Capacity Analysis and Facility Requirements

Introduction

For the most part, this chapter summarizes conclusions identified by TRA/BV in the *Demand/Capacity and Facility Requirements Draft Technical Paper,* published in January 1997. Because it is critical that a comprehensive Capacity Analysis and Facility Requirements assessment be completed before the development plan for the airport is finalized, the following documentation provides additional information where the TRA/BV document was incomplete.

The capacity of an airfield is primarily a function of the major aircraft operating surfaces that compose the facility and the configuration of those surfaces (runways and taxiways). However, it is also related to and considered in conjunction with wind coverage, airspace utilization, and the availability and type of navigational aids. Capacity refers to the number of aircraft operations that a facility can accommodate on either an hourly or yearly basis. It does not refer to the size or weight of aircraft. Facility requirements are used to determine those facilities needed to meet the forecast demand related to the aircraft fleet. Evaluation procedures will analyze runway length, dimensional criteria, aprons, hangars, and support facilities.

Airfield Capacity Methodology

The methodology used for the measurement of airfield capacity used by TRA/BV is described in Federal Aviation Administration (FAA) Advisory Circular 150/5060-5, *Airport Capacity and Delay*.

The capacity of an airport's airside facilities is a function of several factors. These factors include the layout of the airfield, local environmental conditions, specific

characteristics of local aviation demand, and air traffic control requirements. Updated wind and weather information is provided in the following narrative.

Environmental Conditions

Climatological conditions specific to the location of an airport not only influence the layout of the airfield, but also impact the use of the runway system. Variations in the weather resulting in limited cloud ceilings and reduced visibility typically lower airfield capacity, while changes in wind direction and velocity typically dictate runway usage and also influence runway capacity.

Ceiling and Visibility. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, describes three categories of ceiling and visibility minimums for use in both capacity and delay calculations. Visual Flight Rules (VFR) conditions, Instrument Flight Rules (IFR), and Poor Visibility and Ceiling (PVC) conditions. Meteorological data from the National Climatic Data Center has been used to tabulate information at KCIA in more specific terms:

- VFR conditions - ceiling equal to or greater than 1,000 feet above ground level and visibility is equal to or greater than 3 statute miles. These conditions occur at the airport approximately 91.3% percent of the time annually.

- VFR minimums to existing Runway 13R approach minimums - ceiling less than 1,000 feet and/or visibility less than 3 miles, but ceiling equal to or greater than 250 feet and visibility equal to or greater than 1 mile. These conditions occur at the airport approximately 5.5% of the time annually.

- Below existing instrument approach minimums - Ceiling less than 250 feet and/or visibility less than 1 mile. These conditions occur at the airport approximately 3.2% of the time annually.

