

AIRPORT OPERATIONS

Airport Markings

A complete breakdown of runway markings, taxiway markings, holding position markings, and airport signs so you can read any airport surface with total confidence.

AIRPORT MARKINGS

RUNWAY MARKINGS

TAXIWAY MARKINGS

HOLDING POSITION

RUNWAY INCURSION

AIRPORT SIGNS

SURFACE LANGUAGE

Airport markings are the language of the airport surface. Every stripe, arrow, number, and color pattern painted on pavement tells you something about position, clearance limits, and where it is safe to operate.

Misreading a marking or sign is one of the major causes of runway incursions. Whether you are soloing at a quiet field or taxiing at a busy Class B airport, the markings on the ground are your primary reference for runway boundaries, taxi routes, and protected areas.

THE FIRST RULE

- **White** means runway markings. You are on or near pavement associated with landing or takeoff.
- **Yellow** means taxiway markings, holding positions, closed areas, or pavement that requires caution.
- Holding position markings are yellow even when they appear on a runway surface, because their job is to define an operational boundary.

MEMORY AID

White = runway
Yellow = taxiway or caution

Apply the color rule first whenever an unfamiliar marking appears.

Instructor Tip

Any time you see white paint on pavement, mentally raise your runway awareness. At an unfamiliar airport, that habit helps you avoid turning onto or crossing a runway by surprise.

Common Mistake

Students often memorize individual markings but miss the color logic. The color is usually your fastest clue to whether the pavement belongs to a runway, taxiway, boundary, or closed area.

COLOR REFERENCE

COLOR	USED FOR	EXAMPLES
White	Runway markings	Centerline, threshold, aiming point, touchdown zone, side stripes, runway numbers
Yellow	Taxiway markings and hold positions	Taxiway centerline, edge markings, hold short lines, demarcation bar
Yellow chevrons	Unusable pavement	Blast pads, stopways, EMAS areas, runway shoulders when marked unusable
White arrows	Displaced threshold area	Pavement before a displaced threshold, usable for takeoff, rollout, and taxi, but not landing

Runway Categories and Marking Complexity

The FAA adds more runway markings as approach capability becomes more demanding. A visual runway needs basic identification and alignment cues. A nonprecision instrument runway adds aiming points. A precision instrument runway adds touchdown zone bars and side stripes because pilots may break out of clouds close to the runway with very little time to judge alignment and touchdown point.

RUNWAY TYPE	DESIGNATION	CENTERLINE	THRESHOLD	AIMING POINT	TDZ	SIDE STRIPES
Visual	Yes	Yes	Yes	No	No	No
Nonprecision instrument	Yes	Yes	Yes	Yes	No	No
Precision instrument	Yes	Yes	Yes	Yes	Yes	Yes

RUNWAY NUMBERS

Runway numbers are the magnetic bearing rounded to the nearest 10 degrees, divided by 10. Runway 27 points approximately 270 degrees magnetic. Parallel runways add L, R, or C. At very large airports, numbering may be shifted slightly to avoid duplicate names.

RUNWAY MATH

Runway number × 10 = magnetic heading

Opposite runway numbers differ by 18. Runway 28 opposite is Runway 10.

Wrong Runway Trap

The runway number is not decoration. It confirms the runway direction and helps catch a wrong runway lineup before takeoff. Always verify the painted number before adding power.

Examiner Question

If asked what Runway 9 means, answer that it points approximately east on a 090 degree magnetic heading. Runway 27 points west, Runway 18 south, and Runway 36 north.

THRESHOLD MARKINGS

- The threshold is where runway pavement becomes usable for landing.
- Threshold markings are white longitudinal stripes arranged symmetrically around the centerline.
- A threshold bar marks the start of the landing area when the threshold is displaced or relocated.

RUNWAY WIDTH

60 ft
75 ft
100 ft
150 ft
200 ft

STRIPES

4
6
8
12
16

AIMING POINT

Two large white rectangles sit about 1,000 feet from the landing threshold. They give you a stabilized approach reference. You normally fly toward them, then continue into the touchdown zone.

