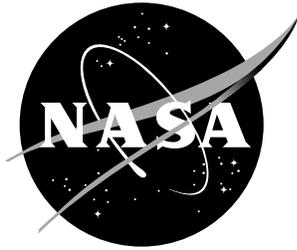


NASA/CR-1998-207675



Air Traffic and Operational Data on Selected U.S. Airports With Parallel Runways

Thomas M. Doyle
Adsystem, Inc., Hampton, Virginia

Frank G. McGee
Lockheed Martin Engineering & Sciences, Hampton, Virginia

May 1998

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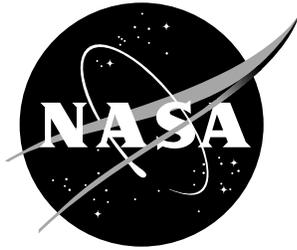
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*Thomas M. Doyle
Adsystem, Inc., Hampton, Virginia*

*Frank G. McGee
Lockheed Martin Engineering & Sciences, Hampton, Virginia*

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-2199

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Introduction

This report presents information on a number of airports in the country with parallel runways and focuses on those that have at least one pair of parallel runways closer than 4300 ft. Information contained in the report describes the airport's current operational activity as obtained through contact with the facility and from FAA air traffic tower activity data for FY 1997. The primary reason for this document is to provide a single source of information for research to determine airports where Airborne Information for Lateral Spacing (AILS) technology may be applicable.

A data sheet is presented for each airport. The data includes the quantity and type of activity at that airport and the resources to handle the activity, and shows the level of air traffic control (ATC) service provided. The level of ATC service at each airport may differ due to a variety of factors, such as the number of operations, runway configuration, and complexity of the surrounding airspace.

The two primary sources that provide ATC services to an airport are the terminal radar approach control facility (TRACON), and the airport traffic control tower. These facilities interface with each other for all aircraft operations in the terminal area. The tower is always located on the airport; however, the TRACON can be located at a site off the airport. The mission of these facilities is to provide a safe, efficient, and expeditious flow of air traffic to airports under their jurisdiction. Airports usually offer this service on a 24-hour-per-day basis in all weather conditions.

Instrument flight rules (IFR) and visual flight rules (VFR) are the basic rules used when providing ATC service. IFR conditions exist when weather conditions are below the minimum for flight under visual flight rules. During IFR conditions, an air traffic controller is responsible for providing prescribed separation between aircraft. VFR conditions exist at an airport when the reported ceiling is 1000 ft or higher, and the visibility is three statute miles or greater. Visual approaches are authorized to an airport when VFR conditions exist and may be used at the discretion of ATC. Under visual approach procedures, the flight deck crew is primarily responsible for maintaining separation from other aircraft. Consequently, separation between aircraft can be reduced and a greater airport flow rate is usually achieved. It is noteworthy that some terminal areas operate more efficiently using IFR procedures most of the time even when VFR procedures could be used. This type of operation is essentially due to the complexity of those areas and the need to have a more orderly flow of traffic. Most terminal areas operate more efficiently when they are able to use visual approach procedures. When employed, IFR procedures can have a delaying effect on the flow of traffic and the airport flow rate will be reduced.

The data sheet for each airport includes the following information:

1. **Airport:** Location, name, and three letter identifier.
2. **Hub airlines:** The airlines that use that airport as a hub.
3. **Airport average daily operations:** The overall average air traffic departures and arrivals for each day using FY 1997 data. This is not for the peak traffic day.
4. **Spacing between parallel runway centerlines:** The distance in feet between each set of parallel runways. When the distance is more than 4300 ft a plus sign (4300 ft +) is added.
5. **Type of radar system used at the airport:** Most airports use the ASR-9 radar with digitized radar data.
6. **Type and number of tower radar displays:** The Digital Brite Radar Indicator Tower Equipment (DBRITE) is used at most towers and is compatible with the ASR-9.
7. **Number of local control positions:** Tower positions that clear aircraft to land and takeoff and separate aircraft under their control.
8. **TRACON serving airport:** The radar approach control facility providing radar service for arriving and departing aircraft at that airport.
 - **TRACON arrival control positions:** Positions that provide sequencing and clearance for an instrument approach to the airport. They hand off aircraft on final approach to the tower local controller.
 - **TRACON final monitor positions:** During instrument meteorological conditions (IMC) they monitor precision instrument approaches to the runway to ensure a safe landing.
9. **Weather conditions below which instrument approaches are required:** A ceiling and/or visibility minimum where aircraft cannot see the airport or traffic to conduct a visual approach, and must use an instrument approach procedure.
10. **Usual or preferred flow of traffic:** The normal landing and departure configuration for that airport.
11. **Airport flow rate:** The number of arrivals the airport can safely and efficiently handle during an hour. The rates shown are for optimum visual conditions. As the weather deteriorates this rate will usually decrease.

12. **Arrival delay factors:** Delays normally occur due to weather affecting air traffic procedures and/or volume of traffic. Airports using two runways during visual meteorological conditions (VMC) may have to use only one runway during instrument meteorological conditions (IMC).

Note: For example, at times due to weather factors and capacity limitations at destination airports, flights will absorb delays on the ground before departure rather than by holding in flight. Related to this, when departure aircraft are not released from their gates because of delays then arriving aircraft inbound to their gates will be delayed.

13. **Remarks:** Any other data that may be a factor at that airport.

An airport diagram showing the overall airport configuration accompanies each data sheet. The airport diagrams are copied from the U.S. Government Flight Information Publication (Terminal), published by the National Imagery and Mapping Agency, September–November 1997.

Table 1 presents a list of U.S. airports with parallel runways 450 ft or more apart and is sorted by the lateral spacing between the runway centerlines.

This report is not intended to serve as an all inclusive authoritative document, but simply as a resource for the researcher. Airport operational characteristics continually evolve and any research should take this into account by insuring that the data being used is based on the most current information available.

Airport: Atlanta/William B. Hartsfield Atlanta International Airport (ATL)

Hub airlines: Delta and Atlantic Southeast

Airport average daily operations: 2123

Spacing between parallel runway centerlines:

- RWY 27R & 26L 4300 ft+
- RWY 26L & 26R 1000 ft
- RWY 27L & 27R 1000 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 6

Number of local control positions: 4 Two local control arrivals and two local control departures. Will have five local control positions when RWY 10/28 is completed.

TRACON serving airport: Atlanta

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2. Three with new runway.

Weather conditions below which instrument approaches are required: Ceiling 2900 ft and/or visibility 5 miles

Usual or preferred flow of traffic: Land on RWY26R & 27L Depart on RWY 27R & 26L

- Sixty percent west RWY 26L/R & RWY 26/R
- Forty percent east RWY 8L/R & RWY 9L/R

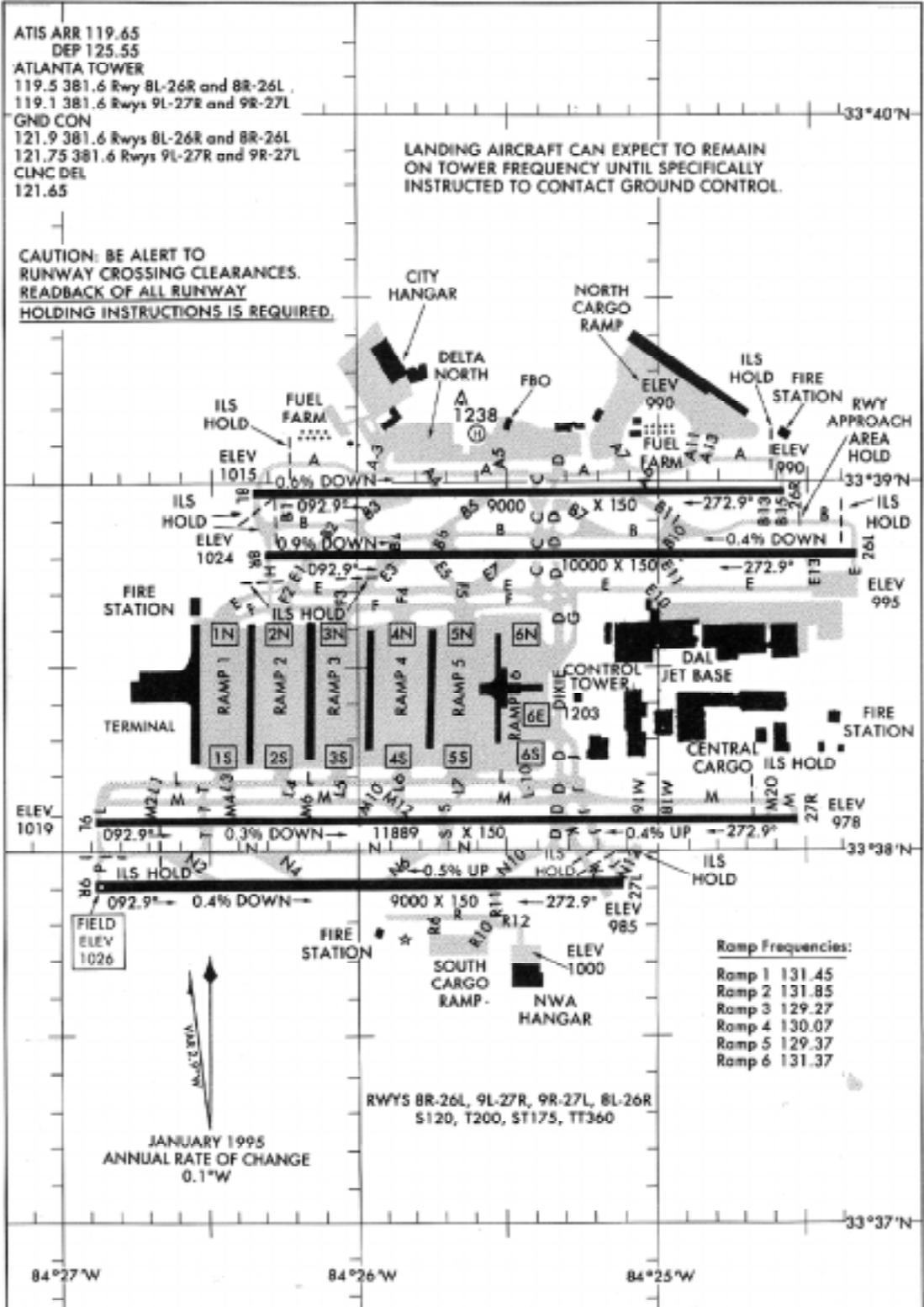
Airport flow rate: 96 per hour

Arrival delay factors: Volume of traffic and severe weather

Remarks: A new parallel runway (RWY 10/28) is being constructed that will give the airport the capability for triple simultaneous ILS approaches.

