Chapter Three: Facility Requirements

LAUGHLIN BULLHEAD INTERNATIONAL Airport

Chapter Three
FACILITY REQUIREMENTS

To properly plan for the future of Laughlin/Bullhead International Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the forecasts conducted in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, terminal building, cargo buildings, aircraft parking apron) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities and outline what new facilities may be needed and when these may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

The cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones have been established for Laughlin/Bullhead International Airport that take into consideration the reasonable range of aviation demand projections prepared in Chapter Two. It is important to consider that actual activity at the airport may be higher or lower than projected activity levels. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand.

The most important reason for utilizing milestones is that they allow the airport to develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules 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. **Table 3A** presents the planning horizon milestones for each activity demand category.

AIRFIELD CAPACITY

An airport's airfield capacity is expressed in terms of its annual service volume (ASV). Annual service volume is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year without incurring significant delay factors. As aircraft operations surpass the ASV, delay factors increase exponentially. Annual service volume accounts for annual differences in runway use, aircraft mix, and weather conditions. The airport's annual service volume was examined utilizing Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

A number of factors are included in the calculation of an airport's ASV. These include the airfield characteristics, meteorological conditions, aircraft mix, and demand characteristics (aircraft operations). The following describes the input factors as they relate to Laughlin/Bullhead International Airport.

Table 3A
PLANNING HORIZON ACTIVITY LEVELS

	BASE YEAR	PLANNING HORIZONS		
	2007	Short Term	Intermediate Term	Long Term
Airline Activity				
Enplaned Passengers	113,796	145,000	200,000	375,000
Annual Operations	*1,944*	*5,200*	*7,200*	*12,600*
Cargo Activity				
Enplaned Cargo (pounds)	1,278,400	1,530,000	1,840,000	2,640,000
Annual Operations	*1,052*	*1,200*	*1,400*	*2,000*
General Aviation Activity				
Based Aircraft	49	80	110	170
Air Taxi Operations	*2,139*	*2,500*	*2,700*	*3,100*
Annual Operations				
Local	5,638	8,200	12,000	24,600
Itinerant	16,597	22,300	30,500	53,300
Total General Aviation Operations	*22,235*	*30,500*	*42,500*	*77,900*
Military Activity				
Local	109	100	100	100
Itinerant	216	200	200	200
Total Military Operations	*325*	*300*	*300*	*300*
Total Airport Operations	***27,695***	***39,700***	***54,100***	***95,900***
Annual Instrument Approaches	***NA***	***188***	***252***	***427***

AIRFIELD LAYOUT

RUNWAY CONFIGURATION

A single runway configuration with a full-length parallel taxiway is available at the airport. Instrument approach procedures are available to Runway 34.

RUNWAY USE

Runway use is normally dictated by wind conditions. The direction of takeoffs and landings are generally determined by the speed and direction of wind. It is generally safest for aircraft to takeoff and land into the wind, avoiding a crosswind (wind that is blowing perpendicular to the travel of the aircraft) or tailwind components during these operations. Winds dictate using Runway 16 the majority of the time.

EXIT TAXIWAYS

Exit taxiways have a significant impact on airfield capacity since the number and location of exits directly determines the occupancy time of an

aircraft on the runway. Six entrance/exit taxiways are available along Runway 16-34. The airfield capacity analysis gives credit to exits located within a prescribed range from a runway's threshold. This range is based upon the mix index of aircraft that use the runway. For Laughlin/Bullhead International Airport, those exit taxiways located between 2,000 and 4,000 feet of the landing threshold count in the capacity determination. The exits must be at least 750 feet apart to count as separate exits. Under these criteria, operations to Runway 16 are credited with one exit, while Runway 34 is credited with two exits. The presence of four or more exit taxiways within the prescribed distance and with proper separation will receive maximum credit for exit taxiways in the capacity and delay model. A total of four exits in this range would increase hourly capacity by approximately 13 percent.

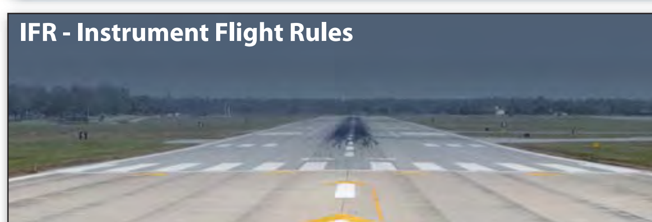
WEATHER CONDITIONS

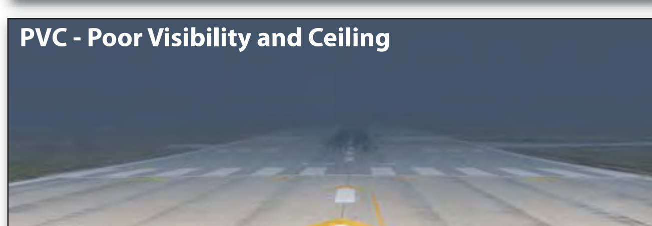
Weather conditions can have a significant effect on airfield capacity. Airport capacity is usually highest in clear weather, when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety. The increased distance between aircraft reduces the number of aircraft which can operate at the airport during any given period. This, consequently, reduces overall airfield capacity.

There are three categories of meteorological conditions considered in this capacity analysis, each defined by the reported cloud ceiling and flight visibility. Visual meteorological conditions (VMC) exist whenever the cloud ceiling is greater than 1,000 feet above ground level, and visibility is greater than three statute miles. VMC flight conditions permit pilots to approach, land, or take off by visual reference and to see and avoid other aircraft.

Instrument meteorological conditions (IMC) exist when the reported ceiling is less than 1,000 feet above ground level and/or visibility is less than three statute miles. Poor visibility conditions (PVC) apply when the cloud ceilings are below 500 feet above ground level (AGL) and visibility is less than one mile. Under IMC and PVC conditions, pilots must rely on instruments for navigation and guidance to the runway. Other aircraft cannot be seen and safe separation between aircraft must be assured solely by following air traffic control rules and procedures. As mentioned, this leads to increased distances between aircraft, which diminishes airfield capacity.

VMC occurs 98 percent of the time at Laughlin/Bullhead International Airport. IMC occur two percent of the time. PVC occur less than one percent of the time; therefore, it is considered negligible for this analysis and not included in the ASV calculations.





AIRCRAFT MIX

Aircraft mix refers to the speed, size, and flight characteristics of aircraft operating at the airport. As the mix of aircraft operating at an airport increases to include larger aircraft, airfield capacity begins to diminish. This is due to larger separation distances that must be maintained between aircraft of different speeds and sizes.

Aircraft mix for the capacity analysis is defined in terms of four aircraft classes. Classes A and B consist of single and multi-engine aircraft weighing less than 12,500 pounds. Aircraft within these classifications are primarily associated with piston-powered general aviation operations, but does include some business turboprop and business jet aircraft (e.g., the Cessna 500 Citation business jet and Beechcraft King Air). Class C consists of multi-engine aircraft weighing between 12,500 and 300,000 pounds. This broad classification includes business jets, turboprops, and large commercial airline aircraft. Most of the business jets in the national fleet are included within this category. Class D includes all aircraft over 300,000 pounds and includes wide-bodies and jumbo jets. There are no Class D aircraft currently operating or forecast to operate from the airport.

For the capacity analysis, the percentage of Class C aircraft operating at the airport is critical in determining the annual service volume as this class includes the larger and faster aircraft in the operational mix. The existing and projected operational fleet mix for the airport is summarized in **Table 3B**. Consistent with projections prepared in the previous chapter, the percentage of Class C aircraft in the operational fleet mix at the airport is expected to slightly decrease through the planning period as its small general aviation aircraft operations are expected to grow slightly faster than commercial aviation.

Table 3B
AIRCRAFT OPERATIONAL MIX - CAPACITY ANALYSIS

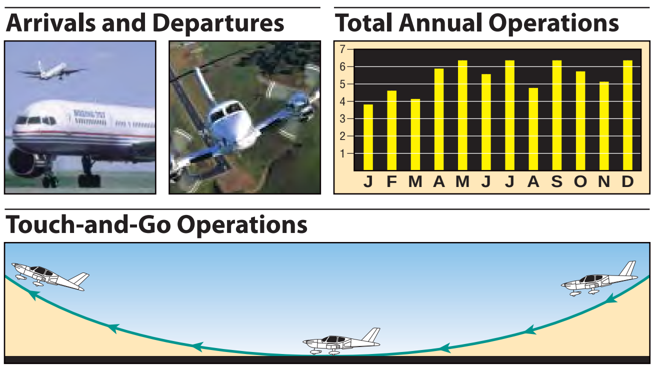
Aircraft Classification	Current	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
VFR				
Classes A & B	80%	77%	79%	81%
Class C	20%	23%	21%	19%
Class D	0%	0%	0%	0%
Percent Local Operations (Touch-and-Go's)	20%	21%	22%	26%

Definitions:

Class A: Small single-engine aircraft with gross weights of 12,500 pounds or less.
Class B: Small twin-engine aircraft with gross weights of 12,500 pounds or less.
Class C: Large aircraft with gross weights over 12,500 pounds up to 300,000 pounds.
Class D: Large aircraft with gross weights over 300,000 pounds.

OPERATIONAL CHARACTERISTICS

Operations, not only the total number of annual operations, but the manner in which they are conducted, have an important effect on airfield capacity. Peak operational periods, touch-and-go operations, and the percent of arrivals impact the number of annual operations that can be conducted at the airport.



PEAK PERIOD OPERATIONS

For the airfield capacity analysis, average daily operations and average peak hour operations during the peak month are calculated. These operational levels were calculated previously in Chapter Two for existing and forecast levels of operations. Typical operational activity is important in the calculation of an airport's annual service level as "peak demand" levels occur sporadically. The peak periods used in the capacity analysis are representative of normal operational activity and can be exceeded at various times through the year.

