

CHAPTER FOUR
DEMAND/CAPACITY ANALYSIS

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Introduction

The purpose of this task is to determine the airfield capacity of Hilton Head Island Airport. This is accomplished by utilizing the FAA Circular, "Airport Capacity and Delay", which discusses a recognized and approved airport capacity model. This model produces the airports Annual Service Volume (ASV) which is a reasonable estimate of the airport's annual capacity.

Some of the factors that affect and are inputs to the model include aircraft fleet mix, runway configuration, percent of touch and go (T&G), percent of arrivals, meteorological conditions, and location/type of taxiway exits.

Aircraft fleet mix is the percent of annual operations by various aircraft types. Aircraft fleet mix classifications are divided into weight and number of engines. The runway configuration reflects the actual runway geometry and the use of the runway system. Some airfield geometry configurations include the number of runways, the physical layout and separation distances between runways. Operation use considerations include the percentage use of the runway system by direction, type of operation and point of takeoff. The percent of arrivals as a function of the total aircraft operations is needed as input, although it is expected that over an extended period of time, the percent split between arrivals and departures will be 50 percent. The percent of touch and go operations actually represents two operations in a short period of time.

Strategically placed taxiway exits that permit aircraft to clear the runway after landing provide significant increases in runway capacity. Meteorological conditions and navigational aids also affect capacity and are needed to develop the model.

With the information mentioned above, the capacity model can be formulated to arrive at the airports ASV. This number will be compared to the existing demand to identify any deficiencies in the airport's airfield capacity. Comparison of future forecasts of aviation activity with available airfield capacity will identify facility needs and when these improvements are needed to increase capacity.

Most of the inputs required for the development and implementation of the capacity model have previously been presented. The meteorological conditions, which are subsequently presented, followed by the results of the analysis.

Meteorological Characteristics

Weather

The weather experienced in a given area is often a good indicator of the facilities necessary for the airport to have continuous operation. In some areas, complete instrumentation is necessary to provide constant operation of the airport. In other areas, the frequency of the weather, which could necessitate a precision instrument landing system (ILS), or similar equipment would be so infrequent as to not justify the cost necessary for the installation and operation of such a facility.

Ceiling and Visibility Conditions

Cloud ceiling and visibility at Hilton Head Island Airport are important considerations because the occurrence of low ceiling and poor visibility conditions require the airport to operate under Instrument Flight Rules (IFR). Under IFR conditions, a pilot controls the spatial orientation of an aircraft through reference to instruments in the cockpit and is constantly under radar contact with the appropriate air traffic control (ATC) facility. Under Visual Flight Rules (VFR) conditions, a pilot controls the spatial orientation of an aircraft through reference to the ground.

Ceiling and visibility conditions at Hilton Head Island Airport were obtained from the Marine Corps Air Station, Beaufort, South Carolina. An analysis of the data were performed to calculate the percentage of flying weather for VFR, IFR, and closed airport conditions (when ceiling and visibility fall below the published minimums):

IFR – Cloud ceiling is less than 1,000 MSL and/or visibility is less than 3 miles; and

Closed – Ceiling is less than 541 feet MSL and/or visibility is less than ½ mile.

These definitions were developed from FAA standard definitions with the IFR conditions based on the lowest ceiling/visibility approach procedures established for Hilton Head Island Airport.