TOUCHDOWN ZONE

Rectangular white bar pairs mark distance from the threshold in 500 foot increments. One pair is 500 feet, two pairs is 1,000 feet, and three pairs is 1,500 feet.

TDZ DISTANCE CUE

Each TDZ bar pair = 500 ft

Use the bars to mentally calibrate touchdown point and runway used.

Side Stripes

Precision runways use continuous white side stripes to define usable runway width and improve contrast between runway pavement, shoulders, and adjacent terrain.

Thresholds, Unusable Pavement, and Construction Changes

The most important distinction is whether pavement is still usable in some way, or completely off limits. A displaced threshold preserves some runway use. Yellow chevrons mark pavement that you do not use for takeoff, landing, or taxi. A relocated threshold is usually temporary and must be briefed through NOTAMs.

FEATURE	MARKING	TAKEOFF	LANDING	ROLLOUT	TAXI
Displaced threshold area	White arrows and white threshold bar	Yes	No	Yes	Yes
Blast pad or stopway	Yellow chevrons	No	No	No	No
Relocated threshold area	Temporary markings and NOTAM	No	No	No	Generally no

DISPLACED THRESHOLD

- The threshold is located somewhere other than the beginning of the paved runway.
- The pavement before the threshold is not available for landing in that direction.
- It is available for takeoff in either direction, landing rollout from the opposite direction, and taxiing.
- White arrows point toward the usable landing threshold. Never land short of the white threshold bar.

Displaced Threshold vs. Chevrons

White arrows mean the pavement still has limited approved uses. Yellow chevrons mean stay out completely. That color difference is the cleanest way to avoid mixing up the two.

BLAST PAD

Protects pavement and surrounding areas from jet or propeller blast erosion. It is at the departure end and marked with yellow chevrons.

STOPWAY

May support aircraft weight during an overrun, but it is not suitable for normal takeoff, landing, or taxi operations.

EMAS

A crushable arresting bed beyond some runway ends. It is marked with yellow chevrons and must never be treated like taxi pavement.

DEMARCATIION BAR

A 3 foot wide yellow bar marks the taxiway to runway boundary when a taxiway leads into a runway with a displaced threshold. It tells you that you are leaving taxi pavement and entering runway pavement before the landing threshold.

Construction Risk

Temporary markings, cones, barricades, plywood, and moved hold positions can appear during airport work. Review NOTAMs before departure or arrival, taxi slowly, and stop for clarification when anything does not match the diagram.

AIRPORT MARKINGS DIAGRAM

THRESHOLD BAR: Large white bar. Beginning of the runway available for landing.

AIMING POINT MARKERS: White rectangles. Provide visual aim point for landing.

TAXIWAY CENTERLINE: Yellow line. Should be centered on the line.

TOUCHDOWN ZONE MARKERS: White rectangles. Indicate the optimal touchdown area.

RUNWAY CENTERLINE: White dashed line. Divides the runway in half.

RUNWAY DESIGNATOR: White numbers. Indicates runway magnetic direction (rounded to nearest 10 degrees).

MARKING COLORS: WHITE - Runway markings; YELLOW - Taxiway markings; RED - Holding position signs.

RUNWAY HOLDING POSITION: Double solid and double dashed yellow lines. Hold short of runway unless cleared to cross.

THRESHOLD BAR: Marks the beginning of the runway available for landing. Do not land before the threshold bar.

AIMING POINT MARKERS: Provide visual reference for proper glide path alignment. Typically spaced in two groups.

TOUCHDOWN ZONE MARKERS: Indicate the optimal touchdown area. Aim to touch down in the first third.

RUNWAY CENTERLINE: Divides the runway in half. Use for directional reference and to remain centered.

RUNWAY DESIGNATOR: Indicates runway magnetic direction. Use the runway that best matches wind and conditions.

BLAST PAD: Protects pavement from the jet blast of departing aircraft. Located beyond the departure end.

STOPWAY: Support aircraft weight during an overrun. Not suitable for normal takeoff, landing, or taxi operations.

