3 FACILITY REQUIREMENTS

This chapter provides a technical analysis of facility requirements for the Douglas Municipal Airport (DGL). The purpose of this analysis is to compare the Airport's existing facilities to the projected aviation-related activity levels and identify any enhancements that may be needed to meet user demand and/or ADOT minimum facility requirements. The following elements of the Airport are addressed:

- Airside Facilities
- General Aviation Facilities
- Support Facilities

3.1 Airside Facility Requirements

Airside facilities include equipment and standards that pertain to the operational capabilities of an airport. For the purposes of this Airport Master Plan Update, airside facilities that are examined include:

- Approach Capability
- Navigational Aids and Lighting
- Airspace Protection
- Part 77 Requirements
- Critical Aircraft and Airport Reference Code
- Runway Design Code
- Approach and Departure Reference Codes
- Runway Dimensional Standards
- Runway Orientation
- Runway Length
- Runway Width
- Runway Pavement Strength
- Taxiway System
- Taxiway Configuration
- Taxiway Dimensional Standards

3.1.1 Approach Capability

The ability of an approaching aircraft to land at an airport is predicated on the weather conditions, the level of pilot training, the type of navigation equipment both in the aircraft and on the ground, and the approach procedures established by the FAA. Under Visual Meteorological Conditions (VMC), which are defined as a cloud ceiling greater than 1,000 feet above ground level (AGL) and visibility conditions equal to or greater than 3 statute miles, pilots may approach an airport using only visual standards or cues. These are basic flight maneuvers that can be performed by all pilots at all public-use airports. Instrument Meteorological Conditions (IMC) occur when cloud ceilings are lower than 1,000 feet AGL and visibility becomes less than 3 statute miles. Under these conditions, properly trained pilots with adequately equipped aircraft can follow FAA-published Instrument Approach Procedures (IAPs) to land at an airport.

The FAA classifies standard IAPs, and the runways supporting those procedures, based on the type of electronic navigation guidance and the lowest approach minimums (visibility and decision height/HATh) provided by that procedure. The classifications include Non-Precision (NP), Precision (P), and Approach Procedures with Vertical Guidance (APV). Non-Precision approaches provide only lateral guidance from either ground based or satellite based Global Positioning System (GPS) navigational aids (NAVAIDs). Precision instrument approaches provide both lateral and vertical guidance and are traditionally supported by multiple ground based NAVAIDs collectively called an Instrument Landing System (ILS). An ILS includes a Localizer (providing lateral guidance), a Glideslope (providing vertical guidance) and an approach lighting system (providing close-in visual guidance). Approach Procedures with Vertical Guidance are a relatively recent outcome of the FAA's Next Generation Air Transportation System (NextGen) program. These approach procedures use GPS technology to provide ILS-like approach capability without the need for traditional ground-based ILS NAVAID equipment.

Douglas Municipal Airport does not currently have any IAPs. Most aircraft operations that occur at the Airport are conducted by helicopters or small, single-engine piston aircraft. As noted in the Forecast Chapter, the Airport receives limited jet traffic, however, the numbers are not sufficient to justify development of an IAP. Furthermore, the favorable year-round climate in Douglas is conducive to visual approaches that are conducted under VMC conditions. Based on these factors, and the relatively low level of aircraft activity at the Airport, it is not anticipated that any IAPs or equipment will be needed in the 20-year planning horizon. It is important to note that Airport users and tenants have identified an approach procedure as a desired facility improvement to increase safety. It is recommended that the feasibility of implementing approach capabilities at DGL be re-examined in the next Master Plan Update, particularly if activity increases at the Airport by that point in time.

3.1.2 Navigational Aids and Lighting

NAVAIDs are any visual or electronic devices airborne or on the surface which provide point-to-point guidance information or position data to aircraft in flight. As described in Chapter 1, Runway 03-21 is equipped with Precision Approach Path Indicators (PAPIs) on both runway ends.

The Airport is also equipped with a wind sock which identifies wind speed and direction, a segmented circle, and a white-green rotating beacon. Runway 03-21 is also equipped with

Medium Intensity Runway Lighting (MIRL), Runway end Indicator Lights (REILs) on both Runway End 03 and 21, and has basic runway markings that are in poor condition. The basic runway markings include runway designation (runway end number), and runway centerline marking, which identifies the center of the runway and provides alignment guidance during takeoffs and landings.

The 2008 Arizona State Airports System Plan (SASP) identifies minimum objectives for the State's airport system that are recommended for airports to fulfill their roles in the statewide system. Douglas Municipal Airport is identified as a General Aviation-Community facility in the SASP. For this airport classification, minimum criteria as they pertain to visual aids and lighting include a rotating beacon, wind cone/segmented circle, MIRLs, and some type of Visual Glide Slope Indicator, such as PAPIs. Based on the type and volume of aircraft operations that occur and are projected to occur at the Airport, the existing NAVAIDs and lighting are anticipated to be adequate and meet the SASP criteria.

Although they do not directly provide guidance for aircraft operations, weather stations provide valuable information to pilots taking off or landing at an airport. DGL does not currently have a weather station, though it has been identified as a need for the Airport. The nearest weather station to the Airport is located at Bisbee-Douglas International Airport, which is 10 miles northwest.

The 2008 SASP recommended that any airport in Arizona should be within 25 nautical miles of an airport weather reporting station. The SASP also cites the 2007 Arizona (Automated Weather Observing System (AWOS) Study that recommended specific airports that should install an AWOS. DGL was not on this list, however, it is anticipated that the trend of larger aircraft and jet aircraft migrating from other area airports will continue in the future. As such, it is recommended that DGL pursue installation of either an Airport Automated Surface Observing System (ASOS) or an AWOS in the intermediate (6-10 year) timeframe. Based on an examination of FAA Airport Improvement Program (AIP) grants from 2016, the overall cost for site preparation and installation of weather reporting equipment at a smaller general aviation airport is between $100,000 and $150,000. The most significant considerations for the installation of a weather reporting station is the initial purchase and installation cost, and operational and maintenance costs of the equipment.

Per FAA Order 6560.20B, the preferred siting of a weather reporting station is adjacent to the primary runway 1,000 feet to 3,000 feet from the runway threshold. The horizontal distance of the facility from the primary runway centerline is 500 feet to 1,000 feet. A specific location for the weather reporting station is identified on the Airport Layout Plan.

Though DGL meets the 2008 SASP requirement of being within 25 nautical miles of an airport weather reporting station, knowledge of accurate, current weather conditions enhances pilot safety, and would be a desirable improvement at the Airport.