TOUCH-AND-GO OPERATIONS

A touch-and-go operation involves an aircraft making a landing and an immediate take-off without coming to a full stop or exiting the runway. These operations are normally associated with general aviation training operations and are included in local operations data recorded by the air traffic control tower. Touch-and-go activity is counted as two operations since there is an arrival and a departure involved. A high percentage of touch-and-go traffic normally results in a higher operational capacity because one landing and one takeoff occurs within a shorter time period than individual operations. Touch-and-go operations currently account for approximately 20 percent of total operations.

PERCENT ARRIVALS

The percentage of arrivals as they relate to the total operations in the design hour is important in determining airfield capacity. Under most circumstances, the lower the percentage of arrivals, the higher the hourly capacity. However, except in unique circumstances, the aircraft arrival-departure split is typically 50-50. At the airport, traffic information indicated no major deviation from this pattern, and arrivals were estimated to account for 50 percent of design period operations.

HOURLY RUNWAY CAPACITY

Based upon the input factors described above, current and future hourly capacities for the various operational scenarios at Laughlin/Bullhead International Airport were determined. As the mix of aircraft operating at an airport changes and peak periods become more spread out through the planning period, the hourly capacity of the system increases slightly. The current and future hourly capacities are depicted in **Table 3C**. At Laughlin/Bullhead International Airport, the current hourly capacity is 80 operations. This is expected to increase to 84 operations by the long term planning horizon.

Table 3C
AIRFIELD DEMAND/CAPACITY SUMMARY

	Base Year	Short Term (± 5)	Intermediate Term (± 10)	Long Term (± 20)
Operational Demand				
Annual	27,670	39,700	54,100	95,900
Design Hour	26	51	81	128
Capacity				
Annual Service Volume	138,000	156,000	179,000	218,000
Weighted Hourly Capacity	80	78	82	84
Delay				
Per Operation (Seconds)	6	9	12	24
Total Annual (Hours)	46	99	180	639

ANNUAL SERVICE VOLUME

The weighted hourly capacity is utilized to determine the annual service volume in the following equation:

$$ASV = C \times D \times H$$

C = weighted hourly capacity;
D = ratio of annual demand to the average daily demand during the peak month; and
H = ratio of average daily demand to the design hour demand during the peak month.

The current ratio of annual demand to average daily demand (D) was determined to be 258 for Laughlin/Bullhead International Airport. This is projected to increase to 310 by the long term planning period as the peak month is projected to decline from 12 percent of total annual operations to 10 percent of total annual operations. The current ratio of average daily demand to average peak hour demand (H) was determined to be 6.7. This ratio is projected to increase to 8.3 by the long term planning period as peak hour operations are projected to decrease from 15 percent of peak day operations to 12 percent of peak day operations.

The current ASV was determined to be 138,000 operations. With the slight decrease in Class C aircraft to operate at the airport through the planning period and the lower peak period levels, the annual service volume is projected to increase to 218,000 by the long term planning horizon. The airport is currently at 20 percent of its annual service volume. Assuming projected long term planning horizon annual operations, the airport would be at 44 percent of the airport's ASV. **Table 3C** summarizes the airport's ASV over the long term planning horizon. A comparison of annual service volume to projected annual operations is provided on **Exhibit 3A**.

AIRCRAFT DELAY

As the number of annual aircraft operations approaches the airfield's capacity, increasing amounts of delay to aircraft operations begin to occur. Delays occur to arriving and departing aircraft in all weather conditions. Arriving aircraft delays result in aircraft holding outside of the airport traffic area. Departing aircraft delays result in aircraft holding at the runway end until released by air traffic control.

Exhibit 3A
AIRFIELD DEMAND/CAPACITY

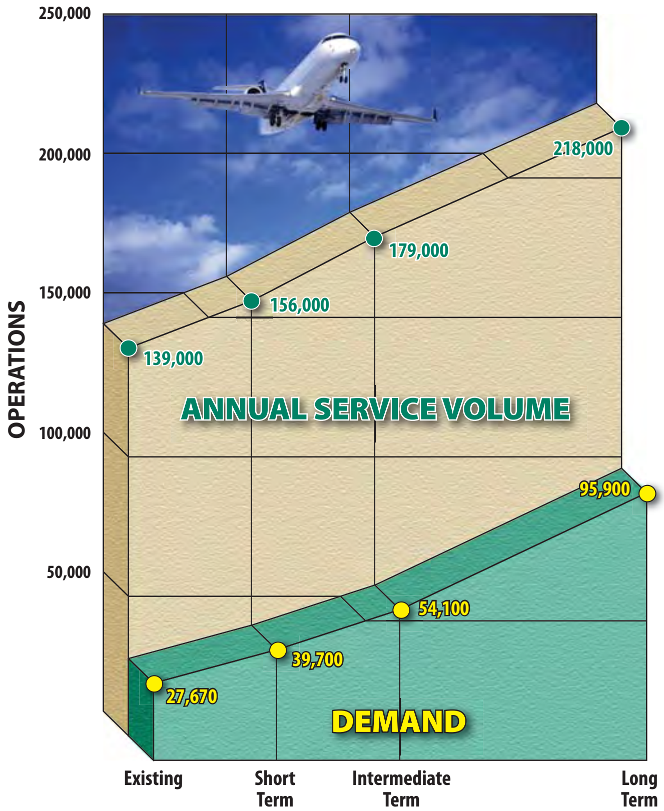


Table 3C also summarizes the aircraft delay analysis conducted for Laughlin/Bullhead International Airport. Current annual delay is negligible and estimated at approximately 46 hours total. Analysis of delay factors for the long range planning horizon indicate that annual delay can be expected to reach over 639 hours. This is only 24 seconds per aircraft operation.

CAPACITY ANALYSIS CONCLUSIONS

FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements for airfield capacity purposes should begin to be considered once operations reach 60 to 75 percent of the annual service volume. From the analysis above, Laughlin/Bullhead International Airport is not expected to exceed 60 percent of annual service volume within the planning period of this master plan.

Typically, a parallel runway is considered when additional capacity is needed at an airport. The current plan for Laughlin/Bullhead International Airport includes a parallel runway south of Runway 16-34 for use by small general aviation aircraft. A parallel runway for small general aviation aircraft maximizes airfield capacity as large and small aircraft are segregated and simultaneous operations can occur at the airport. While the analysis above indicated that a parallel runway may not be needed during the planning period of this master plan, a parallel runway will continue to be planned at Laughlin/Bullhead International Airport. This reserves the property south of the airport for this ultimate use and also allows the City of Bullhead City to continue to properly plan appropriate land uses adjacent to the airport that are compatible with this ultimate use.

CRITICAL DESIGN AIRCRAFT

The selection of appropriate Federal Aviation Administration (FAA) design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use, the airport. The critical design aircraft is used to define the design parameters for the airport. The critical design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 operations per year at the airport. Planning for future aircraft use is of particular importance since design standards are used to plan many airside and landside components. These future standards must be considered now to ensure that short term development does not preclude the long range potential needs of the airport.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This airport reference code (ARC) has two components. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while aircraft wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to FAA Advisory Circular (AC) 150/5300-13, Change 12, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at the certified maximum flap setting and maximum landing weight at standard atmospheric conditions. The five approach categories used in airport planning are as follows:

Category A: Speed less than 91 knots.
Category B: Speed 91 knots or more, but less than 121 knots.
Category C: Speed 121 knots or more, but less than 141 knots.
Category D: Speed 141 knots or more, but less than 166 knots.
Category E: Speed greater than 166 knots.

The airplane design group (ADG) is based upon either the aircraft's wingspan or tail height, whichever is greater. For example, an aircraft may fall in ADG II for wingspan at 70 feet, but ADG III for tail height at 33 feet. This aircraft would be classified under ADG III. The six ADGs used in airport planning are as follows:

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

Source: FAA AC 150/5300-13, Change 12

Representative aircraft by ARC are shown on the following pages. [Chris Riffle distribute ARC pictures in this area.] The airport currently serves an array of aircraft in ARCs up to and including C-III. The aircraft operating at the airport range by operational type from small single engine piston-powered aircraft, such as the Cessna 152, to commercial airline transport aircraft, such as the Boeing 737-800.

The FAA recommends designing airport functional elements to meet the requirements for the most demanding civilian ARC for that airport. In order to determine airfield design requirements, the critical aircraft and critical ARC should first be determined, and then appropriate airport design criteria can be applied. This process begins with a review of aircraft currently using the airport and those expected to use the airport through the long term planning period.

PASSENGER AIRLINE AND CHARTER AIRCRAFT

As outlined in the previous chapter, Laughlin/Bullhead International Airport is served by three air carrier airlines providing charter services supporting the gaming/resort activities in Laughlin, Nevada. Sun Country utilizes the Boeing 737-800 aircraft. Allegiant Airlines utilizes the Boeing (McDonnell-Douglas) MD-83 and MD-88 aircraft. Canadian Northern utilizes the Boeing 737-200. Each of these aircraft falls within ARC C-III. Future facility planning should consider a potential transition to larger air carrier aircraft for charter services. Potential larger charter aircraft would include the Boeing 757 which falls within ARC C-IV.

In the future, regularly scheduled airline service is expected to be provided with regional jet aircraft such as the Embraer regional jet (ERJ) 135 and 145 or Canadair CRJ-200 regional jet. These regional jets fall within ARC C-II. Larger regional jets in the 70- and 90-seat ranges fall within the ARC C-III.

CATEGORY C-III, D-III

- ERJ-170, 190
- Boeing Business Jet
- B 727-200
- B 737-300 Series
- MD-80, DC-9
- Fokker 70, 100
- A319, A320
- Gulfstream V
- Global Express

CATEGORY C-IV, D-IV

- B-757
- B-767
- C-130
- DC-8-70
- DC-10
- MD-11
- L1011

CATEGORY D-V

- B-747 Series
- B-777

CATEGORY A-I

- Beech Baron 55
- Beech Bonanza
- Cessna 150
- Cessna 172
- Cessna Citation
- Cessna Citation Mustang
- Eclipse 500
- Piper Archer
- Piper Seneca

CATEGORY B-I: less than 12,500 lbs.

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- Cessna 421
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I

CATEGORY B-II: less than 12,500 lbs.