Wind Analysis

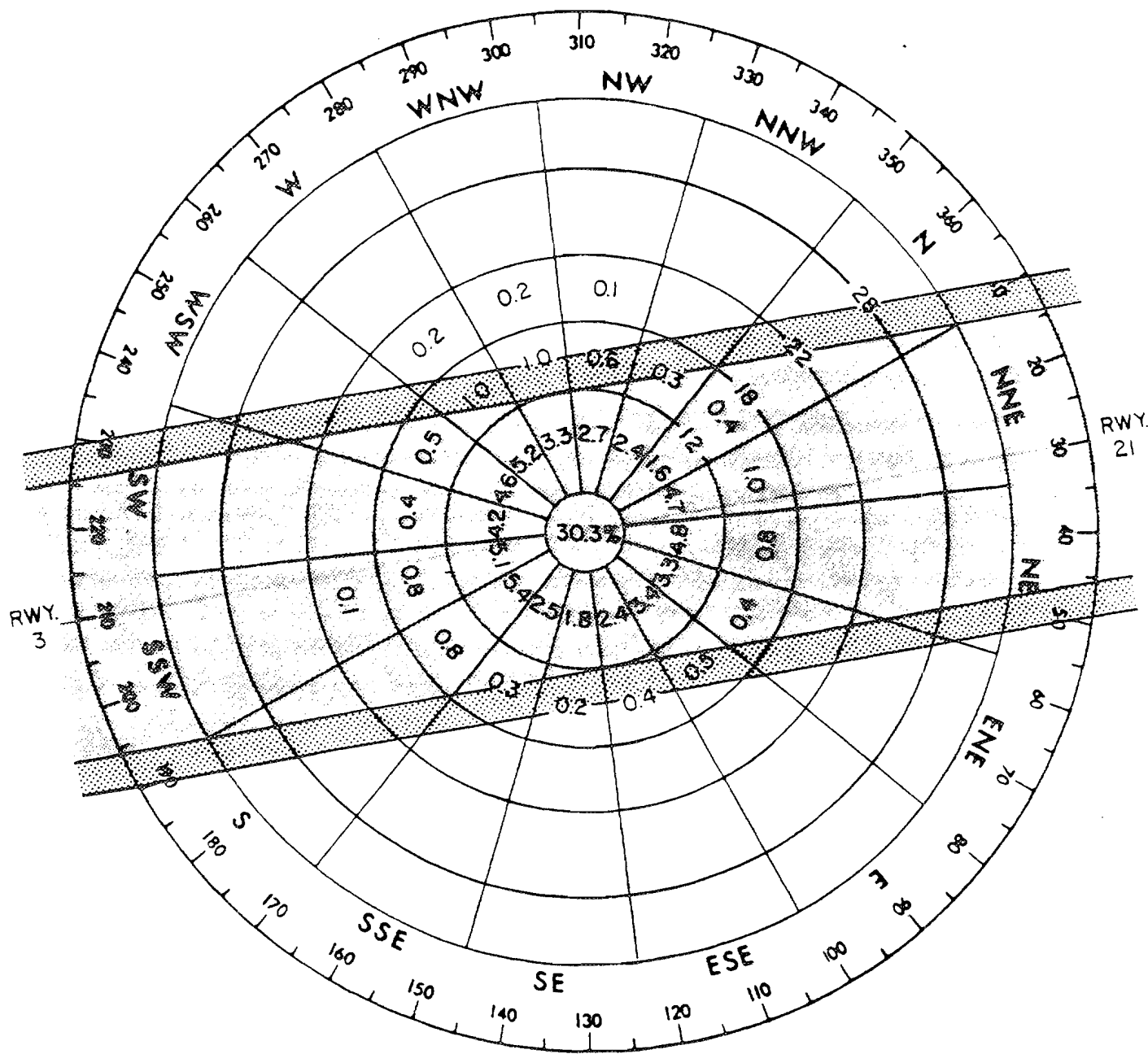
Runway wind coverage for aircraft is defined in terms of allowable or rated crosswind for the type of aircraft using the airfield. Aircraft take off and land into the wind to take full advantage of the runway length and for reasons of stability. In addition, the crosswind component of the wind is of importance, since high velocity crosswinds pose a danger to aircraft movements of all types.

The wind data from the Beaufort Marine Air Station was used to develop an All Weather Wind Rose. Because of the different size and speeds of aircraft that operate at the airport, the wind rose was analyzed for both 12 and 15-mph crosswind conditions. This analysis indicated that, under all weather conditions, crosswind velocities would not exceed 12 mph 96.5 percent of the time and 15 mph 98.4 percent of the time. The All Weather Wind Rose is depicted in Figure 4-1.

Note: Since weather data for Hilton Head Island Airport is not available, Beaufort Marine Air Station data may be substituted under guidelines set by the FAA (Advisory Circular 150/5300-4B)

Airside Capacity

The capacity of the existing runway configuration was estimated in accordance with FAA guidelines per Advisory Circular 150/5060-5, "Airport Capacity and Delay. For the capacity calculations the following conditions were established:



WIND DATA
 12 M.P.H. 96.5%
 15 M.P.H. 98.4%

SOURCE: U.S. WEATHER BUREAU, MARINE CORPS AIR STATION, BEAUFORT, S.C. 1958-1971.



ALL WEATHER WIND ROSE

Hilton Head Island Airport

Aircraft mix is 100 percent A and B
Aircraft arrivals equal departures
The percent Touch and Go Operations is within 0-10 percent
There are no major airspace limitations
There exists a full parallel taxiway with special right angle exit taxiways

It was estimated that the annual service volume (ASV) i.e. , the maximum aircraft operations per year that can theoretically be conducted safely at the Hilton Head Island Airport is 230,000. The maximum hourly capacity for VFR and IFR operations per hour was estimated at 98 and 59 respectively.

Comparing the anticipated demand of annual and peak hour operations as determined in the forecasts and the long-range estimate of runway capacity, the forecasted annual operations are well within the ASV capacity. Since the forecast of aircraft operations are well below the estimated capacities, it is believed that the existing airfield configuration will provide adequate capacity for the next twenty years.

Summary

Airport annual services volume, or airfield capacity was established at 230,000 operations per year. Hourly capacity, under VFR and IFR conditions, was determined as 98 and 59 operations per hour, respectively. Total operations were forecasted at approximately 128,531 in the year 2018. The ratio of demand to capacity is therefore 56 percent. It can be concluded from reviewing the previous data that the airport has adequate airfield capacity throughout the planning period.