AIRPORT DIAGRAM

ATLANTA/THE WILLIAM B. HARTSFIELD ATLANTA INTL (ATL)
ATLANTA, GEORGIA



AIRPORT DIAGRAM

ATLANTA, GEORGIA
ATLANTA/THE WILLIAM B. HARTSFIELD ATLANTA INTL (ATL)

Airport: Boston/General Edward Lawrence Logan International Airport (BOS)

Hub airlines: Northwest

Airport average daily operations: 1354

Spacing between parallel runway centerlines:

- RWY 4L/R 1500 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 3

TRACON serving airport: Boston

- TRACON arrival control positions: 2
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Not a factor at this facility. Local procedures require instrument approaches.

Usual or preferred flow of traffic: Land and depart RWY 4L/R Depart RWY 9

Airport flow rate: 50 per hour

Arrival delay factors: IFR weather

Remarks: Poor weather significantly reduces arrival capacity.

Airport: Dallas-Fort Worth International Airport (DFW)

Hub airlines: American

Airport average daily operations: 2538

Spacing between parallel runway centerlines:

- RWY 17C & 17L 5000 ft
- RWY 17C & 18R 5000 ft
- RWY 17C & 17R 1200 ft
- RWY 18L & 18R 1200 ft

Type of radar system used at the airport: 4 ASR-9s

Type and number of tower radar displays: DBRITE, 2 in East Tower and 2 in West Tower

Number of local control positions: 2 in East Tower and 2 in West Tower

TRACON serving airport: Dallas-Fort Worth

- TRACON arrival control positions: 2
- TRACON of final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 7 miles

Usual or preferred flow of traffic: RWY 17L/C/R and RWY 18L/R. Land on RWY 17L/C & RWY 18R and depart on RWY 17R & RWY 18L

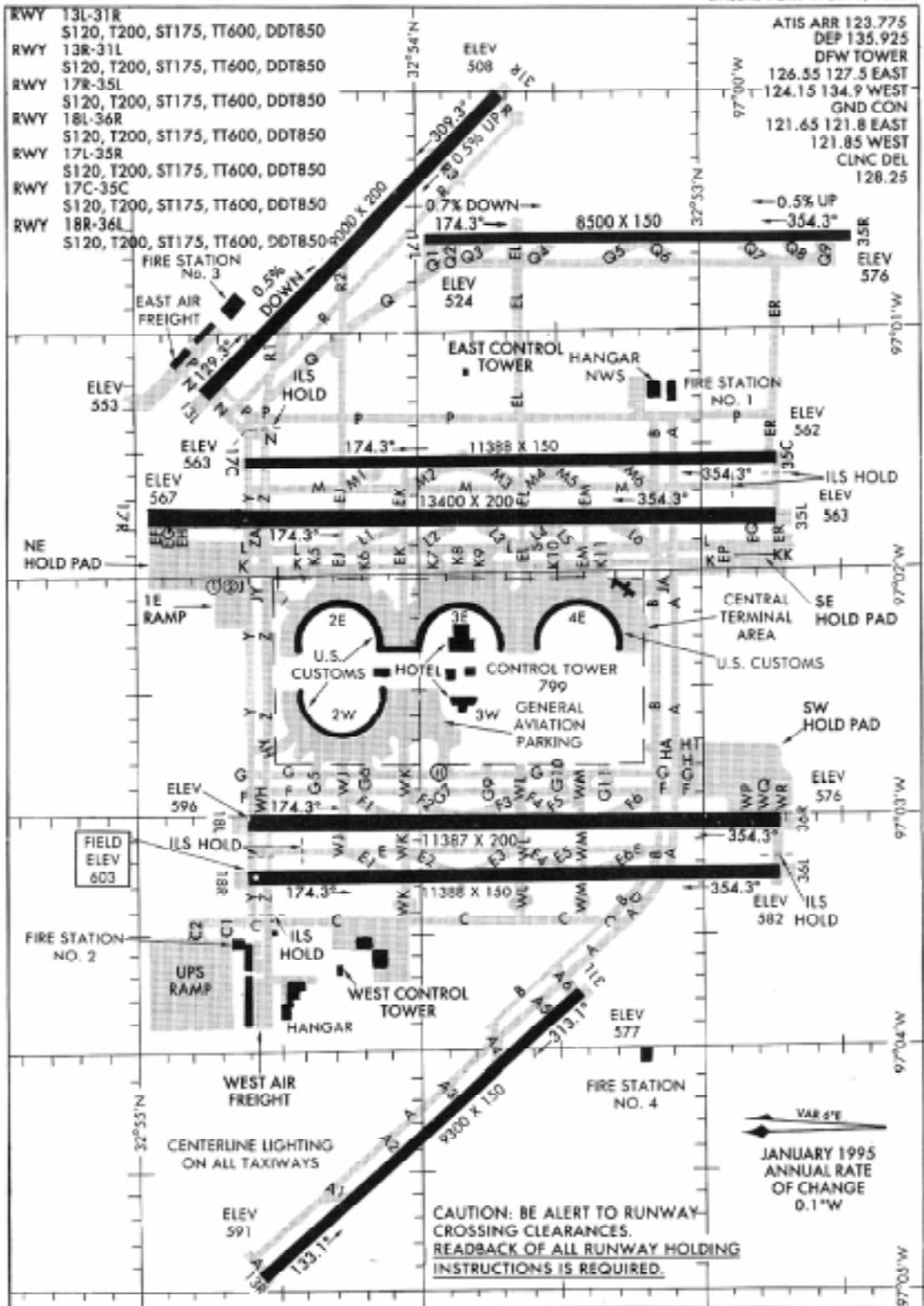
Airport flow rate: 120 per hour

Arrival delay factors: Severe weather

Remarks: Three control towers. Triple parallel approaches are made to RWY 18R & RWY 17C/L.

AIRPORT DIAGRAM

DALLAS-FORT WORTH INTL (DFW)
DALLAS-FORT WORTH, TEXAS



AIRPORT DIAGRAM

DALLAS-FORT WORTH, TEXAS
DALLAS-FORT WORTH INTL (DFW)

Airport: Dallas-Love Field (DAL)

Hub airlines: Southwest

Airport average daily operations: 623

Spacing between parallel runway centerlines:

- RWY 13L/R 3000 ft

Type of radar system used at the airport: ASR-9 located at DFW

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 2

TRACON serving airport: Dallas-Fort Worth

- TRACON arrival control positions: 1
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 7 miles

Usual or preferred flow of traffic: Land and depart RWY 13L/R

Airport flow rate: 36 per hour set by DFW Traffic Management Unit

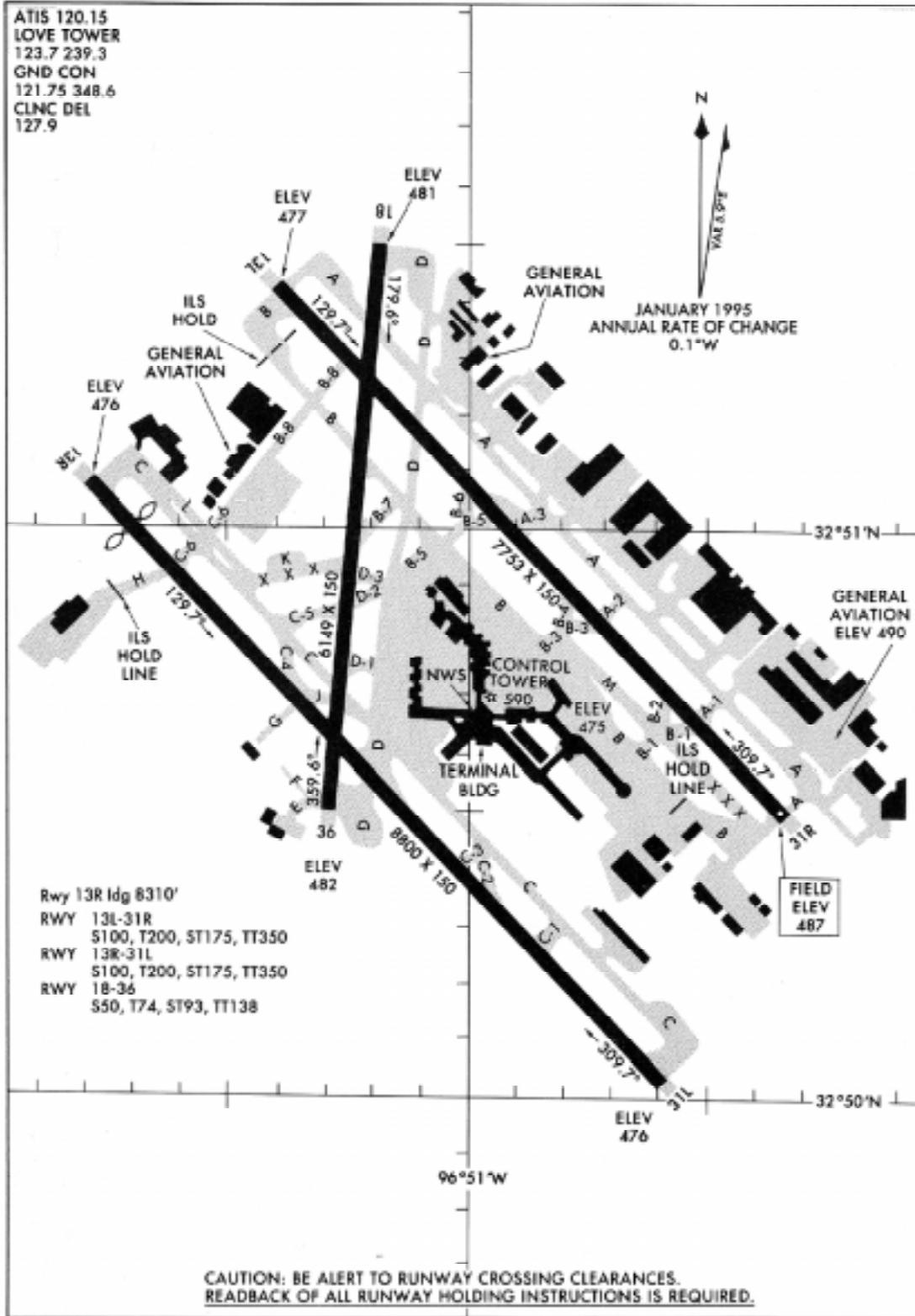
Arrival delay factors: None

Remarks: Tower has limited radar approach control (LRAC) capability. Large numbers of corporate aircraft based at airport.