EMAS (Engineered Material Arresting System): Crushable material bed (steep or shallow slope). Marked with yellow chevrons. Do not treat as taxiway.

DEMARCATIION BAR: Yellow bar across a taxiway at runway boundary. Indicates you are leaving taxiway and about to enter runway.

RELOCATED THRESHOLD: Temporary markings and NOTAM describe the change. Do not assume the area before is available.

CLOSED SURFACE: Large yellow X indicates the runway or taxiway is closed. Do not enter any pavement marked with an X.

ALWAYS CONFIRM WITH CURRENT AIRPORT DIAGRAMS, ATE, AND NOTAMS. WHEN IN DOUBT, ASK, NEVER ASSUME.

Displaced threshold runway diagram showing white arrows, threshold bar, threshold stripes, and usable pavement rules.

Model Answer

A displaced threshold may be used for takeoff, rollout, and taxi, but not landing. A blast pad or stopway is marked with yellow chevrons and is not used for takeoff, landing, rollout, or taxi.

Taxiway Markings and Taxi Technique

Taxiway markings are yellow because they guide ground movement outside the runway landing surface. They tell you where to track, where pavement edges are operationally located, when the runway environment is coming up, and where ATC control of the movement area begins.

TAXIWAY CENTERLINE

- A single continuous yellow line, usually 6 to 12 inches wide.
- Keep the airplane centered over the line as closely as practical.
- Look far ahead along the centerline instead of staring over the nose.
- In many light aircraft, the line appears under or slightly left of the pilot seat.

Wingtip Clearance

Being centered on the taxiway centerline does not guarantee wingtip clearance. You remain responsible for your wings during turns, near parked aircraft, and around signs, lights, vehicles, and construction barricades.

ENHANCED CENTERLINE

At larger airports, dashes appear on both sides of the normal centerline during the final 150 feet before a runway holding position marking. Treat it as a visual countdown to a possible stop.

EDGE LINES

A continuous yellow edge line means the adjacent paved shoulder is not for aircraft use. A dashed yellow edge line means that pavement may be used if necessary.

