

“Aeronautical Lighting and Other Airport Visual Aids,” of the Aeronautical Information Manual (AIM).

### **Runway Markings and Signs**

Runway markings vary depending on the type of operations conducted at the airport. A basic VFR runway may only have centerline markings and runway numbers. Refer to Appendix C of this publication for an example of the most common runway markings that are found at airports.

Since aircraft are affected by the wind during takeoffs and landings, runways are laid out according to the local prevailing winds. Runway numbers are in reference to magnetic north. Certain airports have two or even three runways laid out in the same direction. These are referred to as parallel runways and are distinguished by a letter added to the runway number (e.g., runway 36L (left), 36C (center), and 36R (right)).

### ***Relocated Runway Threshold***

It is sometimes necessary, due to construction or runway maintenance, to close only a portion of a runway. When a portion of a runway is closed, the runway threshold is relocated as necessary. It is referred to as a relocated threshold and methods for identifying the relocated threshold vary. A common way for the relocated threshold to be marked is a ten foot wide white bar across the width of the runway. *[Figure 14-5A and B]*

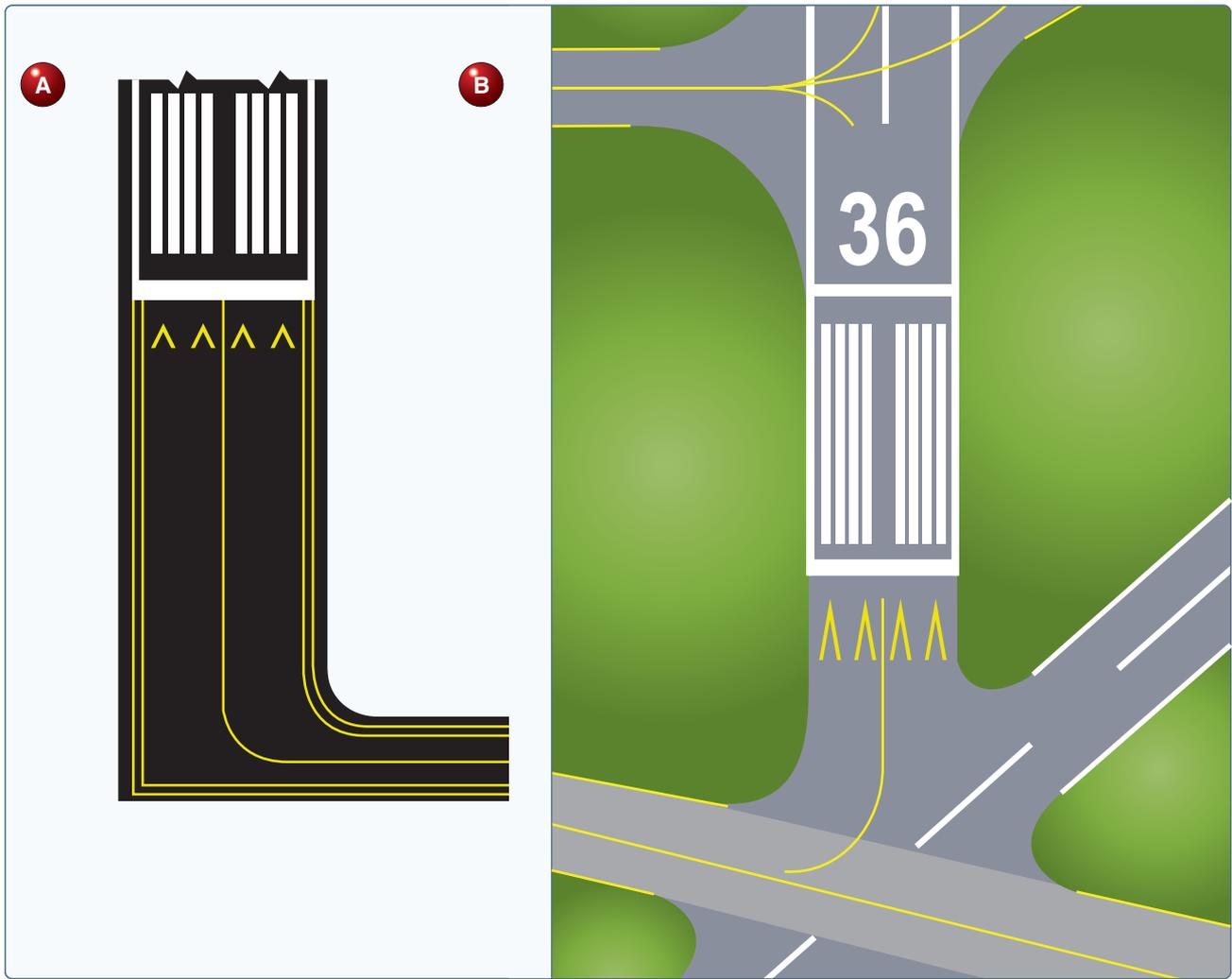
When the threshold is relocated, the closed portion of the runway is not available for use by aircraft for takeoff or landing, but it is available for taxi. When a threshold is relocated, it closes not only a set portion of the approach end of a runway, but also shortens the length of the opposite direction runway. Yellow arrow heads are placed across the width of the runway just prior to the threshold bar.

