obstructions present in the vicinity of the airport, and departure/arrival procedures.

Granbury Regional Airport’s primary runway, Runway 01/19 is 5,200 feet in length. This runway length allows the Airport to serve a wide variety of aircraft in the general aviation fleet, including a variety of business jets.

The method for determining the recommended runway length is based on examining the Airport’s critical aircraft (ARC B-II) and the characteristics of aircraft included in that design category. In order to determine the ultimate required length of a runway, several issues must be considered, including the characteristics of the critical aircraft that will use the runway, the typical stage length being flown by the critical aircraft, as well as common atmospheric conditions at the Airport. In general, longer stage lengths require aircraft to carry more fuel thereby increasing the aircraft’s weight at takeoff and increasing the runway length required for takeoff. Similarly, warmer air temperatures (and corresponding impacts on air density) result in increased runway takeoff length requirements for most aircraft.

The following **Table C.5** presents the recommended FAA design standard lengths for runways using various categories of aircraft at standard useful loads.



TABLE C.5 – RUNWAY LENGTH ANALYSIS SUMMARY

Airport and Runway Data	
Airport Elevation (MSL)	777.5'
Mean daily maximum temperature of hottest month	96°
Maximum difference in runway centerline elevation	14'
Existing Runway Condition Runway 01/19	5,200'
Small aircraft ≤ 12,500 pounds with less than 10 seats	
95% of the fleet	3,400'
100% of the fleet	4,100'
Small aircraft with more than 10 seats	4,450'
Aircraft between 12,500 pounds and 60,000 pounds	
75% of Fleet – 60% useful load	4,800'
75% of Fleet – 90% useful load	7,250'
100% of Fleet – 60% useful load	5,850'
100% of Fleet – 90% useful load	9,400'
Large Aircraft > 60,000 pounds	Refer to individual aircraft manufacturer's planning manual

Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. Lengths based on 777.5' MSL, 96 degrees F Mean Max Temperature, 500 NM stage length, and maximum difference in runway centerline elevation of 52'.

FAA runway length requirements are based on small aircraft with weights of 12,500 pounds or less, large aircraft between 12,500 and 60,000 pounds, and large aircraft weighing greater than 60,000 pounds. The King Air B100 and Cessna Citation 550 each have maximum weights under 60,000 pounds, with MTOWs of 11,800 lbs. and 15,100 lbs. respectively.

The results of the runway length analysis conducted for Granbury Regional Airport indicate that the current runway length is more than sufficient to accommodate operations by all small airplanes. Runway length requirements for large airplanes between 12,500 and 60,000 pounds are calculated based on the percentage of aircraft in that category that can be accommodated as well as the useful load of those aircraft. As shown in Table C.5, the runway length analysis indicates that a runway length of 4,800 feet is sufficient to accommodate approximately 75% of large airplanes (less than 60,000 pounds) when operating at 60% of their average useful load and 7,250 feet would be required for 75% of large aircraft at 90% useful load. A runway length of approximately 5,850 feet would be required to accommodate 100% of the large aircraft at 60% useful load while 9,400 feet would be needed to accommodate 100% of large aircraft at 90% useful



load. Unless a specific aircraft is identified that requires a runway approaching this length, 100% of the fleet at 60% load should be planned for.

It is important to note that aircraft greater than 60,000 pounds can safely operate at the Airport with the current runway length; however, some aircraft may have to fly at less than 100 percent of their useful load and may not be able to fly the maximum range of their aircraft when temperatures are high. Again, aircraft performance characteristics determine the require runway length necessary.

As the runway length analysis indicates, the existing runway length at Granbury Regional Airport is sufficient to accommodate a significant portion of the active general aviation fleet. Even the largest general aviation jets can safely operate on the existing runway system. Again, in certain scenarios these large aircraft may have to take weight and range penalties. As the number of corporate general aviation jets in the national fleet increases, and as the number of operations conducted by these aircraft at the Airport increases, a runway extension resulting in an ultimate runway length of 5,850 feet may be warranted at the Airport.

