



## 4

# AIRPORT FACILITY REQUIREMENTS

## AIRPORT DESIGN FACTORS

This chapter identifies the long-range airfield *and* terminal area facilities needed to satisfy the 20-year forecast of aviation demand at the Jefferson County International Airport (JCIA). Airport facilities have been identified based on the accumulation of inventory information and forecast demand elements, and planned in accordance with FAA airport design standards and airspace criteria. It should be noted, the identification of needed facilities does not constitute a *requirement* in terms of absolute design standards or goals, but rather an *option* for facility improvements to resolve various types of facility or operational inadequacies, or to make improvements as demand warrants.

*Airfield* facility components include runways, taxiways, navigational aids, airfield marking/signage and lighting. *Terminal area* facility components comprises hangars, terminal building, apron parking area, fuel quantity and storage size, public vehicle parking, and airport access requirements.

### **AIRPORT REFERENCE CODE (ARC) CLASSIFICATION**

**Table 4.1** identifies the airport reference code (ARC) at JCIA during each of the planning periods. The FAA has established airport design criteria based on the ARC designation, which provides minimum safety standards in accordance with the performance characteristics of the family of aircraft represented by the airport's *critical* or design aircraft. This particular aircraft, as determined with respect to approach speed and wingspan, is within a design category or family of airplanes that conduct at least 500 annual itinerant operations (combination of landings and takeoffs) per year at the Airport.

### **AIRFIELD DESIGN STANDARDS**

The airfield design and site layout has been determined by application of airport design standards contained in the *FAA Advisory Circular 150/5300-13 Change #6, Airport Design, Version 3.0, Computer Airport Design Program Model*. The model calculates the minimum separation distance between the following airfield components:

- Runway/taxiway distance separations;
- Surface grade and airspace slope;
- Runway threshold distances;
- Airfield safety areas (RSA, OFA, OFZ);
- NAVAID siting and safety areas;
- Runway protection zone (RPZ) size.



<b>Table 4.1</b> <b>Existing and Ultimate Airport Reference Code (ARC)</b> <b>Jefferson County International Airport</b>				
Runway	Existing ARC	Phase 1 ARC (0-5 Years)	Phase 2 ARC (5-10 Years)	Phase 3 ARC (10-20 Years)
Runway 9-27 (Primary)	B-I	B-I	B-I	B-II

Note: The most demanding (greatest) runway ARC per planning phase indicates the airport's ARC.

Note: ARC B-I classification has the following performance characteristics:  
Aircraft Approach Category B = an approach speed of 91 knots or more, but less than 121 knots.  
Airplane Design Group I = a wingspan of less than 49'

Note: ARC B-II classification has the following performance characteristics:  
Aircraft Approach Category B = an approach speed of 91 knots or more, but less than 121 knots.  
Airplane Design Group II = a wingspan of 49' up to, but not including 79'.

**Source:** BWR, Designated Airport Reference Code (ARC) Forecast, August 2002.

**RUNWAY LENGTH STANDARDS**

By design, the primary runway normally has the longest runway length, most favorable wind coverage, greatest pavement strength, and lowest straight-in instrument approach minimums. Its length is determined from the greater of the takeoff or landing performance characteristics required by the composite family of airplanes, as represented by the critical aircraft's airport reference code (ARC).

**Table 4.2** shows recommended runway length requirements for the JCIA computed from the FAA *Advisory Circular 150/5325-4A, Runway Length Requirements, Computer Program Version 4.1*. Recommended runway lengths, which for minimum safety purposes, are based on the most demanding aircraft and runway conditions, have been determined for JCIA using the following site factors: **1)** the airport elevation (107 feet mean sea level - compensating for the affects of density altitude and no wind); **2)** the average mean maximum daily temperature (72.1°F) for the hottest month (July); **3)** the effective runway gradient between runway ends (0.0 percent with a three (3) foot elevation difference between the primary runway ends); **4)** dry versus wet runway pavement; and **5)** the *critical* aircraft family of airplanes forecast to use the runway.

It should be noted that these performance factors are used for the design of airport runways, and not as a substitute for calculations required by airplane operating and performance characteristics.



<i>Table 4.2 Airport Runway Length Data – FAA Advisory Circular 150/ 5325-4A Jefferson County International Airport</i>		
<b>Airport and Runway Data</b>	<b>Input</b>	<b>Input</b>
Airport elevation	107'	107'
Mean daily maximum temperature of the hottest month	72.1° F	72.1° F
Maximum difference in runway centerline elevation	3 feet	3 feet
<b>Recommended Primary Runway Length / Corresponding ARC</b>	<b>Length-Dry</b>	<b>Length-Wet</b>
<i>Small airplanes with less than 10 passenger seats:</i>		
75 percent of these small airplanes (ARC A-I)	2,350'	2,350'
95 percent of these small airplanes (ARC B-I)	2,890'	2,890'
<b>100 percent of these small airplanes (ARC B-II)</b>	<b>3,430'</b>	<b>3,430'</b>
Small airplanes with 10 or more passenger seats (ARC B-II+10)	3,970'	3,970'
<i>Large airplanes less than 60,000 pounds:</i>		
75 percent of these large airplanes at 60 percent useful load	5,250'	5,250'
<b>Recommended Ultimate Runway Design / Corresponding ARC</b>	<b>Ultimate Runway Dimensions</b>	
Primary Runway 9-27 (ARC B-II)*	<b>3,500' x 75'</b>	
<b>Recommended Ultimate Runway Design/ Proposed Airfield Alternative (NPI approach)</b>	<b>Ultimate Runway Dimensions</b>	
Primary Runway 9-27 (ARC B-I)**	<b>3,200' x 75'</b>	
<p>Note: The recommended runway length is rounded to the next 100' increment beyond 30'.            Note: Wet &amp; slippery apply to landing distance/runway end elevation applies to takeoff distance.            Note: Useful load – includes all usable fuel, passengers and cargo.            Note: (*) Recommended runway dimensions based upon forecast aviation demand.            Note: (**) Recommended runway dimensions based upon proposed airfield alternative (NPI approach capability).            Note: Future projections are provided for planning purposes only. The rate or actual build-out experienced at the airport will occur based upon market factors consistent with the provisions of this plan.</p>		

**Source:** AC 150/ 5325-4A (FAA Computer Model), Runway Length Requirements For Airport Design.

**PRIMARY RUNWAY LENGTH/ WIDTH REQUIREMENTS**

Based on the FAA runway length model, the short-term and intermediate phase design length at JCIA is 2,900'. The current runway dimensions are 3,000' x 75'. The ultimate design length for the primary runway expands to 3,500' to accommodate 100 percent of small airplanes with less than ten (10) passenger seats within the ARC B-II family of aircraft during wet and slippery airfield conditions. The long-term unconstrained 3,500' length accommodates *all* small single-engine recreational/training aircraft, agricultural aircraft, all pressurized twin-piston airplanes, and the vast majority of medium to large ARC B-II turbine aircraft operating during the hottest months of the year at maximum gross takeoff weight. Because the representative critical aircraft (Raytheon/ Beechcraft KingAir C90B) is not anticipated to be based at the airport in the immediate future, the *composite* aircraft runway length was used for planning purposes.

**Primary Runway 9-27:** The Primary runway at JCIA, Runway 9-27 is 3,000 feet in length and in order to meet future airport use expectations, a 500-foot extension to either



end of the runway to fulfill ARC B-II design criteria should be considered. This extension could occur on either Runway 9 or Runway 27, or possibly both ends of the runway. Road relocation and realignment of State Highway 19 and/or State Highway 20 would be necessary to accommodate a runway extension of this magnitude. This runway extension would also be accompanied by installation and extension of additional Medium Intensity Runway Lighting (MIRL), as well as an extension of Taxiway 'A'. Due to the fact that the Port of Port Townsend owns property in fee simple off both runway ends, minimal property, if any, would need to be acquired for additional runway expansion.

However, in order to accommodate non-precision instrument (NPI) approach procedures, which will improve airport safety, only a 200-foot runway extension is required. Runways as short as 2,400 feet can support NPI approach with several restrictions and limitations. However, the recommended runway length for establishing an NPI approach is 3,200 feet. This length requirement is also accompanied by measures to ensure a safe, efficient, and unrestricted approach path to the airport which must be satisfied before the establishment of an approach can proceed. Consideration of the 200-foot extension to accommodate NPI approach capability would be the recommended course of action to increase the safety, utilization, and efficiency of JCIA throughout the 20-year planning period and beyond.

With respect to runway width, FAA airport design criteria recommends that runways and airports accommodating Design Group II aircraft (49'-78' wingspan) be at minimum 75 feet in width. Accordingly, the current width of Runway 9-27 is sufficient to accommodate the anticipated aviation demand at the airfield throughout the 20-year planning period and, therefore, will not require additional widening.

Lastly, the Washington State Pavement Management Program identified JCIA's runway surface as having a Pavement Condition Index (PCI) of 85-very good. Therefore, aside from slurry seal and crack seal maintenance projects, the paved runway surface itself would not require an asphalt overlay or a significant maintenance project until the latter stages of airport planning development, quite possibly in the 11-20 year timeframe.

## **CROSSWIND RUNWAY LENGTH/WIDTH REQUIREMENTS**

Crosswind runways are constructed to accommodate wind conditions and/or increase airfield capacity and safety. To meet FAA design recommendations, normally 95 percent wind coverage is desired. At JCIA, the current wind coverage is 93.5 percent at 10.5 knots. This review of local wind conditions confirms that Runway 9-27 does not provide sufficient crosswind capabilities for all aircraft based on the single runway configuration. Therefore, a crosswind runway, by design, would normally be recommended to satisfy airport design standards for prevailing crosswind conditions.