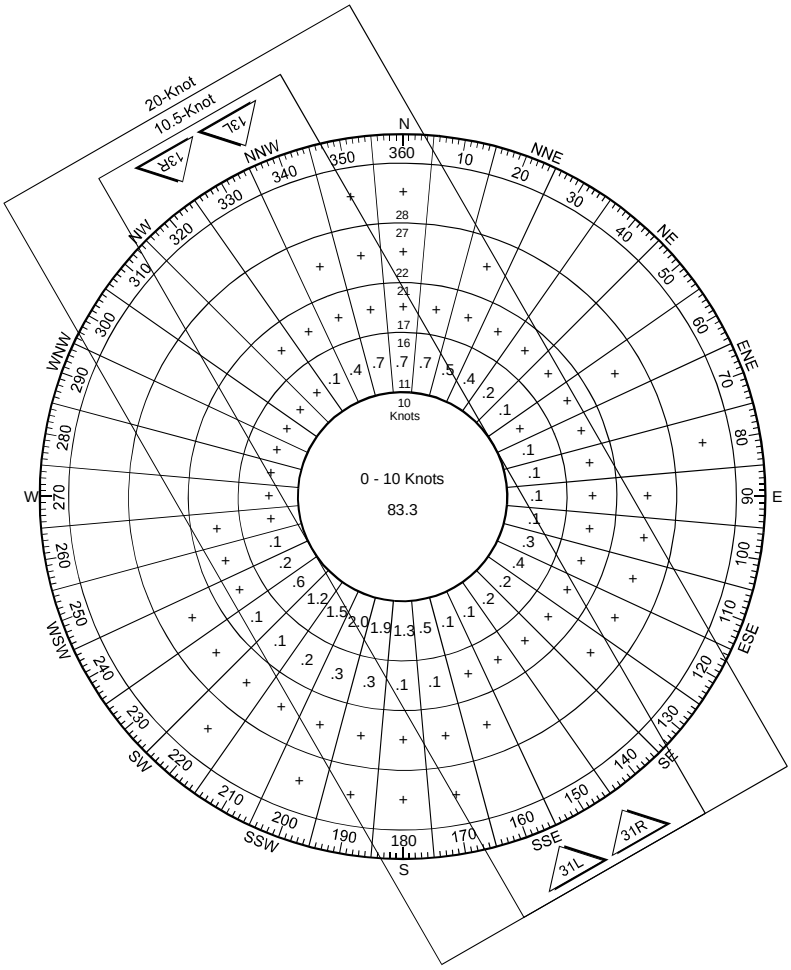
Wind Coverage. Surface wind conditions have a direct effect on the operation of an airport; runways not oriented to take the fullest advantage of prevailing winds will restrict the capacity of the airport to varying degrees. When landing and taking off, aircraft are able to properly operate on a runway as long as the wind component perpendicular to the direction of travel (defined as a crosswind) is not excessive. To determine wind velocity and direction at KCIA, wind data were obtained and an all-weather wind rose was constructed, which is presented in the following illustration, entitled *ALL WEATHER WIND ROSE: 10.5- AND 20-KNOT CROSSWIND COMPONENTS*. The wind data to construct the all-weather wind rose were obtained for the period 1988-1998.

The appropriate crosswind component is dependent upon the Airport Reference Code (ARC) for the type of aircraft that use the airport on a regular basis. As described in the previous chapter, the Boeing 747-200 is the "Design Aircraft" at

KCIA, and thus the appropriate ARC is D-V. However, a significant percentage of aircraft operating at the airport fit into the ARC A-I, B-I, or B-II categories. According to FAA AC 150/5300-13, for ARC-A-I and B-I airports, a crosswind component of 10.5-knots is considered maximum. For ARC A-II and B-II airports, a crosswind component of 13-knots is considered maximum, while for ARC C-I through D-II airports, a crosswind component of 16-knots is considered maximum. Finally, for ARC A-IV through D-VI airports, a crosswind component of 20-knots is considered maximum. Because KCIA is utilized by various ARC categories of aircraft regularly, this wind coverage analysis will consider the range of crosswind components, using the 10.5-knot component and the 20-knot component for analysis.

The desirable wind coverage for an airport is ninety-five percent (95%). This means that the runway should be oriented so that the maximum crosswind component is not exceeded more than five percent (5%) of the time. Based on the wind analysis for KCIA, the 13/31 runway alignment has 99.90% wind coverage for the 20-knot crosswind component, 99.40% for the 16-knot component, 96.97% for the 13-knot component, and 93.05% for the 10.5-knot crosswind component. This analysis indicates that the existing runway configuration provides adequate crosswind coverage for all crosswind components, except the component associated with the small aircraft fleet, where it is minimally lacking.

