FACILITY REQUIREMENTS

As detailed in previous sections, an airport contains both airside and landside facilities. Airside facilities consist of the runways, taxiways, approach and departure facilities, navigational aids, lighting, markings, and signage that assist in the ground movement of aircraft. Landside facilities provide the interface between air and ground transportation and include the terminal building, hangars and tiedowns, aircraft parking aprons, automobile parking, and airport support facilities.

Cost-effective, safe, efficient, and orderly development of an airport should rely more upon actual demand than a time-based forecast figure. Thus, in order to develop a plan that is demand-based rather than time-based, a series of planning horizon milestones have been established that take into consideration the reasonable range of aviation demand projections.

It is important to consider that, over time, the actual activity at the airport may be higher or lower than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand. It is important to plan for these milestones so that airport officials can respond to unanticipated changes in a timely fashion. As a result, these milestones provide flexibility while potentially extending this plan's useful life if aviation trends slow over the period.

The most important reason for utilizing milestones is to allow the airport to develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as the schedule can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program.

The milestones utilized in the study are:

- Short-Term: 0-5 Years
- Intermediate-Term: 6-10 Years
- Long-Term: 11-20+ Years

AIRSIDE FACILITY REQUIREMENTS

RUNWAY SAFETY AREAS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These surfaces include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ).

It is important that the RSA, ROFA, and ROFZ remain under direct ownership of the airport sponsor to ensure that these areas remain free of obstacles and can be readily accessed by maintenance and safety personnel. The airport should also own or maintain sufficient land use control over RPZs to ensure that the area remains obstacle free. Alternatives to owning RPZs include maintaining positive control through avigation easements or ensuring proper zoning measures are taken to maintain compatible land use.

Existing safety areas for each of the runways at ODO are depicted on **Exhibit 25**. For planning purposes, the primary runway should be designed to meet C-III-2400 standards in the ultimate condition, and the crosswind and/or additional runway should be planned to B-II-5000 design standards. While Runway 11-29 currently serves as the airport's primary runway, the alternatives in the next section will evaluate scenarios in which other runways are considered the primary. This includes the evaluation of any potential safety area impacts and mitigative actions to correct non-standard conditions.

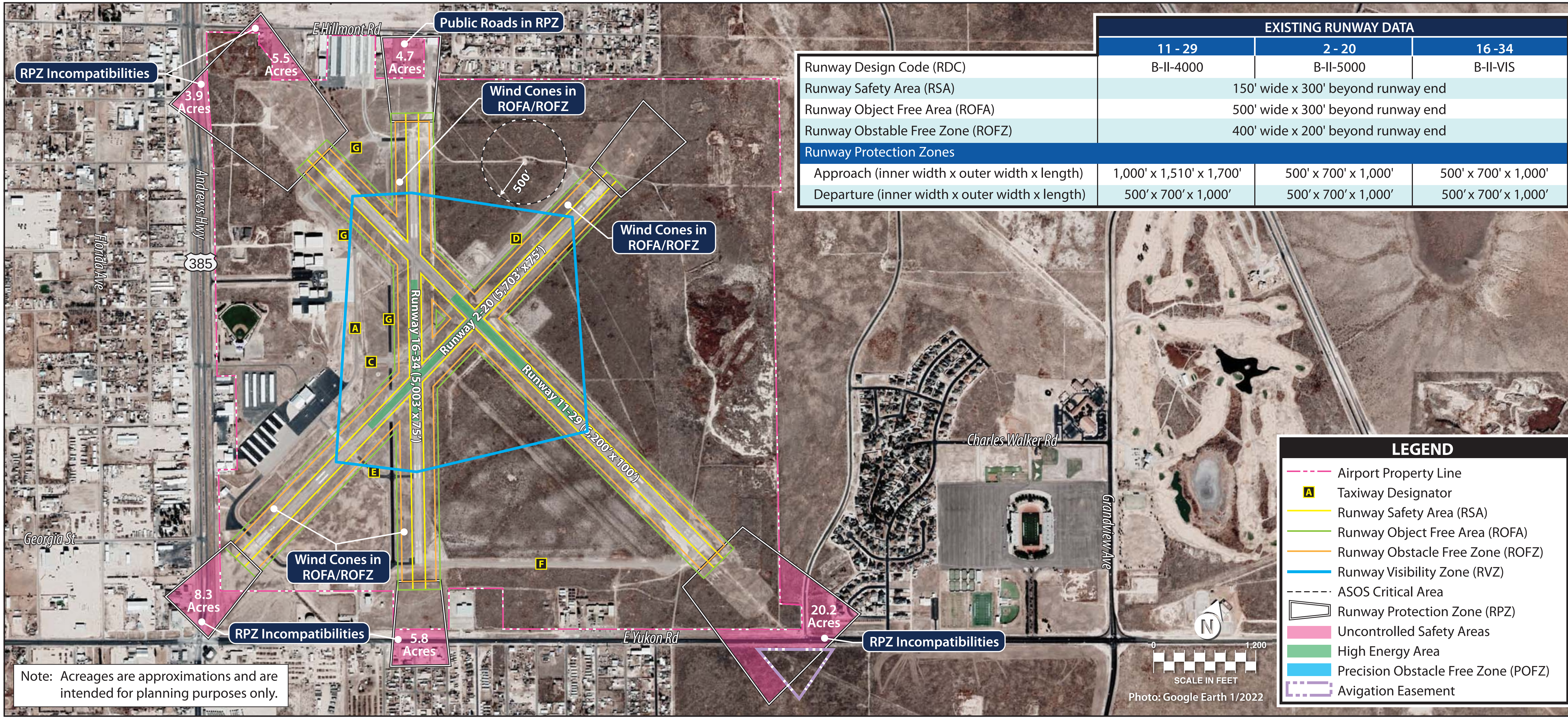
Runway Safety Area (RSA)

The RSA is an established surface surrounding a runway that is designed or prepared to increase safety and decrease potential damage if an aircraft undershoots, overshoots, or makes an excursion from the runway. The RSA is centered upon the runway centerline, and its dimensions are based upon the established RDC. The FAA states within AC 150/5300-13B that the RSA must be cleared and graded and cannot contain hazardous surface variations. In addition, the RSA must be drained either by grading or storm sewers and capable of supporting snow removal and ARFF equipment, as well as the occasional passage of aircraft without damaging the aircraft. The RSA must remain free of obstacles, other than those considered fixed by function, such as runway lights.

The FAA has placed a higher significance on maintaining adequate RSA at all airports. Under Order 5200.8, effective October 1, 1999, the FAA established the *Runway Safety Area Program*. The Order states, "The objective of the Runway Safety Area Program is that all RSAs at federally obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13B, *Airport Design*, to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at the airport and perform airport inspections.

The standard RSA dimensions for each of the runways in the existing condition are 150 feet wide and extending 300 feet beyond each end of the runway. These dimensions will also apply in the ultimate condition for the crosswind and/or additional runway. However, the RSA dimensions for the primary runway will increase in the ultimate RDC C-III-2400 condition, at 500 feet wide and extending 1,000 feet beyond each end of the runway.

At ODO, the RSA for all runways in the existing condition is fully contained within airport property and free of obstructions, in accordance with FAA design standards. The next section of the report will evaluate different runways functioning as the primary runway and meeting C-III-2400 design standards. Potential RSA obstructions/deficiencies associated with the primary runway will be examined, as well as mitigative actions that would be necessary.



EXISTING RUNWAY DATA	11 - 29	2 - 20	16 -34
Runway Design Code (RDC)	B-II-4000	B-II-5000	B-II-VIS
Runway Safety Area (RSA)	150' wide x 300' beyond runway end		
Runway Object Free Area (ROFA)	500' wide x 300' beyond runway end		
Runway Obstable Free Zone (ROFZ)	400' wide x 200' beyond runway end		
Runway Protection Zones			
Approach (inner width x outer width x length)	1,000' x 1,510' x 1,700'	500' x 700' x 1,000'	500' x 700' x 1,000'
Departure (inner width x outer width x length)	500' x 700' x 1,000'	500' x 700' x 1,000'	500' x 700' x 1,000'

	ULTIMATE PRIMARY RUNWAY
Runway Design Code (RDC)	C-III-2400
Runway Safety Area (RSA)	500' wide x 1,000' beyond runway end
Runway Object Free Area (ROFA)	800' wide x 1,000' beyond runway end
Runway Obstable Free Zone (ROFZ)	400' wide x 200' beyond runway end
Runway Protection Zones	
1/2-mile Approach RPZ (inner width x outer width x length)	1,000' x 700' x 2,500'
1/2-mile Departure RPZ (inner width x outer width x length)	1,700' x 500' x 1,010'
3/4-mile Approach RPZ (inner width x outer width x length)	1,000' x 1,510' x 1,700'
3/4-mile Departure RPZ (inner width x outer width x length)	500' x 1,010' x 1,700'

	ULTIMATE CROSSWIND / ADDITIONAL RUNWAY
Runway Design Code (RDC)	B-II-5000
Runway Safety Area (RSA)	150' wide x 300' beyond runway end
Runway Object Free Area (ROFA)	500' wide x 300' beyond runway end
Runway Obstable Free Zone (ROFZ)	400' wide x 200' beyond runway end
Runway Protection Zones	
Approach (inner width x outer width x length)	500' x 700' x 1,000'
Departure (inner width x outer width x length)	500' x 700' x 1,000'

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Runway Object Free Area (ROFA)

The ROFA can be described as a two-dimensional surface area that surrounds all airfield runways. This area must remain clear of obstructions, with an exception to those that are deemed "fixed by function," such as runway lighting systems. This safety area does not have to be level or graded as the RSA does. However, the ROFA must be clear of any penetrations of the lateral elevation of the RSA. Much like the RSA, the ROFA is centered upon the runway centerline, and its size is determined based upon the established RDC.

ROFA design standards for all three runways measure 500 feet wide and extend 300 feet beyond the end of each runway in the existing condition, and for the crosswind and additional runways in the ultimate condition. The ROFA dimensions increase for the ultimate RDC C-III-2400 design standards for the primary runway, at 800 feet wide and extending 1,000 feet beyond the end of each runway.

In the existing condition, the ROFA associated with each runway is fully contained on airport property, but obstructions are present, as noted on **Exhibit 25**. The wind cones adjacent to Runways 2-20 and 16-34 are located within the ROFA, which is a non-standard condition. Consideration should be given to relocating the wind cones outside of the ROFA.

