



# **RUNWAY INCURSION AVOIDANCE**

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# RUNWAY INCURSION AVOIDANCE

its “any occurrence in the airport runway environment involving an aircraft, vehicle, person, or object on the protected area of a surface that creates a collision hazard or results in a loss of required, separation with an aircraft taking off, intending to take off, landing, or intending to land.”

**It simply means that a person, object, vehicle, or aircraft is creating a hazard where it shouldn't be.**



# WHAT IS A RUNWAY SAFETY AREA

Runway safety areas (RSAs) serve as the primary safety mitigation for runway excursions.

Boundaries are pre-determined post hold short area.

(If these are areas of typical excursions, why would we want to be in the way of a potential aircraft excursion?)



# WHAT IS A SURFACE INCIDENT?

A surface incident is an unauthorized or unapproved movement within the designated movement area (excluding runway incursions)

or

an occurrence in that same area associated with the operation of an aircraft that affects or could affect the safety of flight.



## Sources of Runway Incursions

Operational Incidents	Pilot Deviations	Vehicle/Pedestrian Deviations
Action of an Air Traffic Controller that results in: Less than required minimum separation between 2 or more aircraft, or between an aircraft and obstacles, (vehicles, equipment, personnel on runways) or Clearing an aircraft to take off or land on a closed runway	Action of a pilot that violates any Federal Aviation Regulation Example: a pilot crosses a runway without a clearance while enroute to an airport gate	Pedestrians or vehicles entering any portion of the airport movement areas (runways/taxiways) without authorization from air traffic control

## Runway Incursion Severity

### Runway Incursion Severity

Available Reaction Time	Evasive of Corrective Action	Environmental Conditions	Speed of Aircraft and/or Vehicle	Proximity of Aircraft and/or Vehicle
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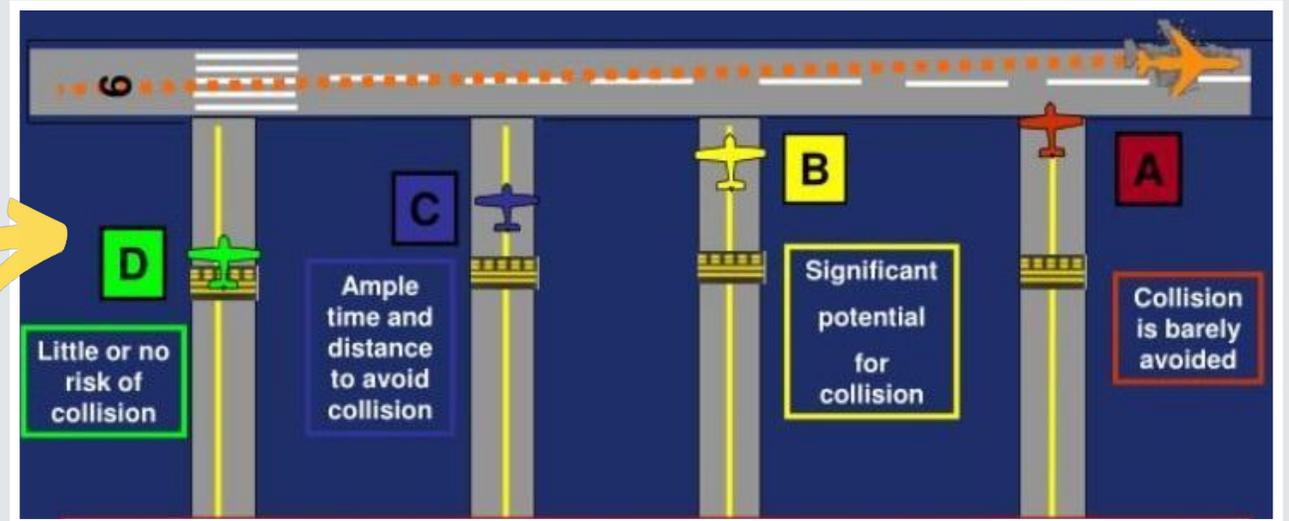


# RUNWAY INCURSION SEVERITY CATEGORIES

In each category/case, the taxiing aircraft penetrated the runway safety area.

What is the runway safety area?

Runway safety area (RSA) is a defined area surrounding a runway that is specifically designated to enhance the safety of aircraft operations



D	C	B	A
is an incident that meets the definition of runway incursion such as an incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with <b>no immediate safety consequences</b>	is an incident characterized by ample time and/or distance to avoid a collision.	is an incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective/evasive response to avoid a collision.	is a serious incident in which a collision was narrowly avoided.

**1. DISTINCT CHALLENGES AND REQUIREMENTS DURING TAXI OPERATIONS NOT FOUND IN OTHER PHASES OF FLIGHT OPERATIONS.**

# TAXIING CHALLENGES

- Low Visibility
- Complex taxi routes
- Hot spots
- Compensating for wind
- Following the taxi line
- Familiarity with airport signage / runway markings
- Jet Blast
- Snowy / Icy Runways
- LAHSO Operations



## TAXIING ON CENTERLINE

Taxi on the centerline of a taxiway is good practice as it keeps the airplane in the center of the taxiway

**CAUTION!** Being centered on the taxiway centerline does not guarantee clearance with other aircraft or objects.



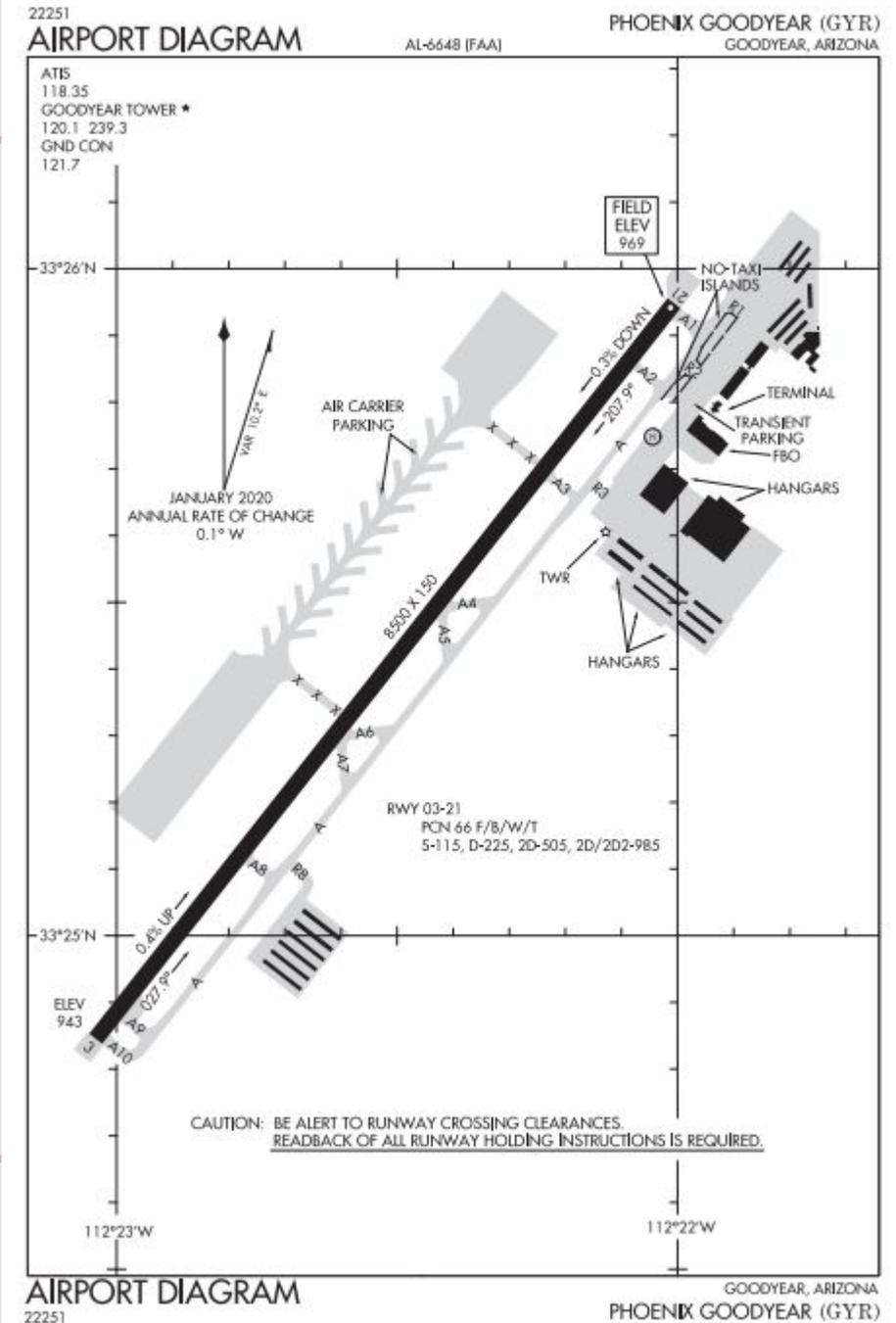
**2. PROCEDURES FOR APPROPRIATE COCKPIT ACTIVITIES DURING TAXIING INCLUDING TAXI ROUTE PLANNING, BRIEFING THE LOCATION OF HOT SPOTS, (CAN BE FOUND IN CHART SUPPLEMENT) COMMUNICATING AND COORDINATING WITH ATC.**

## **APPROPRIATE COCKPIT ACTIVITIES**

- Focus attention and have your "eyes out" of the cockpit when taxiing.
- Have the airport diagram out and available for immediate reference during taxi.
- Review current ATIS for any taxiway closures, runway closures, construction activity, or other airfield specific risks.
- Be alert to similar call signs operating on the field.
- Stop aircraft on the taxiway and request ATC clarification if there is confusion regarding aircraft position or ATC taxi clearance.

## BRIEFING OUR TAXI PLAN

- We need to ensure that we are on the same page as to what is going to happen, what is around us, what hazards are posed and what we expect
- Once a clearance to taxi is received from the ground frequency now we can quickly brief our route and then execute our plan



# HOTSPOTS

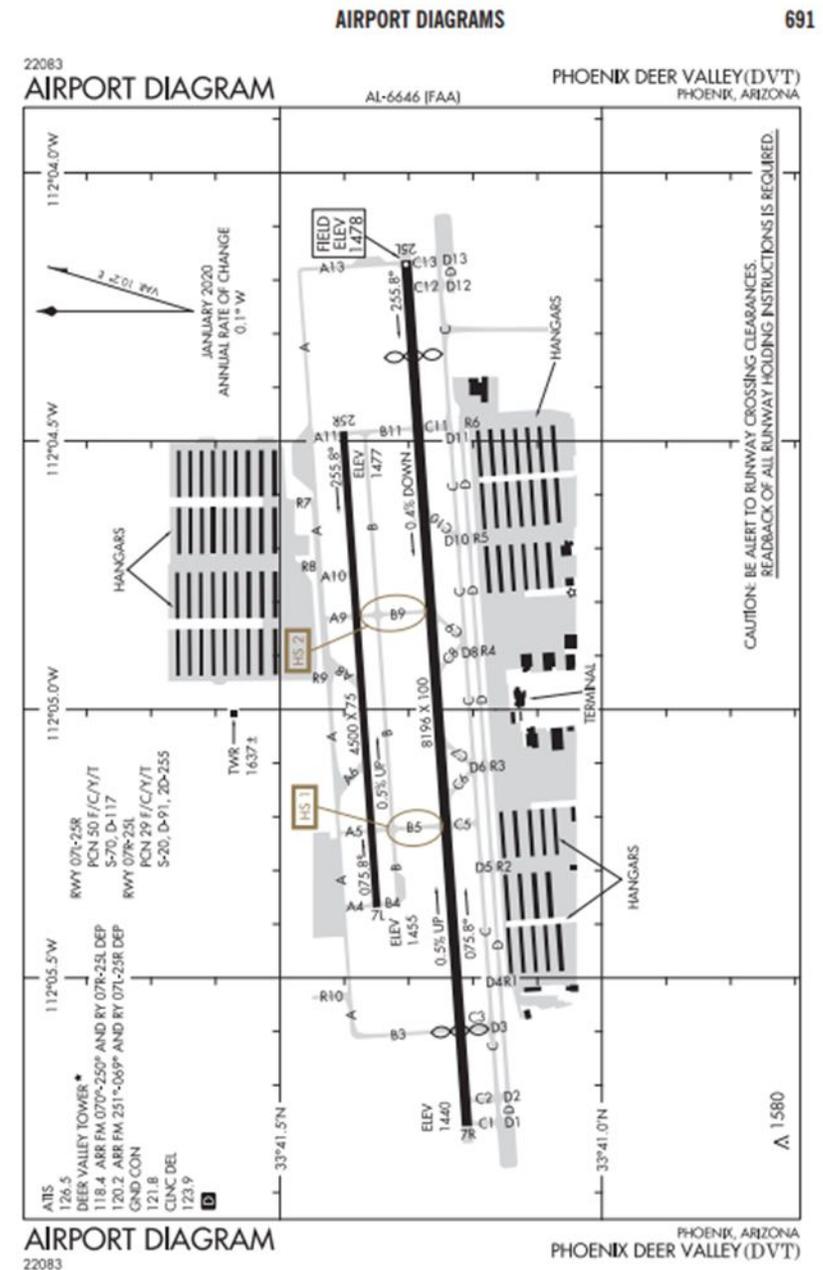
A hot spot is a location on an airport movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

Where can you locate specific information on them?

Chart Supplement

Foreflight (click on them)

[https://www.faa.gov/airports/runway\\_safety/hotspots](https://www.faa.gov/airports/runway_safety/hotspots)



## HOT SPOTS

An "Airport surface hot spot" is a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.

A "hot spot" is a runway safety related problem area on an airport that presents increased risk during surface operations. Typically it is a complex or confusing taxiway/taxiway or taxiway/runway intersection. The area of increased risk has either a history of or potential for runway incursions or surface incidents, due to a variety of causes, such as but not limited to: airport layout, traffic flow, airport marking, signage and lighting, situational awareness, and training. Hot spots are depicted on airport diagrams as open circles or polygons designated as "HS 1", "HS 2", etc. and tabulated in the list below with a brief description of each hot spot. Hot spots will remain charted on airport diagrams until such time the increased risk has been reduced or eliminated.