- Super King Air 200
- Cessna 441
- DHC Twin Otter

CATEGORY B-I, B-II: over 12,500 lbs.

- Super King Air 300
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- Citation II, III, Citation IV, V
- Saab 340
- Embraer 120

CATEGORY C-I, D-I

- Beech 400
- Lear 25, 31, 35, 45, 55, 60
- Israeli Westwind
- HS 125-400, 700

CATEGORY C-II, D-II

- Cessna Citation III, VI, VIII, X
- Gulfstream II, III, IV
- Canadair 600
- ERJ-135, 140, 145
- CRJ-200, 700, 900
- Embraer Regional Jet
- Lockheed JetStar
- Super King Air 350

AIR CARGO AIRCRAFT

Presently, daily air cargo services are provided by contract carriers for FedEx and UPS to regional hubs. The Cessna 208 Caravan and Beechcraft 99 are utilized by the contract carriers. These aircraft fall within ARC B-II. As presented in Chapter Two, air cargo service is not expected to change significantly from the existing feeder-type service experienced at the airport. Therefore, the type of aircraft utilized for this service is not expected to change significantly through the planning period, and the critical air cargo aircraft will remain within ARC B-II.

GENERAL AVIATION

The majority of general aviation operations are conducted by light aircraft, or those weighing less than 12,500 pounds and fall within ARC A-I and ARC B-I. Some general aviation operations, however, are conducted by the full array of business jet aircraft. Business jets have longer wingspans and approach speeds than the light piston-powered aircraft that dominate the general aviation fleet mix; therefore, business jets comprise the critical design aircraft for the general aviation fleet mix at the airport. The business jets that utilize the airport fall within ARC B-I, B-II, C-I, C-II, D-I, and D-II.

To quantify business jet activity at Laughlin/Bullhead International Airport, operational data was obtained from *Airport IQ*, a private company which maintains a database of all aircraft operations which file, fly, and fully complete an instrument flight rule (IFR) flight plan to Laughlin/Bullhead International Airport. Some general aviation operators will depart under visual flight rules (VFR) and open an IFR flight plan enroute, or close their IFR flight plan prior to arriving at Laughlin/Bullhead International Airport. In either case, those operations are not attributed to Laughlin/Bullhead International Airport and are not included in the table. Experience with this data in comparison to actual observed flights at other airports indicates that the *AirportIQ* data could be lower than actual by as much as 50 percent due to the exclusions as explained above. This data does provide valuable information such as aircraft type, origination, destination, and aircraft owner. Thus, the data collected through *AirportIQ* serves to highlight the absolute minimum number of operations as many pilots will open or close a flight plan in the air when visual conditions allow. This is not typically true of air carrier operators and most air taxi operators which are required to fly the full flight plan.

A review of *AirportIQ* data for calendar year 2007 reveals a minimum of 459 private business jet operations at Laughlin/Bullhead International Airport. The largest groupings, or family of jets, were the business jets in ARC B-I and B-II, with 330 operations which represented 72 percent of all private jet operations reported. The next largest group was ARC C-I and C-II, with 101 operations representing 22 percent of total private jet operations. In total, aircraft in ARC D-I and D-II conducted 28 operations at the airport in 2007.

CRITICAL AIRCRAFT SUMMARY

It is evident from the discussion above that the aircraft used in passenger airline service comprise the current critical design aircraft at Laughlin/Bullhead International Airport. As discussed above, the aircraft used in passenger airline service fall within ARC C-III. In the future, larger aircraft could be used in passenger airline service and include aircraft in ADG IV. Therefore, long term facility planning should account for these larger wingspans. Thus, the future critical airplane design group is ADG IV.

The previous master plan had indicated that business jets within Approach Category D may conduct more than 500 operations at the airport in the future and become the critical design aircraft for defining the approach category portion of the ARC. Presently, aircraft in Approach Category D conduct less than 30 annual operations at the airport. While this is significantly below the 500 operations annual threshold, facility planning should still consider Approach Category D operations increasing in the future.

Combining the commercial airline ADG IV with the general aviation Approach Category D indicates that the most appropriate ARC for long term planning remains ARC D-IV. As the primary runway, which accommodates all aircraft operations, Runway 16-34 should be planned to this ARC. A future parallel runway should be planned to ARC B-II as this runway would be designed only for small aircraft operations.

The design of taxiway and apron areas should consider the wingspan requirements of the most demanding aircraft to operate within that specific functional area on the airport. The passenger terminal apron should consider ADG IV. General aviation transient apron and aircraft maintenance and repair hangar areas should consider ADG III requirements to accommodate the largest transient business jets. T-hangar and small conventional hangar areas should consider ADG I requirements as these commonly serve smaller single and multi-engine piston aircraft.

AIRFIELD DESIGN STANDARDS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions or incompatible land uses that could affect an aircraft's safe operation. These include the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), and runway protection zone (RPZ).

The entire RSA, OFA, and OFZ should be under the direct control of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. It is not required that the RPZ be under airport ownership, but it is strongly recommended. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having sufficient land use control measures in place which ensure that the RPZ remains free of incompatible development.

Dimensional standards for the various safety areas associated with the runways are a function of the ARC as well as the approach visibility minimums. At Laughlin/Bullhead International Airport, presently Runway 16-34 should meet design standards for ARC C-III and one mile visibility minimums. Ultimately, Runway 16-34 should meet design standards for ARC D-IV and one-half mile visibility minimums. A future parallel runway should be designed to ARC B-II design standards with one mile visibility minimums.

RUNWAY SAFETY AREA

The runway safety area (RSA) is "a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or an excursion from the runway." The RSA must be free from any obstructions and be graded and stabilized to accommodate the weight of the airport's critical aircraft.

The dimension of the RSA is dependent upon the critical aircraft at the airport. For ARC D-IV, the RSA is 500 feet wide, centered on the runway centerline, and extends 1,000 feet beyond both ends of the runway. The FAA has placed a premium on maintaining and protecting adequate RSA at airports, especially at Title 14 of the Code of Federal Regulations (CFR) Part 139 certificated airports such as Laughlin/Bullhead International Airport. **Exhibit 3B** illustrates the required RSA for Laughlin/Bullhead International Airport. As depicted, the airport maintains adequate RSA and should continue maintaining the RSA in the future.

OBJECT FREE AREA

The object free area (OFA) is an area centered on the runway and taxiway centerlines, provided to enhance the safety of aircraft operations. Only those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes are allowed.

Of particular interest is the runway OFA, which is designed to ensure that the wings of an aircraft traversing the RSA will not impact obstructions outside the RSA. Its dimensions are also based on the airport's critical aircraft. For ARC D-IV, the runway OFA is 800 feet wide (centered on the runway centerline) and extends 1,000 feet beyond the ends of the runway. As shown on **Exhibit 3B**, a portion of the perimeter service road extends through the northeast corner of the OFA. The remainder of the OFA meets FAA standards. The alternatives analysis will examine options available to comply with standards in the northeast portion of the OFA.

OBSTACLE FREE ZONE

An obstacle free zone (OFZ) is a volume of airspace that is required to be clear of objects, except for frangible items required for navigation of aircraft. The OFZ for Runway 16-34 is 400 feet wide, centered along the runway, and extends 200 feet beyond the runway ends. It is bolstered by the precision OFZ, or POFZ, which requires no obstructions in an area 800 feet wide (centered on the runway) beginning at the ends of each runway, having a vertically guided approach, then extending out 200 feet. The POFZ standard would only apply to future runway ends with an instrument approach with one-half mile visibility minimums. As shown on **Exhibit 3B**, Runway 34 meets POFZ requirements and could

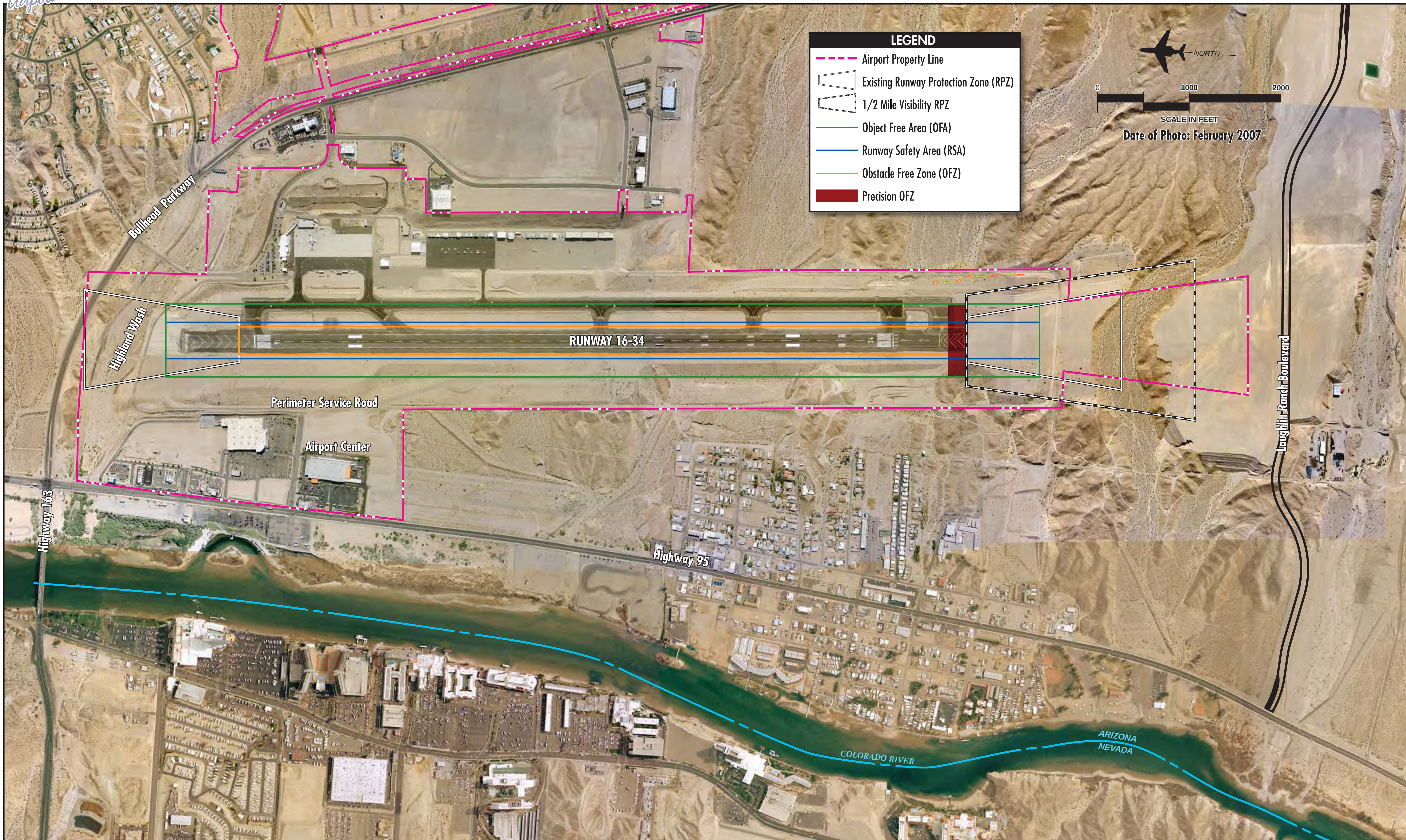


Exhibit 3B
AIRFIELD DESIGN STANDARDS

support a future one-half mile visibility minimum instrument approach. OFZ requirements are also met at Laughlin/Bullhead International Airport.

