Airport Operations

Objective

Identify airport operations and procedures, including traffic patterns, runway identifiers, and light gun signals. Understand the role of ATC and the importance of communication with them.

Motivation

Understanding airport operations is critical for safe flight operations. Pilots need to be familiar with traffic patterns and the role of ATC in managing air traffic. This knowledge will help pilots navigate airports safely and efficiently.

Instruction: Simple to complex, common to uncommon

What are some hazards when flying near an airport?

- Traffic congestion
- Climbing/descending aircraft
- Different aircraft at different speeds
- Pilot preoccupation
- Mix of IFR and VFR traffic

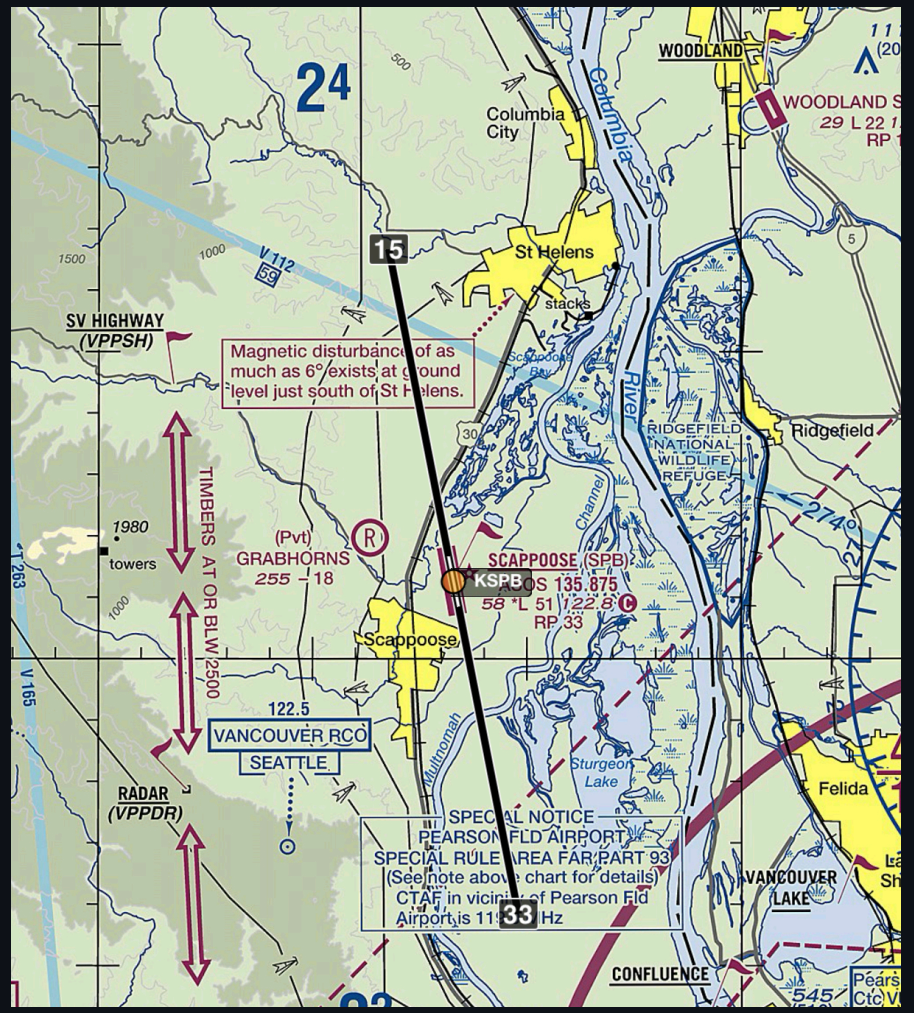
Overview of Airport Operations

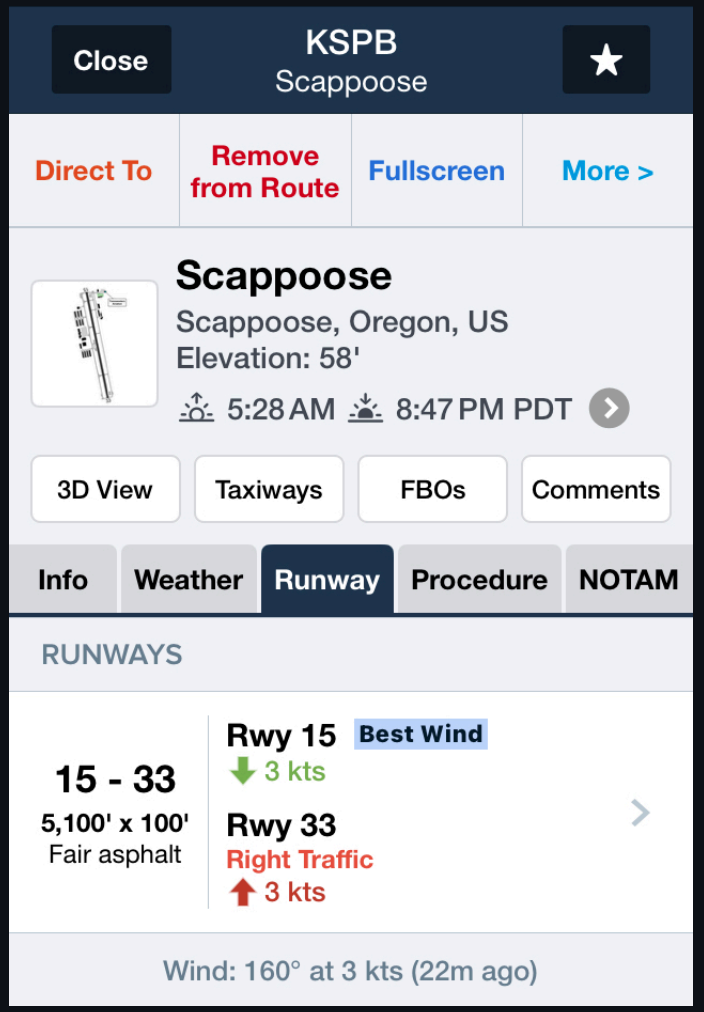
- Untowered airports
  - Runway Identifiers
  - ASOS/AWOS
  - Traffic Patterns
  - CTAF/Unicom frequencies
  - Traffic pattern communication
  - Right-of-way Rules
- Airports with a Control Tower
  - ATC procedure
  - Loss-of-communications
  - Light gun signals
  - Wake turbulence and LAHSO

Let's Go to Scappoose

- What runways do they have?
- What is the weather like?
- How do we know which runway to land on?
- When do we line up with the runway?
- How do we avoid other airplanes?
- How do communicate with those airplanes?

Runway Identifiers: What runways do they have?

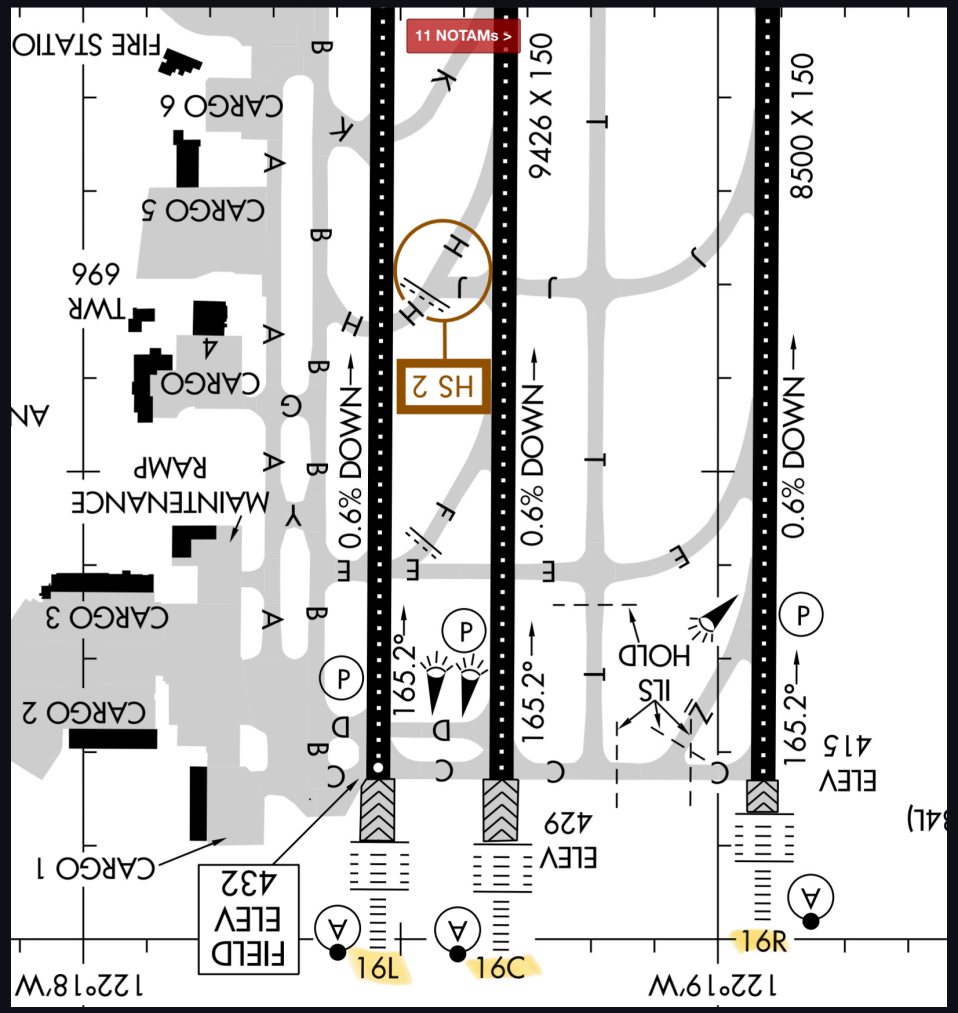




Runway Identifiers

- Aligned with magnetic north heading
- Example: Heading 140°M gives runway 14
- Shift slowly over time
- Parallel runways will be given L, R, or C designations