CITY/AIRPORT	HOT SPOT	DESCRIPTION
<b>ARIZONA</b>		
CHANDLER CHANDLER MUNI (CHD)	HS 1	Rwy 22R may be used as an alternate taxi route due to run-up area and twy congestion.
GRAND CANYON GRAND CANYON NTL PARK (GCN)	HS 1	Pilots sometimes confuse Twy A and Twy B at the Rwy 21 end because of the close proximity. Verify correct taxi route.
PHOENIX PHOENIX DEER VALLEY (DVT)	HS 1	Pilots sometimes cross Rwy 07R-25L at Twy B5 without ATC clearance.
	HS 2	Pilots sometimes cross Rwy 07R-25L at Twy B9 without ATC clearance.
PHOENIX PHOENIX SKY HARBOR INTL (PHX)	HS 1	Rwy 07L and Rwy 07R departures sometimes misidentify Twy F for Rwy 07L or Rwy 07R.
	HS 2	Pilots sometimes cross Rwy 07L/25R at Twy F8, Twy F9, or Twy F10 without authorization.
PRESCOTT PRESCOTT RGNL - ERNEST A LOVE FLD (PRC)	HS 1	Run up area at Twy F1 not visible from the twr.
	HS 2	Twy C4, Twy D4 and Rwy 03R-21L int, frequent rwy crossings.
TUCSON RYAN FLD (RYN)	HS 1	Air tfr often taxies acft via Twy B and onto Rwy 33 for departure on Rwy 06R. Use caution not to enter Rwy 06R without ATC authorization.
TUCSON TUCSON INTL (TUS)	HS 1	Rwy 29R sometimes mistaken for Rwy 29L on arrival.
	HS 2	Pilots instructed to hold short of Rwy 11L-29R or Rwy 11R-29L sometimes cross the apch area of these rwys without authorization.
<b>CALIFORNIA</b>		
ATWATER		

# BRIEFING HOTSPOTS

Plan, Review instructions and Brief

- Make sure you have a current Chart Supplement which has your airport diagram.
- Always write down ATC taxi instructions to prevent mistakes
- Complete pre-taxi checklist
- Minimize workload before taxiing, avoid doing unnecessary tasks that keep your head down.
- Request Progressive Taxi when needed or unsure.
- Continuous loop

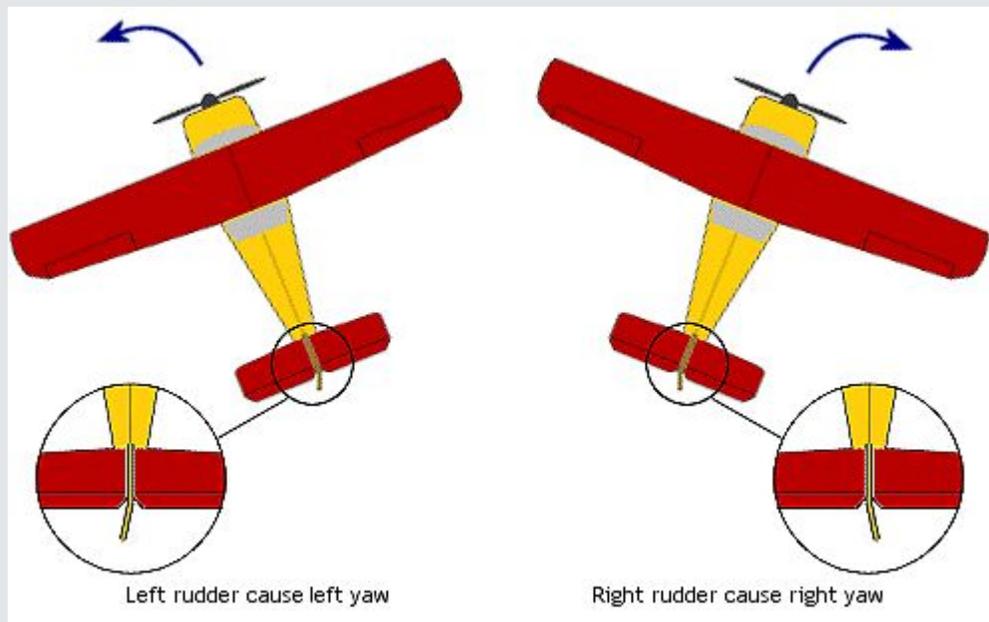
**3. PROCEDURES FOR STEERING, MANEUVERING,  
MAINTAINING TAXIWAY, RUNWAY POSITION, AND SITUATIONAL  
AWARENESS.**

# HOW WE TAXI

Steering is accomplished with **rudder pedals and brakes**

- The pilot applies the rudder in the desired direction of turn and use the appropriate power or brake to control the taxi speed
- To tighten the turn after full pedal deflection is reached, the brake may be applied as needed (differential braking)
- To verify steering, depress the rudder pedal in the direction of turn desired
- Verify that the airplane responds properly to the rudder pedal input
- More engine power may be required to start the airplane moving forward, or to start a turn, than is required to keep it moving in any given direction
  - When using additional power, the throttle should immediately be retarded once the airplane begins moving **to prevent excessive acceleration**

# ITS ALL IN THE RUDDER



## TAXI SPEED

The speed should be at the rate where movement of the airplane is dependent on the throttle. That is, slow enough so when the throttle is closed, the airplane can be stopped promptly. (AFH Ch. 2)



# BRAKING

- When stopping the airplane, it is advisable to always stop with the **nosewheel straight ahead** to relieve any side load on the nosewheel and to make it easier to start moving ahead
- To **avoid overheating the brakes** and controlling the airplane's speed when taxiing downwind, the pilot must keep engine power to a minimum
  - **Power Idle, then compress brakes**
  - **Rather than continuously riding the brakes to control speed, it is appropriate to apply brakes only occasionally**
  - **Avoid resting toes on the brakes, resulting in unnecessarily dragging the brakes**
  - **Other than sharp turns at low speed, the throttle should always be at idle before the brakes are applied**

# THE POH ON TAXIING

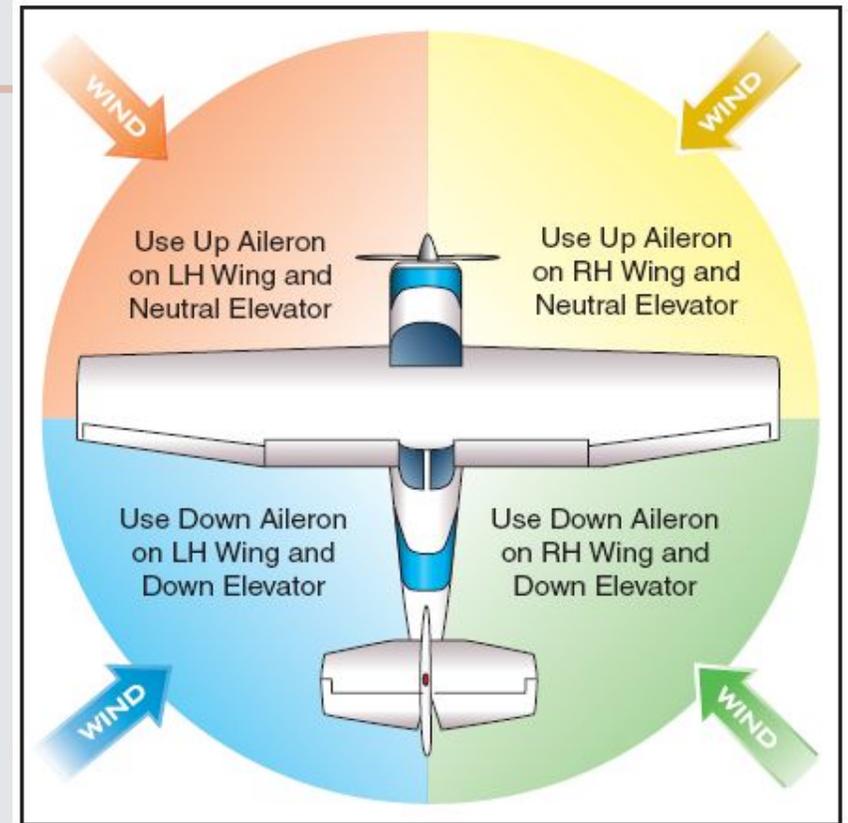
## TAXIING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (Refer to Figure 4-2, Taxiing Diagram) to maintain directional control and balance.

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips.

# WIND CORRECTION

- Taxiing with a Tailwind
  - Keep engine power at a minimum and apply brakes occasionally to prevent overheating them
- Quartering Headwind
  - Neutral elevator
  - Ailerons into the wind
- Quartering Tailwind
  - Elevator down
  - Ailerons with the wind



# POSITIVE EXCHANGE OF CONTROLS

- Anytime we are in the aircraft we will practice a positive exchange of controls.
- This includes when we are about to taxi
- This is the 3 step process:
  - I will say “your controls”.
  - You will say “my controls”, and then,
  - I will say “your controls”.
- This is used to ensure that we all know who is flying/operating the airplane at any given time

# RUNWAY POSITION

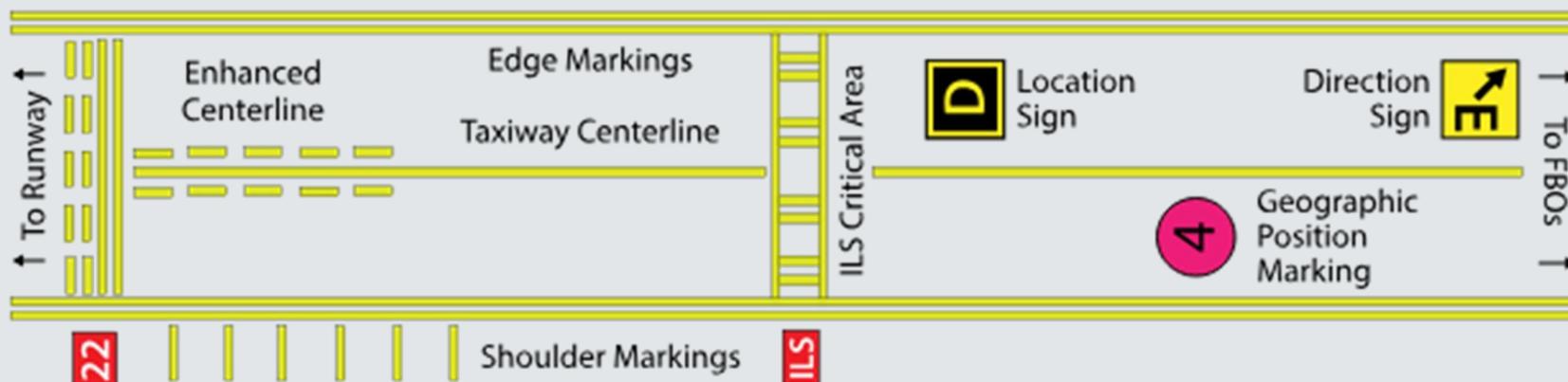
- Line Up and Wait
  - If not given clearance to take off in 90 seconds, call the tower to get clearance
- Centerline
  - **Always be on center during the day (with the exception of obstacles)**
  - Put in your crosswind corrections as needed (remember your control effectiveness is gained as airspeed increases during the takeoff roll)
  - **At night align 3 feet off** runway centerline to ensure approach traffic visibility

## **4. THE RELEVANCE/IMPORTANCE OF HOLD LINES.**

# HOLD SHORT LINES

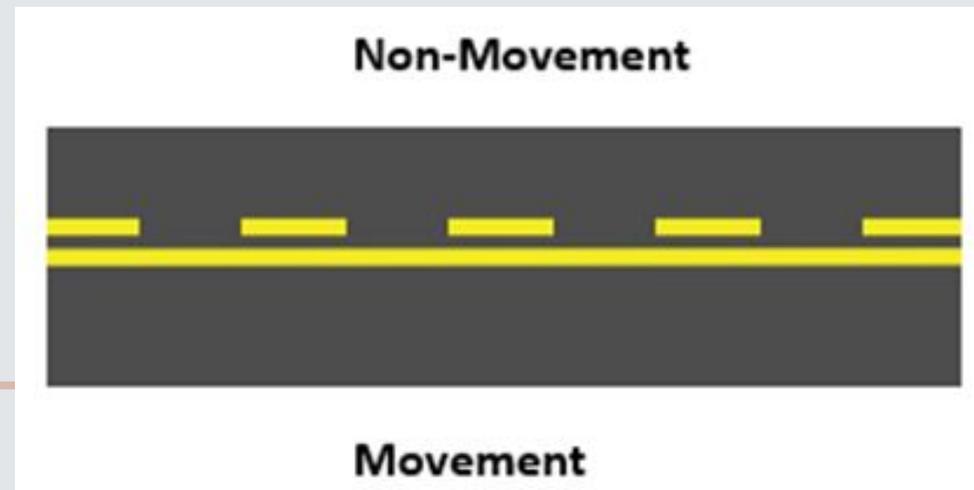
Runway holding position markings indicate where an aircraft is supposed to stop when approaching a runway. These markings consist of four yellow lines, two solid and two dashed, extending across the taxiway or runway width. The solid lines are always on the side where the aircraft is to hold.

- Controlled - Do not cross without ATC Clearance
- Uncontrolled – Pilot must ensure aircraft separation



## NON-MOVEMENT AREA BOUNDARY

- Delineates movement area, under control of ATC, from non-movement area.
- Located on boundary between movement and nonmovement area. Located to ensure wing clearance for taxiing aircraft



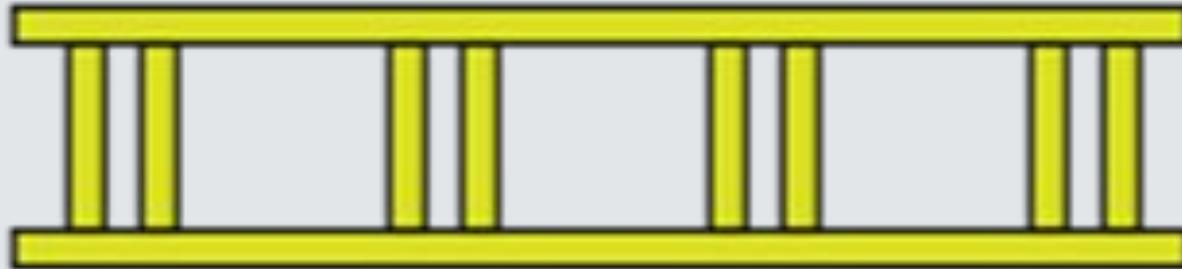
# TAXIWAY HOLD POSITION MARKINGS

Holding position markings for taxiway/taxiway intersections consist of a single, yellow dashed line extending across the taxiway's width.