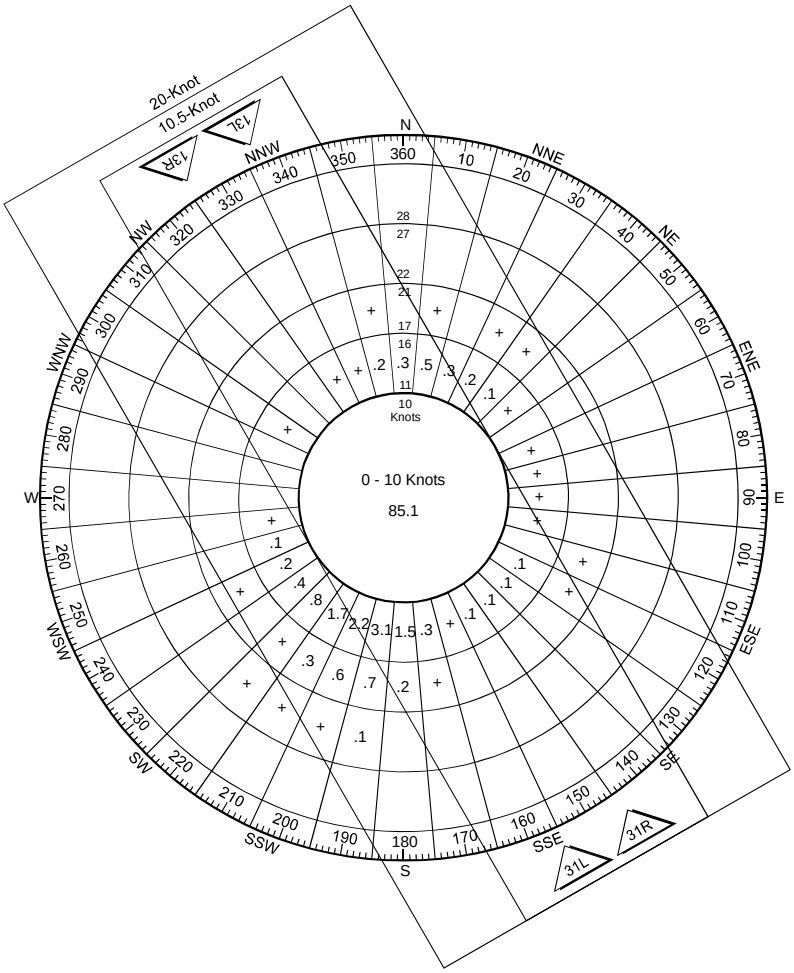
Figure C1
ALL WEATHER WIND ROSE: 10.5- AND 20-KNOT CROSSWIND COMPONENTS
KCIA Master Plan



Source: National Oceanic and Atmospheric Administration, National Climatic Data Center
Station 24233, Seattle-Tacoma International Airport. Period of Record: 1989-1998

The airport currently has ILS instrument approaches to Runway 13R and Runway 31L. In an effort to analyze the effectiveness of these approaches, an Instrument Flight Rules (IFR) wind rose has been constructed and is presented in the following figure entitled *IFR WIND ROSE: 10.5- AND 20-KNOT CROSSWIND COMPONENTS*. Again, wind data from Seattle-Tacoma International Airport has been used in the construction of the IFR wind rose.

Figure C2
IFR[1] WIND ROSE: 10.5- AND 20-KNOT CROSSWIND COMPONENTS
KCIA Master Plan



Source: National Oceanic and Atmospheric Administration National Climatic Data Station 24233 Seattle-Tacoma International Washington. Period of Record: 1989-1998
[1] Ceiling of less than 1,000 feet, but equal to or greater than 250 feet and/or visibility less than three miles, but equal to or greater than one mile.

The following table, Table C1 entitled *IFR WIND COVERAGE SUMMARY*, quantifies the wind coverage offered by the various runways under IFR meteorological conditions.

Table C1
IFR WIND COVERAGE SUMMARY
King County International Airport Master Plan

	Wind Coverage Provided Under IFR Conditions[1] 10.5-Knot Maximum Crosswind 5-Knot Tailwind to Maximum Headwind	Wind Coverage Provided Under IFR Conditions[1] 20-Knot Maximum Crosswind 10-Knot Tailwind to Maximum Headwind
Runway 13[2]	84.90%	98.81%
Runway 31[2]	64.89%	93.43%
Runway 13[2] & 31[2]	93.35%	99.92%

1 Ceiling of less than 1,000 feet, but equal to or greater than 250 feet and/or visibility less than 3 statute miles, but equal to or greater than 1 mile.
2 Equipped with existing instrument approach capabilities.

