

Avoid-A-Bump

Tools and Practices to Improve Your Flying
Safety

Howard Wolvington

ATP, Gold Seal CFI-CFII-MEI
SEL/SES/MEL CSIP

2014 National CFI of the Year
Designated Pilot Examiner

this presentation at

<http://FlyWithHoward.com/resources>





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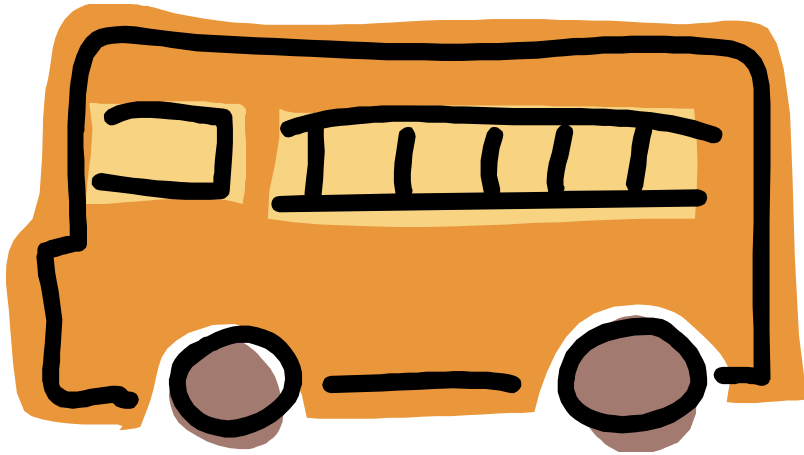
this presentation at

<http://FlyWithHoward.com/resources>



Presentation Logistics

Two Requests From Howard



???
??

Please Hold Questions
To The End



Please Silence Cell
Phones (or set them to
“stun”)

Can We Avoid-A-Bump With:

- **Taxi, and After Taxi:**
 - Airplanes
 - Runway Lights
 - Fences
 - Buildings
 - Turf
 - People
- **Takeoff, Cruise, Landing:**
 - Mid-air Collisions
 - Weather
 - Controlled Flight Into Terrain (CFIT)
 - Loss of Control (Stall/Spin)

Before You Taxi, After You Taxi...



2/21/2015

2/24/2005 KRNT Airport, photo courtesy EFC

5

Before You Taxi, After You Taxi...



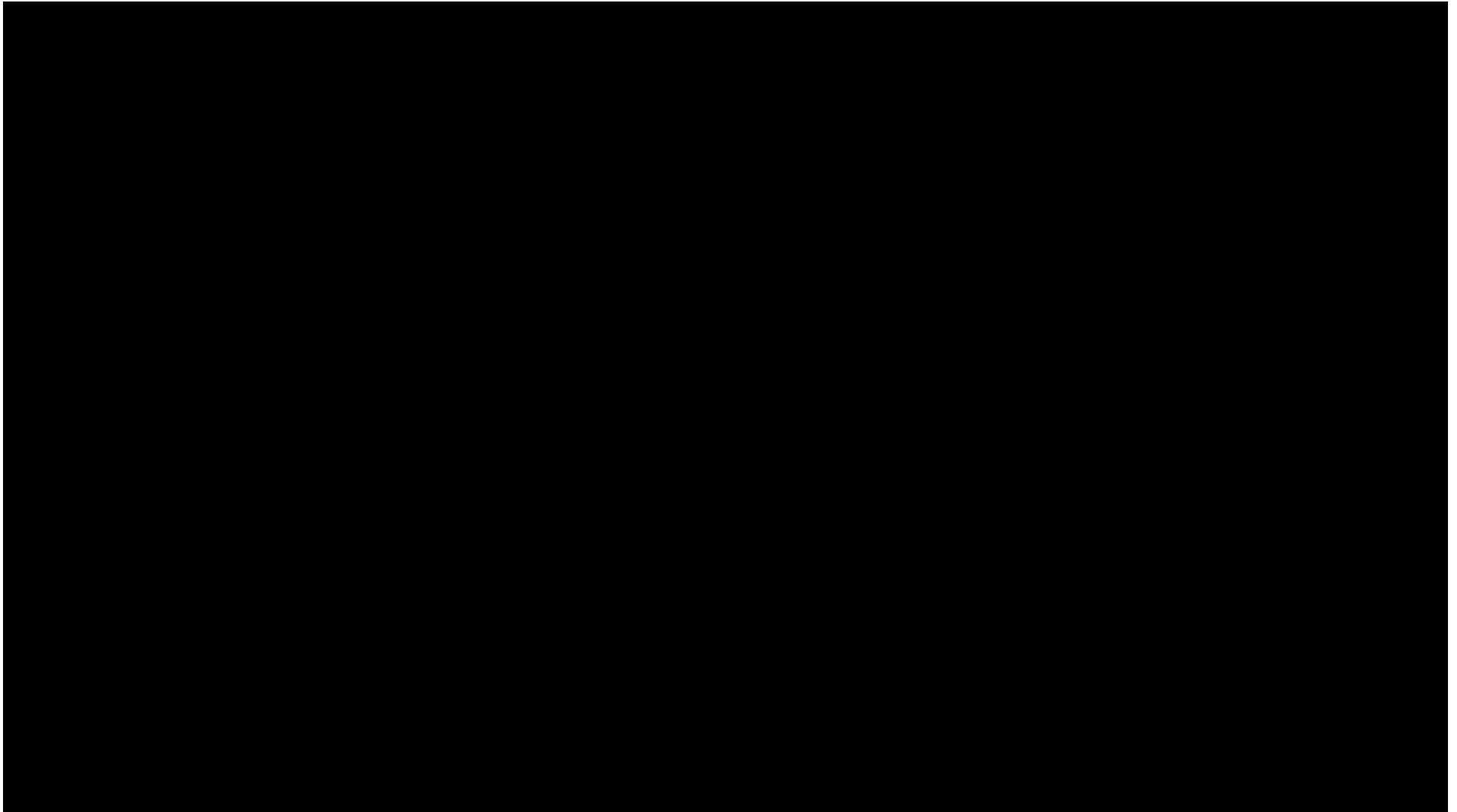
Before You Taxi, After You Taxi

- 12/3/2011 McKinney Texas accident involving Lauren Scruggs
- 4/20/1994 Auburn WA accident
- 8/8/2012 Everett WA accident
- Numerous accidents involving Hand-Propping aircraft engines

Tools and Practices to Avoid-A-Bump

- Neither pilot nor passengers exit nor approach an airplane when the engine is running

A Rundown Feeling During Taxi



Taxi After Landing



Runway Safety

- FAA has incorporated Runway Incursion Avoidance into the Private and Commercial PTS (17 elements)
 - 5 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
 - 9 Utilizing procedures to maintain/enhance situational awareness when conducting taxi operations...
- Taxiing Task in Private and Commercial PTS now includes elements
 - 5 Exhibits procedures ... maintaining situational awareness to avoid runway incursions
 - 9 Uses a taxi chart during taxi
 - 11 Utilizes procedures for eliminating pilot distractions

Runway Safety -- Why?