BALANCED FIELD LENGTH

While the FAA runway analysis provides an overview for categories of aircraft, balanced field length is a more precise calculation to determine the runway length needs for a certain aircraft. Specific to each aircraft and determined by the aircraft manufacturer, balanced field length is defined as “distance required to stop an accelerating aircraft in exactly the same distance as that required to reach take-off speed”. As with those distances presented in **Table C.5**, balanced field length requirements are based on airport elevation, temperature, MTOW, and stage length. **Table C.6** details a cross section of the largest corporate aircraft that currently operate at the field or within the national fleet.

TABLE C.6 – BALANCED FIELD LENGTH ANALYSIS SUMMARY

Aircraft	MTOW	Approximate Length	
		Standard Day (59°)	Mean Max Temp (97°)
Beechcraft King Air 350	15,000 lbs.	3,500'	4,175'
Embraer Phenom 300	17,968 lbs.	3,425'	4,050'
Cessna Citation 550	15,100 lbs.	3,700'	4,350'
Cessna Citation CJ3+	13,870 lbs.	3,400'	4,000'
Cessna Citation Sovereign	30,775 lbs.	3,775'	4,450'
Challenger 604	47,600 lbs.	6,025'	7,125'
Gulfstream G450	71,780 lbs.	6,000'	7,075'

Source: Flight Planning Guides, Airport Planning Manuals, Manufacturer websites



These lengths provide a general overview of the approximate requirements for larger corporate aircraft to operate at the field. As the airport continues to grow and it is determined local demand justifies the implementation of a runway extension, this project could be completed in conjunction with other runway or taxiway improvements that may be planned at the Airport over the study period. Justification for a runway extension would be required to be eligible for funding. Such justification could include letters from actual operators requesting an extension for a specific aircraft or type of aircraft.

RUNWAY WIDTH

The required width of a runway is determined by the critical aircraft and the instrumentation available for the airport. Based on FAA design criteria and existing instrument approach procedures, the existing width of Runway 01/19, 75', is adequate for meeting the existing and proposed operational levels during the 20-year planning period.

PAVEMENT STRENGTH

Runway pavement strength is typically expressed by common landing gear configurations. Example aircraft for each type of gear configuration are as follows:

- Single-Wheel: each landing gear unit has a single tire; example aircraft include light aircraft and some business jet aircraft.
- Dual-wheel: each landing gear unit has two tires; example aircraft are the King Air 350, Citation Longitude, and Gulfstream 450.
- Dual-tandem: main landing gear unit has four tires arranged in the shape of a square; example aircraft is the Boeing 757.

TAXIWAYS

As previously mentioned, the FAA updated taxiway design requirements to aid in the appropriate design for spacing and size of taxiways. It is important to note that the FAA lists seven conditions which should be addressed to reduce the potential for runway incursions:

- **Increase Pilot Situational Awareness** – Keep taxiways simple, “three-node” concept.
- **Avoid wide expanses of pavement** – Requires signage placed away from pilot’s line of sight.
- **Limit runway crossings** – Reduces the number of occurrences and ATC workload.
- **Avoid “high-energy” intersections** – Intersections in the middle third of the runway create the potential for a high speed/energy collision.
- **Increase visibility** – Using right angle intersections, both between taxiways and between taxiways and runways, provides the best visibility for pilots.
- **Avoid “dual purpose” pavements** - Dual purpose runways/taxiways can lead to confusion.
- **Indirect Access** – Taxiways leading directly from an apron to a runway without requiring a turn increase the possibility for incursions.

Per AC 150-5300-13A, the FAA requires a full-length parallel taxiway for runways configured with instrument approach procedures with visibility minimums below one mile and recommended for all other conditions. Runway 01/19 at Granbury Regional Airport is served by a full-length Taxiway “J”. No additional taxiways are recommended for construction at this time.