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center
Station 24233 Seattle-Tacoma International Washington. Period of Record: 1989-1998
Period of Record - 1989-1998

It should be noted that the above table provides information for both the 20-knot crosswind component and the 10.5-knot crosswind component. A maximum tailwind of 5-knots is utilized for the 10.5-knot crosswind component, while a 10-knot tailwind is utilized for the 16-knot crosswind component. This variation is considered appropriate to properly estimate conditions appropriate for small aircraft where a 10.5-knot crosswind is considered maximum and large aircraft where the 16-knot maximum crosswind is utilized.

From this IFR wind coverage summary, it can be determined that if a single runway is considered, Runway 13 offers the best wind coverage. The combination of Runway 13 with Runway 31 provides 20-knot coverage that is approximately 99.92% and 10.5-knot coverage that is approximately 93.35%. Thus, the runway's existing instrument approach capabilities provide good wind coverage during IFR conditions, although the coverage provided to small aircraft fleet is lacking slightly.

Airfield Capacity Analysis

TRA/BV formulated a capacity analysis for the airfield which included consideration of local meteorological conditions, runway configuration and use patterns, aircraft fleet mix, air traffic demand ratio of arrivals to departures, touch-and-go operations, runway occupancy times, and air traffic control procedures. The hourly capacity was

described in terms of a "theoretical" capacity based on methodology described in the FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay;* and a "practical" capacity based on the operating experience of the personnel at FAA's KCIA Air Traffic Control Tower. The capacity calculation for the airport is provided in terms of Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC):

- Theoretical VMC capacity 105 - 110 operations per hour
- Practical VMC capacity 110 -120 – operations per hour
- Theoretical IMC capacity 50 operations per hour
- Practical IMC capacity 33 – 37 operations per hour

These numbers when compared to the peak hour unconstrained forecast activity presented in the previous chapter (130 aircraft operations forecast during peak hours at the end of the planning period) indicate that the airport could experience some capacity related operational delay problems in the future. Additional discussion on this subject is presented in the "Airfield Capacity" narrative of the *Facility Requirements* section of this chapter.

Facility Requirements

This section presents the analysis of requirements for airside and landside facilities necessary to meet aviation demand at KCIA. For those components determined to be deficient, the type and size of facility required to meet future demand is identified. Airside facilities examined include the runways, taxiways, runway protection zones, thresholds, and navigational aids. Landside facilities include such facilities as hangars, aircraft apron areas and airport support facilities.

These analysis uses the growth scenario set forth in the unconstrained forecast of demand for establishing future development needs at the airport. Aviation activity levels should be monitored for consistency with the forecasts. In the event of changes, the schedule of development should be adjusted to correspond to the demand for facilities rather than set to predetermined dates of development. By doing this, over-building or under-building can be avoided.

Airside Facilities

Dimensional Criteria - Runways. The FAA Advisory Circular 150/5300-13, *Airport Design*, recommends standard widths, minimum clearances, and other dimensional criteria for runways, taxiways, safety areas, aprons, and other physical airport features. Dimensions are recommended with respect to the Aircraft Approach

Category and Airplane Design Group designations (the Airport Reference Code), and availability and type of approach instrumentation. Because different aircraft types utilize the two runways at KCIA, each has an appropriate Airport Reference Code (ARC) (Runway 13R/31L is ARC D-V and Runway 13L/31R is ARC B-II). Existing dimensions and the corresponding design criteria applicable to KCIA are contained in the following tables, entitled *DIMENSIONAL STANDARDS*. A table is provided for each runway.

As identified in the table, the facilities at KCIA meet or exceed most of the appropriate requirements. However, there are some notable deficiencies. The runway safety area and runway object free area on the south end of Runway 13R/31L do not meet standards. In addition, the parallel taxiway on the west side of Runway 13R/31L (Taxiway B) has an inadequate separation distance between the runway centerline and taxiway centerline, and the runway centerline to runway centerline distance is inadequate to meet current FAA standards (the standard is 1,200 feet for ARC D-V Runways and the existing dimension is 325 feet).

The following tables also provide recommended remedies for identified deficiencies.