### ***Displaced Threshold***

A displaced threshold is a threshold located at a point on the runway other than the designated beginning of the runway. Displacement of a threshold reduces the length of runway available for landings. The portion of runway behind a displaced threshold is available for takeoffs in either direction, or landings from the opposite direction. A ten feet wide white threshold bar is located across the width of the runway at the displaced threshold, and white arrows are located along the centerline in the area between the beginning of the runway and displaced threshold. White arrow heads are located across the width of the runway just prior to the threshold bar. *[Figure 14-6A and B]*

## **Airport Markings and Signs**

There are markings and signs used at airports that provide directions and assist pilots in airport operations. It is important for you to know the meanings of the signs, markings, and lights that are used on airports as surface navigational aids. All airport markings are painted on the surface, whereas some signs are vertical and some are painted on the surface. An overview of the most common signs and markings are described on the following pages. Additional information may be found in Chapter 2,



**Figure 14-5.** (A) Relocated runway threshold drawing. (B) Relocated threshold for Runway 36 at Joplin Regional Airport (JLN).

**Runway Safety Area**

The runway safety area (RSA) is a defined surface surrounding the runway prepared, or suitable, for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. The dimensions of the RSA vary and can be determined by using the criteria contained within AC 150/5300-13, Airport Design, Chapter 3. Figure 3-1 in AC 150/5300-13 depicts the RSA. Additionally, it provides greater accessibility for firefighting and rescue equipment in emergency situations.

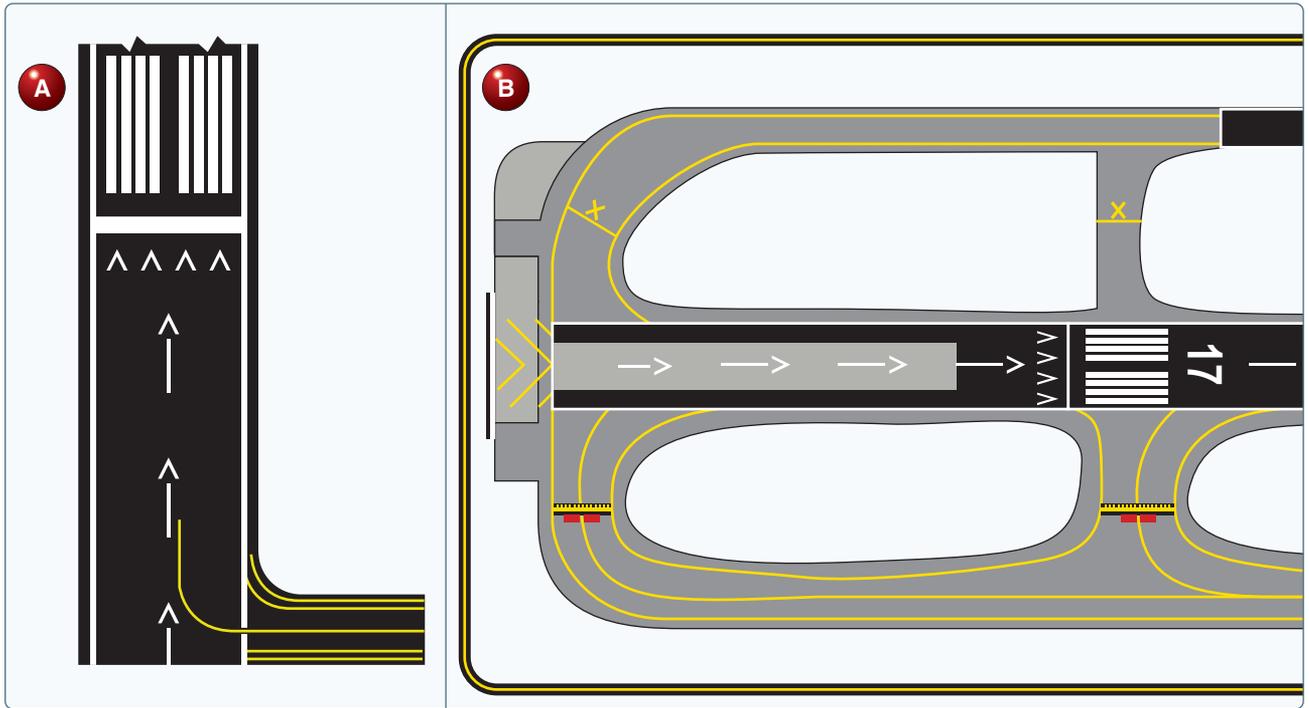
The RSA is typically graded and mowed. The lateral boundaries are usually identified by the presence of the runway holding position signs and markings on the adjoining taxiway stubs. Aircraft should not enter the RSA without making sure of adequate separation from other aircraft during operations at uncontrolled airports. [Figure 14-7]

**Runway Safety Area Boundary Sign**

Some taxiway stubs also have a runway safety area boundary sign that faces the runway and is visible to you only when exiting the runway. This sign has a yellow background with black markings and is typically used at towered airports where a controller commonly requests you to report clear of a runway. This sign is intended to provide you with another visual cue that is used as a guide to determine when you are clear of the runway safety boundary area. The sign shown in Figure 14-8 is what you would see when exiting the runway at Taxiway Kilo. You are out of the runway safety area boundary when the entire aircraft passes the sign and the accompanying surface painted marking.

