Other Airfield Capacities

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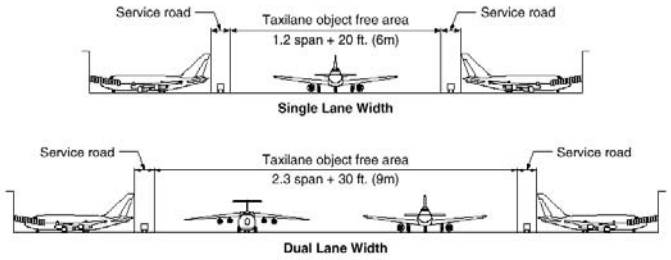
Capacity of Taxiways

- **The capacity of the taxiway system is rarely, if ever, the capacity bottleneck of major airports**
- **However, some specific parts of the taxiway system may consistently act as "hot spots" (points of congestion), especially at older, limited-area airports**
- **Local geometry and traffic flows determine the location of these hot spots**
- **The blocking of groups of stands by a single lane passage is one of the most common examples of such taxiway hot spots**

Single lane vs. dual lane access to stands



Capacity of Aprons

- **Often a tough problem!**
- **Different stands can accommodate different sizes of aircraft**
- **Remote vs. contact stands**
- **Shared use vs. exclusive use (airlines, handlers)**
- **Dependence among neighboring stands**
- **Static capacity: No. of aircraft that can be parked simultaneously at the stands. (Easy!)**
- **Dynamic capacity: No. of aircraft that can be accommodated per hour. (Can be difficult to compute.)**

Stand Blocking Time (SBT)

- **Scheduled occupancy time (SOT) [20 minutes to 4 hours, except for overnight stays]**
- **Positioning time (PT) [3 – 10 mins]**
- **Buffer time (BT) [up to 1+ hour at some locations]**

$$SBT = SOT + PT + BT$$

A Simple Case

- **Assume *n* stands; all can accommodate all aircraft sizes**
- **Subdivide aircraft into *K* relatively homogeneous classes w.r.t. *SBT***

$$E[SBT] = \sum_{i=1}^{K} p_i \cdot SBT_i$$

- **Dynamic capacity = *n* / *E*[*SBT*]**

Annual Airside Capacity

- **The number of aircraft movements that can be handled at a reasonable level of service in one year**
- **Vaguely defined, but very important for planning purposes**
- **Runway system is typically the limiting element**
- **Estimation of annual capacity must consider:**
  - Typical hourly (saturation) capacity
  - Pattern of airport use during a day
  - Reasonable level of delays during busy hours of day
  - Seasonal and day-of-the-week peaking patterns of demand

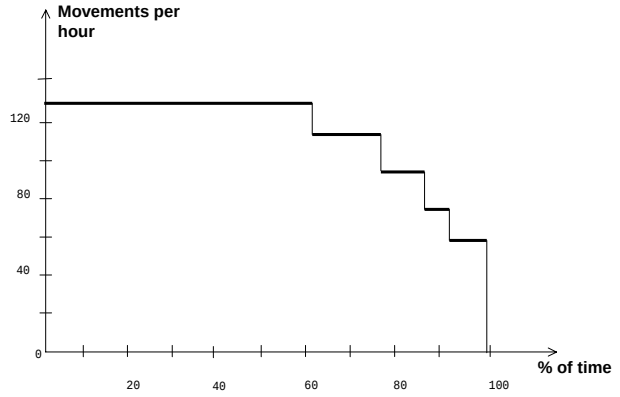
Reference: Chapter 11, Section 11-4

Annual Airside Capacity: Boston Example

1. Typical hourly runway capacity (based on CCC) = 115.
   Compute: A = 115 x 24 x 365 = 1,007,400
2. Equivalent of ~16-17 hours of strong activity per day.
   Compute: 1,007,400 x (16/24) = 671,600
3. ~85% utilization in busy hours for (barely) tolerable delays
   Compute: 671,600 x 0.85 = 570,860
4. Summer season days have about 15% more movements than winter season days
   (570,860 / 2) + (570,860 / 2)x(1/ 1.15) ≅ 534,000

This is a *rough estimate* of the ultimate capacity of Logan airport, without expansion of capacity

Annual Capacity Coverage Chart: Boston/Logan



Peaking Characteristics of 80 Airports in ACI Survey (1998)

Total annual pax (million)	Sample size	Average monthly peaking ratio*	Range of monthly peaking ratios	Monthly peaking ratios greater than 1.2
>20	23	1.18	1.09 – 1.43	6 of 23 (26%)
10 – 20	13	1.25	1.08 – 1.55	9 of 13 (69%)
1 – 10	44	1.35	1.11 – 1.89	34 of 44 (77%)

*** Monthly peaking ratio = (average number of passengers per day during peak month) / (average number of passengers per day during entire year)**

Estimating Annual Capacity: Generalization

Let C be the typical saturation capacity per hour of airport X and let

A = C x 24 x 365 = C x 8760

Then the *annual capacity of X will be in the range of 50%- 60% of A,* the percentage depending on local conditions of use and peaking patterns.

Note: If instead of saturation capacity, C is the *declared* capacity, then the annual capacity will be in the range of 60%- 70% of A, since the declared capacity is usually set to approximately 85%- 90% of saturation capacity.