The next section of the report will evaluate different runways functioning as the primary runway and meeting C-III-2400 design standards. Potential ROFA obstructions/deficiencies associated with the primary runway will be examined, as well as mitigative actions that would be necessary.

Obstacle Free Zones (OFZ)

The Runway Obstacle Free Zone (ROFZ) can be defined as a portion of airspace centered about the runway, and its elevation at any point is equal to the elevation of the closest point on the runway centerline. The function of the ROFZ is to ensure the safety of aircraft conducting operations by preventing object penetrations to this portion of airspace. Potential penetrations to this airspace also include taxiing and parked aircraft. Any obstructions within this portion of airspace must be mounted on frangible couplings and be fixed in its position by its function.

The ROFZ extends 200 feet past each end of the runway on the runway centerline. The ROFZ width for runways accommodating large aircraft is 400 feet. This applies to the existing and ultimate condition at ODO. The wind cones adjacent to Runways 2-20 and 16-34 are located within the existing and ultimate ROFZ and should be relocated.

The Precision Obstacle Free Zone (POFZ) is defined as "a volume of airspace above an area beginning at the runway threshold, at the threshold elevation, and centered on the extended runway centerline, 200 feet long by 800 feet wide." The POFZ is only in effect when the following operational conditions are met:

I. Vertically guided approach
II. Reported ceiling below 250 feet and/or visibility less than ¾-statue mile
III. An aircraft on final approach within two miles of the runway threshold

When these conditions are met, aircraft holding for take-off must hold in such a position so that neither the fuselage nor the tail of the aircraft penetrates the POFZ. However, the wings of the aircraft can penetrate the surface. Currently, no runway end has lower than ¾-statue mile visibility, so a POFZ is not in effect. In the ultimate condition, visibility minimums lower than ¾-mile are planned for the primary runway; therefore, the POFZ would be in effect if the operational conditions above are met.

Runway Protection Zone (RPZ)

An RPZ is a trapezoidal area centered on the extended runway centerline beginning 200 feet from the end of the runway. This safety area has been established to protect the end of the runway from airspace penetrations and incompatible land uses. The RPZ dimensions are based upon the established RDC and the approach visibility minimums serving the runway. While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13B, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements.
- Irrigation channels, as long as they do not attract birds.
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator.
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable.
- Unstaffed navigational aids (NAVAIDs) and facilities, such as required for airport facilities that are fixed-by-function in regard to the RPZ.
- Above-ground fuel tanks associated with back-up generators for unstaffed NAVAIDS.

In September 2022, the FAA published AC 150/5190-4B, *Airport Land Use Compatibility Planning*, which states that airport owner control over RPZs is preferred. Airport owner control over RPZs may be achieved through:

- Ownership of the RPZ property in fee simple;
- Possessing sufficient interest in the RPZ property through easements, deed restrictions, etc.;
- Possessing sufficient land use control authority to regulate land use in the jurisdiction containing the RPZ;
- Possessing and exercising the power of eminent domain over the property; or
- Possessing and exercising permitting authority over proponents of development within the RPZ (e.g., where the sponsor is a State).

AC 150/5190-4B further states that "control is preferably exercised through acquisition of sufficient property interest and includes clearing RPZ areas (and keeping them clear) of objects and activities that would impact the safety of people and property on the ground." The FAA does recognize that land ownership, environmental, geographical, and other considerations can complicate land use compatibility within RPZs. Regardless, airport sponsors are to comply with FAA Grant Assurances, including but not limited to Grant Assurance 21, Compatible Land Use. Sponsors are expected to take appropriate measures to “protect against, remove, or mitigate land uses that introduce incompatible development within RPZs.” For proposed projects that would shift an RPZ into an area with existing incompatible land uses, such as a runway extension or construction of a new runway, the sponsor is expected to have or secure sufficient control of the RPZ, ideally through fee simple ownership. Where existing incompatible land uses are present, the FAA expects sponsors to “seek all possible opportunities to eliminate, reduce, or mitigate existing incompatible land uses” through acquisition, land exchanges, right-of-first-refusal to purchase, agreement with property owners on land uses, easements, or other such measures. These efforts should be revisited during master plan or ALP updates, and periodically thereafter, and documented to demonstrate compliance with FAA Grant Assurances. If new or proposed incompatible land uses impact an RPZ, the FAA expects the airport to take the above actions to control the property within the RPZ, along with adopting a strong public stance opposing the incompatible land uses.

For new incompatible land uses that result from a sponsor-proposed action (i.e., an airfield project such as a runway extension, a change in the critical aircraft that increases the RPZ dimension, or lower minimums that increase the RPZ dimension), The airport sponsor is expected to conduct an Alternatives Evaluation. The intent of the Alternatives Evaluation is to "proactively identify a full range of alternatives and prepare a sufficient evaluation to be able to draw a conclusion about what is ‘appropriate and reasonable.’" For incompatible development off-airport, the sponsor should coordinate with the Airports District Office (ADO) as soon as they are aware of the development, with the alternatives evaluation conducted within 30 days of becoming aware of the development within the RPZ. The following items are typically necessary in an Alternatives Evaluation:

- Sponsor’s statement of the purpose and need of the proposed action (airport project, land use change or development)
- Identification of any other interested parties and proponents
- Identification of any federal, state, and local transportation agencies involved
- Analysis of sponsor control of the land within the RPZ
- Summary of all alternatives considered including:
    - Alternatives that preclude introducing the incompatible land use within the RPZ (e.g., zoning action, purchase, and design alternatives such as implementation of declared distances, displaced thresholds, runway shift or shortening, raising minimums)
    - Alternatives that minimize the impact of the land use in the RPZ (e.g., rerouting a new roadway through less of the RPZ, etc.)
    - Alternatives that mitigate risk to people and property on the ground (e.g., tunnelling, depressing and/or protecting a roadway through the RPZ, implementing operational measures to mitigate any risks, etc.)
- Narrative discussion and exhibits or figures depicting the alternative
- Rough order of magnitude cost estimates associated with each alternative, regardless of potential funding sources
- A practicability assessment based on the feasibility of the alternative in terms of cost, constructability, operational impacts, and other factors.

Once the Alternatives Evaluation has been submitted to the ADO, the FAA will determine whether or not the sponsor has made an adequate effort to pursue and give full consideration to appropriate and reasonable alternatives. **The FAA will not approve or disapprove the airport sponsor's preferred alternative; rather, the FAA will only evaluate whether an acceptable level of alternatives analysis has been completed before the sponsor makes the decision to allow or not allow the proposed land use within the RPZ.**

In summary, the RPZ guidance published in September 2022 shifts the responsibility of protecting the RPZ to the airport sponsor. The airport sponsor is expected to take action to control the RPZ or to demonstrate that appropriate actions have been taken. It is ultimately up to the airport sponsor on whether or not to permit existing or new incompatible land uses within an RPZ, with the understanding that they still have grant assurance obligations, and the FAA retains the authority to review and approve or disapprove portions of the ALP that would adversely impact the safety of people and property within the RPZ.

RPZs include both approach and departure RPZs. The approach RPZ is a function of Aircraft Approach Category (AAC) and approach visibility minimums associated with the approach runway end. The departure RPZ is a function of the AAC and departure procedures associated with the runway. For a particular runway end, the more stringent RPZ requirements (usually associated with the approach RPZ) will govern the property interests and clearing requirements that the airport sponsor should pursue. None of the runways at ODO have displaced thresholds, so the approach and departure RPZs on each runway occur in the same location 200 feet from the end of each runway. For planning purposes, the approach RPZ was used to create the most restrictive condition. The existing RPZs at ODO are presented on **Exhibit 25** and detailed further in **Table 24**.

TABLE 24 | Runway Protection Zones (RPZ) Summary

RPZ	Visibility Minimums	Uncontrolled RPZ	Notes/Incompatibilities
EXISTING CONDITION			
Runway 11	¾ mile	9.4 acres	Portions of the RPZ extend beyond airport property and are uncontrolled; businesses and a residence present; Andrews Highway and Hillmont Road traverse the RPZ.
Runway 29	¾ mile	20.2 acres	Approximately 20.2 acres within the RPZ are uncontrolled, with approximately 2.9 acres protected by a County-owned easement. RPZ contains residential land uses and encompasses E. Yukon Road and other public roadways.
Runway 2	Visual	8.3 acres	A portion of the RPZ is uncontrolled; RPZ contains businesses and encompasses Andrews Highway.
Runway 20	1-mile	N/A	Fully contained on airport property; free of incompatible land uses.
Runway 16	Visual	4.7 acres	A portion of the RPZ is uncontrolled; RPZ contains businesses/hangars.
Runway 34	Visual	5.8 acres	A portion of the RPZ is uncontrolled; residential and business land uses in RPZ; RPZ encompasses E. Yukon Road and other public roadways.

Note: Acreages are approximations
Source: Coffman Associates analysis

As detailed in the table, all but one of the existing condition RPZs extend off airport property, with the exception being the Runway 20 RPZ which is fully contained on airport property and free of incompatible uses. Each of the off-airport RPZs also contains incompatible land uses including residences, businesses, and public roads. In the ultimate condition, the RPZ associated with the primary runway end offering approach minimums down to ½ mile will increase in size, potentially introducing new incompatible land uses in the RPZ. As detailed previously, the FAA will expect the airport sponsor to conduct an Alternatives Evaluation if there is a change to the runway environment, including the introduction of lower approach minimums that would alter the size of the RPZ. Options in the next section will evaluate different scenarios to mitigate incompatible land uses within existing and ultimate RPZs.

RUNWAY ORIENTATION

A runway's designation is based upon its magnetic headings, which are determined by the magnetic declination for the area. The magnetic declination in the area of ODO is 5° 53'E. Primary Runway 11-29 has a true heading of 121°/301°. Adjusting for the magnetic declination, the current magnetic heading of the runway is 115°/295°. Thus, the current runway designation should be maintained in the short-term but should be redesignated as Runway 12-30 in approximately 8-10 years. The other two runway designations (Runway 2-20 and Runway 16-34) should also be maintained, as detailed in **Table 25**.

TABLE 25 | Runway Designations

Runway	True Heading	Magnetic Heading	Desired Runway ID
Runway 11-29	121/301	115/295	11/29*
Runway 2-20	030/210	024/204	2/20
Runway 16-34	165/345	159/339	16/34

Magnetic Declination: 5° 53' E ± 0° 21' changing by 0° 7' W per year; rounded to 6°
*Runway 11-29 should be redesignated as Runway 12-30 in approximately 8-10 years

Sources: Airnav.com; NOAA

FAA Advisory Circular 150/5300-13B, *Airport Design*, recommends that a crosswind runway be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed on the basis of not exceeding a 10.5-knot (12 mph) component for ARC A-I and B-I; 13-knot (15 mph) component for ARC A-II and B-II; 16-knot (18 mph) component for ARC A-III, B-III, C-I through C-III, and D-I through D-III; and a 20-knot (23) component for ARC A-IV through E-VI.