**Runway Holding Position Sign**

Noncompliance with a runway holding position sign may result in the FAA filing a Pilot Deviation against you. A



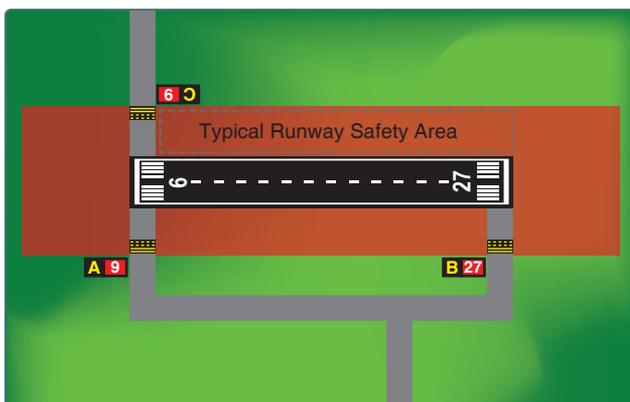
**Figure 14-6.** (A) Displaced runway threshold drawing. (B) Displaced threshold for Runway 17 at Albuquerque International Airport (ABQ).

runway holding position sign is an airport version of a stop sign. [Figure 14-9] It may be seen as a sign and/or its characters painted on the airport pavement. The sign has white characters outlined in black on a red background. It is always collocated with the surface painted holding position markings and is located where taxiways intersect runways. On taxiways that intersect the threshold of the takeoff runway, only the designation of the runway may appear on the sign.

If a taxiway intersects a runway somewhere other than at the threshold, the sign has the designation of the intersecting runway. The runway numbers on the sign are arranged to correspond to the relative location of the respective runway thresholds. Figure 14-10 shows “18-36” to indicate the threshold for Runway 18 is to the left and the threshold for



**Figure 14-8.** Runway safety area boundary sign and marking located on Taxiway Kilo.



**Figure 14-7.** Runway Safety Area.



**Figure 14-9.** Runway holding position sign at takeoff end of Runway 14 with collocated Taxiway Alpha location sign.



**Figure 14-10.** Runway holding position sign at a location other than the takeoff end of Runway 18-36 with collocated Taxiway Alpha location sign.

Runway 36 is to the right. The sign also indicates that you are located on Taxiway Alpha.

If the runway holding position sign is located on a taxiway at the intersection of two runways, the designations for both runways are shown on the sign along with arrows showing the approximate alignment of each runway. [Figure 14-11A and B] In addition to showing the approximate runway alignment, the arrows indicate the direction(s) to the threshold of the runway whose designation is immediately next to each corresponding arrow.

This type of taxiway and runway/runway intersection geometry can be very confusing and create navigational challenges. Extreme caution must be exercised when taxiing onto or crossing this type of intersection. Figure 14-11A and B shows a depiction of a taxiway, runway/runway intersection and is also designated as a “hot spot” on the airport diagram. In the example, Taxiway Bravo intersects with two runways, 31-13 and 35-17, which cross each other.

Surface painted runway holding position signs may also be used to aid you in determining the holding position. These markings consist of white characters on a red background and are painted on the left side of the taxiway centerline. Figure 14-12 shows a surface painted runway holding position sign that is the holding point for Runway 32R-14L.

You should never allow any part of your aircraft to cross the runway holding position sign (either a vertical or surface painted sign) without a clearance from ATC. Doing so poses a hazard to yourself and others.

When the tower is closed or you are operating at a nontowered airport, you may taxi past a runway holding position sign only when the runway is clear of aircraft, and there are no aircraft on final approach. You may then proceed with extreme caution.

### ***Runway Holding Position Marking***

Noncompliance with a runway holding position marking may result in the FAA filing a Pilot Deviation against you. Runway holding position markings consist of four yellow lines, two solid and two dashed, that are painted on the surface and extend across the width of the taxiway to indicate where the aircraft should stop when approaching a runway. These markings are painted across the entire taxiway pavement, are in alignment, and are collocated with the holding position sign as described above.

As you approach the runway, two solid yellow lines and two dashed lines will be visible. Prior to reaching the solid lines, it is imperative to stop and ensure that no portion of the aircraft intersects the first solid yellow line. Do not cross the double solid lines until a clearance from ATC has been received. [Figure 14-13] When the tower is closed or when operating at a nontowered airport, you may taxi onto or across the runway only when the runway is clear and there are no aircraft on final approach. You should use extreme caution when crossing or taxiing onto the runway and always look both ways.

When exiting the runway, the same markings will be seen except the aircraft will be approaching the double dashed lines. [Figure 14-14] In order to be clear of the runway, the entire aircraft must cross both the dashed and solid lines. An ATC clearance is not needed to cross this marking when exiting the runway.

### ***Runway Distance Remaining Signs***

Runway distance remaining signs have a black background with a white number and may be installed along one or both sides of the runway. [Figure 14-15] The number on the signs indicates the distance, in thousands of feet, of landing runway remaining. The last sign, which has the numeral “1,” is located at least 950 feet from the runway end.

### ***Runway Designation Marking***

Runway numbers and letters are determined from the approach direction. The runway number is the whole number nearest one-tenth the magnetic azimuth of the centerline of the runway, measured clockwise from the magnetic north. In the case where there are parallel runways, the letters differentiate between left (L), right (R), or center (C). [Figure 14-16] For example, if there are two parallel runways, they would show the designation number and then either L or R beneath it. For three parallel runways, the designation number would be presented with L, C, or R beneath it.