Table C2
ARC D-V DIMENSIONAL STANDARDS – RUNWAY 13R/31L (in feet)
King County International Airport Master Plan

Item	Existing Dimension (in feet)	Standard (in feet)	Future Condition/ Comment
Runway Width	200	150	200
Runway Shoulder Width (stabilized or paved)	***25***	35	meet standard
Runway Blast Pad			
Width	***200***	220	meet standard
Length	***150***	400	meet standard
Runway 13R Safety Area			
Width	500	500	500
Length (beyond RW end)	***66***	1,000	meet standard/ displace threshold, declared distances
Runway 31L Safety Area			
Width	500	500	500
Length (beyond RW end)	1,000	1,000	1,000
Runway 13R Object Free Area			
Width	800	800	800
Length (beyond RW end)	***-800***	1,000	modification of standard/ displace threshold, declared distances
Runway 31L Object Free Area			
Width	800	800	800
Length (beyond RW end)	1,000	1,000	1,000
Runway C/L to Taxiway C/L	***325***	400	325/ modification of standard
Runway C/L to Holdline	250	280	280
Runway C/L to Aircraft Parking	500	500	500
Taxiway Width	75	75	75
Taxiway C/L To Object	***130+/-***	160	130/ modification of standard
Runway Protection Zone RW 13R	500 x 1,700 x 1,010	500 x 1,700 x 1,010	500 x 1,700 x 1,010
Runway Protection Zone RW 31L	500 x 1,700 x 1,010	500 x 1,700 x 1,010	500 x 1,700 x 1,010
Threshold Location	meets criteria	meet criteria	maintain

Source: FAA Advisory Circular 150/5300-13, *Airport Design*/Barnard Dunkelberg & Company Analysis

Table C3
ARC B-II DIMENSIONAL STANDARDS – RUNWAY 13L/31R (in feet)
King County International Airport Master Plan

Item	Existing Dimension (in feet)	Standard (in feet)	Future Condition/ Comment
Runway Width	100	75	100
Runway Shoulder Width	varies	10	meet standard
Runway Blast Pad			
Width	undefined	95	meet standard
Length	undefined	150	meet standard
Runway 13L Safety Area			
Width	150	150	150
Length (beyond RW end)	300	300	300
Runway 31R Safety Area			
Width	150	150	150
Length (beyond RW end)	300	300	300
Runway 13L Object Free Area			
Width	500	500	500
Length (beyond RW end)	300	300	300
Runway 31R Object Free Area			
Width	500	500	500
Length (beyond RW end)	300	300	300
Runway C/L to Taxiway C/L	200-270	240	200-270/
Runway C/L to Holdline	125	150	150
Runway C/L to Aircraft Parking	300	250	300
Taxiway Width	35-75	35	35-75
Taxiway C/L To Object	>65.5	65.5	>65.5
Runway Protection Zone RW 13R	1,000 x 500 x 700	1,000 x 500 x 700	1,000 x 500 x 700
Runway Protection Zone RW 31L	1,000 x 500 x 700	1,000 x 500 x 700	1,000 x 500 x 700
Threshold Location	meets criteria[1]	meet criteria	maintain

Source: FAA Advisory Circular 150/5300-13, *Airport Design*/Barnard Dunkelberg & Company Analysis
1 - In consideration of of ATCT operating practices and size restrictions for aircraft using Taxiway A9.

Dimensional Criteria - Taxiways. In addition, the FAA also specifies safety and object setback standards for taxiways. At Being Field, these standards vary depending on the size to the aircraft that are allowed to use each taxiway. This information is provided in detail in the Airport Layout Plan drawing set, but is also important to note here and is provided in the following table, entitled *FAA SPECIFIED TAXIWAY SAFETY AREA STANDARDS*.