## **ILS CRITICAL AREA HOLD LINES**

Holding position markings for instrument landing system (ILS) critical areas consist of two solid yellow lines (horizontal) connected by pairs of solid lines (vertical) extending across the width of the taxiway. ATC notifies pilots when to hold short of an ILS critical area.

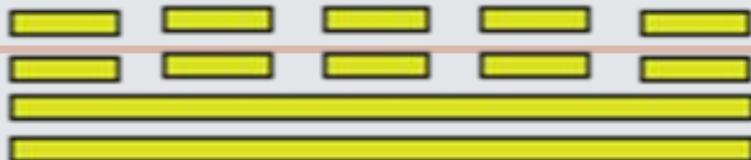


# HOLDING POSITION MARKING

Runway holding position markings indicate where an aircraft is supposed to stop when approaching a runway. These markings consist of four yellow lines, two solid and two dashed, extending across the taxiway or runway width. The solid lines are always on the side where the aircraft is to hold.

Runway holding position markings may be encountered:

- On taxiways where an aircraft is supposed to stop when it does not have clearance to proceed onto the runway.
- On runways that ATC uses for land and hold short operations (LAHSO) or taxiing operations.
- On taxiways located in runway approach areas are used at some airports where a taxiway is located in an approach or departure area. ATC notifies pilots when to hold short of a runway approach or departure area (e.g., “22-APCH” sign).



**5. PROCEDURES FOR ENSURING THE PILOT MAINTAINS STRICT FOCUS TO THE MOVEMENT OF THE AIRCRAFT AND ATC COMMUNICATIONS, INCLUDING THE ELIMINATION OF ALL DISTRACTIVE ACTIVITIES (I.E. CELL PHONE, TEXTING, CONVERSATIONS WITH PASSENGERS) DURING AIRCRAFT TAXI, TAKEOFF AND CLIMB OUT TO CRUISE ALTITUDE.**

# THE STERILE FLIGHT DECK

- Reference: 14 CFR 121.542
- Commonly known as **the sterile cockpit rule**, air carrier pilots must refrain from nonessential activities during critical phases of flight.
- **Critical phases of flight are all ground operations involving taxi, takeoff, and landing, and all other flight operations below 10,000' except cruise flight.** Nonessential activities include such activities as eating or chatting.
- **The equivalent sterile cockpit altitude for light aircraft can be defined as 2,500' AGL or at any altitude within 10 minutes of landing.**



# The Sterile Cockpit

# APPROPRIATE FLIGHT DECK ACTIVITIES

- Prior to Moving - Plan, Brief, and Review
  - Plan – Have a current copy of the airport diagram, review the expected taxi routes
  - Brief – Ground procedures, safety information, and expectations of others
  - Review – Write down ATC instructions and review the route given (ask for clarification if necessary)
- For safety reasons, workload should be at a minimum during taxi
  - All “heads down” activities should only be accomplished when the aircraft is stopped
  - Keep eyes outside
  - Sterile cockpit from taxi through climb
- Continuous Loop Process
  - Always be aware of where you are and what is coming next (turns, hot spots, other traffic, runways, etc.)
  - Ensure understanding of where you are going, and if ever unsure, ask for clarification



**The  
Sterile  
Cockpit**

## WHAT NOT TO DO

Anything that could distract from the task at hand. So;

- Cell phone usage
- texting
- conversations with passengers
- Snacking / Eating
- Any excessive “heads down” activities



**6. PROCEDURES FOR HOLDING THE PILOT'S WORKLOAD TO A MINIMUM  
DURING TAXI OPERATIONS.**

# KEEPING WORKLOAD TO A MINIMUM

- Write it down!
  - Write down taxi instructions, understand them, and repeat them back
  - If you don't understand them or need clarification; Ask ATC!
    - And / or request **progressive Taxi**
- Just like we fly: Keep your head outside 90% out /10% in
  - **10%** might sound like a lot, its just a quick reminder to glance at instruments occasionally to ensure proper engine temps, throttle position, and speed

# PROGRESSIVE TAXI

## STERILE FLIGHT DECK = NO TALKING

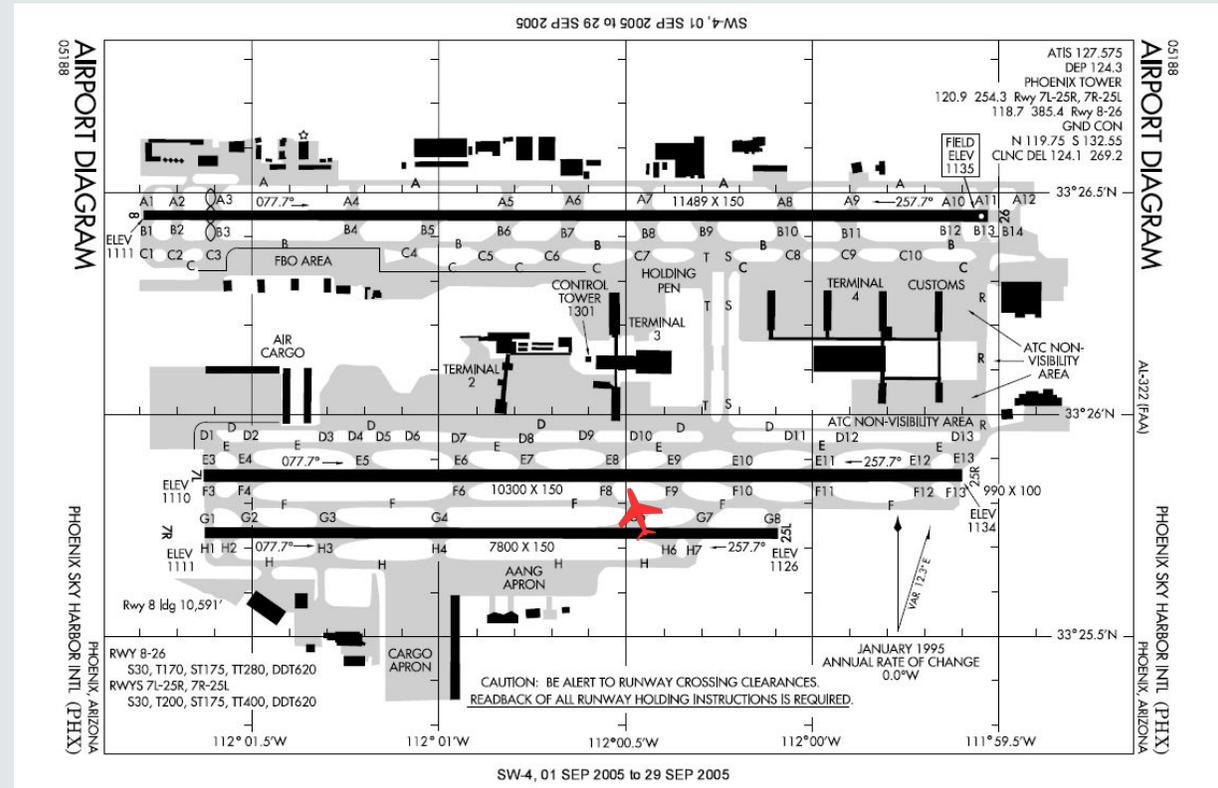
- Unless it pertains to the flight or other hazards.

## Taxiway Centerline

- Use rudders to maintain centerline
- Always have a current airport diagram on hand, monitor your location and route.

## Maintaining Position

- If you are uncertain of your location, stop and ask tower for a Progressive Taxi.
  - Precise taxi instructions given to a pilot unfamiliar with the airport or issued in stages as the aircraft proceeds along the taxi route.



## WHAT DOES A PROGRESSIVE SOUND LIKE?

- Scenario: Just Landed at a KGYR for the first time and confused on where to taxi to Lux Air for fuel.

**Cessna 123:** “Goodyear Ground, Cessna 123 is clear of Runway 3, at Alpha 6 request progressive taxi to Lux Air”

**KGYR Ground:** “Cessna 123, Goodyear Ground, Taxi turn left, via Alpha”

**Cessna 123:** “Goodyear Ground Cessna 123 taxi left Via Alpha”

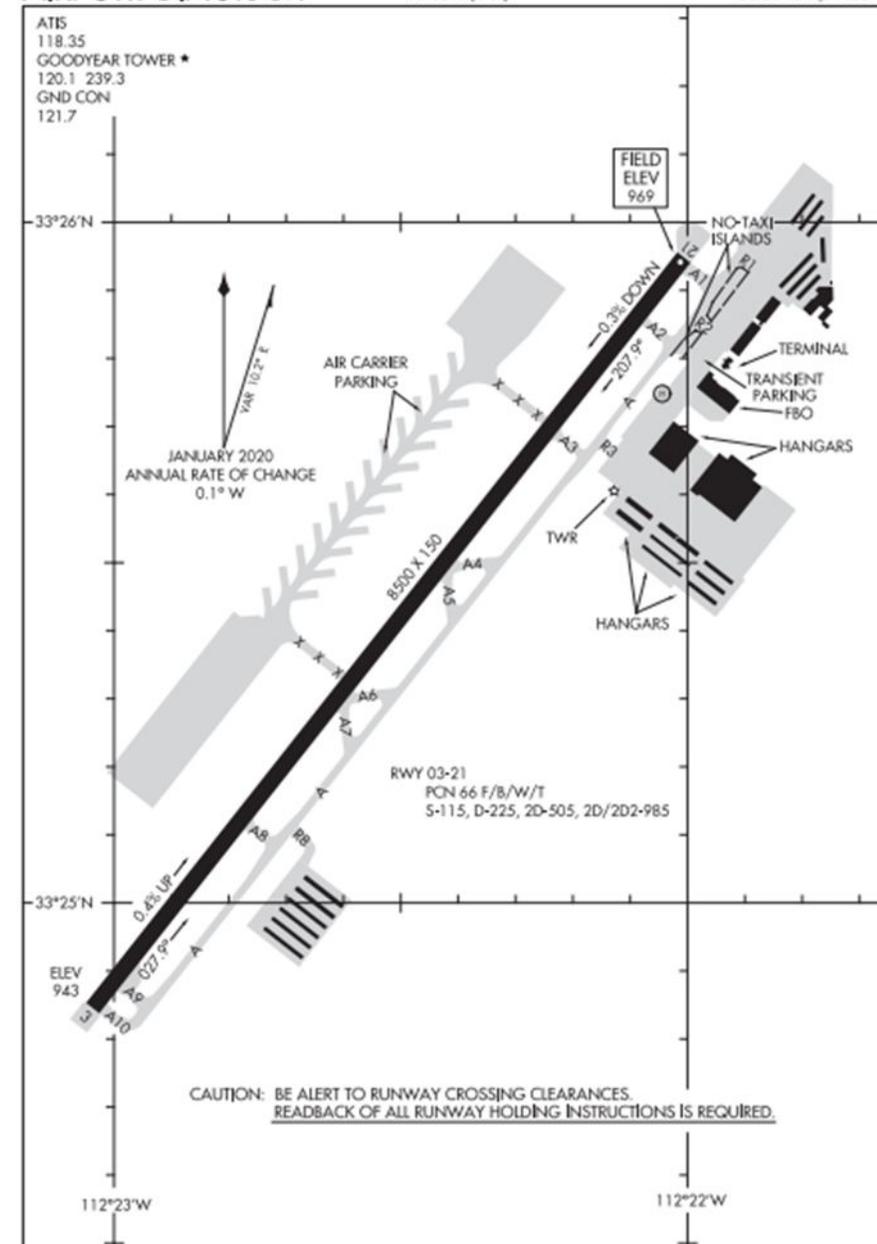
**KGYR Ground:** “Cessna 123 Goodyear Ground, at Ramp 3, turn right then left to Lux Air”

**Cessna 123:** “turn right at Ramp 3 and then left to Lux Air, Cessna 123”

22251

## AIRPORT DIAGRAM

AL-6648 (FAA)

PHOENIX GOODYEAR (GYR)  
GOODYEAR, ARIZONA

AIRPORT DIAGRAM

22251

GOODYEAR, ARIZONA  
PHOENIX GOODYEAR (GYR)

**7. TAXI OPERATION PLANNING PROCEDURES, SUCH AS RECORDING TAXI INSTRUCTIONS, READING BACK TAXI CLEARANCES, AND REVIEWING TAXI ROUTES ON THE AIRPORT DIAGRAM,**

# TAXI CLEARANCE

- A taxi clearance is required prior to entering or moving in the movement area
- Clearance must also be obtained prior to crossing *any* runway
- Taxi instructions will include:
  - The runway, or point, to taxi to
  - Taxi route instructions
  - Hold short instructions or runway crossing clearances
- **Always read back:**
  - Runway assignment
  - Any clearance to enter a specific runway
  - Any instruction to hold short of a specific runway (or taxiway)
- Uncontrolled Fields
  - Announce your intentions on CTAF
  - Monitor CTAF to be aware of other aircraft on or around the airport and deconflict with them
  - Keep in mind that radio communication is not required at uncontrolled fields