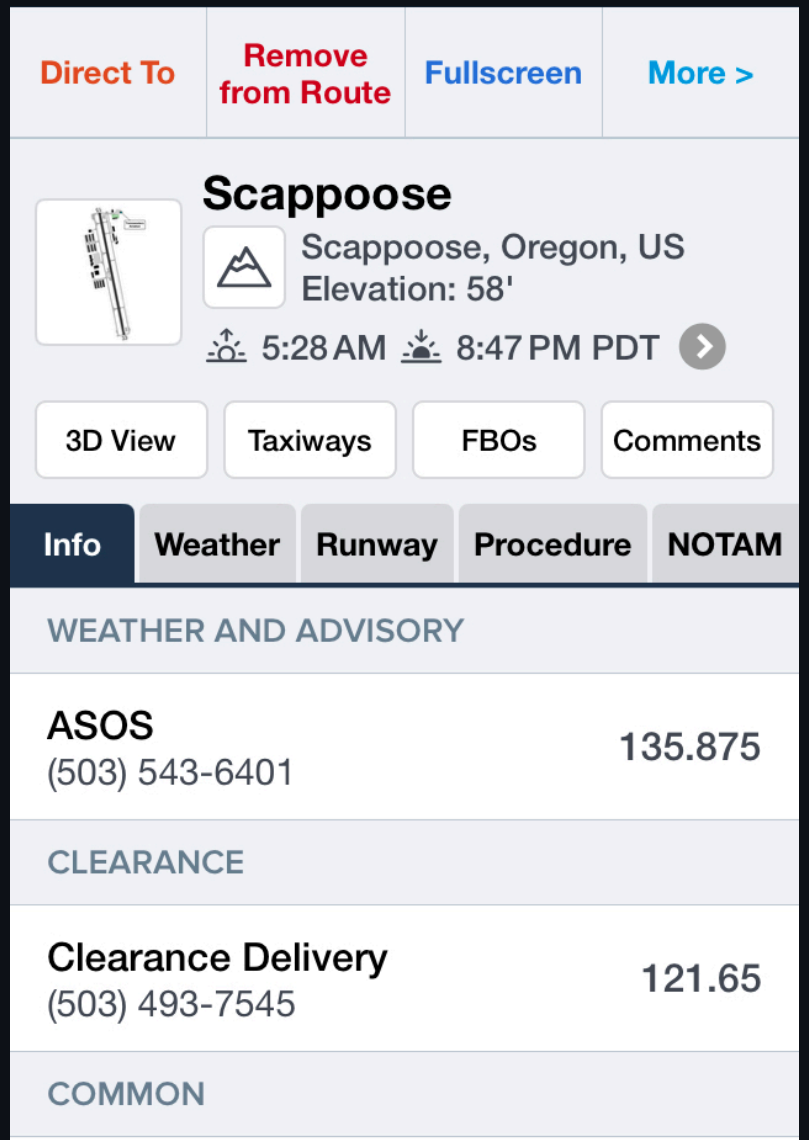
Runway Identifiers: KSEA



Weather: What is the weather like?

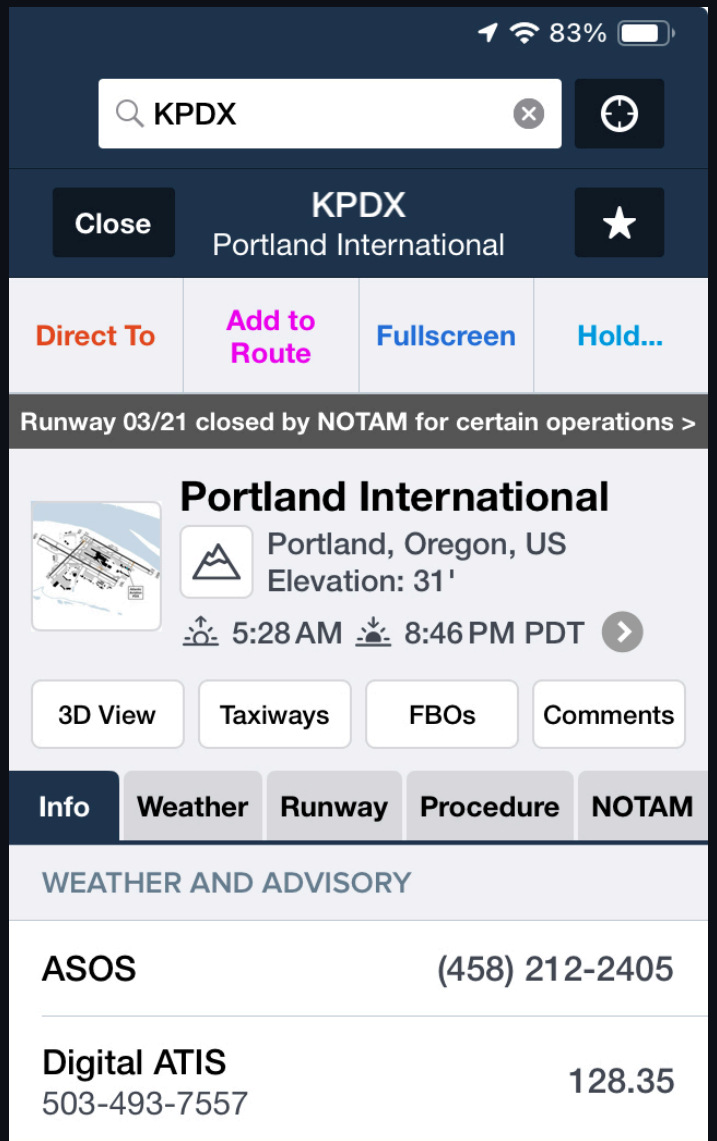
- Many airports will have weather reporting systems
- These stations will give you basic weather information:
  - Altimeter setting
  - Wind direction and speed
  - Temperature/dewpoint
  - Visibility
  - Sky condition (clouds, ceilings)
  - Precipitation

Weather: Automated Weather Observations



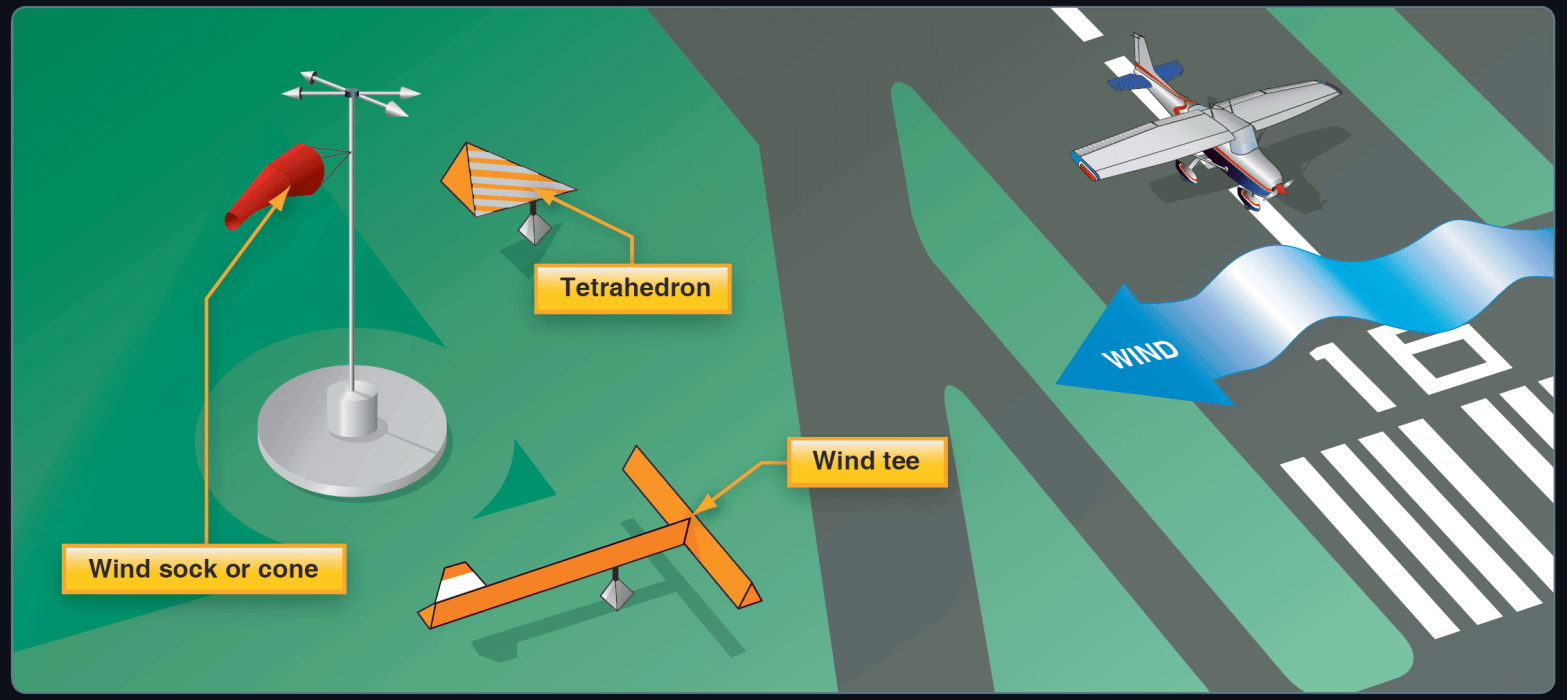
- AWOS: Automated Weather Observing System - basic
- ASOS: Automated Surface Observing System - more advanced
- Machine-generated voices
- Not all systems will give all fields

