(3) Taxiways where the painted hold position markings do not extend straight across the taxiway as shown in figure 8c.

(4) Taxiways where the painted hold position markings are located a short distance from an intersection with another taxiway. In this situation, the pilot turning onto the taxiway would have difficulty seeing the hold position sign on the left. This commonly occurs when the separation distance between the runway and the parallel taxiway is less than standard and the hold position markings are located near the edge of the parallel taxiway (see figure 8b). Because of cockpit visibility limitations, pilots of some aircraft making a left turn from the parallel taxiway onto the connecting taxiway with the runway would have difficultly seeing a sign on the left. In this situation, it may be necessary to install the sign on an angle in accordance with paragraph 16.

b. Holding Position Signs for Runway/Runway Intersections. Signs used to identify runway/runway intersections are identical to signs used for taxiway/runway intersections. For runways 150 feet or less in width, only one sign is needed. For runways more than 150 feet in width, or for runways of any width which are used for "land and hold short" operations or normally used for taxiing, signs on both sides of the runway are needed (see figure 9). Signs should be located at a distance from the intersecting runway to meet the clearance requirements of the intersecting runway as specified in table 1.

c. Holding Position Signs for ILS critical Areas. The inscription on a sign for an ILS critical area is shown in figure 5. Where the distance between the runway holdline and the holdline for an ILS critical area is 50 feet or less, one holdline may be installed, provided it will not affect capacity, by moving the runway holdline back to the ILS holdline position as shown in figure 10. (The critical area for MLS is likely to be smaller than that for ILS. Where the MLS critical area controls, the holding position signs should say MLS). The local FAA office will designate the ILS (or MLS) critical area boundaries for the airport operator. ILS holding position signs should be located on both sides of the taxiway when the ILS holding position marking is located in the geometrical configurations described in paragraph 5a(1) through 5(a)4.

d. Holding Position Signs for Runway Approach Areas. The inscription on a sign for a runway approach area is the associated runway designation followed by a dash and the abbreviation APCH for approach (see figure 6 for an example). The sign is installed on taxiways located in approach areas where an aircraft on a taxiway would either cross through the runway safety area or penetrate the airspace required for the approach or departure runway. This

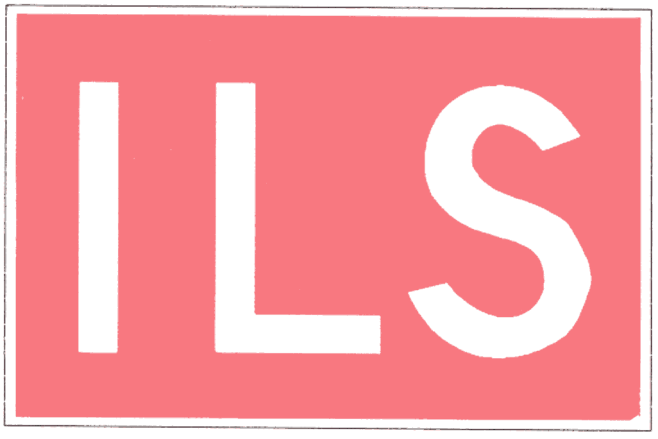

Figure 5. ILS Holding Position Sign

* sign should not be installed on runways. This sign should not be installed on runways or on taxiways that intersect the runway specified on the sign.

e. No Entry Sign. This sign indicates that entry into a particular area is prohibited to aircraft. The sign inscription is shown in figure 7.

6. LOCATION SIGNS. These signs identify the taxiway or runway upon which the aircraft is located. The signs are also used to identify the boundary of the runway safety area/OFZ or ILS critical area for a pilot exiting the runway. Location signs include the following:

a. Taxiway Location Signs. These signs identify the taxiway on which an aircraft is located. A typical sign is shown in figure 11. The signs have yellow inscriptions on a