RUNWAY PROTECTION ZONE

The RPZ is defined as an area off the ends of the runway, designed to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The dimensions of an RPZ are a function of the runway ARC and approach visibility minimums. The RPZ is a two-dimensional space that primarily serves to identify an area where incompatible land uses should not be located. Land uses considered incompatible with the RPZ include any uses which attract groupings of people who occupy the space for long periods of time.

Presently, FAA standards for each runway end require an RPZ having an inner width of 500 feet, outer width of 1,010 feet, and a length of 1,700 feet. As shown on **Exhibit 3B**, the entire Runway 16 RPZ is located on airport property. Portions of the Runway 34 RPZ extend beyond airport property.

A future one-half mile visibility minimum instrument approach requires the largest RPZ having a 1,000-foot inner width, 1,750-foot outer width, and is 2,500 feet long. As shown on **Exhibit 3B**, this larger RPZ would extend off airport property beyond the Runway 34 end. The Runway 34 instrument approach would most likely be upgraded. The alternatives analysis will more closely examine the options to comply with RPZ standards at this runway end.

AIRFIELD DESIGN STANDARDS SUMMARY

Exhibit 3C summarizes the design requirements of airfield design standards according to the associated airport reference code and instrument approach minimum (where applicable) for each runway.

AIRSIDE FACILITIES

Airside facilities include those facilities that are related to the arrival, departure, and ground movement of aircraft. These components include:

- Runways
- Taxiways
- Navigational Approach Aids and Instrument Approaches
- Airfield Lighting, Marking, and Signage

RUNWAY ORIENTATION

For the operational safety and efficiency of an airport, it is desirable for the primary runway of an airport's runway system to be oriented as closely as possible to the direction of the prevailing winds. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off (defined as a crosswind).

FAA design standards specify that additional runway configurations are needed when the primary runway configuration provides less than 95 percent wind coverage at specific crosswind components. The 95 percent wind coverage is computed on the basis of crosswinds not exceeding 10.5 knots for small aircraft weighing less than 12,500 pounds and from 13 to 20 knots for aircraft weighing over 12,500 pounds.

Based upon historical wind data, Runway 16-34 exceeds 95 percent for all crosswind components. Therefore, based on this analysis, the runway system at the airport is properly oriented to prevailing wind flows and aircraft operational safety is maximized. No new runway orientations are needed at the airport.

RUNWAY LENGTH

Runway length is the most important consideration when evaluating the airside facility requirements

Exhibit 3C
RUNWAY REQUIREMENTS

EXISTING	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
RUNWAY 16-34			
ARC C-III 7,500' x 150' 75,000 SWL 200,000 DWL 400,000 DTWL ***Runway Safety Area (RSA)*** 250' each side of runway centerline 1,000' beyond each runway end ***Object Free Area (OFA)*** 400' each side of runway centerline 1,000' beyond each runway end ***Obstacle Free Zone (OFZ)*** 200' each side of runway centerline 200' beyond each runway end ***Runway Protection Zone (RPZ) - Each End*** Inner Width - 500' Outer Width - 1,010' Length - 1,700'	ARC C-III 8,500' x 150' 75,000 SWL 200,000 DWL 400,000 DTWL ***Runway Safety Area (RSA)*** 250' each side of runway centerline 1,000' beyond each runway end ***Object Free Area (OFA)*** 400' each side of runway centerline 1,000' beyond each runway end ***Obstacle Free Zone (OFZ)*** 200' each side of runway centerline 200' beyond each runway end ***Runway Protection Zone (RPZ) - Each End*** Inner Width - 500' Outer Width - 1,010' Length - 1,700'	ARC C-III 8,500' x 150' 75,000 200,000 DWL 400,000 DTWL ***Runway Safety Area (RSA)*** 250' each side of runway centerline 1,000' beyond each runway end ***Object Free Area (OFA)*** 400' each side of runway centerline 1,000' beyond each runway end ***Obstacle Free Zone (OFZ)*** 200' each side of runway centerline 200' beyond each runway end ***Precision Object Free Area (POFA)*** **Runway 34** **400' each side of runway centerline** **200' beyond each runway end** ***Runway Protection Zone (RPZ) - Runway 16*** **Inner Width - 500'** **Outer Width - 1,010'** **Length - 1,700'** ***Runway Protection Zone (RPZ) - Runway 34*** **Inner Width - 1,000'** **Outer Width - 1,750'** **Length - 2,500'**	ARC D-IV 8,500' x 150' SWL 75,000 SWL 200,000 DWL 400,000 DTWL ***Runway Safety Area (RSA)*** 250' each side of runway centerline 1,000' beyond each runway end ***Object Free Area (OFA)*** 400' each side of runway centerline 1,000' beyond each runway end ***Obstacle Free Zone (OFZ)*** 200' each side of runway centerline 200' beyond each runway end ***Precision Object Free Area (POFA)*** Runway 34 400' each side of runway centerline 200' beyond each runway end ***Runway Protection Zone (RPZ) - Runway 16*** Inner Width - 500' Outer Width - 1,010' Length - 1,700' ***Runway Protection Zone (RPZ) - Runway 34*** Inner Width - 1,000' Outer Width - 1,750' Length - 2,500'
PARALLEL RUNWAY			
 Note: Items in bold represent future requirement SWL - Single Wheel Loading DWL - Dual Wheel Loading DTWL - Dual Tandem Wheel Loading			**ARC B-II** **4,700' x 75'** **700' from Runway 16-34 centerline** **12,500 pounds SWL** ***Runway Safety Area (RSA)*** **150' each side of runway centerline** **300' beyond each runway end** ***Object Free Area (OFA)*** **200' each side of runway centerline** **300' beyond each runway end** ***Obstacle Free Zone (OFZ)*** **200' each side of runway centerline** **200' beyond each runway end** ***Runway Protection Zone (RPZ) - Each End*** **Inner Width - 500'** **Outer Width - 700'** **Length - 1,000'**

for future aircraft serving Laughlin/Bullhead International Airport. Runway length requirements are based upon five primary elements: airport elevation, the mean daily maximum temperature of the hottest month, runway gradient, critical aircraft type expected to use the runway, and the stage length of the longest non-stop trip destination.

Aircraft performance declines as elevation, temperature, and runway gradient factors increase. For calculating runway length requirements, the airport is at an elevation of 694 feet above mean sea level (MSL), and the mean daily maximum temperature of the hottest month is 108.2 degrees Fahrenheit (F). The maximum effective gradient is 0.96 percent.

A 1,000-foot extension of Runway 16-34 to the south is currently under environmental review. As required by FAA regulations, an Environmental Assessment (EA) is presently being conducted to determine compliance with the *National Environmental Policy Act* (NEPA). The 1,000-foot extension to the south is being considered to eliminate take-off weight restrictions on commercial airline aircraft that currently operate at the airport. Based upon coordination with Allegiant Airlines and Sun Country Airlines in 2006, the existing 7,500 feet of length on Runway 16-34 does not meet the runway length needs of either airline operating at the airport. Allegiant Airlines notes that the high summertime temperatures experienced at the airport restricts fuel loading. During the warmest summer months, Allegiant Airlines has to make unscheduled fueling stops as they were not able to fully fuel the aircraft at Laughlin/Bullhead International Airport to reach the intended destination. During other times of the year, a longer runway would increase the range of the aircraft operating from Laughlin/Bullhead International Airport. Sun Country Airlines requires a runway length of at least 8,000 feet to fully load their aircraft with passengers and fuel to reach their longest nonstop destination.

Once extended 1,000 feet south, any further extension of Runway 16-34 is unlikely, given current and planned land uses adjacent to the airport. Primarily, an extension of Runway 16-34 any farther south is limited by the location of Laughlin Ranch Boulevard. The current FAA Western-Pacific Region Airports Division's position is that public roadways are not compatible with the RPZ. Therefore, Laughlin Ranch Boulevard cannot cross the Runway 34 RPZ. Considering these requirements, the longest runway length achievable at Laughlin/Bullhead International Airport is 8,500 feet. As detailed above, this length would meet the requirements of the existing airlines using the airport. Based upon FAA planning standards, 8,500 feet of length also exceeds the 7,700 feet of length needed to meet the requirements of the full mix of general aviation aircraft projected to use the airport through the planning period. According to FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, 7,700 feet of runway length is sufficient to serve 100 percent of the general aviation fleet at 60 percent useful loading. According to the same AC, a runway length of 4,700 feet is appropriate for a future parallel runway. Existing and future runway length needs at Laughlin/Bullhead International Airport are shown on **Exhibit 3C**.