AIRPORT DIAGRAM

DALLAS-LOVE FIELD (DAL)

DALLAS, TEXAS



AIRPORT DIAGRAM

DALLAS, TEXAS
 DALLAS-LOVE FIELD (DAL)

Airport: Detroit Metropolitan Wayne County (DTW)

Hub airlines: Northwest

Airport average daily operations: 1486

Spacing between parallel runway centerlines:

- RWY 21L/R 4300 ft+
- RWY 27L/R 4300 ft+
- RWY 21R/C 3800 ft
- RWY 21L/C 2000 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 4

Number of local control positions: 3

TRACON serving airport: Detroit

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 4000 ft and/or visibility 8 miles

Usual or preferred flow of traffic: RWY 21. Land on RWY 21L/R, depart on RWY 21C

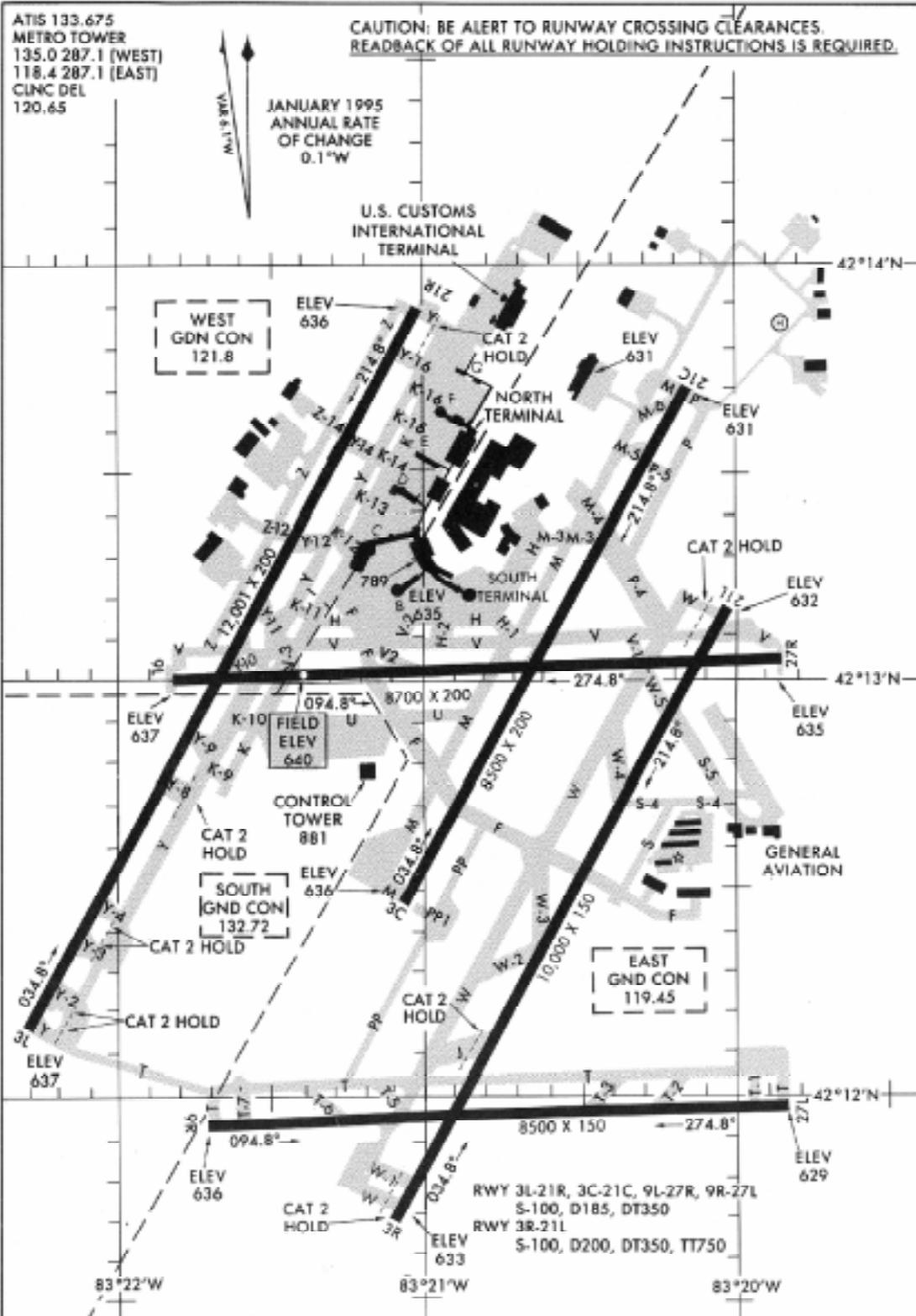
Airport flow rate: 90 per hour

Arrival delay factors: None

Remarks: RWY 4/22, is planned for completion in year 2001. Located west of RWY 3L/21R, this will permit triple parallel approaches.

AIRPORT DIAGRAM

DETROIT METROPOLITAN WAYNE COUNTY (DTW)
DETROIT, MICHIGAN



AIRPORT DIAGRAM

DETROIT, MICHIGAN
DETROIT METROPOLITAN WAYNE COUNTY (DTW)

Airport: Fort Lauderdale-Hollywood International Airport (FLL)

Hub airlines: None

Airport average daily operations: 674

Spacing between parallel runway centerlines:

- RWY 9L/R 4000 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 2

TRACON serving airport: Miami

- TRACON arrival control positions: 1
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 5 miles

Usual or preferred flow of traffic: Land and depart RWY 9L/R

Airport flow rate: None

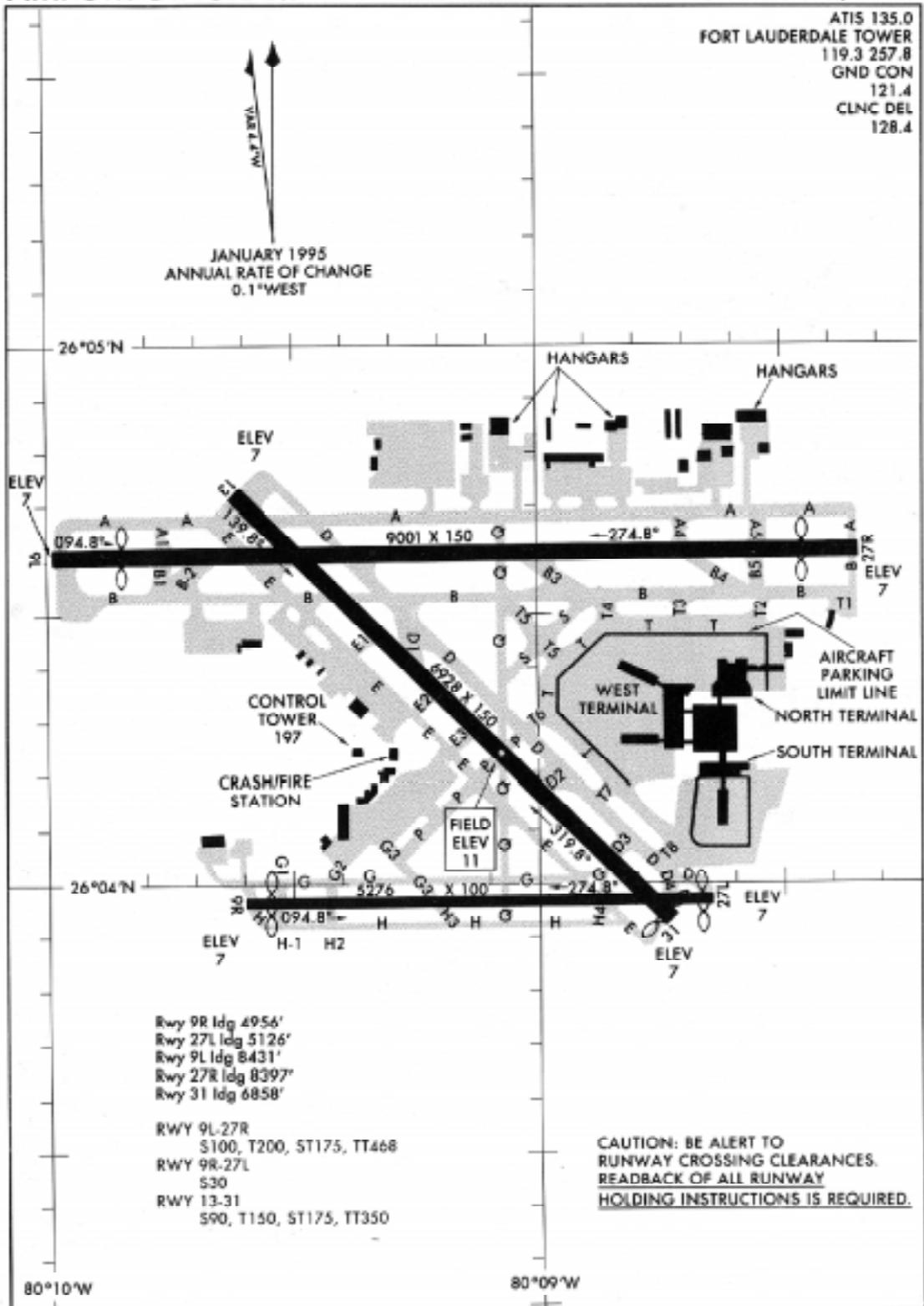
Arrival delay factors: None

Remarks:

AIRPORT DIAGRAM

FORT LAUDERDALE-HOLLYWOOD INTL (FLL)

FORT LAUDERDALE, FLORIDA



AIRPORT DIAGRAM

FORT LAUDERDALE, FLORIDA

FORT LAUDERDALE-HOLLYWOOD INTL (FLL)

Airport: Houston/George Bush Intercontinental Airport (IAH)

Hub airlines: Continental

Airport average daily operations: 1124

Spacing between parallel runway centerlines:

- RWY 26 & 27 4300 ft+
- RWY 14L/R 1000 ft

Type of radar system used at the airport: 2 ASR-9s

Type and number of tower radar displays: DBRITE 4

Number of local control positions: 3

TRACON serving airport: Houston

- TRACON arrival control positions: 3
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: ILS approaches are in use at all times

Usual or preferred flow of traffic: Land RWY 26 and 27, depart RWY 14L/R

Airport flow rate: 72 per hour

Arrival delay factors: Severe weather

Remarks: RWY 8L/26R is planned for completion in year 2002. Located parallel and north of the existing RWY 8/26, this will permit triple simultaneous ILS approaches.