Figure 6. Holding Position Sign for Approach Areas

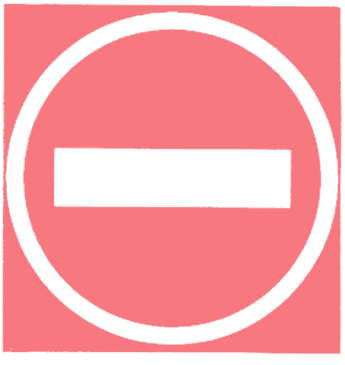

Figure 7. No Entry Sign

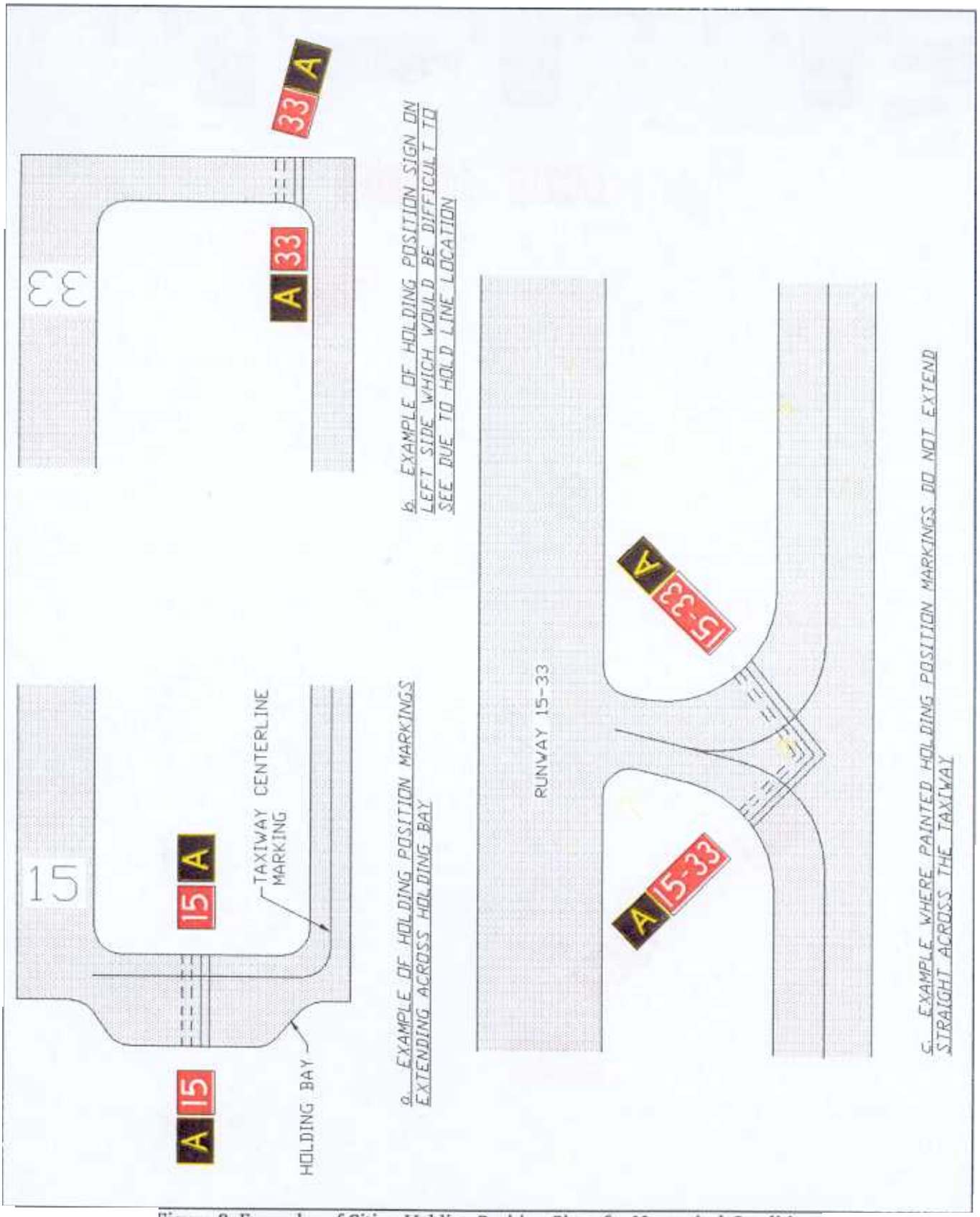

Figure 8. Examples of Siting Holding Position Signs for Nontypical Conditions

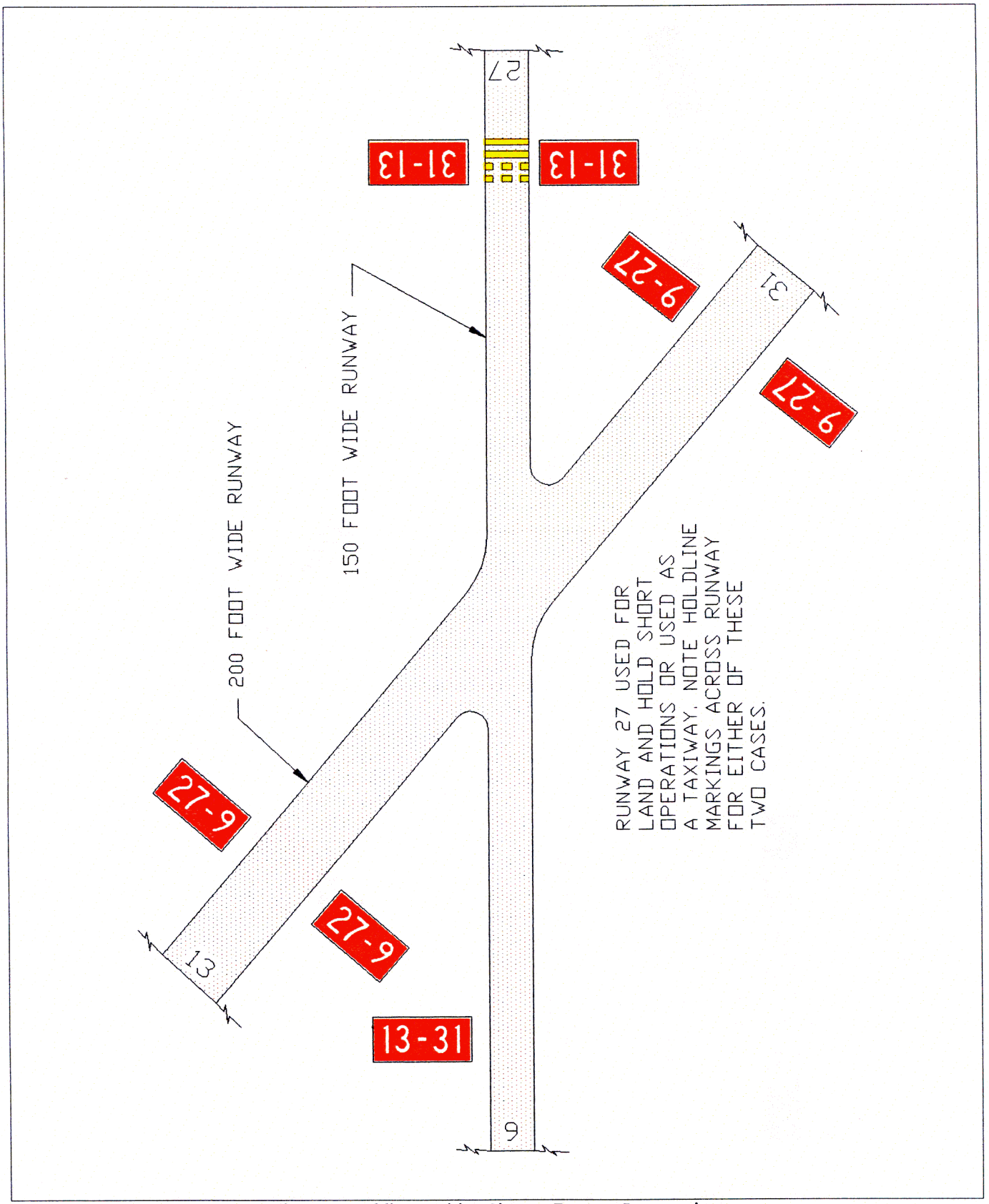

Figure 9. Holding Position Signs at Runway Intersections

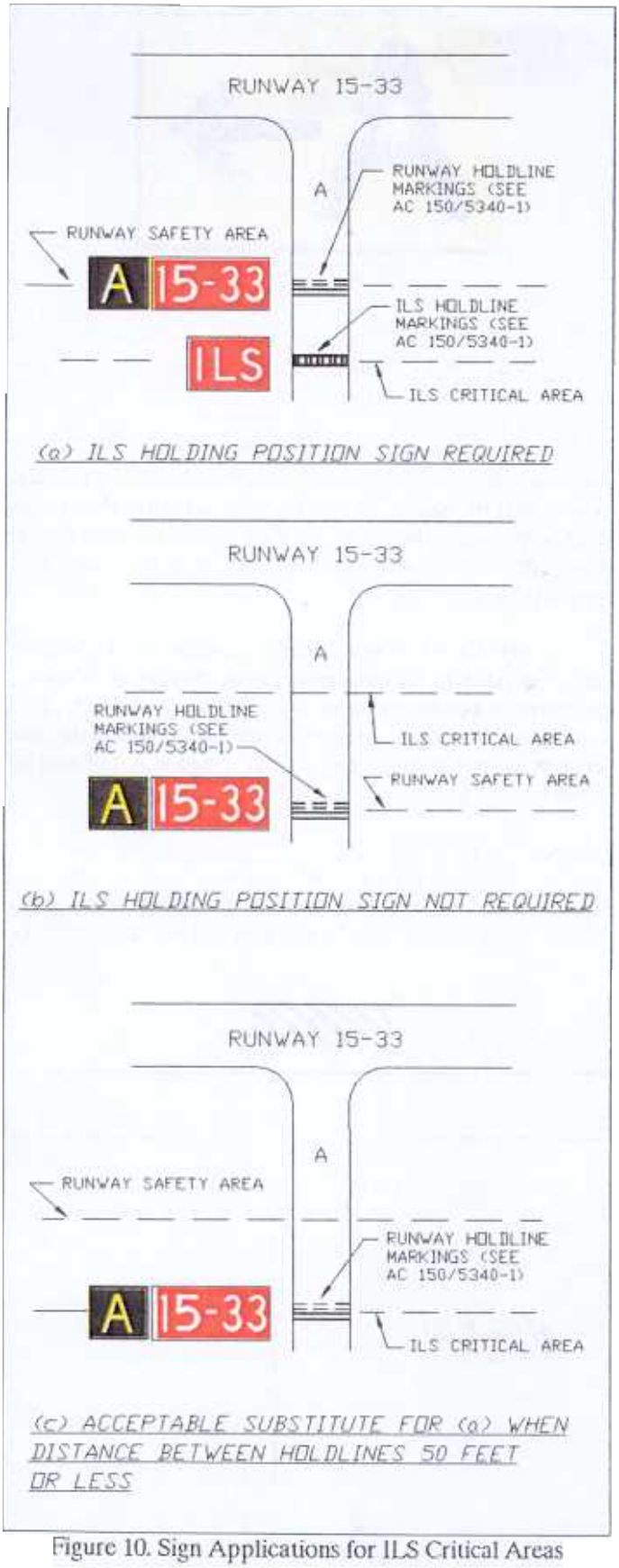

Figure 10. Sign Applications for ILS Critical Areas

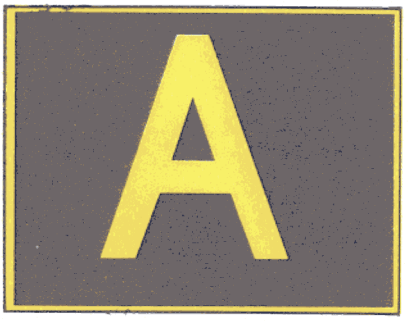

Figure 11. Taxiway Location Sign

black background with a yellow border and do not contain arrows.

b. Runway Location Signs. These signs are installed on * runways where two runways are in proximity which could create confusion as shown in figure 4b. A typical sign is shown in figure 12. These signs should be located to identify clearly the runways for pilots and contain the runway designation only for the one runway end. The signs have yellow inscriptions on a black background with a yellow border and do not contain arrows.

