

Runways



Pavement Marking Colors

AIM 2-3-2 B

Markings for runways are white.

Markings defining the landing area on a heliport are also white except for hospital heliports which use a red “H” on a white cross.

Markings for taxiways, areas not intended for use by aircraft (closed and hazardous areas), and holding positions (even if they are on a runway) are yellow.

Runway Markings

AIM 2-3-3 A

There are three types of markings for runways:

Visual

Nonprecision instrument

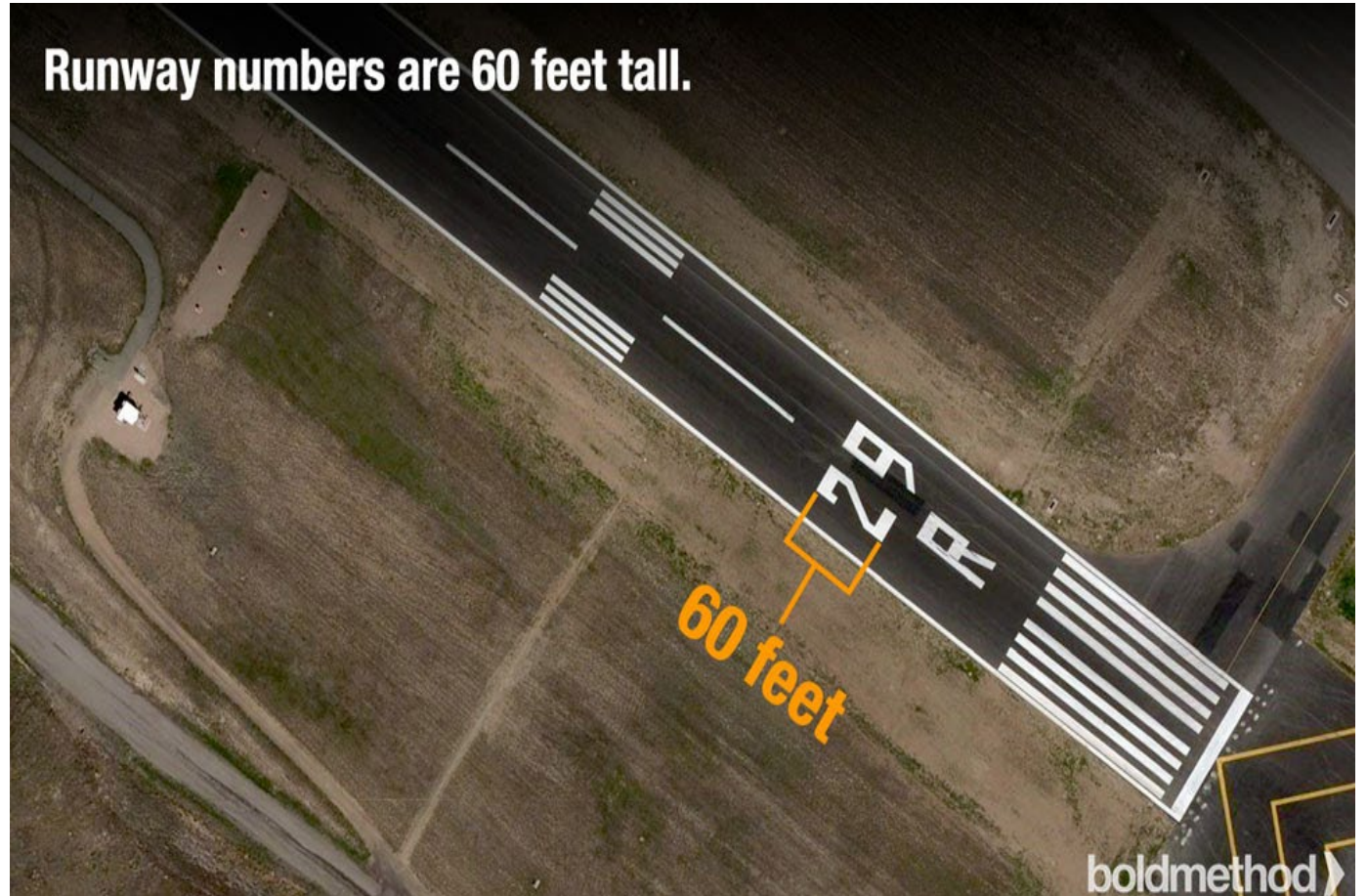
Precision instrument

Runway Stripes

Standard runway stripes are 120 feet long.
Gaps are 80 feet long.