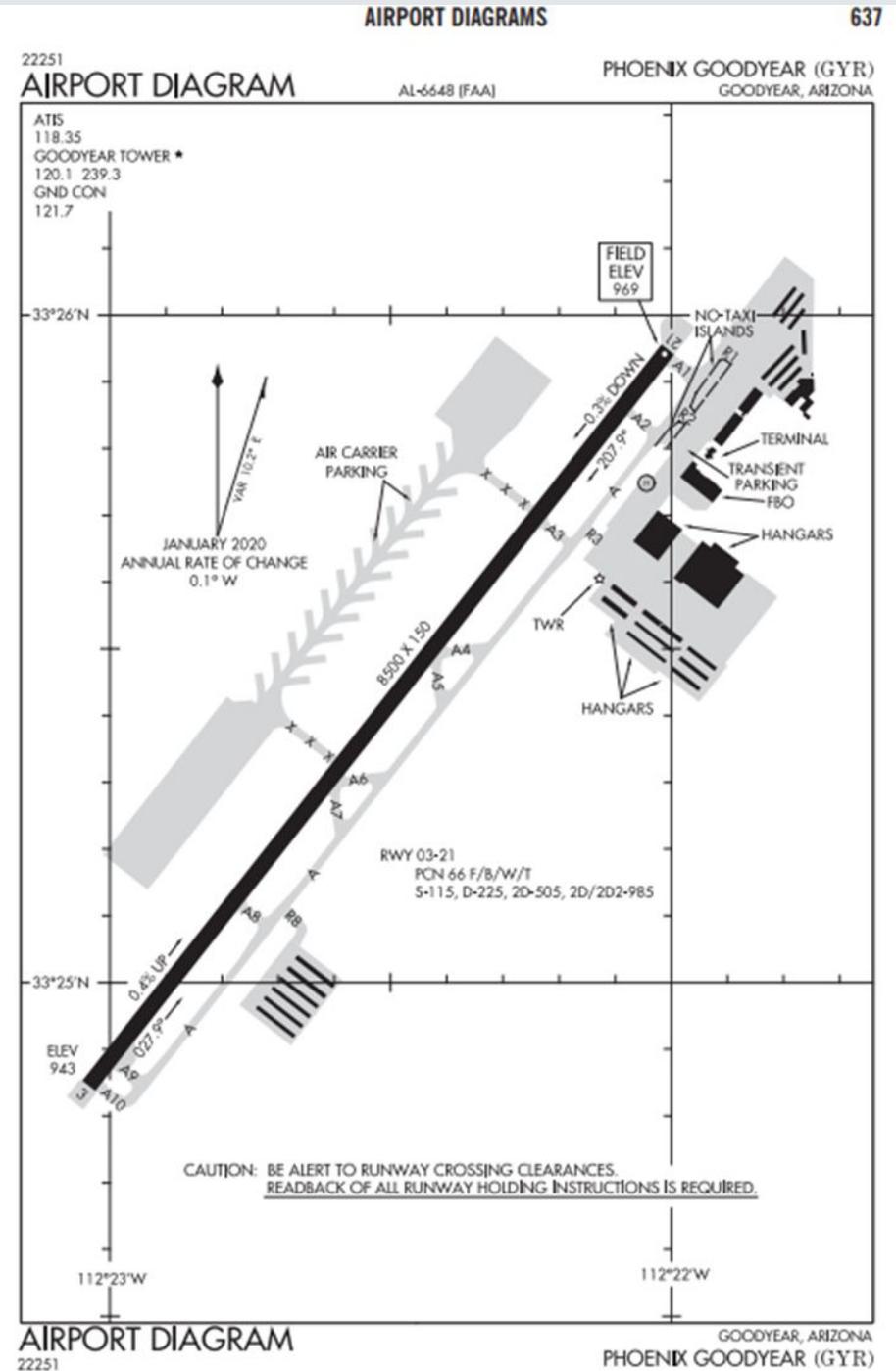
# OUR TAXI PLAN RWY 3

ATIS: Information Whiskey (W) is current  
Aircraft: N293SP

N293SP: Goodyear Tower, Skyhawk 293SP, at Lux Air, with information Whiskey, request taxi for a southbound departure”

Tower: “Skyhawk 293SP, Goodyear Tower, taxi via Alpha to Alpha 10, hold short of Runway 3”

N293SP: “Taxi via Alpha to Alpha 10, hold short runway 3, Skyhawk 293SP”



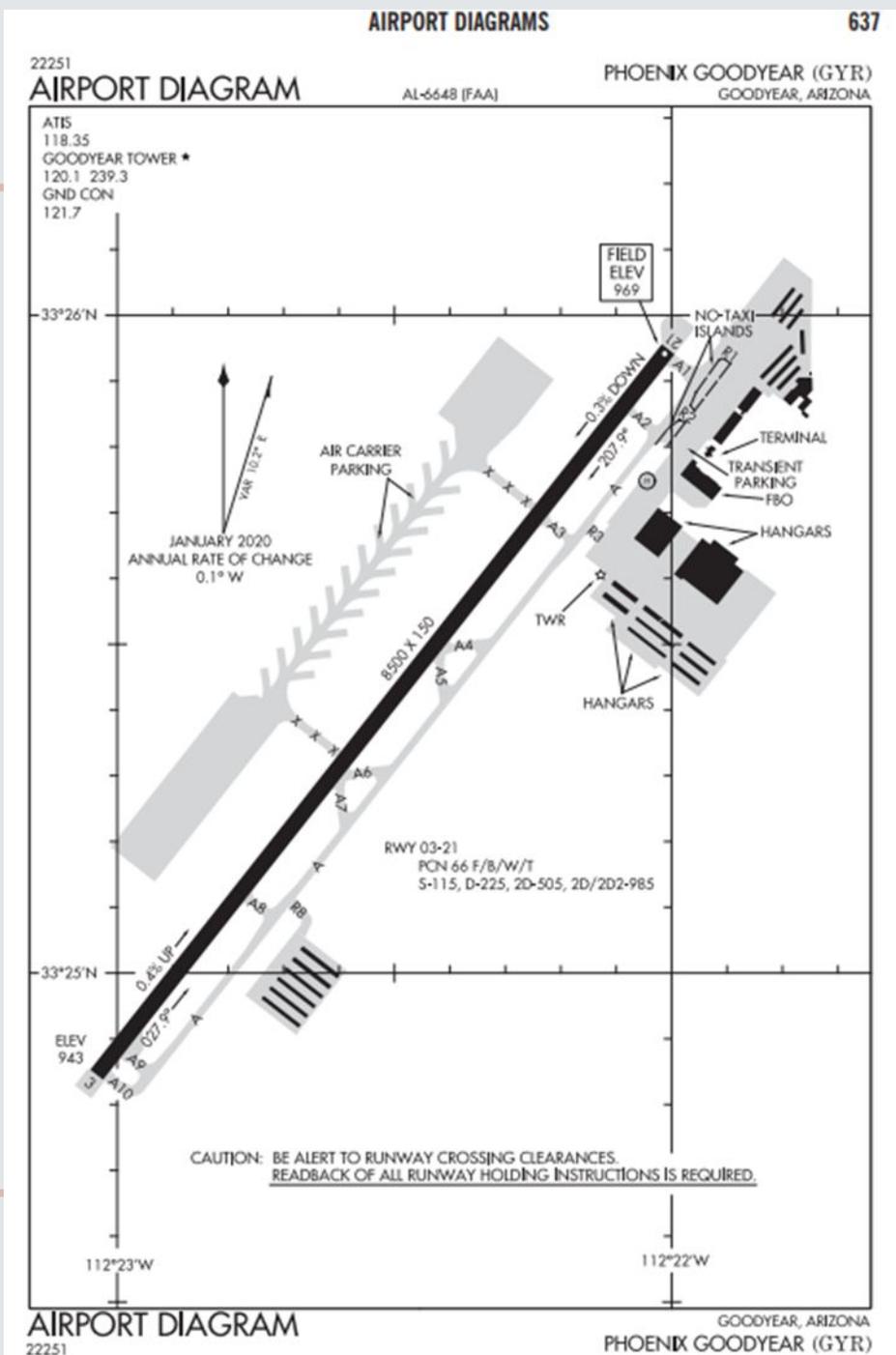
# OUR TAXI PLAN RWY 21

ATIS: Information Foxtrot is current  
Aircraft: N293SP

N293SP: Goodyear Tower, Skyhawk 293SP, at Ramp 3, with information Foxtrot, request taxi for a westbound departure”

Tower: “Skyhawk 293SP, Goodyear Tower, taxi via Alpha to Alpha 1, hold short of Runway 21”

N293SP: “Taxi via Alpha to Alpha 1, hold short runway 21, Skyhawk 293SP”



# AIRPORT SIGNAGE

## Mandatory Instruction Signs

	Mandatory: Hold position for taxiway/runway intersection.	Denotes entrance to runway from a taxiway.
	Mandatory: Holding position for runway/runway intersection.	Denotes intersecting runway.
	Mandatory: Holding position for runway approach area.	Denotes area to be protected for aircraft approaching or departing a runway.
	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.
	Mandatory: No entry.	Denotes aircraft entry is prohibited.

## Information Signs

	Information.	Provides procedural or other specialized information.
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## Runway Distance Remaining Signs

	Distance Remaining.	Distance remaining info for take-off/landing.
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	Direction: Taxiway.	Defines designation/direction of intersecting taxiway(s).
	Runway Exit.	Defines designation/direction of exit taxiways from the rwy.

	Outbound Destination.	Defines directions to take-off runway(s).
	Inbound Destination.	Defines directions to airport destinations for arriving aircraft.

	Taxiway Location.	Identifies taxiway on which the aircraft is located.
	Runway Location.	Identifies the runway on which the aircraft is located.

## Direction Signs

**8. PROCEDURES FOR ENSURING THAT CLEARANCE OR INSTRUCTIONS THAT ARE ACTUALLY RECEIVED ARE ADHERED TO RATHER THAN THE ONES EXPECTED TO BE RECEIVED.**

# TALKING TO ATC

Be **VIGILANT** and **LISTEN** out for your callsign, **WRITE** down and **REPEAT** fully.

If you didn't hear, and you're not sure, **JUST ASK!**

If you're Unfamiliar with ATC phraseology:

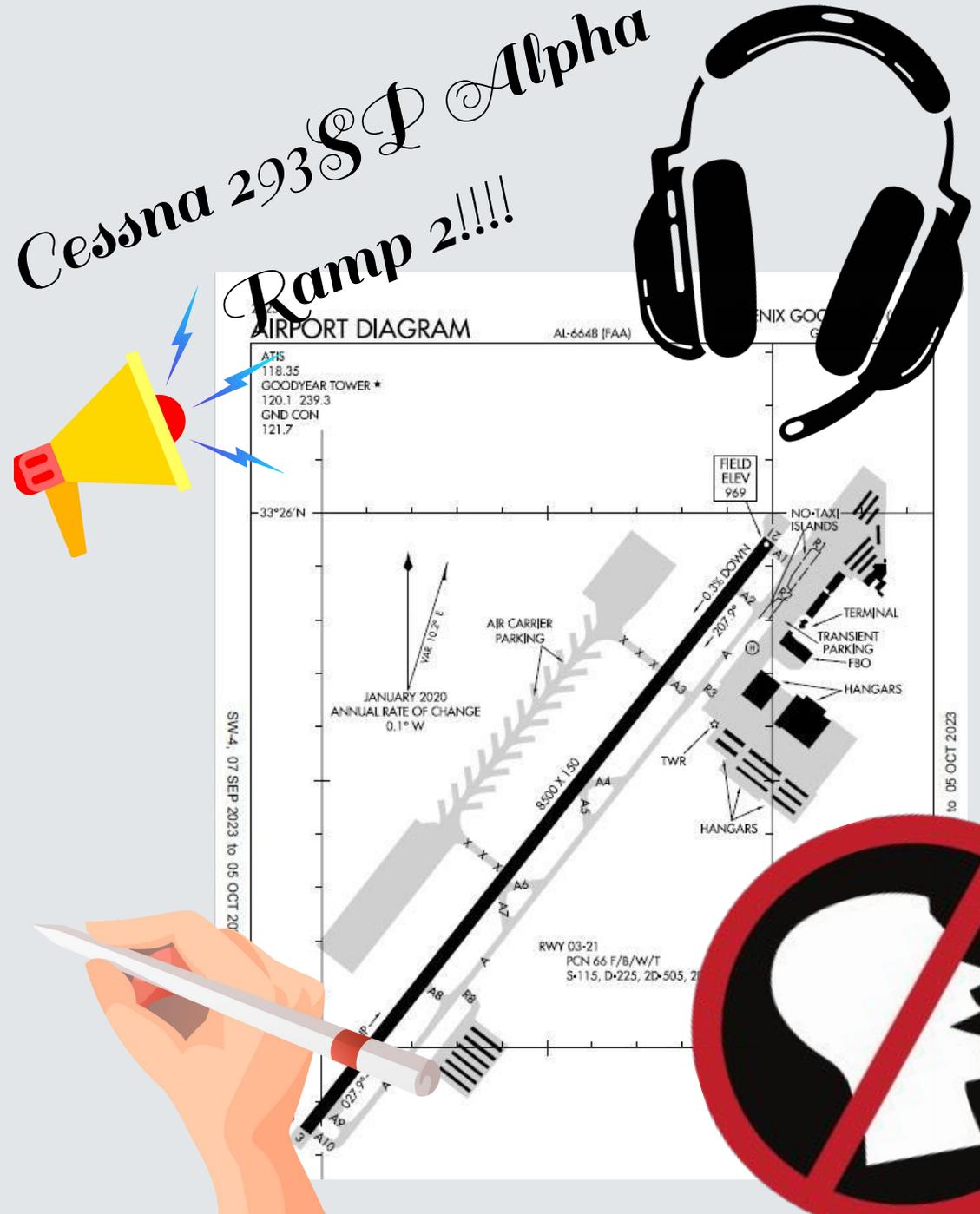
- LIVE ATC
- Pilot/Controller Glossary (AIM)

Once cleared, use the airport diagram to verify your clearance and taxi instructions before moving.

- If visibility permits, make sure you have cleared the area visually.
- Know where you are and where you are going.

Eliminate Expectation Bias

- Occurs when a pilot hears or sees something that he or she expects to hear or see rather than what actually may be occurring.

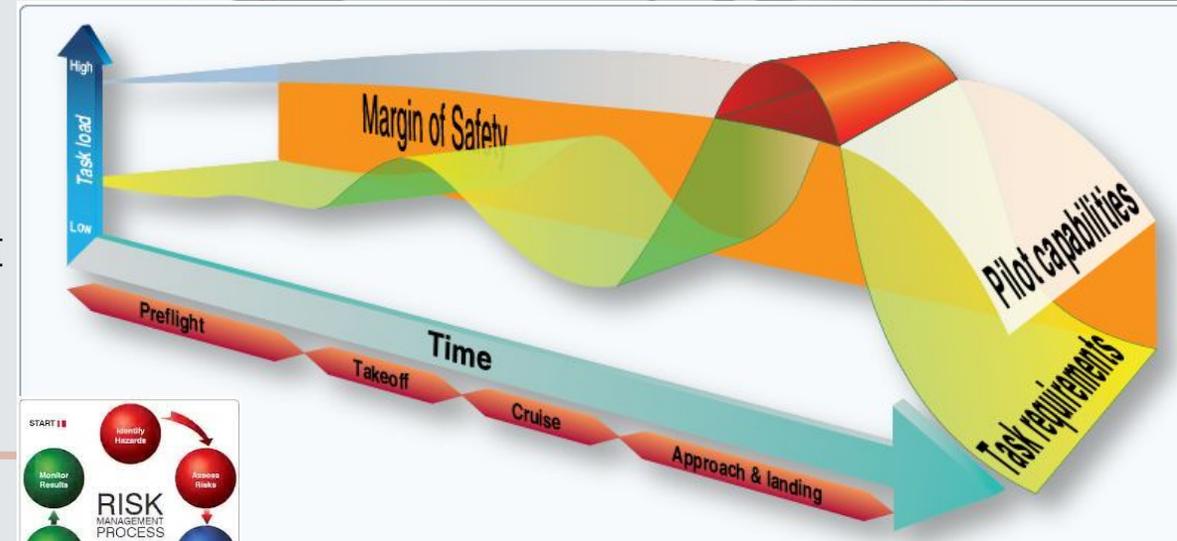


**9. PROCEDURES FOR MAINTAINING/ENHANCING SITUATIONAL AWARENESS WHEN CONDUCTING TAXI OPERATIONS IN RELATION TO OTHER AIRCRAFT OPERATIONS IN THE VICINITY AS WELL AS TO OTHER VEHICLES MOVING ON THE AIRPORT.**

# SITUATIONAL AWARENESS

Situational awareness is the accurate perception and understanding of all the factors and conditions within the five fundamental risk elements (flight, pilot, aircraft, environment, and type of operation that comprise any given aviation situation) that affect safety before, during, and after the flight. (PHAK Ch. 2)

A lot can contribute to losing situational awareness, so its important that as we gain experience in workload management in the airplane, we are evaluating what needs our attention on the flight deck and what doesn't.