Weather: ATIS Broadcasts



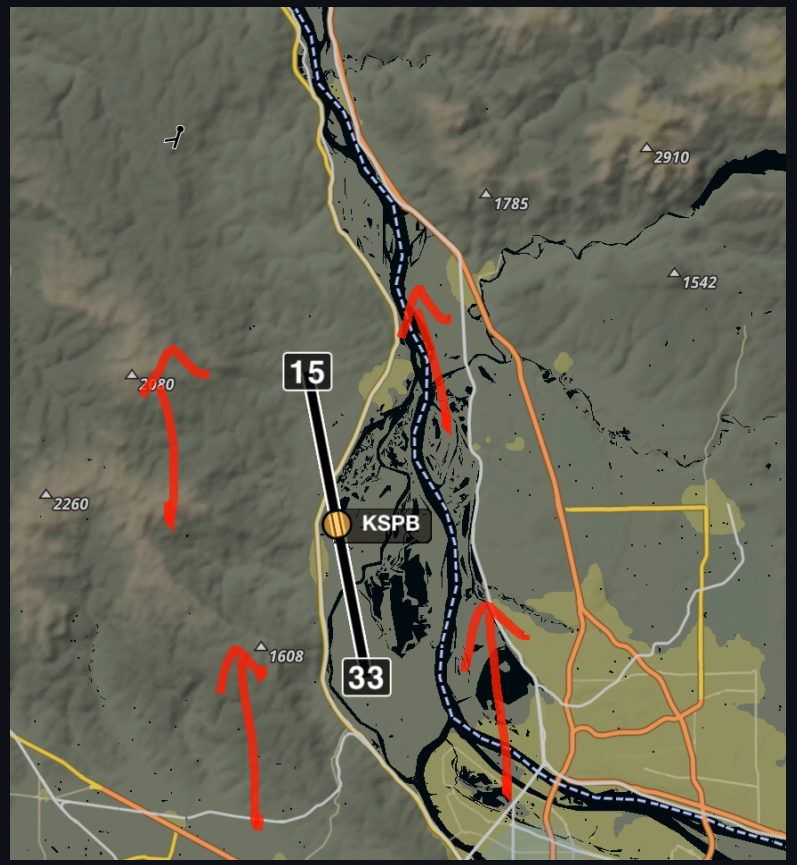
- Found at towered airports
- Usually recorded by a controller
- Will include a letter identifier
  - "Information Golf"
  - You'll include this when you call the controller

Weather: Visual Wind Indicators



- Show which direction to fly a traffic pattern
- Segmented circle/traffic pattern indicator: Shows traffic pattern direction
- Tetrahedron: Land in the direction that it's pointed

Runway Winds: What runway are we going to land on?



- Pick a runway facing the wind
- Wind values are given as the direction the wind is blowing from
- If the wind was 150 at 10 knots: Wind is straight down runway 15
- Also listen for other traffic, see what runway they are using

Runway Winds: Knowledge Check

The wind is reported at 040 at 8 knots. Which runway would we land on, 15 or 33?

Runway Winds: Knowledge Check

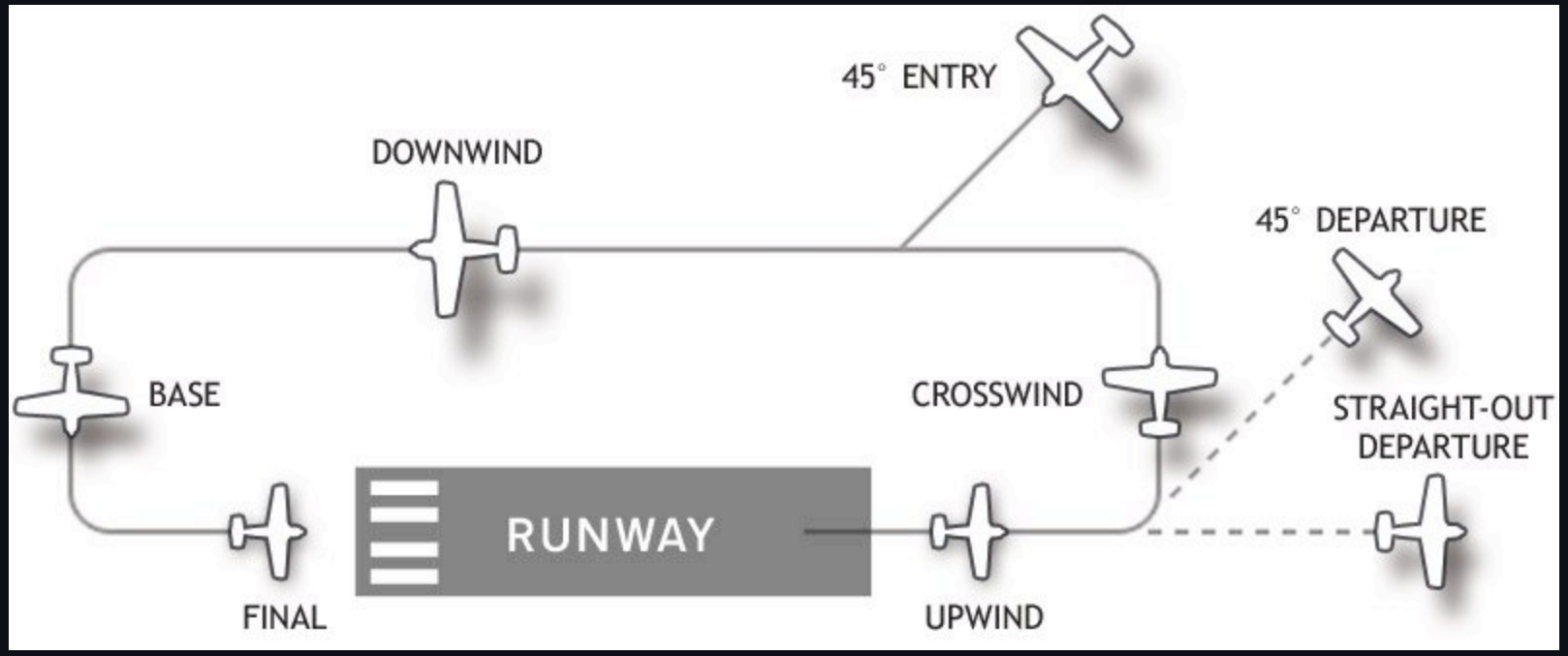
The wind is reported at 040 at 8 knots. Which runway would we land on, 15 or 33?

- Favoring runway 33: 240 - 060°
- Favoring runway 15: 060 - 240°

040 would favor runway 33 slightly, though this is a sizable crosswind.

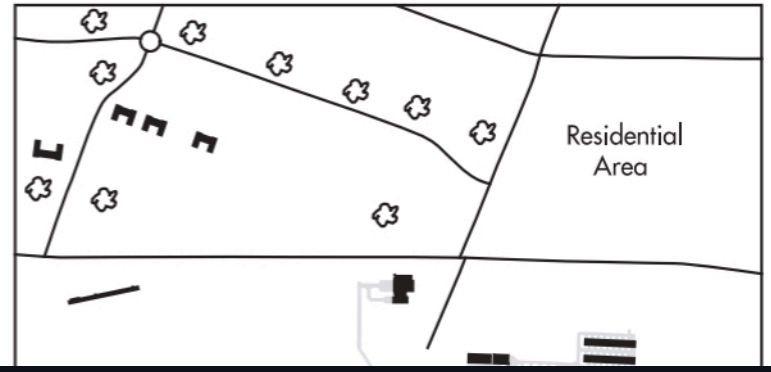
Traffic Patterns: How do we line up with the runway?

We will use a standardized *traffic pattern*, which is a big rectangle that airplanes fly around a runway.



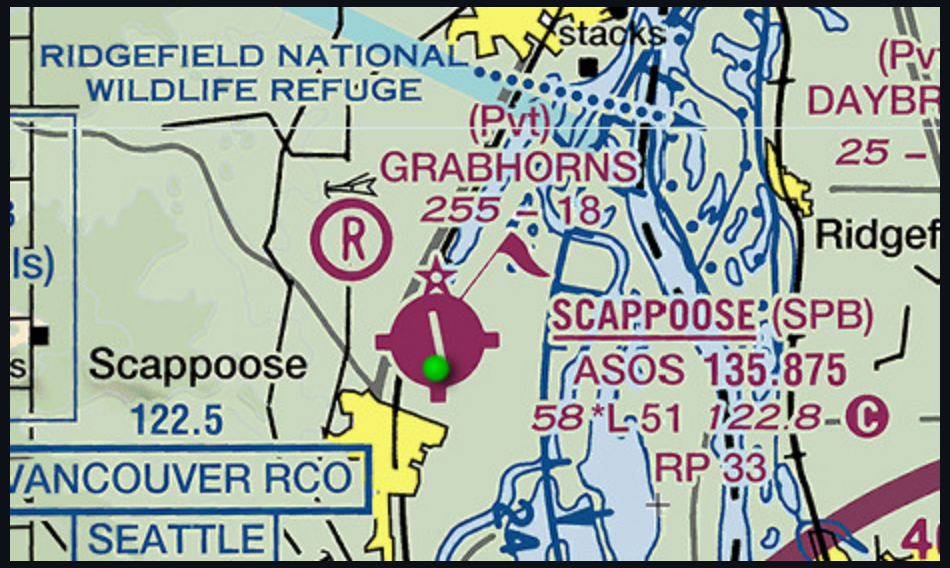
Traffic Patterns: How high do we fly the traffic pattern?