Runway Numbers

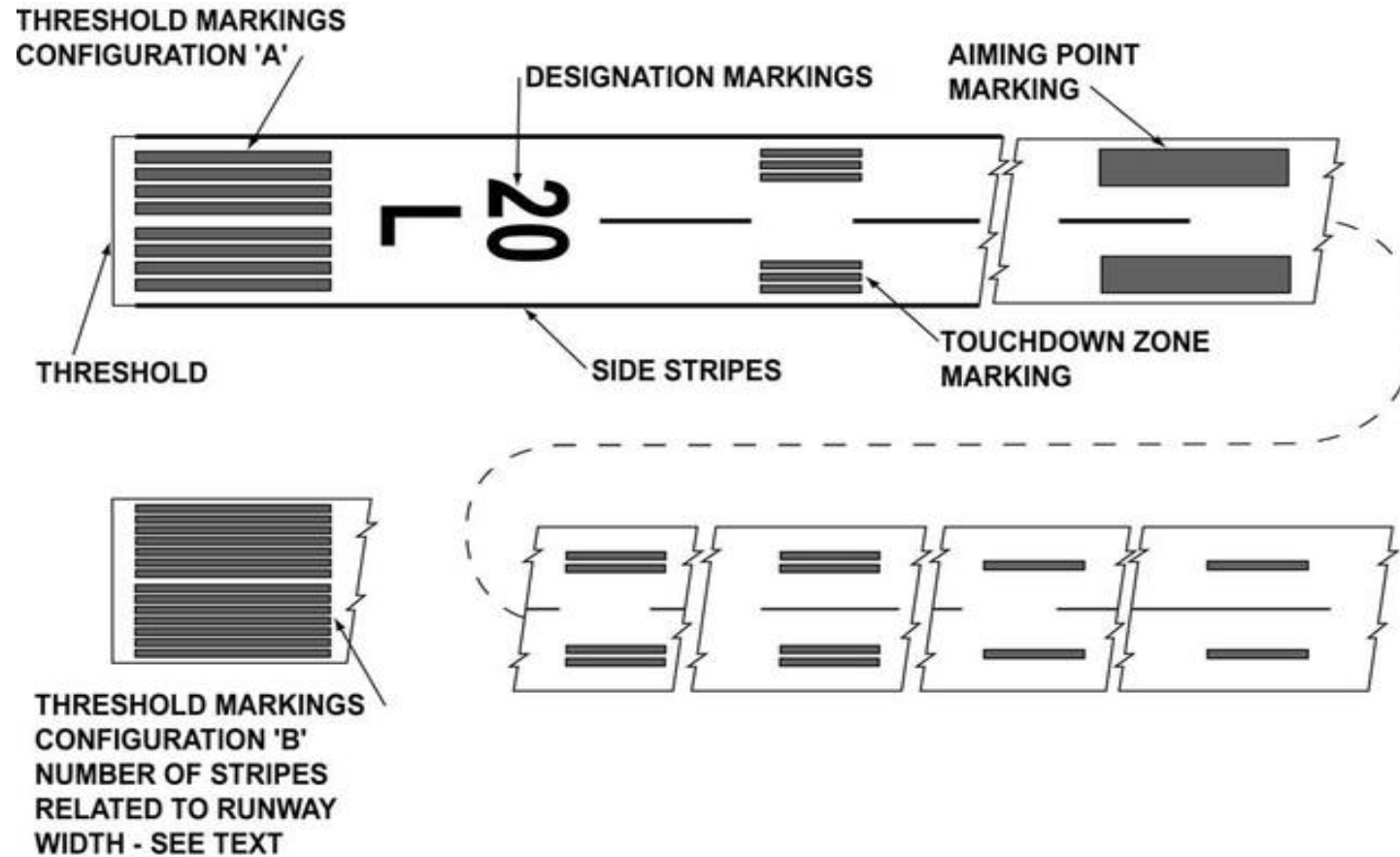


Runway Surface Marking Scheme	Threshold Approach Category		
	Visual Approach	Non-precision Approach (Approaches with vertical guidance not lower than 0.75 statute mile visibility)	Precision Approach (Approaches with vertical guidance lower than 0.75 statute mile visibility)
Runway diagram			
Landing Designator	Required	Required	Required
Centerline	Required	Required	Required
Threshold	Note 1	Required	Required
Aiming Point	Note 2	Note 3	Required
Touchdown Zone	(not applicable)	(not applicable)	Required
Edge Markings	Note 4	Note 4	Required

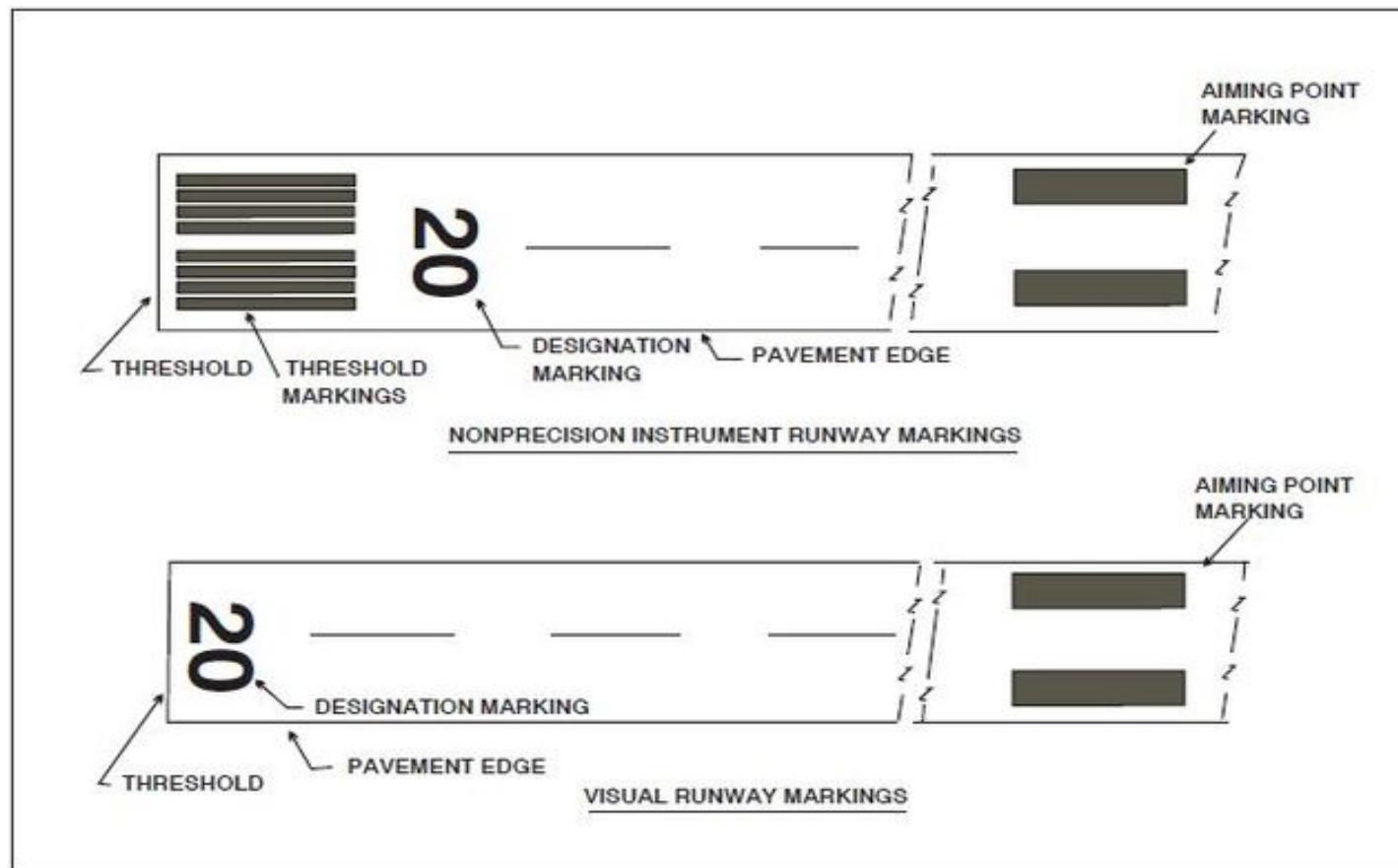
Notes:

1. Required on runways serving approach categories C and D airplanes and for runways used, or intended to be used by international commercial air transport.
2. Required on 4,200 foot or longer runways serving approach categories C and D airplanes.
3. Required on 4,200 foot or longer instrumented runways.
4. Used when the full runway pavement width may not be available for use as a runway.

Precision Instrument Runway Markings



Nonprecision Instrument Runway Markings



Runway Threshold Stripes

TBL 2-3-2

Number of Runway Threshold Stripes

Runway Width	Number of Stripes
60 feet (18 m)	4
75 feet (23 m)	6
100 feet (30 m)	8
150 feet (45 m)	12
200 feet (60 m)	16

Aiming Point Markers

The runway aiming points (commonly called the 1000 foot markers) are a perfect target to descend towards, and you should plan to touchdown on or just beyond them.

If landing performance allows, having some of the runway prior to your point of landing will ensure that you don't land short.

There's rarely a time when landing on the numbers is safer than landing near the aiming point.