# **BEST PRACTICES FOR MAINTAINING SITUATIONAL AWARENESS**

- Develop strong task management skills.
- Plan ahead (e.g., review the airport diagram before taxiing and landing).
- Regularly pause to make a quick mental assessment of the flight environment.
- Consciously raise awareness in critical phases of flight and during ground operations.
- Use advanced avionics properly (avoid complacency and excessive “heads-down” time).

# ***CLEAR PROP!!!***

- When we start the airplane **shouldn't be the only time we are looking for pedestrians or other traffic near our airplane.**

## Other hazards

- Fuel Trucks
- Aircraft
- Pilots - who maybe situationally unaware
- Passengers - who don't know the hazards of being near aircraft that have props running / or are moving
- Wildlife / Pets



# AVOIDING AIRCRAFT & HAZARDS

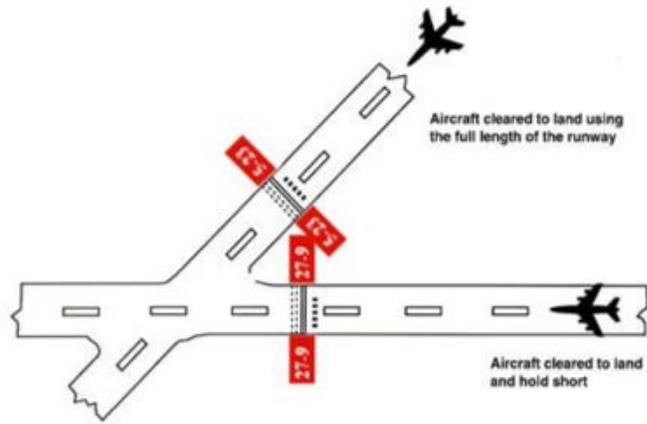
- Keep your eyes outside
  - Checklists, or other “head down” activities, should be accomplished when stopped
- Maintain situational awareness
  - Know where you are and where you’re going – have a taxi diagram
- Taxi at a safe speed
  - Slow down prior to turning
  - Taxi speed – “hanging off the prop”
- Build a mental picture of other traffic on the airport
- Rotating beacon and taxi light(s) should be on, as well as position lights at night
  - Be cautious taxiing with strobes as they can be blinding
- Apply right-of-way rules
- Maintain the centerline and be aware of the airplane’s wingspan
- Maintain a sterile cockpit

**10. PROCEDURES FOR BRIEFING IF A LANDING ROLLOUT TO A TAXIWAY EXIT WILL PLACE THE PILOT IN CLOSE PROXIMITY TO ANOTHER RUNWAY WHICH CAN RESULT IN A RUNWAY INCURSION.**

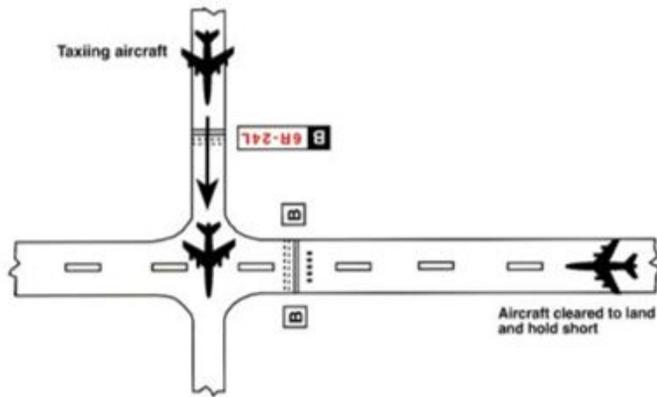
# LAND AND HOLD SHORT OPERATIONS (LAHSO)

- Ops that include landing and holding short of a specific point on the runway
- Pilot Responsibilities
  - Preflight Planning
  - PIC has the final authority to accept or decline clearance
  - Full readback required
- Situational Awareness
  - Current airport & aircraft information
  - Understand LAHSO markings, signs, and lighting
- LAHSO Minimums
  - [Basic VFR: 1,000' ceiling & 3 statute miles visibility](#)
- Can we accept LAHSO ops at the school?
  - No

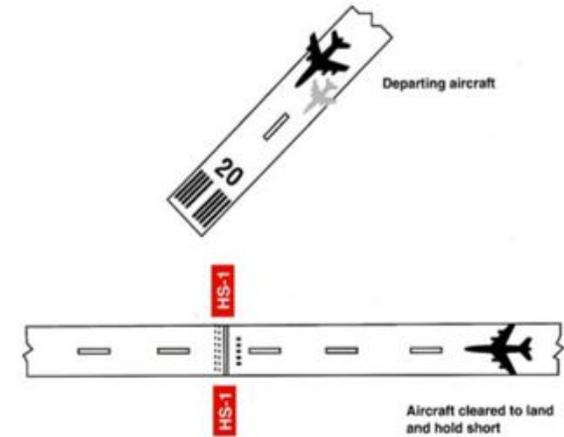
# LAHSO EXAMPLES



Intersecting Runway



Intersecting Taxiway



Other Designated Point

# PILOT RESPONSIBILITIES

- LAHSO instructions do not have to be accepted.
- Student pilots cannot accept a LAHSO instruction during a solo flight.
- Other pilots may accept LAHSO instructions provided the aircraft can safely land and stop within the Available Landing Distance (ALD).
- A pilot who accepts a LAHSO instruction should land and exit the runway at the first convenient taxiway (unless directed otherwise) before reaching the hold short point. Otherwise, the pilot must stop on the runway and hold at the hold short point.

**SHORT FIELD LANDING DISTANCE  
AT 2550 POUNDS**

CONDITIONS:

Flaps 30°  
Power Off  
Maximum Braking  
Paved, level, dry runway  
Zero Wind  
Speed at 50 Ft: 61 KIAS

Press Alt In Feet	0°C		10°C		20°C		30°C		40°C	
	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst	Grnd Roll Ft	Total Ft To Clear 50 Ft Obst
S. L.	545	1290	565	1320	585	1350	605	1380	625	1415
1000	565	1320	585	1350	605	1385	625	1420	650	1450
2000	585	1355	610	1385	630	1420	650	1455	670	1490
3000	610	1385	630	1425	655	1460	675	1495	695	1530
4000	630	1425	655	1460	675	1495	700	1535	725	1570
5000	655	1460	680	1500	705	1535	725	1575	750	1615
6000	680	1500	705	1540	730	1580	755	1620	780	1660
7000	705	1545	730	1585	760	1625	785	1665	810	1705
8000	735	1585	760	1630	790	1670	815	1715	840	1755

NOTES:

1. Short field technique as specified in Section 4.
2. Decrease distances 10% for each 9 knots headwind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
3. For operation on dry, grass runway, increase distances by 45% of the "ground roll" figure.
4. If landing with flaps up, increase the approach speed by 9 KIAS and allow for 35% longer distances.

Figure 5-11. Short Field Landing Distance

# SO, YOU ACCEPTED A LAHSO..WILL YOU MAKE IT BEFORE THE HOLD POSITION MARKING?

- AIM 4-3-11
- Know your landing distances
- Know your runway lengths / slope / distances
- NWKRAFT
  - NOTAMS, Weather, Known ATC delays, Runway Lengths & Distances, Alternates, Fuel requirements, Takeoff & Landing Distances
- FAR 91.103
- Can you go around? Yes!

**11. APPROPRIATE AFTER LANDING/TAXI PROCEDURES IN THE  
EVENT THE AIRCRAFT IS ON A TAXIWAY THAT IS BETWEEN  
PARALLEL RUNWAYS.**

# Between Parallel Runways

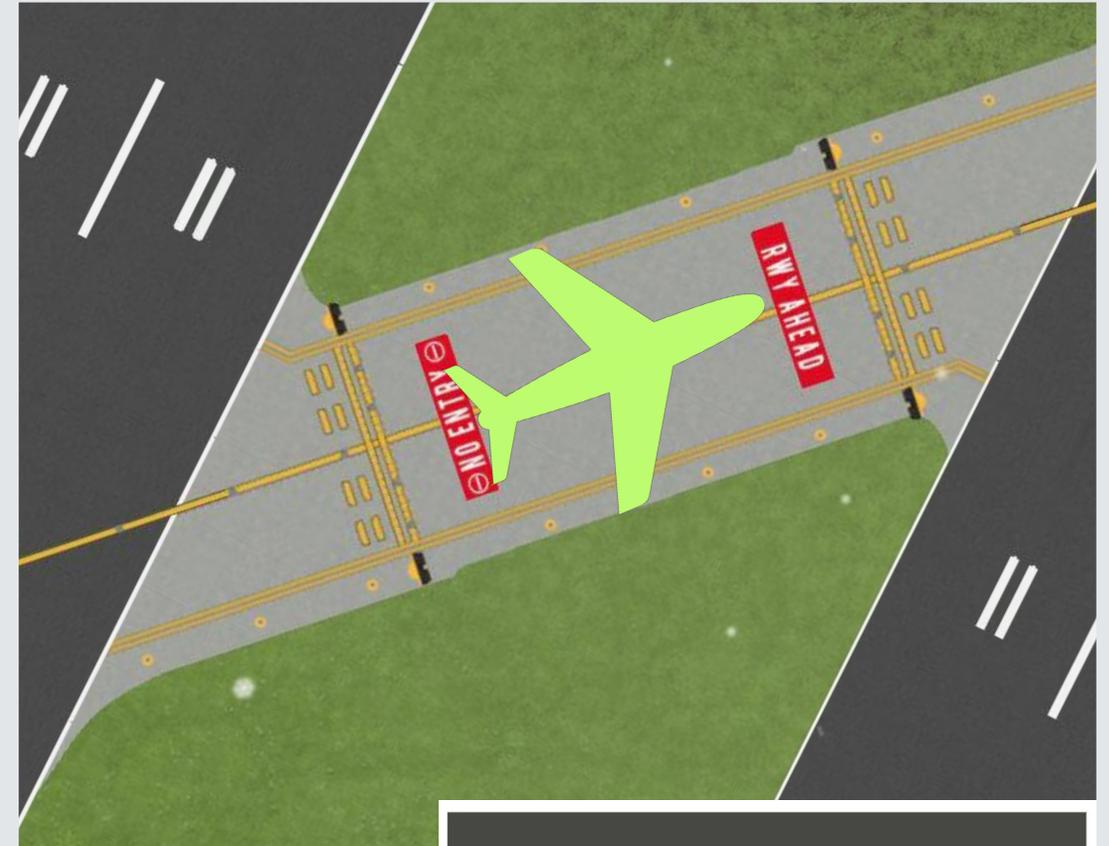
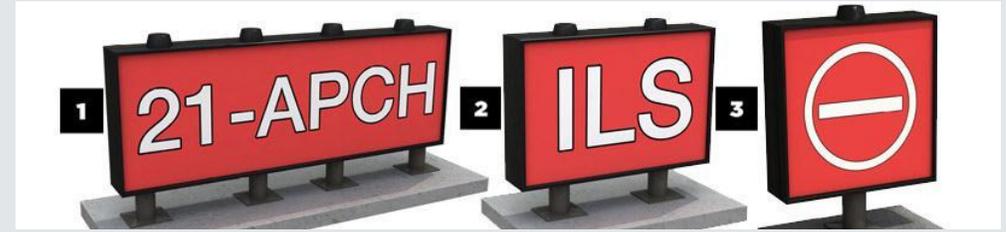
If stopped between parallel runways, **only cross after ATC clearance.**

## Landing

After landing, ensure that the entire aircraft (including tail section) has crossed over the hold short line—entire aircraft is clear of the runway safety area.

- If unable because of adjacent parallel runway's hold short line, stop, and advise ATC.
- **DO NOT CROSS** any runway hold short lines or an instrument landing system (ILS) critical area in use, without explicit ATC clearance.