Figure 12. Runway Location Sign

c. Runway Safety Area/OFZ and Runway Approach Boundary Signs. These signs identify the boundary of the runway safety area/OFZ or the runway approach area to pilots who are exiting these areas. They have a black inscription that depicts the holdline marking on a yellow background as shown in Figure 13. These signs are only used at controlled airports on taxiways where the controller commonly asks the pilot to report "clear of the runway." The pilot can use the sign as a guide in deciding when to report back to the controller. Consequently, these signs would not normally be installed * at every runway exit. This sign would not normally be installed on taxiways having color coded centerline lights but may be desirable in areas where the centerline lights could be obscured by snow or ice.

d. ILS Critical Area Boundary Sign. These signs identify the boundary of the ILS critical area to pilots who are exiting this area. They have a black inscription that depicts the ILS holdline marking on a yellow background as shown in Figure 14. These signs are used at controlled airports on

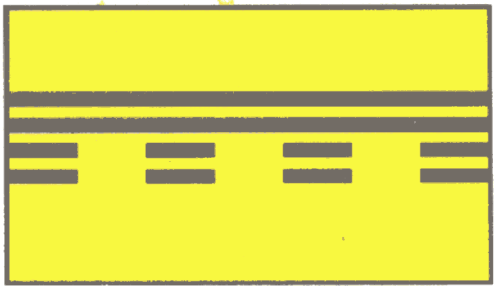

Figure 13. Runway Safety Area/OFZ Boundary Sign and Runway Approach Area Boundary Sign

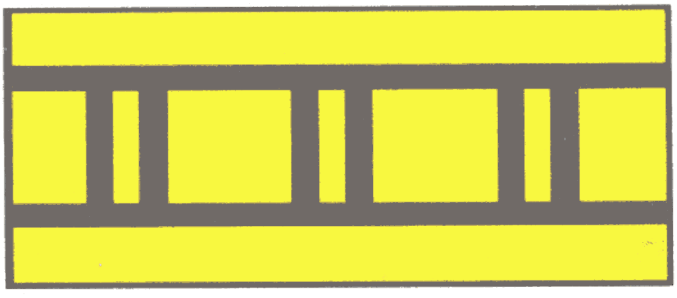

Figure 14. ILS Critical Area Boundary Sign

taxiways where the controller commonly asks the pilot to report "clear of the ILS critical area." The pilot can use the sign as a guide in deciding when to report back to the controller. This sign would not normally be installed on taxiways having color coded centerline lights but may be desirable in areas where the centerline lights could be obscured by snow or ice. These signs are installed only on the back side of ILS holding position signs.

7. DIRECTION SIGNS. These signs indicate directions of other taxiways leading out of an intersection. The signs have black inscriptions on a yellow background and always contain arrows. The arrows should be oriented to approximate the direction of turn. Direction signs should not be collocated with holding position signs or installed between the holdline and the runway. Signs used to indicate the direction of taxiways on the opposite side of a runway should be located on the opposite side of the runway.

a. Taxiway Direction Signs. A typical taxiway direction sign is shown in figure 15, and application examples are shown in figures 20, 21, and appendix 1.

b. Runway Exit Signs. A typical runway exit sign is shown in figure 15, and application examples are shown in figures A-1, A-2, and A-3 of appendix 1. Signs for runway exits are located prior to the runway/taxiway intersection on the side and in the direction of the runway where the aircraft is expected to exit. A runway exit sign should never have more than one arrow for each taxiway designation shown on the sign.

Figure 15. Direction Sign

(1) If a taxiway crosses a runway and an aircraft can be expected to exit on either side, then exit signs should be located on both sides of the runway.

(2) For taxiways that are intended only to be used as exits from the runway in one direction, such as taxiways located near the end of the runway or intersecting the runway at an acute angle, the signs should be installed only for the runway direction in which they are intended to be used (see appendix 1).

(3) When two acute-angle taxiways (i.e., high speed exits), intended to be used in opposite directions, intersect the runway at a common point, the exit signs should be located prior to the common point intersection rather than in the area between the two exits (see appendix 1, figure A-1, Taxiways D and E).