The aiming points are 150 feet long and 20 feet wide.

If a runway is shorter than 4,200 feet, the aiming points may be shortened to 100 feet in length.

In almost every case, following the VASI will give a single-engine piston aircraft more than enough room to land and stop well before the end of the runway.

<https://youtu.be/INkrEeEKUYg>



Runway Markings

LEARN TO FLY!

RUNWAY

MARKINGS



Use Aiming Points or VASI/PAPI?

In almost all cases, it's best to use the VASI or PAPI.



AIM 2-3-3 H 1 Relocation of a Threshold.

Sometimes construction, maintenance, or other activities require the threshold to be relocated towards the rollout end of the runway.

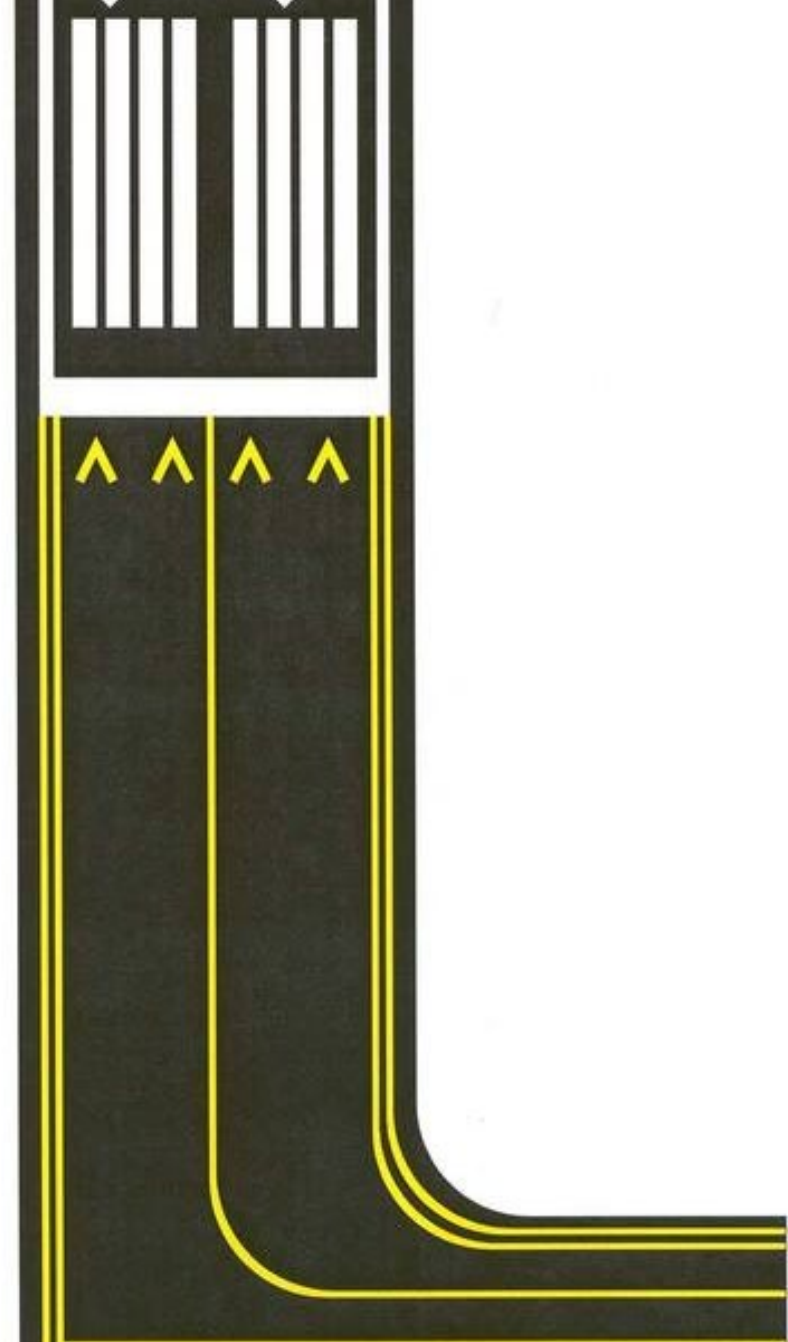
When a threshold is relocated, it closes not only a set portion of the approach end of a runway, but also shortens the length of the opposite direction runway.

In these cases, a NOTAM should be issued by the airport operator identifying the portion of the runway that is closed (for example, 10/28 W 900 CLSD).

Because the duration of the relocation can vary from a few hours to several months, methods identifying the new threshold may vary.

One common practice is to use a ten feet wide white threshold bar across the width of the runway.

Although the runway lights in the area between the old threshold and new threshold will not be illuminated, the runway markings in this area may or may not be obliterated, removed, or covered.



AIM 2-3-3 H 2 Displaced Threshold.

A displaced threshold is a threshold located at a point on the runway other than the designated beginning of the runway.

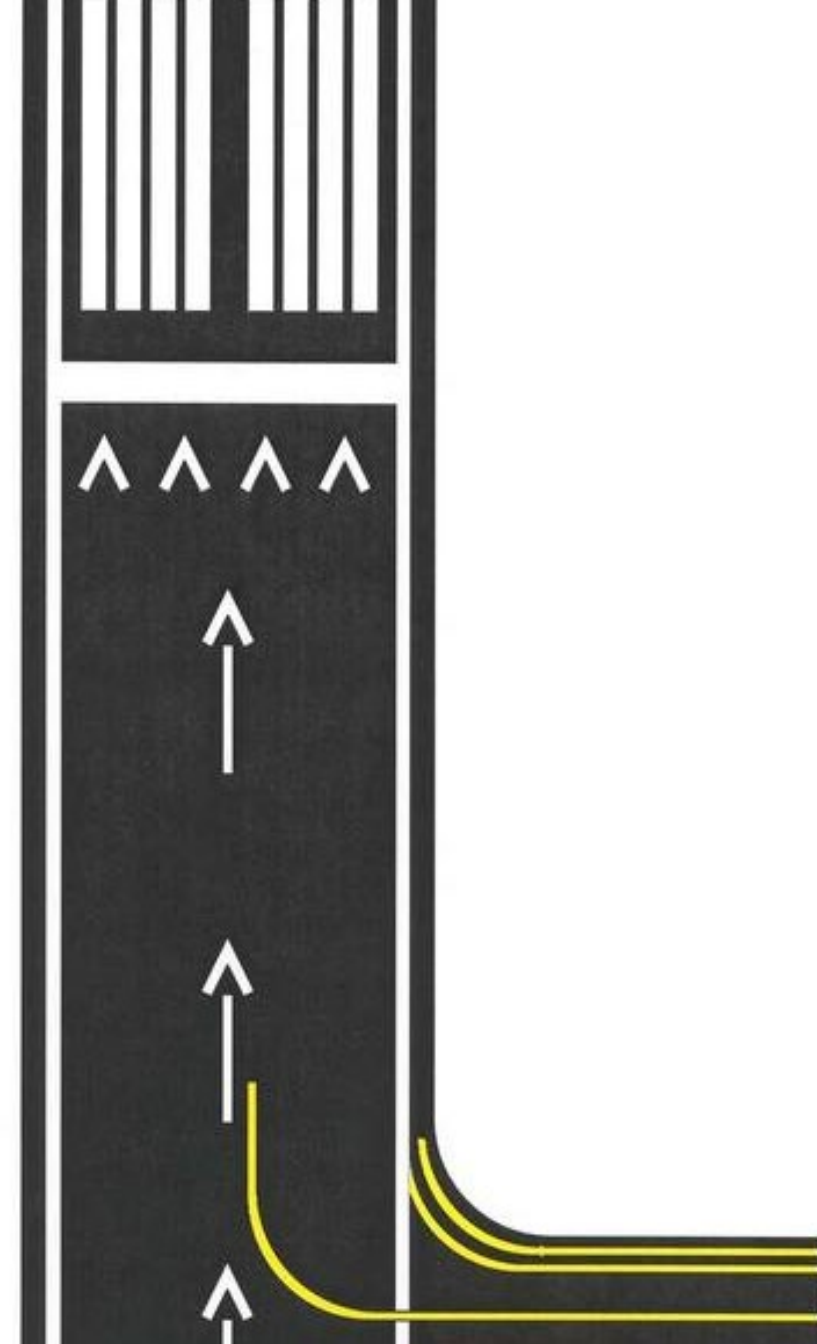
Displacement of a threshold reduces the length of runway available for landings.