PEARSON FLD (VUO)(KVUO) 2 SW UTC–8(–7DT) N45°37.23′ W122°39.39′ **SEATTLE**
29 TPA—1029(1000) NOTAM FILE VUO **L–1C**
RWY 08–26: H3275X60 (ASPH) MIRL **IAP**
RWY 08: VASI(V4R)—GA 3.75° TCH 31′. Bridge.
RWY 26: REIL. PAPI(P2R)—GA 4.0° TCH 32′. Thld dsplcd 762′. Tree. Rgt tfc.
RUNWAY DECLARED DISTANCE INFORMATION
RWY 08: TORA–3275 TODA–3275 ASDA–3065 LDA–3065
RWY 26: TORA–3275 TODA–3275 ASDA–3275 LDA–2513
SERVICE: S4 **FUEL** 100LL **OX** 2 **LGT** Rwy 08 VASI unusable byd 6° L or R of rwy cntrln. ACTVT PAPI Rwy 26, MIRL Rwy 08–26—CTAF.

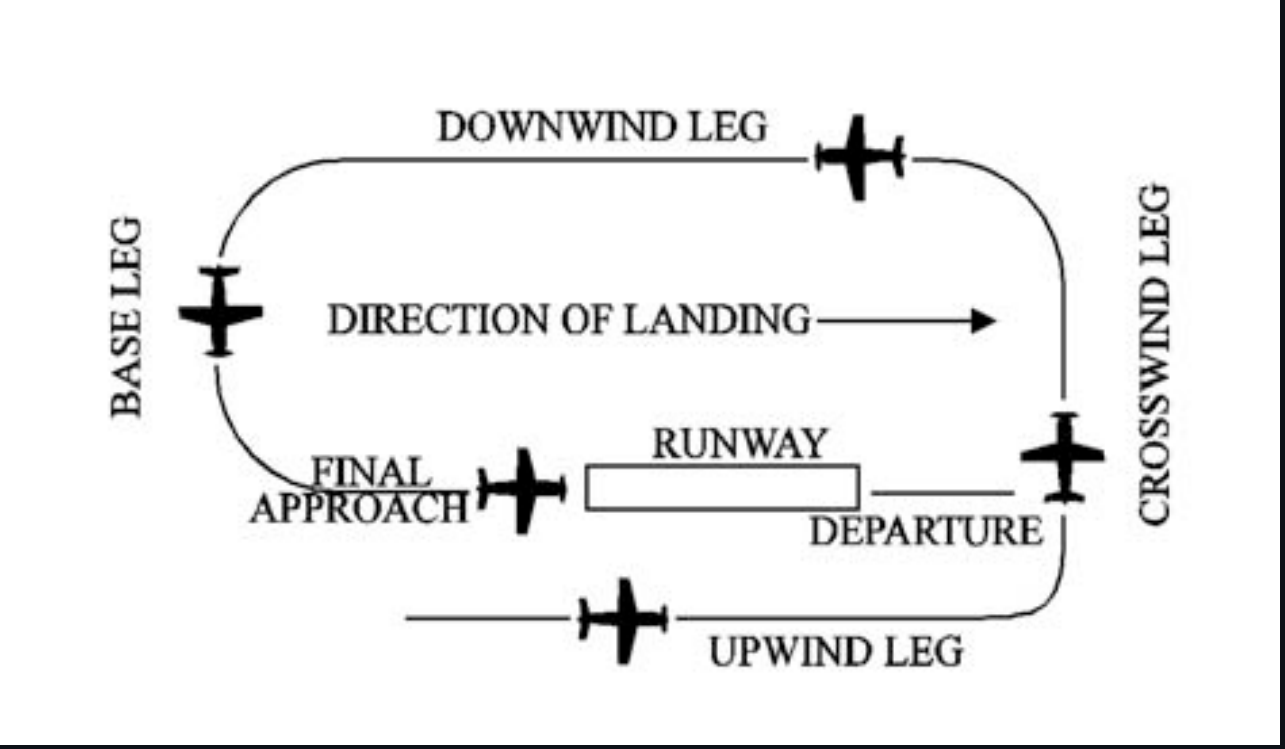


- Chart supplement
- Propeller-driven aircraft: 1000' above field elevation
- Large or turbine aircraft: 1500' above field elevation
- Helicopters: 500', but may vary

Traffic Patterns: What direction do we turn?

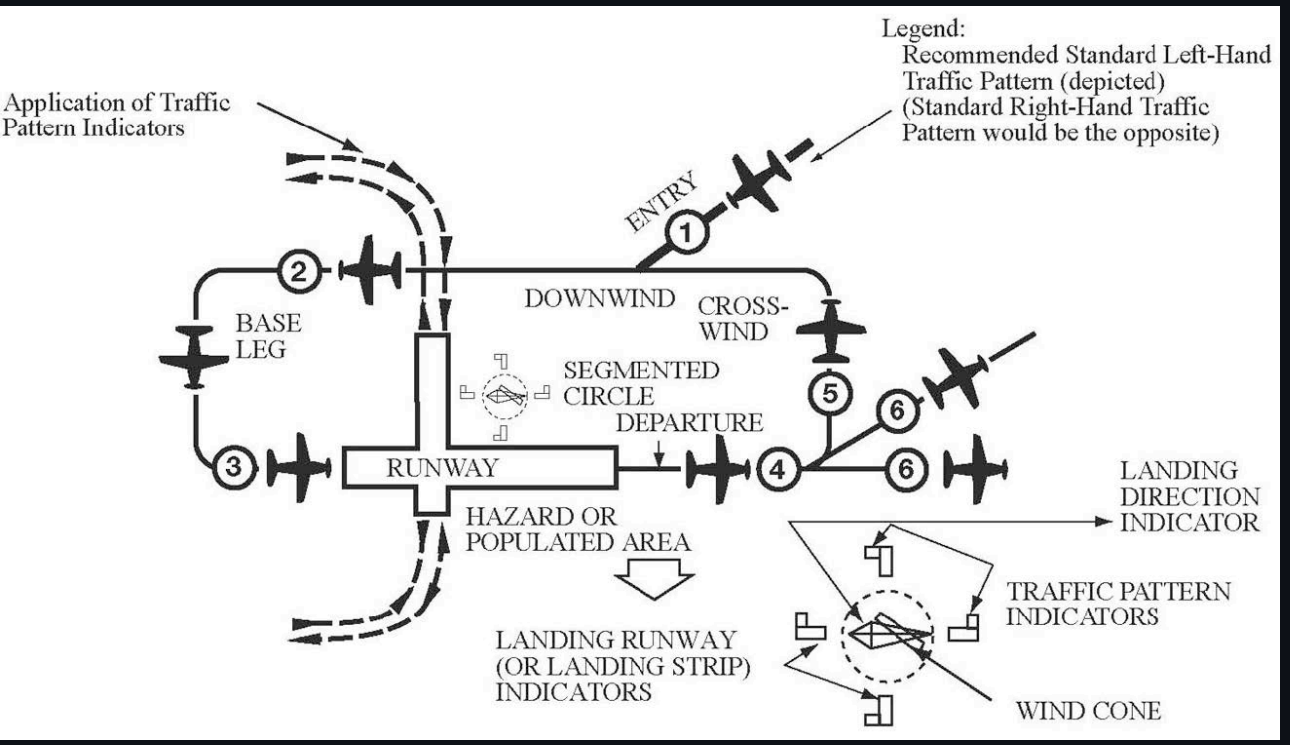


- By default, all traffic patterns are made to the left
- Some airport have exceptions, shown on sectional ("RP 36"), and in ForeFlight



Traffic Patterns: Legs for Landing

- Downwind leg
- Base leg
- Final approach
- Departure



Traffic Patterns: Entry

- Enter on 45° to the downwind leg, at pattern altitude (1)
  - Look for traffic that may already be on downwind
- Turn base 45° from touchdown point (2)
- Turn final to line up with runway (3)