8. TAXIWAY ENDING MARKER. The sign system does not provide a sign to indicate that a taxiway does not continue beyond an intersection. A frangible, retroreflective barrier, as shown in figure 16, should be installed on the far side of the

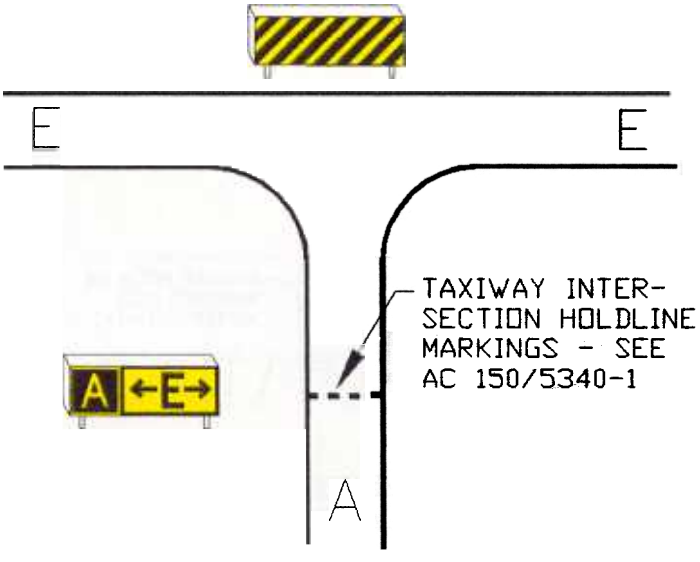

Figure 16. Taxiway Ending Marker

intersection if the normal visual cues such as marking and lighting are inadequate.

9. DESTINATION SIGNS. Destination signs have black inscriptions on a yellow background and always contain an arrow. These signs indicate the general direction to a remote location. They are not normally needed on an airport where taxiway direction signs are used. At many of the larger airports, taxiway routing is a very dynamic process, dependent on many variables including airfield construction and primary runway utilization. In these cases destination signs may provide contradictory information or routing possibilities in relation to air traffic control (ATC) communications. The use of destination signs at such airports is justified in cases of remote locations or where it is determined that such a level of confusion can exist that taxiway location signs and direction signs alone would not adequately guide a pilot to the desired destination. Destination signs may be more beneficial at uncontrolled airports.

a. Outbound Destination Signs. Outbound destination signs are used to identify directions to the takeoff runways. These routes usually begin at the entrance to a taxiway from an apron area. The inscription is the runway number plus an arrow indicating the direction (see figure 17). More than one runway number, separated by a dot, may be shown where the taxiing route is common to both runways as shown in figure 18.

b. Inbound Destination Signs. Major destination areas are usually shown on inbound destination signs. For example, at many airports, signs indicating the way to the apron may be adequate; whereas, at other airports, it may be necessary to make a distinction between passenger aprons, cargo aprons,

Figure 17. Typical Outbound Destination Sign

Figure 18. Outbound Destination Sign to Different Runways

Figure 19. Example of an Inbound Destination Sign

military aprons, or between aprons in different locations on the airport, such as north apron, east apron, etc. At appropriate points closer to the major destination areas, more detailed destination signs should be provided to indicate specific areas which are designated for parking service, passenger handling, military aircraft, etc. (see figure 19 for a typical sign). The inscription on destination signs should contain a minimum of three letters which should be selected so that no confusion could exist with other taxiway guidance signs. Common abbreviations used for inbound destinations are:

APRON --- general parking, servicing, and loading areas

FUEL --- areas where aircraft are fueled or serviced

TERM --- gate positions at which aircraft are loaded or unloaded

CIVIL--- areas set aside for civil aircraft

MIL --- areas set aside for military aircraft

PAX --- areas set aside for passenger handling

CARGO --- areas set aside for cargo handling

INTL --- areas set aside for handling international flights

FBO --- fixed-base operator

10. ROADWAY SIGNS. Vehicle roadways that intersect runways or taxiways should have a standard retroreflective highway stop sign on them prior to the intersection. At intersections with taxiways, it is permissible to use a standard retroreflective highway yield sign in lieu of a stop sign. These signs should be located at the edge of the applicable runway safety area/OFZ or taxiway safety area on frangible mounts and restricted to a height that does not interfere with aircraft using the runways or taxiways. It should be noted that aircraft clearance requirements and jet blast may preclude the use of

these signs on roadways that are located on the apron or other parts of the air operations area.

11. INFORMATION SIGNS. Signs installed on the airside of an airport, other than taxiway guidance signs as described in this chapter or runway distance remaining signs as described in chapter 2, should have black inscriptions on a yellow background, should provide adequate clearance to aircraft, and should conform to the general installation guidelines in paragraph 16. An example of such a sign is one that provides noise abatement procedures or other such specialized information. These signs need not be lighted and the size of the inscription is at the discretion of the airport operator.

12. GENERAL SIGNING CONVENTIONS. The following general signing conventions should be followed:

a. Unless otherwise noted herein, signs should always be placed on the left side of the taxiway as seen by the pilot of the approaching aircraft. If signs are installed on both sides of the taxiway at the same location, the sign faces should be identical (an exception is for holding position signs as explained in paragraph 12d). Signs should not be installed between the taxiway/runway holding position sign and the runway.

b. Signs may be located on the right side of the taxiway when necessary to meet clearance requirements or where impractical to install on the left side because of terrain or conflicts with other objects.

c. Some signs may be installed on the back side of other signs even though it results in the sign being on the right side of the taxiway. Signs that may be installed in this manner include:

(1) Runway safety area/OFZ and runway approach area boundary signs may be installed on the back sides of taxiway/runway intersections and runway approach area holding position signs.