Incident 12/6/1999 Providence, RI

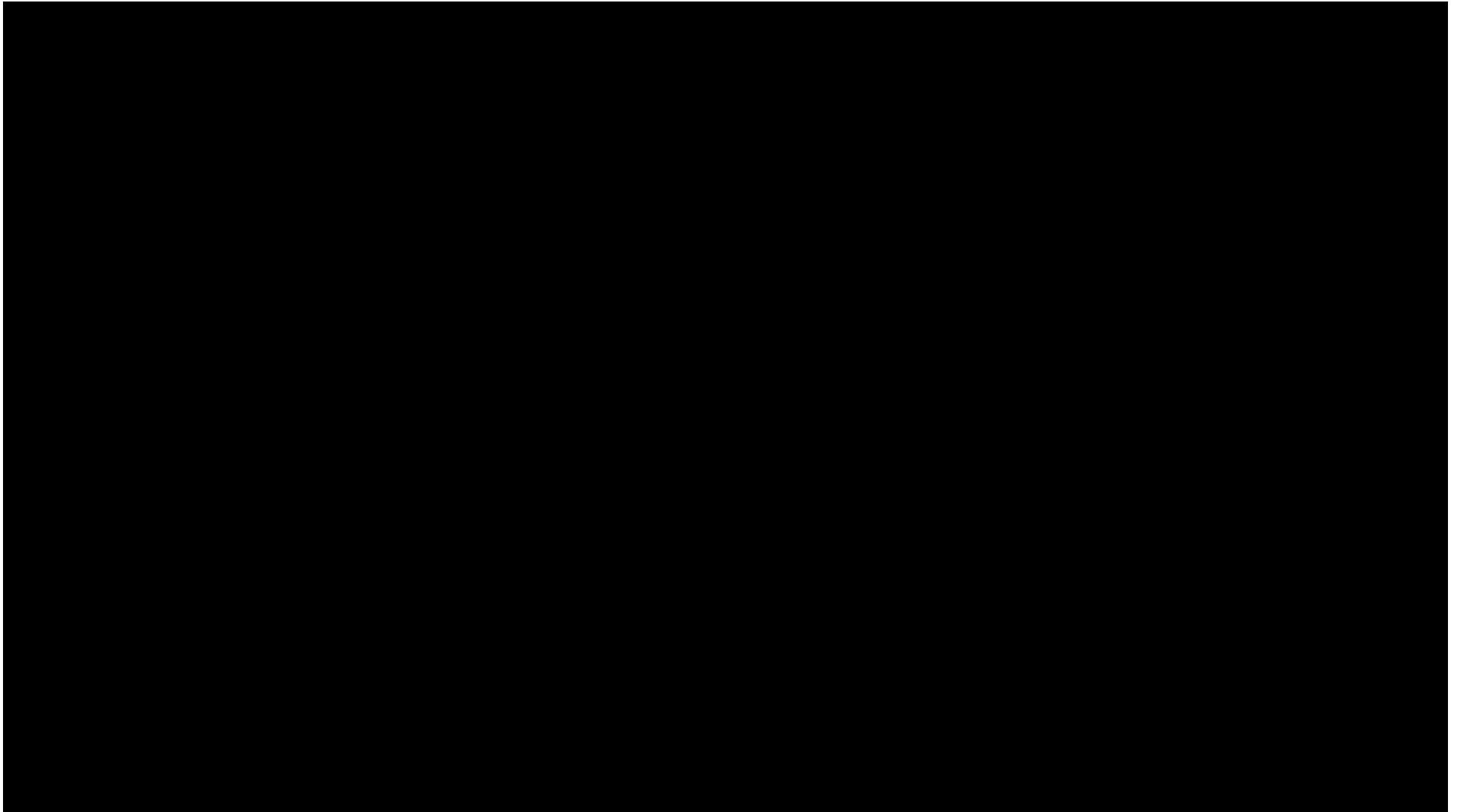
United #1448 B757

FedEx #1662 B727

USAir #2998 B737

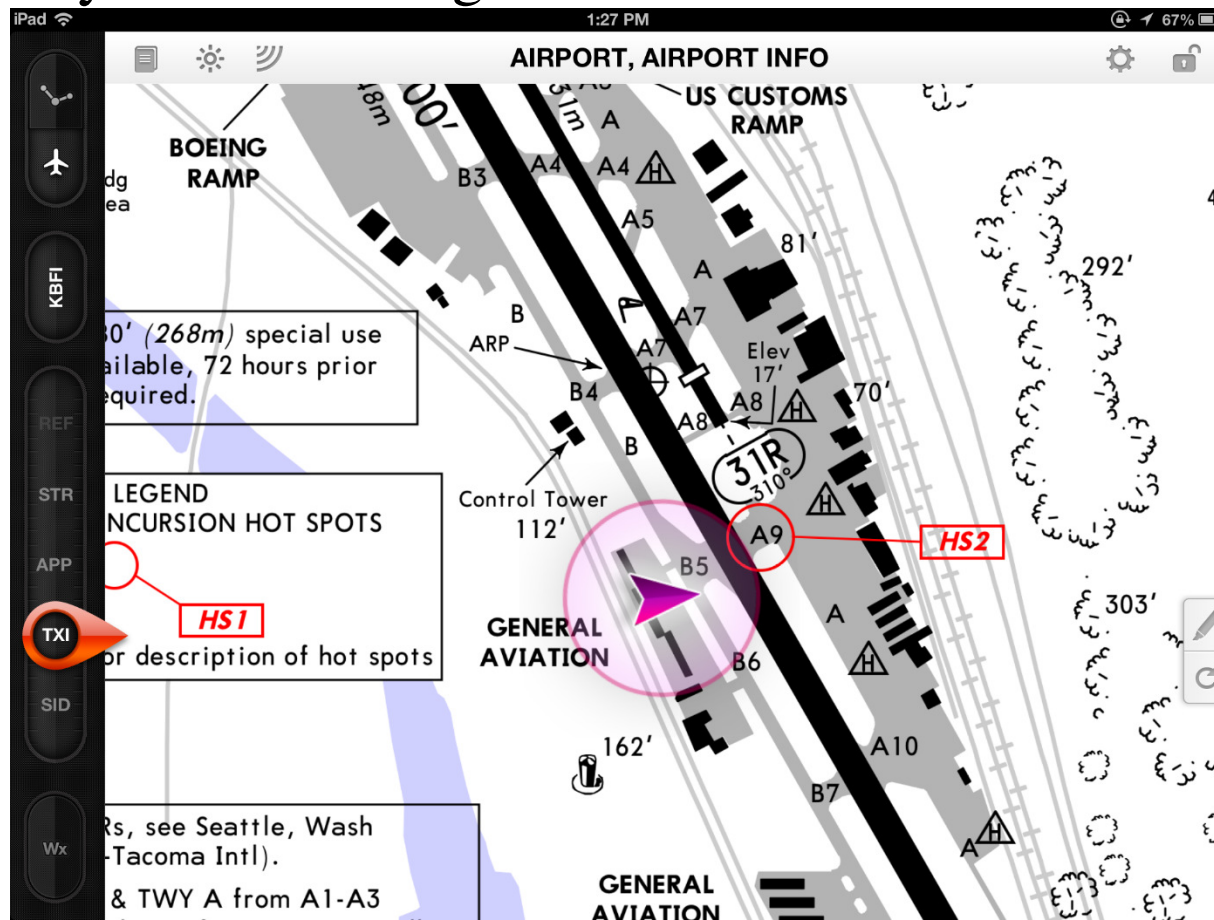
AOPA ASI Safety Video: 12/6/1999 Providence, RI

United 1448 FedEx 1662 USAir 2998



Tools and Practices

- Have a Taxi Diagram – at least paper!
- Have panel avionics or a portable tablet with a **georeferenced** taxi diagram always in use during taxi



Text and Taxi?