3.1.3 Airspace Protection

The safe and efficient operation of aircraft requires that certain areas on and near an airport remain clear of objects that could present a hazard to air navigation. Airports that are listed in the National Plan of Integrated Airport System (NPIAS) and receive federal funding support through the Airport Improvement Program (AIP) are considered "federally obligated" and as

such, are subject to FAA Grant Assurances 20 and 21 which require airport sponsors to take appropriate actions to protect the surrounding airspace from incompatible land uses and to prevent/mitigate hazardous obstacles to navigation. Because Douglas Municipal Airport is not included in the NPIAS, it is not obligated to adhere to airspace protection standards, however, it is recommended that the Airport maintain protection of the surrounding airspace to promote safe aircraft operations to the extent possible. It should be noted that these surfaces exist at all airports, regardless if they are included in the NPIAS or not.

The FAA has established two primary sets of airspace protection standards. These include Federal Aviation Regulation (FAR) Part 77 Safe, Efficient Use, and Preservation of The Navigable Airspace, and Order 8260.3 United States Standard for Terminal Instrument Procedures (TERPS). While similar in nature and purpose, these standards have specific applications relative to approach procedures and minimums, usable runway length, AIP funding, and compatible land use planning.

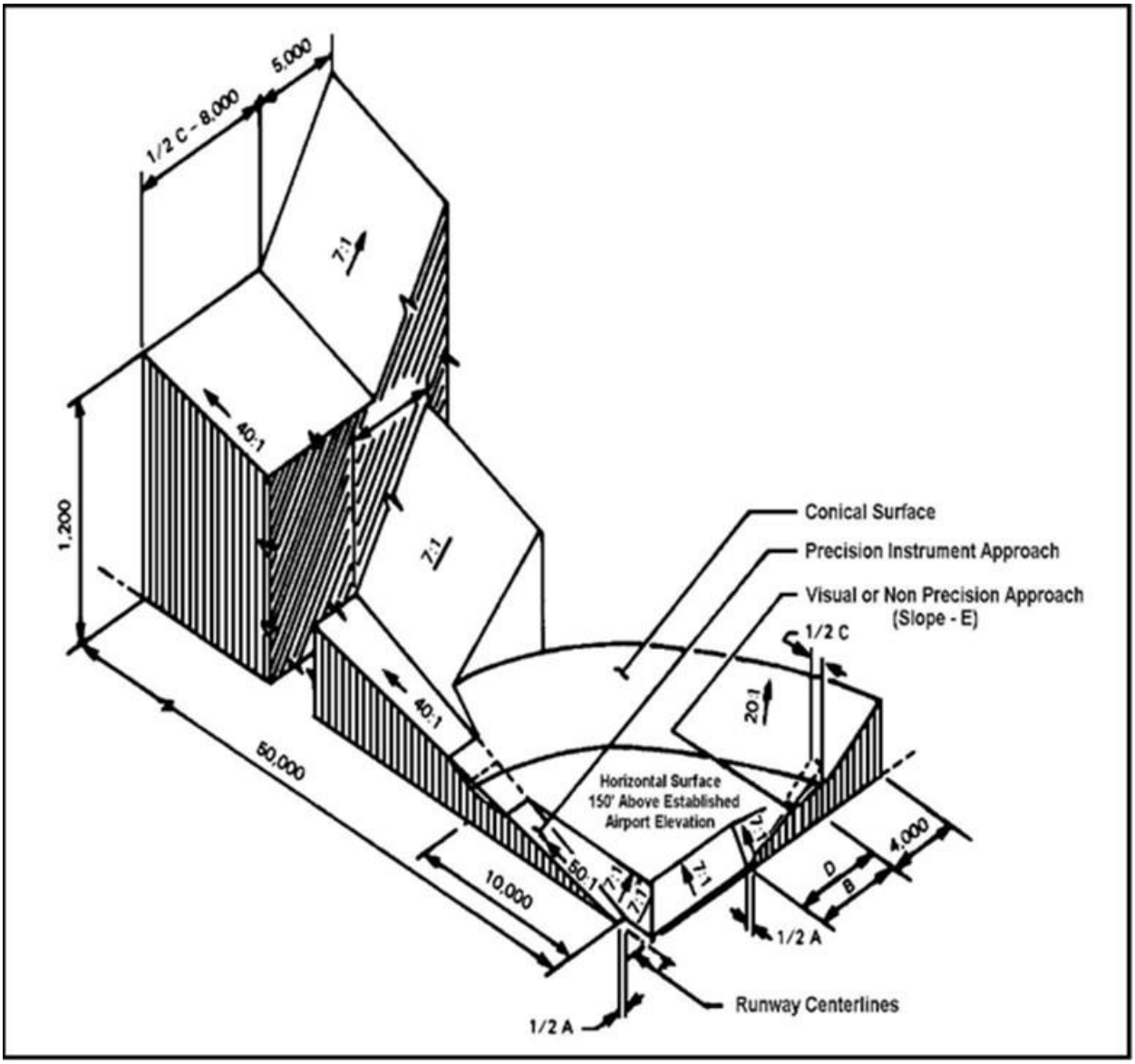
In June 2016, Quantum Spatial, a geospatial service company conducted an aerial observation of the Airport, providing high-resolution imagery and identification of airspace obstacles at DGL. Based on the results of this observation, 33 obstacles to the Part 77 Surfaces were identified. Most of these were identified as terrain, trees, and bushes. There was one tower identified as an obstacle in the Transitional Surface. It is important to note that there were no obstacles identified in the Primary Surface. The following sections identify obstacles and airspace surfaces in greater detail.

3.1.4 Part 77 Requirements

As directed by FAR Part 77, *imaginary surfaces* around the airfield are established for determining obstructions to air navigation. These standards are most applicable to promoting compatible land use on and near airports and are used predominately by the Airports Division of the FAA. These surfaces can vary in shape, size and slope, depending on the available approach procedures to each runway end. Any penetration of these imaginary surfaces, either manmade or natural, are identified as obstructions and must be evaluated by the FAA to determine if they present a hazard to air navigation. If determined to be a hazard, the obstacle should be removed or altered to mitigate the penetration. If not mitigated appropriately, the obstacle could adversely affect approach and departure minimums and/or operational procedures.

Based on the requirements of FAR Part 77, the following describes the imaginary surfaces as they apply to the existing Runway 03-21 at DGL. All references to a surface's *slope* is expressed in horizontal feet by vertical feet. For example, a 20:1 slope rises one foot vertically for every 20 feet horizontally. A graphical depiction of Part 77 surfaces is shown in **Exhibit 3-1**.