Exhibit 4, presented previously, details the associated wind coverage. As stated previously, in all weather conditions, Runway 11-29 provides for 77.51 percent coverage in 10.5-knot crosswind conditions, 87.44 percent coverage in 13-knot crosswind conditions, and greater than 95 percent coverage in 16-knot and higher crosswind conditions. As shown on the exhibit, the other two runways provide better crosswind coverage than Runway 11-29, and all three runways combined provide greater than 98 percent coverage in the 10.5-knot condition.

Based on this information, a crosswind runway at ODO is justified for federal funding assistance; however, a third runway is not. An additional runway is defined as a runway that is not the primary or crosswind, and the FAA will generally not participate in funding for maintenance for additional runways[21]. Such is the case with Runway 2-20 at ODO, which is funded by Ector County. As part of this study, an analysis of the

[21] FAA AIP Handbook, https://www.faa.gov/airports/aip/aip_handbook/?Chapter=Appendix#PG02

necessity of maintaining an additional runway has been included. Each of the runways was examined in relation to one another to determine the combined crosswind coverage of a two-runway system. **Exhibit 26** details the results of this analysis for all weather and IFR conditions. Based on these findings, the preferred combination is Runway 11-29 and Runway 2-20, which offers a combined wind coverage of 96.37 percent in 10.5-knot crosswind conditions and greater than 99 percent coverage for 13-knot and higher conditions. Other considerations, such as local land uses and constraining factors, could influence which runway is best served as the crosswind as well. Alternatives in the next section will include options to maintain the three-runway system currently available or to decommission one of the runways.

RUNWAYS 11/29 & 2/20									
ALL WEATHER WIND COVERAGE					IFR WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots	Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 11-29	77.51%	87.44%	95.67%	98.94%	Runway 11-29	71.61%	81.90%	92.39%	97.43%
Runway 2-20	87.00%	93.43%	97.86%	99.44%	Runway 2-20	92.18%	95.87%	98.22%	99.24%
All Runways	96.37%	99.02%	99.82%	99.98%	All Runways	97.13%	98.98%	99.62%	99.92%

RUNWAYS 11/29 & 16/34									
ALL WEATHER WIND COVERAGE					IFR WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots	Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 11-29	77.51%	87.44%	95.67%	98.94%	Runway 11-29	71.61%	81.90%	92.39%	97.43%
Runway 16-34	86.87%	92.30%	97.06%	99.13%	Runway 16-34	78.84%	87.43%	95.26%	98.63%
All Runways	91.83%	96.18%	98.69%	99.79%	All Runways	83.63%	91.67%	96.88%	99.47%

RUNWAYS 16/34 & 2/20									
ALL WEATHER WIND COVERAGE					IFR WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots	Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 16-34	86.87%	92.30%	97.06%	99.13%	Runway 16-34	78.84%	87.43%	95.26%	98.63%
Runway 2-20	87.00%	93.43%	97.86%	99.44%	Runway 2-20	92.18%	95.87%	98.22%	99.24%
All Runways	95.25%	97.85%	99.21%	99.76%	All Runways	95.77%	98.21%	99.17%	99.61%

Exhibit 26 – Dual Runway Wind Coverage

RUNWAY LENGTH REQUIREMENTS

AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. The determination of runway length requirements for the airport is based on five primary factors:

- Mean maximum temperature of hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)

The mean maximum daily temperature of the hottest month for ODO is 95.3 degrees Fahrenheit (F), which occurs in July. The airport elevation is 3,004 feet mean sea level (MSL). The longest runway, Runway 11-29, has a gradient of 0.10 percent, which conforms to FAA design standards for gradient.
Airplanes operate on a wide variety of available runway lengths. Many factors will govern the sustainability of runway lengths for aircraft, such as elevation, temperature, wind, aircraft weight, wing flap settings,

runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures. Airport operators can pursue policies that maximize the sustainability of the runway length. Policies such as area zoning and height and hazard restricting can protect an airport's runway length. Airport ownership (fee simple easement) of land leading to the runway ends reduces the possibility of natural growth or man-made obstructions. Planning of runways should include an evaluation of aircraft types expected to use the airport now and in the future. Future planning should be realistic and supported by the FAA-approved forecasts and should be based on the critical aircraft (or family of aircraft).

General Aviation Aircraft

Most operations occurring at ODO are conducted using smaller GA aircraft weighing less than 12,500 pounds. Following guidance from AC 150/ 5325-4B, to accommodate 95 percent of these small aircraft with less than 10 passenger seats, a runway length of 4,600 feet is recommended. For 100 percent of these small aircraft, a runway length of 5,000 feet is recommended. For small aircraft with 10 or more passenger seats, 5,000 feet of runway length is recommended.

The airport is also utilized by aircraft weighing more than 12,500 pounds, including small- to medium-sized business jet aircraft. Runway length requirements for business jets weighing less than 60,000 pounds have also been calculated. These calculations take into consideration the runway gradient and landing length requirements for contaminated runways (wet). Business jets tend to need greater runway length when landing on a wet surface because of their increased approach speeds. AC 150/5325-4B stipulates that runway length determination for business jets consider a grouping of airplanes with similar operating characteristics. The AC provides two separate "family groupings of airplanes," each based upon their representative percentage of aircraft in the national fleet. The first grouping is those business jets that make up 75 percent of the national fleet, and the second group is those making up 100 percent of the national fleet. **Table 26** presents a partial list of common aircraft in each aircraft grouping. A third group considers business jets weighing more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

TABLE 26 | Business Jet Categories for Runway Length Determination

Aircraft	MTOW (lbs.)
75 Percent of the National Fleet	
Lear 35	20,350
Lear 45	20,500
Cessna 550	14,100
Cessna 560XL	20,000
Cessna 650 (VII)	22,000
IAI Westwind	23,500
Beechjet 400	15,800
Falcon 50	18,500
75-100 Percent of the National Fleet	
Lear 55	21,500
Lear 60	23,500
Hawker 800XP	28,000
Hawker 1000	31,000
Cessna 650 (III/IV)	22,000
Cessna 750 (X)	36,100
Challenger 604	47,600
IAI Astra	23,500
Greater than 60,000 Pounds	
Gulfstream II	65,500
Gulfstream IV	73,200
Gulfstream V	90,500
Global Express	98,000
Gulfstream 650	99,600
MTOW: Maximum Takeoff Weight	

Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*

Table 27 presents the results of the runway length analysis for business jets developed following the guidance provided in AC 150/5325-4B. To accommodate 75 percent of the business jet fleet at 60 percent useful load, a runway length of 5,800 feet is recommended. This length is derived from a raw length of 5,727 feet that is adjusted, as recommended, for runway gradient and consideration of landing length needs on a contaminated runway (wet and slippery). To accommodate 100 percent of the business jet fleet at 60 percent useful load, a runway length of 7,600 feet is recommended.

TABLE 27 | Runway Length Requirements

Fleet Mix Category	TAKEOFF LENGTHS		LANDING LENGTHS	Final Runway Length
	Raw Runway Length from FAA AC	Runway Length with Gradient Adjustment (+360’)	Wet Surface Landing Length for Jets (+15%)*	
75% of fleet at 60% useful load	5,727	5,787	5,500	5,800
100% of fleet at 60% useful load	7,475	7,535	5,500	7,600
75% of fleet at 90% useful load	8,606	8,666	7,000	8,700
100% of fleet at 90% useful load	8,606	8,666	7,000	8,700
*Max 5,500’ for 60% useful load and max 7,000’ for 90% useful load in wet condition.				

Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*

Utilization of the 90 percent category for runway length determination is generally not considered by the FAA unless there is a demonstrated need at an airport. This could be documented activity by a business jet operator that flies out frequently with heavy loads. To accommodate 75 percent of the business jet fleet at 90 percent useful load, a runway length of 8,700 feet is recommended. To accommodate 100 percent of business jets at 90 percent useful load, a runway length of 8,700 feet is recommended.

Another method to determine runway length requirements for aircraft at ODO is to examine aircraft flight planning manuals under conditions specific to the airport. Several aircraft were analyzed for take-off length requirements at a design temperature of 95.3 degrees F at a field elevation of 3,004 feet MSL with a 0.10 percent runway grade. **Table 28** provides a detailed runway length analysis for several of the most common turbine aircraft in the national fleet. This data was obtained from Ultra-Nav software, which computes operational parameters for specific aircraft based on flight manual data. The analysis includes the maximum takeoff weight (MTOW) allowable and the percent useful load from 60 percent to 100 percent.

The analysis shows that the current length of 6,200 feet available on Runway 11-29 is adequate for all but one of the business jets analyzed at 60 percent useful load. At 70 percent useful load, three more aircraft are limited, and progressively more jets become weight-restricted at 80 percent and greater useful loads, with many not capable due to climb limitations at 100 percent useful loads.