The portion of runway behind a displaced threshold is available for takeoffs in either direction and landings from the opposite direction.

A ten feet wide white threshold bar is located across the width of the runway at the displaced threshold.

White arrows are located along the centerline in the area between the beginning of the runway and displaced threshold.

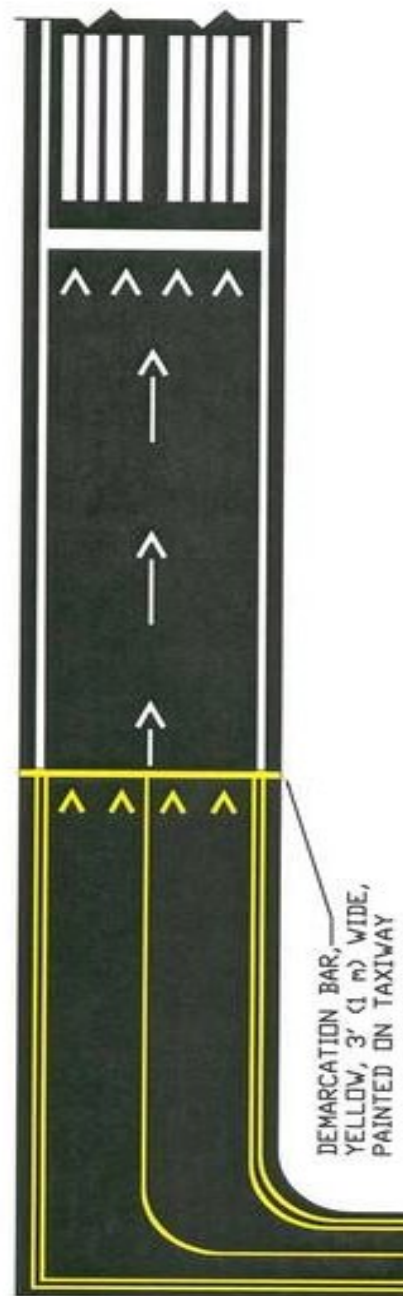
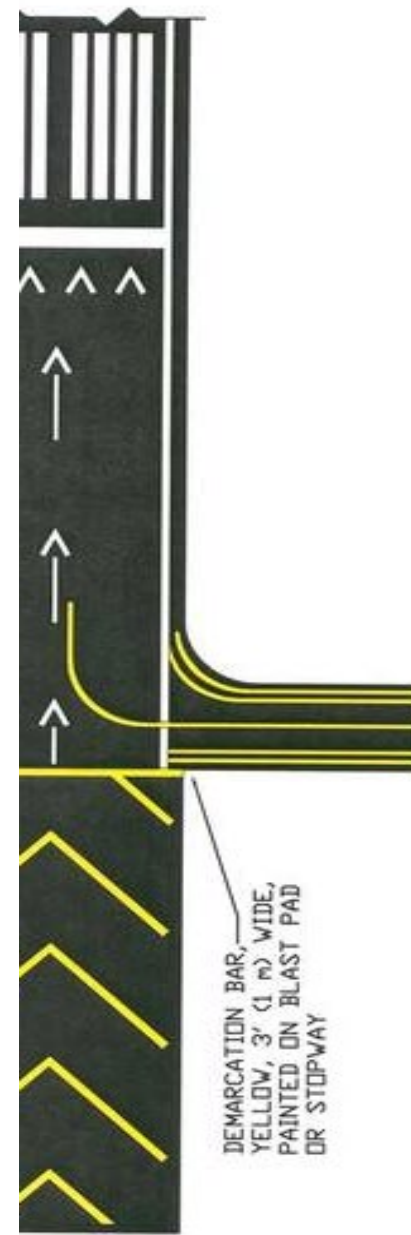
White arrow heads are located across the width of the runway just prior to the threshold bar, as shown in FIG 2-3-4.



AIM 2-3-3 I Demarcation Bar.