Table C4
FAA SPECIFIED TAXIWAY SAFETY AREA WIDTH STANDARDS
King County International Airport Master Plan

Taxiway	Standard (in feet)
Taxiways "A" (Alpha) from A-3 to south edge of A-10, A-4, A-7, A-9, and A-10 (Design Group V)	214'
Taxiway "A" from A-1 to A-3, and A-1 (Restricted to 150,000 lbs. or less; Design Group IV)	171'
Taxiway "B" (Bravo) , B-1, B-3, B-4, B-5, B-7, and B-10 (Design Group V)	214'
Taxiways A-2, A-11, and B-2 (Restricted to 60,000 lbs. or less – Design Group III)	118'
Taxiway A north of A-1, A-3, A-5, A-6, A-8, B-6, B-8, and B-9 are not in the air carrier movement area. (Restricted to 12,500 lbs. or less; Design Group II)	79'

Runway Pavement Strength. The pavement of the main runway (Runway 13R/31L) can support aircraft with gross weights of 100,000 pounds single wheel, 125,000 pounds dual-wheel, and 330,000 pounds dual-tandem wheel landing gear configuration. The pavement strength of Runway 13R/31L varies along its length within a range of 75,000 to 100,000 pounds single wheel and 95,000 to 200,000+ dual wheel landing gear.

Runway 13L/31R (the secondary runway) has a single wheel landing gear pavement strength of 50,000 pounds.

Airfield Capacity. An estimate of peak hour aircraft operations during the average day of the peak month was presented in the previous chapter entitled *Aviation Activity Demand Forecast*. This is the standard FAA methodology for estimating the average peak hour demand and leads to the ability to make a theoretical comparison with an estimate of the airport's maximum ability to efficiently accommodate aircraft operations.

In consideration of the forecast number of annual number of aircraft operations at the end of the planning horizon (480,210 annual operations in the year 2015), it is anticipated that demand will be approximately 130 peak hour aircraft operations during Visual Metrological Conditions (VMC) and approximately 40 during Instrument Metrological Conditions (IMC). This is indicative of the fact that the airport will continue to operate at a level that is near its maximum capability to efficiently accommodate aircraft landings and takeoffs without unacceptable delay (estimated at between 105 and 120 operations during VMC and between 33 and 50 operations during IMC).

Because no new runways are being proposed at KCIA, it will continue to be important to maintain the existing runway system to maximize its ability to be used efficiently (maintaining an appropriate taxiway and instrument approach system, etc.).

In summary, the forecasts of aviation activity indicate that KCIA will be operating at near its capacity to efficiently accommodate aircraft operations and it has only a limited ability to accommodate regional growth in aviation activity. This would suggest that if there is significant growth in the number of aircraft operations in the region, that growth is likely to occur at other existing or new airports.

Runway Length. Generally, runway length requirements for design purposes at commercial service/general aviation airports like KCIA are premised on several factors. These factors include:

- For general aviation aircraft, the factor is the category of aircraft using the airport. The categories are small aircraft under 12,500 pounds maximum takeoff weight and large aircraft under 60,000 pounds maximum certificated takeoff weight. The general aviation large aircraft fleet includes the majority of the business jet fleet. Runway length requirements are derived from the computer based FAA Airport Design Software supplied in conjunction with Advisory Circular 150/5300-13, *Airport Design*. Using this software, three values are entered into the computer, including the airport elevation of 18 feet Above Mean Sea Level (AMSL), the Mean Normal Maximum Temperature (NMT) of 78.4 degrees Fahrenheit, and the maximum difference in runway elevation at the centerline of five feet. This data generates the general recommendations for runway length requirements at KCIA, which are provided in the following table entitled, *RUNWAY LENGTH REQUIREMENTS*.

The data in the table indicates that for the small general aviation aircraft fleet, a runway between 2,390 feet and 4,060 feet in length is required. The secondary runway at the airport is 3,710 feet long (with approach threshold displacements of 250 feet on the north and 375 feet on the south), an appropriate length for its utilization. For the larger general aviation aircraft, a runway length of between 4,530 feet and 7,390 feet is required. The main runway with its existing length of 10,000 feet provides adequately for the large general aviation aircraft.