Tools and Practices

- Never multitask during taxi
 - Don't text and drive; Don't text and taxi
 - No programming of the GPS
 - No call and copy of IFR clearance
 - No conversations with passengers
 - Listen Up!
- 75% of all Runway incursions are caused by GA aircraft

Collision Avoidance By The Professionals



Collision Avoidance – Pilots

- Pilots have the responsibility to “**See and Avoid**” other aircraft at all times, including when on IFR flights when in VMC
 - 91.111(a): **No person may operate an aircraft so close to another aircraft as to create a collision hazard**
 - 91.113(b): **When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft**

Midair Collisions Change The Course Of US Aviation History

Notable Mid-Air Collisions Between Commercial and GA Aircraft

Date	Location	Deaths	Ground	Flight	Model	Tail #	Model
3/9/1967	Urbana, OH	26		TWA 553	DC9	N1063T	Beech Baron 55
9/9/1969	Fairfield, IN	83		Allegheny 853	DC9	N7374J	Piper PA28
1/9/1975	Whittier, CA	14		Golden West 261	Twin Otter	N11421	Cessna 150
9/25/1978	San Diego, CA	144	7	Pacific SW 192	727	N7711G	Cessna 172
8/31/1986	Cerritos, CA	82	15	Aeromexico 498	DC9	N4891F	Piper PA28



PSA 192 Seconds After Collision with C172



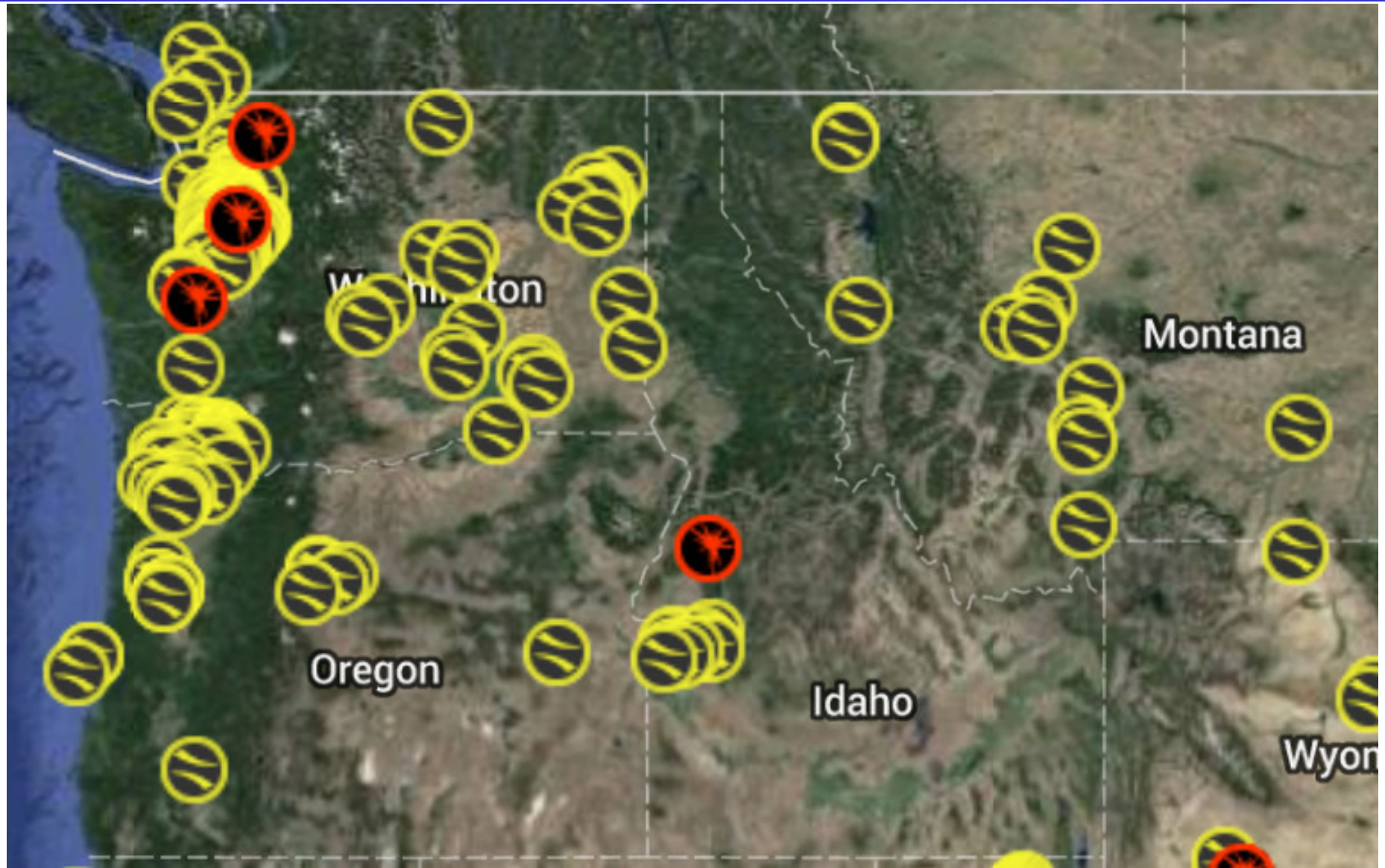
Memorial in the Cerritos Sculpture Garden

Collision Avoidance – ATC

- Air Traffic Control has the responsibility to separate **IFR aircraft** from each other in controlled airspace. Primary tools are:
 - Radar and/or position reports
 - Transponder equipment requirements in select airspace
 - Two way communications with IFR aircraft
 - Strict aircraft separation procedures
- Air Traffic Control will provide traffic advisories to **VFR aircraft** on a “workload permitting” basis (“VFR Flight Following”)