(2) ILS critical area boundary signs may be installed on the back sides of ILS critical area holding position signs.

(3) Taxiway location signs, when installed on the far side of an intersection, may be installed on the back side of direction signs. *Note:* Location signs installed in this manner do not replace the need for location signs installed on the left prior to the intersection.

(4) Taxiway location signs may be installed on the back side of holding position signs.

(5) Destination signs may be installed on the back sides of direction signs on the far side of intersections when the destination referred to is straight ahead (see appendix 1, figure A-1).

d. Taxiway location signs installed in conjunction with holding position signs for taxiway/runway intersections should always be installed outboard of the holding position sign (see taxiway B, figure 3).

e. Location signs are normally included as part of a direction sign array which is located prior to the taxiway intersection. Except for intersections of only two taxiways (see paragraph 12h), the location sign is placed in the array so that the designations for all turns to the left would be located to the left of the location sign; the designations for all turns to the right or straight ahead, when required (see paragraph 12g), are located to the right of the location sign (see figure 20).

f. When more than one taxiway direction sign is installed at the same location, the designations of the intersecting taxiways and their respective arrows are arranged left to right in a clockwise manner starting from the taxiway or runway on which the aircraft is located (see figure 21).

g. All direction signs have arrows. Arrows on signs should be oriented to the approximate direction of the turn. Except as noted in paragraph 12h, each designation appearing in an array of direction signs should be accompanied only by one arrow. A direction sign with an arrow indicating that a taxiway continues straight ahead (25 degrees or less change in alignment at the intersection) is not normally needed (see figure 20a). Where the intersection alignment changes more than 25 degrees, a sign with an arrow approximating the direction of the taxiway should be used (see figure 20b). If the taxiway continues straight ahead (25 degrees or less change in alignment) and the designation of the taxiway changes at the intersection, then a direction sign with an arrow should be used (see figures 20c and 20d).

h. When a taxiway intersection is comprised of only two taxiways, it is permissible to place the location sign to the left of the sign array. In this case the designation for the intersecting taxiway on the direction sign will be accompanied by two arrows. For this type of installation, the taxiway cannot change designation or alignment (more than 25 degrees) on the other side of the intersection (see figure 20a).

i. In some cases, location signs may not be needed in conjunction with direction signs (see figure 21.) In analyzing the need for a location sign, all information concerning the intersection must be considered. This would include but not be limited to:

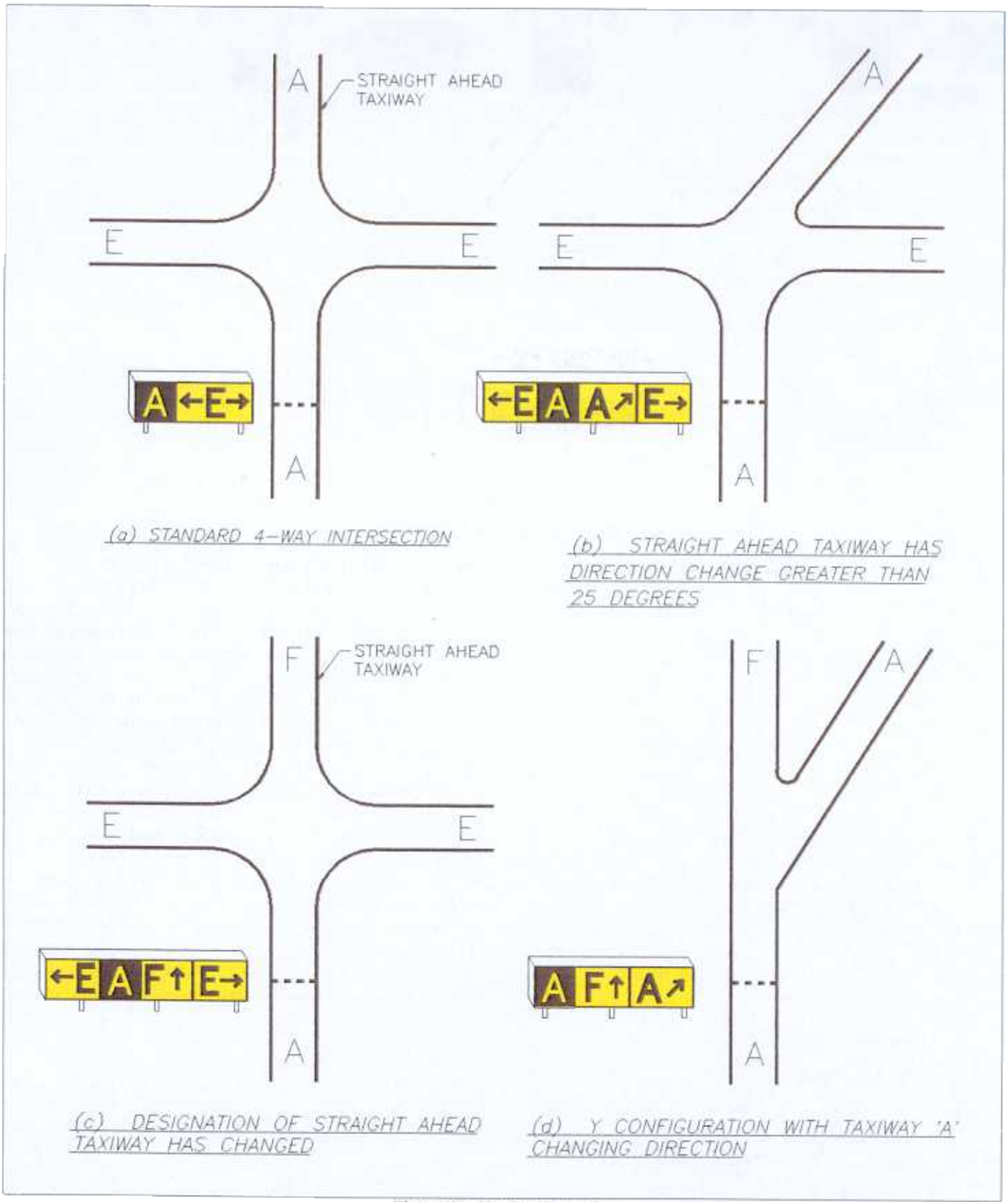

Figure 20. Signing Examples

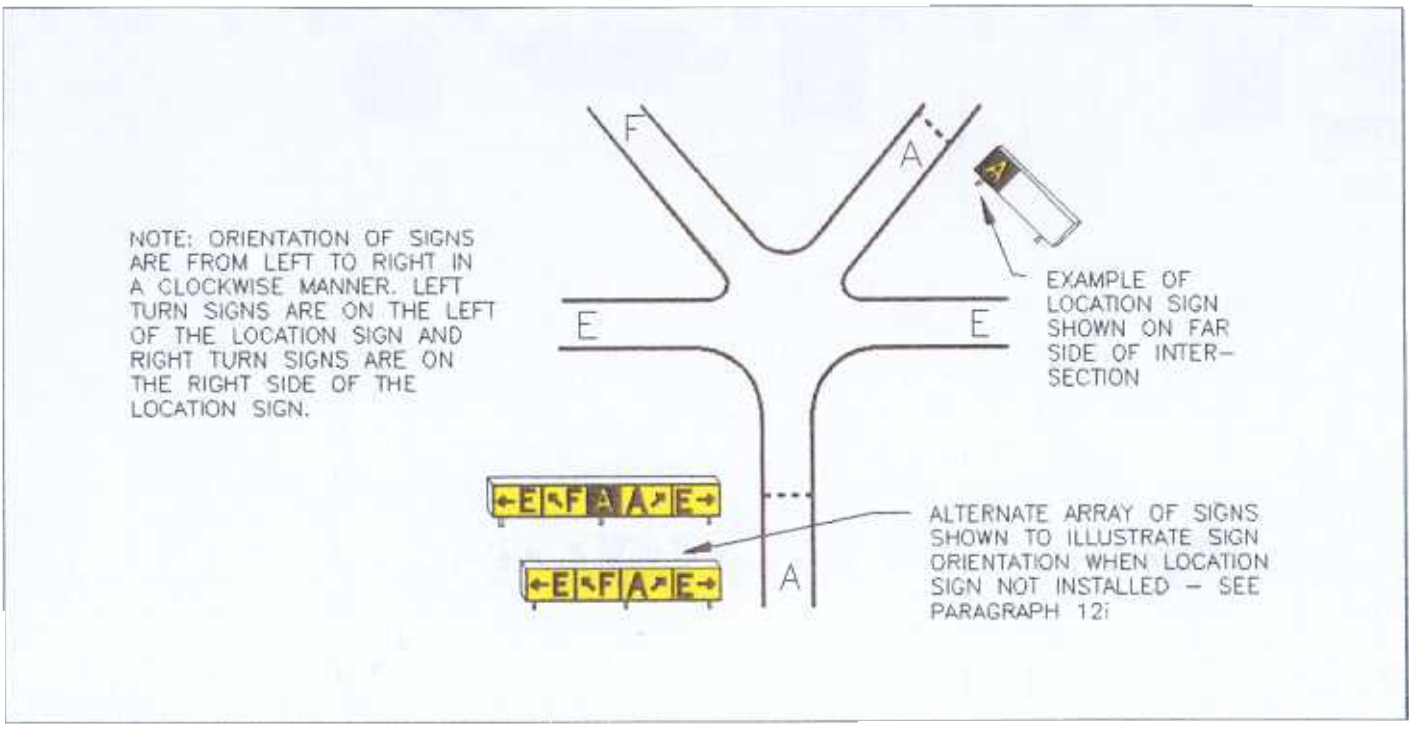

Figure 21. Signing an Intersection

(1) complexity of the intersection layout.

(2) distance from last location sign.

(3) complexity of prior intersections.

(4) traffic flow patterns through the intersection

(5) visibility conditions under which the intersection is used.

j. Destination signs should be installed in advance of intersections but should not be collocated with other signs. They may also be installed on the far side of an intersection when the taxiway does not continue, and direction signs are provided prior to the intersection.

k. Information signs should not be collocated with mandatory, location, direction, or destination signs.

l. Each designation and its associated arrow included in an array of direction signs or destination signs should be delineated from the other designations in the array by a black vertical border. When it is appropriate, a location sign may be used to provide this delineation (see figure 21.)