- For commercial service aircraft above 60,000 pounds, generalized data from the FAA's airport design software indicates that the runway length requirements are between 5,020 and 6,820 feet, depending on length of haul. More specifically, the most demanding commercial aircraft currently using the airport with regard to runway length are the air cargo aircraft (e.g., DC-8s, B-767, B-727s, B-747 etc.). The air cargo operators at the airport indicate that the main runway's length of 10,000 feet is adequate to accommodate their requirements. In addition, the air cargo operators have indicated that the runway would remain adequate in length under almost all operational conditions if it were to be

Table C5
RUNWAY LENGTH REQUIREMENTS
King County International Airport Master Plan

Aircraft Category	Length (Feet) Dry	Wet
Airplanes less than 12,500 lbs. with less than 10 seats[1]		
75% of Small Aircraft Fleet	2,390	2,390
95% of Small Aircraft Fleet	2,940	2,940
100% of Small Aircraft Fleet	3,480	3,480
Airplanes less than 12,500 lbs. with 10 or more seats[1]	4,060	4,060
Airplanes greater than 12,500 lbs. and less than 60,000 lbs[1]		
75% of fleet at 60% useful load	4,630	5,260
75% of fleet at 90% useful load	5,970	6,810
100% of fleet at 60% useful load	5,050	5,500
100% of fleet at 90% useful load	7,390	7,390
Commercial Service Aircraft Over 60,000 lbs[1]		
Length of Haul – 500 miles	5,020	5,020
Length of Haul – 1,000 miles	5,960	5,960
Length of Haul – 1,500 miles	6,820	6,820
Special Aircraft Operational Activity[2]		
AWACS and Flight Test	10,000	10,000

1 Source: FAA Advisory Circular 150/5300-13, *Airport Design*.
2 Source: The Boeing Company

Lengths based on 18' AMSL, 78.4° F NMT and a maximum difference in runway centerline elevation of 4'.

shortened to 9,120 feet to accommodate runway safety area improvements.

- Some airports have special aircraft operational activity that must be considered with regard to runway length requirements. At KCIA those special considerations include the Boeing Company's flight test program, and the AWACS aircraft maintenance program that is conducted at the airport. Because of the land-based facilities that are required to support these uses, an airport must be able to accommodate the AWACS and flight test activities with great reliability under almost all conditions. In order to properly support these special aircraft operational activities, a 10,000 foot take-off runway length is required at KCIA.

The analysis presented in the table above indicates that runway lengths presently provided at the airport can accommodate the existing and forecast aircraft fleet. The analysis also indicates that it is critical to maintain the existing runway lengths of the main and secondary runways.

Taxiways. Taxiways are constructed primarily to enable the movement of aircraft between the various functional areas on the airport and the runway system. Some taxiways are necessary simply to provide access between aircraft parking aprons and runways, whereas other taxiways become necessary to provide more efficient and safer use of the airfield. In addition, the placement of taxiways can have an effect on the likelihood of runway incursions. As described earlier, the taxiway system at KCIA generally meets the required standards (see Tables C2, C3, and C4). However, the runway centerline to taxiway centerline standard of 400 feet is not met by the existing parallel taxiway on the west side of Runway 13R/31L. Also, the placement of exit/entrance taxiways is analyzed from the standpoint of minimizing the runway occupancy times of arriving aircraft and minimizing the likelihood of runway incursions.

Electronic Landing Aids. Airport navigational aids, including instrument approaches and associated equipment, and airport lighting are detailed in the *Inventory* chapter of this document. The airport is currently equipped with an Instrument Landing System (ILS) approach procedure serving Runway 13R and Runway 31L, along with a Localizer/DME approach to Runway 13R.

Within the near future, Global Positioning System (GPS) approaches are expected to be the FAA's standard approach technology. With GPS the cost of establishing improved instrument approaches could be significantly reduced. The concept is to provide the best (lowest minimum) instrument approaches technically possible in consideration of surrounding terrain and structures to facilitate the most efficient use of airport facilities at KCIA. Newer technology instrument approach systems [GPS/FMS, Transponder Landing System (TLS), and Localizer Directional Aid (LDA)] may be of benefit when considering land use compatibility issues in the vicinity of the airport.

Airport Lighting. Presently the main runway at KCIA is equipped with High Intensity Runway Lights (HIRL). A Short Approach Light System with Sequenced Flashing Lights (SALSF) along with Precision Approach Path Indicator (PAPI) lights serve Runway 13R. Runway 31L has PAPI lights and Runway End Identifier Lights (REILS).