Exhibit 3-1. FAR Part 77 Surfaces



Source: National Oceanic and Atmospheric Administration.

Primary Surface

This surface is longitudinally centered on the runway. The elevation of any point on the surface is the same as the elevation of the nearest point on the runway centerline. For Runway 03-21 this surface is 500 feet wide and extends 200 feet beyond the ends of pavement usable for takeoff and landing. There are no known obstacles to the Primary Surface.

Approach Surface

This surface is longitudinally centered on the extended runway centerline and extends outward and upward from the end of the Primary Surface. An Approach Surface is applied to each end of each runway, based upon the type of approach available or planned for that runway end. The inner width of the Approach Surface is the same width of the Primary Surface. The Approach Surface extends at a specific slope to a uniform width and distance based on the approach capabilities of the runway. For Runway Ends 03 and 21 this surface begins 200 feet beyond the end of the runway, is 5,000 feet long, and rises at a slope of 20 to 1 to an outer width of 1,500 feet.

Based on aerial photogrammetry conducted by Quantum Spatial, there are 17 obstacles in the Approach Surfaces of Runway 03-21, all of which are identified as trees and bushes. It is recommended that these obstacles be cleared and approach areas be regularly maintained.

Transitional Surface

This surface extends outward and upward from the sides of the Primary Surface and from the sides of the Approach Surfaces at a slope of 7 to 1 up to the height of the Horizontal Surface. There were 5 obstacles identified within the Transitional Surface, including bushes, terrain and one tower.

Horizontal Surface

This surface is a horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the Primary Surface of each runway and connecting the adjacent arcs by lines tangent to those arcs. At DGL, the Horizontal Surface extends 5,000 feet from the ends of Runway 03-21, at an elevation of 4,323 feet MSL. There are no known obstacles located in the Horizontal Surface.

Conical Surface

This surface extends outward and upward from the periphery of the Horizontal Surface. The Conical Surface extends at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

Ten obstacles, all identified as terrain, are located within the Conical Surface with penetrations ranging from less than 1 foot to 39 feet. These obstacles are not prohibitive to operating aircraft at DGL.

3.1.5 Critical Aircraft and Airport Reference Code (ARC)

The FAA classifies airports and runways by their current and planned operational capabilities. These classifications – described below – along with the aircraft classifications defined in Chapter 1 are used to determine the appropriate FAA standards, as per AC 150/5300-13A, to which the airfield facilities are to be designed and built. Although Douglas Municipal Airport is not mandated to adhere to FAA standards, it is recommended that facilities reflect those identified in FAA AC 150/5300-13A to the extent possible.

An Airport Reference Code (ARC) is an airport designation that represents the Aircraft Approach Category (AAC) and Airplane Design Group (ADG) of the most demanding aircraft that the airfield is intended to accommodate on a regular basis. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely at an airport.

The FAA identifies a Critical Aircraft as the most demanding airplane or group of airplanes that utilize a runway on a regular basis, which is defined as at least 250 takeoffs per year. The previous Airport Layout Plan (ALP) identified DGL's Critical Aircraft as a Beech King Air C-90, which has an ARC designation of B-II (small). Based on an analysis of historical operations at DGL using the FAA's Traffic Flow Management System Count database (TFMSC), the most demanding aircraft that regularly operates at DGL is the Beechcraft Super King Air 200. Although more demanding aircraft including smaller jets do operate at the Airport, this aircraft model is reflective of a more typical, regularly operating aircraft. Though the Super King Air 200 does not conduct 250 annual takeoffs, it is the recommended Critical Aircraft for the Airport. With an approach speed of approximately 103 knots and a wingspan of 54 feet 6 inches, the ARC for the Beechcraft Super King Air 200 is B-II (small), the same ARC that has been maintained on DGL's ALP since 2003.

Consistent with FAA guidance, the Critical Aircraft anticipated to use the facilities over the planning horizon are those with an AAC-ADG of B-II (small), which includes the King Air 200. Based on this, the ARC for Douglas Municipal Airport is anticipated to remain B-II (small) throughout the planning horizon.

3.1.6 Runway Design Code (RDC)

The RDC is used to signify the design standards to which each specific runway is to be planned and built. This classification has three components: AAC, ADG and the highest approach visibility minimums that either end of the runway is planned to provide. Within these classifications, instrument approach visibility minimums are expressed in runway visual range (RVR) values of 1200, 1600, 2400, 4000 and 5000 feet, as described in **Table 3-1**. An airport's ARC will be consistent with the highest RDC of any of its runways. The RDC for Douglas Municipal Airport's Runway 03-21 is B-II-VIS.

Table 3-1. Instrument Approach Visibility Minimums

RVR (ft)	Corresponding Visibility Category (statute mile)
VIS	Visual Conditions (including instrument circling)
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 ILS)
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II ILS)
1200	Lower than ¼ mile (CAT-III ILS)

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

3.1.7 Approach and Departure Reference Codes (APRC & DPRC)

Approach and Departure Reference Codes (APRC and DPRC) describe the *current* operational capabilities of a runway and adjacent taxiways where no special operating procedures are necessary. In contrast, the RDC is based on *planned* development and has no operational application.

Like the RDC, the APRC is composed of three components: AAC, ADG, and visibility minimums. The APRC indicates which aircraft can operate on taxiways adjacent to a runway under particular meteorological conditions. The APRC classification is also used to identify

several critical design standards including runway lighting and marking, threshold siting criteria, obstacle free zones, and other FAA obstacle identification surfaces. The APRC for Runway 03-21 is B/II/VIS.

The DPRC represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operational procedures necessary. It is similar to the APRC, but is composed of two components, AAC and ADG. The DPRC for Runway 03-21 is B/II.

3.1.8 Runway Dimensional Standards

FAA AC 150/5300-13A, Change 1, *Airport Design*, identifies dimensional standards pertaining to runways and runway-related separations that are essential to provide clearance from potential hazards affecting routine aircraft movements on the airfield. Application of these standards is determined by the previously presented RDC and relates to separation distances for parallel runways, hold lines, parallel taxiways, aircraft parking areas, obstacle free areas, and safety areas. The following describes the specific safety or runway protection areas as they apply to Runway 03-21. The FAA design standards for a B-II (small) runway with visual approach minimums are summarized in **Table 3-2.**

As shown, all DGL's runway dimensional standards meet FAA requirements.