C.4

NAVIGATIONAL AIDS

Navigational Aids (NAVAIDs) are any visual or electronic devices, airborne or on the ground, that provide point-to-point guidance information or position data to aircraft in flight. Airport NAVAIDs provide guidance to a specific runway end or to an airport. An airport is equipped with precision, non-precision, or visual capabilities in accordance with design standards that are based on safety considerations and airport operational needs. The type, mission, and volume of activity used in association with meteorological, airspace, and capacity considerations determine an airports eligibility and need for various NAVAIDs.

INSTRUMENT NAVAIDS

This category of NAVAID provides assistance to aircraft performing instrument approach procedures to an airport. An instrument approach procedure is defined as a series of predetermined maneuvers for guiding an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing can be made visually.



The current instrument approaches outlined in Chapter 1, Inventory, are sufficiently meeting the current demand at GDJ. However, once Runway 01/19 is complete, the existing approaches will be relocated to serve the new runway.

AUTOMATED WEATHER

Granbury Regional Airport is served by an on-site Automated Weather Observing System (AWOS-3) which can be tuned on frequency 118.925 or by phone at (817) 573-7514. An AWOS unit provides pilots with a computer-generated voice message which is broadcast via radio frequency in the vicinity of the airport. The message contains pertinent weather information including wind speed and direction, visibility, temperature, dew point, and cloud ceiling heights.

C.5

DIMENSIONAL STANDARDS

Dimensional standards include measurements that account for physical runway and taxiway characteristics as well as safety related areas. These standards, contained in FAA AC 150/5300-13A, are shown in Table C.7 as they pertain to GDJ. As established in previous sections, the design aircraft is considered to be within the ARC B-II group category for Runway 01/19 and the supporting airfield infrastructure.

The following dimensional standards are important to the design of the runway and taxiway system at GDJ as well as the safety of the aircraft operating within the airport environment.

TABLE C.7 – FAA DESIGN CRITERIA SUMMARY

Design Item	Runway 14-32 (B-I); Not lower than ¾-mile vis. minimums TO BE CLOSED	Runway 01/19 (B-II); Not lower than 1-Mile vis. minimums UNDER CONSTRUCTION
Runway		
Width	60'	75'
Safety Areas (SA)		
Width	120'	150'
Length beyond Runway end	240' / 240'	300' / 300'
Length beyond Runway end	240' / 240'	300' / 300'
Object Free Areas (OFA)		
Width	400'	500'
Length beyond Runway end	240' / 240'	300' / 300'
Length beyond Runway end	240' / 240'	300' / 300'
Obstacle Free Zone (OFZ)		
Width	250'	400'



Length beyond Runway end	200' / 200'	200' / 200'
Length beyond Runway end	200' / 200'	200' / 200'
Taxiway		
Width	25'	35'
Safety Area	49'	79'
Object Free Area	89'	131'
Centerline to Fixed or Movable Object	39.5'	57.5'
Runway Centerline to:		
Holdline	200'	200'
Taxiway Centerline	225'	240'
A/C Parking Area	200'	250''

Source: FAA AC 150/5300-13A, *Airport Design*, Change 1

RUNWAY SAFETY AREA

The runway safety area (RSA) is the surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. Based on FAA RDC B-II design standards for existing conditions, the RSA should extend beyond the end of the runway for 300 feet and be 150 feet wide the full length of the runway. In addition, a required length of 300 feet prior to the threshold is needed. Runway 01/19 meets the necessary dimensional criteria.

OBJECT FREE AREA

The object free area (OFA) is an area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects except for objects that need to be located in the OFA for the purpose of air navigation or aircraft ground maneuvering.

Currently, RDC B-II standards indicate requirements for the OFA to be 500 feet wide and extend 300 feet beyond each runway end. Runway 01/19 meets the necessary dimensional criteria.