Airport: Indianapolis International Airport (IND)

Hub airlines: None

Airport average daily operations: 591

Spacing between parallel runway centerlines:

- RWY 23L/R 4300 ft+

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 2

TRACON serving airport: Indianapolis

- TRACON arrival control positions: 2
- TRACON final monitor positions: None
- Capability for simultaneous approaches starting the summer of 1998, will require two final monitors. One horizontal display for two final monitors has already been installed.

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 5 miles

Usual or preferred flow of traffic: RWY 23L/R. At night from 2200 to 0600, land RWY 5 and depart RWY 23

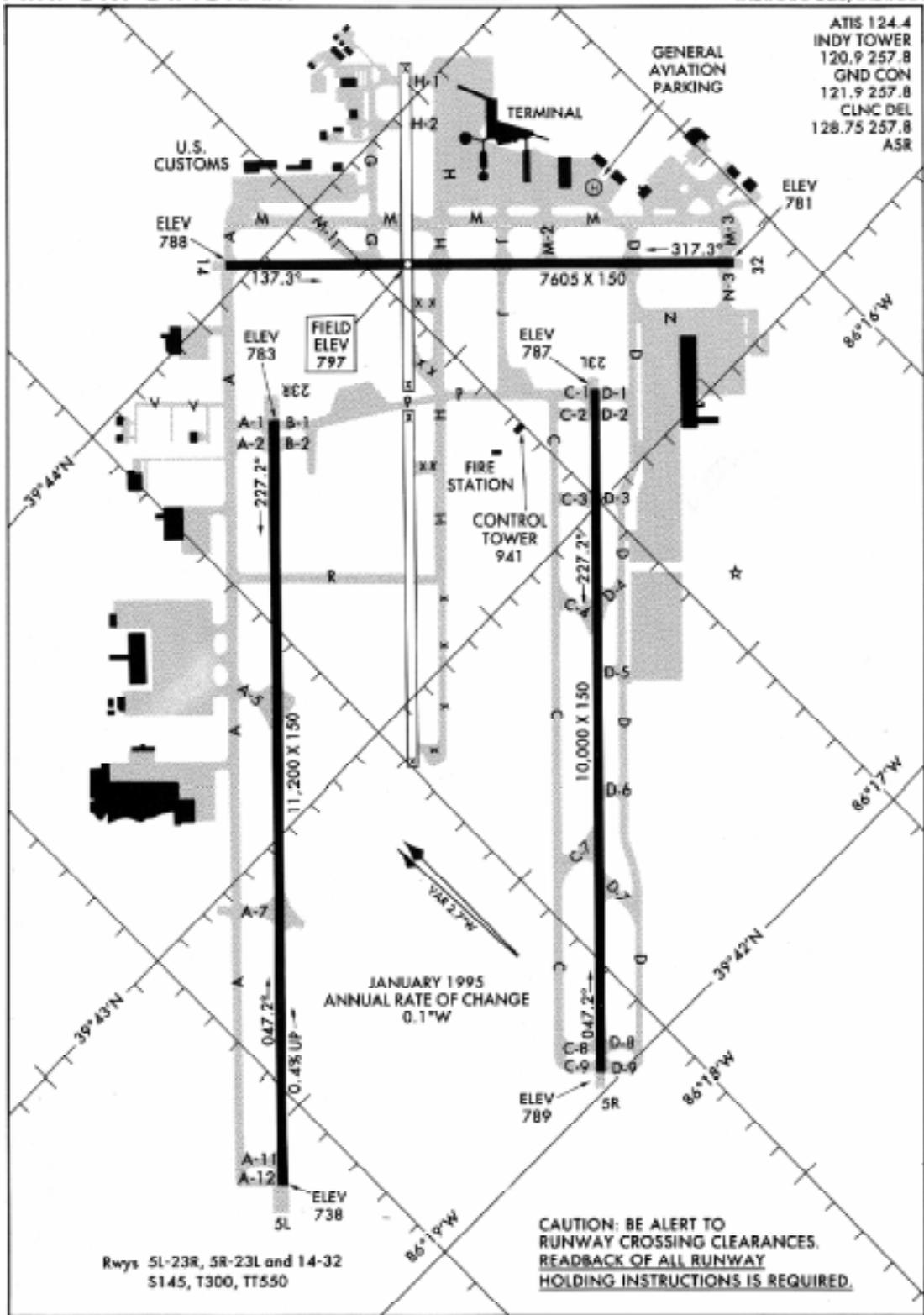
Airport flow rate: 70 per hour

Arrival delay factors: None

Remarks: Federal Express and U.S. Postal Service conduct night operations. Each have their own terminal and hangar.

AIRPORT DIAGRAM

INDIANAPOLIS INTL (IND)
INDIANAPOLIS, INDIANA



AIRPORT DIAGRAM

INDIANAPOLIS, INDIANA
INDIANAPOLIS INTL (IND)

Airport: Las Vegas/McCarran International Airport (LAS)

Hub airlines: America West and Southwest

Airport average daily operations: 1302

Spacing between parallel runway centerlines:

- RWY 25L/R 1000 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 2

TRACON serving airport: Las Vegas

- TRACON arrival control positions: 2
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Low ceilings on rare occasions

Usual or preferred flow of traffic:

- Arrivals RWY 25L
- Departures RWY 25R
- Business and general aviation aircraft use RWY 19L/R

Airport flow rate: 60 per hour

Arrival delay factors: None

Remarks: Mountains are located six to ten miles to the west. Southwest Airlines expects 60 additional operations when new gates open June 1998.

Airport: Los Angeles International Airport (LAX)

Hub airlines: United, TWA, and Continental

Airport average daily operations: 2101

Spacing between parallel runway centerlines:

- RWY 25R/24L 4300 ft+
- RWY 25L/R 700 ft
- RWY 24L/R 700 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 5

Number of local control positions: 2

TRACON serving airport: Southern California (SCT)

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 5000 ft and/or visibility 8 miles

Usual or preferred flow of traffic: RWY 24 and RWY 25

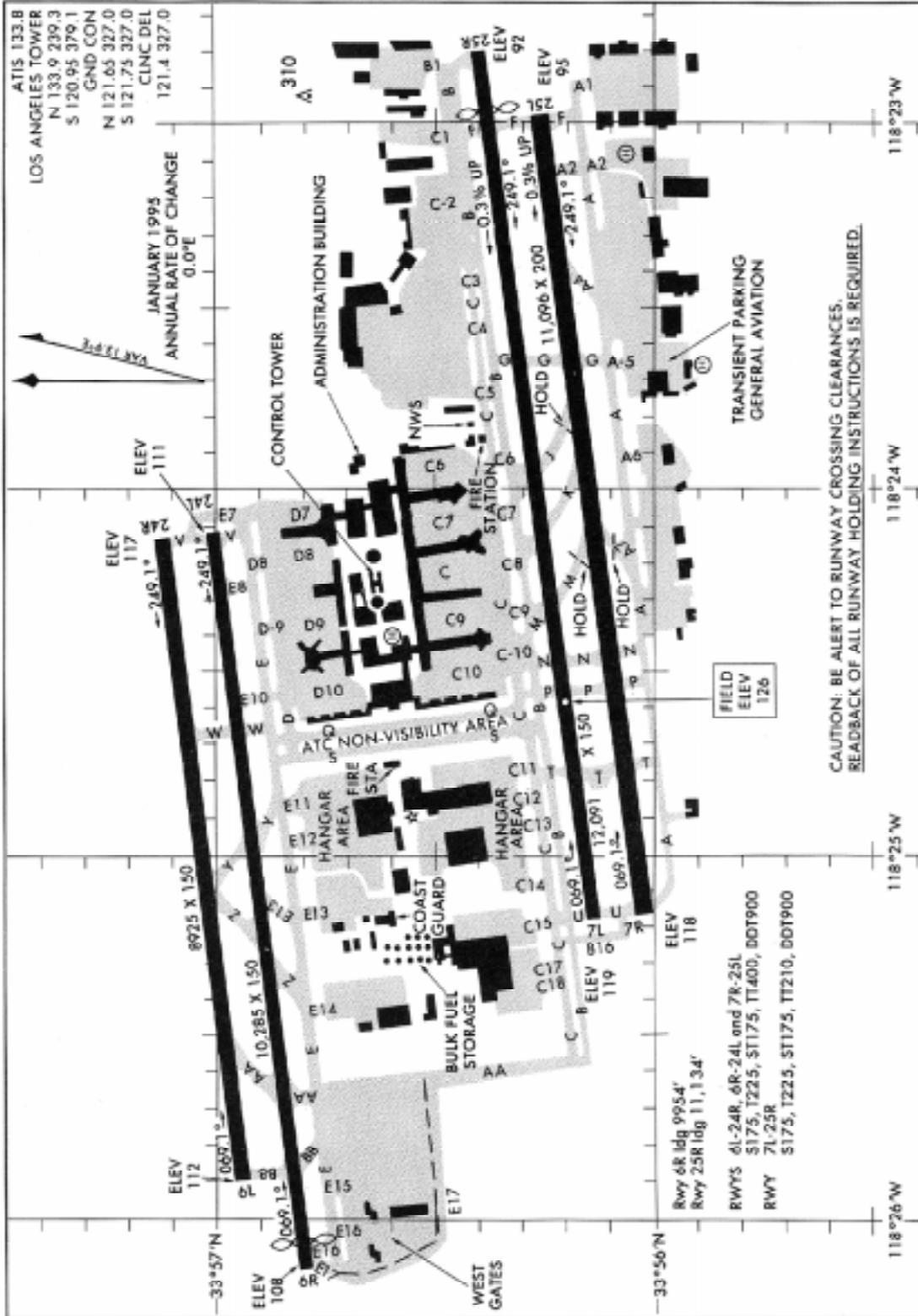
Airport flow rate: 84 per hour

Arrival delay factors: Volume of traffic

Remarks: When RWYs 24 and 25 are in use, all aircraft inbound from the east are sequenced to make ILS approaches.

AIRPORT DIAGRAM

LOS ANGELES INTL (LAX)
LOS ANGELES, CALIFORNIA



AIRPORT DIAGRAM

LOS ANGELES, CALIFORNIA
LOS ANGELES INTL (LAX)

Airport: Memphis International Airport (MEM)

Hub airlines: Northwest

Airport average daily operations: 1003

Spacing between parallel runway centerlines:

- RWY 36L & 36C 3400 ft
- RWY 36C & 36R 926 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 3

TRACON serving airport: Memphis

- TRACON arrival control positions: 3
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 5000 ft and/or visibility 5 miles

Usual or preferred flow of traffic: RWY 36L/C/R. Federal Express uses RWY 27 for night operations

Airport flow rate: 80 per hour

Arrival delay factors: None

Remarks: Busy after midnight due to Federal Express operations.