Traffic Patterns: Mid-Field Entry

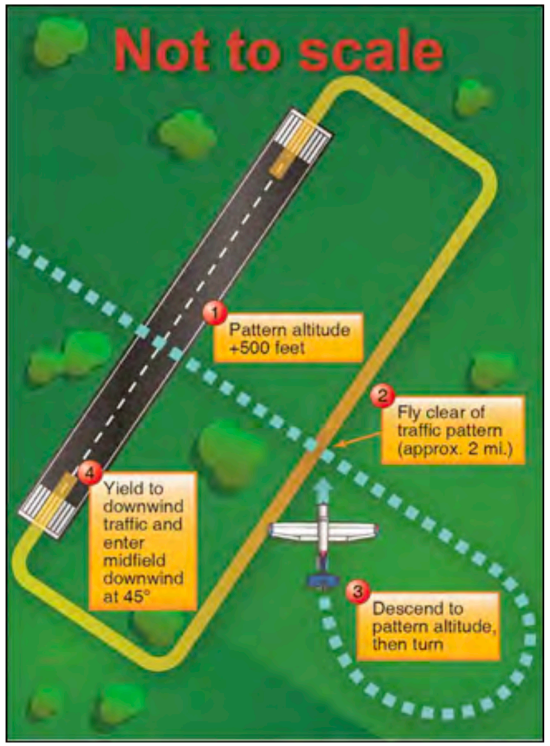


Figure 14-2. *Preferred Entry-Crossing Midfield.*

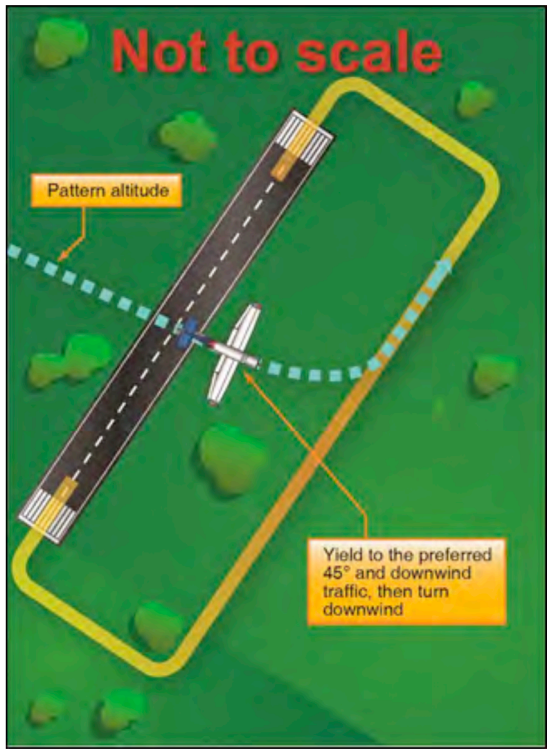
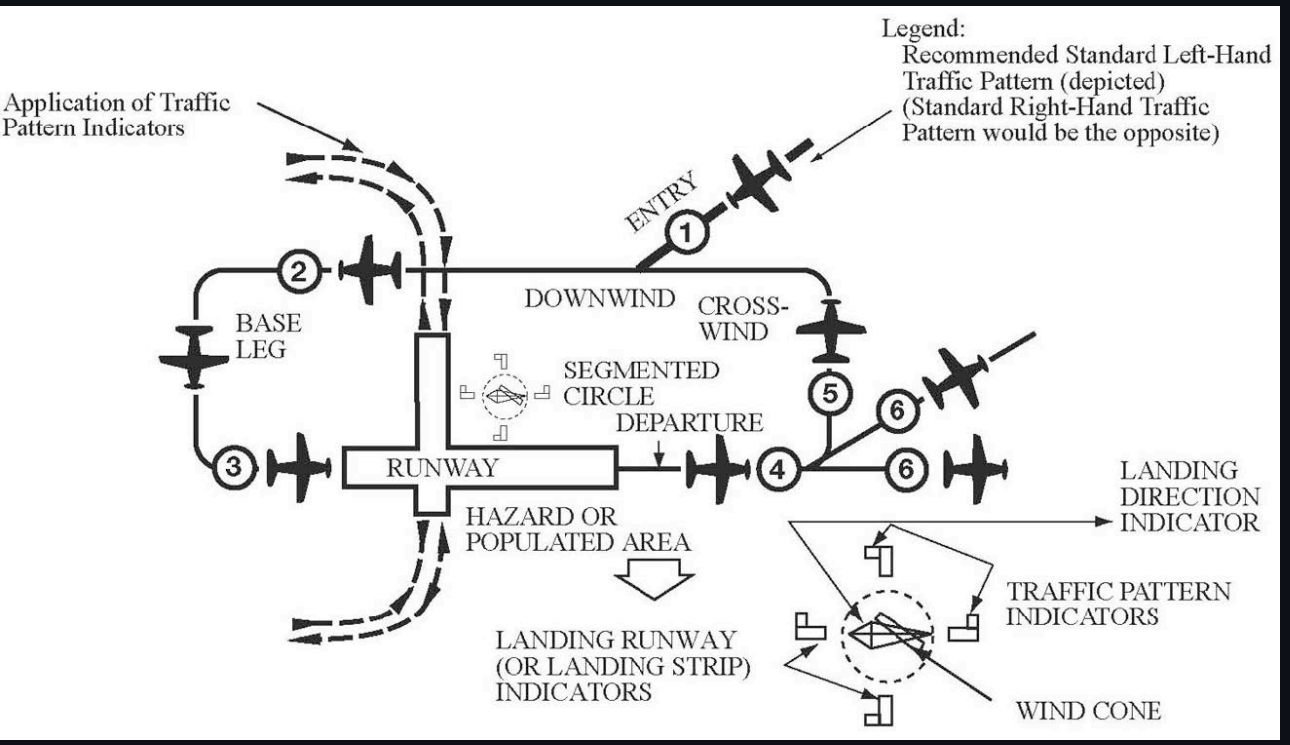


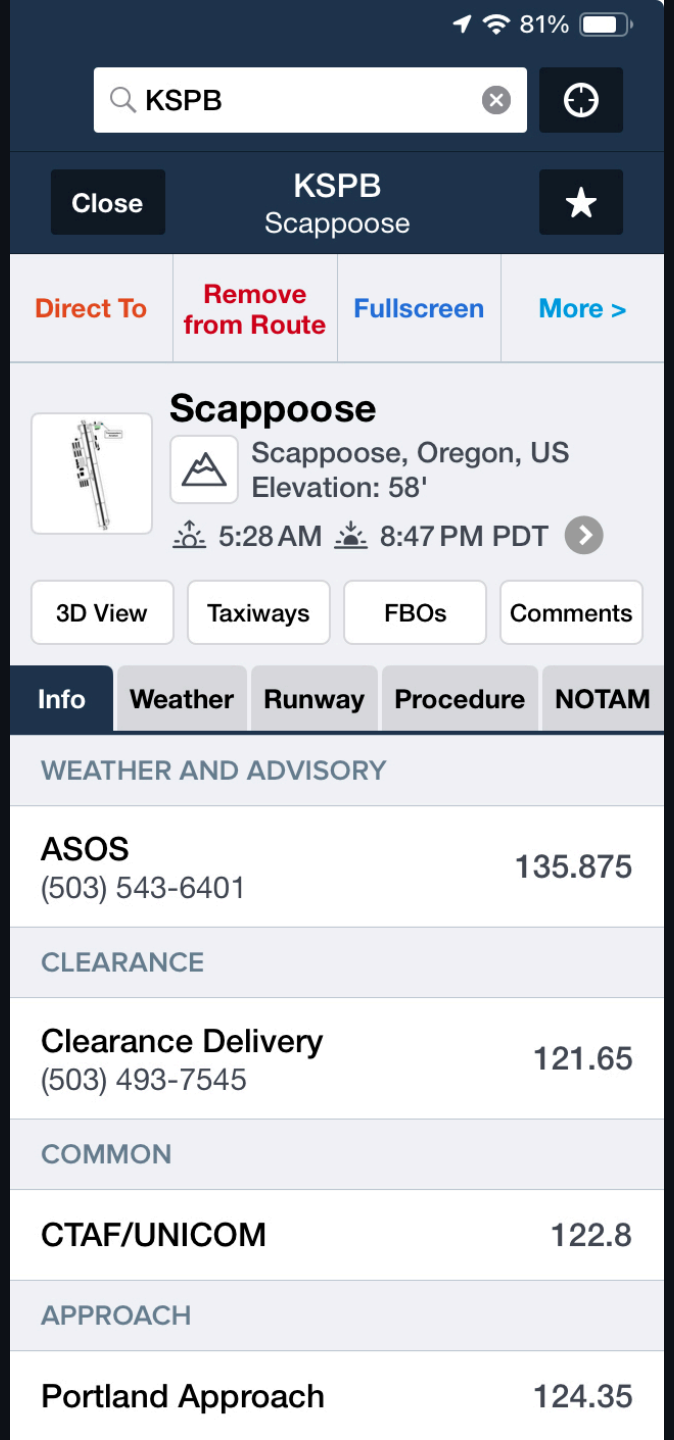
Figure 14-3. *Alternate Midfield Entry.*

- What if you're on the "wrong" side of the airport?
- Preferred entry: Overfly midfield at pattern altitude + 500 ft.
- Fly ~2 mi clear of the pattern, make a right turn to join the 45