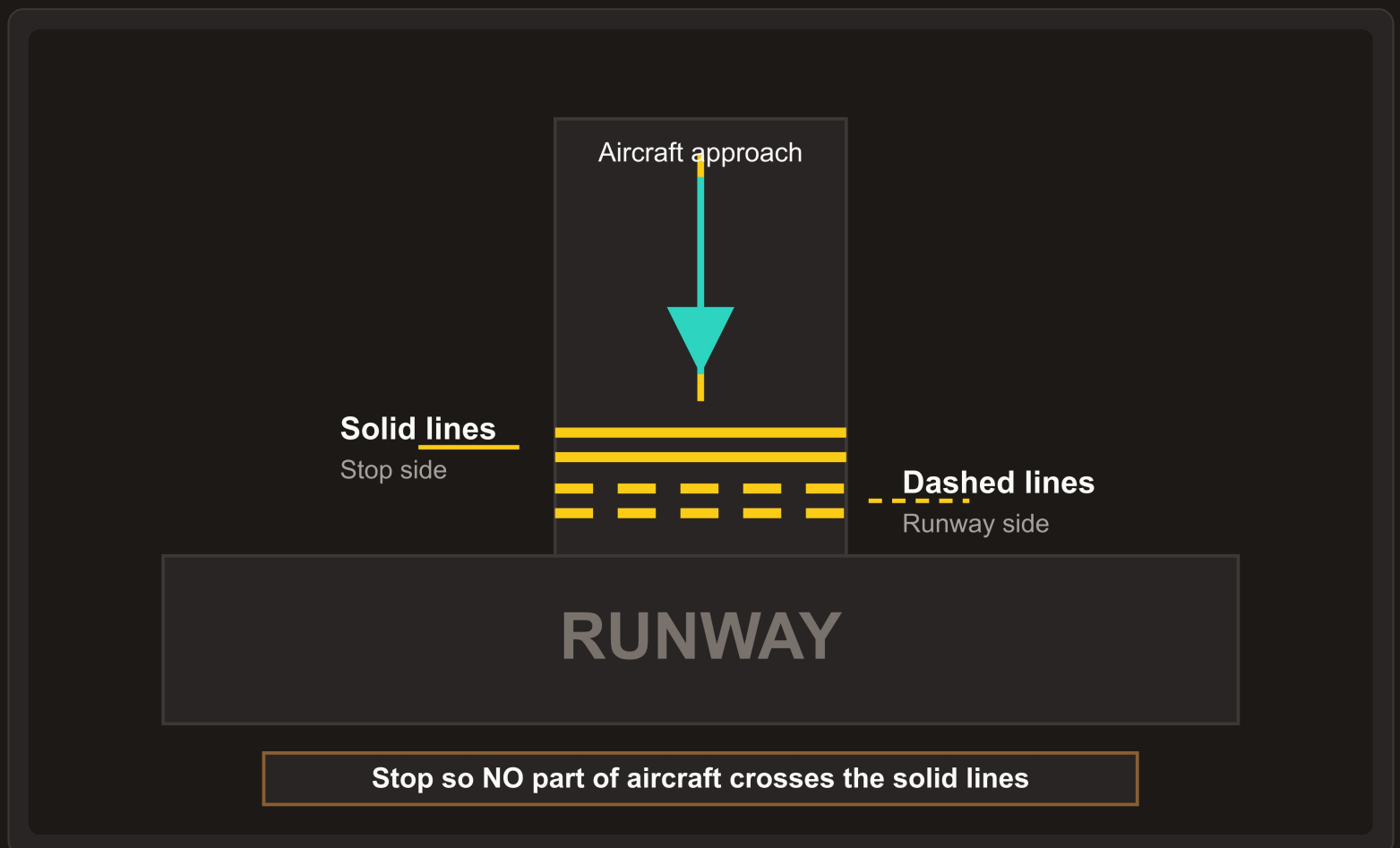
Enhanced Centerline Habit

When the extra dashes appear, slow down, find the hold short marking, and verify your clearance status before the airplane reaches the runway boundary.

Taxi Brief

Before moving, review the airport diagram, expected taxi route, hold short points, hotspot notes, and construction NOTAMs. Two minutes of planning can prevent a runway incursion.

Hold Short Lines, the Most Safety Critical Marking



SOLID VS DASHED

Solid = stop side
Dashed = runway side

If the dashes are on your side, you have already crossed into the runway environment.

Stop Before the Lines

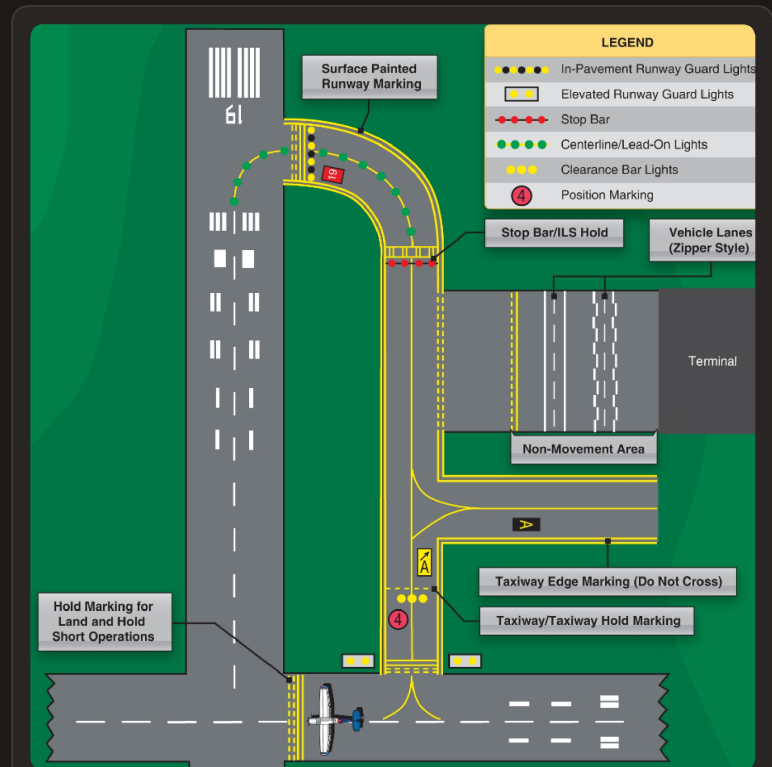
Stopping on the marking is not holding short. Every part of the aircraft, including the nose and wings, must remain on the taxiway side of the solid lines until cleared or until you have verified separation at a non towered field.

