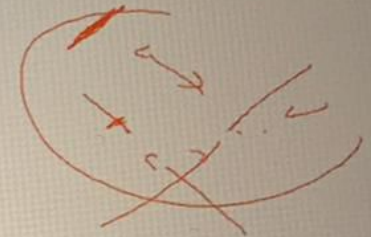


Factors that influence travelers selecting air transportation:

- Income
- Education
- Occupation
- Purpose of trip
- Length of trip

Selection of Airport Site

Factor that should be considered in selecting an airport site:



- Convenience to users vs. Convenience to community (closest to town vs. away from town (noise, pollution, safety))
- Availability of land and land cost
- Topography (a large flat area ~ 3 sq. km)/ for design layout
- Airspace obstructions
- Engineering material factors: soil type, drainage, availability of aggregates
- Environmental Factors (noise, air, water and soil pollution)
- Availability of other transportation modes (Hwy & RR) + utilities
- Atmospheric Conditions: Wind directions, temperature, and altitude
- Coordination with other airports
- Other consideration such as birds, politics & Sabotage

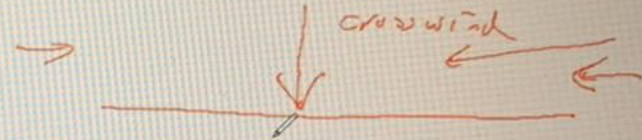


Runway Orientation

- Landing: With wind or against wind?
- Takeoff: With wind or against wind?
- Landing and Takeoff are safest when performed against (into) the wind

- Landing: increase resistance
- Takeoff: increase thrust

Thus requiring shorter distance to stop or takeoff (shorter runways)



- Cross wind, or cross wind component (wind at right angle to the direction of travel) significantly and adversely affect aircraft operation particularly safety during landing and takeoff.

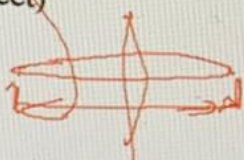
Table 18-3 Determinants of the FAA Airport Reference Code

FAA Aircraft Approach Category	
Approach Speed	Aircraft Approach Category
Speed less than <u>91</u> knots	A ✓
Speed 91 knots or more but less than 121 knots	B
Speed 121 knots or more but less than 141 knots	C
Speed 141 knots or more but less than 166 knots	D
Speed <u>166</u> knots or more	E ✓

FAA Airplane Design Groups	
Wingspan	Airplane Design Group (ADG)
Up to but not including <u>15</u> m (49 feet)	I
15 m (49 feet) up to but not including 24 m (79 feet)	II ✓
24 m (79 feet) up to but not including 36 m (118 feet)	III
36 m (118 feet) up to but not including 52 m (171 feet)	IV
52 m (171 feet) up to but not including 65 m (214 feet)	V
65 m (214 feet) up to but not including <u>80</u> m (262 feet)	VI ✓

idle speed 86

300 knots



→ A-II

E VI

1.8 knots

nautical mile/hr = knots

statute mile = 5280'

nautical mile = 6076'

Source: Airport Design, FAA Advisory Circular 150/5300-13, including Changes 1-4, Federal Aviation Administration, Washington, DC, September 29, 1989.

Federal Aviation Administration (FAA) recommends maximum crosswind as follow*:

A-I & B-I:	10.5 knots
A-II & B-II:	13.0
A-III & B-III & C-1 to D-III	16.0
A-IV to D-VI	20.0

* See "Airport Reference Code Table 18.3 p.551.

FAA Standards: Runways should be oriented so that aircraft may land at least 95% of the time without cross wind exceeding above requirements.

The Wind Rose Method: to determine the “best” runway orientation concerning prevailing winds.

See Example page 510/511

Homework problem: 1 /p.522 (optional)
Wind Rose link (FAA)

<https://airports-gis.faa.gov/airportsqis/publicToolbox/windroseForm.jsp?windroseId=null&onLoadCommand=none&requestToken=1481094383606>