Airport: Minneapolis-St. Paul International Airport (MSP)

Hub airlines: Northwest

Airport average daily operations: 1338

Spacing between parallel runway centerlines:

- RWY 30L/R 3380 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 2

TRACON serving airport: Minneapolis

- TRACON arrival control positions: 2
- Final monitor positions: 2 precision runway monitors (PRM)

Weather conditions below which instrument approaches are required: Ceiling 3200 ft and/or visibility 8 miles

Usual or preferred flow of traffic: Simultaneous parallel approaches to RWY 30L/R

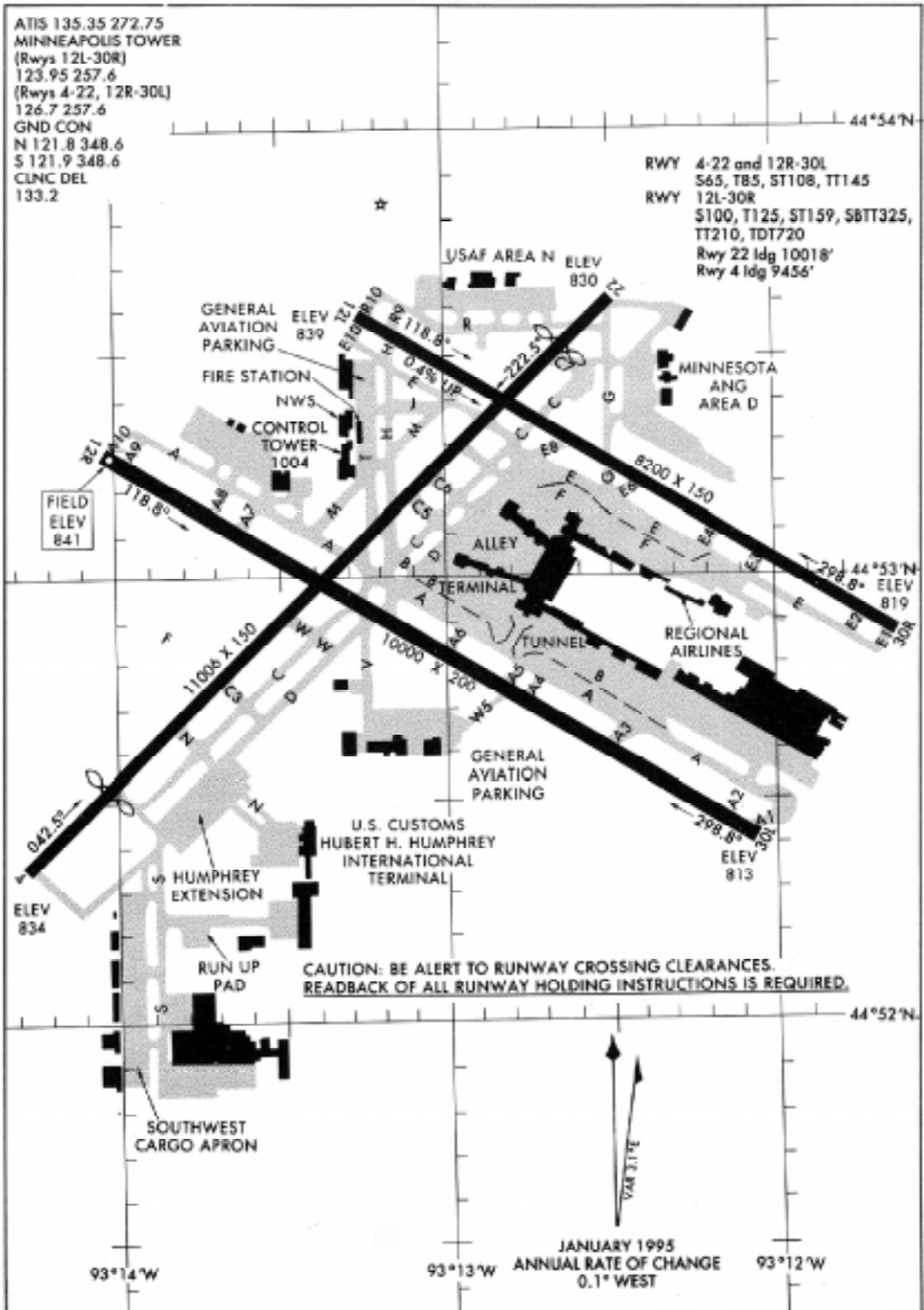
Airport flow rate: 60 per hour

Arrival delay factors: None

Remarks: ILS PRM approaches approved. RWY 17/35 is planned for completion in year 2003, and will be used primarily as a departure runway.

AIRPORT DIAGRAM

MINNEAPOLIS-ST PAUL INTL (WOLD-CHAMBERLAIN) (MSP)
MINNEAPOLIS, MINNESOTA



AIRPORT DIAGRAM

MINNEAPOLIS, MINNESOTA
MINNEAPOLIS-ST PAUL INTL (WOLD-CHAMBERLAIN) (MSP)

Airport: New York/John F. Kennedy International Airport (JFK)

Hub airlines: US Airways, Delta, TWA, American, and United

Airport average daily operations: 992

Spacing between parallel runway centerlines:

- RWY 31L/R 4300 ft+
- RWY 4L/R 3000 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 2

TRACON serving airport: New York

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2. Used for approaches to RWY 31L/R only

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 7 miles

Usual or preferred flow of traffic: RWY 31L/R

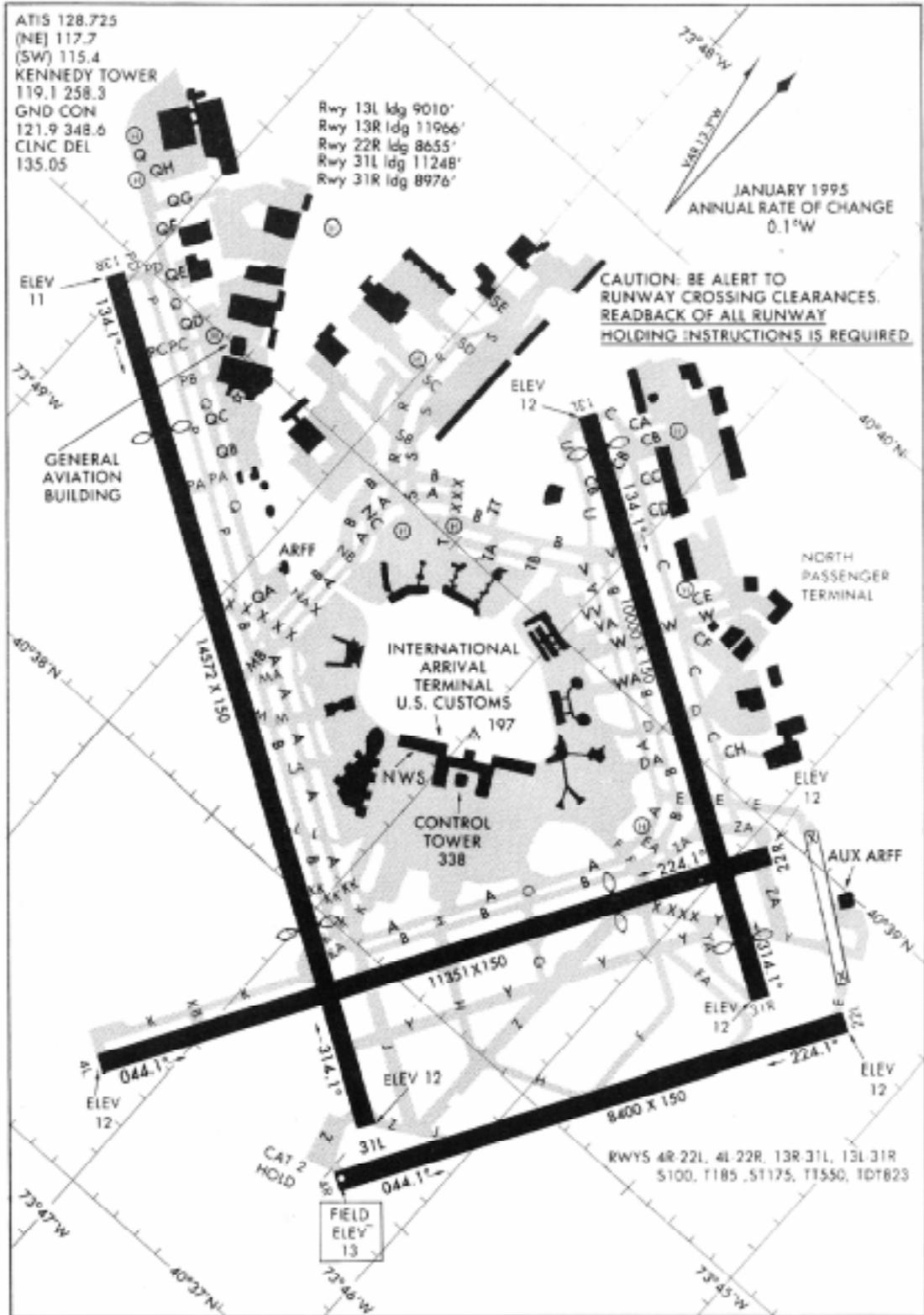
Airport flow rate: 50 per hour

Arrival delay factors: IFR weather

Remarks: Very busy area with many airspace constraints. John F. Kennedy, Newark, and LaGuardia airports are all within 20 miles of each other.