However, given the physical site constraints of the current JCIA location, a crosswind runway is not being considered as a viable option. First, the current wind coverage for the single runway, while not meeting the recommended 95 percent level, still remains excellent at 93.5 percent. The 1.5 percent reduction in coverage only affects about five days per year and given the

## FACILITY REQUIREMENTS



current level of activity, this would only affect about 700 aircraft operations per year. The current site is also physically constrained by state highways to the east and west, and natural terrain obstructions to the Part 77 airspace surfaces in the immediate vicinity of the airfield. The costs associated with significant airport expansion would likely prove to be cost prohibitive, and, therefore, not a feasible design option.

## TAXIWAY/TAXILANE REQUIREMENTS

By design, taxiways provide airfield and terminal area access, and enhance airport operational safety and capacity by minimizing runway occupancy. From a cost-benefit standpoint, taxiways are normally constructed progressively, with a full-parallel taxiway system planned for runways with 20,000 annual runway operations. Currently, Runway 9-27 experience greater than 20,000 annual operations (nearly 47,600 operations) and activity is expected to continue to increase throughout the planning period. The following is a discussion of taxiway design standards:

**Runway 9-27 Taxiway System:** Based on FAA design standards, for Design Group II aircraft, a 35' taxiway width and 75' turning radius is required for the Runway 9-27 parallel taxiway system. The present JCIA taxiway system (Taxiway A, B, and C) provide adequate and direct routing between the airfield and terminal/ aircraft ramp area.

- **Taxiway Alpha:** The minimum separation distance between the runway and full-length parallel taxiway centerline for an ARC B-II basic visual approach runway with greater than 1-mile visibility is 240', with hold position line markings at 200' perpendicular to the runway centerline. Currently, the parallel taxiway, Taxiway A, serving JCIA is 25' in width and has a centerline separation from the primary Runway of 225'. Therefore, based on FAA design standards, it would be recommended to widen Taxiway A to 35' and set back an additional 15' from the runway centerline. Given the anticipated Design Group II aviation activity to occur during the long-term phase of airport development, this taxiway realignment and widening project would most likely be planned during the 11-20 year planning stage.
- **Taxiway Bravo:** The mid-field exit/connector taxiway for Runway 9-27 is 35' in width at the runway midpoint and narrows to 25' in width as the taxiway extends into the airport terminal area/aircraft apron. Taxiway B is recommended to be widened from 25' to 35' from where it provides access between the terminal area and Taxiway A. This improvement would be undertaken when the airport has sufficient activity by Group II aircraft, again likely in the long-term planning stage.
- **Taxiway Charlie:** This taxiway provides access to the airport terminal/aircraft parking area, as well as the west side hangar area near the Runway 9 vicinity and is currently 25' in width. It is recommended to widen Taxiway C from 25' to 35' from where it provides access between the terminal area/hangar area and Taxiway A (11-20 year planning stage).



According to the Washington State Pavement Management Program, the JCIA taxiway system has a Pavement Condition Index (PCI) rating of 97- excellent. Given the operational activity of Runway 9-27, regular pavement maintenance and airfield inspections of the JCIA taxiway system is recommended for future planning and design considerations to maintain the condition the asphalt surface. In addition, the current taxiway system is marked with blue omni-directional reflectors and is considered to be adequate throughout the 20-year planning period. Should the Airport receive a published instrument approach, as well as upgrade the facility to ARC B-II, medium intensity taxiway lighting (MITL) is recommended to be installed for the taxiway system, particularly Taxiway A.

## **TAXILANE REQUIREMENTS**

Taxilanes provide access to airplane parking areas, fueling areas, and hangars. Typically, taxilanes are 20'-25' in width at general aviation airports. Taxilane routes are designated by a single white solid stripe marking. Just as taxiways and other paved areas, taxilanes should be visually inspected periodically to ensure surface continuity and condition. In addition, taxilanes also have specific object free areas which accommodate for proper wingtip clearance and should be separated or spaced as appropriate to allow aircraft to maneuver freely throughout the airport terminal area complex. Taxilanes and the associated taxilane object free areas are depicted in greater detail on the JCIA Terminal Area Drawing within the Airport Layout Plan set of drawings.





## **RUNWAY AND TAXIWAY PAVEMENT STRENGTH STANDARDS**

The two categories of pavement surface present at JCIA are asphalt and concrete. Concrete surrounds the underground storage tanks, as well as the fuel metering and dispensing facilities. The characteristics of concrete includes a hard, rigid surface which includes seams or joints for expansion and contraction while at the same time allowing for high compression from increased aircraft loading. Also, concrete resists weathering, as well as the corrosive effects or solvent actions of fuel and oil deposits. This makes concrete ideal for accommodating fuel facilities and the adjacent area. Asphalt, on the other hand, is less expensive to maintain and install than concrete and is flexible so expansion joints and seams are not needed. Also, since asphalt is petroleum based, it tends to be susceptible to oxidation from ultra-violet (UV) rays, as well as the solvent action of fuel and oil. Hence, asphalt requires more upkeep and maintenance activity. Given the fact that a vast majority of JCIA's paved surfaces are asphalt and that paved surfaces represent a major capital investment and maintenance responsibility, it important for the airport sponsor to ensure that, through regular physical inspection, the asphalt surfaces at JCIA are able to continue to withstand and accommodate the operational frequency and operating conditions taking place at JCIA now and in the future.



**AIRCRAFT PAVEMENT STRENGTH DEMANDS**

**Table 4.3** lists common ARC B-I and B-II business aircraft now using and forecast to operate at the JCIA. The ARC B-II category of aircraft includes small and large general aviation airplanes having a wide-range of performance capabilities and maximum operating weights ranging between 5,500 to 22,000 pounds. The aircraft fleet mix forecast indicates the most demanding aircraft (over 12,500 lbs.) anticipated to operate at JCIA would have a maximum takeoff weight of 22,000 pounds, with the majority of the ARC B-I and B-II operations expected to be conducted by aircraft with weights ranging between 5,500 pounds and 10,100 pounds (single-wheel gear). It is expected that most ARC B-II operations would likely operate at less than maximum gross, with weights averaging less than 12,500 pounds (swg).

<i>Table 4.3 Common ARC B-I to B-II Business Aircraft Jefferson County International Airport</i>				
Aircraft	Aircraft Type	ARC	Gear Type	Take-off Weight
<i>Current and Forecast Aircraft Use- Small Aircraft (Less than 12,500 lbs.)</i>				
<b>Beechcraft Baron B-58 ()</b>	<b>Small Twin Piston</b>	<b>B-I</b>	<b>Single Wheel</b>	<b>5,500lbs.</b>
Cessna 400 Series	Small Twin Piston	B-I	Single Wheel	6,300-10,000 lbs.
Cessna Grand Caravan	Single Turboprop	B-I	Single Wheel	8,785 lbs.
Piper Cheyenne II	Twin Turboprop	B-II	Single Wheel	12,050 lbs.
<b>Beech King Air Series (C90B, 200, 300) ()</b>	<b>Medium-Large Twin Turboprop</b>	<b>B-II</b>	<b>Single Wheel</b>	<b>9,650-12,500 lbs.</b>
<i>Current and Forecast Aircraft Use- Large Aircraft (Greater than 12,500 lbs.)</i>				
Beech Super King 350	Large Twin Turboprop	B-II	Single Wheel	15,000 lbs.
Beechjet 400 Series	Business Turbofan	B-I	Single Wheel	16,400 lbs.
Cessna Citation Series	Corporate Turbofan	B-II	Single Wheel	13,300-22,000 lbs.
Note: Existing Critical Aircraft (  ) Note: Future Critical Aircraft (  )				

**Source:** FAA Advisory Circular 150/5300-13, Change #6, Airport Design, 2000; FAA Advisory Circular 150/5325-4A, Runway Length Requirements For Airport Design, 1990.

**Table 4.4** identifies the ultimate runway and taxiway strengths recommended for each major pavement surface at the JCIA. Taxiways and aircraft parking aprons are considered important aircraft operational areas and should be constructed to the same weight bearing strength standards as the primary runway.



<p style="text-align: center;"><i>Table 4.4 Existing/Ulimate Pavement Strength Jefferson County International Airport</i></p>			
Pavement Area	Existing Pavement Condition Index (PCI)	Existing Pavement Strength (lbs.)	Ultimate Pavement Design Strength (lbs.)
Primary Runway 9-27	85- Very Good	12,500 lbs. (swg)	12,500 lbs. (swg)
Taxiway Alpha	97- Excellent	12,500 lbs. (swg)	12,500 lbs. (swg)
Taxiway Bravo	97- Excellent	12,500 lbs. (swg)	12,500 lbs. (swg)
Taxiway Charlie	97- Excellent	12,500 lbs. (swg)	12,500 lbs. (swg)
Main Tie-Down/ Apron Area	93- Excellent	12,500 lbs. (swg)	12,500 lbs. (swg)
East Terminal Area Tie-Down Extension	93- Excellent	12,500 lbs. (swg)	12,500 lbs. (swg)

**Note:** The gear type and configuration dictate how the aircraft weight is distributed to the pavement and determines the pavement response to aircraft loadings. (swg): single-wheel gear aircraft – each landing gear is supported by a single tire.

Source: FAA Advisory Circular 150/5300-13, Change #6, *Airport Design*, 2002.