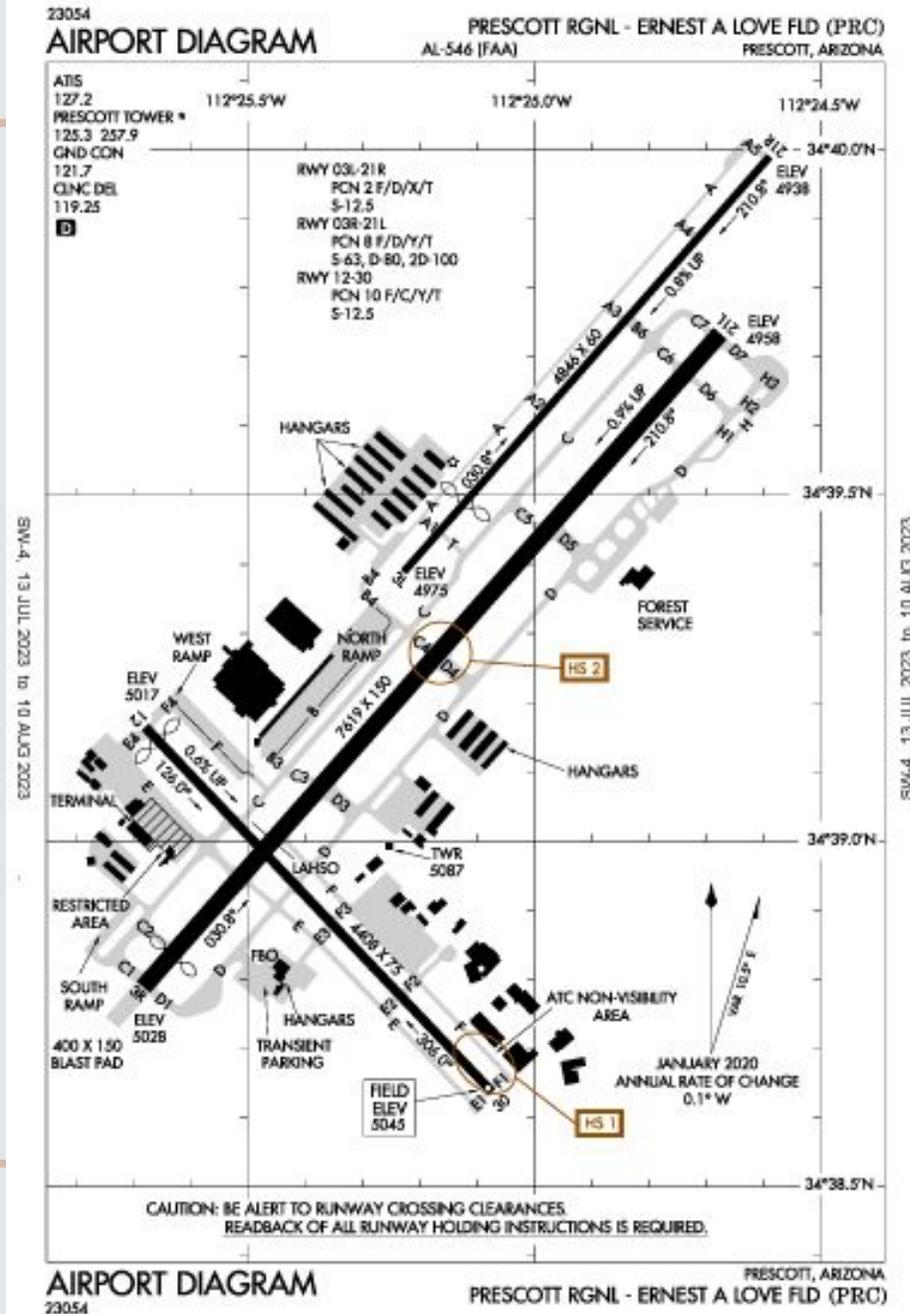
If at **Non Towered Airport** – hold short until you can verify that



**12. SPECIFIC PROCEDURES FOR OPERATIONS AT AN AIRPORT WITH AN OPERATING AIR TRAFFIC CONTROL TOWER, WITH EMPHASIS ON ATC COMMUNICATIONS AND RUNWAY ENTRY/CROSSING AUTHORIZATIONS.**

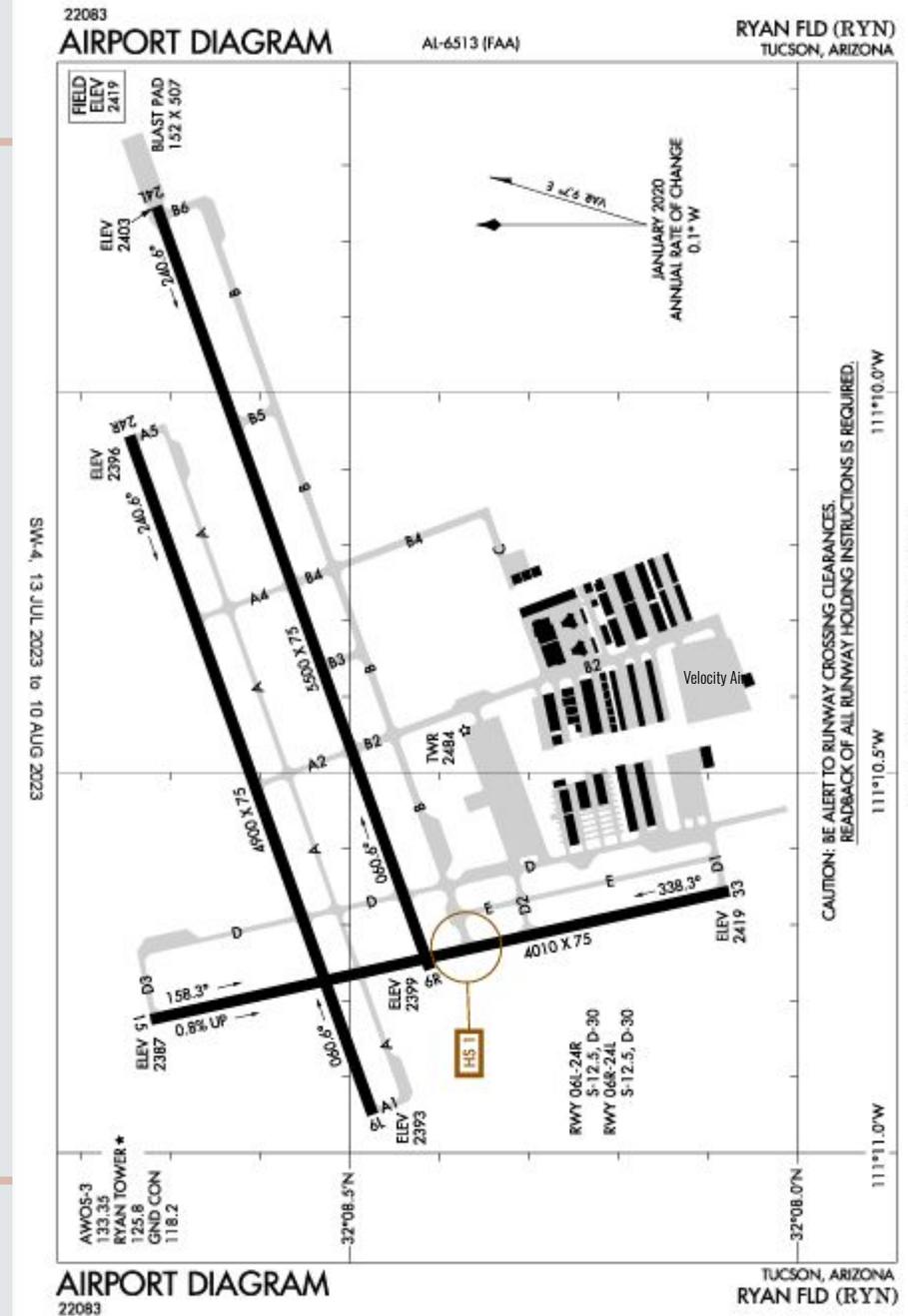
# CROSSING RUNWAYS

When receiving taxi instructions that require you to cross runways, always ensure that you fully understand when and where to hold short or when to cross any runway.



# TAXI EXAMPLE: KRYN

- We decided our cross country will take us from KGYR to KRYN. We also decided we will make a quick “pit stop” at Velocity Air (FBO)
- In the air we will brief WARNB
  - **HS1** – Hotspot 1: “Air tfc often taxies acft via Twy B and onto Rwy 33 for departure on Rwy 06R. Use caution not to enter Rwy 06R without ATC authorization”
- Once we landed and taxied off the active (Rwy 6L) we are at A2 stopped, waiting for ATC.
- N347ME: “ Ryan Ground, Skyhawk 347ME clear or Rwy 6L at A2, request taxi to Velocity Air”
- KRYN Ground: “Skyhawk 347ME, Ryan Ground, taxi via A2, **cross Runway 6R/24L**, onto B2, onto velocity”
- N347ME: “taxi via A2, **cross Runway 6R/24L**, onto B2, onto velocity Skyhawk 347ME”

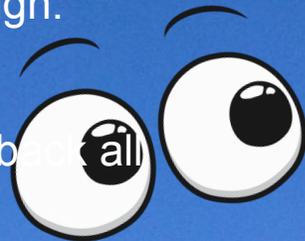


**13. ATC COMMUNICATIONS AND PILOT ACTIONS BEFORE  
TAKEOFF, BEFORE LANDING, AND AFTER LANDING AT  
TOWERED AND NONTOWERED AIRPORTS.**



# TOWERED

- Plan and brief your departure/arrival route.
- Be on the correct frequency (Ground vs Tower).
- Standard Phraseology.
- Be vigilant of other traffic and LISTEN for your callsign.
- Write down and read back all clearances.



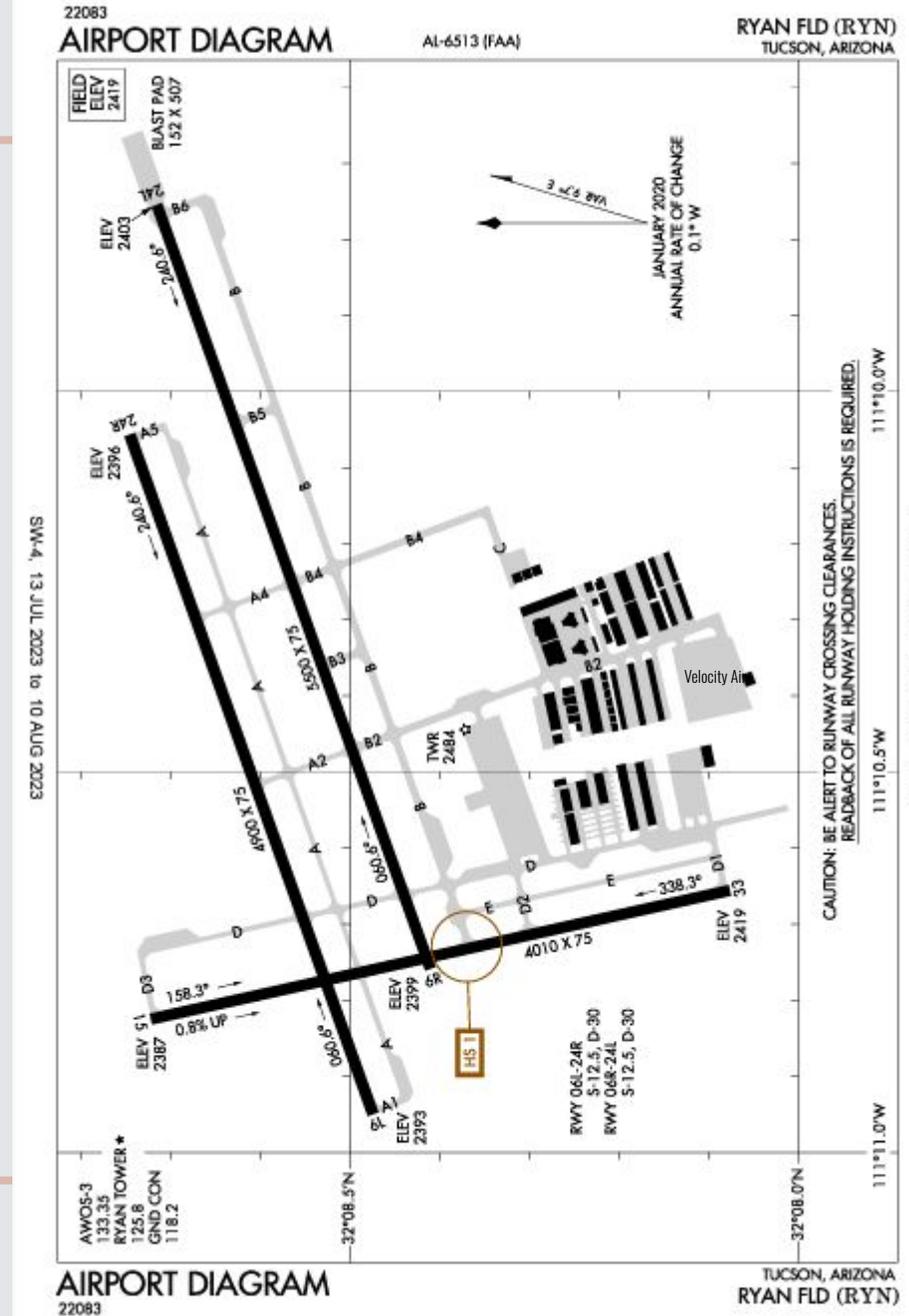
**VS**

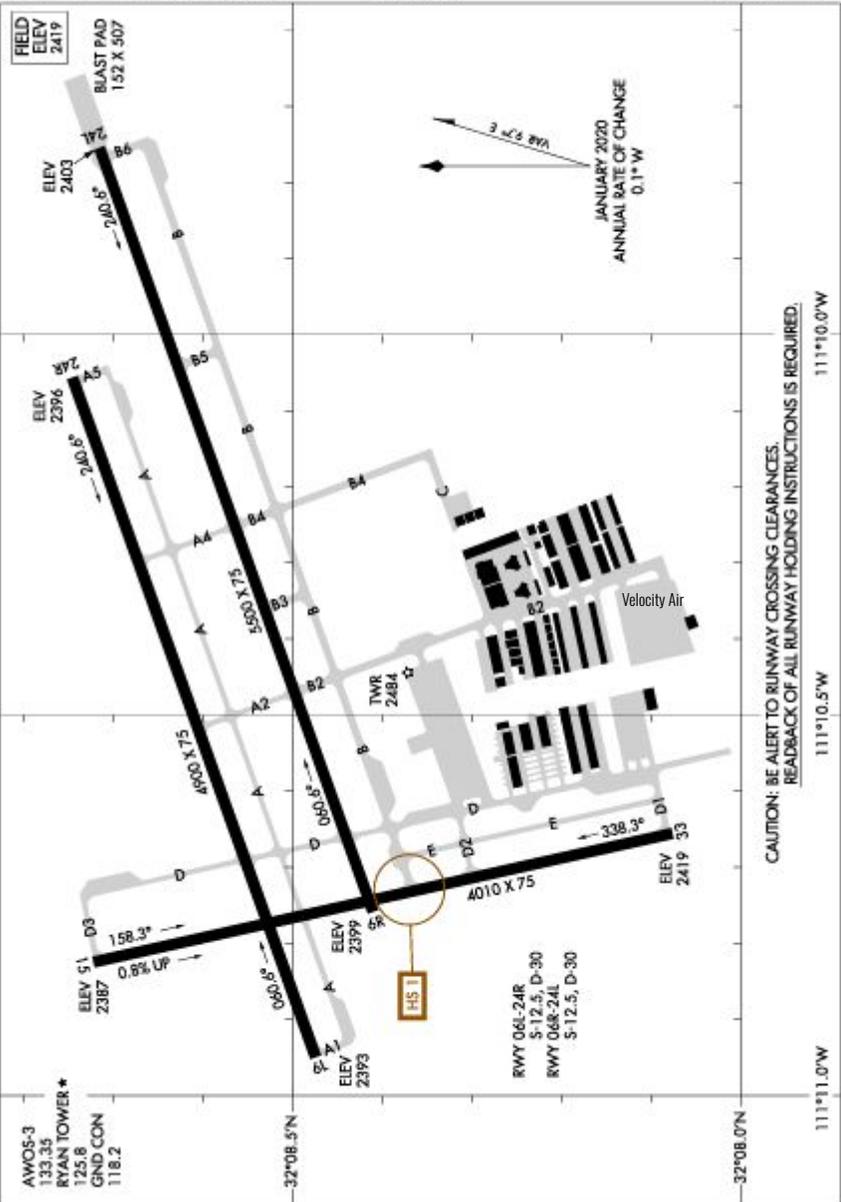
# NONTOWERED

- Plan ahead and become familiar with Direction and Altitude of local traffic patterns.
- More than one runway may be in use when the wind is calm.
- Listen and be on the lookout for other aircraft operations flying VFR or IFR and announce your intentions on CTAF.
- Monitor/communicate on CTAF from engine start, taxi, and until 10 miles from airport.
- Be aware of your surroundings, not all aircraft are equipped with radios.