AIRPORT DIAGRAM

NEW YORK/JOHN F. KENNEDY INTL (JFK)
NEW YORK, NEW YORK



AIRPORT DIAGRAM

NEW YORK, NEW YORK
NEW YORK/JOHN F. KENNEDY INTL (JFK)

Airport: Oakland/Metropolitan Oakland International Airport (OAK)

Hub airlines: Southwest

Airport average daily operations: 1338

Spacing between parallel runway centerlines:

- RWY 27L/R 1000 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITES 4

Number of local control positions: 3

TRACON serving airport: Bay TRACON

- TRACON arrival control positions: 3
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Ceiling 4000 ft and/or visibility 8 miles

Usual or preferred flow of traffic: RWY 27L/R and RWY 29

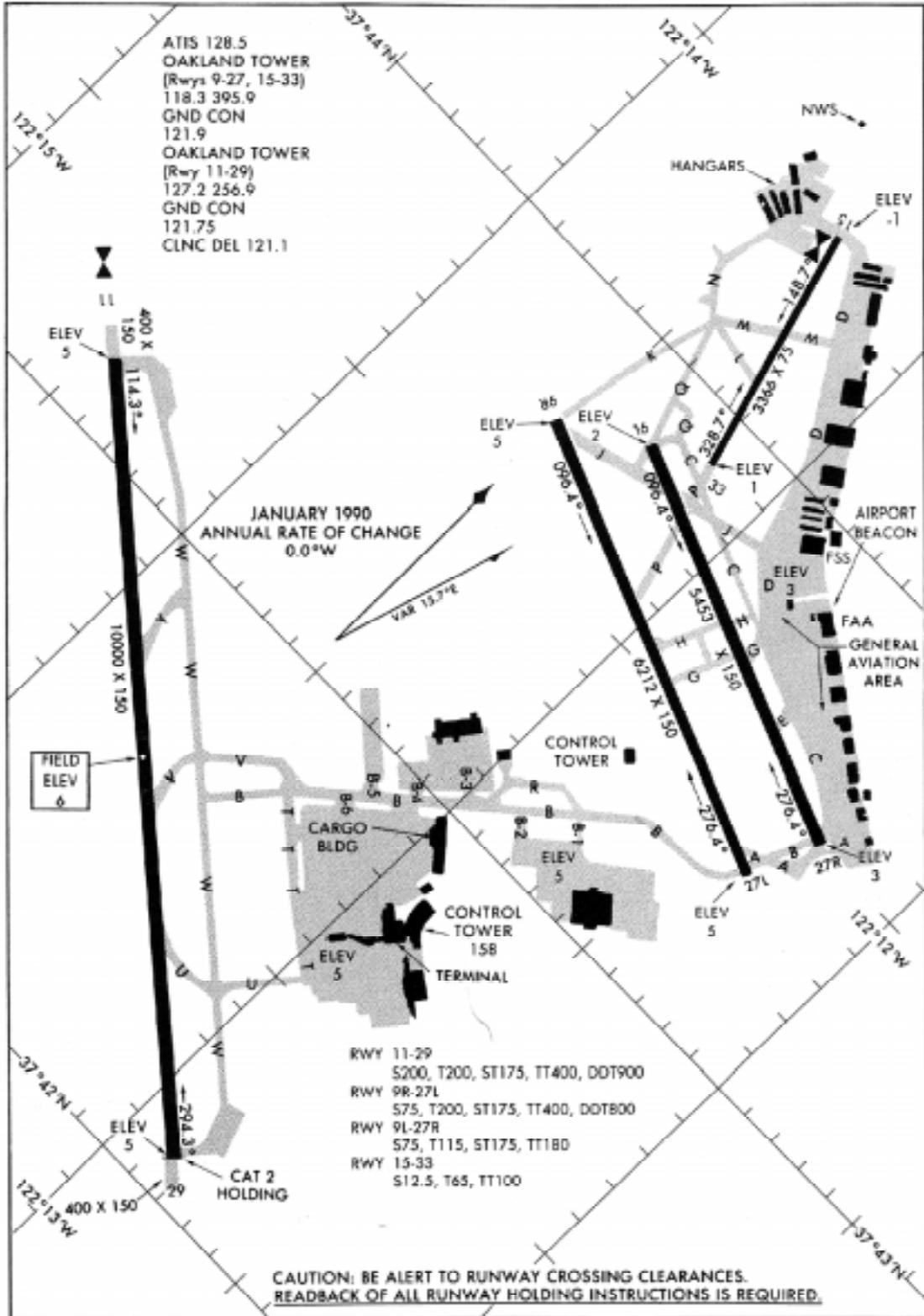
Airport flow rate: 35 per hour

Arrival delay factors: Severe weather and volume of traffic

Remarks: Airspace constraints caused by proximity to San Francisco and San Jose Airports.

AIRPORT DIAGRAM

OAKLAND/METROPOLITAN OAKLAND INTL (OAK)
OAKLAND, CALIFORNIA



AIRPORT DIAGRAM

OAKLAND, CALIFORNIA
OAKLAND/METROPOLITAN OAKLAND INTL (OAK)

Airport: Orlando International Airport (MCO)

Hub airlines: Delta and US Airways

Airport average daily operations: 978

Spacing between parallel runway centerlines:

- RWY 18R & 17 4300 ft+
- RWY 18L/R 1500 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 2

TRACON serving airport: Orlando

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 5 miles

Usual or preferred flow of traffic: Land RWY 18R and 17 and depart RWY 18L and 17

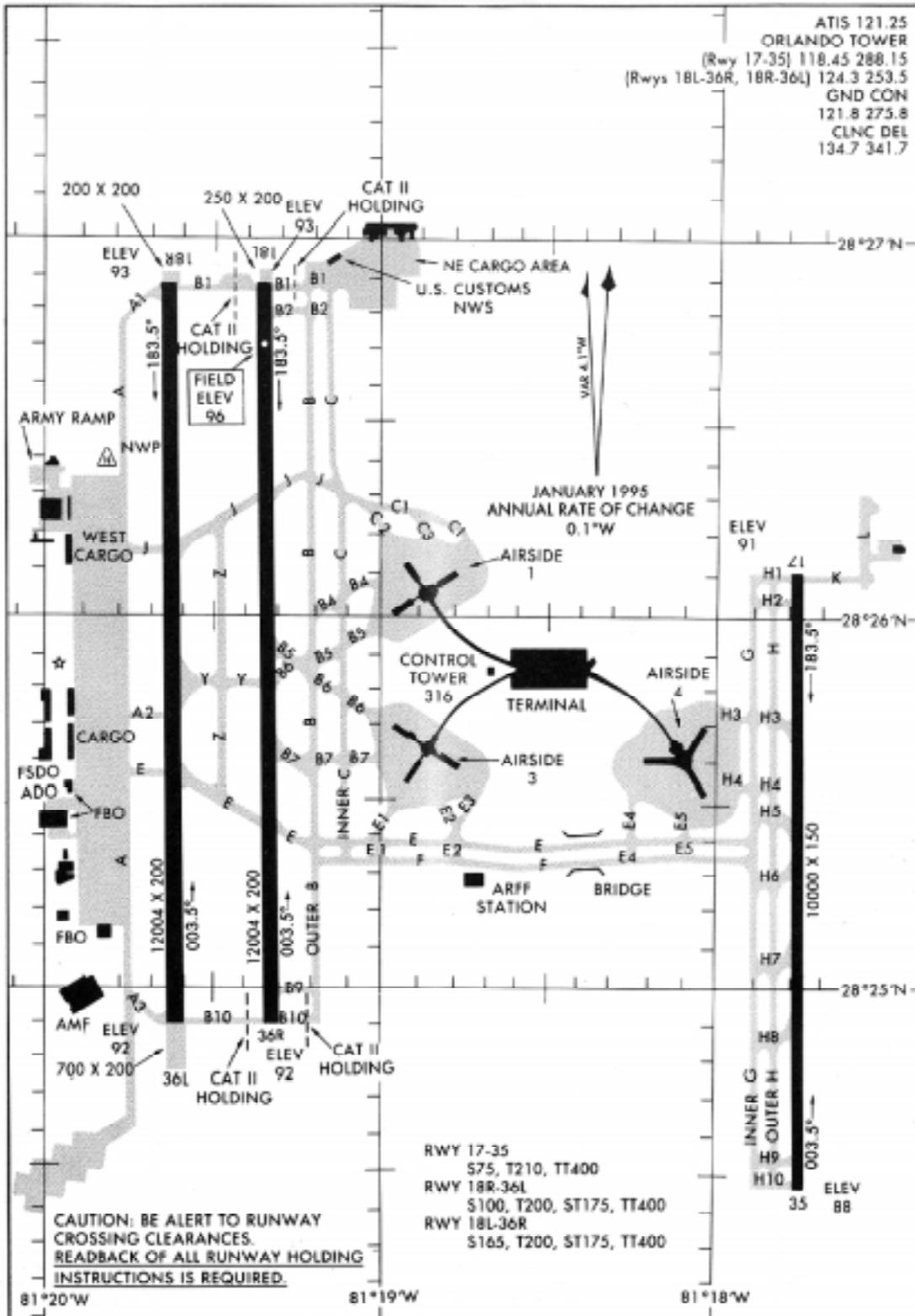
Airport flow rate: 70 per hour

Arrival delay factors: Severe weather

Remarks: RWY 17L/35R is planned for completion in year 2002. Located parallel and east of the existing RWY 17/35, this will permit triple simultaneous ILS approaches.

AIRPORT DIAGRAM

ORLANDO INTL (MCO)
ORLANDO, FLORIDA



AIRPORT DIAGRAM

ORLANDO, FLORIDA
ORLANDO INTL (MCO)

Airport: Philadelphia International Airport (PHL)

Hub airlines: US Airways

Airport average daily operations: 1258

Spacing between parallel runway centerlines:

- RWY 27L/R 1400 ft

Type of radar system used at the airport: ASR-9 and ASR-8

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 2

TRACON serving airport: Philadelphia

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 2500 ft and/or visibility 8 miles

Usual or preferred flow of traffic: RWY 27L/R

Airport flow rate: 50 per hour

Arrival delay factors: IFR weather

Remarks: RWY 8/26 scheduled to open in early 2000.