## **AIRFIELD SAFETY AREA REQUIREMENTS**

Maintaining the existing airport infrastructure and being in compliance with current airport design standards is required to maintain a minimum and reasonable level of airport operational safety and efficiency. The major airport design elements, as follows, are established from FAA Advisory Circular 150/5300-13, *Change #6, Airport Design* and FAR Part 77, *Objects Affecting Navigable Airspace*, and should conform with FAA airport design criteria without modification to standards. The design requirements are identified and graphically shown on the Airport Layout Plan (ALP) drawings.

**Runway Safety Area (RSA):** The RSA is a two-dimensional surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway. Under dry conditions, the RSA must support an airplane without causing structural damage to the airplane or injury to the occupants. The RSA must be cleared and free of objects except those required for air-navigation, and graded to transverse and longitudinal standards to prevent water accumulation.

The existing RSA at JCIA is 120 feet in width and extends 240 feet beyond the end of the runway. The ultimate dimensions of the RSA for the JCIA will be 150 feet wide and extend 300 feet beyond the runway end(s).



**Object Free Area (OFA):** The OFA is a two-dimensional area on the ground centered on the runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for those that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. An object is considered any ground structure, navigational aid, person, equipment, terrain or parked aircraft.

The OFA at JCIA is currently dimensioned at 400' wide and extends 240' beyond the runway end. The ultimate OFA dimensions will be 500' wide and extend out to 300' beyond the runway ends.

**Building Restriction Line (BRL):** The BRL represents the boundary that delineates the airside and landside of the airport, and identifies area on airport property suitable for building area locations based on airspace and visibility restrictions. The BRL, recommended to provide at 35.0'-above ground clearance, is established with reference to FAR Part 77 criteria, in addition to other design factors.

The existing and ultimate BRL centerline separation for Runway 9-27 will be 370 feet to provide 35 feet of structure clearance. The 370-foot BRL offset is consistent with basic visual approach visibility minimums at facilities expected serve primarily small aircraft (below 12,500 pounds).

**Runway Protection Zone (RPZ):** The purpose of the RPZ is to enhance the protection of people and property on the ground, and to prevent obstructions from being a potential hazard to aircraft. The RPZ is a two-dimensional trapezoid area beginning 200 feet beyond the paved runway end, and extends along the runway centerline. The RPZ size is determined by the Aircraft Approach Category of airplanes expected to utilize the airport, as well as the type of instrument approach or minimum visibility to the runway ends (visual; non-precision and precision with not lower than 1-mile;  $\frac{3}{4}$ -mile; or as low as  $\frac{1}{2}$ -mile). The FAA recommends that airport sponsor own the RPZ property in fee simple, and that the RPZ be clear of any non-aeronautical structure of public assembly or object that would interfere with the arrival and departure of aircraft. At current, the Port of Port Townsend owns the RPZ in fee simple ownership.

The current and existing RPZs for JCIA will be sized to accommodate primarily small aircraft with basic visual approach capabilities. The RPZ size is approximately 8 acres in size.

**Runway Obstacle Free Zone (ROFZ):** The OFZ is the airspace below 150 feet above the established airport elevation and centered on the runway centerline, and precludes all objects including taxiing and parked airplanes, and object penetrations except for frangible visual post mounted NAVAIDS expressly located in the OFZ by function.

The existing and ultimate ROFZ at JCIA is 250 feet in width and extends 200 feet beyond both of the runway ends.



**FAR Part 77 Approach Slope/Surface:** The approach slope is a three-dimensional FAR Part 77 trapezoid area beyond each runway end having a defined slope for clearance over structures and objects beyond the runway threshold. The purpose of the approach slope/surface is to provide proper clearance for the efficient and safe approach and departure of aircraft.

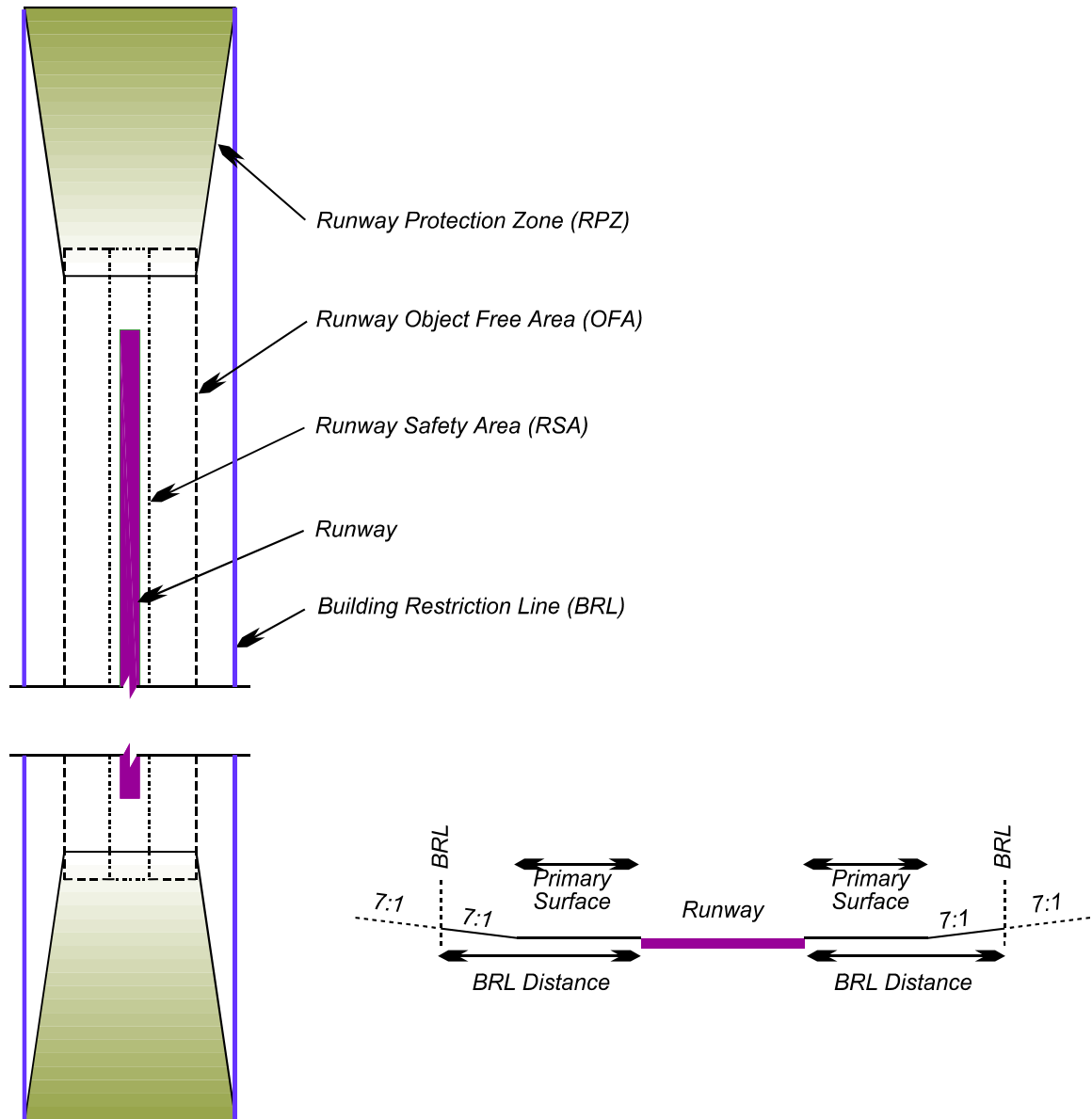
The FAR Part 77 approach slope surfaces for Runways 9 and 27 are 20:1 allowing day basic visual approach procedures for small aircraft exclusively.

**Crop Restriction Line (CRL):** The CRL is a boundary used to control concurrent on-airport agricultural areas in order to achieve unobstructed safety standards. Restricting agricultural operations to areas outside the RSA, ROFA, TOFA, OFZ and RVZ will normally provide the minimum object clearances. Agricultural operations are also excluded from critical areas associated with the establishment of navigational and visual approach aids.

**Exhibit 4.1** depicts the airport safety areas (RPZ, OFA, RSA and BRL). **Exhibit 4.2** depicts the FAR Part 77 imaginary airspace surfaces and design criteria.