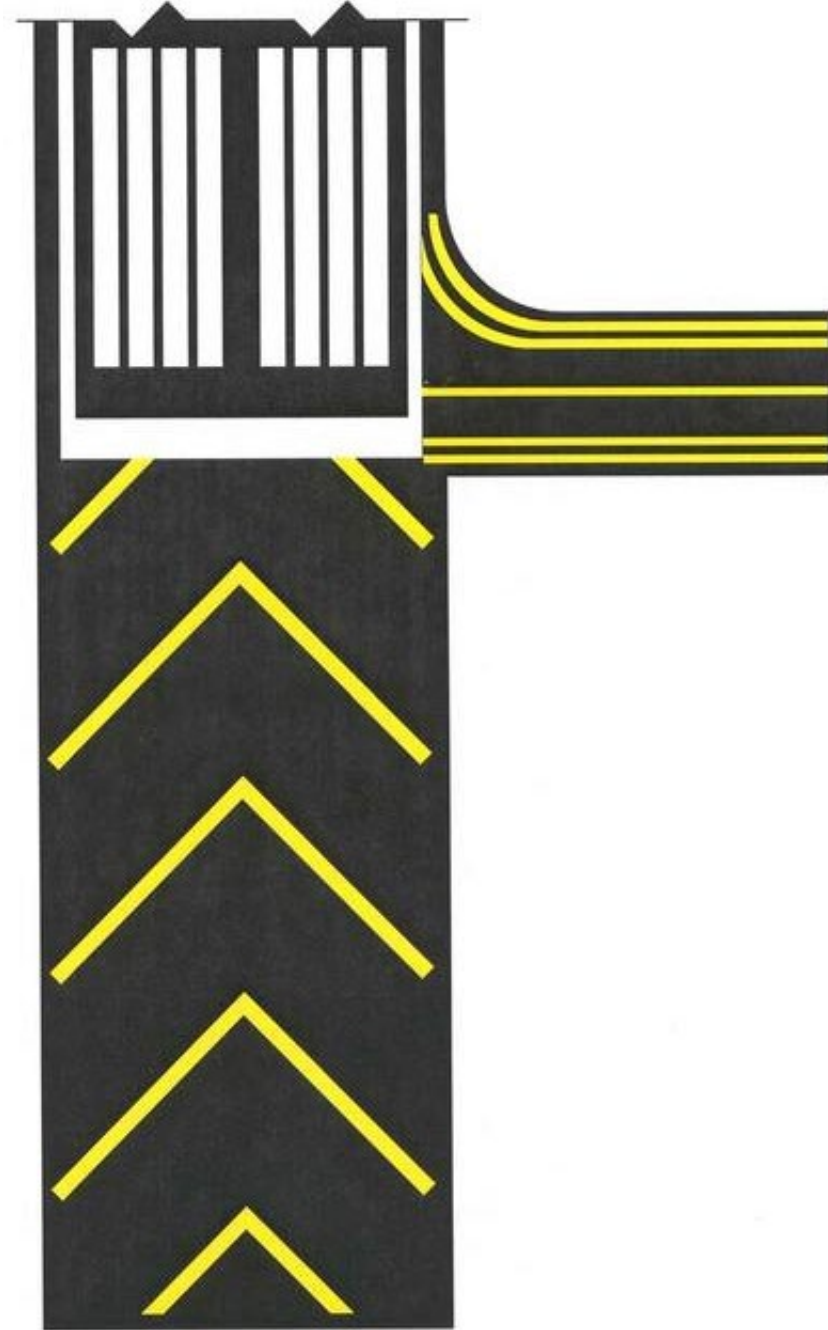
A demarcation bar delineates a runway with a displaced threshold from a blast pad, stopway, or taxiway that precedes the runway.

A demarcation bar is 3 feet (1 m) wide and yellow, since it is not located on the runway, as shown in FIG 2-3-6.



AIM 2-3-3 I 1 Chevrons.

These markings are used to show pavement areas aligned with the runway that are unusable for landing, takeoff, and taxiing. Chevrons are yellow. (See FIG 2-3-7.)



Runway Holding Position Sign



Holding Position Sign at Beginning of Takeoff Runway



Holding Position Sign for Taxiway that Intersects Intersection of Two Runways



Sign Prohibiting Aircraft Entry into an Area



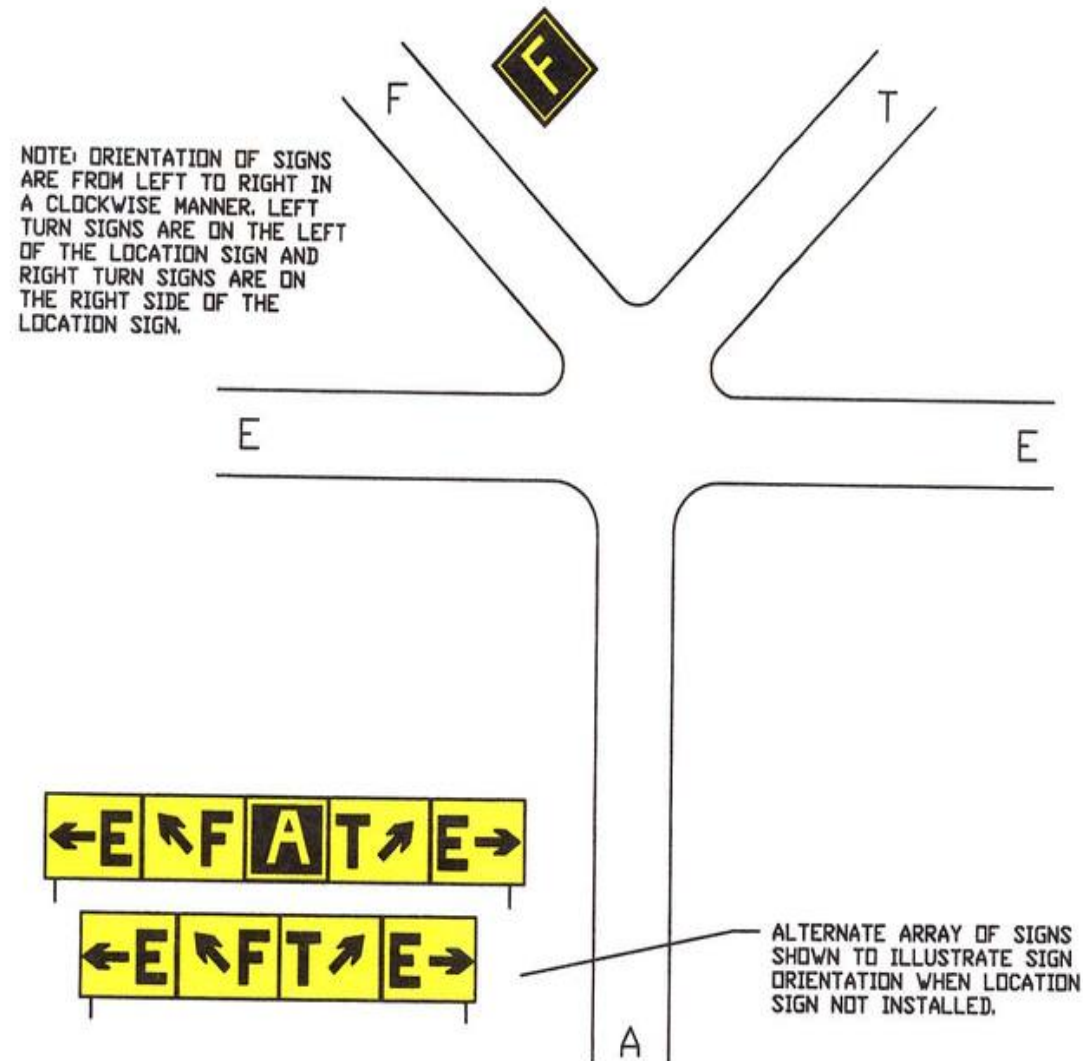
Taxiway Location Sign



Runway Location Sign



Direction Sign Array with Location Sign on Far Side of Intersection



Runway Distance Remaining Sign Indicating 3,000 feet of Runway Remaining



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 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.

Additionally, it provides greater accessibility for firefighting and rescue equipment in emergency situations.