RUNWAY OBSTACLE FREE ZONE

The runway obstacle free zone (ROFZ) is a 3D volume of airspace above the established airport elevation which protects the operational transition of aircraft to and from the runway. The length of the ROFZ is fixed at 200 feet beyond the associated runway end, but the width is dependent upon the pavement strength, RDC, and visibility minimums associated with the instrument approach procedures associated with the runway. The ROFZ width requirement at GDJ is 400 feet and the elevation of the ROFZ is equal to the closest perpendicular point along the runway edge.



BUILDING RESTRICTION LINE

The FAA no longer has fixed-distance standards for the Building Restriction Line (BRL) location. Rather, the BRL is a line which identifies suitable building area locations on airports. It considered such things as runway protection zones, the appropriate OFAs and OFZs, NAVAID critical areas, areas required for TERPS, and air traffic control (ATCT) line of sight (at airports where ATCTs exist). Typically, the closer development is to the Aircraft Operations Area (AOA), the more impact it will have on future expansion capabilities of the airport. Future considerations, including development coinciding with the completion of Runway 01/19 will be examined in the alternatives section of this study.

RUNWAY PROTECTION ZONES

Runway Protection Zones (RPZ) are trapezoidal areas off the end of each runway end that serve to enhance the protection of people and property on the ground in the event an aircraft lands or crashed beyond the runway end. RPZs underlie a portion of the approach closest to the airport. Many land uses are prohibited by FAA guidelines within these areas. However, these limitations are only enforceable if the RPZ is owned or controlled by the airport sponsor. Airport control of these areas is strongly recommended and is primarily achieved through airport property acquisition, but can also occur through easements or zoning to control development and land use activities.

Runway 01/19 will be feature RPZ dimensions of 500' x 700' x 1,000' to accommodate the anticipated 1-mile approach visibility minimums. Currently, all RPZ property relating to Runway 01/19 is owned or controlled by GDJ. However, Loop 567 penetrates the RPZ for Runway 19 on the north side of the airport while U.S. Highway 377 & Loop 567 clip the outermost corners of the Runway 01 end.

This section describes the landside requirements needed to accommodate GDJ’s general aviation activity throughout the planning period. Areas of particular focus include the hangars, aprons, and tie-down areas, automobile parking, as well as the various associated support facilities.

HANGARS

Hangars are the preferred method for based aircraft storage at GDJ to protect aircraft from high temperatures, sun exposure, and severe weather. The airport currently has a waiting list for hangar rentals. Currently, there are six (6) T-Hangar structures providing 75 storage units, one (1) shade hangar providing ten (10) storage units, and several box / conventional hangars providing the remainder of the aircraft storage needs.

The majority of based aircraft are stored in hangars with the remaining few utilizing ramp tie-down positions. The aforementioned rate is assumed for the future based aircraft at GDJ and used in determining the demand for additional hangars. The aircraft type influences the type of storage required for based aircraft. Taking this into consideration, the projected based aircraft fleet mix was used to identify the number of additional hangars by type projected over each phase of the planning period. For the end of the planning period (year 2040) hangar space requirements were calculated as follows in **Table C.8**.

TABLE C.8 – AIRPORT HANGAR SPACE REQUIREMENT

Percent of Aircraft Type	Type of Storage
100% of Jet Aircraft	Corporate Hangar
50% of Multi Engine Aircraft	Corporate Hangar
50% of Multi Engine Aircraft	T-Hangar/Box Hangar
50% of Single Engine Aircraft	T-Hangar
50% of Single Engine Aircraft	Corporate Hangar

Conventional hangar space requirements assumed 10,000 square feet per based jet aircraft, 2,500 square feet per turbo-prop, and 1,500 square feet per helicopter. T-Hangar units assumed 1,200 square feet per single-engine piston and 1,500 square feet per multi-engine piston based aircraft. Applying these standards to the forecast of based aircraft yielded the following hangar needs for the year 2040:

- Corporate / Conventional Hangar Space: 118,750 square feet
- T-Hangar Units: 16 units

AIRCRAFT PARKING APRONS

Aircraft parking area requirements were calculated on the assumption that paved aprons areas will be provided for all based general aviation aircraft not kept in hangars at GDJ. This was estimated to be equivalent to 10 percent of all small single-engine based aircraft throughout the planning period. A total of 500 square yards of apron per aircraft was used for planning the local apron requirement. By the year 2040, a total of 3,700 square yards of based aircraft parking apron will be needed.