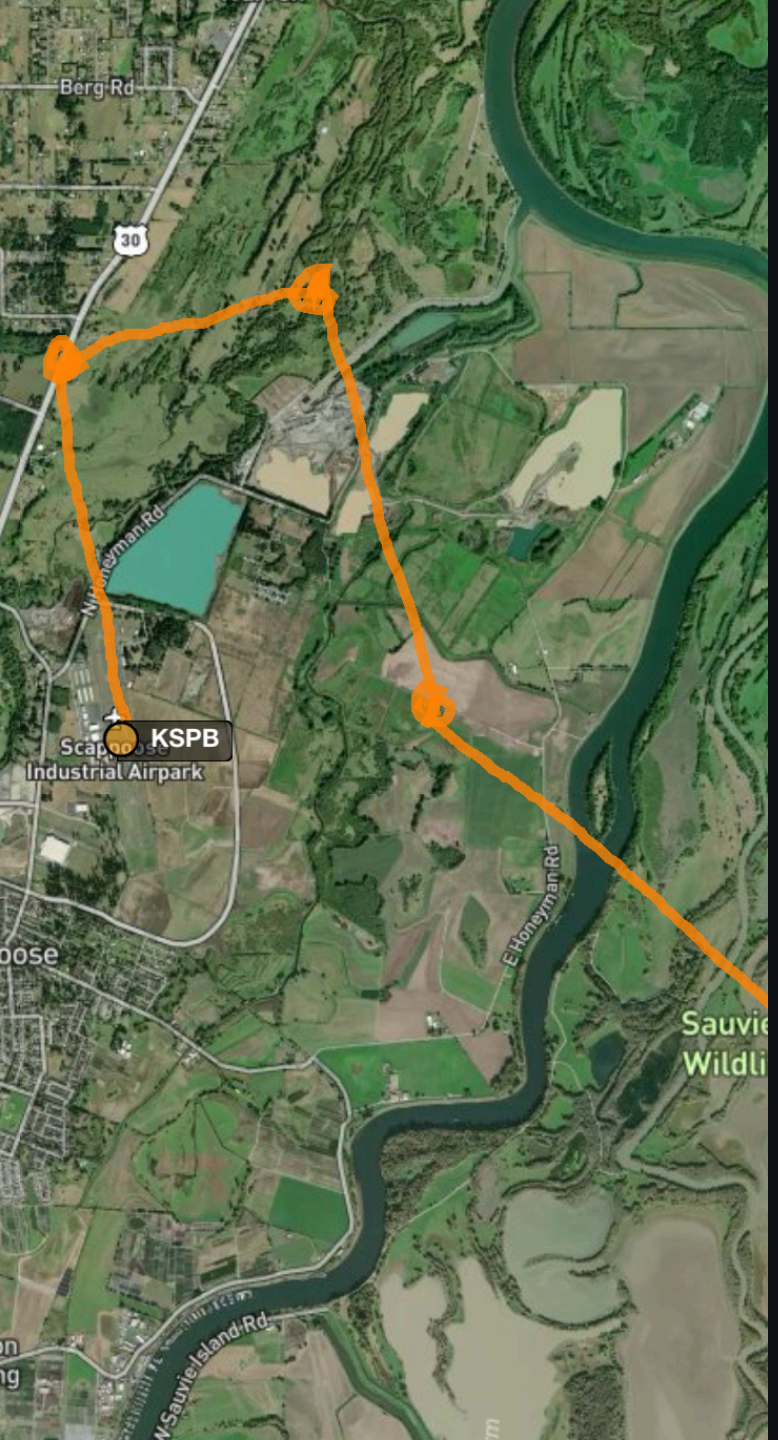
Traffic Patterns: Exit

- If remaining in the pattern, start crosswind leg within 300' of pattern altitude (4)
- When departing the pattern, depart straight-out or 45° in the direction of the pattern (6)



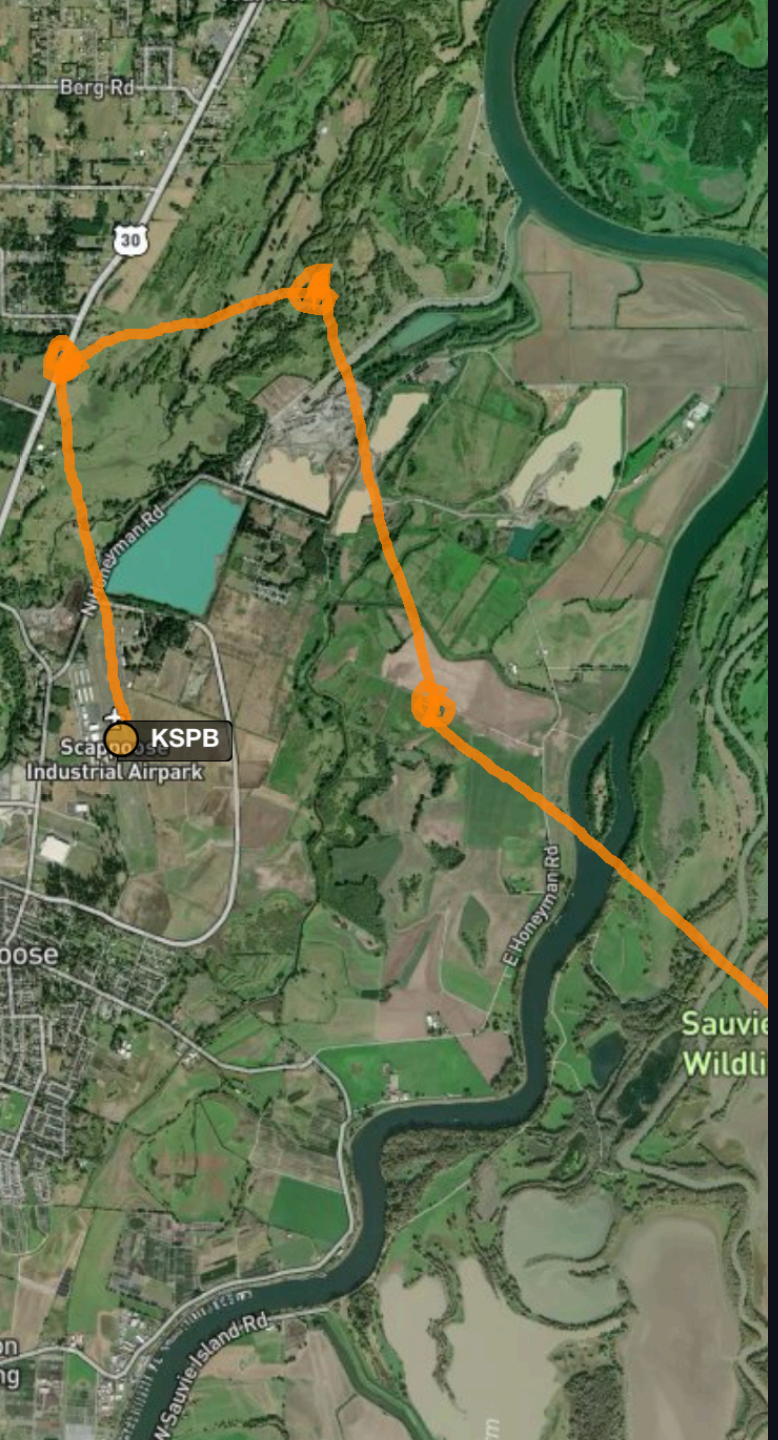
Untowered Airport Communications: How will we announce our intention to land?

- Airports will have a published **common traffic advisory frequency (CTAF)**
  - What we will use to announce our position
- UNICOM
  - These allow you to communicate with a station on the ground
  - Often, these are manned by a fixed-based operator (FBO) on the ground
  - You can use them to request services like fuel



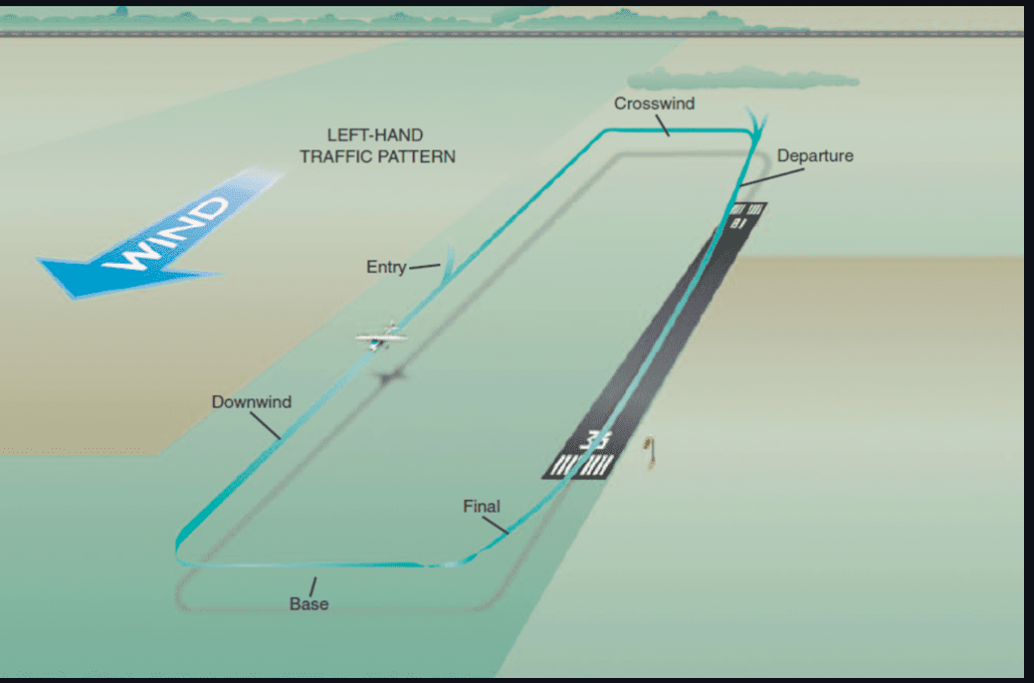
Untowered Airport: Position Calls

- Make initial call 10 miles out
  - `Scappoose traffic, N12382 10 mi east, 2000, entering 45 runway 15, Scappoose`
- Call when joining the 45
  - `Scappoose traffic, N12382 3 mi left 45 runway 15, full stop, Scappoose`
- Call when mid-field downwind
  - `Scappoose traffic, N12382 left downwind runway 15, full stop, Scappoose`
- Call when on base
  - `Scappoose traffic, N12382 left base runway 15, full stop, Scappoose`



Untowered Airport: Position Calls (cont.)