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 the picture 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 Safety Area Boundary Sign



The relevance/importance of hold lines

They depict the holding position or the location where the aircraft is to stop so as not to enter the runway environment.

When ATC issues a “hold short” clearance, you are expected to taxi up to, but not cross any part of the runway holding marking.

At a towered airport, runway hold markings should never be crossed without explicit ATC instructions

You must read back the entire clearance and “hold short” instruction, to include runway identifier and your call sign.



The relevance/importance of hold lines

If you are on the taxiway side of these lines, do not cross the solid lines

If you are coming off the runway, go ahead and cross over the dashed lines and then stop.



Runway Holding Position Sign

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

A runway holding position sign is an airport version of a stop sign.

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.

Runway Holding Position Sign



Runway Holding Position 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.

The picture shows “18-36” to indicate the threshold for Runway 18 is to the left and the threshold for Runway 36 is to the right.

The sign also indicates that you are located on Taxiway Alpha.

Runway Holding Position Sign



Runway Lighting

The basic runway lighting system consists of two straight parallel lines of runway edge lights.

These lights are aviation white, although aviation yellow may be substituted for a distance of 2,000 feet from the far end of the runway to indicate a caution zone.

At some airports, the intensity of the runway edge lights can be activated and adjusted by radio control.

The control system consists of a 3-step control responsive to 7, 5, and/or 3 microphone clicks.

All lighting is illuminated for a period of 15 minutes from the most recent time of activation and may not be extinguished prior to end of the 15-minute period.

Runway Lighting

Suggested use is to always initially key the mike 7 times; this assures that all controlled lights are turned on to the maximum available intensity.

If desired, adjustment can then be made, where the capability is provided, to a lower intensity by keying 5 and/or 3 times.

Even when lights are on, the pilot should always key the mike as directed when overflying an airport of intended landing or just prior to entering the final segment of an approach.

This assures the aircraft is close enough to activate the system and a full 15-minute lighting duration is available.

Runway Edge Lighting

The length limits of the runway are defined by straight lines of lights across the runway ends.

At some airports, the runway threshold lights are aviation green, and the runway end lights are aviation red.

At many airports, the taxiways are also lighted.

A taxiway edge lighting system consists of blue lights that outline the usable limits of taxi paths.



Taxiway Lights

Simply put, all taxiways are surrounded by blue lights.

Make sure to stay on pavement between blue lights from the runway to the ramp.

Go extra slow...do not catching up on email/Facebook...leave the GPS alone till stopped



Declared Distances

Takeoff Run Available (**TORA**) = the runway length declared available and suitable for the ground run of an airplane taking off

Takeoff Distance Available (**TODA**) = the length of the TORA plus the length of the clearway, if provided

Accelerate-Stop Distance Available (**ASDA**) = the TORA plus the length of the stopway, if provided for the acceleration and deceleration of an airplane aborting a takeoff

Landing Distance Available (**LDA**) = the runway length declared available and suitable for landing an airplane

Declared Distances (Said another way)

Landing Distance Available (**LDA**) = Threshold to threshold, not including displacement at the approach end.

Takeoff Run Available (**TORA**) = Threshold to threshold, including displacements. This distance is all available for ground roll, if you're feeling lucky. Or precise.

Accelerate-Stop Distance Available (**ASDA**) = Takeoff threshold to the end of the stopway, if it's there; threshold to threshold, if not.

Takeoff Distance Available (**TODA**) = This is the total obstacle-free distance, including runway and clearway.

Stopway and Clearway

Stopway

An area at the end of the runway that can support an aircraft that has rejected a takeoff.

- at least as wide as the runway itself
- shares the runway centerline

Clearway

This is a larger area beyond the end of the runway that's free of obstacles, useful if you need a little extra room to clear that 50-foot tree.

- at least 500 feet wide
- shares the runway centerline
- within airport boundary
- possible upslope, but not more than 1.25%
- no obstacles except threshold lights
- includes the stopway, if there is one