Special Holding Boundaries and Movement Areas

Not every holding position protects the runway pavement itself. Some markings protect instrument signals, taxiway intersections, or the boundary between ramp areas and ATC controlled movement areas. The operational question is always the same: what clearance or communication do I need before crossing?

ILS CRITICAL AREA

- The marking looks like a ladder, with two solid yellow lines connected by pairs of solid yellow cross lines.
- It protects localizer and glideslope signal integrity during low visibility operations.
- Aircraft metal inside the critical area can distort the signal being used by an aircraft on approach.
- When instructed to hold short of the ILS critical area, stop so no part of the aircraft extends beyond the marking.



ILS critical area holding position marking compared with standard runway hold short marking.

ILS Marking Confusion

Do not describe the ladder marking as a normal hold short line. On a checkride, you must identify both, explain the visual difference, and explain that the ILS marking protects navigation signal accuracy.

Model Answer

The ILS critical area is a protected zone around localizer and glideslope equipment. Aircraft inside it can reflect or distort signals, which is especially dangerous when an approaching aircraft is relying on the ILS in low visibility.

TAXIWAY INTERSECTION HOLD

A single dashed yellow line may be used where ATC needs to hold aircraft short of another taxiway. If cleared to hold short of Taxiway Bravo, stop before that dashed line.

NON MOVEMENT BOUNDARY

A solid and dashed yellow boundary separates the non movement area from the movement area. The solid line is on the movement side, the dashed line is on the ramp or non movement side.

Runway Incursion Defense

A runway incursion is any unauthorized or improper presence of an aircraft, vehicle, or person in the protected area of a runway. The most common pilot causes are crossing a hold short line without clearance, becoming confused during taxi, and failing to verify the correct runway before takeoff.

FOUR CHECKS AT EVERY HOLD SHORT

- Confirm explicit ATC clearance, or at a non towered airport confirm there is no conflicting traffic.
- Visually check the runway in both directions.
- Confirm the transponder is in ALT mode before runway entry.
- Read back the clearance correctly, or make the proper CTAF announcement.

Legal Consequence

Crossing a hold short line without clearance at a towered airport can become both an ATC instruction violation and a careless or reckless operation issue. The FAA does not need an accident before taking enforcement action.

NON TOWERED AIRPORTS

Markings mean the same thing without an operating tower. The difference is that you must self separate, announce on CTAF, and verify the runway is clear before crossing or entering.

LAHSO

Land and Hold Short Operations are optional. If you accept, you must stop before the hold short markings on the landing runway. Decline when runway condition, aircraft performance, or workload makes compliance uncertain.

Airport Signs Work With the Pavement

Signs confirm where you are, where you may go, and where you must stop. The sign color system is as important as the pavement color system. Red means a mandatory instruction. Black and yellow signs either identify your location or direct your route, depending on which color is the background.



Mandatory
Instruction



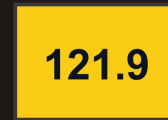
Location



Direction



Destination



Information



Distance
Remaining

SIGN TYPE	BACKGROUND	TEXT	ARROWS	PURPOSE
Mandatory instruction	Red	White	No	Runway entry, hold short, ILS critical area, no entry
Location	Black	Yellow	No	Identifies the taxiway or runway you are currently on
Direction	Yellow	Black	Yes	Shows intersecting taxiways and turn directions
Destination	Yellow	Black	Yes	Points toward runways, terminals, cargo, fuel, or other destinations
Information	Yellow	Black	No	Provides non navigation information such as frequencies or noise procedures
Distance remaining	Black	White	No	Shows runway remaining in thousands of feet

SIGN COLOR RULE

Red and white = mandatory
Yellow on black = location
Black on yellow = direction

If there is an arrow, the sign is telling you where something leads.