TABLE 28 - Business Aircraft Takeoff Length Requirements

		TAKEOFF LENGTH REQUIREMENTS (FEET)				
		Useful Load				
Aircraft Name	**MTOW**	**60%**	**70%**	**80%**	**90%**	**100%**
Pilatus PC-12	9,921	2,521	2,741	2,973	3,217	3,473
King Air C90GTi	10,100	3,000	3,221	3,466	3,710	3,954
King Air 200 GT	12,500	4,099	4,238	4,362	4,475	4,581
Citation CJ3	13,870	3,412	3,678	3,974	4,334	4,735
Citation Sovereign	30,300	3,581	3,844	4,114	4,425	4,789
King Air 350	15,000	4,239	4,406	4,576	4,909	5,282
Gulfstream 450	74,600	5,321	5,874	6,485	7,128	7,872
Lear 40	21,000	5,186	5,811	6,538	7,318	8,113
Falcon 2000	35,800	5,548	6,029	6,557	7,212	8,610
Challenger 604/605	48,200	5,893	6,492	7,193	7,956	8,740
Gulfstream 650	99,600	5,663	6,280	6,960	7,826	8,789
Gulfstream 550	91,000	5,647	6,319	7,272	8,263	9,234
Gulfstream V	90,500	5,257	6,085	6,995	8,104	9,371
Beechjet 400A	16,300	4,752	5,130	5,508	Climb Limited	Climb Limited
Citation II (550)	13,300	3,745	4,179	4,650	5,159	Climb Limited
Citation 560 XLS	20,200	4,016	4,337	4,687	5,063	Climb Limited
Citation X	35,700	5,324	5,853	6,438	Climb Limited	Climb Limited
Citation III	21,500	5,067	5,601	Climb Limited	Climb Limited	Climb Limited
Citation (525) CJ1	10,600	4,228	4,681	5,141	Climb Limited	Climb Limited
Citation (525A) CJ2	12,375	3,723	4,024	4,351	4,708	Climb Limited
Lear 60	23,500	6,263	6,854	7,521	8,425	Climb Limited

Green figures are less than or equal to the longest runway length available at ODO; orange figures are greater than that length (6,200')
'Climb Limited' indicates the input data is outside the operating limits of the aircraft planning manual.
MTOW - Maximum Takeoff Weight

Source: Ultranav software

Table 29 presents the runway length required for landing under three operational categories: Title 14 Code of Federal Regulations (CFR) Part 25, CFR Part 135, and CFR Part 91k. CFR Part 25 operations are those conducted by individuals or companies which own their aircraft. CFR Part 135 applies to all for-hire charter operations, including most fractional ownership operations. CFR Part 91k includes operations in fractional ownership which utilize their own aircraft under direction of pilots specifically assigned to said aircraft. Part 91k and Part 135 rules regarding landing operations require operators to land at the destination airport within 60 percent of the effective runway length. An additional rule allows for operators to land within 80 percent of the effective runway length if the operator has an approved destination airport analysis in the airport's program operating manual. The landing length analysis conducted accounts for both scenarios.

The landing length analysis shows that all Part 25 and Part 91k operations, as well as most aircraft operating under Part 135, can land on the available runway length at ODO during dry runway conditions. During wet or contaminated runway conditions, Part 25 operations can land on Runway 11-29; however, fewer aircraft are able to meet the landing length requirements under Part 91k and Part 135.

TABLE 29 | Turbine Aircraft Landing Length Requirements

Aircraft Name	MLW	LANDING LENGTH REQUIREMENTS (FEET)					
		Dry Runway Condition			Wet Runway Condition		
		Part 25	80% Rule	60% Rule	Part 25	80% Rule	60% Rule
King Air 350	15,000	2,974	3,718	4,957	3,420	4,275	5,700
Gulfstream V	75,300	2,979	3,724	4,965	3,426	4,283	5,710
Falcon 2000	33,000	3,325	4,156	5,542	3,824	4,780	6,373
Citation Sovereign	27,100	2,989	3,736	4,982	3,833	4,791	6,388
Lear 40	19,200	3,079	3,849	5,132	3,967	4,959	6,612
Citation (525) CJ1	9,800	3,104	3,880	5,173	4,205	5,256	7,008
Citation CJ3	12,750	3,191	3,989	5,318	4,338	5,423	7,230
Citation III	19,000	3,208	4,010	5,347	4,559	5,699	7,598
Challenger 604/605	38,000	3,017	3,771	5,028	4,781	5,976	7,968
Citation (525A) CJ2	11,500	3,362	4,203	5,603	4,852	6,065	8,087
Gulfstream 550	75,300	2,958	3,698	4,930	5,400	6,750	9,000
Gulfstream 650	83,500	4,130	5,163	6,883	5,503	6,879	9,172
Citation 560 XLS	18,700	3,632	4,540	6,053	5,770	7,213	9,617
Citation X	31,800	4,109	5,136	6,848	5,851	7,314	9,752
Gulfstream 450	66,000	3,472	4,340	5,787	6,063	7,579	10,105
Beechjet 400A	15,700	No Data	No Data	No Data	No Data	No Data	No Data
King Air C90GTi	9,600	1,653	2,066	2,755	No Data	No Data	No Data
Citation II (550)	12,700	2,783	3,479	4,638	No Data	No Data	No Data
King Air 200 GT	12,500	1,330	1,663	2,217	No Data	No Data	No Data
Pilatus PC-12	9,921	2,483	3,104	4,138	No Data	No Data	No Data

Green figures are less than or equal to the longest runway length available at ODO; orange figures are greater than that length (6,200')
MLW – Maximum Landing Weight
N/A – Not Applicable. Turboprop aircraft landing lengths are not adjusted for wet runway conditions.

Source: Ultranav software

Runway Length Summary

Many factors are considered when determining appropriate runway length for safe and efficient operations of aircraft at ODO. The airport should strive to accommodate business jets and turboprop aircraft to the greatest extent possible as demand would dictate. Runway 11-29 is the longest runway available at 6,200 feet, and it can accommodate many of these aircraft under moderate loading conditions, even during hot temperatures and at high percentage useful loads. At near maximum takeoff weights (MTOWs), some aircraft do have runway length requirements that exceed the available length on Runway 11-29, and many are climb limited.

Justification for any runway extension to meet the needs of turbine aircraft would require regular use on the order of 500 annual itinerant operations. This is the minimum threshold required to obtain FAA grant funding assistance. The existing critical aircraft, the King Air 200/300/350, can operate at 100 percent useful load. The ultimate critical aircraft, the Gulfstream V, requires a longer runway than what is currently available when operating at 80 percent and greater useful loads. While the majority of the business jets analyzed can operate on the existing runway length with up to 80 percent useful loads, it is important to plan for the eventuality of larger C/D aircraft operating more frequently at ODO. As such, alternatives in the next section will evaluate options for extending the primary runway up to 7,000 feet.

RUNWAY WIDTH

Runway width design standards are based primarily on the airport's critical aircraft but can also be influenced by the visibility minimums of published instrument approach procedures. At 100 feet wide, Runway 11-29 exceeds existing B-II-4000 design standards which call for a runway width of 75 feet. Runways 2-20 and 16-34 are both 75 feet wide, which meets the existing design standards for these runways. In the ultimate condition of C-III-2400 for the primary runway, the standard runway width increases to 100 feet. As such, the primary runway should be planned at 100 feet wide, with the crosswind and/or additional runway planned at 75 feet wide.

RUNWAY PAVEMENT STRENGTH

Airport pavements must be able to withstand repeated operations by aircraft of significant weight; therefore, the strength rating of a runway is an important consideration in facility planning. While runways are assigned a specific strength rating, it does not preclude aircraft weighing more than the published strength rating from using the runway. All federally obligated airports must remain open to the public, and it is typically up to the pilot of the aircraft to determine if a runway can support their aircraft safely. An airport sponsor cannot restrict an aircraft from using the runway simply because its weight exceeds the published strength rating. On the other hand, the airport sponsor has an obligation to properly maintain the runway and protect the useful life of the runway, typically for 20 years. According to the FAA publication, *Airport/Facility Directory*, "Runway strength rating is not intended as a maximum allowable weight or as an operating limitation. Many airport pavements are capable of supporting limited operations with gross weights in excess of the published figures." The directory goes on to say that those aircraft exceeding the pavement strength should contact the airport sponsor for permission to operate at the airport.

The current runway strength rating on Runway 11-29 is reported at 30,000 pounds SWL, which is adequate to accommodate the majority of aircraft that currently operate at the airport. However, as detailed in the TFMSC (see **Exhibit 24**), the airport is also used by larger, heavier aircraft that have MTOWs of greater than 30,000 pounds. For example, the Challenger 600/604, a C-II aircraft, has an MTOW of 48,200 pounds with dual-wheel main landing gear, while the ultimate critical aircraft (Gulfstream V) has an MTOW of 90,500 pounds DWL. Runways 2-20 and 16-34 both have reported pavement strengths of 14,000 pounds SWL. The King Air 350, which has been identified as the existing critical aircraft for these runways, has an MTOW of 15,000 pounds on dual-wheel main landing gear.

Consideration should be given to strengthening the primary runway to 100,000 pounds DWL by the long term to better accommodate heavier aircraft. Consideration should also be given to increasing the pavement strength on the crosswind and/or additional runway to 30,000 pounds DWL to accommodate a wider range of B-II aircraft.

RUNWAY LINE-OF-SIGHT AND GRADIENT

The FAA has instituted various line-of-sight requirements to facilitate coordination among aircraft and between aircraft and vehicles that are operating on active runways. This allows departing and arriving aircraft to verify the location and actions of other aircraft and vehicles on the ground that could create a conflict.

Line-of-sight standards for an individual runway are based on whether or not there is a parallel taxiway available. When a full-length parallel taxiway is available, thus facilitating faster runway exit times, then any point five feet above the runway centerline must be mutually visible with any other point five feet above the runway centerline that is located at less than half the length of the runway. All runways meet the line-of-sight standard.

The surface gradient of a runway affects aircraft performance and pilot perception. The surface gradient is the maximum allowable slope for a runway. For runways designated for approach categories A and B, the maximum longitudinal grade is 2.0 percent. The maximum longitudinal grade for runways in approach category C, D, and E is 1.5 percent; however, longitudinal grades exceeding 0.8 percent are not acceptable within the lesser of the following criteria:

- In the first and last quarter of the runway length; or
- The first and last 2,500 feet of the runway length.

At ODO, each runway meets the longitudinal gradient standard for approach category B. However, when evaluating a scenario in which one of the runways transitions to aircraft design group C, stricter gradient standards will apply, particularly for the runway ends. Using survey data collected from the United States Geological Survey (USGS),[22] the following calculations were conducted.

- Runway 11 – When measuring 1,550 feet from the Runway 11 end, there is a gradient of 0.15 percent, which meets the standard for category C.
- Runway 29 – When measuring 1,550 feet from the Runway 29 end, there is a gradient of 0.01 percent, which meets the standard for category C.
- Runway 2 – When measuring 1,425.75 feet from the Runway 2 end, there is a gradient of 0.47 percent, which meets the standard for category C.
- Runway 20 – When measuring 1,425.75 feet from the Runway 20 end, there is a gradient of 1.28 percent, which exceeds the standard for category C.
- Runway 16 – When measuring 1,250.75 feet from the Runway 16 end, there is a gradient of 0.79 percent, which meets the standard for category C.
- Runway 34 – When measuring 1,250.75 feet from the Runway 34 end, there is a gradient of 0.50 percent, which meets the standard for category C.

At 1.28 percent, the last quarter of Runway 2-20 (measuring in from the Runway 20 end) exceeds the allowable grade in a group C environment. This is the only runway that does not meet the standard for aircraft design group C. In order to meet gradient standards on Runway 20, this runway end would need to be lowered by approximately seven feet.