RUNWAY WIDTH

Runway width is primarily determined by the planning ARC for the particular runway. FAA design standards specify a minimum width of 150 feet for ARC D-IV. Runway 16-34 currently meets the standard established by the FAA and should satisfy future needs with normal maintenance. The future parallel runway should be 75 feet wide to conform to ARC B-II standards.

PAVEMENT STRENGTH

The most important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight. The current strength rating on Runway 16-34 is 75,000 pounds single wheel loading (SWL), 200,000 pounds dual wheel loading (DWL), and 400,000 pounds dual tandem wheel loading (DTWL). The current runway strength rating is sufficient to accommodate all existing and potential future aircraft that may operate at the airport. A pavement strength rating of 12,500 pounds SWL should be planned for the future parallel runway.

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield. Design standards for separation between the runways and parallel taxiways are based upon the wingspan of the critical aircraft using the runway. Existing taxiways at Laughlin/Bullhead International Airport are constructed of asphalt.

Runway 16-34 is served by a full-length parallel taxiway. The parallel Taxiway A centerline is located 400 feet from the Runway 16-34 centerline. Taxiways A1, A2, A3, A5, A6, A7 and A8 are 75 feet wide. The taxiway widths and separation from the runway meet FAA standards for ARC D-IV aircraft with one-half mile visibility minimum instrument approaches. This taxiway should be maintained in its existing location and width through the planning period.

Taxiways A1, A2, A3, A5, A6, A7 and A8 are entrance/exit taxiways which connect the runway to Taxiway A. Taxiways A2 and A3 connect Taxiway A to the terminal apron. These taxiways should be maintained in the future.

Future facility planning should include providing more entrance/exit taxiways on Runway 16-34 as detailed in the airfield capacity analysis. Up to three additional exit taxiways are needed to achieve the full taxiway exit rating for the calculation of annual service volume. Additional exit taxiways within 2,000 to 4,000 feet from the landing threshold of each runway could increase annual service by 13 percent. The alternatives analysis will examine additional exit taxiways on Runway 16-34.

Holding aprons are available at each end of Runway 16-34. These areas allow aircraft to prepare for departure off the taxiway surface. This allows aircraft ready to depart to by-pass the aircraft in the hold apron. These holding aprons should be maintained through the planning period.

The future parallel runway should be served by a full-length parallel taxiway that is located 240 feet (centerline to centerline) from the runway. All taxiways serving this runway should be 35 feet wide to meet FAA design standards. Holding aprons should be planned for each runway.

Taxiway requirements are summarized on **Exhibit 3D**.

Exhibit 3D
TAXIWAY REQUIREMENTS

EXISTING	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
RUNWAY 16-34			
Full Length Parallel Taxiway A 75' wide 400' from Runway 16-34 centerline Six entrance/exit taxiways 75' wide Holding Apron Each End	Full Length Parallel Taxiway A 75' wide 400' from Runway 16-34 centerline Six entrance/exit taxiways 75' wide Holding Apron Each End	Full Length Parallel Taxiway A 75' wide 400' from Runway 16-34 centerline Six entrance/exit taxiways 75' wide Holding Apron Each End	Full Length Parallel Taxiway A 75' wide 400' from Runway 16-34 centerline **Nine entrance/exit taxiways 75' wide** Holding Apron Each End
PARALLEL RUNWAY			
			**Full Length Parallel Taxiway 35' wide 240' from runway centerline Four entrance/exit taxiways 35' wide Holding Apron Each End**

Note: Items in bold represent future requirement

NAVIGATIONAL AND APPROACH AIDS

Electronic and visual guidance to arriving aircraft enhance the safety and capacity of the airfield. Such facilities are vital to the success of the airport and provide additional safety to passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by commercial pilots when visibility is good.

Instrument approaches have historically been categorized as either precision or nonprecision. Precision instrument approach aids provide an exact course alignment and vertical descent path for an aircraft on final approach to a runway, while nonprecision instrument approach aids provide only course alignment information. Most existing precision instrument approaches in the United States are instrument landing systems (ILS), although the Global Positioning System (GPS) is now used to provide both vertical and lateral navigation for pilots. In early 2008, there were over 1,030 published GPS approaches that provided both exact course alignment and vertical descent path information to pilots (precision approach), including one at Laughlin/Bullhead International Airport.

There are currently two published instrument approaches to Laughlin/Bullhead International Airport. This includes the Area Navigation (RNAV) GPS approach to Runway 34 and the very high frequency omnidirectional range (VOR)/distance measuring equipment (DME) approach to Runway 34. Both approaches allow for circling to land on Runway 16, although with increased minimums.

The RNAV GPS approach to Runway 34 provides both course alignment and vertical descent information. The localizer performance with vertical guidance (LPV) minimums allow for an approach to landing when visibility is restricted to two miles and cloud ceilings are as low as 700 feet and visibility is restricted to two miles for Approach Categories A through D. Lateral Navigation (LNAV) (course guidance) minimums allow for landings when the cloud ceilings are as low as 1¼ miles for aircraft within Approach Category A, 1½ miles for aircraft within Approach Category B, and three miles for aircraft in Approach Categories C and D. The cloud ceiling minimum for Approach Categories A through C is 1,000 feet AGL. The cloud ceiling minimum for Approach Category D is 1,100 feet AGL.

The VOR/DME approach provides only course guidance information to the pilot. This approach procedure allows for landings when the cloud ceilings are as low as 1¼ miles for aircraft within Approach Category A, 1½ miles for aircraft within Approach Category B, and three miles for aircraft in Approach Categories C and D. The cloud ceiling minimum for all approaches is 1,800 feet AGL.

The capabilities of the RNAV (GPS) LNAV approach and the VOR/DME approach are very limited. For each of these approaches, the cloud ceiling is very high and the visibility minimums for Approach Categories C and D are the same for visual flight. While the LPV approach has lower minimums, the visibility minimums are still two miles.

Future facility planning should include lowering approach minimums to the extent practicable. Ultimately, it would be preferable to provide landings to Category I minimums – ½ mile visibility and 200-foot cloud ceilings at Laughlin/Bullhead International Airport. Many factors affect the instrument approach minimums. Most notably, the terrain features surrounding the airport may ultimately impact the visibility and cloud ceiling minimums. Lower approach and visibility minimums may ultimately only be achieved with additional lighting aids described below. Only the FAA can change the approach visibility minimums at the airport.

An RNAV (GPS) approach procedure was available to Runway 16; however, this approach was decommissioned in 2007 when Runway 16-34 was reconstructed and the Runway 16 end was relocated to the south. A new approach will now have to be redesigned to Runway 16. This approach should provide both course alignment and vertical descent information. **Exhibit 3E** summarizes instrument approach requirements for Laughlin/Bullhead International Airport through the planning period.

No instrument approach procedures are required for the future parallel runway. This runway is planned for small aircraft use during visual conditions only.

Exhibit 3E
INSTRUMENT APPROACH REQUIREMENTS

EXISTING	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
RNAV (GPS) - Runway 34 LPV minimums	RNAV (GPS) - Runway 34 LPV minimums	RNAV (GPS) - Runway 34 **CAT I LPV minimums**	RNAV (GPS) - Runway 34 CAT I LPV minimums
VOR/DME - Runway 34	VOR/DME - Runway 34	VOR/DME - Runway 34	VOR/DME - Runway 34
	RNAV (GPS) - Runway 16 LPV minimums	RNAV (GPS) - Runway 16 LPV minimums	RNAV (GPS) - Runway 16 LPV minimums

RNAV - Area Navigation
VOR - Very High Frequency Omnidirectional Range Facility
DME - Distance Measuring Equipment
GPS - Global Positioning System
LPV - An approach procedure with vertical guidance based on WAAS [wide area augmentation system] lateral and vertical guidance
CAT I - Category I
Note: Items in bold represent future requirement

AIRFIELD MARKING, LIGHTING AND SIGNAGE

In order to facilitate the safe movement of aircraft about the airfield, airports use pavement markings, lighting, and signage to direct pilots to their destinations. Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular 150/5340-1J, *Marking of Paved Areas on Airports*, provides the guidance necessary to design airport markings. **Exhibit 3F** summarizes marking, lighting, and signage requirements for the airport.

Runway 34 has the necessary markings for a precision approach. Runway 16 has nonprecision markings. These markings will suffice through the planning period. The future parallel runway should have basic markings.

Taxiway and apron areas also require marking. Yellow centerline stripes are currently painted on all taxiway surfaces at the airport to provide this guidance to pilots. The apron areas also have centerline markings to indicate the alignment of taxilanes within these areas. Hold lines are provided at all runway/taxiway intersections. Enhanced taxiway markings were added in 2008. Besides routine maintenance of the taxiway markings, these markings will be sufficient through the planning period.

Airport lighting systems provide critical guidance to pilots during nighttime and low visibility operations. Runway 16-34 is equipped with medium intensity runway lighting (MIRL). Facility planning should include upgrading to high intensity runway lighting (HIRL) to support precision instrument approach minimums. MIRL should be planned for the future parallel runway.