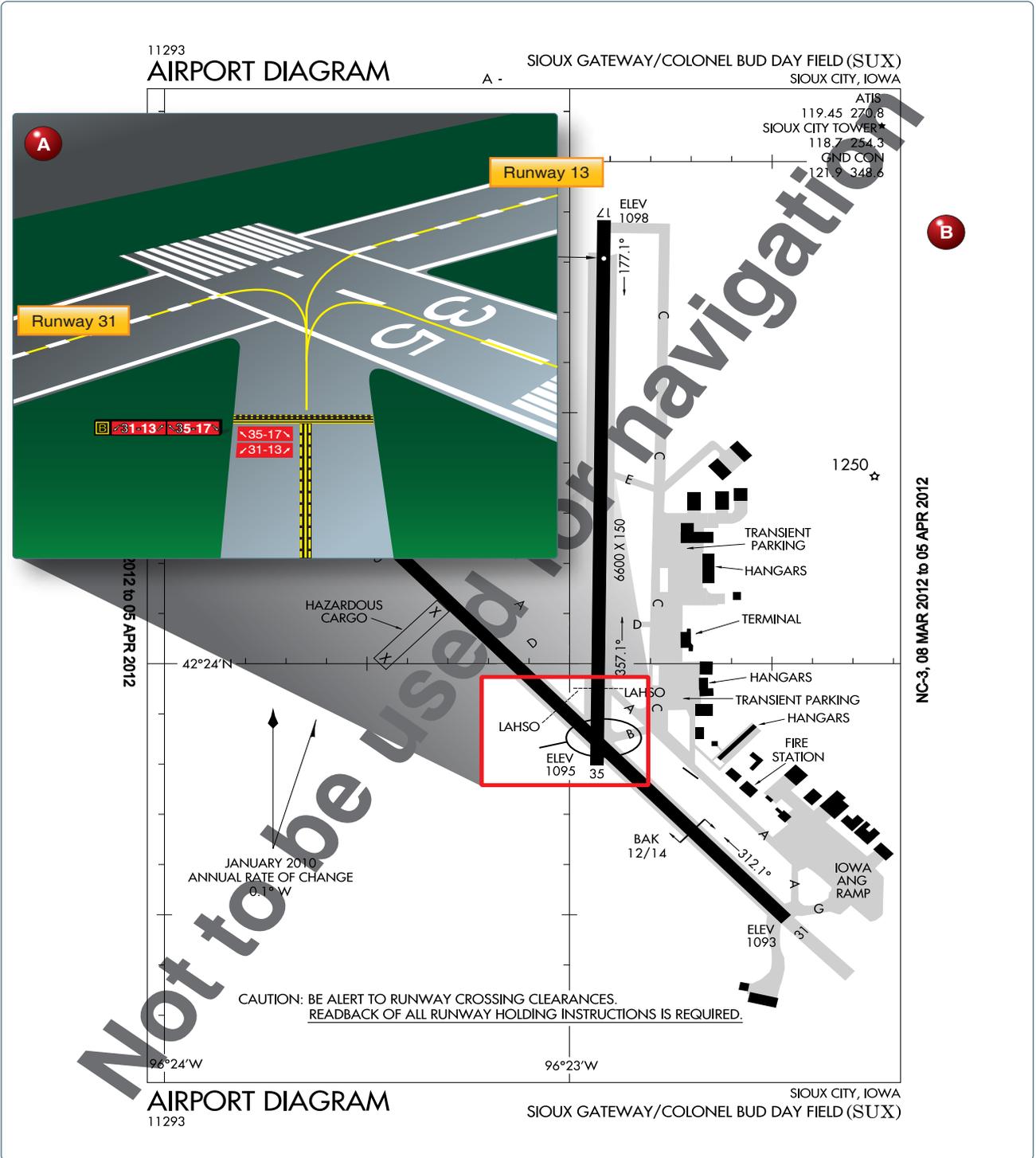


Figure 14-11. (A) Taxiway Bravo location sign collocated with runway/runway intersection holding signs at Sioux Gateway Airport (SUX) (B) Airport diagram of Sioux Gateway Airport (SUX), Sioux City, Iowa. The area outlined in red is a designated “hot spot” (HS1).



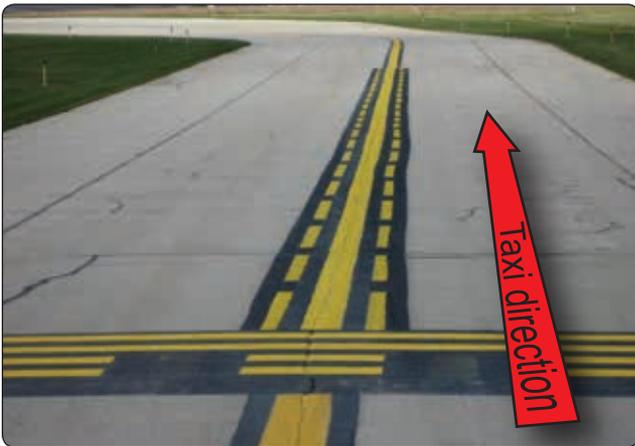
**Figure 14-12.** Surface painted runway holding position signs for Runway 32R-14L along with the enhanced taxiway centerline marking.



**Figure 14-15.** Runway distance remaining sign indicating that there is 2,000 feet of runway remaining.



**Figure 14-13.** Surface painted holding position marking along with enhanced taxiway centerline.



**Figure 14-14.** Runway holding position markings as seen when exiting the runway. When exiting the runway, no ATC clearance is required to cross.

### **Land and Hold Short Operations (LAHSO)**

When simultaneous operations (takeoffs and landings) are being conducted on intersecting runways, Land and Hold Short Operations (LAHSO) may also be in effect. LAHSO is an ATC procedure that may require your participation and

compliance. As pilot in command (PIC), you have the final authority to accept or decline any LAHSO clearance.

If issued a land and hold short clearance, you must be aware of the reduced runway distances and whether or not you can comply before accepting the clearance. You do not have to accept a LAHSO clearance. Pilots should only receive a LAHSO clearance when there is a minimum ceiling of 1,000 feet and 3 statute miles of visibility.