Airport: Phoenix Sky Harbor International Airport (PHX)

Hub airlines: Southwest and America West

Airport average daily operations: 1468

Spacing between parallel runway centerlines:

- RWY 26L/R 3565 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 2

TRACON serving airport: Phoenix

- TRACON arrival control positions: 2
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: VFR conditions majority of the time

Usual or preferred flow of traffic: RWY 26L/R

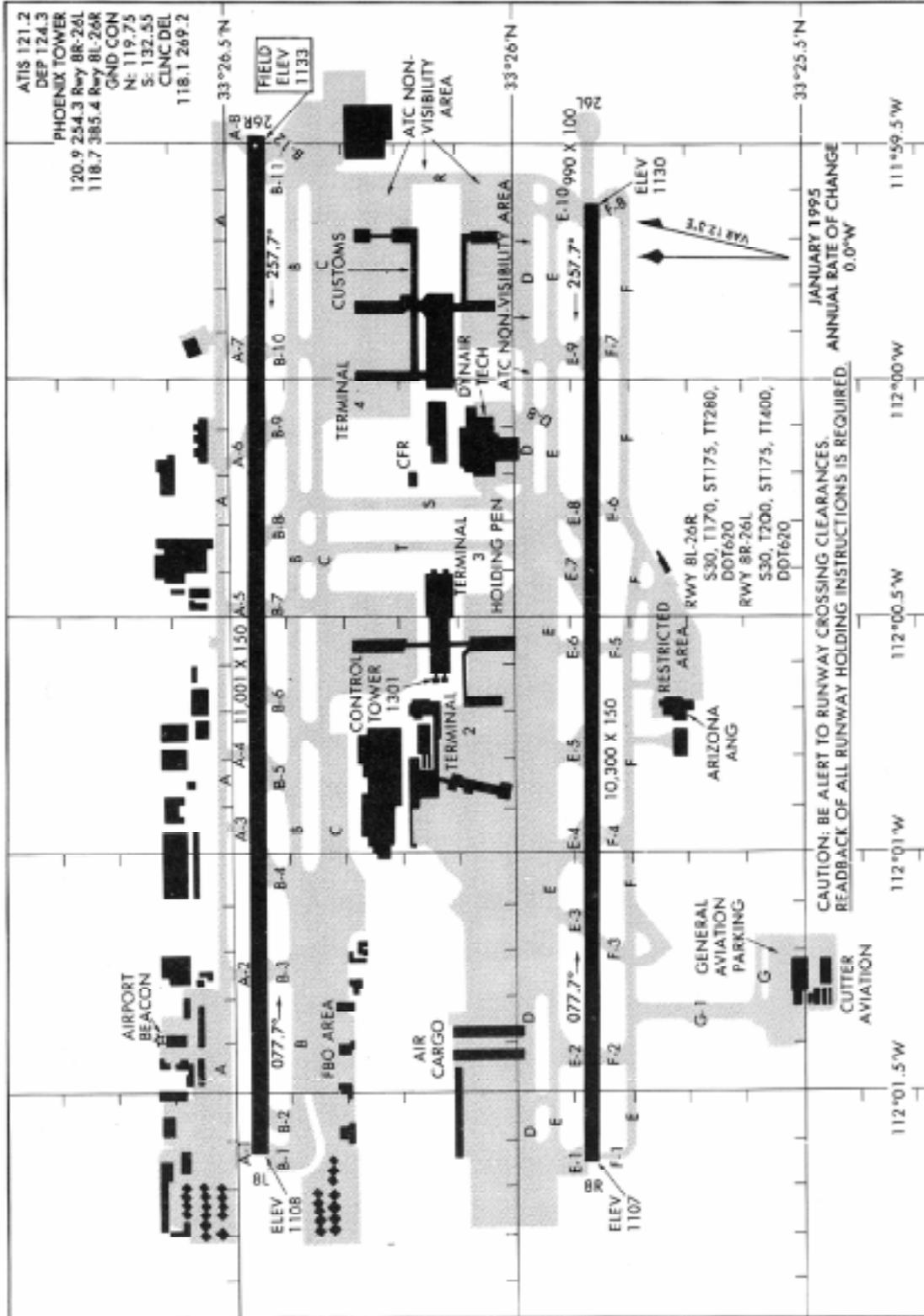
Airport flow rate: 60 per hour

Arrival delay factors: None

Remarks: RWY 7/25 is planned for completion in mid-1999. Located parallel and south of the existing RWY 8R/26L, this will permit dual simultaneous ILS approaches.

AIRPORT DIAGRAM

PHOENIX SKY HARBOR INTL (PHX)
PHOENIX, ARIZONA



AIRPORT DIAGRAM

PHOENIX, ARIZONA
PHOENIX SKY HARBOR INTL (PHX)

Airport: Pittsburgh International Airport (PIT)

Hub airlines: US Airways

Airport average daily operations: 1256

Spacing between parallel runway centerlines:

- RWY 28R/C 4300 ft
- RWY 28C/L 1200 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 3

TRACON serving airport: Pittsburgh

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 8 miles

Usual or preferred flow of traffic: RWY 28L/C/R. Land on RWY 28L/R and depart on RWY 28C

Airport flow rate: 87 per hour

Arrival delay factors: None

Remarks:

Airport: Portland International Airport (PDX)

Hub airlines: None

Airport average daily operations: 897

Spacing between parallel runway centerlines:

- RWY 10L/R 3100 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 1

TRACON serving airport: Portland

- TRACON arrival control positions: 3
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Ceiling 3000 ft and/or visibility 7 miles

Usual or preferred flow of traffic: RWY 10L/R during fall and winter. RWY 28L/R during spring and summer

Airport flow rate: 50 per hour

Arrival delay factors: IFR weather

Remarks:

Airport: Raleigh-Durham International Airport (RDU)

Hub airlines: Midway and US Airways

Airport average daily operations: 661

Spacing between parallel runway centerlines:

- RWY 23L/R 3400 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 2

TRACON serving airport: Raleigh

- TRACON arrival control positions: 2
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Ceiling 4000 ft and/or visibility 8 miles

Usual or preferred flow of traffic: RWY 23L/R

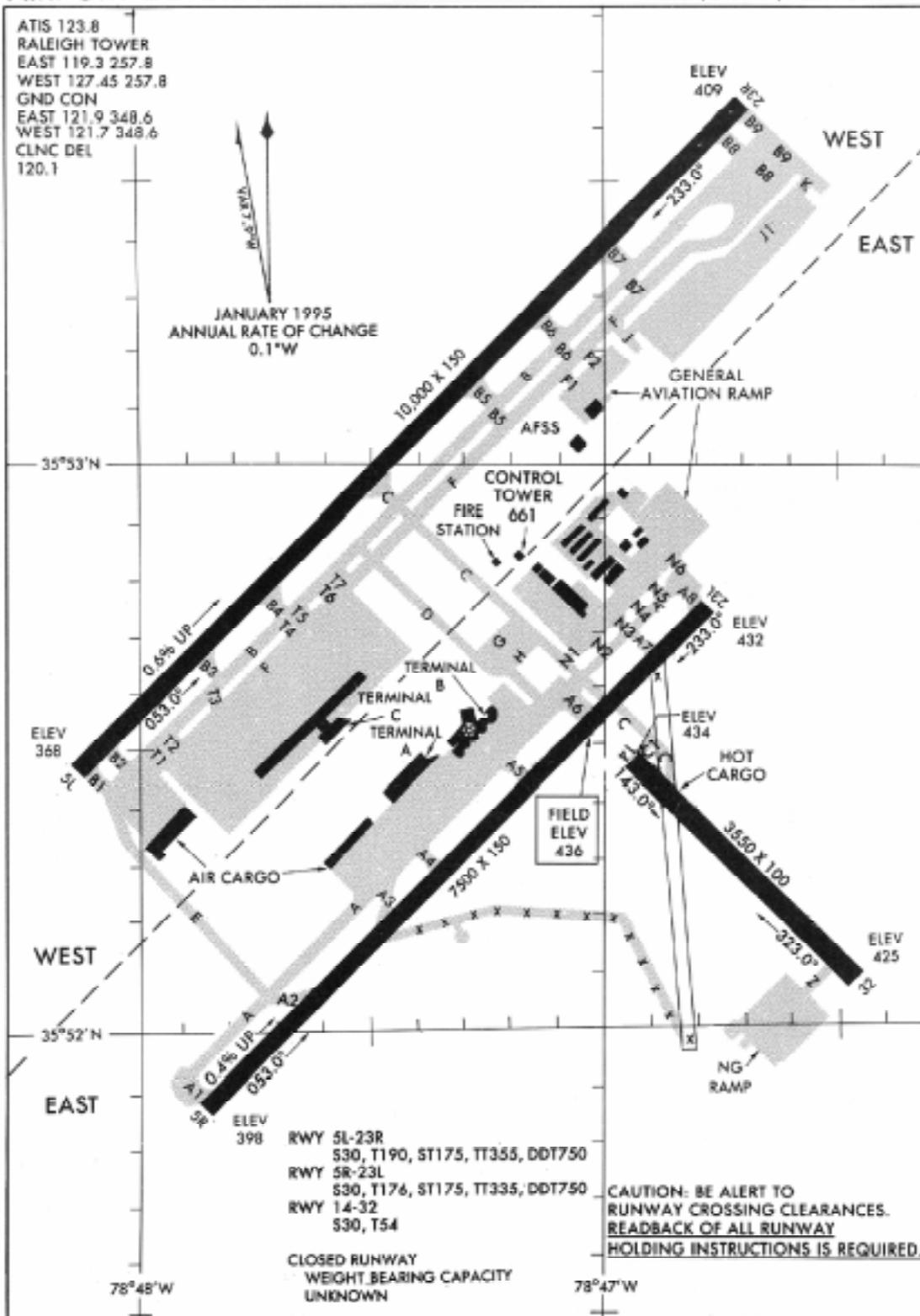
Airport flow rate: None

Arrival delay factors: IFR weather

Remarks: RWY 5/23 is planned for completion in year 2005. Located parallel and west of RWY 5L/23R, this will permit dual simultaneous ILS approaches.

AIRPORT DIAGRAM

RALEIGH-DURHAM INTL (RDU)
RALEIGH/DURHAM, NORTH CAROLINA



AIRPORT DIAGRAM

RALEIGH/DURHAM, NORTH CAROLINA
RALEIGH-DURHAM INTL (RDU)

Airport: Salt Lake City International Airport (SLC)

Hub airlines: Delta and Continental

Airport average daily operations: 1025

Spacing between parallel runway centerlines:

- RWY 16L/R 4300 ft+

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 3

Number of local control positions: 3

TRACON serving airport: Salt Lake

- TRACON arrival control positions: 3
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 6000 ft and/or visibility 5 miles

Usual or preferred flow of traffic: RWY 16L/R

Airport flow rate: 60 per hour

Arrival delay factors: Severe weather

Remarks: Mountainous terrain in proximity constrains traffic flow. Can only run downwind on west side of airport.

Airport: San Francisco International Airport (SFO)

Hub airlines: United

Airport average daily operations: 1224

Spacing between parallel runway centerlines:

- RWY 28L/R 750 ft
- RWY 1L/R 750 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 4

Number of local control positions: 1

TRACON serving airport: Bay TRACON

- TRACON arrival control positions: 2
- TRACON final monitor positions: None

Weather conditions below which instrument approaches are required: Ceiling 5000 ft and/or visibility 7 miles

Usual or preferred flow of traffic: Land RWY 28L/R and depart RWY 1L/R

Airport flow rate: 60 per hour

Arrival delay factors: IFR weather and volume of traffic

Remarks: Aircraft on final approach for RWY 28L/R require additional spacing to allow departures on crossing parallel runways (RWY 1L/R). This has a significant impact on traffic flow management and tower procedures.