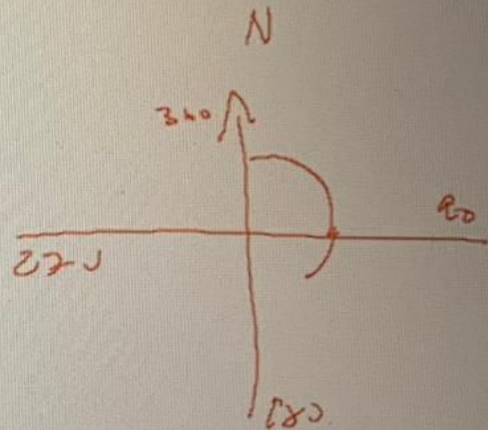
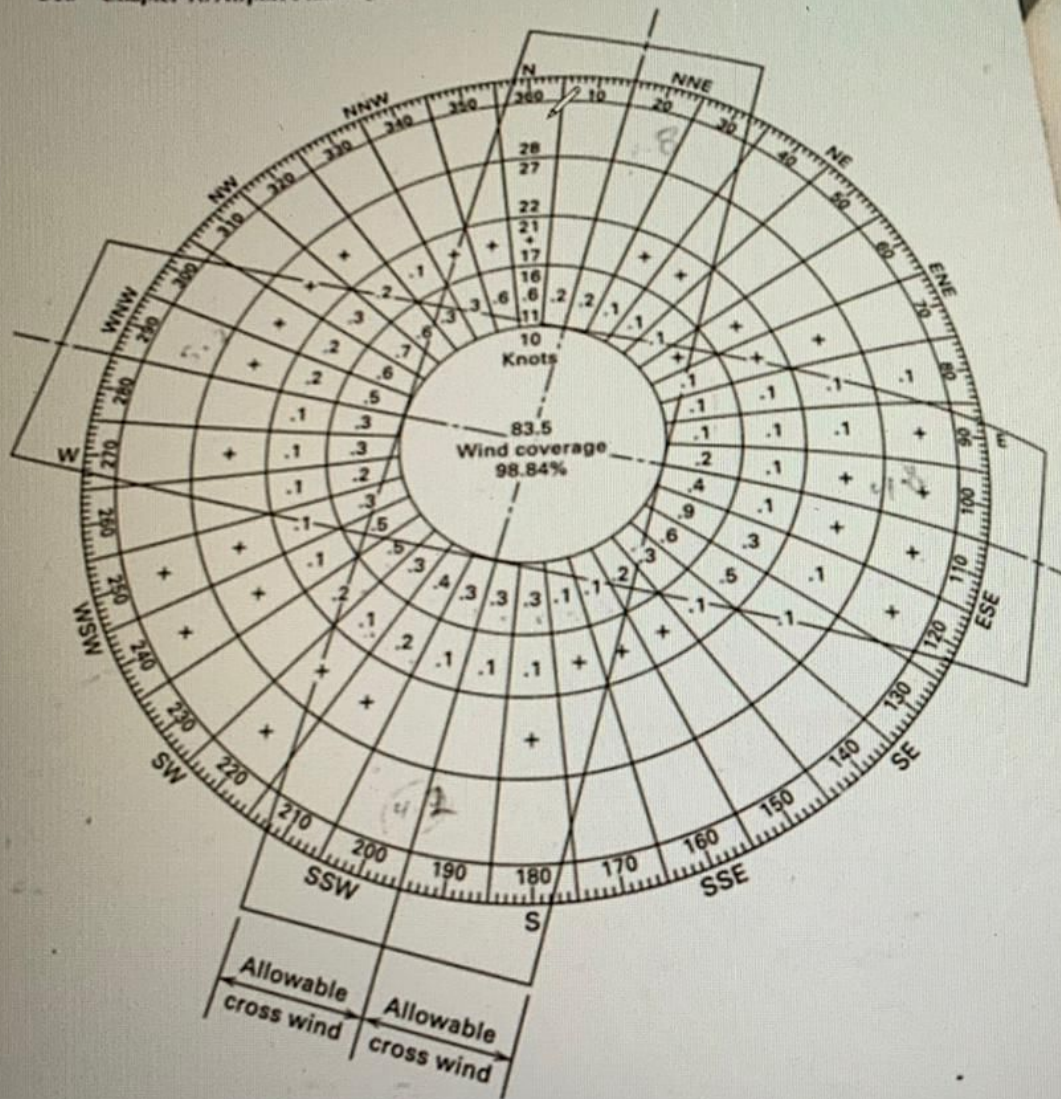


Figure 16-3 A typical wind rose.

16-6. Runway Orientation 511

Table 16-2 Typical Wind Data

Hourly Observations of Wind Speed (Knots)