# LINE UP AND WAIT

- We are at Velocity Air (FBO) and have planned a trip back to KGYR
- At the FBO we will brief our expected taxi plan and the hotspots
  - **HS1** – Hotspot 1: “Air tfc often taxies acft via Twy B and onto Rwy 33 for departure on Rwy 06R. Use caution not to enter Rwy 06R without ATC authorization”
- N347ME: “ Ryan Tower, Skyhawk 347ME, holding short of Runway 6L at A1, ready for departure”
- KRYN Tower: “Skyhawk 347ME, Ryan tower, **line up and wait on 6L**”
- N347ME: “Ryan Tower. Skyhawk 347ME, **line up and wait runway 6L**”
- KRYN Tower: “ Skyhawk 347ME, Ryan Tower, **Cleared for takeoff runway 6L**”
- N347ME: “Ryan Tower, Skyhawk 347ME **cleared for takeoff Runway 6L**”



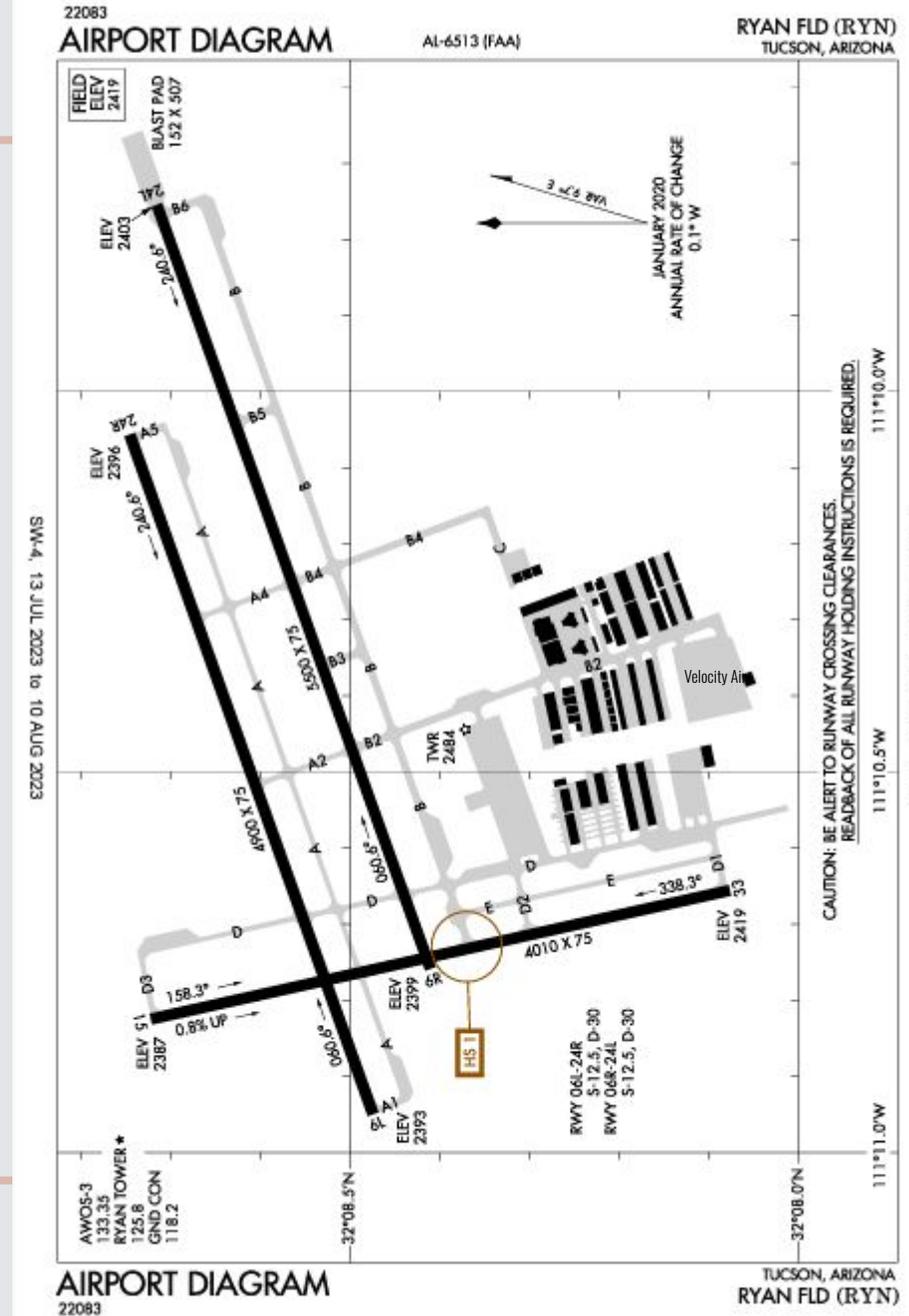


# CLEARED TO LAND

- Cleared to Land on Runway 6L
- In the air we will brief WARNB
  - **HS1** – Hotspot 1: “Air tfc often taxies acft via Twy B and onto Rwy 33 for departure on Rwy 06R. Use caution not to enter Rwy 06R without ATC authorization”
- KRYN Tower: “Skyhawk 347ME, Ryan Tower, **cleared to land Runway 6L**”
- N347ME: “Ryan Tower, Skyhawk 347ME clear to land Rwy 6L”
- KRYN Tower: “Skyhawk 347ME, Ryan Tower, Contact Ground 118.2”
- N347ME: “Ryan Tower, Skyhawk 347ME, Contact Ground on 118.2”
- Clear the runway and the hold short line then contact ground for taxi

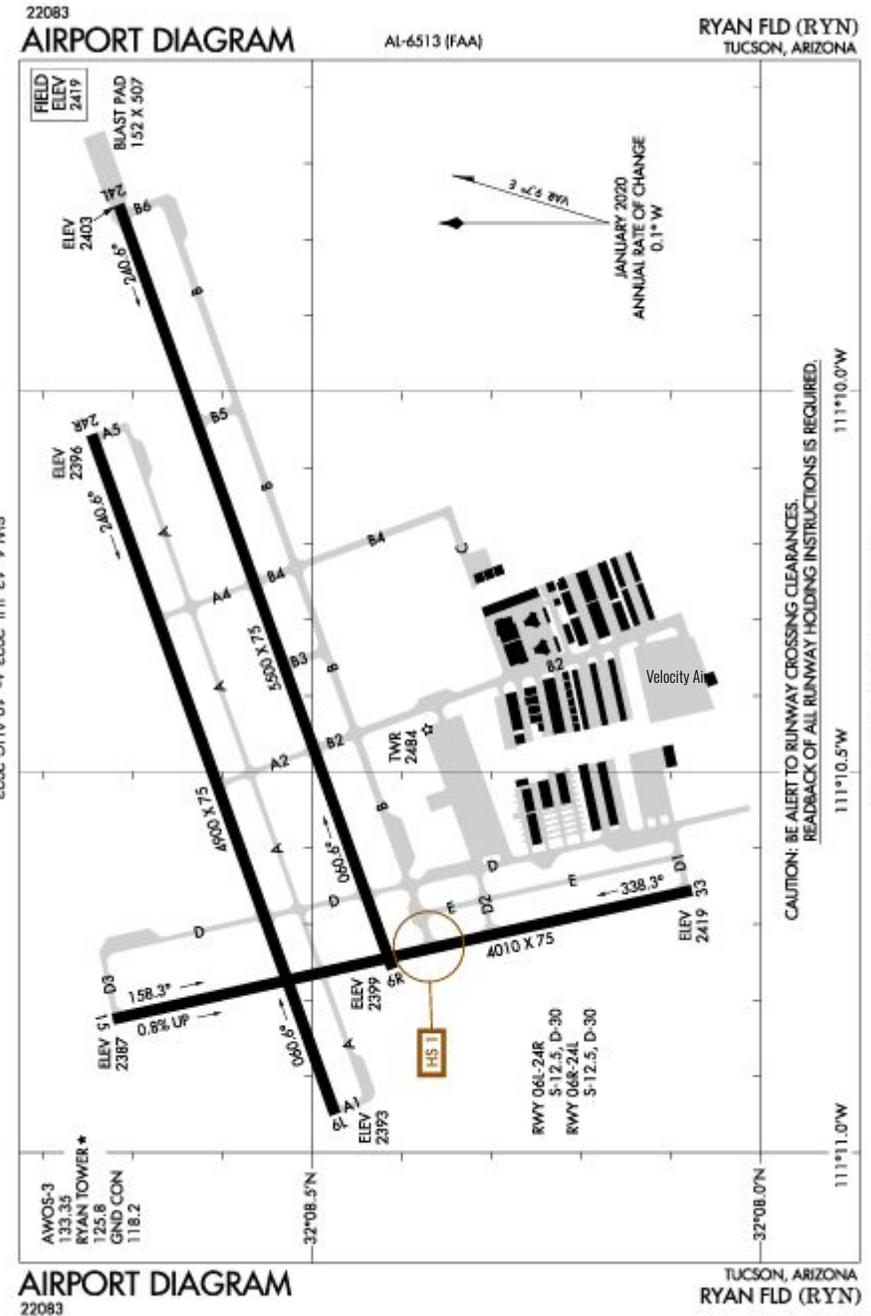
# LANDING – NON TOWERED

- Landing when the tower is closed
- In the air we will brief WARNB
  - **HS1** – Hotspot 1: “Air tfc often taxies acft via Twy B and onto Rwy 33 for departure on Rwy 06R. Use caution not to enter Rwy 06R without ATC authorization”
- Assume all calls in airspace have been made to short final
- “Ryan Traffic Skyhawk 347ME is short final for Runway 6L”
- “Ryan Traffic Skyhawk 347ME is clear of Runway 6L”
- “Ryan Traffic, Skyhawk 347ME is taxiing via A2, crossing runway 6R/24L, then taxiing via B2, crossing B, then proceeding on B2, to Velocity”
- **Announce again when just about to cross and then finished crossing the runway 6R/24L, and re-announce the rest of the taxi**
- “Ryan Traffic, Skyhawk 347ME is taking runway 6R24L to cross”
- “Ryan Traffic, Skyhawk 347ME is clear of runway 6R24L, proceeding via B2, crossing B, then again proceeding on B2 to Velocity”



# AFTER LANDING

- We decided our cross country will take us from KGYR to KRYN. We also decided we will make a quick “pit stop” at Velocity Air (FBO)
- In the air we will brief WARNB
  - **HS1** – Hotspot 1: “Air tfc often taxies acft via Twy B and onto Rwy 33 for departure on Rwy 06R. Use caution not to enter Rwy 06R without ATC authorization”
- Once we landed and taxied off the active (Rwy 6L) we are at A2 stopped, waiting for ATC.
- N347ME: “ Ryan Ground, Skyhawk 347ME clear or Rwy 6L at A2, request taxi to Velocity Air”
- KRYN Ground: “Skyhawk 347ME, Ryan Ground, taxi via A2, **cross Runway 6R/24L**, onto B2, onto velocity”
- N347ME: “taxi via A2, **cross Runway 6R/24L**, onto B2, onto velocity Skyhawk 347ME”

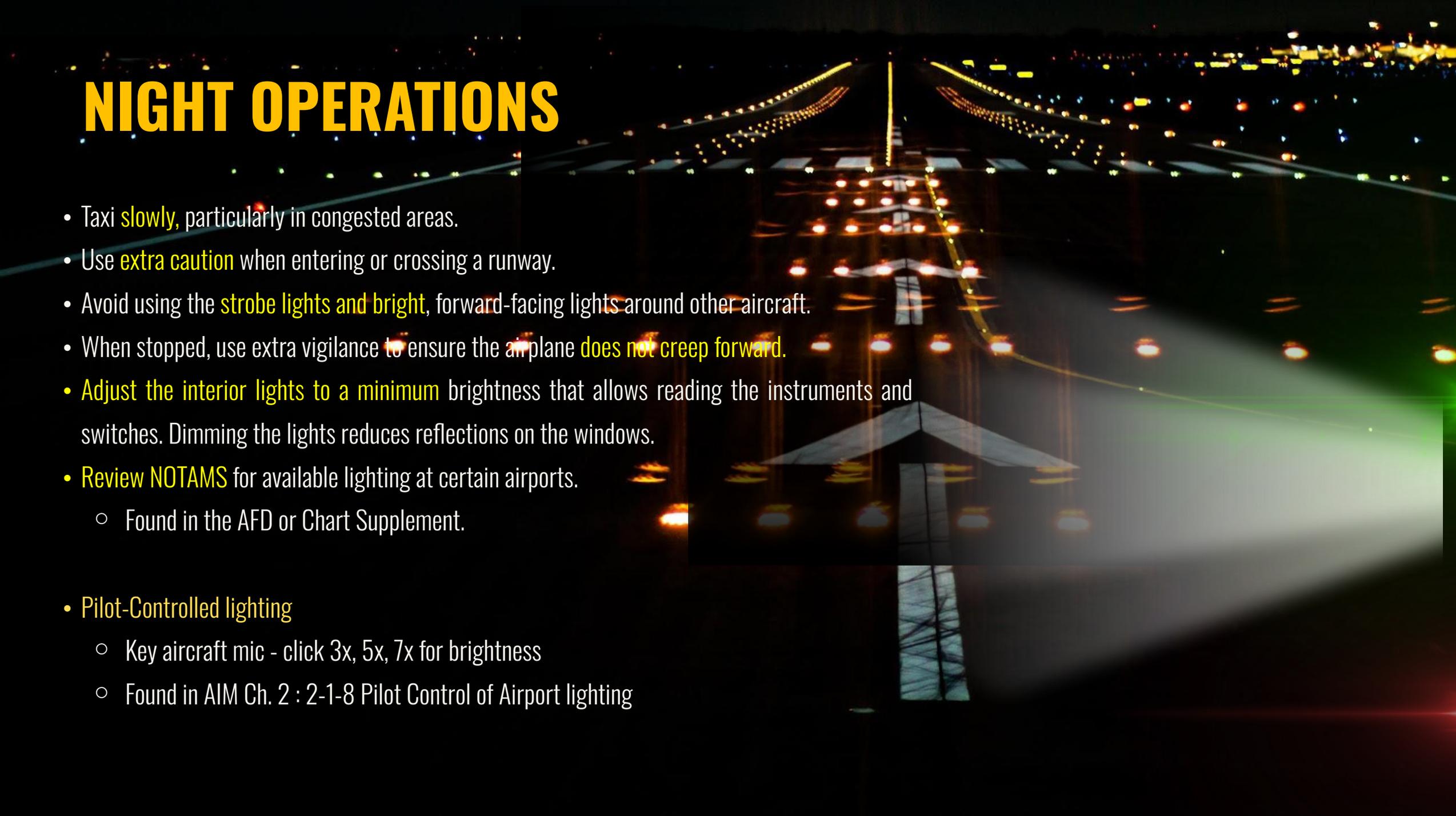


# LANDING AND ROLLOUT

- Plan Ahead (Plan Brief Review)
  - Estimate your runway exit point, and how it will affect the taxi and taxi route
    - Taxiway
    - Another runway
    - Hot Spot(s)
    - Closed taxiways / runways
- Hold Lines
  - When exiting the runway, ensure the entire aircraft has crossed the hold short line
  - Advise ATC if unable to fully clear the runway
- Appropriate Activities
  - Sterile cockpit, all “heads down” activities should only be completed when stopped, keep eyes outside
  - “Continuous Loop”