[22] Lidar data from USGS was analyzed to determine ground elevation along each runway, with a variance allowance of one meter. An 18b ground survey should be conducted to more accurately determine longitudinal gradient for the runway.

SEPARATION STANDARDS

Runway/Taxiway Separation

The design standard for the separation between runways and parallel taxiways is a function of the critical aircraft and the instrument approach visibility minimum. The separation standard for all runways in the existing condition is 240 feet from the runway centerline to the parallel taxiway centerline. Partial parallel Taxiway G, which serves Runway 11-29, is separated from the runway by 400 feet. Taxiway D, where it extends parallel to Runway 2-20, has a separation of 300 feet, as does Taxiway G where it is parallel to Runway 16-34. This additional separation above the standard 240 feet provides an additional safety margin for pilots and aircraft, and these taxiways should be maintained in their existing locations.

In the ultimate C-III-2400 condition, the separation standard increases to 400 feet from the primary runway centerline to a parallel taxiway. The separation standard for parallel taxiways serving the ultimate crosswind and/or additional runway remains at 240 feet. The alternatives in the next section will examine various options to ensure the standard runway-taxiway separation is met for the primary runway.

Holding Position Separation

Holding position markings are placed on taxiways leading to runways. When approaching the runway, pilots should stop short of the holding position marking line. FAA design standards call for hold lines to be 200 feet from runway centerline for B-II runways with approach minimums no lower than ¾-mile, and 250 feet from runway centerline for C-III runways with approach minimums lower than ¾-mile. The FAA also recommends that hold lines be parallel with the runway so that a pilot is fully perpendicular to the runway with a clear, unobstructed view of the entire runway length. If a 90-degree angle intersection with the runway is not practicable, a +/- 15-degree margin is allowable.

At ODO, all hold lines leading to Runway 11-29 are 250 feet from the runway centerline and are perpendicular to the runway, meeting FAA design standards. Hold lines serving Runway 2-20 are at least 200 feet from the runway centerline and are perpendicular, with the exception of the markings on Taxiway G where it crosses Runway 2-20. These holding position markings are approximately 300 feet from the centerline and are outside the allowable margin for intersection angles. Similarly, taxiways leading to Runway 16-34 are marked with hold lines that meet the separation standard of 200 feet and are positioned 90 degrees from the runway centerline, except for those on Taxiway C. These markings are located approximately 280 feet from centerline but fall outside the allowable +/- 15-degree margin. The next section, Alternatives, will consider various options to correct nonstandard conditions as they pertain to taxiways in the ultimate condition.

Aircraft Parking Area Separation

According to FAA AC 150/5300-13B, aircraft parking positions should be located to ensure that aircraft components (wings, tail, and fuselage) do not:

1. Conflict with the object free area for adjacent runway or taxiways:
   a. Runway Object Free Area (ROFA)
   b. Taxiway Object Free Area (TOFA)
   c. Taxilane Object Free Area (TLOFA)

2. Violate any of the following aeronautical surfaces and areas:
   a. Runway approach or departure surface
   b. Runway Visibility Zone (RVZ)
   c. Runway Obstacle Free Zone (ROFZ)
   d. Navigational aid equipment critical areas

Marked aircraft parking positions at ODO are located on the north ramp, the south ramp, and the south T-hangar ramp. Aircraft parking also occurs on the FBO/terminal ramp, though there are no marked positions. **Exhibit 27** depicts these areas, along with the existing ROFA, TOFA, and TLOFA (TOFA and TLOFA standards are described in greater detail in the next section). While marked parking is not included on the FBO/terminal ramp, any aircraft parked within the orange or pink shaded areas would become obstructions. On the north ramp, the pavement has deteriorated and several of the marked parking areas are no longer visible; those that are visible are clear of the TOFA and TLOFA. The south ramp and south T-hangar ramp do contain marked aircraft parking positions that are located within either the TOFA or the TLOFA, indicated in red on the exhibit. The parking positions should be removed/relocated so that parked aircraft do not obstruct these safety areas. Additionally, a portion of a T-hangar located on the south ramp is located within the TLOFA, and the taxilane centerline marking should be relocated so that this safety area is not obstructed by the hangar.

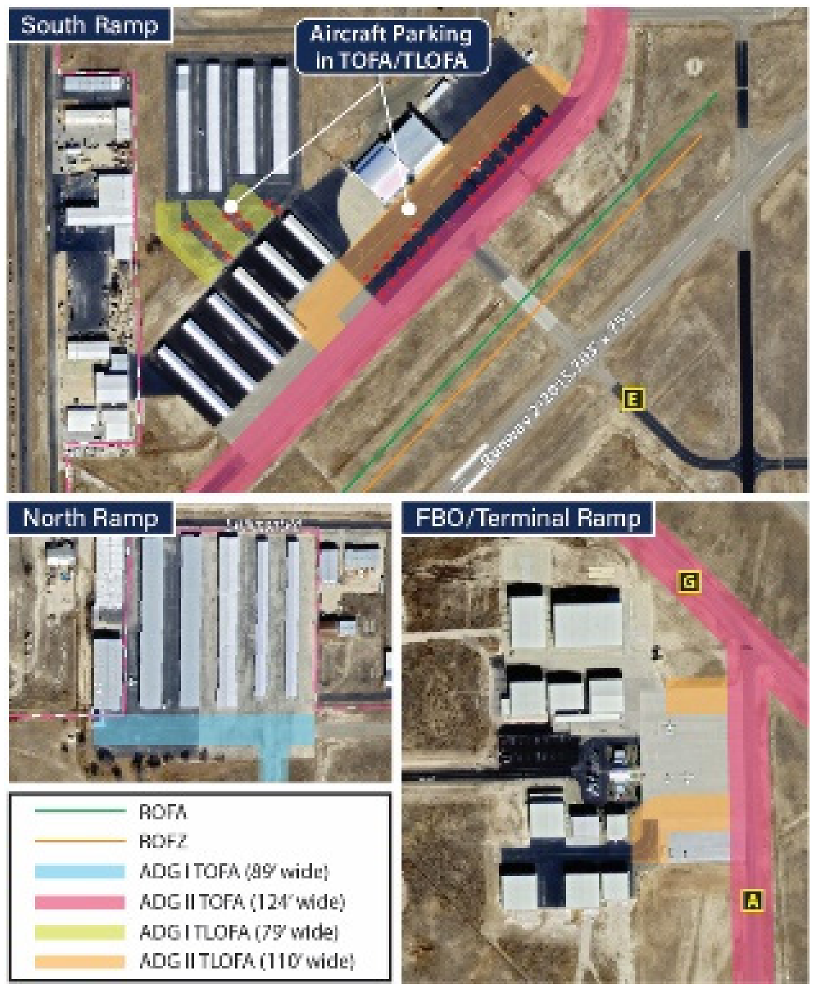


Exhibit 27 – Aircraft Parking Separation

TAXIWAYS

The design standards associated with taxiways are determined by the Taxiway Design Group (TDG) or the ADG of the critical design aircraft. As determined previously, the applicable ADG for all runways at ODO is ADG II at present, with an anticipated shift to ADG III in the ultimate condition. **Table 30** presents the various taxiway design standards related to ADG II and III. The table also shows those taxiway design standards related to TDG. The TDG standards are based on the Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiway and taxilane pavements can and should be planned to the most appropriate TDG design standards based on usage.

TABLE 30 | Taxiway Dimensions and Standards

STANDARDS BASED ON WINGSPAN	***ADG II***	***ADG III***
Taxiway and Taxilane Protection		
Taxiway Safety Area width (TSA)	79’	118’
Taxiway Object Free Area width (TOFA)	124’	171’
Taxilane Object Free Area width (TLOFA)	110’	158’
Taxiway and Taxilane Separation		
Taxiway Centerline to Parallel Taxiway Centerline	102’	144’
Taxiway Centerline to Fixed or Moveable Object	62’	85.5’
Taxilane Centerline to Parallel Taxilane Centerline	94’	138’
Taxilane Centerline to Fixed or Moveable Object	55’	79’
Wingtip Clearance		
Taxiway Wingtip Clearance (feet)	23’	27’
Taxilane Wingtip Clearance (feet)	16’	20’
STANDARDS BASED ON TDG	***TDG 1A/1B***	***TDG 2A/2B***
Taxiway Width Standard	25’	35’
Taxiway Edge Safety Margin	5’	7.5’
Taxiway Shoulder Width	10’	15’
ADG: Airplane Design Group | TDG: Taxiway Design Group | Note: All dimensions in feet		

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

The current design for taxiways serving all runways is TDG 2A, based upon the Beechcraft King Air 200/300/350, which dictates a width of 35 feet. The entire taxiway system at ODO is at least 35 feet wide. Certain portions of the landside area that are utilized exclusively by small aircraft, such as the T-hangar areas, should adhere to TDG 1A/1B standards.

All taxiway widths on the airfield should at least be maintained unless financial constraints dictate. As such, the width could remain until such time as rehabilitation is needed and financial resources to support such are not available. FAA grant availability can only be provided if the project meets eligibility thresholds as determined by the FAA.

At ODO, the existing TOFA for taxiways serving each of the runways is 124 feet wide, with an increase to 171 feet wide when the airport transitions to C-III. The TLOFA varies depending on the type of aircraft using the taxilane. Both the TOFA and the TLOFA should be cleared of objects except for those needed for air navigation or aircraft ground maneuvering purposes. The TOFAs associated with the airfield taxiways are clear of obstructions; however, as mentioned previously, several of the aircraft parking positions on the south ramp and south T-hangar ramp are located within a TOFA or TLOFA.

Taxiway and Taxilane Design Considerations

FAA AC 150/5300-13B, *Airport Design*, provides guidance on recommended taxiway and taxilane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft." The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation included in the current AC, as well as previous FAA safety and design recommendations.