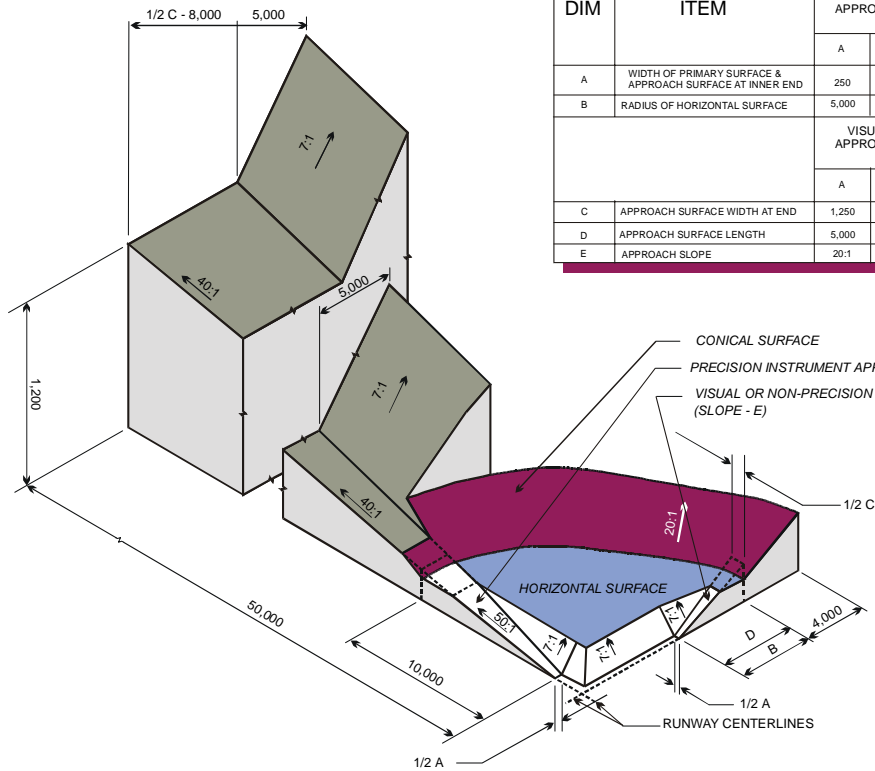
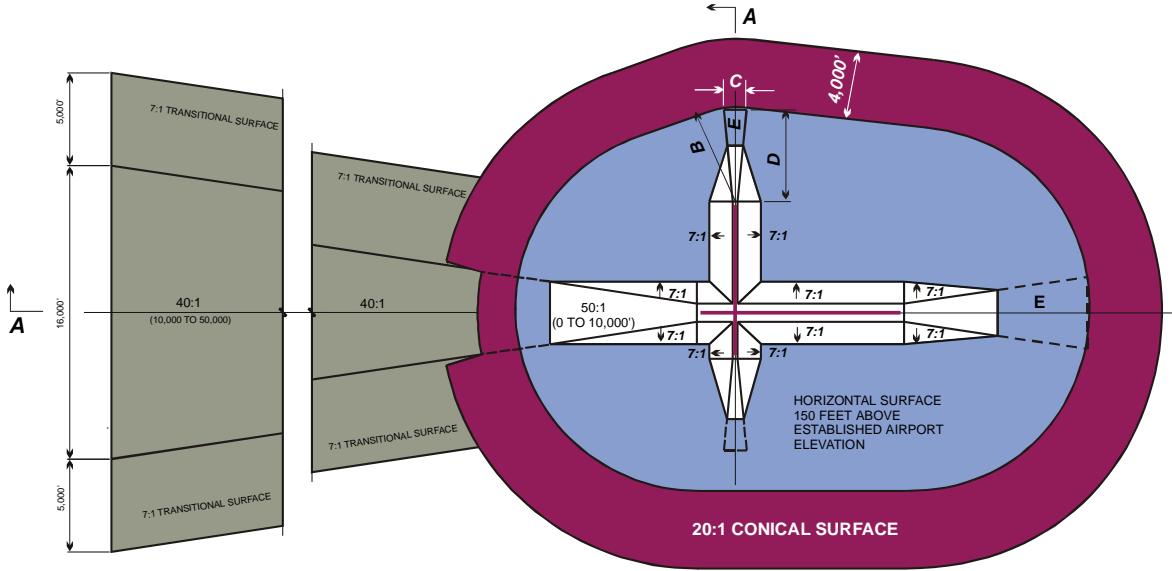
**EXHIBIT 4.1: RUNWAY SAFETY AREA REQUIREMENTS**



Source: FAA Advisory Circular 150/5300-13, Change #5, Airport Design, 1998



**EXHIBIT 4.2: FAR PART 77 - IMAGINARY AIRPORT SURFACES**



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH		PRECISION INSTRUMENT RUNWAY	
		A	B	A	B		
A	WIDTH OF PRIMARY SURFACE & APPROACH SURFACE AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	-
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	-

Source: FAA FAR Part 77, Objects Affecting Navigable Airspace, 1978



## AIRPORT LIGHTING AND MARKING REQUIREMENTS

Airport lighting is used to assist in maximizing the utility of the airport during day, night, and adverse weather conditions. The following lighting systems and airport markings are recommended airfield items for JCIA.

**Runway Lighting/Pavement Marking:** Medium Intensity Runway Lighting (MIRL) defines the lateral and longitudinal limits of the runway. White MIRL, with pilot-controlled system, is the recommended standard lighting system for runways with a straight-in instrument approach procedure or when a facility accommodates Category B and turbine powered aircraft. Runway lighting systems should adhere to requirements as prescribed in *FAA Advisory Circular 150/ 5340-24, Runway and Taxiway Edge Lighting System*. Runway pavement markings should adhere to requirements as prescribed in *FAA Advisory Circular 150/5340-1H, Standards for Airport Markings*.

As a basic visual approach runway, Runway 9-27 should be marked only with white runway end designation numbers, as well as a white dashed runway centerline marking. Depending on the frequency of snow and ice removal activity at the airport, the runway markings may require repainting every 2-4 years. The markings and MIRL for Runway 9-27 appear to be in good physical condition.

**Taxiway Marking/Pavement Marking:** Blue or white omni-directional reflectors are sufficient to delineate the lateral limits of the airport taxiways, in lieu of Medium Intensity Taxiway Lighting (MITL). Centerline reflectors, in combination with a solid yellow/ white centerline stripe, are recommended for all taxiways and taxilanes. All paved taxiways and taxilanes are recommended to be painted with standard taxiway markings as prescribed in *FAA Advisory Circular 150/5340-1H, Standards for Airport Markings*.

**Runway End Identifier Lights (REILs):** This REIL lighting system provides rapid and positive identification of the runway approach end, consisting of a pair of white synchronized high-intensity photo-strobe lights located laterally along the runway threshold. REILs can be outfitted to a basic visual runway in cases which there is a lack of visual acuity and contrast with the surrounding landscape, particularly terrain, or surrounding ambient off-airport lighting. The REILs are highly recommended to be unobstructed from aircraft on the final approach path to the runway.

**Visual Guidance Approach Aids:** Visual guidance approach aids, such as a Precision Approach Path Indicator (PAPI-2L/2R), a two unit/lamp apparatus, emits red and white colored light beams providing continuous visual descent guidance information along the final approach path (normally at 3 degrees for 3 nautical miles during daytime, and up to 5 nautical miles at night) to the desired runway touchdown point. The system is installed in a row perpendicular to the runway being located 600-800 feet down the runway and offset 50 feet to the left or right side. It is recommended that each paved runway end have visual guidance indicators, particularly those ends where rising terrain might be an issue on the final approach path.



Runway 9-27 currently has a PAPI-2L/2R in operation for the 9 and 27 ends and appears to be in good operating condition. With an extension of Runway 9-27, the PAPIs would require removal and relocation on the affected runway end.

**Airport Signage:** Standard airport signs provide mandatory instructions, runway and taxiway location, directional and destination information, as well as airport special informational signage providing awareness for aircraft maneuvering on the ground. *FAA Advisory Circular 150/5345-44F, Specifications for Taxiway and Runway Signs* and *FAA Advisory Circular 150/5340-18C, Standards for Airport Sign Systems*, should be followed for continued proper implementation and maintenance of airport signs.

The current airfield signage at JCIA, in some instances, appears to be non-standard and is recommended to be improved to follow specification as outlined in signage system Advisory Circulars.

**Wind Indicator/ Segmented Circle and Airport Beacon:** A dual colored red, yellow, or white segmented circle with a lighted wind indicator or wind sock is required as the standard indication of the wind direction and airport traffic pattern in the vicinity of the airport. Segmented circles should remain clear of all runway and taxiway safety areas and object free areas. The wind sock support pole should not be so tall as to encroach on FAP Part 77 airspace surfaces in the vicinity of the runway and it is also recommended to be orange in color. The wind sock is recommended to have a minimum opening diameter of 18 inches providing wind speed observations from five to 50 miles per hour and also should be distinguished by either white, yellow, or orange marking.

The airport beacon provides visual airport identification and location during night-time operations, as well as during inclement weather conditions (IFR). The light emitted from a beacon should be angled from one to ten degrees above the horizon depending upon the surrounding terrain or obstructions. Airport beacons should be regulated to emit a white-green flash of light at a rate of two to five times per minute.

The airport beacon at JCIA, located to the north of the main terminal area complex, is atop elevated ground with tree lines surrounding the area. The trees adjacent to the airport beacon are recommended to be topped regularly or removed to prevent obstruction of the light pulses to local aircraft activity. If this option is not possible, it might be well advised to remove and relocate the airport beacon to a point closer to the terminal area or airfield.



## AIRPORT NAVIGATION SYSTEMS (NAVAIDS)

Airport navigation aids (NAVAIDS) are installed on or near the airport to increase an airport's reliability during night and inclement weather conditions, and to provide electronic guidance and visual references for executing an approach to the airport or runway. Published instrument approach procedures are developed under the guidelines located in FAA Handbook 9260.3B, United State Standard for Terminal Instrument Approach Procedures (TERP), which specifies minimum activity levels to qualify for instrument approach equipment and approach procedures. The airport sponsor/owner/operator may request the establishment of published instrument approach procedure. Typically, precision instrument approach capabilities are planned when actual airport instrument approaches exceed 200. Based on airport activity and instrument flight rules (IFR) conditions, at this point in the study, basic visual approaches are planned for both runway ends. For information, the following paragraphs, however, describe the status of existing and new NAVAIDs used at general aviation airports, particularly those systems available to JCIA should an instrument approach procedure be considered in the future.