- Call when on final
  - `Scappoose traffic, N12382 final runway 15, full stop, Scappoose`
- When clear of runway
  - `Scappoose traffic, N12382 clear of runway 15, Scappoose`



Untowered Airport Communication: How do we avoid other airplanes?

- See-and-avoid
  - Look for airplanes in all legs of pattern
- Listen for other airplanes on the radio
  - Some airplanes may not have a radio

Runway Distances: How Long is the Runway?

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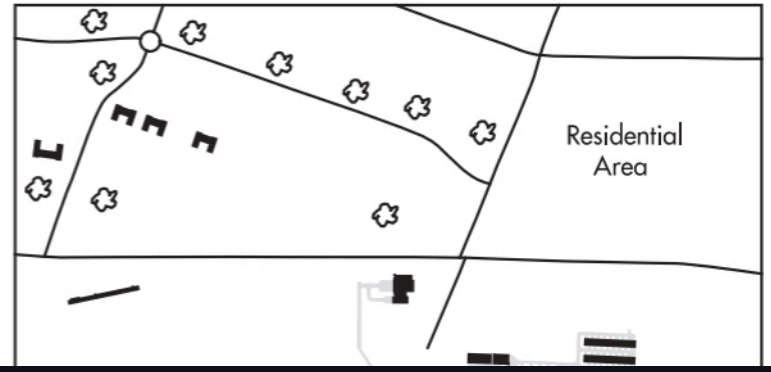
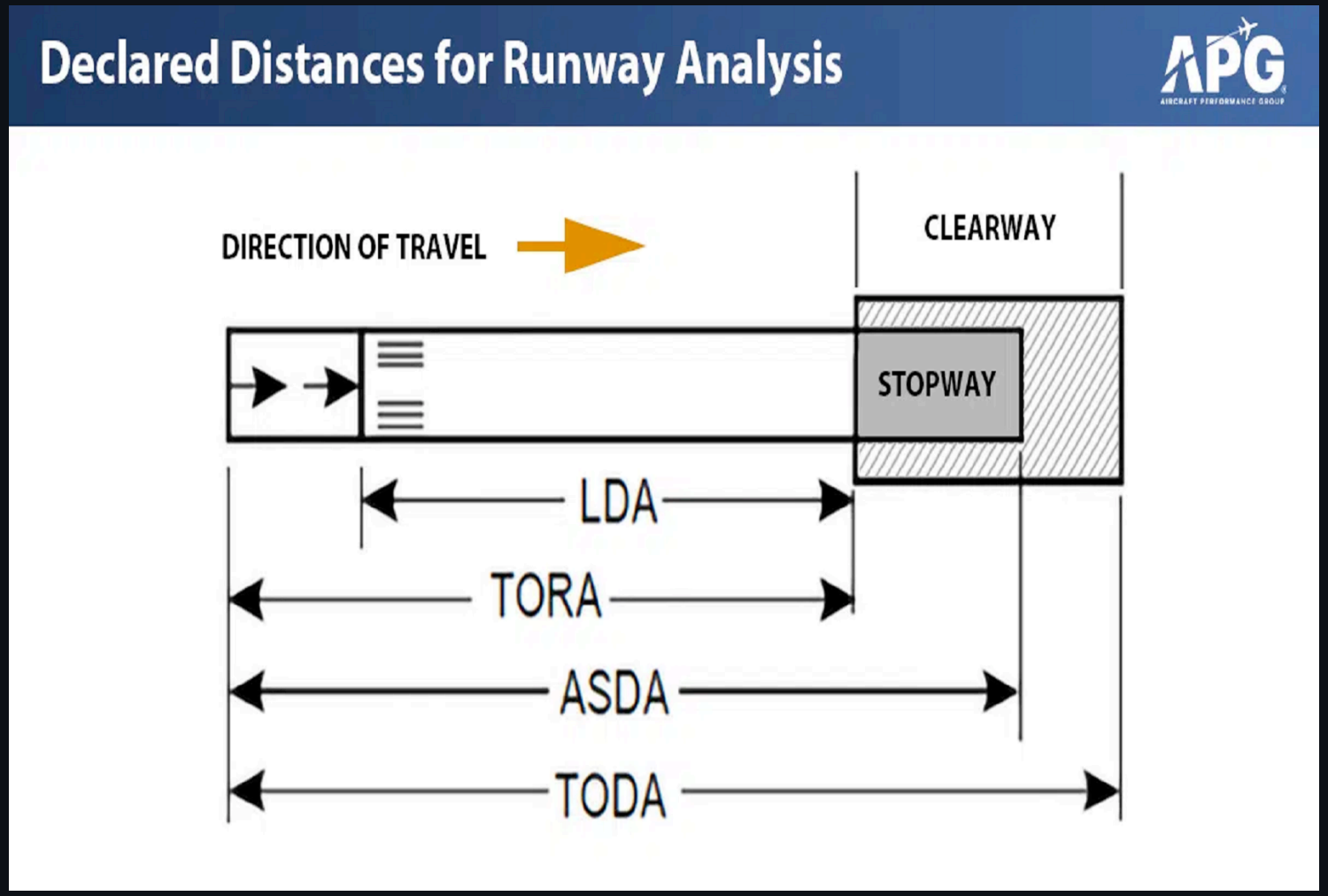
SERVICE: S4 **FUEL** 100LL **OX** 2 **LGT** Rwy 08 VASI unusable byd 6° L or R of rwy cntrln. ACTVT PAPI Rwy 26, MIRL Rwy 08–26—CTAF.

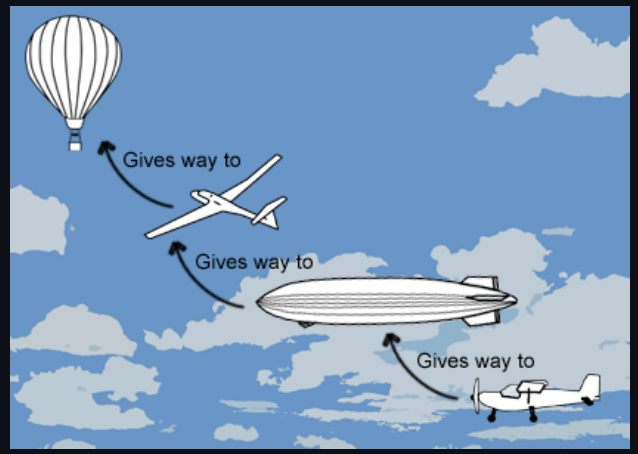


- TORA: Takeoff runway Available, usually the length of the runway
- TODA: Takeoff distance available, TODA + any clearway/stopway beyond the end of the runway
- ASDA: Accelerate-Stop Distance Available: Distance available to accelerate and stop

Runway Distances: How Long is the Runway?



Right-of-way Rules (91.113)

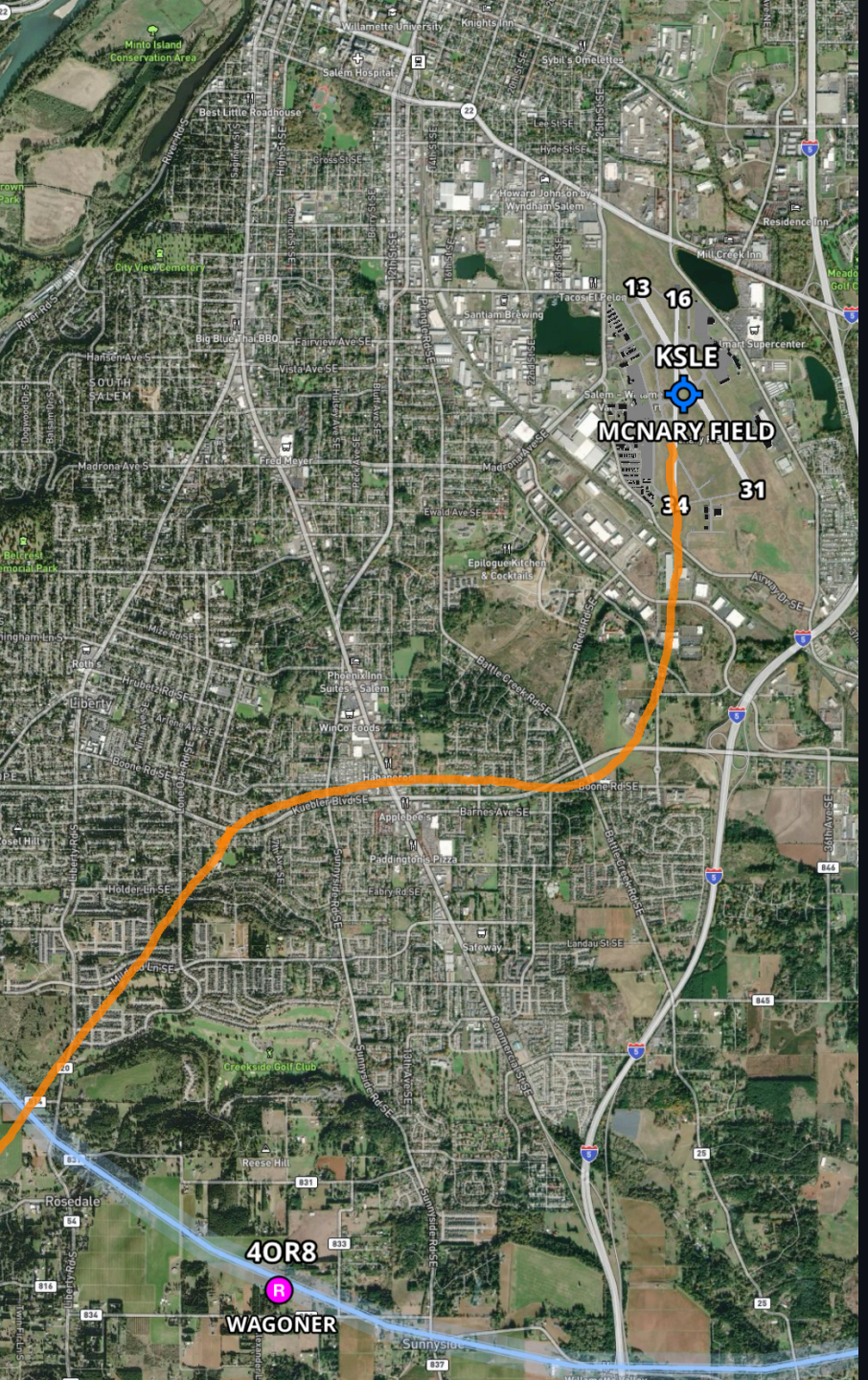


- Airplane in distress have right-of-way
- Balloons > Gliders > Airships > Airplane, Rotocraft, Weight-shift control, powered parachute
- When two airplanes are approaching to land, the lower one has right-of-way
    - However, you cannot take advantage of this by cutting in front of another aircraft