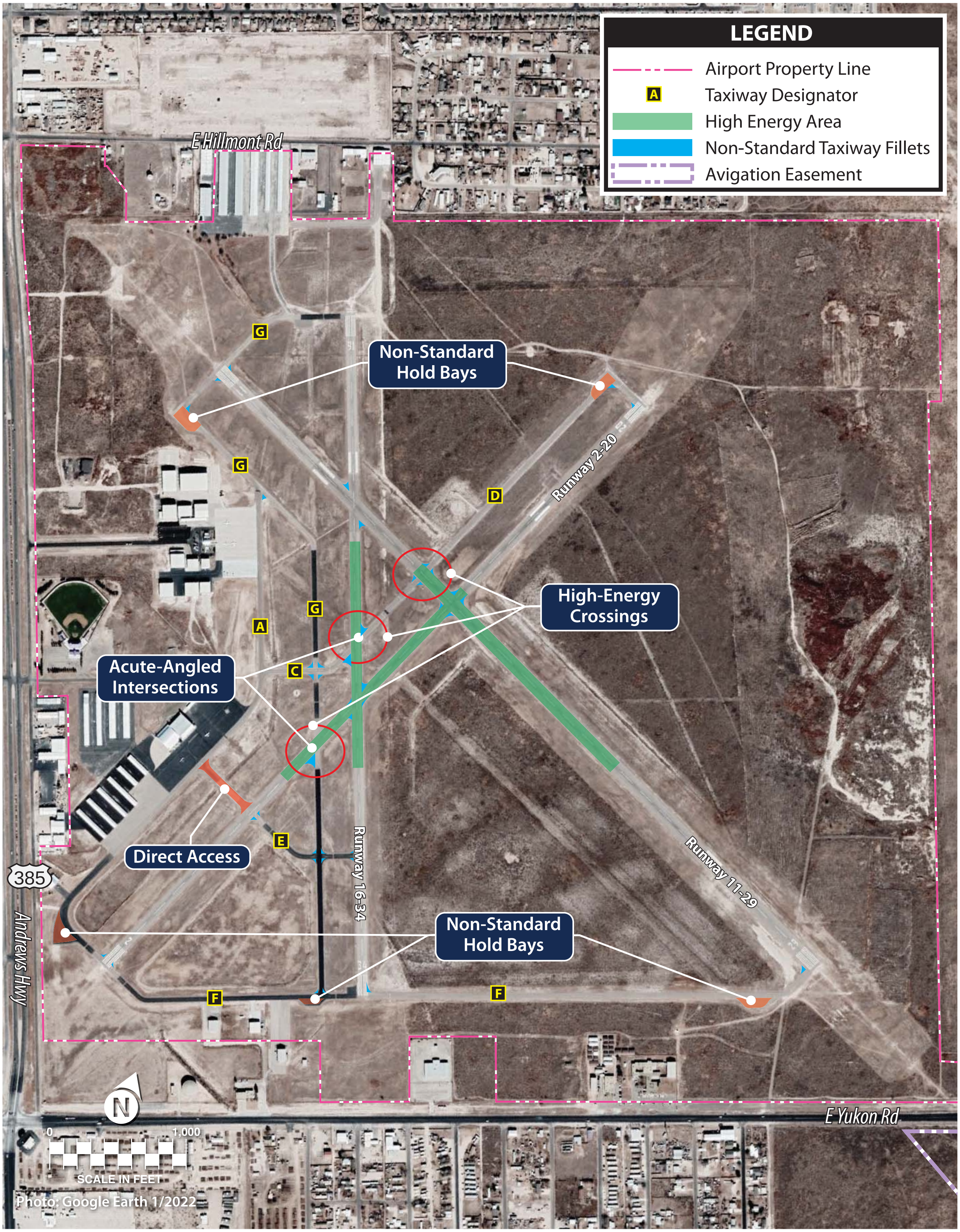
1. **Taxiing Method**: Taxiways are designed for "cockpit over centerline" taxiing with pavement being sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate "judgmental oversteering," which is where the pilot must intentionally steer the cockpit outside the marked centerline in order to assure the aircraft remains on the taxiway pavement.
2. **Curve Design**: Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.
3. **Three-Path Concept**: To maintain pilot situational awareness, taxiway intersections should provide a pilot with a maximum of three choices of travel. Ideally, these are right, left, and a continuation straight ahead.
4. **Channelized Taxiing**: To support visibility of airfield signage, taxiway intersections should be designed to meet standard taxiway width and fillet geometry.
5. **Designated Hot Spots and Runway Incursion Mitigation (RIM) Locations**: A hot spot is a location on the airfield with elevated risk of a collision or runway incursion. For areas the FAA designates as a hot spot or RIM location, mitigation measures should be prioritized.
6. **Intersection Angles**: Design turns to be 90 degrees wherever possible. For acute-angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.
7. **Runway Incursions**: Design taxiways to reduce the probability of runway incursions.
   - *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiway systems simple using the "three-path" concept.
   - *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
   - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold – through simple reduction in the number of occurrences, and through a reduction in air traffic controller workload.
   - *Avoid "High Energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
   - *Increase Visibility*: Right-angle intersections, both between taxiways and runways, provide the best visibility. Acute-angle runway exits provide greater efficiency in runway usage but should not be used as runway entrance or crossing points. A right-angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.

- *Avoid "Dual Purpose" Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.
- *Direct Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
- *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other hot spots should be corrected as soon as practicable.

8. **Runway/Taxiway Intersections**
    - *Right Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for an acute-angled exit. Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs, so they are visible to pilots.
    - *Acute Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage. The construction of high-speed exits is typically only justified for runways with regular use by jet aircraft in approach categories C and above.
    - *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.
9. **Taxiway/Runway/Apron Incursion Prevention**: Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways at mid-span should be avoided.
    - *Wide Throat Taxiways*: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and make lighting and marking more difficult.
    - *Direct Access from Apron to a Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout or no-taxi island that forces pilots to make a conscious decision to turn.
    - *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

The taxiway system at ODO generally provides for the efficient movement of aircraft, and there are no FAA-designated hot spots at the airport. However, there are several non-standard taxiway geometry conditions, as detailed on **Exhibit 28**, including:

- Taxiway E provides direct access to Runway 2-20 from the south ramp.
- Taxiway D crosses Runways 11-29 and 16-34 in their high-energy areas, as does Taxiway G where it crosses Runway 2-20.
- Taxiway G has an acute-angled intersection with Runway 2-20, and Taxiway C with Runway 16-34. These intersections are outside the +/- 15-degree margin discussed previously.


LEGEND
Airport Property Line
Taxiway Designator
High Energy Area
Non-Standard Taxiway Fillets
Avigation Easement
E Hillmont Rd
Non-Standard Hold Bays
Runway 2-20
High-Energy Crossings
Acute-Angled Intersections
Direct Access
Runway 16-34
Runway 11-29
Non-Standard Hold Bays
385
Andrews Hwy
E Yukon Rd
0
1,000
SCALE IN FEET
Photo: Google Earth 1/2022
N
A
C
D
E
F
G

- The holding bays serving each runway end are non-standard. The FAA now considers these designs to be wide expanses of pavement and has set new standards for holding bay design.
- Taxiway fillet geometry is non-standard. Taxiway fillets are areas of additional pavement designed to maintain the taxiway edge safety margin (TESM) and serve to widen taxiways at the inside of turns. This increases the safety margin for taxiing aircraft when pilots are navigating turns.

In the alternatives chapter, potential solutions to these non-standard conditions will be presented. Analysis in the next chapter will also consider improvements which could be implemented on the airfield to minimize runway incursion potential, improve efficiency, and conform to FAA standards for taxiway design.

NAVIGATIONAL AND APPROACH AIDS

Navigational aids are devices that provide pilots with guidance and position information when utilizing the runway system. Electronic and visual guidance to arriving aircraft enhance the safety and capacity of the airfield. Such facilities are vital to the success of an airport and provide additional safety to pilots and passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by pilots conducting flight training and operating larger aircraft when visibility is good.

Instrument Approach Aids

ODO has three published instrument approach procedures and a circling VOR-A approach. Runway 11-29 has non-precision LPV (GPS) approaches to both ends that provide visibility minimums down to ¾-mile. In support of the ¾-mile LPV approach, both ends of Runway 11-29 are equipped with a medium intensity approach lighting system (MALS) that enhances safety at the airport, especially during inclement weather or nighttime activity. Runway 20 offers an LNAV (GPS) approach with visibility minimums down to 1-mile. Runway 2 and Runway 16-34 are visual runways with no instrument approach capability.

Analysis in the next chapter will consider improvements necessary for enhancing instrument approach capabilities at the airport, with the primary runway proposed to offer visibility minimums down to ½-mile. In order to achieve a ½-mile LPV approach, a MALSR, which is a MALS that includes runway alignment indicator lights, is necessary. As mentioned in the Runway Protection Zone section, lower approach minimums can increase the size of the RPZ, thereby causing new incompatible land uses to be introduced. The alternatives in the next section will evaluate various options for mitigating incompatible land uses in the RPZ(s) associated with the proposed lower approach minimums.

Visual Approach Aids

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. All runway ends at ODO are equipped with visual approach aids that provide pilots with an indication of being above, below, or on the correct descent glidepath. These systems include PAPI-4s on Runway 11-29, PAPI-2s on Runway 16-34, and VASIs on Runway 2-20. In the ultimate condition, PAPI-4s should be provided on the primary runway, and the crosswind and/or additional runway should be equipped with PAPI-2s.

Runway end identification lights (REILs) are flashing lights located at the runway threshold that facilitate rapid identification of the runway end at night and during poor visibility conditions. REILs provide pilots with the ability to identify the runway threshold and distinguish runway end lighting from other lighting on the airport and in the approach areas. None of the runways are equipped with REILs. Consideration should be given to installing REILs on any runway end that is not equipped with a more sophisticated approach light system (i.e., MALS, MALSR).

As mentioned, a medium-intensity approach lighting system (MALSR) is recommended for a ½-mile LPV (GPS) approach. MALSRs consist of a combination of steady burning light bars and flashers that provide pilots with visual information on runway alignment, height perception, roll guidance, and horizontal references to support the visual portion of an instrument approach. The Alternatives section will depict options for installing a MALSR on any runway end providing a ½-mile approach.

Airfield Marking, Lighting, and Signage

All three runways have non-precision markings, which is consistent with the available instrument approach capabilities of the runway system. If and when the airport is provided with visibility minimums lower than ¾-mile, the runway end offering the improved approach would need to be equipped with precision markings with the addition of touchdown zone markings. Current runway markings should be maintained until such time that a ½-mile approach is implemented.

Runway and taxiway lighting systems serve as the primary means of navigation in reduced visibility and nighttime operations. Currently, all runways are equipped with MIRL, a common runway lighting system that can be activated via a pilot-controlled system. This system should be maintained through the planning period. The taxiways are equipped with green taxiway centerline reflectors. Consideration should be given to upgrading to medium intensity taxiway lighting (MITL) on all taxiways.