## **14. PROCEDURES UNIQUE TO NIGHT OPERATIONS.**

# NIGHT OPERATIONS

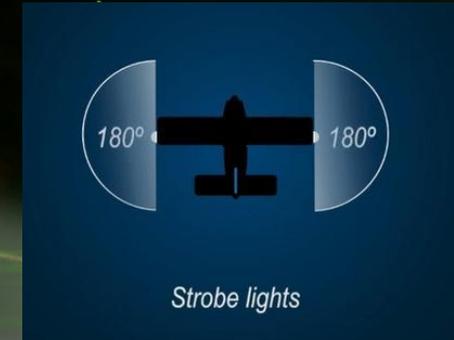
A night view of an airport runway. The runway is illuminated by a central line of lights and side lights, creating a perspective that leads the eye down the center. A large commercial airplane is visible on the runway, its lights reflecting on the tarmac. The background shows the airport's perimeter lights and some distant city lights under a dark sky.

- Taxi **slowly**, particularly in congested areas.
- Use **extra caution** when entering or crossing a runway.
- Avoid using the **strobe lights and bright**, forward-facing lights around other aircraft.
- When stopped, use extra vigilance to ensure the airplane **does not creep forward**.
- **Adjust the interior lights to a minimum** brightness that allows reading the instruments and switches. Dimming the lights reduces reflections on the windows.
- **Review NOTAMS** for available lighting at certain airports.
  - Found in the AFD or Chart Supplement.
- **Pilot-Controlled lighting**
  - Key aircraft mic - click 3x, 5x, 7x for brightness
  - Found in AIM Ch. 2 : 2-1-8 Pilot Control of Airport lighting

# NIGHT OPERATIONS

## Exterior lights

- Are used to increase the visibility of airplanes on airport surfaces, be mindful of other pilots' night vision.
- Engines running—use beacon lights.
- **Taxiing**—prior to commencing taxi (landing lights, position (red/green), and anti-collision lights)
  - Turn ON when moving/intending to move on ground.
  - **Turn OFF** strobe lights if they will adversely affect the vision of others in proximity. **(Then turn them back on again)**
- Crossing a runway—use all exterior lights.
- Cleared to Line Up and Wait: Line up slightly (approximately 3') off the



# TAXIWAY LIGHTING

**Taxiway edge lights** outline the edges of taxiways during periods of darkness or restricted visibility conditions. These fixtures are steady burning and emit blue light.

**Taxiway centerline lights** are located along the taxiway centerline to facilitate ground traffic under low visibility conditions. These lights are steady burning and emit green light.

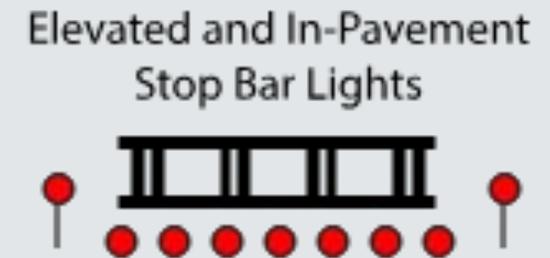
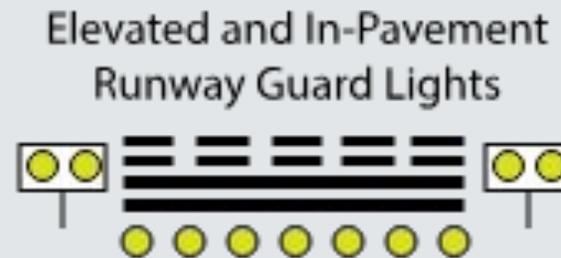
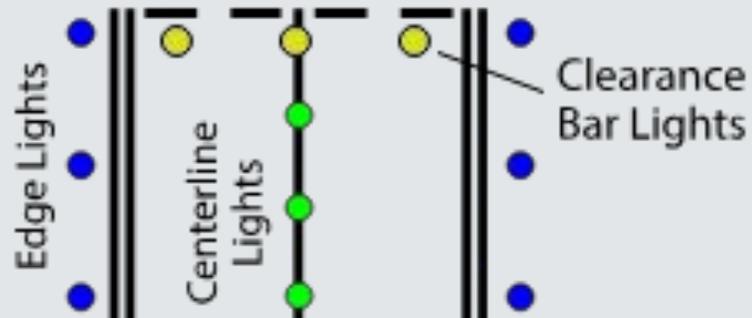
**Clearance bar lights** consist of three yellow in-pavement lights. These lights are installed at some taxiway holding positions to increase the conspicuity of the holding position in low visibility conditions and periods of darkness.

**Runway guard lights** are installed at taxiways that provide access to an active runway and may be used in all weather conditions. These lights consist of elevated or in-pavement, alternately flashing yellow lights that identify the location of a runway holding position marking.

**Elevated runway guard lights** are called “wig-wag” lights because they blink on and off in an alternating fashion.

**Stop bar lights** confirm the ATC clearance to enter or cross the active runway in low visibility conditions. These lights consist of a row of red, unidirectional, elevated, and in-pavement lights placed at the runway holding position (runway entrance or ILS critical area). These lights may be operated automatically or controlled by ATC. Following an ATC clearance to proceed, the stop bar is turned off, and the taxiway centerline lead-on lights are turned on.

- **Caution:** Never cross a red illuminated stop bar, even if an ATC clearance has been received.



## **15. OPERATIONS AT NON-TOWERED AIRPORTS.**

## **NONTOWERED AIRPORT CONSIDERATIONS**

- Continuously monitor and communicate on the appropriate frequency. Remember that some aircraft may not be equipped with a radio.
- Scan the full length of the runway, including the final approach paths, before entering or crossing a runway.
- Remember that there is no “active” runway. Flight operations may occur on more than one runway.
- Aircraft may be flying an instrument approach to runways other than the runway in use for takeoff and landing.

## **16. USE OF AIRCRAFT EXTERIOR LIGHTING.**

# AIRCRAFT LIGHTING- 91.209

## Recommended Usage of Exterior Lighting

- References: 14 CFR 91.209, AIM 4-3-23, AC 91-73
- Engines Running: Beacon ON
- Sunset to Sunrise: Position lights ON
- Taxi (While Moving): Taxi light ON
- Taxi (When Stopped or Yielding): Taxi light OFF
- Crossing a Runway: All exterior lights ON
- Line Up and Wait: Landing light OFF; All other exterior lights ON
- Takeoff and Landing: All exterior lights ON
- Climb and Descent: All exterior lights ON



## **17. LOW VISIBILITY OPERATIONS**

# LOW VISIBILITY CONDITIONS

Low Visibility Conditions increase the risk of a runway incursion.

All resources available should be used during taxi :

- Airport Diagram
- Heading Indicators
- Airport Signs
- Marking
- Lighting

If uncertain of your location, do NOT stop on a runway; advise ATC and continue to make position calls.

**REMEMBER:** ATC does not have Radar Services on the ground to see you.

- However, some big airports have Airport Surface Detection System - a surveillance system using radar and satellite technology that allows air traffic controllers to track surface movement of aircraft and vehicles. Developed to

# LANDING ON A CONTAMINATED RUNWAY?

AC 91-79A Mitigating the Risks of a Runway Overrun Upon Landing Recommends:

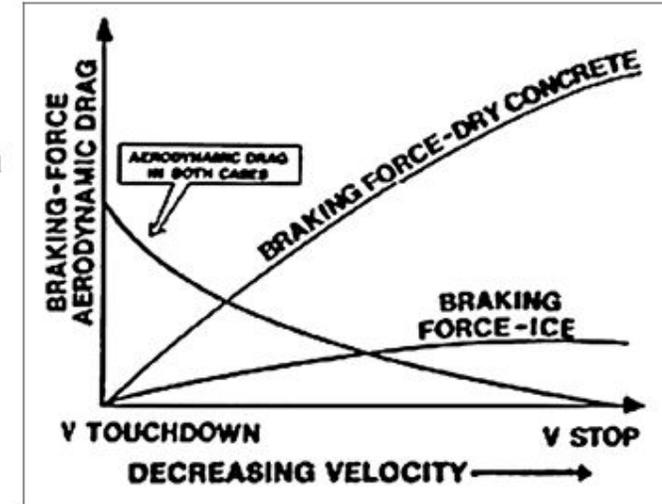
A safety margin of 15% should be added, and the resulting distance should be within the runway length available. The FAA considers a 15 percent margin to be the **minimum acceptable safety margin**.



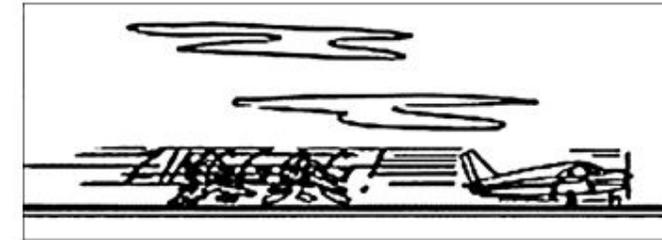
## Landing on Wet, Icy, or Snow-Covered Runways

Where runway friction is low or nil, aerodynamic braking becomes much more important. Use aerodynamic drag to your advantage on landing—especially when the runway is wet or icy. Simply hold the nosewheel off until it settles on its own.

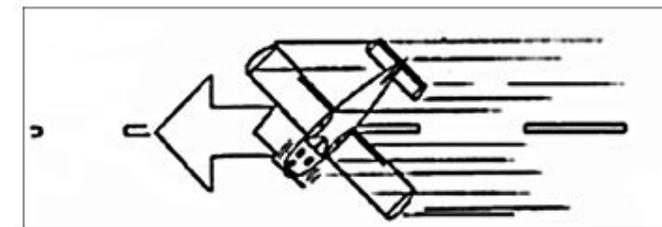
Braking is not the only problem.



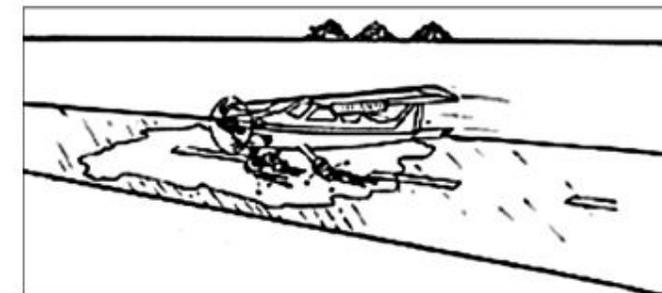
Skidding is another real hazard on a wet or icy runway.



Improper braking is the villain because locked brakes stop the wheels from rolling, and braking effectiveness (not to mention steering effectiveness) drops to nothing.



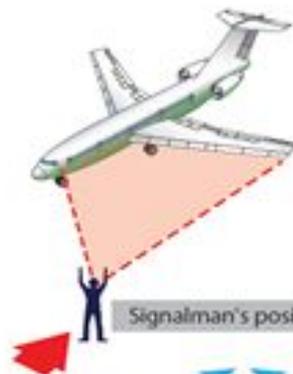
Skidding sideways is a fast ticket to blown tires or collapsed landing gear.



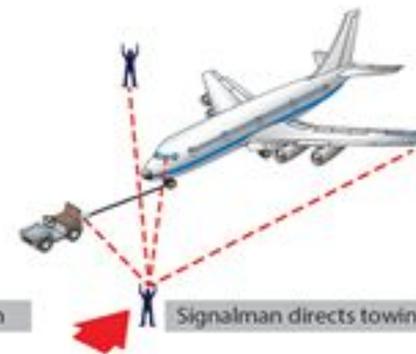
# MARSHALLING



Flagman directs pilot to signalman if traffic conditions require



Signalman's position



Signalman directs towing



Stop



Come ahead



Emergency stop



Cut engines



Start engines



Pull chocks



Insert chocks



Slow down



All clear (OK.)



Left turn



Right turn



Night operation

# LIGHT GUN SIGNALS

LIGHT GUN SIGNALS			
COLOR AND TYPE OF SIGNAL	MOVEMENT OF VEHICLES, EQUIPMENT AND PERSONNEL	AIRCRAFT ON THE GROUND	AIRCRAFT IN FLIGHT
<b>STEADY GREEN</b> 	Cleared to cross, proceed or go	Cleared for takeoff	Cleared to land
<b>FLASHING GREEN</b> 	Not applicable	Cleared for taxi	Return for landing (to be followed by steady green at the proper time)
<b>STEADY RED</b> 	STOP	STOP	Give way to other aircraft and continue circling
<b>FLASHING RED</b> 	Clear the taxiway/runway	Taxi clear of the runway in use	Airport unsafe, do not land
<b>FLASHING WHITE</b> 	Return to starting point on airport	Return to starting point on airport	Not applicable
<b>ALTERNATING RED AND GREEN</b> 	Exercise Extreme Caution!!!!	Exercise Extreme Caution!!!!	Exercise Extreme Caution!!!!