Runway holding position signs and markings are installed on those runways used for LAHSO. The signs and markings are placed at the LAHSO point to aid you in determining where to stop and hold the aircraft and are located prior to the runway/runway intersection. [Figure 14-17]

The holding position sign has a white inscription with black border around the numbers on a red background and is installed adjacent to the holding position markings. If you accept a land and hold short clearance, you must comply so that no portion of the aircraft extends beyond these hold markings.

If receiving “cleared to land” instructions from ATC, you are authorized to use the entire landing length of the runway and should disregard any LAHSO holding position markings located on the runway. If you receive and accept LAHSO instructions, you must stop short of the intersecting runway prior to the LAHSO signs and markings.

Below is a list of items which, if thoroughly understood and complied with, will ensure that LAHSO operations are conducted properly.

- Know landing distance available.
- Be advised by ATC as to why LAHSO are being conducted.

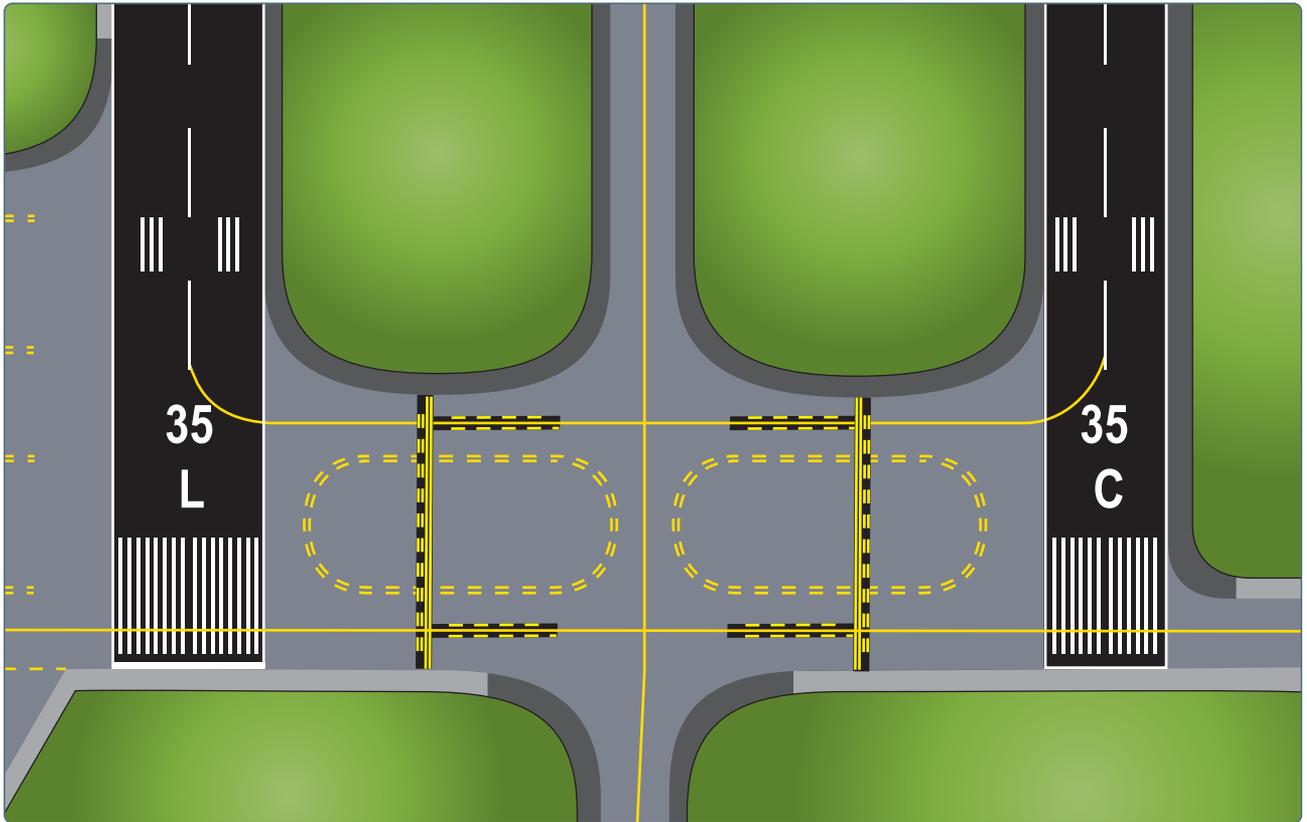


Figure 14-16. Two of three parallel runways.

- Advise ATC if you cannot comply with LAHSO.
- Know what signs and markings are at the LAHSO point.
- LAHSO are not authorized for student pilots who are performing a solo flight.
- At many airports air carrier aircraft are not authorized to participate in LAHSO if the other aircraft is a general aviation aircraft.
- Generally, LAHSO are not authorized at night.
- LAHSO are not authorized on wet runways.

If you accept the following clearance from ATC: “Cleared to land Runway 36 hold short of Runway 23,” you must either exit Runway 36 or stop at the holding position prior to Runway 23.

### Taxiway Markings and Signs

Taxiway direction signs have a yellow background and black characters, which identifies the designation or intersecting taxiways. Arrows indicate the direction of turn that would place the aircraft on the designated taxiway. [Figure 14-18] Direction signs are normally located on the left side of the taxiway and prior to the intersection. These signs and markings (with a yellow background and black characters) indicate the direction toward a different taxiway, leading off a runway, or out of an intersection. Figure 14-18 shows Taxiway Delta and how Taxiway Bravo intersects ahead at 90° both left and right.