Handwritten notes: 3-45, 35, 3-15

	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41	Over	Total
1	469	842	568	212	0	0	0	0	0	0	2091
2	568	1263	820	169	0	0	0	0	0	0	2820
3	294	775	519	73	0	0	0	0	0	0	1670
4	317	872	509	62	9	0	0	0	0	0	1771
5	268	861	437	106	11	0	0	0	0	0	1672
6	357	534	151	42	0	0	0	0	0	0	1092
7	369	403	273	84	8	0	0	0	0	0	1175
8	158	261	138	69	36	10	0	0	0	0	814
9	167	352	176	128	73	52	41	22	0	0	971
10	119	303	127	180	68	59	21	0	0	0	877
11	323	586	268	312	98	41	9	0	0	0	1651
12	618	1397	624	779	111	23	28	0	0	0	3779
13	472	1375	674	531	271	69	21	0	0	0	3571
14	647	1377	574	281	452	67	0	0	0	0	3008
15	338	1093	348	135	129	0	0	0	0	0	1941
16	560	1399	523	121	27	0	0	0	0	0	2622
17	587	883	469	128	19	0	0	0	0	0	2079
18	1046	1984	1068	297	12	0	0	0	0	0	4496
19	499	793	586	241	83	18	0	0	0	0	2211
20	371	946	615	243	92	0	0	0	0	0	2239
21	340	732	528	323	64	0	0	0	0	0	2078
22	479	768	603	323	147	8	0	0	0	0	2253
23	187	1008	915	413	231	115	38	19	0	0	2715
24	458	943	800	453	192	0	0	0	0	0	2779
25	351	899	752	297	96	11	18	0	0	0	2431
26	368	731	379	208	102	21	9	0	0	0	1739
27	411	748	469	232	53	0	0	0	0	0	1997
28	191	554	276	287	118	19	0	0	0	0	1426
29	271	642	548	479	118	0	0	0	0	0	2100
30	379	873	526	543	143	17	0	0	0	0	2563
31	299	643	597	618	208	34	0	0	0	0	2398
32	397	852	521	559	222	19	0	0	0	0	2510
33	236	721	324	238	158	23	0	0	0	0	1567
34	280	916	845	307	48	0	0	0	0	0	2372
35	252	931	918	487	24	0	0	0	0	0	2611
36	501	1568	1381	569	23	0	0	0	0	0	4046
TOTAL	7729	0	0	0	0	0	0	0	0	0	7729
TOTAL	21676	31828	19849	10437	3357	529	166	22	0	0	87864

10 seconds

10 years x 365 x 24 = 87864 p



Source: Airport Design, FAA Advisory Circular 150/5300-13, including Changes 1-4, Federal Aviation Administration, Washington, DC, September 29, 1989.

16-6. Runway Orientation 511

Table 16-2 Typical Wind Data
Hourly Observations of Wind Speed (Knots)

Direction	Hourly Observations of Wind Speed (Knots)									Total
	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	41 Over	
1	469	842	568	212	0	0	0	0	0	2091
2	568	1263	820	169	0	0	0	0	0	2820
3	294	775	519	73	9	0	0	0	0	1670
4	317	872	509	62	11	0	0	0	0	1771
5	268	861	437	106	0	0	0	0	0	1672
6	357	534	151	42	8	0	0	0	0	1092
7	369	403	273	84	36	10	0	0	0	1175
8	158	261	138	69	73	52	41	22	0	814
9	167	352	176	128	68	59	21	0	0	971
10	119	303	127	180	98	41	9	0	0	877
11	323	586	268	312	779	271	23	28	0	1651
12	618	1397	624	779	271	69	21	0	0	3779
13	472	1375	674	531	452	67	0	0	0	3571
14	647	1377	574	281	129	0	0	0	0	3008
15	338	1093	348	135	27	0	0	0	0	1941
16	560	1399	523	121	19	0	0	0	0	2622
17	587	883	469	128	12	0	0	0	0	2079
18	1046	1984	1068	297	83	18	0	0	0	4496
19	499	793	586	241	92	0	0	0	0	2211
20	371	946	615	243	64	0	0	0	0	2239
21	340	732	528	323	147	8	0	0	0	2078
22	479	768	603	231	115	38	19	0	0	2253
23	187	1008	915	413	192	0	0	0	0	2715
24	458	943	800	453	96	11	18	0	0	2779
25	351	899	752	297	102	21	9	0	0	2431
26	368	731	379	208	53	0	0	0	0	1739
27	411	748	469	232	118	19	0	0	0	1997
28	191	554	276	287	118	0	0	0	0	1426
29	271	642	548	479	143	17	0	0	0	2100
30	379	873	526	543	208	34	0	0	0	2563
31	299	643	597	618	222	19	0	0	0	2398
32	397	852	521	559	158	23	0	0	0	2510
33	236	721	324	238	48	0	0	0	0	1567
34	280	916	845	307	24	0	0	0	0	2372
35	252	931	918	487	23	0	0	0	0	2611
36	501	1568	1381	569	27	0	0	0	0	4046
0	7729	0	0	0	0	0	0	0	0	7729
TOTAL:	21676	31828	19849	10437	3357	529	166	22	0	87864

↑
10.5

$$\frac{297}{87864} = \sqrt{0.0034}$$

0.24%

= 0.234

Source: Airport Design, FAA Advisory Circular 150/5300-13, including Changes 1-4, Federal Aviation Administration, Washington, DC, September 29, 1989.