Table 3-2. Runway Dimensional Standards

Design Criteria	Runway 03-21	
	Existing Conditions	B-II (small) FAA Standards
Runway Design		
Width	75'	75'
Shoulder Width	20'	10'
Runway Protection		
RSA Length beyond departure end	300'	300'
RSA Length prior to threshold	300'	300'
RSA Width	150'	150'
ROFA Length beyond departure end	300'	300'
ROFA Length prior to threshold	300'	300'
ROFA Width	500'	500'
ROFZ Length beyond runway end	200'	200'
ROFZ Width	400'	400'
RPZ Length	1,000'	1,000'
RPZ Inner Width	250'	250'
RPZ Outer Width	450'	450'
Runway Separation		
Holding Position	200'	200'
Parallel Taxiway/Taxilane Centerline	240'	240'
Aircraft Parking Area	355'	250'

Sources: FAA Advisory Circular 150/5300-13A, 1999 Approved Airport Layout Drawing

Runway Safety Area (RSA)

The RSA is described by FAA as "a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, an overshoot, or excursion from the runway."

For Runway 03-21, this surface is 150 feet wide and extends 300 feet prior to the landing threshold and 300 feet beyond the departure end of the runway. The existing RSA is clear of obstacles and is entirely located on airport-owned property. Based on the type of aircraft that currently use and are projected to use the Airport, the existing RSA is adequate to accommodate projected demand.

Runway Object Free Area (ROFA)

The ROFA is an area centered on the runway centerline that is provided to enhance the safety of aircraft operations by clearing all above ground objects that protrude above the RSA edge elevation, except for objects that need to be in the ROFA for air navigation or aircraft ground maneuvering purposes. Object that must remain on the ROFA are constructed on frangible mounts, to minimize potential damage to aircraft in the event of an errant mishap.

For Runway 03-21, this surface is 500 feet wide and extends 300 feet prior to the landing threshold and 300 feet beyond the departure end of the runway. It is anticipated that the existing ROFA dimensions are adequate to accommodate existing and projected levels of demand, however, the ROFA off the end of Runway End 03 is penetrated by the Airport's perimeter fence and access road. As an extension or relocation of Runway 03-21 is not a specific recommendation of this Airport Master Plan Update, it is recommended that the City of Douglas acquire an avigation easement for safety areas that extend off the Airport property, including the RSA.

Runway Protection Zone (RPZ)

The RPZ is a trapezoidal area beginning 200 feet beyond the runway end and centered on the extended runway centerline. The RPZ is a compatible land use measure meant to enhance the protection of people and property on the ground. Airports should maintain positive control of RPZs through fee simple acquisition, easement or use restrictions/agreements. Such control includes clearing of RPZ areas of incompatible objects and activities.

As shown in Table 3.2, the RPZs for both ends of Runway 03-21 adhere to FAA standards for a B-II (small) facility. Although portions of the existing and proposed RPZ cross Geronimo Trail, Airport Road, and into Mexico, the existing RPZs do not have buildings or functions that promote large congregations of people, with the exception of approximately 4 to 6 homes located in Agua Prieta, Mexico that are within the RPZ.

The RPZ off the end of Runway end 03 is penetrated by the Airport perimeter fence and an access road. The RPZ off the end of Runway End 21 is penetrated by the perimeter fence as well as East Geronimo Trail. It is recommended that the City of Douglas acquire avigation easements or acquire the property that is encompassed by the RPZs to protect the Airport environment from incompatible land use.

Runway Obstacle Free Zone (OFZ)

The OFZ is defined by FAA as a volume of airspace centered above the runway centerline that extends 200 feet beyond each end of the runway surface that precludes taxiing or parked

airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function. For Runway 03-21, the OFZ is 400 feet wide. Based on existing and projected aircraft activity, it is anticipated that the existing ROFZ dimensions are adequate, however, the ROFZ off the end of Runway End 03 is penetrated by the Airport's perimeter fence and access road. This area is entirely within the ROFA, so the recommendation to acquire an avigation easement for the ROFA will also ensure that the ROFZ is adequately protected.

Runway Separation Standards

The FAA defines several separation standards that measure from the runway centerline to other airport facilities and are established to ensure operational safety of the airport users. The following are runway separation standards applicable to DGL:

- Runway Centerline to Edge of Aircraft Parking Area – For Runway 03-21, the standard distance is 250 feet. Existing tie-downs on aircraft parking aprons comply with this standard, as the closest distance from any aircraft parking area to the runway centerline is approximately 355 feet.
- Parallel Taxiway/Taxilane – FAA standard for a B-II (small) facility for runway-to-parallel taxiway/taxilane centerline is 240 feet. The centerline of the partial parallel taxiway at DGL is 240 feet from the centerline of Runway 03-21, which complies with this standard.
- Holding Position – FAA standard for a B-II (small) facility for runway centerline distance to aircraft holding position is 125 feet. There is one holding position on Runway end 21 and two holding positions on Runway end 03. All holding positions are 200 feet from the centerline of Runway 03-21, which exceeds to FAA design standards.

3.1.9 Runway Orientation

Ideally, a runway is oriented with the prevailing wind, as taking off and landing into the wind enhances aircraft performance. The FAA recommends that the primary runway have at least 95 percent wind coverage, which means that 95 percent of the time, the wind at an airport is within acceptable crosswind limitations. Crosswind coverage is calculated using the highest crosswind component that is acceptable for the types of aircraft expected to use the runway system. Larger aircraft have a higher tolerance for crosswind than smaller aircraft due to their size, weight and operational speed. If 95 percent coverage cannot be met by the primary runway, an additional "crosswind runway" may be needed to safely accommodate the aircraft needing the additional crosswind coverage.

Since DGL does not have a weather station, wind data were taken from the nearest Airport Automated Surface Observing System (ASOS), which is located at Bisbee-Douglas International Airport approximately 10 miles northeast of DGL. **Table 3-3** identifies wind coverage for Runway 03-21.

Table 3-3. Runway 03-21 Wind Coverage

	10.5 kt	13 kt	16 kt
All Weather	89.75%	**94.4%**	98.07%
IFR	81.15%	**86.36%**	91.52%
VFR	89.89%	**94.54%**	98.18%

Source: FAA AGIS Website, https://airports-gis.faa.gov/public/windrose_help.html

For a B-II (small) runway with visual approach minimums, the FAA recommends that 95 percent crosswind coverage be met for a 13-knot crosswind component. As shown in Table 3-3, Runway 03-21 at DGL does not satisfy this requirement. Airport tenants and users identified that a crosswind runway is a desirable facility, however, it is not as high of a priority as rehabilitation of the existing runway.