Effective ground movement of aircraft at night is enhanced by the availability of taxiway lighting. Medium intensity taxiway lighting (MITL) is installed

Exhibit 3F
AIRFIELD LIGHTING AND MARKING REQUIREMENTS

EXISTING	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
Rotating Beacon Pilot Controlled Lighting (PCL)	Rotating Beacon Pilot Controlled Lighting (PCL)	Rotating Beacon Pilot Controlled Lighting (PCL)	Rotating Beacon Pilot Controlled Lighting (PCL)
RUNWAY 16-34			
Medium Intensity Runway Edge Lighting (MIRL) Medium Intensity Taxiway Edge Lighting (MITL) Lighted Runway/Taxiway Directional Signage Precision Approach Path Indicator (PAPI-4) Each Runway End Runway End Identifier Lights (REILs) Each Runway End Distance Remaining Signs Precision Runway Markings - Runway 34 Nonprecision Runway Markings - Runway 16	Medium Intensity Runway Edge Lighting (MIRL) Medium Intensity Taxiway Edge Lighting (MITL) Lighted Runway/Taxiway Directional Signage Precision Approach Path Indicator (PAPI-4) Each Runway End Runway End Identifier Lights (REILs) Each Runway End Distance Remaining Signs Precision Runway Markings - Runway 34 Nonprecision Runway Markings - Runway 16	**High Intensity Runway Edge Lighting (HIRL)** Medium Intensity Taxiway Edge Lighting (MITL) Lighted Runway/Taxiway Directional Signage Precision Approach Path Indicator (PAPI-4) Each Runway End Runway End Identifier Lights (REILs) Each Runway End Distance Remaining Signs Precision Runway Markings - Runway 34 Nonprecision Runway Markings - Runway 16 **Medium Intensity Approach Lighting System with Runway Alignment Indicator Lighting (MALSR) - Runway 34**	High Intensity Runway Edge Lighting (HIRL) Medium Intensity Taxiway Edge Lighting (MITL) Lighted Runway/Taxiway Directional Signage Precision Approach Path Indicator (PAPI-4) Each Runway End Runway End Identifier Lights (REILs) Each Runway End Distance Remaining Signs Precision Runway Markings - Runway 34 Nonprecision Runway Markings - Runway 16 Medium Intensity Approach Lighting System with Runway Alignment Indicator Lighting (MALSR) - Runway 34
PARALLEL RUNWAY			
			**Medium Intensity Runway Edge Lighting (MIRL)** **Medium Intensity Taxiway Edge Lighting (MITL)** **Lighted Runway/Taxiway Directional Signage** **Precision Approach Path Indicator (PAPI-2) Each Runway End** **Runway End Identifier Lights (REILs) Each Runway End** **Basic Runway Markings**

Note: Items in bold represent future requirement

on all taxiways on the airfield. The existing airfield lighting systems, while adequate in intensity, will require routine maintenance and upgrades during the planning period. MITL should be planned for all future taxiways, including those serving the future parallel runway.

Airfield signage provides another means of notifying pilots of their location on the airport. A system of signs placed at several airfield intersections on the airport is the best method available to provide this guidance. Signs located at intersections of taxiways provide crucial information to avoid conflicts between moving aircraft. Directional signage instructs pilots as to the location of taxiways and terminal aprons. Mandatory hold signs are also installed at the airport. These signs alert the pilot of the proper location to stop and hold prior to taxiing to the runway. At Laughlin/Bullhead International Airport, all signs are lit. These signs are required for certification at the airport and must be maintained through the planning period. Directional signage will also be required for the future parallel runway.

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, a four-box precision approach slope indicator (PAPI-4) system has been installed at the Runway 16 and Runway 34 ends. The PAPI-4s are located on the east side of the runway approximately 700 feet south of the runway end. The PAPI consists of a series of lights that, when interpreted by the pilot, give him or her an indication of being above, below, or on the designed descent path to the runway. The PAPIs should be maintained through the planning period. PAPI-2s should be planned for each end of the future parallel runway.

Runway end identification lights (REILs) provide rapid and positive identification of the approach ends of a runway. An REIL system has been installed at each runway end. An REIL consists of two synchronized flashing lights, located laterally on each side of the runway threshold, facing the approaching aircraft. The REILs should be maintained through the planning period. REILs should be planned for each end of the future parallel runway.

To improve instrument approach minimums at the airport, an approach lighting system may ultimately be required. Therefore, a medium intensity approach lighting system with runway alignment indicator lights (MALSR) should be planned for Runway 34. An MALSR provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended centerline of the runway.

The location of an airport at night is universally indicated by a rotating beacon which projects two beams of light, one white and one green, 180 degrees apart. The rotating beacon at Laughlin/Bullhead International Airport is located atop a metal tower northeast of the Runway 16 end. The rotating beacon should be maintained through the planning period.

Runway 16-34 is equipped with distance remaining signs. These signs are set in 1,000-foot increments to notify the pilot of the remaining runway length. These signs should be maintained through the planning period.

The MIRL system on Runway 16-34 is connected to the pilot-controlled lighting system (PCL). This system allows pilots to turn on or increase the intensity of the MIRL from the aircraft with the use of the aircraft's radio transmitter. Future facility planning should include connecting the PAPIs, REILS, and future MALSR to the PCL.

Weather Reporting

The airport has a lighted wind cone and segmented circle. A lighted wind cone provides information to pilots regarding wind conditions. The segmented circle surrounds the lighted wind cone and provides traffic pattern information to pilots. A lighted wind sock is also available between the runway and Taxiway A adjacent to Taxiway A2, while another is located approximately 1,000 feet north of the Runway 34 threshold. The segmented circle and lighted wind cone are required by regulation as the airport traffic control tower (ATCT) is not open 24 hours a day. As shown on **Exhibit 3G**, these systems should be maintained through the planning period.

An Automated Weather Observation System III (AWOS-III) was installed at the airport in 2007. The AWOS automatically records weather conditions such as wind speed, wind gusts, wind direction,

Exhibit 3G
WEATHER/COMMUNICATION FACILITY REQUIREMENTS

EXISTING	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
Lighted Wind Indicator	Lighted Wind Indicator	Lighted Wind Indicator	Lighted Wind Indicator
Segmented Circle	Segmented Circle	Segmented Circle	Segmented Circle
Automated Weather Observing System (AWOS)	Automated Weather Observing System (AWOS)	Automated Weather Observing System (AWOS)	Automated Weather Observing System (AWOS)
Remote Transmitter/Receiver	Remote Transmitter/Receiver	Remote Transmitter/Receiver	Remote Transmitter/Receiver
Airport Traffic Control Tower (ATCT)	Airport Traffic Control Tower (ATCT)	Airport Traffic Control Tower (ATCT)	Airport Traffic Control Tower (ATCT)

variable wind direction, temperature, dew point, altimeter setting, density altitude, visibility, variable visibility, precipitation, sky condition, and cloud height. This information is then transmitted at regular intervals. The AWOS is located adjacent to the segmented circle and should be maintained through the planning period.

Communication Facilities

The ATCT is located east of the runway approximately at midfield. The ATCT is staffed through a contract with the FAA from 8:00 a.m. to 6:00 p.m. local time. Remote transmitter/receiver (RTR) equipment at the airport provides for contacting the Los Angeles ARTCC after the ATCT is closed for opening and closing flight plans. The ATCT and RTR enhance safety at the airport and should be maintained through the planning period.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling aircraft, passengers, and freight while on the ground. These facilities provide the essential interface between air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs.

AIRLINE TERMINAL

Components of the terminal area complex include the terminal building, gate positions, and apron area. This section identifies the facilities required to meet the airport's needs through the planning period.

The existing airline terminal area facilities were evaluated based on planning guidelines relating to the major functional elements of the terminal area as presented in AC 150/5360-9, *Planning and Design of Airport Terminal Facilities at Non-hub Locations*, the consultant's database of terminal planning criterion, and information collected during the inventory element to prepare estimates of various terminal building requirements.

Facility requirements were updated to reflect the planning horizon for enplanement milestones. This included the enplanement levels of 145,000, 200,000, and 375,000 annual enplaned passengers. Peak hour enplaned passenger levels dictate many of the terminal requirements. The peak hour enplaned passenger levels are forecast at 286, 310, and 508 passengers for each future planning horizon. These peak hour passengers reflect the introduction of regularly scheduled passenger services at the airport and the continuation of charter services supporting the gaming/resort activities in Laughlin, Nevada.

Airline terminal capacity and requirements were developed for the following functional areas as shown on **Exhibit 3H**.

- Airline Ticketing and Operations
- Departure Facilities
- Baggage Claim
- Terminal Services
- Public Use Areas and Security
- Administration/Support

Commercial airline terminal functions are provided in two separate single-level buildings located in the northeast portion of the airport. The main terminal building provides space for ticketing, airline operations, checked baggage screening and make-up, secure screening, rental cars, airport administration, and Transportation Security Administration (TSA) offices. Baggage claim is located at the far western end of the building. The baggage claim shelf and lobby are located outside in a covered area.

Departure functions are contained in a second separate building located southeast of the main terminal building. Access to this building is

Exhibit 3H
PASSENGER TERMINAL BUILDING REQUIREMENTS

		AVAILABLE	PASSENGER DEMAND LEVELS 145,000	200,000	375,000
	Peak Hour Enplaned Passengers	N/A	286	310	508
TICKETING					
	Counter Length (l.f.)	49	128	138	227
	Counter Area (s.f.)	0	1,300	1,400	2,300
	Ticket Lobby (s.f.)	1,400	3,200	3,500	5,700
	Airline Operations/ Bag Make-Up (s.f.)	1,400	6,900	8,100	11,100
DEPARTURE FACILITIES					
	Aircraft Gates	2	3	4	7
	Security Stations	2	2	2	3
	Checkpoint Security Screening/ Quequing Area (s.f.)	2,900	3,400	3,700	6,100
	Holdroom Area (s.f.) [Note 1]	6,300	6,300	6,800	11,200
BAGGAGE CLAIM					
	Claim Display (l.f.)	30	286	310	508
	Baggage Claim Lobby (s.f.) [Note 2]	1,200	7,900	7,600	14,00
TERMINAL SERVICES					
	Rental Car				
	Counter Length (l.f.)	24	95	103	169
	Office Area (s.f.)	600	1,900	2,100	3,400
	Counter Queue Area (s.f.)	300	1,000	1,100	1,700
	Food/Beverage (s.f.)	400	3,800	4,100	6,800
	Retail (s.f.)	0	1,000	1,100	1,700
	Restrooms (s.f.)	1,600	1,900	2,000	3,100
PUBLIC LOBBY					
	Seating/Greeting/Farewell Area/ Circulation (s.f.)	2,200	5,200	5,600	9,200
OTHER AREAS					
	Airport Adminstration/ Office Space	2,300	4,900	4,900	4,900
	Subtotal Programmed Area	20,600	48,700	52,000	81,200
	General Circulation	2,200	7,300	7,900	12,200
	Mechanical/Electrical, & Storage (s.f.)	N/A	5,600	6,100	9,300
TOTAL TERMINAL BUILDING		**22,800**	**61,600**	**66,000**	**102,700**

Note 1: Includes unused areas
Note 2: Existing square-footage not included in total.

via a covered secure walkway. The walkway is enclosed by chain link fencing and/or steel bar fencing on both sides. This building provides the departure gates, hold rooms, and vending/ snack bar. All aircraft boarding is ground level through aircraft stairs.