**Global Positioning System (GPS):** GPS is a highly accurate satellite based navigation system requiring three or more signals from any of the 24 GPS satellites currently in use to pinpoint the location of an aircraft. A GPS receiver on board an aircraft calculates time and distance measurements to determine relative aircraft position and velocity. The calculated aircraft position is accurate to within a few feet or a few meters. In addition, the concept of Differential GPS (DGPS) portends to provide the necessary accuracy for precision approaches (CAT I) through the installation of ground-based reference stations to improve the GPS signal accuracy. The key advantage of DGPS is that the improved signal accuracy, as well as the ground-based reference station will allow aircraft to make PI approaches a number of runway at a multitude of airports within a certain radius of the DGPS installation.

**Wide Area Augmentation System (WAAS):** WAAS is designed to enhance the capabilities of GPS signals to allow for CAT I precision instrument approaches without the need for on-airport ground-based equipment. Simply, WAAS will provide a ground-based augmentation signal through the installation of 24 ground-based stations to be coupled with the 24 GPS satellites to provide the necessary margin of safety and accuracy to allow CAT I precision instrument approaches to most U.S. airports.

**Local Area Augmentation System (LAAS):** LAAS involves the installation of a ground-based transmitter at an airport facility that augments satellite signals to provide for CAT II and CAT III precision instrument approaches at airports located within 60 miles of a LAAS transmitting station.



## **MISCELLANEOUS AIRFIELD FACILITY REQUIREMENTS**

### ***AIRFIELD FENCING/ SECURITY REQUIREMENTS***

Perimeter fencing, electronic gate access, and terminal area fencing between airport property and public (along the airport property boundary/perimeter) areas are recommended to discourage unauthorized access by people and wildlife to the airfield operating environment. For general aviation airports such as JCIA, the specific location, type and height of fencing is dependent upon the level of security desired by the airport sponsor and by the number and types of penetrations of the airport operations area. In the terminal area, medium intensity pole mounted lighting can supplement fencing as an added element of security. Generally, where wildlife hazards are not an issue, perimeter fencing is 4-5 feet in height. Where there is potential for wildlife hazards, the fencing is recommended to be from 7-10 feet above ground level.

Installation of perimeter fencing, at minimum, is recommended for JCIA within the initial phase of airport development. Terminal area fencing and electronic access gates, including installation of additional terminal area lights are also recommended within the initial to mid-phase of airport development.

## **SUMMARY OF AIRSIDE FACILITY REQUIREMENTS**

**Table 4.5** provides a summary of runway and airside facility requirements to accommodate the level of activity projected for the JCIA for each of the three planning phases spanning the 20-year planning period.



**Table 4.5**  
**Summary of Airside Facility Requirements**  
**Jefferson County International Airport**

Airport Component	Existing (2002)	Phase 1 Short-Term (0-5 Years)	Phase 2 Mid-Term (6-10 Years)	Phase 3 Long-Term (11-20 Years)
<b>RUNWAY 9-27</b> <b>Runway Strength</b> <b>Runway Marking</b> <b>Runway Lights</b> <b>Visual Guidance</b>	3,000' x 75' 12,500 lbs. (swg) Basic Visual MIRL REILs – 9 & 27 PAPI-2L – 9 PAPI-2R – 27	3,200' x 75' 12,500 lbs. (swg) NPI MIRL REILs – 9 & 27 PAPI-2L – 9 PAPI-2R – 27	3,200' x 75' 12,500 lbs. (swg) NPI MIRL REILs – 9 & 27 PAPI-2L – 9 PAPI-2R – 27	3,200' x 75' 12,500 lbs. (swg) NPI MIRL REILs – 9 & 27 PAPI-2L – 9 PAPI-2R – 27
<b>Taxiway System</b> <b>Taxiway Marking</b>	Full Parallel Blue Reflectors	Full Parallel MITL	Full Parallel MITL	Full Parallel MITL
<b>Airport Navigational (NAVAIDs)</b>	None	GPS/ LAAS & WAAS (optional only)	GPS/ LAAS & WAAS (optional only)	GPS/ LAAS & WAAS (optional only)

Acronyms: (GPS) Global Positioning System (MIRL) Medium Intensity Runway Lights  
(PAPI) Precision Approach Path Indicators (REIL) Runway End Identifier Lights  
(MITL) Medium Intensity Taxiway Lighting (NPI) Non-Precision Instrument

Note: Future projections are provided for planning purposes only. The rate or actual build-out experienced at the airport will occur based upon market factors consistent with the provisions of this plan.

**Source:** BWR, Airport Facility Requirement Summary, August 2002.  
 FAA Advisory Circular 150/5300-13, Change #6, *Airport Design*, 2002.

## **COMMERCIAL SERVICE TERMINAL AREA FACILITY REQUIREMENTS**

The commercial service terminal area is defined as the portion of JCIA terminal area that will accommodate potential non-scheduled, scheduled, or chartered commercial service aircraft and passengers. This defined area will share portions of the airport terminal building, aircraft apron, fuel facilities, as well as automobile parking space with general aviation aircraft and users that also utilize the same services and amenities at JCIA. A separate analysis was prepared for each terminal area component to determine future development requirements for cumulative commercial service activity and demand levels. The commercial service components located within the terminal area includes the following structures, services and activities:

- Passenger terminal building
- Passenger terminal parking and road access
- Commercial service aircraft ramp/ apron areas
- Fuel facilities for commercial service
- Passenger terminal fencing/ lighting



**COMMERCIAL SERVICE PEAKING CHARACTERISTICS**

**Table 4.6** summarizes the 20-year commercial service peaking characteristics calculated from the forecast of potential commercial service activity. Peaking characteristics quantify spacial requirements and facility capacities required to accommodate the anticipated commercial service aviation demand levels at the airport. The *peak hour enplaned passenger* refers to the average number of air passengers expected to use the terminal area during the average day of the peak month (design day). Passenger peaking activity can be cyclical, remain constant, or become stagnant. Passenger activity is based primarily upon the prevailing economic conditions of the local and national economies, airline economical condition and solvency, or the demand for or lack of demand for passenger service.

<i>Table 4.6 Commercial Service Activity Peaking Characteristics Jefferson County International Airport</i>					
000	2002	2007	2012	2017	2022
<b>Annual Passenger Enplanements</b>	1,041	1,300	2,600	3,500	5,200
<b>Peak Month Enplanements</b>	125	156	312	420	624
<b>Design Day Enplanements</b>	4	5	10	14	21
<b>Peak Hour Passenger Enplanements</b>	2	2	5	6	9
<i>Peak Month = Annual operations x 12%</i> <i>Design Day (Average Day of Peak Month) = Peak Month Operations / 30 Days Per Month</i> <i>Peak Hour = Design Day Enplanements x 45%</i>					

**Source:** BWR Commercial Service Activity Peaking Characteristics, August 2002.

**COMMERCIAL SERVICE PASSENGER TERMINAL AREA/SPACE REQUIREMENTS**

The commercial passenger terminal building provides an important functional role central to the operation, promotion and visibility of the airport. Processing of enplaning and deplaning passenger is the primary function of the passenger terminal building. Based on an assessment of commercial service demands, the following individual terminal building components were identified for JCIA based on the accommodation of average peak-hour activity estimate during the planning period:

- Airline ticket counters
- Lobby and waiting area
- Airline administrative office space
- Concessions area
- Public restrooms and telephones
- Snow removal and equipment storage area

Based on an assessment of the commercial service demand requirements at JCIA, the following recommendations should be considered in the event that commercial service activity once again occurs at JCIA.



- The terminal area will revolve around a centralized terminal building layout, where all passenger processing takes place at a centralized location. At general aviation airports with less than 100,000 annual operations, such as JCIA, a simple terminal building design concept is applicable. This concept has the passenger walking onto the airport ramp/ apron to board aircraft. Additionally, this concept provides for ample curb frontage and short walking distances for airport patrons.
- The airport terminal building is the interface between ground and air transportation and must be safe, efficient, and comfortable. In pursuing terminal building development, the overall design must strive for passenger convenience, demonstrate operational efficiency for the landside, as well as airside components of the airport, expandability to meet forecast demand and needs, and be aesthetically pleasing to convey community pride, value, and tradition.
- Initially, 360 to 1,620 square feet would be required to properly accommodate the estimated commercial service passenger demand at JCIA, not including general aviation peak hour activity. A dedicated airport terminal would be required to accommodate commercial service, as well as general aviation passenger mix.
- Any terminal building under development must adhere to requirements as set forth in Title II of the Americans with Disabilities Act of 1990 (ADA), as well as comply with Americans with Disabilities Act Accessibility Guidelines (ADAAG) (1991).

## **COMMERCIAL SERVICE AIRCRAFT APRON/RAMP AREA**

At present, the main tie-down ramp/ apron area at JCIA accommodates 10,967 square yards of space. This main apron would be ideal to host twin-engine commercial service aircraft. Initially, should commercial service begin at JCIA in the near future, one (1) designated commercial service aircraft tie-down would be required. Approximately 360 square yards (3,240 square feet) is recommended to host aircraft for this type of use. For future commercial aircraft tie-down space requirements, one (1) additional tie-down space equaling 360 square yards (3,240 square feet) of ramp space is recommended bringing the total commercial aircraft tie-down space requirements to two (2) aircraft tie-downs. From that point forward, commercial tie-downs would be added as demand would warrant.

- Medium intensity fluorescent lighting is recommended to light the designated commercial service apron area during periods from sunset to sunrise. Additionally, these tie-downs should be located in close proximity to the airport passenger terminal with unrestricted passenger ingress from the terminal building.