The most recent ALP, which was conditionally approved in 2003, identifies development of a crosswind Runway 12-30. While it is unlikely that the Airport would receive significant funding from the State to construct a crosswind runway, it is recommended that it still be shown on the updated ALP developed for this Master Plan Update as the crosswind runway is justified, just not a high priority given other needs at DGL. It should also be noted that despite the fact that crosswind coverages do not necessarily satisfy FAA criteria, it does not inhibit the Airport from operating as a safe facility. Based on the information provided in this section, it is further recommended that prior to any detailed planning effort pertaining to the installation of a crosswind runway, the City conduct a wind study to determine crosswind coverage specifically at DGL.

3.1.10 Runway Length

FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. Factors that affect needed runway length include temperature, airport elevation, runway gradient, critical aircraft expected to use the airport, and the stage length or distance of the longest nonstop destination. Specific aircraft performance is a key factor in determining the runway length needed for takeoff and landing.

According to the FAA AC, the following criteria are identified for critical aircraft:

> "The recommended length for the primary runway is determined by considering either the family of airplanes having similar performance characteristics or a specific airplane needing the longest runway. In either case, the choice should be based on airplanes that are forecast to use the runway on a regular basis. A regular basis is considered to be at least 250 takeoffs a year."

AC 150/5325-4B contains exhibits that calculate runway length requirements based on families of airplanes having similar performance characteristics and utilizing inputs from the airport regarding temperature and elevation. The runway length requirement results are categorized for small aircraft less than or equal to 12,500 pounds, aircraft weighing over 12,500 pounds but less than 60,000 pounds, and large aircraft more than 60,000 pounds. The 12,500 to 60,000-pound category or less is further subdivided into groups that compose 95 percent of aircraft within that fleet category, and 100 percent of aircraft within that category.

As noted in previous sections, the B-II critical aircraft for Douglas Municipal Airport is the Beechcraft Super King Air 200, which has a Maximum Takeoff Weight of 12,500 pounds. Also noted in FAA AC 150/5325-4B, for airport elevations above 3,000 feet, the airport designer must use the 100 percent of fleet calculations for 12,500 pound or lighter aircraft.

Takeoff lengths interpolated from the FAA tables identified in the Advisory Circular are based off an Airport elevation of 4,173 feet above MSL, and the mean maximum temperature of the hottest month, which is 94 degrees according to the previous Master Plan. Based on these inputs, the recommended runway length for Douglas Municipal Airport is 5,750 feet. The published length of Runway 03-21 is 5,760 feet. As noted, the runway length calculation accounts for 100 percent of the fleet that falls into the "Less than 12,500 Pounds" category, which includes small turbo-prop aircraft. Based on the relatively low levels of activity that occur at the Airport, and the types of aircraft that operate there, it is estimated that the existing runway length is adequate to accommodate existing and projected levels of demand.

Per FAA AC 150/5325-4B, the length requirements for a crosswind runway are the same as those for the primary runway. As such, it is recommended that the Airport Layout Plan depict a future crosswind runway that is 5,750 feet in length.

3.1.11 Runway Width

The width of Runway 03-21 is 75 feet. The FAA design standard for runway width is based on the AAC and approach visibility minimums to the runway. As indicated previously in **Table 3-2**, the standard runway width for a B-II airport with visual approach minimums is 75 feet. Based on existing and projected activity at the Airport, it is anticipated that a 75-foot wide runway is adequate to accommodate demand. This 75-foot standard is applicable to both existing Runway 03-21 and the future crosswind runway.

3.1.12 Runway Pavement Strength

Pavement design strength is related to three primary factors:

- The operating weight of aircraft anticipated to use the airport;
- The landing gear type and geometry; and
- The volume of annual aircraft operations, by type.

Pavement strength rating is not the same as maximum weight limit. Aircraft weighing more than the certified strength can operate on the runways on an infrequent basis, however, frequent activity by heavier aircraft can reduce the useful life of the pavement. Also, FAA regulations state that all federally obligated airports (these are airports that have accepted FAA funding and the associated grant assurances, which does not include DGL) must remain open to the public and cannot restrict an aircraft from using the runway due only to its weight exceeding the published pavement strength rating. The pilot of the aircraft decides which airports to use based on their determination that the airport can support their aircraft in a safe manner.

According to the 2003 ALP, Runway 03-21 has a pavement strength of 12,500 pounds for single-wheel-gear configurations, which is adequate to accommodate existing and projected demand.

According to ADOT, other than minor patching and crack sealing, the last major rehabilitation of Runway 03-21, which was a 5-inch overlay, was conducted in 1997. The Airport was last inspected in April 2013. At that time, the Runway and the turnaround taxiway was given a Pavement Condition Index (PCI) rating of 19. ADOT recommends major rehabilitation, such as a thick overlay or reconstruction when a runway's PCI drops below 55. Notes from that inspection include significant quantities of low-, medium-, and high-severity longitudinal and transverse cracking, bulging areas of pavement, and high potential of Foreign Object Debris (FOD). Airport maintenance staff regularly remove large pieces of dislocated pavement, and Airport users have identified that rehabilitation of Runway 03-21 is the most important facility need at DGL.

Based on the existing condition of Runway 03-21, the increase in turbo-prop and jet aircraft operations, and projected levels of activity, full runway reconstruction is recommended as a near-term improvement. This includes reconstruction of the turnaround taxiway. If funding from State and/or local sources cannot afford a full reconstruction of Runway 03-21, at minimum, a mill and overlay should be considered to maintain the Airport's ability to accommodate aircraft operations.

3.1.13 Taxiway System

The taxiway system links the runway and other operational areas at an airport. An effective taxiway system allows for the orderly movement of aircraft and enhances operational efficiency and safety by reducing the potential for congestion, runway crossings and pilot confusion. The following evaluates the taxiway infrastructure at Douglas Municipal Airport and identifies recommended enhancements to meet the circulation needs of the various based and transient aircraft operators.

Like the runway design standards described in Section 3.1.8, FAA AC 150/5300-13A identifies dimensional standards pertaining to taxiways and taxiway-related separations that are intended to provide adequate operational clearance between other aircraft and fixed and moveable objects.