Declared Distances

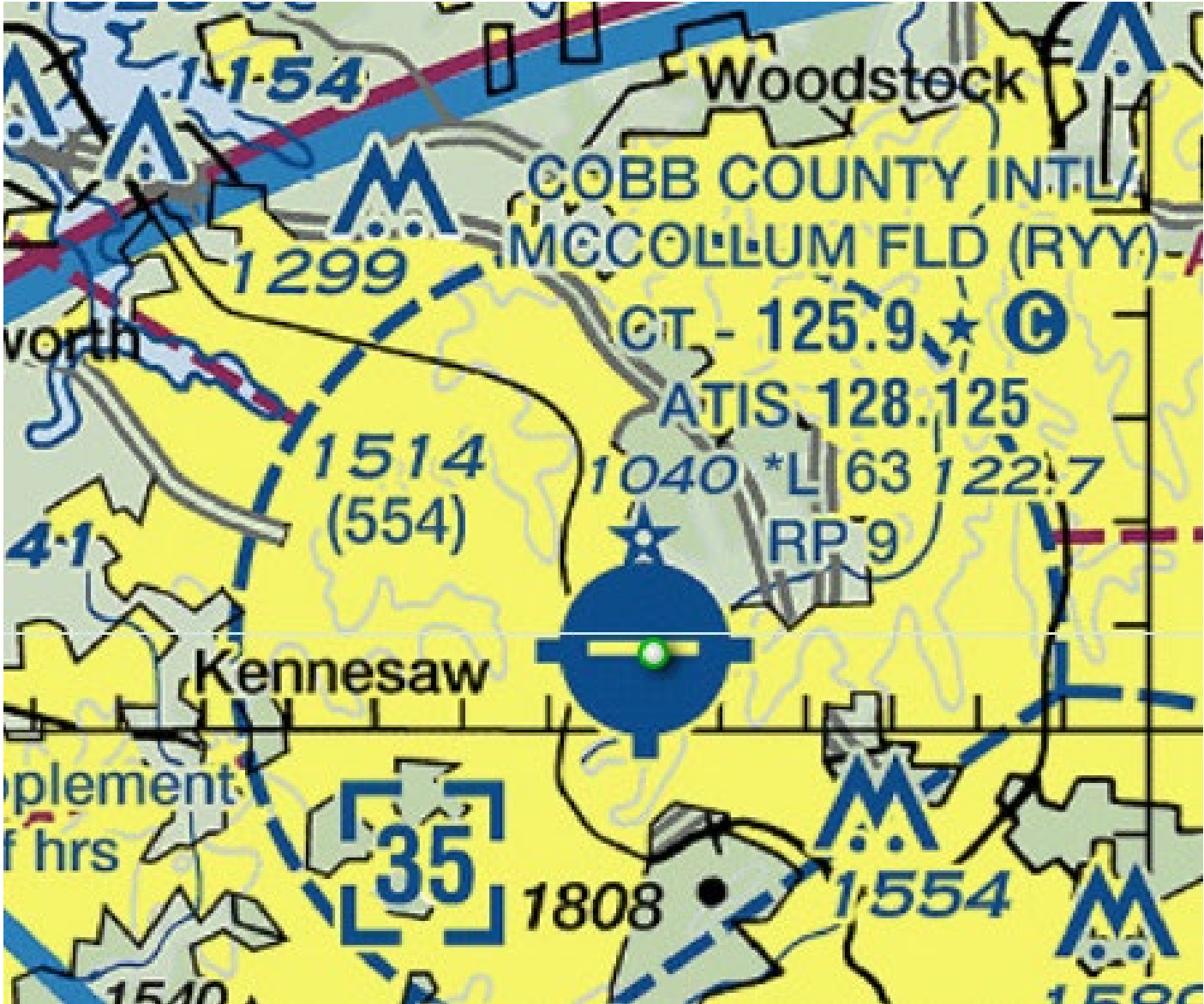


Declared Distances





KRYYY



The logo for KRYY, featuring the call letters in a white, bold, sans-serif font. The letters are positioned on the right side of a dark blue background that includes a large, lighter blue circular graphic element on the left.

RWY 09:

PAPI(P4L)—GA 4.0° TCH 46'. Thld dsplcd 1062'. Road. Rgt tfc.

RWY 27:

MALSF. PAPI(P4L)—GA 3.0° TCH 45'. Trees.

RUNWAY DECLARED DISTANCE INFORMATION

RWY 09: TORA-6311 TODA-6311 ASDA-6311 LDA-5233

RWY 27: TORA-6311 TODA-6311 ASDA-5374 LDA-5374

KRYY

202

GEORGIA

COBB CO INTL/MCCOLLUM FLD (RYY)(KRYY) 21 NW UTC-5(-4DT) N34°00.79' W84°35.82'

ATLANTA

1040 B LRA NOTAM FILE RYY

H-9A, 12F, L-18I, A

RWY 09-27: H6295X100 (CONC-GRVD) PCN 50 R/C/W/T HIRL

IAP, AD

0.7% up W

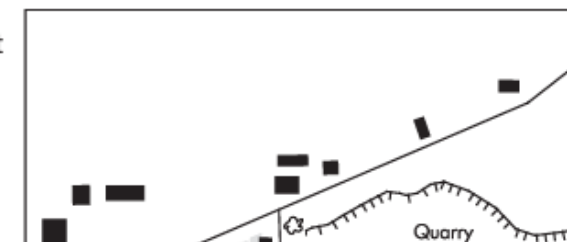
RWY 09: PAPI(P4L)—GA 4.0° TCH 46'. Thld dsplcd 1062'. Road. Rgt tfc.

RWY 27: MALSF. PAPI(P4L)—GA 3.0° TCH 45'. Trees.

RUNWAY DECLARED DISTANCE INFORMATION

RWY 09: TORA-6311 TODA-6311 ASDA-6311 LDA-5233

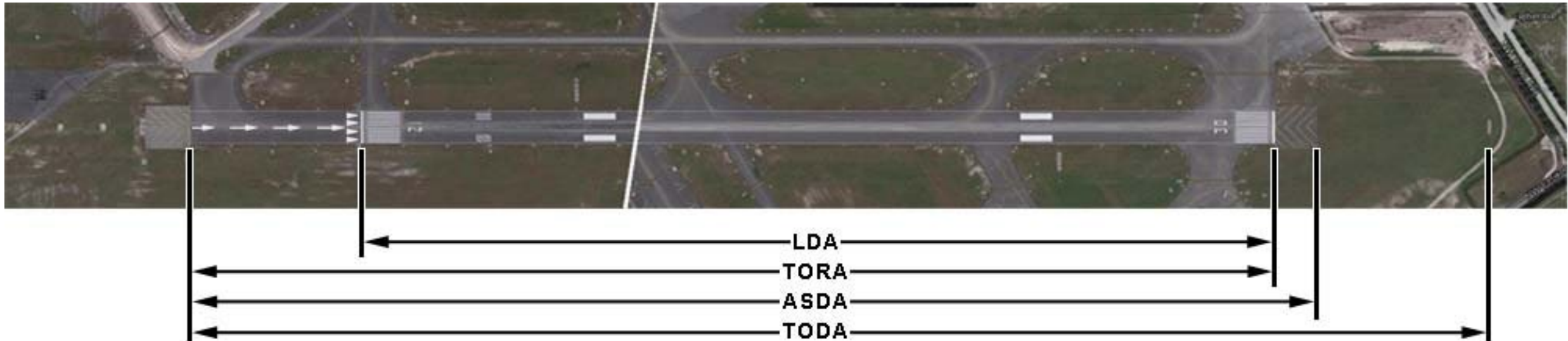
RWY 27: TORA-6311 TODA-6311 ASDA-5374 LDA-5374



KRYV



RWY 12: TORA—6800 TODA—7800 ASDA—7000 LDA—6000



RWY 21L:TORA—6001 TODA—6001 ASDA—6001 LDA—5001



IFR TRAINING

RUNWAY

DISTANCES



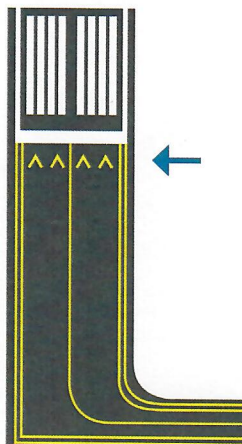


Any questions I can answer or
follow up later on?

Relocated Runway Threshold

Sometimes due to maintenance or construction, a threshold will be relocated. This shortens the usable runway in both directions on takeoff and landing (but is available for taxi).

Yellow arrows are placed prior to the threshold bar.

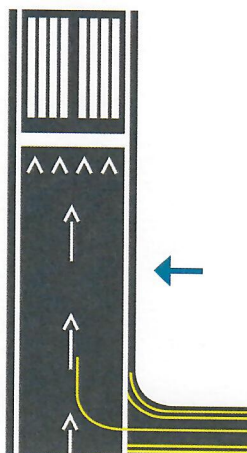


AIRPLANE ACADEMY

Displaced Threshold

A displaced threshold is a threshold located at a point on the runway other than the designated beginning of the runway.

Pilots must land beyond the displaced threshold (typically due to approach obstacle clearance). It is available for takeoffs in either direction, as well as landing in the opposite direction.

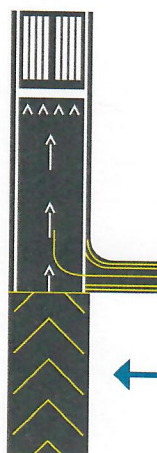


AIRPLANE ACADEMY

Unusable Area

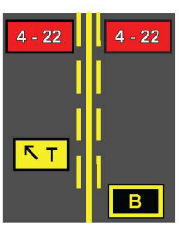
Chevrons are used to show pavement areas aligned with the runway that are unusable for landing, takeoff, and taxiing.