The secondary runway has Medium Intensity Runway Lights (MIRL) and VASI serving both runway ends.

Future improvements should include the provision of REIL and PAPI for both ends of the secondary runway.

Landside Facilities

Landside facilities are those facilities that support the airside facilities, but are not actually part of the aircraft operating surfaces. These consist of such facilities as terminal buildings, aprons, access roads, hangars and support facilities. Following an analysis of these existing facilities, current deficiencies can be noted in terms of accommodating both existing and future needs.

The landside facility needs identified below are taken into consideration in the formulation of the development plan proposal that is documented in the following chapter, *Airport Development Plan*. It is important to note that because of the lack of developable land at the airport and the inability to significantly expand airport land holdings for aviation uses, the total accommodation of all forecast landside demand is not feasible.

Passenger Terminal Facilities. Although there is forecast demand, there is no proposal currently being presented to King County that would bring significantly increased scheduled passenger service to the airport. When and if actual increased demand is a reality, it will bring with it the need for improved facilities (terminal, parking, etc.), along with increased capital improvement funding for those improved facilities. Sources and strategies for funding of improved facilities cannot be identified until specific needs are detailed in conjunction with a solid proposal for the provision of significantly increased commercial passenger service.

Aircraft Storage. The general aviation based aircraft forecast indicates that there will be approximately 50 additional aircraft based at the airport by the end of the planning period (2015). This combined with the current waiting list for hangars at the airport indicates that there will be a demand for approximately 14 additional acres for general aviation apron and hangar facilities. For based aircraft, this includes additional hangar facilities for 72 aircraft and additional apron tie-down area for 21 aircraft. For transient aircraft, this includes additional space for 20 aircraft on tie-downs

Air Cargo Facilities. The demand for air cargo facility development area has been forecast to increase to 43 acres by the year 2015. This includes area for air cargo structures, aircraft parking areas, along with automobile/truck parking and movement areas. Currently air cargo facilities at KCIA occupy approximately 22 acres.

Support Facilities Requirements

In addition to the aircraft storage facilities described above, there are several airport support facilities that have quantifiable requirements and that are vital to the efficient and safe operation of the airport.

Aircraft Rescue and Fire Fighting (ARFF) Facility. The requirements for ARFF equipment and staff are based upon the length of the largest air carrier aircraft that serves the airport with an average of five (5) or more daily departures. Because the airport does not have regular service by large commercial passenger service aircraft, it maintains ARFF Index A facilites and equipment as specified by FAR Part 139.317.

The following table, entitled *REPRESENTATIVE AIR CARRIER AIRCRAFT LENGTHS AND ARFF INDEX*, presents representative air carrier aircraft along with their respective lengths and ARFF Index.

Table C6
REPRESENTATIVE AIR CARRIER AIRCRAFT LENGTHS AND ARFF INDEX
King County International Airport Master Plan

Representative Aircraft	Length	ARFF Index
EMB 120, Dash 8, ATR-72	<90	A
B-737, A-320	90' to 126'	B
B-727, B-757, MD-80	126' to 159'	C
B-767, DC-10	159' & 200'	D
MD-11, B-747	>200'	E

Source: CFR Part 139.315

Air Traffic Control Tower (ATCT).

The ATCT facility at the airport is well located to meet existing and forecast needs; however, because of the age of the facility significant renovation, including an earthquake retrofit will be required in the next few years. It could be that the complete replacement of the facility will be required. This project will be included in the capital improvement project and cost considerations of this Airport Master Plan.

Fuel Storage Facility.

Although adequate in size to provide for future needs, the airport's primary fuel storage facility is located within the runway protection zone associated with the north end of the main runway. It is programmed for relocation.

Summary

Although many of the existing airport facilities are adequate to serve through the end of the 20-year planning period, others will need improvement to accommodate the existing and future aviation demand, and provide a safe and efficient aircraft operating environment. The facility requirements detailed in this chapter will be used to evaluate the airport and provide the basis for the Master Plan recommendations.