These standards are based on both the ADG and the Taxiway Design Group (TDG) of the aircraft intended to use the facilities. The TDG is established by the overall Main Gear Width (MGW) and the Cockpit to Main Gear Distance (CMG) of the Airport's critical aircraft. The Cessna Beechcraft King Air 200 is classified as ADG II and TDG-2. The FAA design standards for these various aircraft classifications are summarized in **Tables 3-4** and **3-5.**

Table 3-4. Taxiway Design Standards Based on ADG

Item	Existing Conditions (ft.)	FAA Standards ADG II (ft.)
Taxiway Safety Area Width	79	79
Taxiway OFA Width	131	131

Source: FAA Advisory Circular 150/5300-13A, Change 1

Table 3-5. Taxiway Design Standards based on TDG

Item	Existing Conditions (ft.)	FAA Standards TDG 2 (ft.)
Taxiway Width	35	35
Taxiway Edge Safety Margin	7.5	7.5
Taxiway Shoulder Width	15	15

Source: FAA Advisory Circular 150/5300-13A, Change 1

Douglas Municipal Airport has a partial parallel taxiway, Taxiway A, that is approximately 3,050 feet in length. Taxiway A-4 connects Runway 03-21 with aircraft parking aprons and is approximately 1,800 feet in length. Taxiways A-1 and A-2 are turnaround taxiways on Runway end 03. The remaining taxiways, A-3 and A-5, are connector taxiways that join Runway 03-21 and Taxiway A. The 2008 Arizona State Airports System Plan identifies that airports designated as GA-Community, which includes DGL, should have a full or partial parallel taxiway.

Airport tenants and users have identified a full-length parallel taxiway as a need for DGL, although not as high of a priority as rehabilitation of the existing runway. The previous ALP identifies a full-length parallel taxiway, however, based on the volume and type of aircraft operations that are projected at DGL, it is estimated that the existing taxiway configuration is adequate to accommodate demand. It is recommended that a full-length parallel taxiway remain depicted on the ALP, however, it is a facility improvement that should be considered long-term (11-20 years) unless activity significantly increases before that timeframe. A graphical depiction of the taxiway system at DGL is shown in **Exhibit 3-2**.

Exhibit 3-2. Taxiway System

Source: Google Earth, Kimley-Horn and Associates.

Based on the standards identified in Table 3-4 and 3-5, the existing width (35 ft.) of the parallel taxiway and connector taxiways with graded, unpaved shoulders is adequate to accommodate existing and projected activity.

3.2 General Aviation Facilities

The term "General Aviation Facility" refers to a facility that provides aviation services to airport users and aircraft operators such as hangar space, terminal space, and aircraft apron space. In this analysis, the following facilities were evaluated:

- Based Aircraft Storage Facilities
- Itinerant Aircraft Storage Requirements
- Apron Requirements
- Helipads
- Automobile Parking Facilities
- Airport Terminal Facility

3.2.1 Based Aircraft Storage Facilities

As noted in previous sections of this MPU, there were 12 based aircraft at the Airport in 2016, and it is projected that this number will increase to 14 by 2036.

At most airports, based aircraft are stored in either conventional hangars, T-hangars, or on the apron (aircraft tie-downs and designated aircraft apron parking spaces). These storage types are explained below.

- Conventional Hangar - This type of hangar is a large building which can house multiple aircraft in protective storage, and usually contains a large door through which aircraft can pass. Sometimes an "FBO" designation is included for this type of hangar indicating it is operated by a provider of public aviation services that stores multiple itinerant and based aircraft as part of the business activity. Conventional hangars can also be owned and house aircraft operated by or in conjunction with the owner/operator of the hangar. Examples of operators of this type of hangar space include governmental aviation divisions, private aviation companies, or corporate aviation departments. These operators would only house their own aircraft in these hangars, not itinerant aircraft.
- T-hangar - This type of hangar is an individual storage unit for a small aircraft, usually a single-engine or light twin aircraft classified under ADG I. The "T" designation corresponds to the overall shape of the unit, which is similar to a T. These individual hangars are generally grouped into linear buildings containing multiple units in a row.
- Aircraft Tie-down - An aircraft tie-down is typically an on-apron parking space that includes fixed points, typically concrete, where an aircraft can be secured using straps or cables. There can also be tie-downs on grass or non-apron areas. Although tie-downs do not provide covered protection from weather elements, they do prevent an aircraft from moving and minimize damage attributed to high winds.

At DGL, five based aircraft are stored in the 10-unit t-hangar, and the remaining seven based aircraft are stored in conventional hangars. There is no waiting list at the Airport for aircraft

hangar space. Although there are 5 T-hangar spaces that are not currently housing aircraft, according to the property manager, all units are currently rented out. The two conventional hangars account for approximately 15,000 square feet of aircraft storage area. In the larger conventional hangar, which currently houses six based aircraft, there is approximately 5,000 square feet of space that can be used for additional aircraft. It is anticipated that the existing aircraft storage hangar space is adequate to accommodate projected levels of based aircraft.

It should be noted that Lifeline, the Airport's sole current permanent tenant, indicated that they would potentially require additional hangar space for existing and future aircraft. The current hangar that is used by Lifeline is approximately 2,500 square feet in size. Based on conversations with Lifeline, a new hangar approximately 5,000 square feet in size should be planned for. This facility would likely be funded by Lifeline, and a logical location for the hangar would be between the existing Lifeline hangar and the aircraft fuel tanks to the southeast. This location provides direct access to the main apron and there is adequate space for hangar expansion. Upon expansion, if the tenant no longer requires the old hangar, the Airport could utilize it to accommodate future based aircraft or itinerant aircraft. It is recommended that the Airport continue to monitor tenant activity, and determine if expansion or reconstruction of the current smaller conventional hangar is needed.

3.2.2 Itinerant Aircraft Storage Requirements

As noted, itinerant aircraft are currently, and are projected to be stored at tie-downs on the aircraft parking apron as well as in the large conventional hangar. As identified in Chapter 1, the Airport has a total of 45 aircraft tie-downs, nine of which are located on the primary apron that houses the aircraft hangars and fueling facilities. Although peak operations projections were not developed for this Master Plan Update, based on observed activity levels provided by Airport Management and tenants, the existing aircraft tie-downs and hangar space are more than adequate to accommodate projected levels of itinerant demand. As noted, if Lifeline expands to a new executive hangar and has no use for the old facility, the Airport could preserve the vacated hangar and use for based aircraft or overflow itinerant aircraft.

3.2.3 Apron Requirements

Apron areas are intended to accommodate based and itinerant aircraft parking. Itinerant aircraft typically require a greater area for shorter amounts of time (usually less than 24 hours). Typically, based aircraft require a smaller area for longer amounts of time as this represents their storage or base location at an airport. However, it has been determined that existing and projected based aircraft will utilize conventional and T-hangars for storage purposes, leaving only itinerant aircraft to regularly utilize apron areas.