## **COMMERCIAL SERVICE TERMINAL AREA AUTO PARKING**

As a rule of thumb, commercial service auto parking demand increases proportionally to the increase in peak hour passenger enplanements. The commercial service auto parking requirements are based on approximately 1.5 spaces times the peak hour passenger.



Approximately 330 square feet (36.6 square yards) per parking space should be provided, plus an additional 50 percent of that total area for maneuvering purposes.

- For future auto parking space requirements, approximately 14 auto parking spaces (6,950 square feet/770 square yards) should be set aside for commercial service passenger use with one (1) parking space being handicapped designated, as well as one (1) parking space being van accessible for disabled passengers. Additionally, passenger auto parking should be sited to minimize walking distances to the passenger terminal.

## **COMMERCIAL SERVICE FUEL FACILITY REQUIREMENTS**

Commercial service fuel facility requirements are based upon the forecast of annual commercial service activity at the airport, as well as the average hourly fuel consumption rates for twin-engine piston powered aircraft. The fuel storage requirement estimate reflects a high and low range of anticipated activity (one to the three departures per day) with the assumption that fuel is dispensed once every departure or every two operations throughout a six day per week period.

- Approximately 1,000 gallons of 100 LL aviation fuel is recommended should commercial operational activity include only one departure per day throughout the year. Should commercial service activity reach three departures per day, approximately 2,800 gallons of aviation fuel storage would be required to accommodate the commercial service aviation demand at JCIA.
- The estimated fuel capacity for commercial service activity assumes that the six to eight passenger aircraft are propelled by piston-powered engines. However, should some of these aircraft be retrofitted with turbine engines, additional fuel facilities to accommodate JetA fuel, not to exceed 1,000 gallons, are recommended.
- A dedicated fueling truck system is generally utilized for Jet A, as well as 100LL fueling in lieu of towing an aircraft and having aircraft maneuvering around fuel islands. However, an aircraft tug is also a viable option to assist with large business aircraft. Should a fuel truck be acquired for fueling operations, it should be parked as well as operated at a minimum of 50' from the airport passenger terminal building, as well as 50' from all structures on the airport. Fuel trucks should not be parked within enclosed structures, including hangars, due to potential fire hazards involved and to ensure proper ventilation.

## **AIRCRAFT RESCUE AND FIREFIGHTING (ARFF) REQUIREMENTS**

Smaller general aviation airports such as JCIA, with the potential of accommodating commercial service activity, are well advised to consider their emergency response capability at the airport. Generally, FAR Part 139 airports accommodating scheduled and unscheduled commercial service by aircraft with 30 to 60 passenger seats are required to have ARFF capability, as well as an ARFF facility at the airport. More recently, this requirement has extended to facilities that



host scheduled commercial service utilizing aircraft with 10 passenger seats. Given the future anticipated commercial service activity, Part 139 ARFF requirements will most likely not apply to JCIA. However, should commercial service be initiated once again at JCIA, the Port is recommended to consider the following courses of action to provide a safe commercial service flight environment as practical as possible.

- In relying upon local and county firefighting services and capabilities, fire and emergency medical personnel are recommended to be present at the airport 15 minutes prior to and 15 minutes following commercial service operations at JCIA. This timeframe is ideal in the event that an emergency incident occurs during the approach or departure phase to and from the airport.
- During commercial service activity the recommended number of vehicles to provide emergency assistance would be one (1) lightweight firefighting vehicle occupied by fire and emergency service/medical response personnel. With regard to the recommended extinguishing agent(s), 500 pounds of dry chemical or Halon 1211, or 450 pound of dry chemical and 100 gallons of water or Aqueous Film Forming Foam (AFFF) would be adequate to address an emergency incident at the airport involving an aircraft less than 90' in length.

## **COMMERCIAL TERMINAL AREA FENCING/ SECURITY REQUIREMENTS**

Perimeter fencing, electronic gate access, and terminal area fencing between airport property and public (along the airport property boundary/perimeter) areas are recommended to discourage unauthorized access by people and wildlife to the airfield operating environment. For general aviation airports such as JCIA, the specific location, type and height of fencing is dependent upon the level of security desired by the airport sponsor and by the number and types of penetrations of the airport operations area. In the terminal area, medium intensity pole mounted lighting can supplement fencing as an added element of security.

- Installation of perimeter terminal area fencing, at minimum, is recommended for JCIA within the initial phase of airport development. Terminal area fencing and electronic access gates, including installation of additional terminal area lights are also recommended within the initial to mid phase of airport development to further safeguard the commercial service venue within the terminal area complex.
- Routine security patrol checks should be conducted by the Port staff or local law enforcement personnel to ensure security breaches are identified and corrected so as to prevent potential runway incursions, as well as prevent unauthorized access to the terminal and airside operations areas.



**SUMMARY OF COMMERCIAL SERVICE TERMINAL AREA FACILITY REQUIREMENTS**

**Table 4.7** summarizes the commercial service terminal area facility requirements to accommodate the projected demand activity at the Jefferson County International Airport for each of the three phases of the 20-year planning period.

<p align="center"><i>Table 4.7 Commercial Service Terminal Area Facility Requirements Summary Jefferson County International Airport</i></p>				
Facility	Existing (2002)	Phase 1 (0-5) Short-Term	Phase 2 (6-10) Mid-Term	Phase 3 (11-20) Long-Term
Annual Enplaned Passengers	1,041	1,300	2,600	5,200
Peak Hour Passengers	2	2	5	9
<b>***Commercial Service Apron Tie-Downs:</b>	None	One (360 S.Y.)	One (360 S.Y.)	Two (720 S.Y.)
<b>Total Apron Tie-Down Area (Main Airport Apron):</b>	98,700 S.F. (10,967 S.Y.)	98,700 S.F. (10,967 S.Y.)	98,700 S.F. (10,967 S.Y.)	98,700 S.F. (10,967 S.Y.)
<b>*Terminal Building Size</b>	360 S.F.	360 S.F.	900 S.F.	1,620 S.F.
<b>Total Storage (100LL) Total Storage (Jet A)</b>	1,000 Gallons None	1,000 Gallons None	1,600 Gallons 500 Gallons	2,500 Gallons 500 Gallons
<b>Total Fuel Storage Volume</b>	1,000 Gallons	1,000 Gallons	1,900 Gallons	2,800 Gallons
<b>**Commercial Passenger Auto Parking: Auto Parking Area Auto Parking Spaces</b>	1,485 S.F. 3 spaces	1,485 S.F. 3 spaces	3,960 S.F. 8 spaces	6,930 S.F. 14 spaces
<p>Note (*): For estimating purposes, 150 square feet of gross terminal building area was allotted per design peak-hour passenger; total passenger/visitor waiting lobby, and maneuvering space was estimated to be 20 percent of the total design peak-hour passenger activity.</p> <p>Note (**): The paved auto parking area requirements are based on approximately 1.5 spaces times the peak hour passenger (FAA-AC 150/5360-13). Approximately 330 square feet (36.6 square yards) per parking space should be provided, plus an additional 50 percent for maneuvering.</p> <p>Note (***): For planning purposes, approximately 360 S.Y. of apron space is reserved for transient/ itinerant aircraft parking.</p> <p>Note: Future projections are provided for planning purposes only. The rate or actual build-out experienced at the Airport will occur based upon market factors consistent with the provisions of this plan.</p>				

**Source:** BWR, Commercial Service Terminal Area Facility Requirement Summary, August 2002.



**GENERAL AVIATION TERMINAL AREA FACILITY REQUIREMENTS**

The terminal area, or *landside*, is defined as that portion of the airport other than the landing area, and includes facilities relating to the accommodation of people and the servicing of aircraft. A separate analysis was prepared for each terminal area component to determine future development requirements, which have been assessed as a cumulative total of airfield activity and demand levels. The general aviation, airport terminal area typically includes the following structures, services and activities:

- Airport terminal/administration building;
- Aircraft hangars and storage areas;
- Automobile parking areas and roadway access;
- Fuel storage and dispensing facilities;
- Aircraft ramp and apron areas for based and itinerant aircraft;
- FBO, commercial, and maintenance activities.

**AIRPORT GENERAL AVIATION PEAKING CHARACTERISTICS**

**Table 4.8** summarizes the 20-year airport general aviation peaking characteristics calculated from the forecast of annual operations. Peaking characteristics quantify spacial requirements and facility capacities required to accommodate the anticipated general aviation demand levels at the airport. These requirements are in addition to those calculated for commercial service activity. The *peak hour passenger* refers to the average number of pilots and passengers (visitors) expected to use the terminal area during the average day of the peak month (design day). Peaking at general aviation airport often occurs during the summer months (June, July and August) as typically consistent with fuel sales and heavier periods of flight training and recreational flying.