Taxiway direction signs can also be displayed as surface painted markings. Figure 14-19 shows Taxiway Bravo as proceeding straight ahead while Taxiway Alpha turns to the right at approximately 45°.



Figure 14-17. Runway holding position sign and marking for LAHSO.



**Figure 14-18.** Taxiway Bravo direction sign with a collocated Taxiway Delta location sign. When the arrow on the direction sign indicates a turn, the sign is located prior to the intersection.

Figure 14-20A and B shows an example of a direction sign at a complex taxiway intersection. Figure 14-20A and B shows Taxiway Bravo intersects with Taxiway Sierra at 90°, but at 45° with Taxiway Foxtrot. This type of array can be displayed with or without the taxiway location sign, which in this case would be Taxiway Bravo.

### **Enhanced Taxiway Centerline Markings**

At most towered airports, the enhanced taxiway centerline marking is used to warn you of an upcoming runway. It consists of yellow dashed lines on either side of the normal solid taxiway centerline and the dashes extend up to 150 feet prior to a runway holding position marking. [Figure 14-21A and B] They are used to aid you in maintaining awareness during surface movement to reduce runway incursions.

### **Destination Signs**

Destination signs have black characters on a yellow background indicating a destination at the airport. These



**Figure 14-19.** Surface painted taxiway direction signs.

signs always have an arrow showing the direction of the taxi route to that destination. [Figure 14-22] When the arrow on the destination sign indicates a turn, the sign is located prior to the intersection. Destinations commonly shown on these types of signs include runways, aprons, terminals, military areas, civil aviation areas, cargo areas, international areas, and fixed-base operators. When the inscription for two or more destinations having a common taxi route are placed on a sign, the destinations are separated by a “dot” (•) and one arrow would be used as shown in Figure 14-22. When the inscription on a sign contains two or more destinations having different taxi routes, each destination is accompanied by an arrow and separated from the other destination(s) on the sign with a vertical black message divider as shown in Figure 14-23. The example shown in Figure 14-23 shows two signs. The sign in the foreground explains that Runway 20 threshold is to the left, and Runways 32, 2, and 14 are to the right. The sign in the background indicates that you are located on Taxiway Bravo and Taxiway November will take you to those runways.

### **Holding Position Signs and Markings for an Instrument Landing System (ILS) Critical Area**

The instrument landing system (ILS) broadcasts signals to arriving instrument aircraft to guide them to the runway. Each of these ILSs have critical areas that must be kept clear of all obstacles in order to ensure quality of the broadcast signal. At many airports, taxiways extend into the ILS critical area. Most of the time, this is of no concern; however, during times of poor weather, an aircraft on approach may depend on a good signal quality. When necessary, ATC will protect the ILS critical area for arrival instrument traffic by instructing taxiing aircraft to “**hold short**” of Runway (XX) ILS critical area.

The ILS critical area hold sign has white characters, outlined in black, on a red background and is installed adjacent to the ILS holding position markings. [Figure 14-24] The holding position markings for the ILS critical area appear on the pavement as a horizontal yellow ladder extending across the width of the taxiway.

When instructed to “hold short of Runway (XX) ILS critical area,” you must ensure no portion of the aircraft extends beyond these markings. [Figure 14-25] If ATC does not instruct you to hold at this point, then you may bypass the ILS critical area hold position markings and continue with your taxi. Figure 14-24 shows that the ILS hold sign is located on Taxiway Golf and the ILS ladder hold position marking is adjacent to the hold sign.