13. SIGN SIZE AND LOCATION. The signs should be in accordance with AC 150/5345-44, *Specifications for Taxiway and Runway Signs* (current edition). Three sizes (heights) of signs are available (see table 2). The choice of a particular size involves several factors such as effectiveness, aircraft clearance, jet blast, and snow removal operations. Normally, the larger the sign and the closer it is located to the runway or taxiway edge, the more effective it is. However, aircraft clearance requirements and jet blast effects require smaller signs when located near the pavement edges, whereas, effectiveness requires larger signs when located at further distances. Also,the effects of snow removal operations on the signs should be considered in the choice of sign size and location. The sign used must provide 12 inches (30 cm) of clearance beween the top of the sign and any part of the most critical aircraft using, or expected to use, the airport when the aircraft's wheels are at the defined pavement edge. The distances shown in table 1 should be used in determining runway holding positions. All signs in an array, e.g., a runway/taxiway holding position sign array consisting of a runway holding position sign and a taxiway location sign, should be the same size and same height above the ground. For determining sign locations with respect to intersecting taxiways, the clearance requirements to other moving aircraft, as given in table 3, should be used. For signs installed at holding positions, the signs should be in line with the holdline markings; however, a tolerance of $\pm$ 10 feet is allowed. Where there is no operational need for taxiway holdline markings (at taxiway/taxiway intersections), the signs may be installed in the area from the taxiway point of tangency to the location where holdline markings would be installed (table 3). However, locating the signs where the holdline marking would be installed will obviate the need to relocate the signs if the operational need for a taxiway holding position develops in the future.

Table 1. Location Distances for Holding Position Markings

Aircraft approach category and (airplane design group)	Perpendicular distance from runway centerline to intersecting runway/taxiway centerline in feet (meters)*	
	Visual and nonprecision instrument	Precision instrument
A & B (I and II) small airplanes only	125 (38)	175 (53)
A & B (I, II, and III)	200 (60)	250 (75)
A & B (IV)	250 (75)	250 (75)
C & D (I through IV)	250 (75)	250 (75)
C & D (V)	250 (75)	280 (85)

* Increases for elevation above sea level are:

1. Aircraft approach categories A and B.

   a. Airplane design groups I and II. No increase to this distance is required.

   b. Airplane design group III. This distance is increased one foot for each 100 feet above 5,100 feet above sea level.

   c.. Airplane design group IV.

      (1) Visual and nonprecision instrument. No increase to this distance is required.

      (2) Precision instrument. This distance is increased one foot for each 100 feet above sea level.

2. Aircraft approach category C.

   a. Airplane design groups I, II, and III. No increase to this distance is required.

   b. Airplane design group IV.

      (1) Visual and nonprecision instrument. No increase to this distance is required.

      (2) Precision instrument. This distance is increased one foot for each 100 feet above sea level.'

   c. Airplane design group V. This distance is increased one foot for each 100 feet above sea level.

3. Aircraft approach category D. This distance is increased one foot for each 100 feet above sea level.

14. SIGN OPERATION. Holding position signs for runways, ILS critical areas, approach areas, and their associated taxiway location signs should be illuminated when the associated runway lights are illuminated. Other taxiway guidance signs should be illuminated when the associated taxiway lights are illuminated. Signs powered from lighting circuits that are electrically monitored may have an adverse effect on the monitoring of the lighting circuit. *

15. PAVEMENT MARKING SIGNS. Where signs cannot be installed and/or there is a need for additional guidance, then directional guidance or location information may be painted on the pavement.

16. INSTALLATION. The signs should be mounted on a concrete slab, concrete pedestals, or angle iron stakes so that the top of the sign is level. The concrete edges or stakes should not protrude above grade. Signs are oriented so that the face is perpendicular to the centerline of the taxiway or runway. For special situations where visibility would be improved, single sided signs may be canted. Power to the signs should be provided through breakaway cable connectors installed within the frangible coupling portion of the sign's mounting legs. Auxiliary equipment, such as isolation transformers or series circuit power adapter units, should be installed in a light base can embedded in the ground. *

17-19. RESERVED.

Table 2. Location Distances for Taxiway Guidance Signs

Sign size	Sign heights [inches (cm)]			Perpendicular distance from defined taxiway/runway edge to near side of sign [feet (m)]
	Legend	Face	Installed (max.) *	
1	12 (30)	18 (46)	30 (76)	10-20 (3-6)
2	15 (38)	24 (61)	36 (91)	20-35 (6-10.5)
3	18 (46)	30 (76)	42 (107)	35-60 (10.5-18)

* * The height referred to in this column is the distance from top of the sign to grade measured at the side of the sign that is nearest to the applicable runway, taxiway, or apron. In accordance with paragraph 13 this height should be reduced, if necessary, to provide the required 12-inch clearance between the top of the sign and the critical aircraft. *

Table 3. Perpendicular Distances for Taxiway Intersection Markings from Centerline of Crossing Taxiway

Airplane design group [1]					
I	II	III	IV	V	VI
44.5 feet (13.5 m)	65.5 feet (20 m)	93 feet (28.5 m)	129.5 feet (39.5 m)	160 feet (48.5 m)	193 feet (59 m)

[1] See AC 150/5300-13, *Airport Design*