Airport: Seattle-Tacoma International Airport (SEA)

Hub airlines: Alaska and United

Airport average daily operations: 1043

Spacing between parallel runway centerlines:

- RWY 16L/R 800 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 1

TRACON serving airport: Seattle

- TRACON arrival control positions: 1
- TRACON final monitor positions: 2 running approaches to Boeing field during IMC

Weather conditions below which instrument approaches are required: Ceiling 3100 ft and/or visibility 4 miles

Usual or preferred flow of traffic: RWY 16L/R

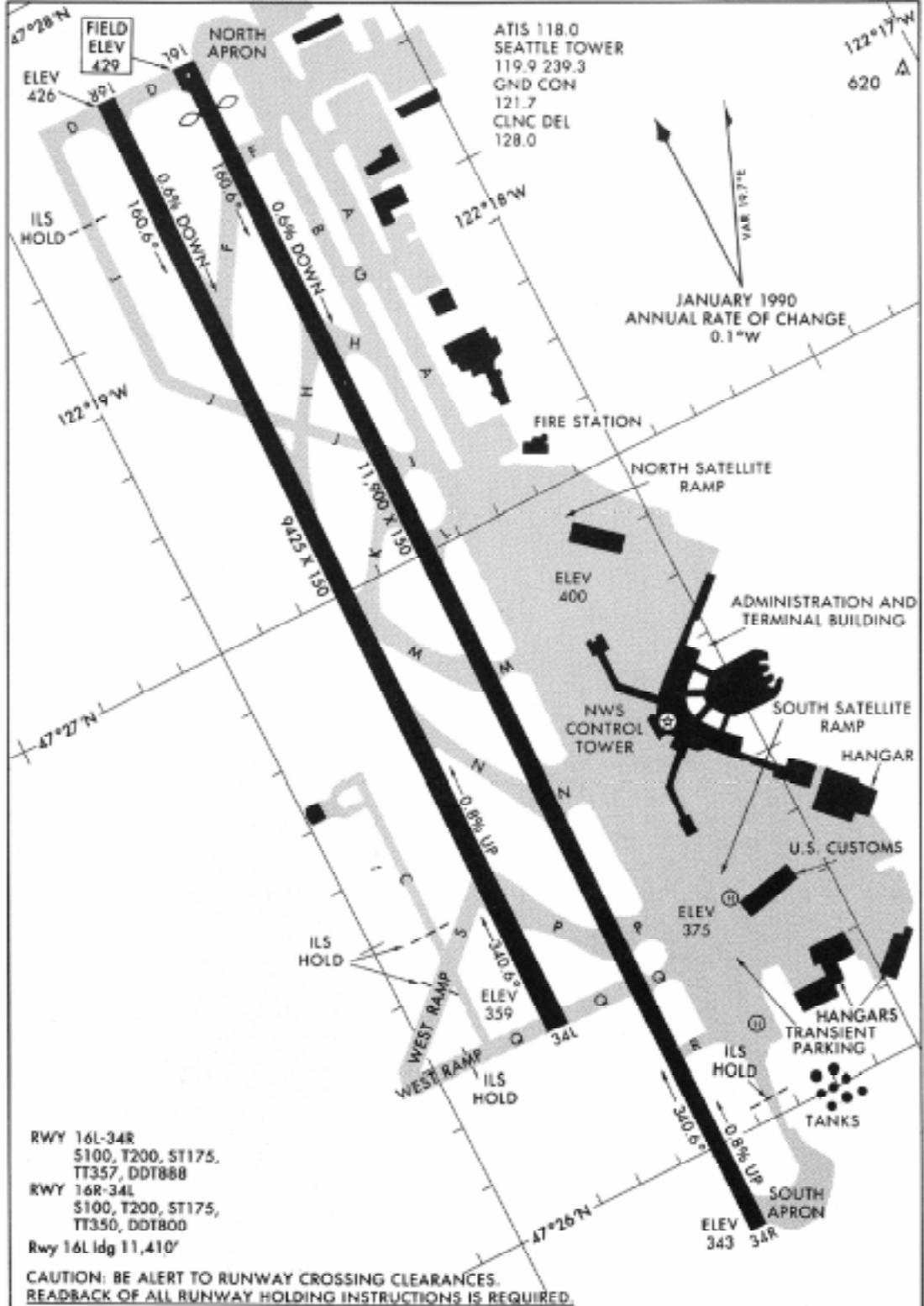
Airport flow rate: 48 per hour

Arrival delay factors: None

Remarks: Boeing field located 4 miles north. A new parallel runway is being planned west of RWY 16R and will be operational in 2001. Runway centerlines between the new runway and RWY 16L will be 2500 ft.

AIRPORT DIAGRAM

SEATTLE-TACOMA INTL (SEA)
SEATTLE, WASHINGTON



AIRPORT DIAGRAM

SEATTLE, WASHINGTON
SEATTLE-TACOMA INTL (SEA)

Airport: St. Louis-Lambert International Airport (STL)

Hub airlines: TWA

Airport average daily operations: 1413

Spacing between parallel runway centerlines:

- RWY 30L/R 1300 ft

Type of radar system used at the airport: ASR-9

Type and number of tower radar displays: DBRITE 2

Number of local control positions: 3

TRACON serving airport: St. Louis

- TRACON arrival control positions: 2
- TRACON final monitor positions: 2

Weather conditions below which instrument approaches are required: Ceiling 5000 ft and/or visibility 5 miles

Usual or preferred flow of traffic: Land RWY 30L/R and RWY 24 and depart RWY 30L/R

Airport flow rate: 72 per hour

Arrival delay factors: IFR weather and volume of traffic

Remarks: Dependent converging ILS RWY 24 and 30R approaches authorized. Localizer Type Directional Aid approaches authorized to RWY 30L and RWY 12L. No heavy jets on Localizer Type Directional Aid approaches or to RWY 24.

Table 1. U.S. AIRPORTS WITH PARALLEL RUNWAYS

4300 FT OR GREATER BETWEEN RUNWAY CENTERLINES		
<u>Airports</u>	<u>Runways</u>	<u>Spacing</u>
Atlanta (ATL)	26L/27R	4300 ft+
Baltimore (BWI)	15L/15R	4300 ft+
Charlotte (CLT)	18L/18R	4300 ft+
Chicago O'Hare (ORD)	4L/4R	4300 ft+
	9L/9R	4300 ft+
	14L/14R	4300 ft+
Cincinnati (CVG)	18L/18R	4300 ft+
Dallas-Fort Worth (DFW)	18L/17R	5000 ft+
	17L/17C	5000 ft+
Denver (DEN)	35L/35R	5000 ft+
	34/35L	5000 ft+
	25/26	5000 ft+
Detroit (DTW)	21L/21R	4300 ft+
	27L/27R	4300 ft+
Dulles (IAD)	1L/1R	4300 ft+
Honolulu (HNL)	8L/8R	4300 ft+
Houston (IAH)	26/27	4300 ft+
Indianapolis (IND)	23L/23R	4300 ft+
Kansas City (MCI)	1L/1R	4300 ft+
Kennedy (JFK)	31L/31R	4300 ft+
Los Angeles (LAX)	24L/25R	4300 ft+
Memphis (MEM)	18L/18R	4300 ft+
Miami (MIA)	9L/9R	4300 ft+
Nashville (BNA)	2C/2R	4300 ft+
Orlando (MCO)	18R/17	4300 ft+
Pittsburgh (PIT)	28R/28C	4300 ft+
Salt Lake City (SLC)	16L/16R	4300 ft+
Tampa (TPA)	18L/18R	4300 ft+

3400 FT – 4299 FT BETWEEN RUNWAY CENTERLINES		
<u>Airports</u>	<u>Runways</u>	<u>Spacing</u>
Fort Lauderdale (FLL)	9L/9R	4000 ft
Detroit (DTW)	21L/21C	3800 ft
Phoenix (PHX)	26L/26R	3565 ft
Memphis (MEM)	36L/36R	3400 ft
Raleigh-Durham (RDU)	5L/5R	3400 ft

2500 FT – 3399 FT BETWEEN RUNWAY CENTERLINES		
<u>Airports</u>	<u>Runways</u>	<u>Spacing</u>
Minneapolis (MSP)	30L/30R	3380 ft
Salt Lake City (SLC)	16L/17	3200 ft
Portland (PDX)	10L/10R	3100 ft
Dallas-Love (DAL)	13L/13R	3000 ft
Kennedy (JFK)	4L/4R	3000 ft

Table 1. Concluded.

2000 FT – 2499 FT BETWEEN RUNWAY CENTERLINES		
<u>Airports</u>	<u>Runways</u>	<u>Spacing</u>
Detroit (DTW)	21C/21R	2000 ft

1500 FT – 1999 FT BETWEEN RUNWAY CENTERLINES		
<u>Airports</u>	<u>Runways</u>	<u>Spacing</u>
Orlando (MCO)	18L/18R	1500 ft
Boston (BOS)	4L/4R	1500 ft

1000 FT – 1499 FT BETWEEN RUNWAY CENTERLINES		
<u>Airports</u>	<u>Runways</u>	<u>Spacing</u>
Philadelphia (PHL)	27L/27R	1400 ft
St. Louis (STL)	30L/30R	1300 ft
Dallas-Fort Worth (DFW)	17C/17R	1200 ft
	18L/18R	1200 ft
Pittsburgh (PIT)	28C/28L	1200 ft
Atlanta (ATL)	8L/8R	1000 ft
	9L/9R	1000 ft
Houston (IAH)	14L/14R	1000 ft
Las Vegas (LAS)	25L/25R	1000 ft
Oakland (OAK)	27L/27R	1000 ft

450 FT – 999 FT BETWEEN RUNWAY CENTERLINES		
<u>Airports</u>	<u>Runways</u>	<u>Spacing</u>
Memphis (MEM)	36C/36R	926 ft
Chicago-Midway (MDW)	4L/4R	920 ft
Newark (EWR)	4L/4R	900 ft
San Antonio (SAT)	12L/12R	900 ft
Las Vegas (LAS)	19L/19R	860 ft
Houston-Hobby (HOU)	12L/12R	800 ft
Seattle (SEA)	16L/16R	800 ft
Chicago-Midway (MDW)	13L/13C	775 ft
Los Angeles (LAX)	25L/25R	700 ft
	24L/24R	700 ft
San Francisco (SFO)	1L/1R	750 ft
	28L/28R	750 ft
Ontario (ONT)	8L/8R	700 ft
San Jose (SJC)	12L/12R	700 ft
	12R/11	700 ft
Cleveland (CLE)	5L/5R	450 ft