Direction vs Destination

Both use black text on a yellow background. Direction signs show taxiway branches at an intersection. Destination signs point to places such as runways, terminals, cargo areas, or fuel.

Black Sign With Yellow Letters

That is a location sign. It tells you what taxiway or runway you are currently on. No arrows. Yellow background with arrows means direction or destination instead.

Red Sign With Runway Numbers

A red sign with white runway numbers identifies a runway holding position. Stop before the associated marking unless you have clearance or confirmed separation at a non towered airport.

NO ENTRY

Red sign with a white inscription or symbol prohibiting entry into an area. Treat it as a hard stop.

DISTANCE REMAINING

Black background with a white number along the runway edge. A 3 means about 3,000 feet of runway remain.

RUNWAY PAIR SIGN

A sign showing 28 / 10 refers to the two directions of the same runway. Know which direction lies left or right as you face the sign.

Less Common Markings You Still Need to Recognize

Most private pilot questions focus on runways, taxiways, signs, and hold short markings, but several additional markings appear in real operations. They are especially common at large airports, low visibility airports, and airport surfaces shared with vehicles.

GEOGRAPHIC POSITION

Pink or magenta circles with a number inside are used at airports with Surface Movement Guidance and Control Systems. They help pilots report exact position during low visibility taxi.

VOR CHECKPOINT

A painted circle with an arrow marks a ground VOR receiver checkpoint. Align the aircraft as published and verify receiver accuracy within plus or minus 4 degrees.

VEHICLE ROADWAYS

White solid lines define roadway edges and dashed white lines may separate vehicle lanes. Some airports use zipper style markings where vehicles share or cross aircraft movement areas.

SHOULDER MARKINGS

Yellow chevron like markings along runway sides identify paved shoulders that may look usable but are not intended for aircraft operation.

Regulatory and Testing Context

The AIM explains airport markings and signs for pilots. FAA airport marking and sign advisory circulars define the engineering standards airports use to paint and install them. Your operational duty comes from complying with ATC instructions, avoiding careless or reckless operation, and meeting ACS knowledge requirements.

PRIMARY REFERENCES

- AIM 2 3 1 through 2 3 15 covers airport marking aids and signs.
- AC 150/5340 1 establishes standards for airport markings.
- AC 150/5340 18 establishes standards for airport sign systems.
- Private and Commercial ACS Area III Task A include signs, markings, and lighting as required knowledge.

OPERATIONAL RULES

- 14 CFR 91.129, 91.130, and 91.131 require compliance with ATC instructions at towered airports.
- FAR 91.13 prohibits careless or reckless operation.
- A hold short violation or entry into a closed surface can trigger FAA enforcement even without damage or injury.

Airport Diagram Scenario

An examiner may point to an airport diagram and ask you to identify hold short points, taxiway direction, runway orientation, or the non movement area boundary. Know your departure and arrival airports cold.

Magnetic Variation Updates

Runway numbers can change when magnetic variation shifts enough that the runway heading no longer matches the painted designation. Charts, signs, and databases should update, but an aircraft GPS database may lag if it is not current.

FINAL STUDY SCAN

PROMPT	ANSWER TO KNOW COLD
Four yellow hold short lines	Two solid lines on the stop side, two dashed lines on the runway side. Stop before the solid lines.
White arrows before threshold	Displaced threshold area. Not for landing, but usable for takeoff, rollout, and taxi unless otherwise restricted.
Yellow chevrons	Unusable pavement. Do not take off, land, roll out, or taxi there.
Large yellow X	Closed runway or taxiway. Do not enter or use it.
Black sign, yellow letters	Location sign. It tells you where you are.
Red sign, white inscription	Mandatory instruction sign. Stop, verify clearance, and do not proceed unless authorized.