Airfield signage serves as another means of navigation for pilots. Airfield signage informs pilots of their location on the airport, as well as directs them to major airport facilities, such as runways, taxiways, and aprons. Lighted location and directional signs are installed on the airfield. This system is adequate and should be maintained through the planning period.

Weather Facilities

ODO is equipped with a lighted wind cone and segmented circle located near the intersection of Runway 11-29 and Taxiway D. The wind cone provides pilots with information about wind conditions, while the segmented circle provides traffic pattern information to pilots. Supplemental wind cones are located at the ends of Runways 2, 20, 16, and 34 and on top of a T-hangar on the south ramp. As mentioned previously, the wind cones situated near the runway ends are located inside the ROFA/ROFZ in the existing and ultimate conditions and should be relocated outside these safety areas.

The airfield is also equipped with an ASOS, located between the Runway 16 and 20 ends. The ASOS transmits on-site weather condition information to pilots and should be maintained in its existing location throughout the planning horizon.

Airside facility requirements are summarized on **Exhibit 29**.

LANDSIDE FACILITY REQUIREMENTS

Elements included within this section include general aviation terminal facilities, aircraft hangars and tiedowns, aircraft parking aprons, automobile parking, and airport support facilities.

TERMINAL BUILDING REQUIREMENTS

The terminal facilities provide space for a variety of activities and pilot services. Existing GA terminal facilities at ODO are contained in a 4,100-square-foot (sf) building, which houses a lobby, pilots' lounge and snooze room, flight planning room, conference room, offices, kitchen, and restrooms.

The number of itinerant passengers expected to use terminal services during the design hour are taken into consideration to estimate terminal facility needs. These requirements are based upon a range of designated square feet per design hour passenger, which is typically between 90 and 125 sf. For this study, a planning standard of 100 sf was used to estimate the space required. To determine the number of design hour passengers, the number of itinerant design hour operations is multiplied by the number of passengers expected on the aircraft. Design hour itinerant operations have been estimated at 15 percent of the design day itinerant operations occurring at the airport. As most of the aircraft operating at the airport allow for multiple passengers, a multiplier of 3.0 was established for the short-term, growing to 5.0 by the long-term. This is a reasonable multiplier as the airport regularly accommodates itinerant operations, including air taxi, by aircraft with seating capacities of four to 10 passengers – a trend which is expected to continue throughout the planning period.

Table 31 details current and projected terminal building requirements over the planning period. As can be seen, in terms of size, the existing terminal facility is adequate to accommodate airport users through the intermediate term. However, by the end of the long-term planning horizon, an additional 600 sf of space may be required.

TABLE 31 | GA Terminal Services Requirements

	Available	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Operations	6	7	8	9
Multiplier		3.0	3.5	5.0
Design Hour Itinerant Passengers		22	28	47
Total Building Space (sf)	**4,100**	**2,200**	**2,800**	**4,700**

Source: Coffman Associates analysis

EXISTING	SHORT-TERM	LONG-TERM
Primary Runway		
B-II-4000	C-III-2400	C-III-2400
6,200' x 100'	6,500' x 100'	7,000' x 100'
30,000 lbs SWL	Increase to 50,000 lbs DWL	Increase to 100,000 lbs DWL
Standard RSA, ROFA, ROFZ	Maintain	Maintain
Portions of both RPZs uncontrolled and contain incompatibilities	Acquire avigation easements; consider corrective measures for incompatibilites	Maintain corrected condition
Crosswind Runway		
B-II-5000	B-II-5000	B-II-5000
5,703' x 75'	Maintain	Maintain
14,000 lbs SWL	Increase to 30,000 lbs DWL	Maintain
Standard RSA; wind cones in ROFA/ROFZ	Maintain RSA; relocate wind cones	Maintain corrected condition
Portions of both RPZs uncontrolled and contain incompatibilities	Acquire avigation easements; consider corrective measures for incompatibilites	Maintain corrected condition
Additional Runway (Not Eligible for Funding)		
B-II-VIS	Consider runway closure or maintain at B-II-5000	Consider runway closure or maintain at B-II-5000
5,003' x 75'	Maintain if runway remains	Maintain if runway remains
14,000 lbs SWL	Increase to 30,000 lbs DWL if runway remains	Maintain
Standard RSA; wind cones in ROFA/ROFZ	Remove wind cones	N/A
Portions of both RPZs uncontrolled and contain incompatibilities	Acquire avigation easements; consider corrective measures if runway remains	Maintain corrected condition if runway remains
Taxiways		
All taxiways at least 35' wide, meeting TDG 2A standards	Maintain	Maintain
Standard runway/taxiway separation	Maintain	Maintain
TOFA/TLOFA obstructions on the south ramp and south T-hangar ramp	Consider corrective measures	Maintain corrected condition
Direct access from south ramp to Runway 2-20 via Taxiway E	Consider corrective measures	Maintain corrected condition
High-energy crossings	Consider corrective measures	Maintain corrected condition
Acute-angled runway/taxiway intersections	Consider corrective measures	Maintain corrected condition
Non-standard holding bays on each runway end	Consider corrective measures	Maintain corrected condition
Non-standard taxiway fillet geometry	Consider corrective measures	Maintain corrected condition
Navigational and Approach Aids		
LPV GPS (11, 29), RNAV GPS (20), circling VOR	Consider lower minimums on primary runway	Maintain
MALS (11, 29)	Install MALSR on runway with 1/2-mile approach	Maintain
PAPI-4 (11, 29); VASI (2, 20); PAPI-2 (16, 34)	PAPI-4s on primary runway; PAPI-2s on crosswind/additional runway; REILs on any runway without an ALS	Maintain
Lighting, Marking, Signage, and Weather Facilities		
Rotating beacon	Maintain	Maintain
MIRL	Maintain	Maintain
Taxiway Reflectors	Install MITL	Maintain
Non-precision markings	Precision markings on primary runway; maintain other markings	Maintain
Standard holding position markings except on acute-angled taxiways	Maintain standard hold lines; include standard hold lines on new taxiway pavement	Maintain
Lighted airfield and directional signage	Maintain	Maintain
ASOS	Maintain in existing location	Maintain
Lighted wind cone and segemented circle; supplemental wind cones	Relocate supplemental wind cones located in ROFA/ROFZ	Maintain corrected condition

KEY

ALS - Approach Lighting System
ASOS - Automatic Surface Observing System
GPS - Global Positioning System
LPV - Localizer Performance Vertical Guidance
MALSR - Medium Intensity Approach Lighting System with Runway Alignment
MIRL - Medium Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
PAPI - Precision Approach Path Indicator
REILs - Runway End Identifier Lights
RNAV - Area Navigation
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
RSA - Runway Safety Area
SWL - Single Wheel Landing Gear Type
TDG - Taxiway Design Group
TLOFA - Taxilane Object Free Area
TOFA - Taxiway Object Free Area
VASI - Visual Approach Slope Indicator
VIS - Visual
VOR - Very High Frequency Omni-Directional Range

AIRCRAFT STORAGE HANGARS, APRON, AND VEHICLE PARKING REQUIREMENTS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is toward more sophisticated aircraft (and, consequently, more expensive aircraft); therefore, many aircraft owners prefer enclosed hangar space to outside tiedowns.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at the airport in the future. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, actual hangar construction should be based upon actual demand trends and financial investment conditions.

There are a variety of aircraft storage options typically available at an airport, including shade hangars, T-hangars, linear box hangars, executive/box hangars, and bulk storage conventional hangars. Shade hangars are the most basic form of aircraft protection and are common in warmer climates. These structures provide a roof covering, but no walls or doors.

T-hangars are intended to accommodate one small single engine piston aircraft or, in some cases, one multi-engine piston aircraft. T-hangars are so named because they are in the shape of a “T,” providing a space for the aircraft nose and wings, but no space for turning the aircraft within the hangar. Basically, the aircraft can be parked in only one position. T-hangars are commonly “nested” with several individual storage units to maximize hangar space. In these cases, taxiway access is needed on both sides of the nested T-hangar facility. T-hangars are popular with aircraft owners with tighter budgets as they tend to be the least expensive enclosed hangar space to build and lease. There are 15 T-hangars at ODO offering 187 individual units, or approximately 222,100 sf of T-hangar storage space.

Executive hangars are another hangar type commonly used for GA aircraft storage. These hangars provide additional storage space, usually with a footprint between 2,500 and 10,000 sf. Spaces this size allow for increased aircraft maneuverability and can provide for the storage of multiple aircraft within one hangar. Some executive hangars also have space for a small office. There are six executive hangars comprising approximately 37,700 sf of storage space at ODO.

Conventional hangars are the large, clear span hangars typically located facing the main aircraft apron at airports. These hangars provide for bulk aircraft storage and are often utilized by airport businesses, such as an FBO. ODO has eight conventional hangars offering approximately 102,400 sf of storage space. For planning purposes, executive and conventional hangars have been grouped together to develop an overall total for future capacity needs.

Planning for future aircraft storage needs is based on typical owner preferences and standard sizes for hangar space. For determining future aircraft storage needs, a planning standard of 1,200 square feet per single engine piston aircraft and 1,500 sf per multi-engine piston aircraft is utilized for T-hangars. For executive/conventional hangars, a planning standard of 3,000 sf is utilized for turboprop aircraft; 5,000 sf is utilized for business jet aircraft storage needs; and 1,500 sf is utilized for helicopter storage needs. In addition, since portions of executive/conventional hangars are also used for aircraft maintenance and servicing, requirements for service hangar area were estimated using a planning standard of 250 sf.

In total, there is approximately 396,400 sf of aircraft storage capacity at ODO. With 108 aircraft currently based at the facility and more anticipated to base at the airport by the end of the planning period, expansion of hangar facilities should be planned. **Table 32** details the estimated hangar space requirements over the planning period. Over the long-term, an additional 81,800 sf of hangar space is estimated to be needed, with additional capacity needed for each storage type. Options to include these additional facilities will be explored in the next section. Construction of new hangars should be phased to meet existing demand and not tied to a particular date or timeframe. Construction can be undertaken by either the airport sponsor or private developer.