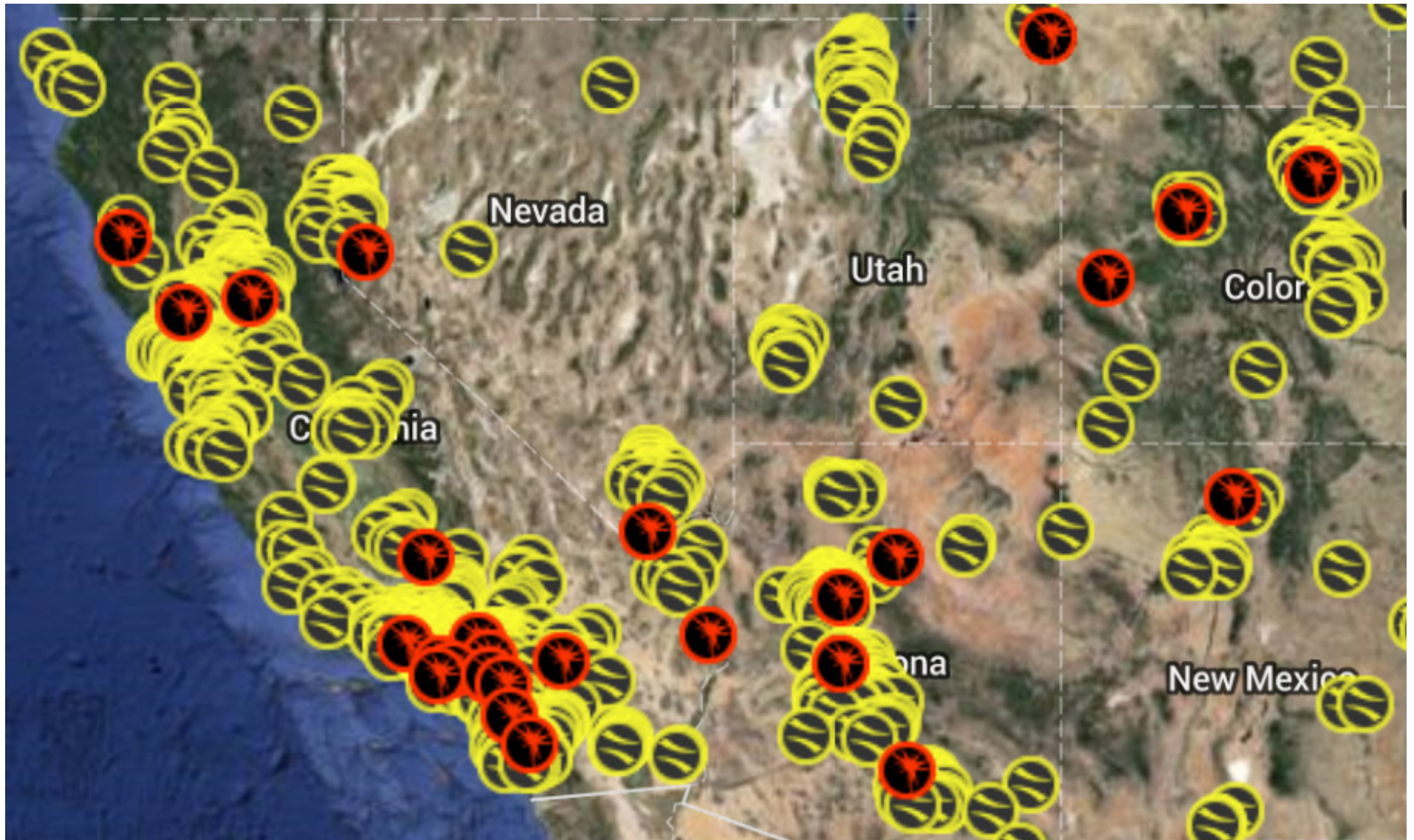
SeeAndAvoid.org map of NW Collisions & Near Mid-Air Collisions

30 mid-air collisions and 75 people killed per year; 2700 deaths over 36 year reporting period



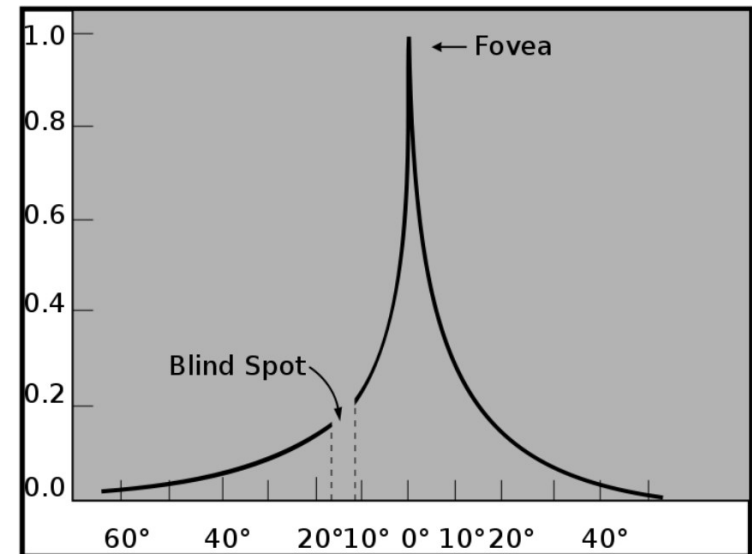
SeeAndAvoid.org map of SW Collisions & Near Mid-Air Collisions

30 mid-air collisions and 75 people killed per year; 2700 deaths over 36 year reporting period



Collision Avoidance – ATC and Pilots

- “See and Avoid” does not always work
- While the “Big Sky” theory applies, there are practical limitations
 - Atmospheric and light conditions
 - Limitations of the human eye (fovea)
 - Contamination on the windshield
 - Intercept angles
 - Traffic density
 - Blind spots in the aircraft
 - Pilot (or CFI) workload
- Large aircraft have mandatory collision avoidance equipment (TCAS) which provide proximity warnings, or traffic advisories (TAs) and resolution advisories (RAs)
- Other Traffic Information Systems, both active and derived from ATC radar data are available to GA pilots (TAS, TIS-A, TIS-B)