In addition, transient apron are required to meet itinerant general aviation demand was estimates using an approach suggested by the FAA in Advisory Circular 150/5300-13A, Airport Design. This approach indicates that the area needed to transient aircraft parking will differ by airport, but principles should include an allowance for an appropriate amount of apron area per transient aircraft. For this analysis, it was assumed that 50 percent of the daily itinerant operations on a busy day (a busy day is 10 percent busier than the average day) will represent aircraft on the ground at any one time. Transient apron requirements for general aviation aircraft at GDJ indicated that 500 square yards per itinerant aircraft was reasonable distribution. This will permit the accommodation of aircraft ranging from single-engine piston aircraft to large multi-engine turbo-props. Based upon forecast demand, a total of 12,305 square yards will be needed by the year 2040.

TERMINAL SPACE

The existing general aviation terminal building at GDJ includes a 3,600 square foot building with public restrooms, flight planning area, meeting rooms, offices, and lobby. This space is currently sufficient, however, as activity grows in the future, additional space will be required. With the completion of Runway 01/19, it is anticipated that a new general aviation terminal facility will be constructed to support the forecast growth at the airport. Based on the forecast demand, the airport will require a total of 5,000 square feet of terminal space by 2040.

AUTO PARKING

Auto space requirements are a function of the number of passengers, employees, and pilot expected to use an airport during the daily peak hour. At low to medium activity general aviation airports, planning standards indicate that roughly 1.3 auto parking spaces per total number of peak day general aviation pilots and passengers is adequate. GDJ currently accommodates 42 auto parking positions. Based on forecast demand, it is anticipated the airport will require a total of 84 parking spaces.

FUEL STORAGE FACILITIES

GDJ is equipped with an above-ground 12,000-gallon Jet-A tank and an above-ground AVGAS/100LL tank. There is a 3,000-gallon Jet-A fuel truck, which is used to fuel jet aircraft and turbine helicopters. Given the forecast demand, it is anticipated that the airport will require approximately 21,000-gallons of Jet-A and 11,500-gallons every two weeks. Given the current tank capacity for Jet-A, it is recommended the airport increase the frequency of tanker delivery or



consider purchasing additional Jet-A fuel storage. It is anticipated that a new fuel storage facility would be paired with the construction of a new terminal area following the completion of Runway 01/19.

C.7

SUMMARY OF FACILITY NEEDS

Table C.9 presents a summary of the facility needs for GDJ. As shown, the forecast of aviation demands indicates the need for additional landside hangar and parking facilities.

TABLE C.8 – AIRPORT HANGAR MINIMUM FACILITY NEEDS

ITEM	2025	2030	2040
Airport Reference Code	B-II	B-II	B-II
Pavement Load-Bearing Capacity	30,000 lbs.	30,000 lbs.	30,000 lbs.
Lighting Systems & Approach Aids	MIRL	MIRL	MIRL
Conventional Hangar Space	53,370 sq. ft.	68,340 sq. ft.	118,750 sq. ft.
T-Hangars	5 Units	10 Units	16 Units
Apron Area	8,813 sq. yds.	11,057 sq. yds.	12,305 sq. yds.
Based Aircraft Apron	2,800 sq. yds.	3,400 sq. yds.	3,700 sq. yds.
Itinerant Apron	6,013 sq. yds.	7,657 sq. yds.	8,605 sq. yds.
Terminal Building Space	3,200 sq. ft.	3,750 sq. ft.	5,000 sq. ft.
Auto Parking	54 spaces	63 spaces	84 Spaces
Miscellaneous			
Fuel Farm	No change	No change	12,000-gallon AVGAS, 12,000-gallon Jet-A