TABLE 32 | Aircraft Storage Requirements

	Current	Short Term	Intermediate Term	Long Term
Based Aircraft	108	116	125	144
T-hangar Units	187	191	196	206
T-hangar Area (sf)	222,100	226,300	231,700	243,100
Executive/Conventional Hangar area (sf)	140,100	152,600	167,100	199,100
Service Hangar Space	34,200	29,000	31,300	36,000
Total Aircraft Storage (sf)	**396,400**	**407,900**	**430,100**	**478,200**

Source: Coffman Associates analysis

Parking apron and parking position requirements have also been calculated. Parking aprons should provide space for locally based aircraft that are not in storage hangars, as well as itinerant aircraft and those that are used for training and air taxi operations. An industry planning standard of 650 square yards (sy) per local aircraft, 800 sy per itinerant aircraft, and 1,600 sy per large turboprop/jet aircraft was applied to determine required aircraft apron space. Aircraft parking position requirements have been calculated at three percent of based aircraft for local operations and 25 percent of busy day itinerant operations for transient GA operations. As jet operations are anticipated to increase over the planning period, there may be demand for more turbine aircraft parking positions.

Table 33 details parking apron and position requirements over the planning period. ODO currently has approximately 57,600 sy of aircraft parking apron available, with 53 marked parking positions. As detailed in the table, additional apron pavement is needed during the short-term, with approximately 32,800 additional sy anticipated to be required by the long-term. Additional marked aircraft parking will also be needed beginning in the short-term, with 54 more aircraft parking positions estimated to be needed over the next 20 years. The alternatives to follow will consider new apron space to meet this projected demand.

TABLE 33 | Aircraft Apron and Parking Requirements

	Current	Short Term	Intermediate Term	Long Term
AIRCRAFT PARKING				
Local Positions	25	35	38	43
Transient GA Positions	28	29	32	38
Corporate Jet Positions	0	7	11	16
Helicopter Positions	0	3	5	10
Total Aircraft Parking Positions	**53**	**74**	**85**	**107**
Total Apron Area (sy)	**57,600**	**59,700**	**70,100**	**90,400**
VEHICLE PARKING				
Terminal Spaces	22	17	22	36
Based Owner/Terminal Overflow	31	29	31	36
Total Vehicle Parking	**53**	**46**	**53**	**72**

Source: Coffman Associates analysis

Vehicle parking spaces for airport users have also been evaluated. Currently, the airport offers 22 paved parking spaces in front of the terminal, including two handicapped spaces, as well as 31 additional spaces in a lot immediately to the west. Parking space requirements were based upon estimated existing and future itinerant traffic, as well as based aircraft at the airport. This planning study assumes that 25 percent of based aircraft will require a vehicle parking space. **Table 33** details vehicle parking requirements for the airport. An additional 19 vehicle parking spaces are estimated to be needed by the long-term to accommodate local and transient airport users.

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF)

ODO does not have an aircraft rescue and firefighting (ARFF) building or equipment located on the airfield. Because the airport is a GA airport, the FAA does not require ARFF services to be provided. The airport is anticipated to remain a GA airport through the planning period, so on-site ARFF facilities are not planned.

AVIATION FUEL STORAGE

Fuel at ODO is stored in three fuel tanks. There are two Jet A tanks with capacities of 12,000 gallons each, and one 100LL storage tank with a capacity of 10,000 gallons. Based on historic fuel flowage records from the last three years, the airport pumped an average of 450,711 gallons of Jet A and 122,342 gallons of 100LL annually. Dividing the total fuel flowage by the total number of operations provides a ratio of fuel flowage per operation. Between 2019 and 2021, the airport pumped approximately 117.7 gallons of Jet A per turbine operation and 3.7 gallons of 100LL per piston operation. It is anticipated that, over the course of the planning period, the Jet A flowage ratio will increase slightly as the airport accommodates larger jets, and the AvGas flowage ratio will remain static.

Maintaining a 14-day fuel supply would allow the airport to limit the impact of a disruption of fuel delivery. Currently, the airport has enough static fuel storage to meet the 14-day supply criteria for both Jet A and 100LL fuel. Based on these usage assumptions and projected design day operations, additional storage for Jet A is projected to be needed by the intermediate period, while 100LL storage is adequate over the planning period. **Table 34** summarizes the forecasted fuel storage requirements through the planning period.

TABLE 34 | Fuel Storage Requirements

			PLANNING HORIZON		
	Available	Current Need*	Short Term	Intermediate Term	Long Term
Jet A					
Daily Usage (gal.)		1,235	1,484	1,822	2,631
14-Day Supply (gal.)	24,000	17,300	20,800	25,500	36,800
Annual Usage (gal.)		450,711	541,600	664,900	960,200
100LL					
Daily Usage (gal.)		335	376	400	452
14-Day Supply (gal.)	10,000	4,700	5,300	5,600	6,300
Annual Usage (gal.)		122,342	137,100	146,000	164,900

*Current need reflects average of last three years' fuel flowage.

Sources: Historic fuel flowage data provided by the airport; fuel supply projections prepared by Coffman Associates.

Planning should also consider an additional tank to store unleaded aviation fuel (100UL). The FAA has recently approved the use of 100UL in piston-powered aircraft, although unknowns regarding infrastructure and distribution remain. Nevertheless, the alternatives will include placeholders for these facilities.

UTILITIES

The availability and capacity of the utilities serving the airport are important factors in determining the development potential of the airport property, as well as the land immediately adjacent to the facility. Ultimately, the availability of water, gas, sewer, and power sources are of primary concern when assessing available utilities. Given the forecast potential for future landside facility growth, the utility infrastructure serving the airport may need to be expanded to serve future development.

PERIMETER FENCING AND GATES

Perimeter fencing is used at airports primarily to secure the aircraft operational area and reduce wildlife incursions. The physical barrier of perimeter fencing has the following functions:

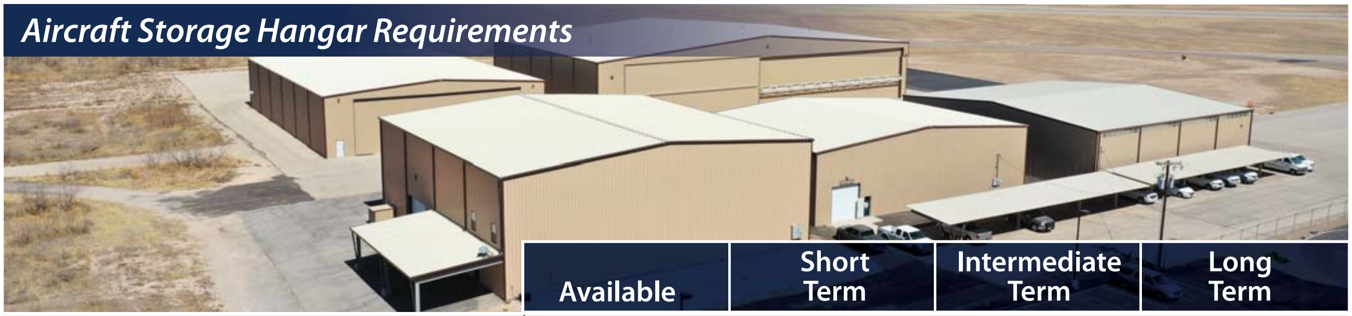
- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area.
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Optimizes the use of security personnel, while enhancing the capabilities for detection and apprehension of unauthorized individuals.
- Demonstrates a corporate concern for facility security.
- Limits inadvertent access to the aircraft operations area by wildlife.

ODO is fully enclosed by fencing. This consists of an eight-foot wildlife resistant fencing with three-strand barbed wire. Security gates limit access to the airfield. All fencing and gates should be maintained throughout the planning period. It should be noted that, in spite of the fencing, wildlife including coyotes have managed to access the airfield. The airport is currently working with a wildlife control specialist to remove the animals and prevent future access.

LANDSIDE FACILITY REQUIREMENTS SUMMARY

A summary of the landside facilities projected to be needed at ODO is presented on **Exhibit 30**.

Aircraft Storage Hangar Requirements



	Available	Short Term	Intermediate Term	Long Term
T-Hangar Units (#)	187	191	196	206
T-Hangar Area (sf)	222,100	226,300	231,700	243,100
Executive/Conventional Hangar Area (sf)	140,100	152,600	167,100	199,100
Service/Maintenance Area (sf)	34,200	29,000	31,300	36,000
Total Hangar Storage Area (sf)	396,400	407,900	430,100	478,200

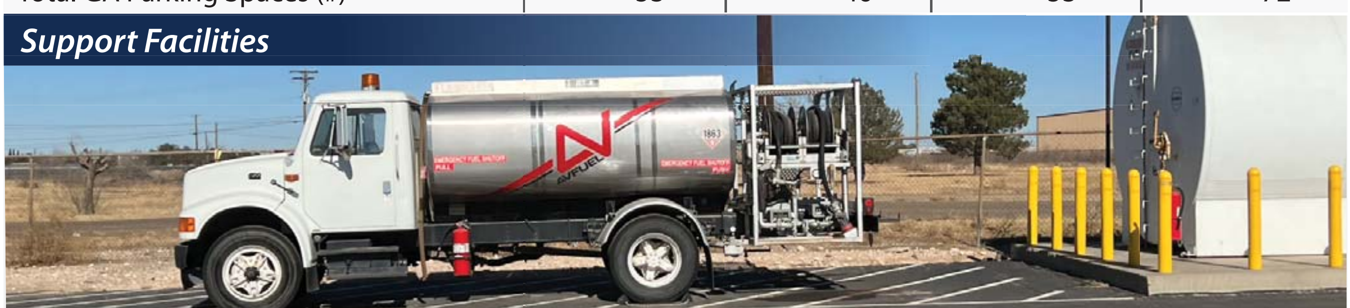
Aircraft Parking Apron

	Available	Short Term	Intermediate Term	Long Term
Aircraft Parking Positions (#)	53	74	85	107
Total Apron Area (sy)	57,600	59,700	70,100	90,400

General Aviation Terminal Facilities and Parking

	Available	Short Term	Intermediate Term	Long Term
Building Space (sf)	4,100	2,200	2,800	4,700
Total GA Parking Spaces (#)	53	46	53	72

Support Facilities



	Available	Short Term	Intermediate Term	Long Term
14-Day Fuel Storage - 100LL (gal.)	10,000	5,300	5,600	6,300
14-Day Fuel Storage - Jet A (gal.)	24,000	20,800	25,500	36,800

SUMMARY

This chapter has outlined the safety design standards and facilities required to meet potential aviation demand projected at ODO for the next 20 years. The short-term roughly corresponds to a five-year timeframe, the intermediate term is approximately 10 years, and the long-term is 20 years.

In the next section, potential improvements to the airside and landside systems will be examined through a series of development alternatives. Most of the alternatives discussion will focus on those capital improvements that would be eligible for federal and state grant funds. Other projects of local concern will also be presented. Ultimately, an overall development plan that presents a vision beyond the 20-year scope of this Airport Layout Plan will be developed for ODO.