Transponder Operation

December 1964: Mandate for Transponders

AIM 4-1-20 Transponder Operation

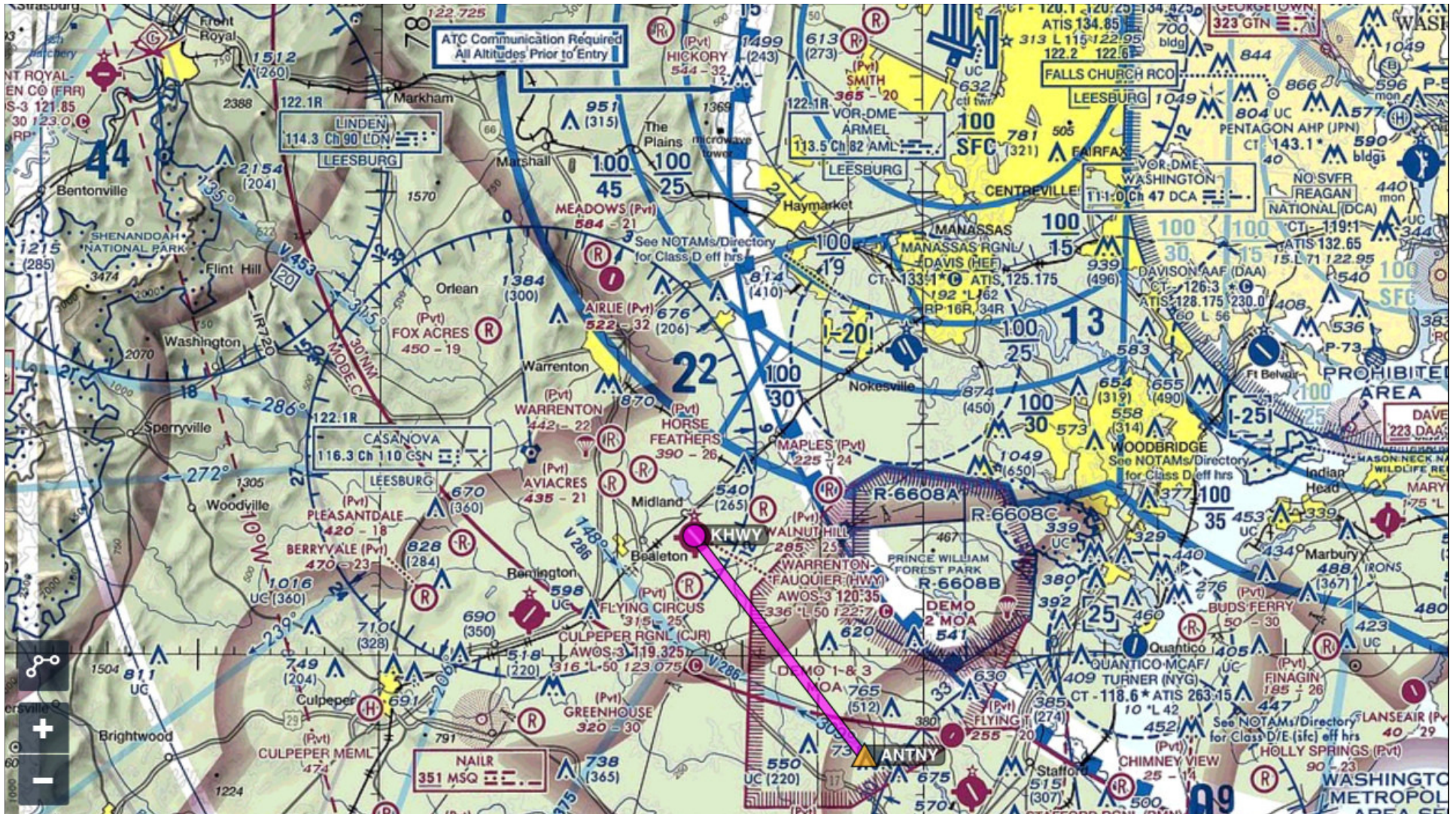
- a. 3. Civil and military transponders should be turned to the “on” or normal altitude reporting position **prior to moving on the airport surface** to ensure the aircraft is visible to ATC surveillance systems.
In all cases, while in controlled airspace each pilot operating an aircraft equipped with an operable ATC transponder maintained in accordance with 14 CFR Section 91.413 must operate the transponder, including mode C if installed, on the appropriate code or as assigned by ATC.

Tools and Practices

- Turn your transponder to **ALT** and leave it there **ALWAYS!**

This makes your aircraft visible to aircraft with active traffic collision avoidance systems and is required by ADS-B configurations and current guidance in the AIM

Washington DC VFR Sectional



Aircraft Summary 5-28-2012

	Bonanza	Cherokee
Tail	N6658R	N23SC
Departure	KHWY-Warrenton	KCJR-Culpeper
SOB	2	1
Purpose	Flight Review	Practice Approach
PIC Hours	1,600/4,000	11,100
ATC Communications	NO	YES
Transponder	1200	4323
Weather	Clear Day VFR	
Employer	NTSB	FAA

TSB Canada Accident Investigation Report

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada



AVIATION INVESTIGATION REPORT A12H0001



MID-AIR COLLISION

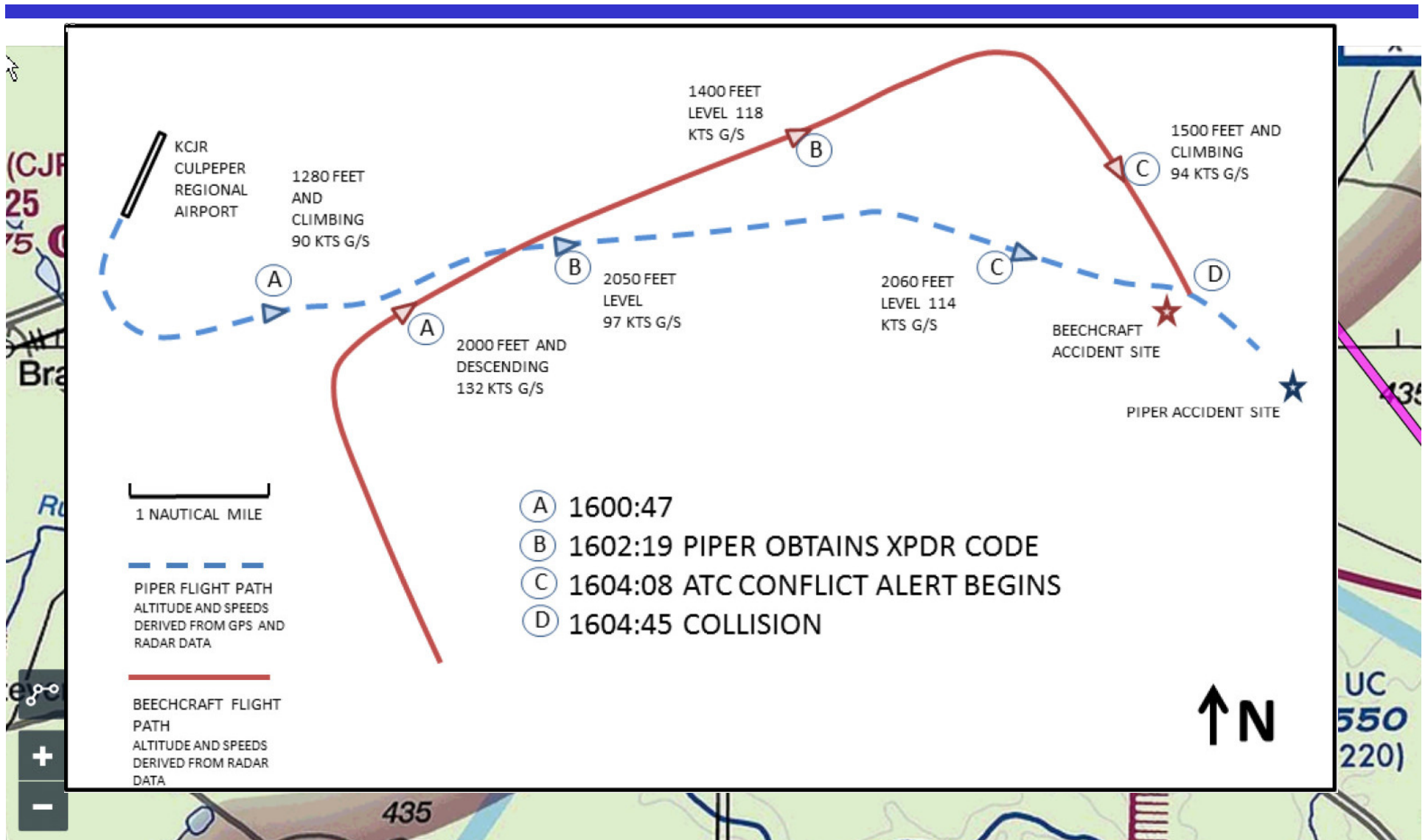
BETWEEN BEECHCRAFT V35B, N6658R
AND PIPER PA-28-140, N23SC
WARRENTON, VIRGINIA, 6 NM S
28 MAY 2012