Airports with a Control Tower

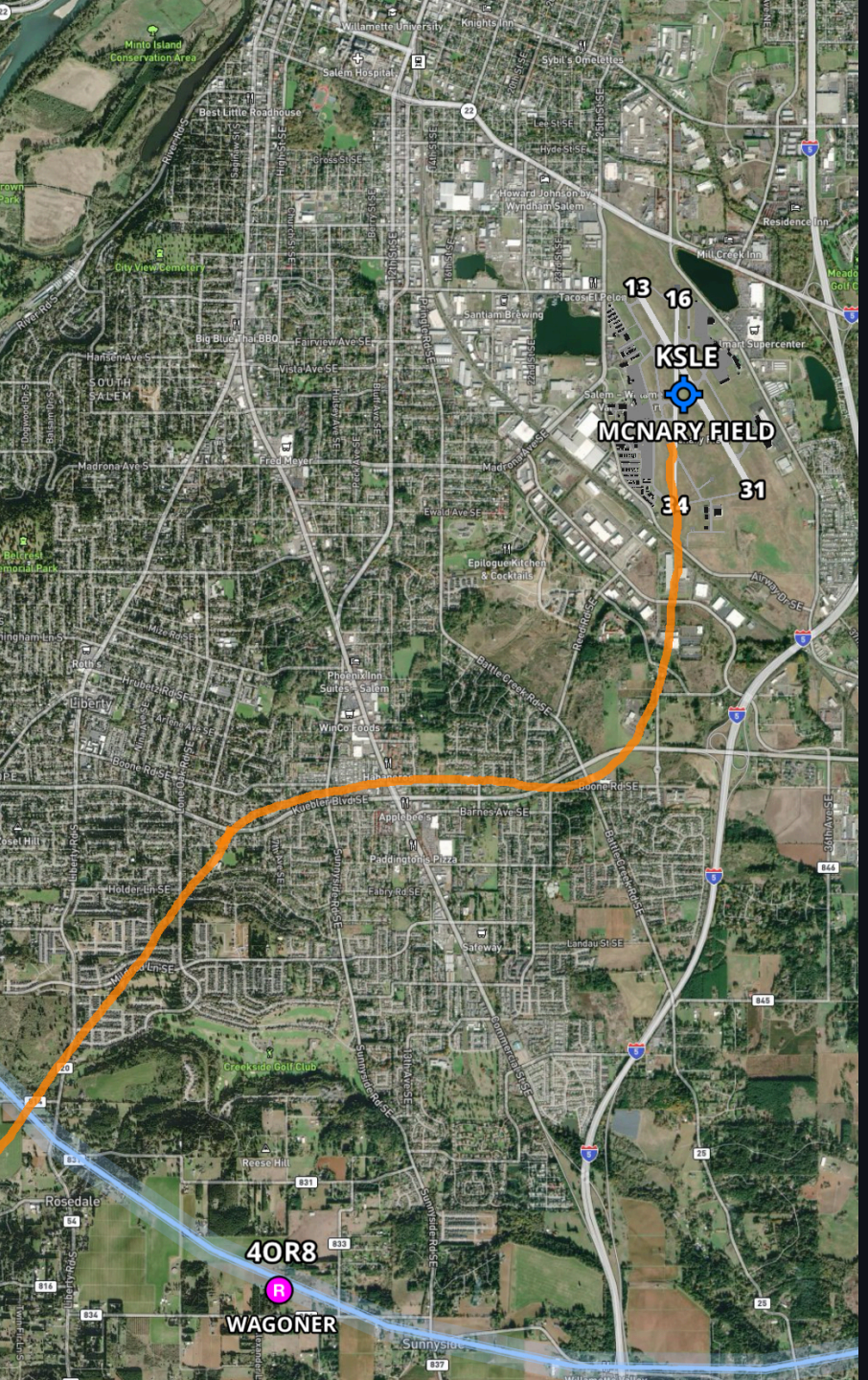
Control Tower Operations

- Maintain contact with the control tower while you're in the airspace
- Make initial call-up 15 miles out
- Some airports have a radar display, but not all
  - Traffic advisories
  - Recommended headings



Control Tower: Arrival

- Get the ATIS
- Initial call 15 miles out
  - Call: `Salem Tower, N12382, 15 miles southwest, inbound to land with information Papa`
  - Response: `N12382, Salem Tower, enter left base runway 34. Report 2 mile base.`



Control Tower: Arrival

- On a 2mi base
  - Call: `Salem Tower, N12382, 2 mile left base runway 34`
  - Response: `N12382 cleared to land runway 34`
- Once on the ground
  - Tower: `N12382 turn left A4, contact ground point 9`
  - "Ground" point 9 means `121.9`
- Once over the hold short line at A4
  - `Salem Ground, N12382 at A4, request taxi to FBO`

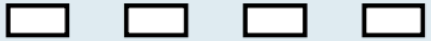
Types of Landings

- "Full stop": land and depart runway
- Touch-and-go: Touch and immediately takeoff again
- Stop-and-go: Land, stop on runway, then takeoff again
- Low approach: Fly low over the runway
- "Cleared for the option", means cleared for any of the above

Radio Failure: Loss of Two-Way Radio

- Can be loss of receive, transmit function, or both
- Squawk 7600
- Landing at an untowered airport
  - Remain outside the traffic pattern
  - Observe wind, traffic flow
  - Enter pattern when it is safe to do so
- Towered airport (Class D)
  - Try calling tower
  - Squawk 7600
  - Remain outside traffic pattern
  - Look for light gun signals from tower

Light Gun Signals

Color and Type of Signal	Movement of Vehicles, Equipment and Personnel	Aircraft on the Ground	Aircraft in Flight
Steady green 	Cleared to cross, proceed or go	Cleared for takeoff	Cleared to land
Flashing green 	Not applicable	Cleared for taxi	Return for landing (to be followed by steady green at the proper time)
Steady red 	Stop	Stop	Give way to other aircraft and continue circling
Flashing red 	Clear the taxiway/runway	Taxi clear of the runway in use	Airport unsafe, do not land
Flashing white 	Return to starting point on airport	Return to starting point on airport	Not applicable
Alternating red and green 	Exercise extreme caution!!!!	Exercise extreme caution!!!!	Exercise extreme caution!!!!

Land And Hold Short Operations (LAHSO)

- Land before an intersecting runway or taxiway
- PIC needs to accept or decline
- Land and hold short points are listed in the Chart Supplement
  - Available Landing Distance (ALD) listed for each
- Example: `N12382 cleared to land runway six right, hold short of taxiway bravo for crossing traffic B737.`
- Need basic VFR weather conditions

Wake Turbulence Holds

- ATC will hold light aircraft for 3 minutes if a large aircraft has just takeoff
- "Hold for wake turbulence"
- Pilots can request to waive this, "Request to waiver 3 minute interval"

Intersection Takeoffs

- Controller will give you take off distance available from intersection
- Pilots need to accept or decline
- Risks of intersection takeoffs:
  - Reduced takeoff distance
  - Less runway in case of an engine failure

Summary

- Uncontrolled airports
  - Runway Identifiers
  - Weather: ATIS/AWOS/ASOS
  - How to select a runway
  - Traffic Patterns: Direction, altitude, entry, exit
  - Communications
  - Runway Distances
  - Right-of-way Rules
- Control Tower Operations
  - Control Tower: Arrival
  - Types of Landings
  - Radio Failure: Loss of Two-Way Radio
  - Light Gun Signals
  - Land And Hold Short Operations (LAHSO)
  - Wake Turbulence Holds
  - Intersection Takeoffs

Knowledge Check

Preparing to land at an untowered airport, you listen to the AWOS and hear the wind is 270° at 10 knots. Looking at the wind sock though, you see it's point towards a heading of 180°

Which direction should you fly the traffic pattern and land?

Knowledge Check

You're on final to runway 36 at a towered airport. The controller tells you to "cleared for the option". What does that mean?

Knowledge Check

You're on final to runway 18 at a towered airport with crossing runways. The controller tells you to "cleared to land runway 18, hold short of runway 36 for crossing traffic".

What does that mean? Do you have to comply?