<i>Table 4.8 General Aviation Demand Peak Activity Characteristics Jefferson County International Airport</i>					
	2002	2007	2012	2017	2022
<b>Annual Aircraft Operations</b>	47,600	50,800	59,700	70,400	82,500
<b>Peak Month Operations</b>	3,967	4,233	4,975	5,867	6,875
<b>Design Day Operations</b>	132	141	166	196	229
<b>Peak Hour Operations</b>	11	12	14	16	19
<b>Passenger/ Operation Ratio</b>	1.15	1.15	1.18	1.20	1.25
<b>Design/ Peak Hour Passengers</b>	<b>12.6</b>	<b>13.5</b>	<b>16.5</b>	<b>19.2</b>	<b>23.7</b>
<i>Peak Month Operations= Annual operations / 12 months            Design Day Operations (Average Day of Peak Month) = Peak Month Operations / 30 Days Per Month            Peak Hour Operation = Design Day Operation / 12 hours            Design/ Peak Hour Passenger = Peak Hour Operations x Passenger/ Operation Ratio</i>					

**Source:** BWR, General Aviation Demand Peak Activity Forecast, August 2002.



## GENERAL AVIATION TERMINAL BUILDING/SPACE REQUIREMENTS

**Table 4.9** summarizes the existing and future public-use general aviation terminal building space requirements projected over the 20-year planning period. At general aviation airports, the terminal building provides a functional and social capacity central to the operation, promotion, and visible identity of the airport, as well as the community. The terminal building balances the present and future needs for passengers and airport patrons, provides convenience and ease of access, accommodates a wide range of aircraft operational activity, serves as the center of business commerce at the airport, and is the center of operational control at the airport. Below, is a roster of general aviation terminal building components which are ideal to fulfill the above mentioned parameters at JCIA.

- Passenger/ patron reception area;
- Meeter and greeter waiting area;
- Public restrooms;
- Utility/mechanical storage area;
- FBO office/retail space;
- Pilot lounge/flight planning room;
- Conference/board rooms; and
- Break room/dining area.

Siting and planning of a general aviation future terminal building at JCIA should consider the following recommendations:

- The general aviation terminal area will revolve around a centralized terminal building layout, where all passenger processing takes place at a centralized location. At general aviation airports with less than 100,000 annual operations, such a JCIA, a simple terminal building design concept is applicable. This concept has the passenger walking onto the airport ramp/apron to board aircraft. Additionally, this concept provides for ample curb frontage and short walking distances for airport patrons. At JCIA, a combined facility to accommodate both commercial and general aviation usage and needs may be a prudent alternative and an effective use of space and airport capital.
- The airport terminal building is the interface between ground and air transportation and must be safe, efficient, and comfortable. In pursuing terminal building development, the overall design must strive for passenger convenience, demonstrate operational efficiency for the landside, as well as airside components of the airport, expandability to meet forecast demand and needs, and be aesthetically pleasing to convey community pride, value, and tradition.
- Initially, 2,260 to 4,260 square feet would be required to properly accommodate the estimated general aviation passenger demand at JCIA not including commercial service peak hour passenger activity. A dedicated airport terminal would be required to accommodate a general aviation, as well as commercial passenger mix.
- Like the commercial terminal building, any terminal building under development must adhere to requirements as set forth in Title II of the Americans With Disabilities Act of 1990 (ADA), as well as comply with Americans With Disabilities Act Accessibility Guidelines (ADAAG) (1991).



## **SNOW REMOVAL EQUIPMENT (SRE) BUILDING REQUIREMENTS**

A dedicated SRE building for storing, protecting, and servicing airport snow removal and maintenance equipment is recommended as an option for future capital development at JCIA should the need arise. The basic requirements for an SRE building is to provide a warm and sheltered environment, protect equipment/ components from moisture, contaminants, or composition change, and be centralized to accommodate operational efficiency. In addition, the SRE should provide direct and convenient access to the airport operations area, must not interfere with Building Restriction Line (BRL) or Taxilane Object free Area (TOFA) requirements, provide for adequate space for future expansion. Space requirements of an SRE building at JCIA is largely dependent upon the number and type of equipment pieces to be stored at the airport and will most likely require a determination by the Port as to the SRE's overall dimensions. The SRE building can be a separate stand-alone structure or be attached to an existing structure such as the airport terminal building or a T-hangar structure.

## **AIRCRAFT HANGAR/ STORAGE REQUIREMENTS**

Future hangars located at JCIA should accommodate at least 95 to 100 percent of existing and forecast based aircraft. Generally, single-engine aircraft require 1,000 to 1,250 square feet, twin-engine piston aircraft usually require 1,400 to 2,500 square feet for storage, and approximately 3,000 square feet of space is recommended for cabin class business aircraft, including small to medium sized turbo-prop and business jet aircraft. In addition, hangar development should occur along an established flight line and be allowed additional area for future expansion while at the same time allowing for potential for on-airport commercial or industrial economical expansion. General hangar design considerations and recommendations at JCIA include the following:

- All future hangar structures at JCIA must be constructed outside of or immediately adjacent to the Building Restriction Line (BRL) providing a minimum of 370' centerline offset to the proposed structures. In addition, the Taxilane Object Free Area (TOFA) clearance criteria between hangar structures is recommended to be 57.5' for one-way traffic and 115' for two-way traffic.
- All future hangar structures are recommended to be equipped with interior and exterior lighting and electrical connections, while also having potential access to utilities at the airport. Block-style straight-unit T-hangars occupy more space, but are generally preferred over nested T-hangars due to the fact that these T-hangars can be extended and expanded more easily. As with other airport buildings, the basic requirement for hangars is to provide a warm and sheltered environment, protect equipment/components from moisture, contaminants, or composition change, and be centralized to accommodate operational efficiency. The design should also prevent entry by unauthorized persons or local wildlife.
- Hangar development should allow for adequate drainage with minimal slope differential between the hangar door and the taxilane paved surface. A concrete slab



surface hangar floor is recommended, with less than one percent downward slope to the taxilane and surrounding paved surfaces.

- Future hangar development, to the extent feasible, should be segregated based on the hangar size, type, and function. From a planning standpoint, hangars should be aesthetically pleasing and be centralized with respect to automobile access, aircraft access, and located along the existing flight line to minimize the potential costs associated with access, drainage, utility and auto parking expansion.

## **GENERAL AVIATION AIRPORT RAMP/AIRCRAFT PARKING APRON REQUIREMENTS**

At present, the main general aviation paved tie-down ramp/apron, as well as the eastern tie-down apron extension area at JCIA, accommodates a total of 15,836 square yards (142,524 square feet) of tie-down space while at the same time accommodating 32 aircraft tie-downs. In addition, the centralized grass tie-down area provides an additional 36,110 square yards (325,000 square feet) of tie-down area including 36 designated aircraft tie-downs. From a planning standpoint, the current space available to airport patrons for tie-down space is adequate to fulfill the current and future demand for aircraft tie-down requirements. As a matter of process, **Table 4.9** indicates the general aviation itinerant aircraft tie-down area/space requirements for JCIA throughout the 20-year planning period. In addition, **Table 4.10** indicates the aircraft parking apron facility requirements for the 20-year planning period.

Paved aircraft parking apron and tie-down ramp areas should be provided for approximately 40 percent of the peak/design day itinerant aircraft, plus approximately five (5) percent of the total based aircraft. FAA airport planning criteria recommends 360 square yards (3,240 square feet) per itinerant aircraft space, and approximately 300 square yards (2,700 square feet) per based aircraft for determining future apron/ ramp area facility requirements. Other site specific aircraft apron/ ramp space planning and design considerations at JCIA are included below.

- The aircraft parking and tie-down area (paved or non-paved) should provide sufficient taxiing and maneuvering space to taxiway/taxilane egress and ingress the area without risk of structural damage to the aircraft or existing structures, and to allow two-way passing of aircraft along the main apron. Ideally, the main apron/ramp area is recommended be centralized along the runway mid-point, and allow for a continuation of building and hangar expansion adjacent to the terminal area flight line as future demand warrants.



**Table 4.9**  
*General Aviation Itinerant Aircraft Tie-Down Space Requirements  
Jefferson County International Airport*

Design Operations (Percentage)	Existing 2002	2007	2012	2022
Peak Day Operations	132	141	166	229
Peak Day Itinerant Operations (45%)	59	63	75	103
Transient Itinerant Operations (45%)	27	29	34	46
Transient Aircraft (50%)	13	14	17	23
Transient Aircraft at One Time (40%)	5	6	7	9

**Source:** BWR, Itinerant Aircraft Tie-Down Space Requirements, August 2002.

**Table 4.10**  
*General Aviation Aircraft Parking Apron Facility Requirements  
Jefferson County International Airport*

	Existing 2002		2007		2012		2022	
	S.Y.	A/C	S.Y.	A/C	S.Y.	A/C	S.Y.	A/C
Transient Aircraft	1,800	5	2,160	6	2,520	7	3,240	9
Based Aircraft	96		109		128		177	
Based Aircraft Tie-Downs (5%)	1,500	5	1,500	5	1,800	6	2,700	9
<b>Total S.Y./ Tie-Downs Required</b>	<b>3,300</b>	<b>10</b>	<b>3,660</b>	<b>11</b>	<b>4,320</b>	<b>13</b>	<b>5,940</b>	<b>18</b>
<b>Total Tie-Down Spaces *</b>	21 (Main Apron) 11 (East Apron) 36 (Turf Area)		11 (Main Apron) 0 (East Apron) 0 (Turf Area)		13 (Main Apron) 0 (East Apron) 0 (Turf Area)		18 (Main Apron) 0 (East Apron) 0 (Turf Area)	
<b>Total Required Apron Area</b>	<b>51,946 S.Y.</b> <b>(467,514 S.F.)</b>		<b>3,660 S.Y.</b> <b>(32,940 S.F.)</b>		<b>4,320 S.Y.</b> <b>(38,880 S.F.)</b>		<b>5,940 S.Y.</b> <b>(53,460 S.F.)</b>	

**Source:** BWR, Aircraft Parking Apron Facility Requirements, August 2002.

**\* Note:** Existing tie-down areas include 21 (main apron), 11 (east apron), and 36 turf area tie-downs. The tie-downs identified in 2007, 2012, and 2022 are those needed by calculation based on airport activity. Clearly, existing tie-downs are sufficient over the planning period.