Canada

KCJR to KHWY 8nm

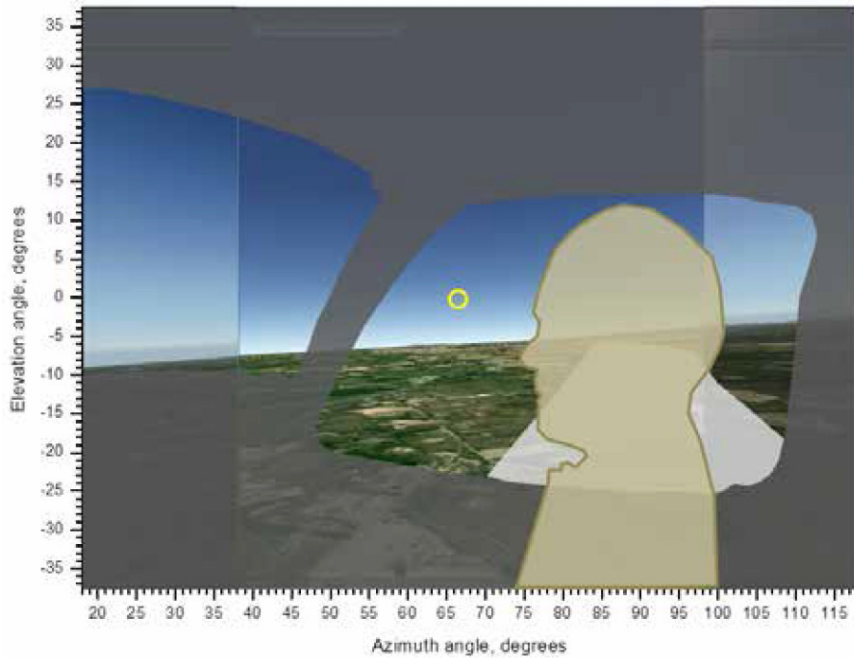


Piper/Beechcraft Accident Area

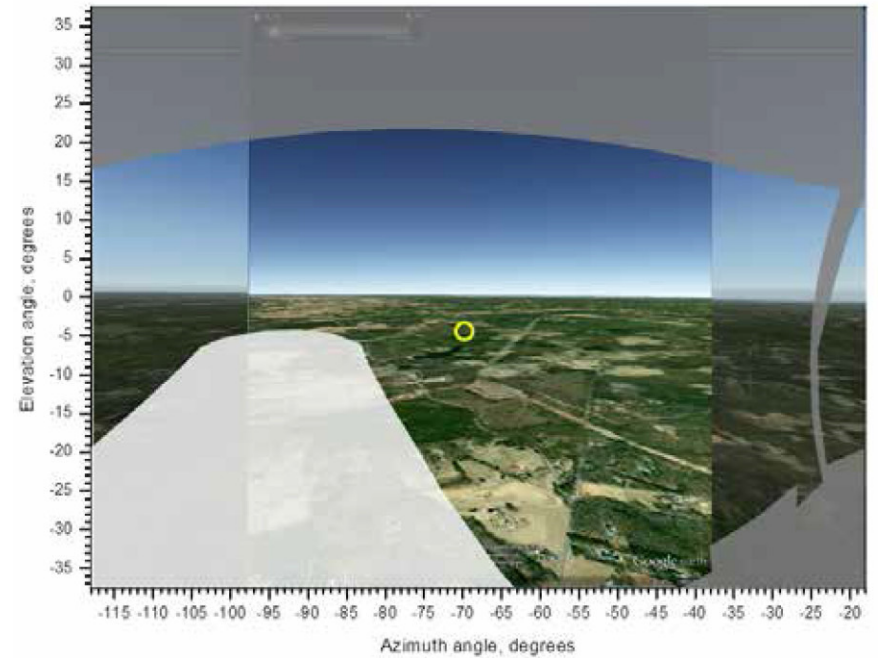


TSB Canada Field Of View Analysis

✦ View of Piper from left seat of Beechcraft at 1604:08.2 (37.6 s before impact)



View of Beechcraft from left seat of Piper at 1604:08.2 (37.6 s before impact)



TSB Canada Findings

- Neither pilot saw the other aircraft in time to avert a mid-air collision, likely **due to the inherent limitations of the see-and-avoid principle**.
- In the absence of a **means of alerting visual flight rules (VFR) pilots to potential conflicts** to enhance the current see-and avoid technique, the risk for mid-air collisions remains.

TSB Canada Report Quotations

- 1991 report Australian Transport Safety Bureau:
 - “**Because of its many limitations, the see-and-avoid concept should not be expected to fulfil a significant role in future air traffic systems**”
- 2005 Research Report, [Limitations of the See-and-Avoid Concept in Civil Aviation](#), *Aviation, Space, and Environmental Medicine*, Dr. C Craig Morris: (study of 159 civil mid-air collisions)
 - “Finally, the see-and-avoid concept misleads pilots and controllers by encouraging overconfidence in visual scanning while neglecting its physical and behavioral limitations and mitigation strategies. While **visual scanning** is necessary to prevent midair collisions, especially of aircraft flying slowly in close proximity and not yet on collision courses, **it is not sufficient**.”