A common example of an unusable area is a runway blast pad, designed to reduce the erosive effect of jet blast and propeller wash.



AIRPLANE ACADEMY

AIRPORT SIGN AND MARKING – QUICK REFERENCE GUIDE

EXAMPLE	TYPE OF SIGN	PURPOSE	LOCATION/CONVENTION
4 - 22	Mandatory: Hold position for taxiway/ runway intersection.	Denotes entrance to runway from a taxiway.	Located <u>L side</u> of taxiway within 10 feet of hold position markings.
22 - 4	Mandatory: Holding position for runway/runway intersection.	Denotes intersecting runway.	Located <u>L side</u> of rwy prior to intersection, & <u>R side</u> if rwy more than 150' wide, used as taxiway, or has "land & hold short" ops.
4 - APCH	Mandatory: Holding position for runway approach area.	Denotes area to be protected for aircraft approaching or departing a runway.	Located on taxiways crossing thru runway approach areas where an aircraft would enter an RSA or apch/ departure airspace.
ILS	Mandatory: Holding position for ILS critical area/precision obstacle free zone.	Denotes entrance to area to be protected for an ILS signal or approach airspace.	Located on twys where the twys enter the NAVAID critical area or where aircraft on taxiway would violate ILS apch airspace (including POFZ).
	Mandatory: No entry.	Denotes aircraft entry is prohibited.	Located on paved areas that <u>aircraft</u> should not enter.
B	Taxiway Location.	Identifies taxiway on which the aircraft is located.	Located along taxiway by itself, as part of an array of taxiway direction signs, or combined with a runway/ taxiway hold sign.
22	Runway Location.	Identifies the runway on which the aircraft is located.	Normally located where the <u>proximity of two rwys</u> to one another could cause confusion.
	Runway Safety Area / OFZ and Runway Approach Area Boundary.	Identifies exit boundary for an RSA / OFZ or rwy approach.	Located on taxiways on <u>back side</u> of certain runway/ taxiway holding position signs or runway approach area signs.
	ILS Critical Area/POFZ Boundary.	Identifies ILS critical area exit boundary.	Located on taxiways on <u>back side</u> of ILS critical area signs.
J →	Direction: Taxiway.	Defines designation/direction of intersecting taxiway(s).	Located on <u>L side, prior to intersection</u> with an array L to R in clockwise manner.
↖ L	Runway Exit.	Defines designation/direction of exit taxiways from the rwy.	Located on same side of runway as exit, prior to exit
22 ↑	Outbound Destination.	Defines directions to take-off runway(s).	Located on taxi routes to runway(s). <u>Never</u> collocated or combined with other signs.
FBO ↘	Inbound Destination.	Defines directions to airport destinations for arriving aircraft.	Located on taxi routes to airport destinations. <u>Never</u> collocated or combined with other types of signs.
NOISE ABATEMENT PROCEDURES IN EFFECT 2300 - 0500	Information.	Provides procedural or other specialized information.	Located along taxi routes or aircraft parking/staging areas. May not be lighted.
	Taxiway Ending Marker.	Indicates taxiway does not continue beyond intersection.	Installed at taxiway end or far side of intersection, if visual cues are inadequate.
7	Distance Remaining.	Distance remaining info for take-off/landing.	Located along the sides of runways at 1000' increments.
EXAMPLE	TYPE OF MARKING	PURPOSE	LOCATION/CONVENTION
	Holding Position.	Denotes entrance to runway from a taxiway.	Located across centerline within 10 feet of hold sign on taxiways and on certain runways.
	ILS Critical Area/POFZ Boundary.	Denotes entrance to area to be protected for an ILS signal or approach airspace.	Located on twys where the twys enter the NAVAID critical area or where aircraft on taxiway would violate ILS apch airspace (including POFZ).
	Taxiway/Taxiway Holding Position.	Denotes location on taxiway or apron where aircraft hold short of another taxiway.	Used at ATCT airports where needed to hold traffic at a twy/twy intersection. Installed provides wing clearance.
	Non-Movement Area Boundary.	Delineates movement area under control of ATCT, from non-movement area.	Located on boundary between movement and non-movement area. Located to ensure wing clearance for taxiing aircraft.
	Taxiway Edge.	Defines edge of usable, full strength taxiway.	Located along twy edge where contiguous shoulder or other paved surface NOT intended for use by aircraft.
	Dashed Taxiway Edge.	Defines taxiway edge where adjoining pavement is usable.	Located along twy edge where contiguous paved surface or apron is intended for use by aircraft.
	Surface Painted Holding Position.	Denotes entrance to runway from a taxiway.	Supplements elevated holding position signs. Required where hold line exceeds 200'. Also useful at complex intersections.
	Enhanced Taxiway Centerline.	Provides visual cue to help identify location of hold position.	Taxiway centerlines are enhanced 150' prior to a runway holding position marking.
	Surface Painted Taxiway Direction.	Defines designation/direction of intersecting taxiway(s).	Located L side for turns to left. R side for turns to right. Installed prior to intersection.
	Surface Painted Taxiway Location.	Identifies taxiway on which the aircraft is located.	Located R side. Can be installed on L side if combined with surface painted hold sign.

Ref. AC 150/5340-1J Standards for Airport Markings, and AC 150/5340-18D Standards for Airport Signs Systems



Federal Aviation Administration



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ATC Light Gun Signals

Color and type of signal	MEANING		
	Aircraft on the ground	Aircraft in flight	Movement of vehicles equipment and personnel
 Steady green	Cleared for takeoff	Cleared to land	Cleared to cross; proceed; go
 Flashing green	Cleared to taxi	Return for landing <i>(to be followed by steady green at the proper time)</i>	Not applicable
 Steady red	Stop	Give way to other aircraft and continue circling	Stop
 Flashing red	Taxi clear of landing area or runway in use	Airport unsafe- Do not land	Clear the taxiway/runway
 Flashing white	Return to starting point on airport	Not applicable	Return to starting point on airport
 Alternating red and green	General warning signal – exercise extreme caution	General warning signal – exercise extreme caution	General warning signal – exercise extreme caution

Reply with one of the following acknowledgements:

Fixed-wing aircraft



Between sunrise and sunset:

- (a) Move ailerons or rudder while on the ground.
- (b) Rock wings while in flight.

Between sunset and sunrise:

- (a) Flash landing light or navigation lights.

Helicopters



Between sunrise and sunset:

- (a) While hovering, either turn the helicopter toward the controlling facility and flash the landing light or rock the tip path plane.
- (b) While in flight, either flash the landing light or rock the tip path plane.

Between sunset and sunrise:

- (a) Flash navigation lights or landing light.



Review full course online anytime at asf.org/radiocomm

For use in chart or flight planning ring binders, cut along dashed lines and punch holes as needed in margins. To ensure accurate sizing, set printer Page Scaling option to "None" or "100%."

Airport Signs