TICKETING AND AIRLINE OPERATIONS

The first destination for enplaning passengers in the terminal building is usually the airline ticket counter. The ticketing area consists of the ticket counters, queuing area for passengers in line at the counters, and the ticket lobby which provides circulation. Presently, there are up to four separate ticketing areas at Laughlin/Bullhead International Airport. Four airline offices are provided behind and adjacent to the ticket counters. The TSA has installed an explosive detections system (EDS) for checked baggage screening.

The ticket lobby should be arranged so that the enplaning passenger has immediate access and clear visibility to the individual airline ticket counters upon entering the building. Circulation patterns should allow the option of bypassing the counters with minimum interference. Provisions for seating should be minimal to avoid congestion and to encourage passengers to proceed to the gate area. Airline ticket counter frontage, counter area, counter queuing area, ticketing lobby, and airline office and operations area requirements for each potential enplanement level have been calculated. The current arrangement of the ticketing area meets these functional requirements.

The analysis of the airline ticketing functional areas at the airport indicates that additional area will be needed through the planning period. This includes additional counter length, ticket lobby space, and airline operations/baggage make-up.

DEPARTURE GATES AND HOLDROOMS

There are two ground level departure gates at the airport. While ground level loading and unloading of passengers can be used by regional jets which may provide scheduled airline service in the future, ground level boarding is more complicated for the large transport jets that utilize the airport for charter services. Long term facility planning should include second-level boarding capabilities with loading bridges. Furthermore, as shown on **Exhibit 3H**, long term planning anticipates the need for up to seven departure gates for peak periods.

The number of gates required to accommodate the combined peak hour activity and the aircraft seating capacities determines holdroom capacity requirements. Holdrooms should be sized to provide adequate space and area for the largest group of people that can use each gate. Currently, there is one large holdroom for passengers. Forecasts indicate that the existing holdroom area will need to be increased to meet peak passenger levels. Additional unused space is available in the departure facility for additional holdroom area, although this area will not meet projected long term needs.

PASSENGER SCREENING

Current security screening is positioned in the main terminal building. The size of the existing security areas, however, is not fully adequate to facilitate efficiency. The existing secure station queuing area is undersized for future peak passenger levels. Future areas should be planned to fully accommodate not only the needs of the security stations, but also increase queuing space.

BAGGAGE CLAIM

The passenger arrival process consists primarily of those facilities and functions that reunite the arriving passengers with their checked baggage. The existing claim device at the airport consists of a single display shelf located outside the main terminal building in a covered patio area. The bags are loaded onto the shelf via the baggage tug carts from the apron.

Short term planning should consider enclosing the baggage claim area. Forecasts call for an increase in the size of the current baggage claim area through the planning period. Future consideration would include a mechanized device to display baggage. The location of the baggage claim area will be more fully explored within the alternatives.

TERMINAL SERVICES

Similar to airline ticketing, rental car counter facilities include office, counter area, and queue areas. There are currently three counters identified for rental car services. The forecasts show a need for additional rental car area through the planning period. Additional space may be required sooner should additional rental car providers initiate service at the airport.

As shown on **Exhibit 3H**, additional space for food and beverages may be required through the long term. Retail space is also projected to be needed through the planning period. Public restroom space will need to increase through the planning period.

PUBLIC-USE AREA

The public lobby is where passengers or visitors may comfortably relax while waiting for arrivals or departures. In today's environment, visitors must remain out of the secure departure areas, so a public lobby is important. The terminal building provides more than 2,200 square feet of space for this purpose. Within the main terminal building, circulation space is particularly limited as most areas are dedicated for ticketing and passenger screening queuing. Additional circulation space will be needed through the long term planning period.

BUILDING SUPPORT AND ADMINISTRATION

Building support facilities include all miscellaneous spaces at the airport, including mechanical, telephone, business centers, walls/structures, and general circulation. As other components of the airport increase in size, so will supporting spaces.

The administrative offices are located within the terminal building. This includes space for airport management. The space needed for these facilities will be dependent upon the Mohave County Airport Authority's (MCAA) needs through the planning period.

TERMINAL APRON

The existing terminal apron encompasses approximately 43,100 square yards. Space is available to park up to three large transport jet aircraft. Depending upon future boarding gate design, more than 35,000 square yards of apron will be needed for aircraft parking. While the existing apron exceeds this space requirement, this apron is also used by the air cargo carriers.

TERMINAL ACCESS ROADWAY

Principal access to the terminal is from Laughlin View Drive. Laughlin View Drive is a two-lane road intersecting with Bullhead Parkway, north of the airport across the Highland Wash as well as to the east. The northern connection can be closed when there is high water present in the Highland Wash. Bullhead Parkway connects to the regional highway network. Access to the main terminal building is via a one-way loop road. The expansion of the terminal parking area eliminated the need to cross in front of the terminal. A new two-way access road extends along the northern section of the parking area. Access to the departure facility is via Aston Drive. Future access needs will be dependent upon the final location of the terminal.

TERMINAL CURB FRONTAGE

The curb element is the interface between the terminal building and the ground transportation system. The length of curb required for the loading and unloading of passengers and baggage is determined by the type and volume of ground vehicles anticipated in the peak period on the design day.

Exhibit 3J
AUTOMOBILE PARKING AND TERMINAL CURB REQUIREMENTS

	AVAILABLE	PASSENGER DEMAND LEVELS 145,000	200,000	375,000
AUTO PARKING				
Public Parking	310	207	270	493
Employee	NA	58	80	150
Rental Car	90	103	142	266
Total Auto Parking	400	368	492	909
TERMINAL CURB				
Length (ft)	330	560	610	990

A typical problem for terminal curb capacity is the length of dwell time for vehicles utilizing the curb. At airports where the curb front has not been strictly patrolled, vehicles have been known to be parked at the curb while the driver and/or riders are inside the terminal checking in, greeting arriving passengers, or awaiting baggage pick-up. Since most curbs are not designed for vehicles to remain curbside for more than two to three minutes, capacity problems can ensue. Since the events of 9/11, most airports police the curb front much more strictly for security reasons. This alone has reduced the curb front capacity problems at most airports.

At the airport, the terminal roadway provides one lane for loading and unloading of passengers and two through lanes for automobile flow. The curb frontage totals approximately 330 feet in length. As shown on **Exhibit 3J**, additional curb length may be needed through the planning period as peak passenger levels increase. This will avoid situations of double-parking near the bag claim or ticketing areas

VEHICLE PARKING

Vehicle parking in the airline passenger terminal area of the airport includes those spaces utilized by passengers, visitors, and employees of the airline terminal facilities. Parking spaces are classified as public, employee, and rental car. Most vehicle parking is located in a surface lot immediately north of the terminal building and is used for public, employee, and some rental car parking. A second rental car parking area is located east of the terminal building.

Exhibit 3J presents the parking requirements for the planning horizons. Public parking requirements were based upon design hour (short term) and design day (long term) passenger levels. Public parking will need to be significantly expanded through the planning period. Rental car parking needs depend upon the operational requirements of the rental car agencies. However, it appears that additional rental car spaces will be required through the planning period.

TERMINAL REQUIREMENTS SUMMARY

The existing space dedicated to passenger airline functions is insufficient to efficiently serve project-

ed airline passenger levels. Additional space will be needed to accommodate growth in passenger levels at the airport. This can only be accomplished through expansion of the existing buildings or new building construction. Additional parking areas will also be needed. The previous master plan relocated long term terminal functions to the south end of the airport to accommodate long term passenger levels. This will be reexamined within this Master Plan.

AIR CARGO

The two primary cargo-related facilities requiring analysis include the cargo apron and building space. Presently, there is no single building or facility dedicated solely to air cargo on the airport. Air cargo is presently transferred directly from aircraft to vehicles on the apron area. This practice is expected to continue through the planning period. The cargo carriers are currently located in temporary facilities along the southern edge of the apron. Facility planning should include relocating these carriers to the east edge of the apron so that the vehicles do not cross the entire apron and Taxiway A2 to reach the aircraft.

GENERAL AVIATION

General aviation facilities are those necessary for handling general aviation aircraft and passengers while on the ground. This section is devoted to identifying future general aviation facility needs during the planning period for the following types of facilities normally associated with general aviation terminal areas.

GENERAL AVIATION TERMINAL SERVICES

The general aviation facilities are often the first impression of the community that corporate officials and other visitors will encounter. General aviation terminal facilities at an airport provide space for passenger waiting, pilots' lounge, pilot flight planning, concessions, management, storage, and various other needs. Landmark Aviation plans the construction of a new 3,000-square-foot general aviation terminal in 2008.

The methodology used in estimating general aviation terminal facility needs was based upon the number of airport users expected to utilize general aviation facilities during the design hour. Space requirements for terminal facilities were based on providing 120 square feet per design hour itinerant passenger. **Exhibit 3K** outlines the space requirements for general aviation terminal services at Laughlin/Bullhead International Airport through the long term planning horizon. As shown in the table, up to 10,800 square feet of space should be provided in the long term for general aviation passengers.

HANGARS

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 tie-downs.

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, hangar development should be based upon actual demand trends and financial investment conditions.

Laughlin/Bullhead International Airport has a number of individual T-hangar spaces. T-hangars are popular with aircraft owners having only one small aircraft as they provide space for a single aircraft. Commonly, large T-hangar structures are constructed that combine several individual spaces within a larger structure, allowing aircraft owners privacy and individual access to their space. Conventional hangars range in configuration and total area. These hangars are open space facilities with no supporting structure interference. Often, other airport services are offered from the conventional hangars. There are 14 conventional hangars at the airport totaling 67,700 square feet. Currently, there are 15 individual T-hangar positions available on the airport. For T-hangars, a planning standard of 1,200 square feet per based aircraft will be used to determine future requirements.