U.S. DOT 2005 Research Report Contents

- Potential mitigation strategies include:
 - **1) pilot and ATC training on physical and behavioral limitations of the see-and-avoid concept**
 - **2) ATC safety alerts and recommendations in all conflict situations**
 - **3) reliable altitude-encoding transponders activated at all times in all aircraft**
 - **4) standard traffic pattern entry, exit, and circuit procedures at all airports**
 - **5) standard communications, and position announcements in the traffic pattern, at all airports**
 - **6) standard procedures for announcing positions and headings in arrival and departure areas, corridors, scenic areas, and other high-density areas**
 - **7) affordable and reliable collision avoidance technologies in all general aviation aircraft as the NTSB recommended in 1987**

Tools and Practices

- Unless you fly only in sparsely populated areas, **get and use some sort of traffic system** that helps you know where to look and enhances See-And-Avoid

Traffic Collision and Avoidance System (TCAS)

Active Traffic System (TAS)

Mode S Traffic System (TIS-A)

ADS-B Traffic System (TIS-B)

- System can be panel mounted avionics, portable or a combination
- **For a complete traffic picture, TIS-B (ADS-B In traffic) requires ADS-B Out compliance**

TIS-A (Mode S Transponder)



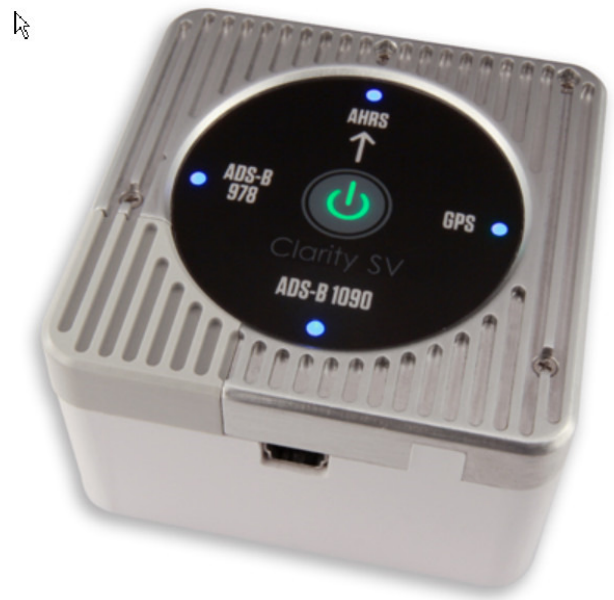
Traffic Alert Displayed on Panel Mounted Avionics



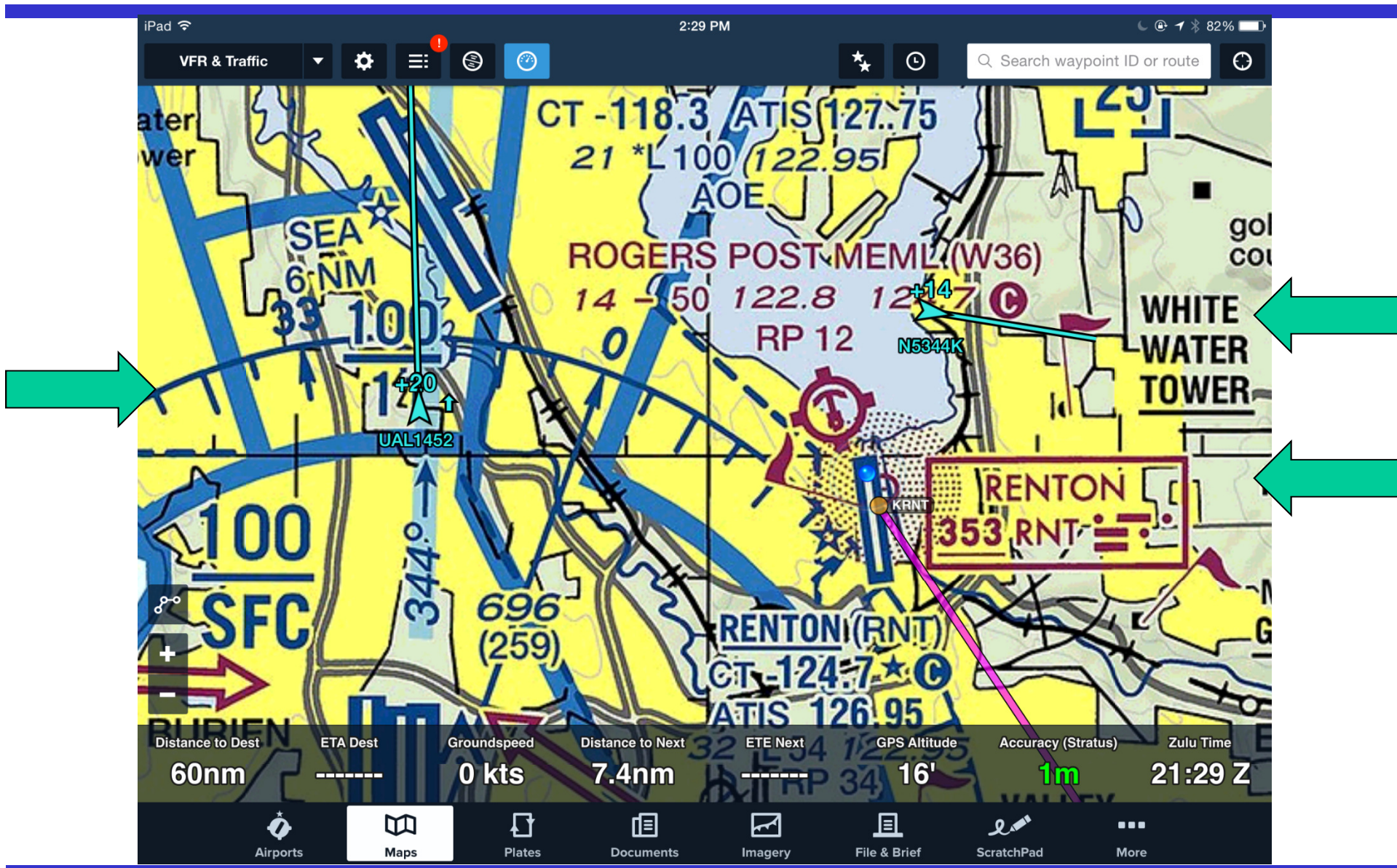
Traffic Alert from Panel Mounted Avionics