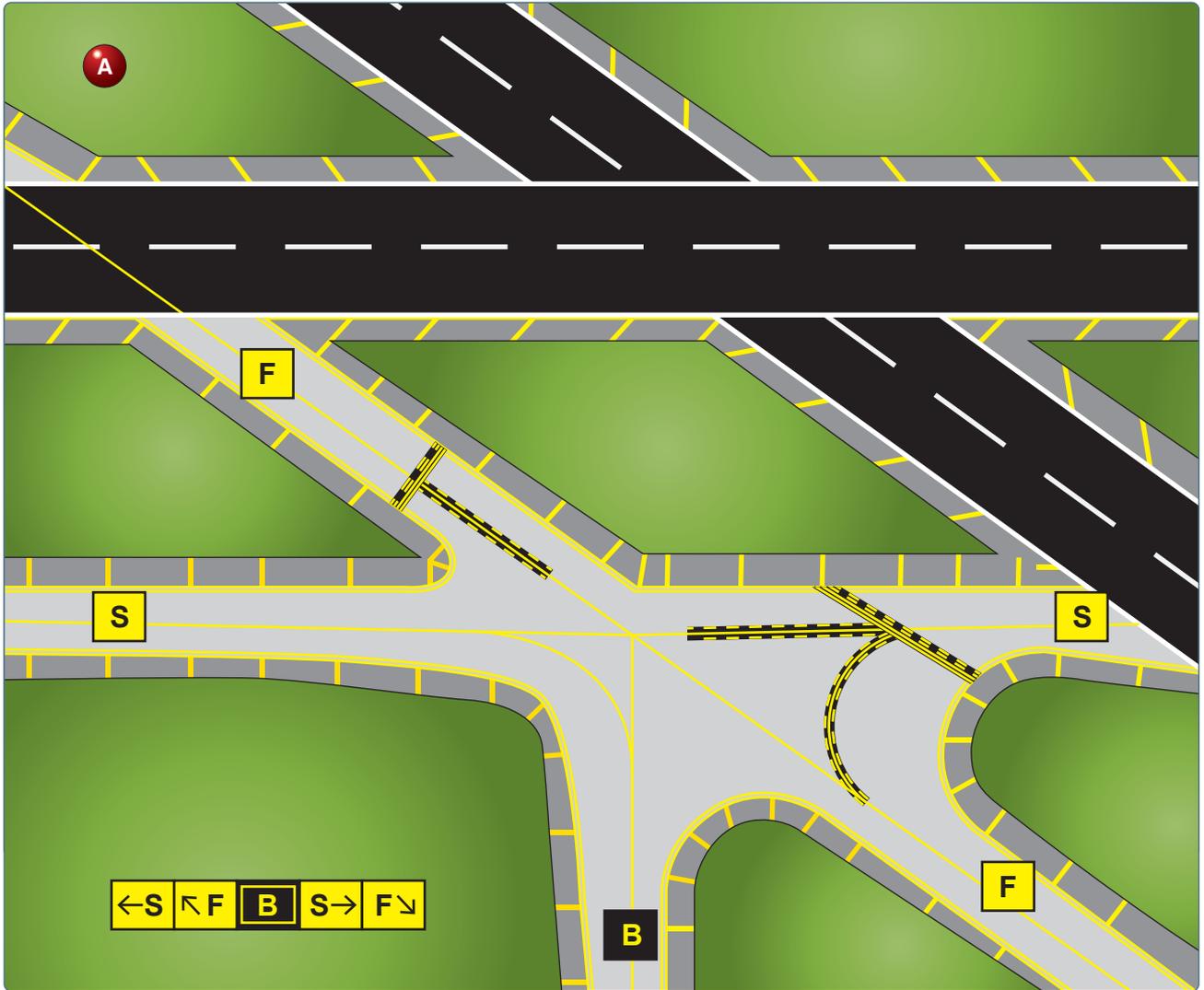


Figure 14-20. Orientation of signs is from left to right in a clockwise manner. Left turn signs are on the left and right turn on the right. In this view, the pilot is on Taxiway Bravo.



Figure 14-21. (A) Enhanced taxiway centerline marking. (B) Enhanced taxiway centerline marking and runway holding position marking.



Figure 14-22. Destination sign to the fixed-base operator (FBO).



Figure 14-23. Runway destination sign with different taxi routes.



Figure 14-24. Instrument landing system (ILS) holding position sign and marking on Taxiway Golf.

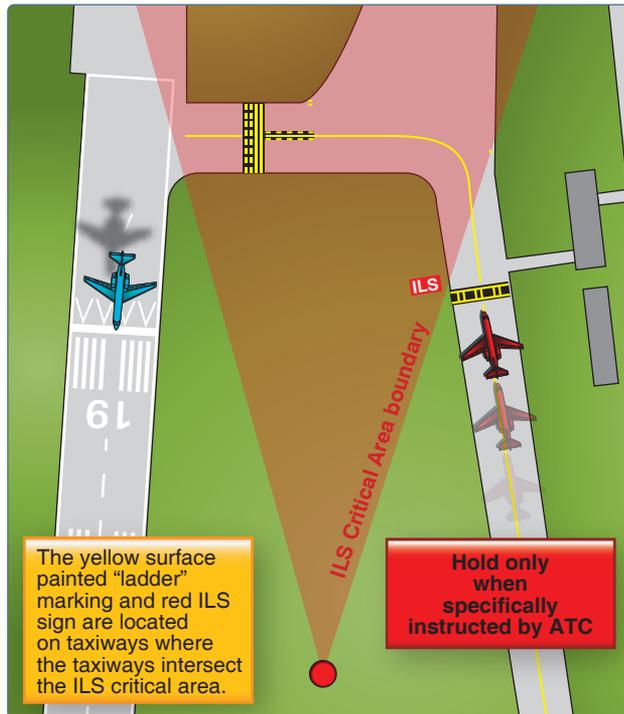


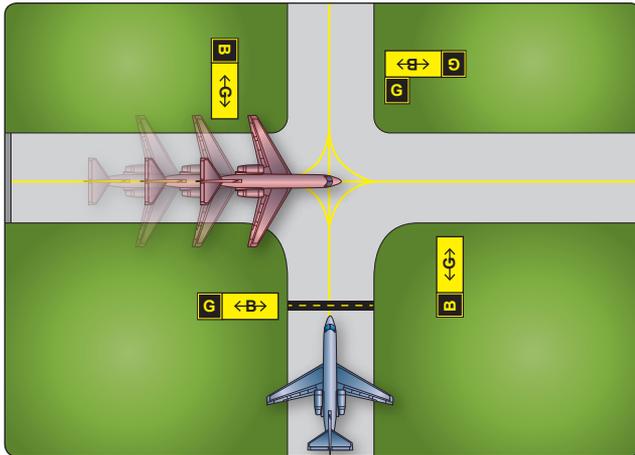
Figure 14-25. Holding position sign and marking for instrument landing system (ILS) critical area boundary.

### Holding Position Markings for Taxiway/Taxiway Intersections

Holding position markings for taxiway/taxiway intersections consist of a single dashed yellow line extending across the width of the taxiway. [Figure 14-26] They are painted on taxiways where ATC normally holds aircraft short of a taxiway intersection. When instructed by ATC "hold short of Taxiway X," you should stop so that no part of your aircraft extends beyond the holding position marking. When the marking is not present, you should stop your aircraft at a point that provides adequate clearance from an aircraft on the intersecting taxiway.

### Marking and Lighting of Permanently Closed Runways and Taxiways

For runways and taxiways that are permanently closed, the lighting circuits are disconnected. The runway threshold, runway designation, and touchdown markings are obliterated and yellow "Xs" are placed at each end of the runway and at 1,000-foot intervals.