For itinerant aircraft, consideration must be made for the aircraft parking area, taxilanes leading into and out of the parking positions, and circulation areas. Typically, itinerant apron requirements are contingent on the number and type of aircraft that will use the facility.

As noted in Chapter 1, there are two aprons at DGL that encompass a total area of approximately 47,500 square yards. Although there are 36 aircraft tie-downs located on the northern and southern portions of the apron areas near the T-hangar facility, this area is primarily used by based aircraft taxiing to and from the T-hangars. It is also used infrequently by transient aircraft during special events. A 2013 ADOT inspection identified these apron areas had a PCI of 26,

which is considered "poor". Based on the infrequent use of these aprons and the other high-priority facility needs identified in this chapter, it is recommended that the Airport conduct regular maintenance and crack-sealing as necessary, rather than pursue grants for rehabilitation or reconstruction of these apron areas.

The primary apron is used regularly by based aircraft and transient aircraft and is more than adequate to accommodate existing and projected aircraft activity. Any increase in demand for apron space would be associated with an increase in aircraft tie-downs for transient aircraft on the primary apron. As noted in the previous section, it is anticipated that the existing number of aircraft tie-downs is adequate to accommodate projected demand. As such, the existing aircraft parking aprons are also anticipated to accommodate projected levels of demand. The 2013 ADOT inspection identified the PCI of this apron as 53, which is considered "poor". As with the previously noted apron areas, it is recommended that the Airport perform regular maintenance on the primary apron as needed rather than pursue full rehabilitation or reconstruction.

3.2.4 Helipads

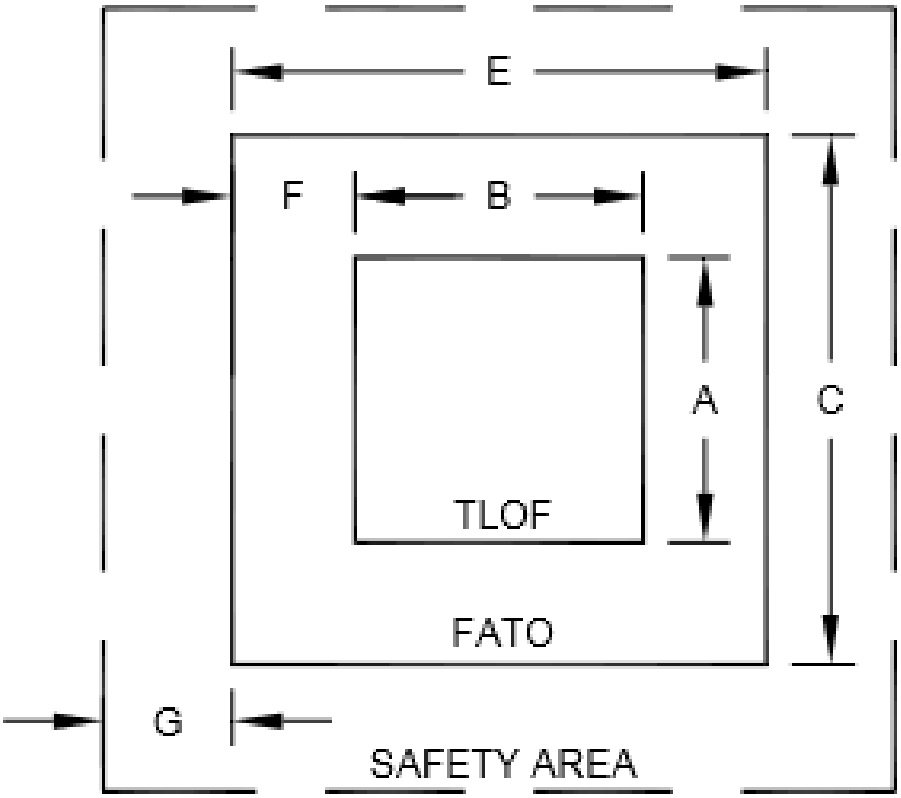
Currently, DGL has a temporary helipad that is located on the eastern portion of the primary aircraft parking apron. The helipad is used frequently by the existing Airport tenant Lifeline, as well as military and other government agency rotorcraft. Based on conversations with Lifeline and other Airport users, a permanent helipad has been identified as a need based on the frequent use of rotorcraft at DGL. The general location of the existing helipad is adequate to accommodate the type of rotorcraft that operate on the main ramp. The associated safety areas for helipads are based on the Rotor Diameter (RD) of the design helicopter, which is currently a Bell 407.

As noted, DGL is a non-NPIAS facility, and is not required to adhere to FAA recommendations, however, it is recommended that a new helipad adhere to FAA standards to the extent possible. Specific site determination recommendations and safety areas for helipads are described in FAA AC 150/5390-2C – Heliport Design. The minimum design standards for a helipad at DGL is depicted in **Exhibit 3-3** and **Table 3-6**.

The following acronyms are used in the exhibit and table below:

- D = Overall length of the design helicopter
- RD = Rotor diameter of the design helicopter
- TLOF = Touchdown and Liftoff Area
- FATO = Final Approach and Takeoff Area

Exhibit 3-3. Helipad Design Criteria for General Aviation Airports



Source: FAA AC 150/5390-2C Heliport Design

Table 3-6. Helipad Safety Areas and Minimum Dimensions

Exhibit Element	Item	Design Standard	Recommended Length (ft.)
A	Minimum TLOF Length	**1 RD**	35
B	Minimum TLOF Width	**1 RD**	35
C	Minimum FATO Length	**1 ½ RD**	52.5
E	Minimum FATO Width	**1 ½ RD**	52.5
F	TLOF/FATO Minimum Separation	**¾ D – ½ RD**	17.5
G	Minimum Safety Area Width	**Varies**	20

Source: FAA AC 150/5390-2C Heliport Design

Based on feedback provided by Airport Management and the Airport Master Plan Advisory Committee, several locations have been identified for the installation of a permanent helipad; all of which are on or near the primary aircraft parking apron. The location of the existing helipad allows for the recommended FAA safety areas and separation criteria to be met, does not require additional pavement, and is in close proximity to the current tenant, Lifeline, who is the primary user of the helipad facility. As such, it is recommended that a new helipad be situated in its existing location in the near-term, and if the tenant or other helicopter operators prefer it be moved long-term, that a new facility be located in a convenient location designated for aviation-related development as identified on the Airport Layout Plan.