## FUEL STORAGE FACILITY REQUIREMENTS

General aviation fuel facility requirements are based upon the forecast of annual operational activity at the airport, as well as the average hourly fuel consumption rates for single and twin-engine piston powered aircraft. The current fuel facilities at JCIA are underground storage tanks (UST) consisting of one 10,000 gallon capacity fuel tank accommodating 100LL Avgas. The fuel meter/pump station is an automated 24-hour fuel pump which was installed approximately four years ago. According to the aviation activity forecasts, the current 100LL Avgas fuel facility and accompanying fuel storage capacity will be adequate to accommodate the future piston-engine aviation demand at JCIA.

Due to the forecast of ARC B-II aircraft, primarily small to medium sized turbo-prop aircraft, expected to operate at the airport in the latter phase of airport development, it is recommended that 500 gallons of Jet A fuel capacity be established to accommodate the anticipated turbine powered aircraft demand. Additional Jet A fuel storage capability beyond the 500 gallon total would be determined by the demand for additional Jet A fuel. Additional fuel facility planning and design considerations for JCIA include the following recommendations.

- Airports likely to conduct or have fueling operations on the airport assume responsibility over fueling practices with respect to safety from fire and explosions. This is the case with JCIA. The Port is recommended to establish standards that address facilities, procedures, and training of prospective fueling personnel. This could include posting of warning signs of the inherent hazards associated with fueling operations along with posting of the appropriate Dangerous Goods Placards in the area of the fueling facilities.
- The Port is recommended to inspect fueling operations on the airport every three months to ensure continued surveillance of the facilities and operations taking place at the airport. In the event that local jurisdictions require different inspection standards, the FAA has adopted generally accepted standards, and cites guidelines proposed by the National Fire Protection Association (NFPA) as being acceptable means to comply with the general standards.
- Operations should abide by National Pollutant Discharge Elimination System (NPDES) provisions of the Clean Water Act, as well as all federal regulations and legislation as well as in addressing environmental concerns as they relate to aircraft fueling operations and USTs.



## **AUTO PARKING, CIRCULATION AND ACCESS REQUIREMENTS**

As a rule of thumb, general aviation auto parking demand increases proportionally to the increase in peak hour passenger activity. The general aviation auto parking requirements are based on approximately 1.5 spaces times the peak hour passenger. Approximately 330 square feet (36.6 square yards) per parking space should be provided, plus an additional 50 percent of that total area for maneuvering purposes.

- For future auto parking space requirements, approximately 28 auto parking spaces (13,860 square feet) should be set aside for general aviation passenger use with one (1) parking space being handicapped designated, as well as one (1) parking space being van accessible for disabled passengers. Additionally, passenger auto parking should be sited to minimize walking distances to the passenger terminal. The current auto parking area is recommended to be remarked and reconfigured to adequately provide for existing and future demand at the airport during peak periods of activity.

With regard to airport access, the Port should consult with the State and the County regarding potential improvements to State Highway 19 in the vicinity of the Airport to safer access for both Airport users and pass-by travelers. This may include a left turn pocket at the intersection with Airport Road, and possibly a traffic signal at the intersection with Prospect Road. In addition, consideration should be given to the construction of a two lane paved access road originating from the west and providing direct airport access from State Highway 20.

## **TERMINAL AREA FENCING/SECURITY REQUIREMENTS**

Perimeter fencing, electronic gate access, and terminal area fencing between airport property and public (along the airport property boundary/ perimeter) areas are recommended to discourage unauthorized access by people and wildlife to the airfield operating environment. For general aviation airports such as JCIA, the specific location, type and height of fencing is dependent upon the level of security desired by the airport sponsor and by the number and types of penetrations of the airport operations area. In the terminal area, medium intensity pole mounted lighting can supplement fencing as an added element of security.

- Installation of perimeter terminal area fencing, at minimum, is recommended for JCIA within the initial phase of airport development. Terminal area fencing and electronic access gates, including installation of additional terminal area lights are also recommended within the initial to mid phase of airport development to further safeguard the commercial service venue within the terminal area complex.
- Routine security patrol checks should be conducted by the Port staff or local law enforcement personnel to ensure security breaches are identified and corrected so as to prevent potential runway incursions, as well as prevent unauthorized access to the terminal and airside operations areas.



## SNOW REMOVAL AND ICE CONTROL REQUIREMENTS

Given the fact that snow and icing conditions at an airport are classified as emergency situations, the timely removal and treatment of snow and ice at the airport are important considerations. Snow and ice clearance time requirements are based on the amount of time required to displace or clear one inch of snow weighing up to 25 pounds per cubic foot. Snow removal equipment requirements are based upon the annual operational activity at the airport, as well as the average annual snow fall amount at the airport.

The following considerations concerning snow and ice removal requirements apply to JCIA.

- Should JCIA accommodate future on-demand commercial service snow clearance time requirements include clearing of snow and ice once every one half (1/2) hour. During periods of non-commercial service aviation activity, snow clearance time requirements include clearing snow and ice once every two (2) hours.
- Given JCIA's current and future operational activity, and annual snowfall amounts of 30 inches or less, it is recommended that a minimum of one displacement plow be made available to operate at the airport during periods of average to extreme snowfall.
- Snow and ice can be removed either by mechanical or chemical means. Along with mechanical snow removal techniques including rotary snow blowers, plows, broom sweepers, and loaders, chemical means including material spreaders that disperse de-ice/ anti-ice granules or liquid that can be utilized to remove and control ice and snow at JCIA. For preventing or removing snow and ice accumulations on airport pavement, the types of chemicals available include urea, acetate-based compounds (Cryotech, CMA, Clearway 2) and sodium formate (Safeway SF). Liquids approved for ice control and removal at airports include polypropylene glycol and ethylene glycol.



**SUMMARY OF GENERAL AVIATION TERMINAL AREA FACILITY REQUIREMENTS**

**Table 4.11** summarizes the general aviation terminal area facility requirements to accommodate activity projected for the Jefferson County International Airport for each of the three phases spanning the 20-year planning period.

<i>Table 4.11 Summary of General Aviation Terminal Area Facility Requirements Jefferson County International Airport</i>				
<b>Facility</b>	<b>Existing (2002)</b>	<b>Phase 1 (0-5) Short-Term</b>	<b>Phase 2 (6-10) Mid-Term</b>	<b>Phase 3 (11-20) Long-Term</b>
<b>Based Aircraft</b>	<b>96</b>	<b>109</b>	<b>128</b>	<b>177</b>
<b>Annual Operations</b>	<b>47,600</b>	<b>50,800</b>	<b>59,700</b>	<b>82,500</b>
<b>Peak Hour Passengers</b>	<b>12.6</b>	<b>13.5</b>	<b>16.5</b>	<b>23.7</b>
<b>Apron Tie-Down Area: Public-Use Apron Tie-Downs:</b>	68 (Marked)	11 (Marked)	13 (Marked)	18 (Marked)
<b>Total Apron Tie-Down Area:</b>	51,946 S.Y. (467,514 S.F.)	3,660 S.Y. (32,940 S.F.)	4,320 S.Y. (38,880 S.F.)	5,940 S.Y. (53,460 S.F.)
<b>Total Hangar Space: Nested T-Hangars Common/ Maint. Hangars &amp; Clear Span Hangars (Total Hangar Area Added During Planning Period) Total Hangar Space:</b>	89,175 S.F.  6,000 S.F.  95,175 S.F.	94,175 S.F.  11,850 S.F. (10,850 S.F.)  106,025 S.F.	115,425 S.F.  15,750 S.F. (25,150 S.F.)  131,175 S.F.	169,175 S.F.  25,500 S.F. (63,500 S.F.)  194,675 S.F.
<b>*Terminal Building Size (Admin. Offices)</b>	2,000 S.F.	2,430 S.F.	2,970 S.F.	4,266 S.F.
<b>Airport Fuel Storage: Total Storage (100LL) Total Storage (Jet A)</b>	10,000 Gallons N/A	10,000 Gallons N/A	10,000 Gallons 1,500 Gallons	10,000 Gallons 1,500 Gallons
<b>Total Fuel Storage Volume</b>	10,000 Gallons	10,000 Gallons	11,500 Gallons	11,500 Gallons
<b>**Public Auto Parking: Auto Parking Area Auto Parking Spaces</b>	13,200 S.F. 40 spaces	9,900 S.F. 20 spaces	12,375 S.F. 25 spaces	17,820 S.F. 36 spaces
<p>Note (*): For estimating purposes, 150 square feet of gross terminal building area was allotted per design peak-hour passenger; total passenger/visitor waiting lobby, and maneuvering space was estimated to be 20 percent of the total design peak-hour passenger activity.</p> <p>Note (**): The paved auto parking area requirements are based on approximately 1.5 spaces times the peak hour passenger (FAA-AC 150/5360-13). Approximately 330 square feet (36.6 square yards) per parking space should be provided, plus an additional 50 percent for maneuvering.</p> <p>Note: Future projections are provided for planning purposes only. The rate or actual build-out experienced at the airport will occur based upon market factors consistent with the provisions of this plan.</p>				

**Source:** BWR, Summary of General Aviation Terminal Area Facility Requirement Summary, August 2002.



# **JEFFERSON COUNTY INTERNATIONAL AIRPORT (JCIA)**

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**Airport Master Plan Update  
Port of Port Townsend, Washington**

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