**Figure 14-26.** Holding position marking on a taxiway.

### Temporarily Closed Runways and Taxiways

For temporarily closed runways and taxiways, a visual indication is often provided with yellow “Xs” or raised lighted yellow “Xs” placed at each end of the runway. Depending on the reason for the closure, duration of closure, airfield configuration, and the existence and the hours of operation of an ATC tower, a visual indication may not be present. As discussed previously in the chapter, you must always check NOTAMs and ATIS for runway and taxiway closure information.

Figure 14-27A shows an example of a yellow “X” laid flat with an adequate number of heavy sand bags to keep the wind from getting under and displacing the vinyl material.

A very effective and preferable visual aid to depict temporary closure is the lighted “X” placed on or near the runway designation numbers. [Figure 14-27B and C] This device is much more discernible to approaching aircraft than the other materials described above.

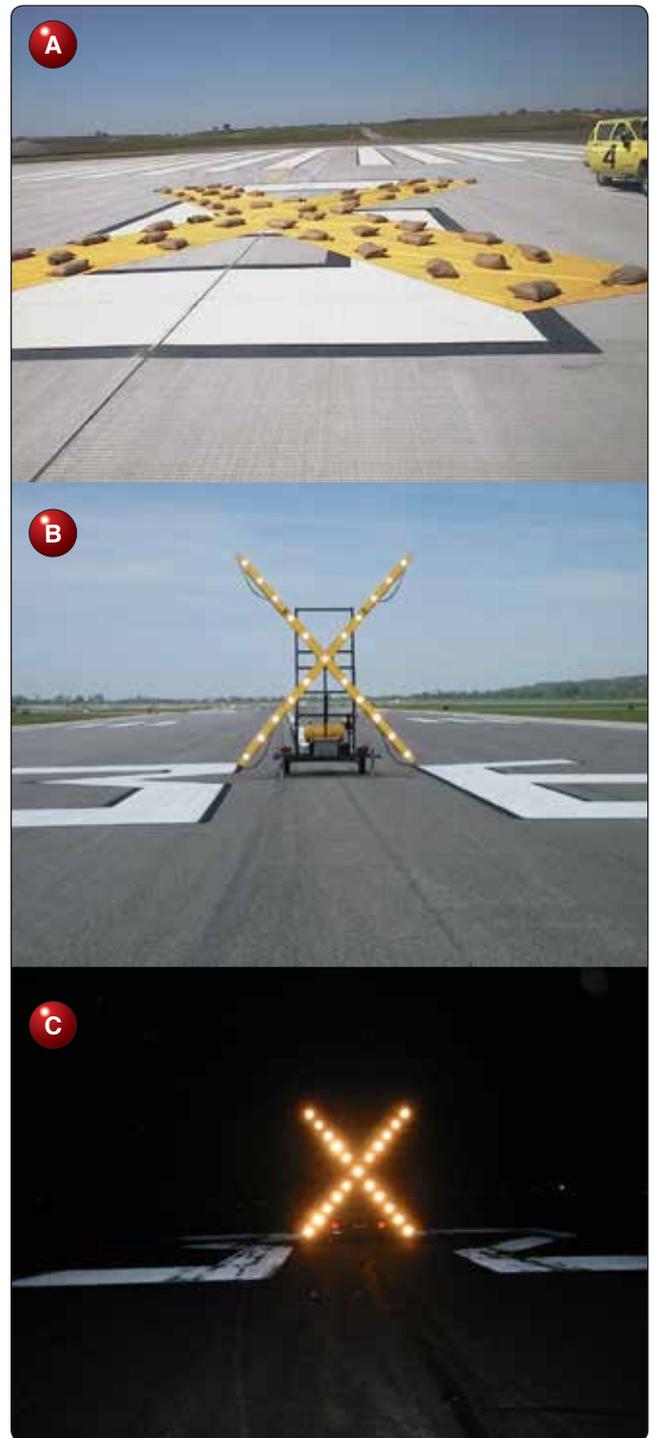
### Other Markings

Some other markings found on the airport include vehicle roadway markings, VOR receiver checkpoint markings, and non-movement area boundary markings.

### Airport Signs

There are six types of signs that may be found at airports. The more complex the layout of an airport, the more important the signs become to pilots. Appendix C of this publication shows examples of some signs that are found at most airports, their purpose, and appropriate pilot action. The six types of signs are:

- Mandatory instruction signs—red background with white inscription. These signs denote an entrance to a runway, critical area, or prohibited area.



**Figure 14-27.** (A) Yellow “X” placed on surface of temporarily closed runways. (B) Lighted “X” placed on temporarily closed runways. (C) Lighted “X” at night showing a temporarily closed runway.

- Location signs—black with yellow inscription and a yellow border, no arrows. They are used to identify a taxiway or runway location, to identify the boundary of the runway, or identify an instrument landing system (ILS) critical area.

- Direction signs—yellow background with black inscription. The inscription identifies the designation of the intersecting taxiway(s) leading out of an intersection.
- Destination signs—yellow background with black inscription and arrows. These signs provide information on locating areas, such as runways, terminals, cargo areas, and civil aviation areas.
- Information signs—yellow background with black inscription. These signs are used to provide the pilot with information on areas that cannot be seen from the control tower, applicable radio frequencies, and noise abatement procedures. The airport operator determines the need, size, and location of these signs.
- Runway distance remaining signs—black background with white numbers. The numbers indicate the distance of the remaining runway in thousands of feet.