3.2.5 Automobile Parking Facilities

As noted in Chapter 1, the Airport has 30 paved and approximately 20 unpaved automobile parking spaces available for use. There are no designated parking spaces inside the fenced aircraft parking apron area, however, tenants and Airport Staff often park vehicles in this area, away from the existing tie-downs and aircraft taxiing areas. The aircraft parking apron is enclosed by a chain-link fence and has a security gate, although the gate is rarely closed. Because the Airport tenant Lifeline is stationed at the Airport 24 hours a day, there is no perceived security threat from people or vehicles entering and leaving the apron area. Because the security gate remains open constantly, Airport users can park their vehicles in either of the designated lots and walk to buildings and facilities that access the apron.

Based on projections of aircraft operations and based aircraft, it is estimated that the existing parking spaces are adequate to accommodate future demand, however, if an FBO or additional tenants are established at the Airport, additional automobile parking facilities may be needed. Future landside development and additional parking should be located on or near Airport-owned structures west of the primary apron.

3.2.6 Airport Terminal Facility

Currently, the Airport does not have any terminal facility. Often, at a general aviation airport such as DGL, the airport sponsor or an FBO will provide a facility that has services such as restrooms and a pilot lounge. Based on conversations with Airport tenants and users, a terminal facility is considered a need at DGL. It is recommended that the Airport develop a small terminal facility as an intermediate (6-10 year) improvement.

In January 2017, Airport Management and the Master Plan Advisory Committee conducted a meeting to identify specific locations for facility improvements at the Airport. The area west of the primary apron that currently houses several City-owned buildings was the preferred location for a new terminal facility. Based on discussions with the City, it has been determined that construction of a new terminal building is a more viable option compared to renovation of any existing structures. While this Master Plan Update does not recommend a specific type of terminal structure, several airports with similar characteristics and activity levels have trailer/mobile home units that serve as terminals. These structures are typically sized 1,600 square feet, and are a relatively economical alternative to brick-and-mortar facilities.

As an interim action item prior to a permanent terminal facility, it may be beneficial for the Airport to provide portable toilets near the main apron for Airport users and pilots.

Representatives for Lifeline have indicated that pilots frequently mistake their office as a terminal facility and request to use their restrooms. Because Lifeline employees can be stationed 24 hours a day and have regimented work/sleep schedules, such interruptions can pose a safety hazard to their medical evacuation operations.

3.3 Support Facilities

This section examines the requirements of support facilities essential to the daily operation of the Airport. These facilities include airport access and circulation, airport maintenance facilities, utilities, and fuel storage facilities.

3.3.1 Airport Access and Circulation

The Airport is currently accessed from West Airport Road, with one access point on the west side of the parking lot through a secure gate. An unsecured access point at the southernmost point of West Airport Road is often used by U.S. Customs and Border Patrol to monitor the Airport's border with Mexico, however, the areas that are accessed are fenced off from the airfield. Any proposed development at the Airport is anticipated to be near existing facilities rather than on these undeveloped portions of the airfield. As such, general aviation activity at the Airport is not anticipated to increase enough to plan and develop another access point or access road for general aviation purposes. However, additional access and circulation may be needed based on non-aviation development. The current facility circulation provides safe and sufficient accessibility to Douglas Municipal Airport users, tenants, and maintenance personnel.

3.3.2 Aviation Fuel Storage Facilities

Douglas Municipal Airport offers 24-hour, self-fueling with one 12,000-gallon above-ground tank of AvGas and one 12,000-gallon above-ground tank of Jet A fuel. While the Airport does not have a fueling truck, it does provide assistance with fueling upon request.

Based on projected aircraft operations throughout the planning period and historical fuel sales data at DGL, the current fuel tank capacity is adequate to support aviation operations. The date that these tanks were installed was unknown at the time this Master Plan Update was conducted, however, the City has identified that they are compliant with EPA requirements for fuel storage facilities.

3.3.3 Airport Maintenance Facilities

The Airport houses some maintenance equipment in the large conventional hangar adjacent to the primary aircraft parking apron. This equipment includes a riding lawnmower, an open-air vehicle to transport equipment, and various tools and chemical agents for typical maintenance activities. Larger equipment such as sweepers for the runways and taxiways, or tractors for hauling and lawn maintenance are housed in an off-Airport facility and are requested from the City as needed. It is estimated that even if projected based aircraft are all stored in the large conventional hangar, there will be adequate space for the required maintenance equipment to be stored. As noted in previous sections, if the Airport tenant relocates its aircraft storage hangar, the existing hangar may become available for general Airport use. This facility could also provide additional maintenance equipment storage space.

3.3.4 Utilities

Utilities at Douglas Municipal Airport are provided by a variety of sources which include electricity by the Arizona Public Service Electric Company, and water and sewer provided by the City of Douglas. Based on projected aircraft operations and capacity at DGL, additional utilities or expansion of existing services are not anticipated to be needed, however, there may need to be potential expansion of utilities infrastructure for non-aviation development in the future.

3.4 Summary of Facility Requirements

Based on the facility requirements identified in this section, **Table 3-7** presents a summary of recommended improvements to the Airport's existing facilities throughout the planning period. Facility requirements are categorized as high-priority or low-priority. High-priority improvements are specific recommendations based on the analysis described in this Master Plan Update. Low-priority improvements include long-term projects that may be outside of the 20-year planning horizon, or projects that are desirable, but not necessarily feasible based on projected levels of aviation demand.

Table 3-7. Facility Requirements - Summary

Airside Facilities	Priority Level	General Aviation Facilities	Priority Level	Support Facilities	Priority Level
Remove obstacles from airspace surfaces, and ensure those that cannot be removed are properly marked or lit	High	Construct a permanent helipad useable by medium and large rotorcraft	High	Expansion of utility infrastructure for non-aviation use	Low
Install a weather reporting station (AWOS or ASOS)	High	Construct a terminal facility that houses restroom facilities and pilot lounge	High		
Expand Runway Protection Zones (RPZs) to FAA standard for a B-II facility	High				
Reconstruct Runway 03-21 to a pavement strength of 12,500 lbs. for single-wheel gear configuration (if full reconstruction cannot be achieved, a full mill and overlay is recommended)	High				
Reconstruct turnaround taxiways on Runway end 03 (if full reconstruction cannot be achieved, a full mill and overlay is recommended)	High				
Install crosswind runway to satisfy FAA recommended 95% wind coverage	Low				
Examine potential for instrument approach procedures to enhance safety	Low				
Construct full-length parallel taxiway	Low				

Source: Kimley-Horn and Associates