The current storage mix indicates that all the hangars are full, with the remaining based aircraft located on the apron. In the future, the majority of single engine based aircraft were assumed to be located within the T-hangars, while all future turboprop, turbojet, and helicopters would be located within a conventional hangar. As the trend toward more sophisticated aircraft continues throughout the planning period, it is important to determine the need for more conventional hangars. For conventional hangars, a planning standard of 2,500 square feet per aircraft was utilized.

Since portions of the conventional hangars are also used for aircraft maintenance and servicing, requirements for maintenance/service hangar area were estimated using a planning standard of 20 percent of the conventional hangar space needs.

Future hangar requirements for the airport are summarized on **Exhibit 3K**. The analysis indicated that there will be a need for additional hangar storage positions, both T-hangar and conventional hangar, for storage of based general aviation aircraft. **Exhibit 3K** also presents hangar storage needs in terms of hangar square footage. By the long term of the plan, up to 380,200 square feet of aircraft storage space may be needed at the airport.

Exhibit 3K
GENERAL AVIATION FACILITY REQUIREMENTS

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
HANGAR AREA REQUIREMENTS				
Aircraft to be Hangared	37	64	93	151
T-Hangars	15	26	47	91
Conventional Hangar Positions	18-35	38	47	60
T-Hangar Area (s.f.)	19,400	51,200	113,900	246,200
Conventional Hangar Storage Area (s.f.)	67,700	71,900	86,000	111,700
Maintenance Area (s.f.)	N/A	14,200	17,200	22,300
Subtotal Convential Hangar Area (s.f.)	67,700	85,200	103,200	134,000
Total Hangar Area (s.f.)	87,100	136,400	217,100	380,200
OTHER FACILITIES				
		Aircraft Wash Rack	Aircraft Wash Rack	Aircraft Wash Rack
HELICOPTER OPERATIONS				
		Two Paved Hardstands	Two Paved Hardstands	Two Paved Hardstands
TERMINAL				
	3,800	3,900	5,800	10,800

AIRCRAFT PARKING APRON

A parking apron should be provided for transient aircraft, as well as some daytime ramp space to hold based aircraft. At the present time, there are 12 based aircraft stored on the ramp. With a total of 67 tiedown positions, approximately 82 percent of tiedowns are available for based and transient aircraft use. In the future, up to 25 based aircraft positions on the apron are forecast. Although some aircraft are stored in conventional hangars, they may be moved to the ramp during the day to provide hangar area for aircraft maintenance.

Exhibit 3L
AIRCRAFT PARKING APRON REQUIREMENTS

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
Single, Multi-engine Transient Aircraft Positions		11	15	29
Apron Area (s.y.)		9,000	12,200	23,000
Transient Business Aircraft Positions		5	7	10
Apron Area (s.y.)		8,000	11,200	16,000
Locally-Based Aircraft Positions		20	22	25
Apron Area (s.y.)		10,000	11,000	12,500
Total Positions	67	36	44	64
Total Apron Area (s.y.)	95,400	27,000	34,400	51,500

FAA Advisory Circular 150/5300-13, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At Laughlin/Bullhead International Airport, the number of itinerant spaces required was estimated to be approximately 15 percent of the busy-day itinerant operations. A planning criterion of 800 square yards was used for single and multi-engine itinerant aircraft, while a planning criterion of 1,600 square yards was used to determine the area for transient jet aircraft. As shown in **Exhibit 3L**, the existing general aviation apron and parking positions should be adequate through the planning period. The existing available apron area meets or exceeds all demand forecast requirements.

VEHICULAR PARKING

General aviation vehicular parking demands have also been determined for Laughlin/Bullhead International Airport. Space determinations were based on an evaluation of existing airport use, as well as industry standards. Terminal automobile parking spaces required to meet general aviation itinerant and fixed base operator (FBO) demands were calculated by multiplying design hour itinerant passengers by the industry standard of 1.9 in the short term, increasing to 2.5 for the long term as corporate operations increase. The parking requirements of based aircraft owners should also be considered. Although some owners prefer to park their vehicles in their hangar, safety can be compromised when automobile and aircraft movements are intermixed. For this reason, separate parking requirements, which consider one-half of based aircraft at the airport, were applied to general aviation automobile parking space requirements. Utilizing this methodology, parking requirements for general aviation activity is for 72 spaces in the Short Term Planning Horizon, 103 spaces in the Intermediate Term Planning Horizon, and 175 spaces in the Long Term Planning Horizon.

Presently, there are no existing paved general aviation parking areas. Access to the hangar area is along the apron. Facility planning should include developing paved parking areas at the airport and including segregated vehicle access to the aircraft hangars.

SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation facilities have been identified for inclusion in this master plan. Facility requirements have been identified for these remaining facilities:

- Aircraft Wash Facilities
- Helicopter Operations
- Airport Rescue and Firefighting Facilities
- Airport Maintenance Facilities
- Fuel Storage

AIRCRAFT WASH FACILITY

Presently, there are no designated aircraft wash facilities on the airport. Consideration should be given to establishing an aircraft wash facility at the airport to collect aircraft cleaning fluids used during the cleaning process.

HELICOPTER PARKING

Presently, there are eight helicopter parking areas on the airport. Helicopters operate on the apron areas shared by fixed-wing aircraft. Helicopter operations should be segregated to the extent practicable. Long term facility planning should consider establishing helicopter hardstands for segregating helicopter parking.

AIRCRAFT RESCUE AND FIREFIGHTING

Requirements for aircraft rescue and firefighting (ARFF) services at an airport are established under Title 14 of the Code of Federal Regulations (CFR) Part 139, which applies to the certification and operation of land airports served by any scheduled or unscheduled passenger operation of an air carrier using an aircraft with nine or more passenger seats. Paragraph 139.315 establishes ARFF index ratings based on the length of the largest aircraft with an average of five or more daily departures.

The following indicates the requirements for each ARFF Index and the associated equipment requirements:

Index A - Includes aircraft less than 90 feet in length (Saab 340, Regional Jet).
Index B - Includes aircraft at least 90 feet but less than 126 feet in length (Boeing 737).
Index C - Includes aircraft at least 126 feet but less than 159 feet in length (Boeing 757).
Index D - Includes aircraft at least 159 feet but less than 200 feet in length (Boeing 767).
Index E - Includes aircraft at least 200 feet in length (Boeing 747).

The Laughlin/Bullhead International Airport ARFF facility currently maintains Index B capability. To meet Index B requirements, at least one vehicle able to carry 500 pounds of sodium-based dry chemical or Halon 1211, 1,500 gallons of water, and the commensurate quantity of aqueous film forming foams AFFF for foam production is required. If two ARFF vehicles are used, one must carry those agents listed for Index A requirements, and the other vehicle must carry an amount of water and the commensurate quantity of AFFF so that the total quantity of water for foam production carried by both vehicles is at least 1,500 gallons.

The requirement to meet any higher index would need to be based on the number of daily operations of aircraft within that index. Regional jet aircraft are anticipated to be used through the planning period for scheduled passenger service. With the exception of the Embraer 145, all existing regional jets with less than 50 seats are less than 90 feet in length and fall within Index A. Larger seating capacity regional jets fall within Index B.

While Index B should be adequate through the planning period, Index C may become necessary if larger aircraft such as the Boeing 757 are utilized at the airport. Index C requires either of the following: (1) Three vehicles, one vehicle carrying 500 pounds of sodium-based dry chemical or halon 1211; or 450 pounds of potassium-based dry chemical and water with a commensurate quantity of AFFF to total 100 gallons for simultaneous dry chemical and AFFF foam application, and two vehicles carrying an amount of water and the commensurate quantity of AFFF so that the total quantity of water for foam production carried by all three vehicles is at least 3,000 gallons, or (2) Two vehicles, one vehicle carrying 500 pounds of sodium-based dry chemical or halon 1211; or 450 pounds of potassium-based dry chemical and water with a commensurate quantity of AFFF to total 100 gallons for simultaneous dry chemical and AFFF foam application, and one vehicle carrying an amount of water and the commensurate quantity of AFFF so that the total quantity of water for foam production carried by both vehicles is at least 3,000 gallons. Replacement of the existing ARFF vehicle should be considered in the short term.

The existing ARFF facility at Laughlin/Bullhead International Airport is located on the north end of the airfield, providing quick response capability. Regulations require that at least one vehicle must be capable of reaching the midpoint of the farthest runway within three minutes from the time of the alarm to the time of initial agent application. The existing location is well-suited to meet this criterion.

AVIATION FUEL STORAGE

All fuel storage and dispensing facilities at the airport are privately owned and operated. Presently, all Landmark fuel storage is in aboveground tanks located at the terminus of Aston Drive as shown previously on Exhibit 1C. Jet fuel storage totals 40,000 gallons. 100LL fuel storage totals 12,000 gallons. All fuel is dispensed via mobile fueling trucks. Tri-State Care Flight maintains a 12,000 gallon above ground fule storage tank between hangars 31 and 32 for self-fueling. Any future fuel storage needs should be determined by the FBOs providing fueling services and will be dependent upon delivery schedules. The existing consolidated fuel storage area should be maintained through the planning period, as this area provides ease of access for both the fuel delivery vehicles as well as the mobile fuel trucks.

AIRPORT MAINTENANCE FACILITIES

All equipment necessary to maintain the airport to Part 139 standards is available at the airport. The present airport maintenance facility is west of the passenger terminal building in the same building that stores the ARFF equipment. The alternatives analysis will examine alternative locations for an airport maintenance facility to provide more area and segregate from ARFF functions should that be desired by the MCAA in the future.

UTILITIES

Electrical, water, natural gas, and sanitary sewer services are available at the airport. No information collected during the inventory effort revealed any deficiencies in providing electrical, water, or sanitary sewer services at the airport. Therefore, it is assumed that all future infrastructure needs for these services will be sufficiently met.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet aviation demands projected for Laughlin/Bullhead International Airport through the long term planning horizon. Following the facility requirements determination, the next step is to develop a direction for development to best meet these projected needs. The remainder of the Master Plan will be devoted to outlining this direction, its schedule, and its costs.