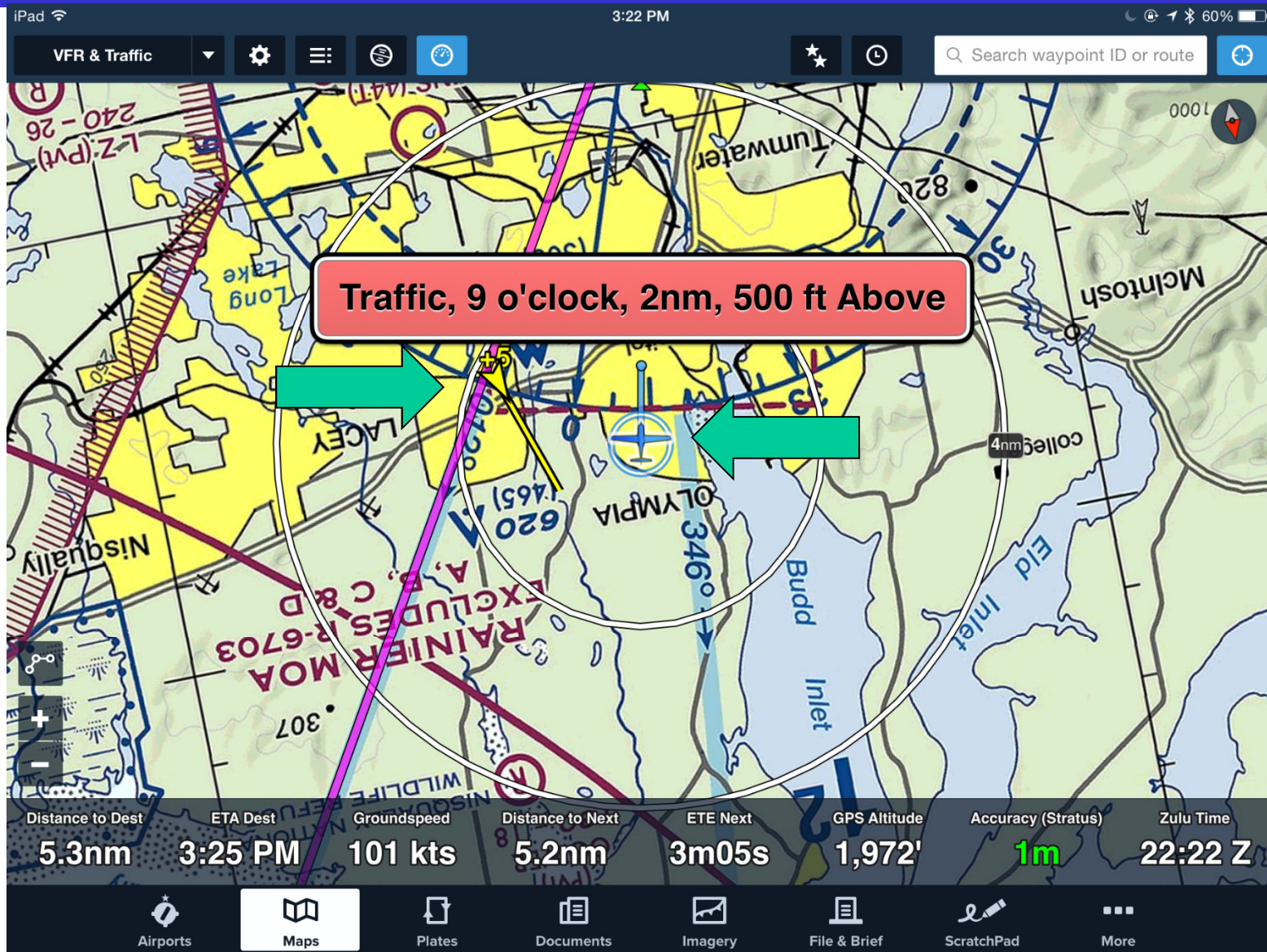
Representative Portable ADS-B IN Equipment



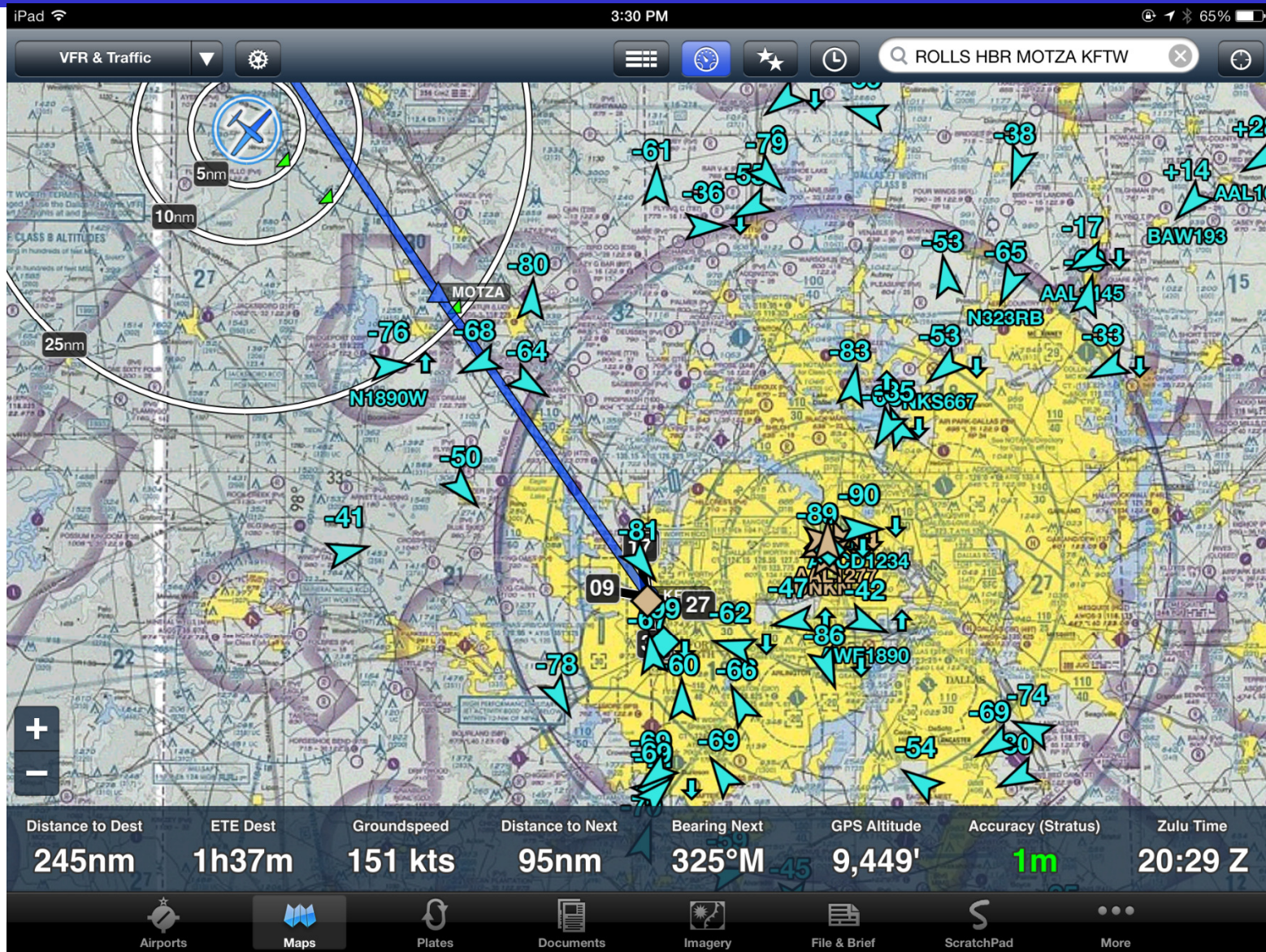
ADS-B Aircraft to Aircraft Traffic (Air to Ground Example)



Traffic Alert Displayed on an iPad



Approaching Chicago



Is Your Panel Mounted Avionics Installed / Configured Correctly?



ADS-B Configuration Error



Validation of ADS-B Installation

- Be sure that your ADS-B Out system is properly installed and working correctly
- Email to: 9-AWA-AFS-300-ADSB-AvionicsCheck@faa.gov
 - N number
 - ADS-B OUT equipment
 - Position Source

Beech A36



Photo 3: Beechcraft Airplane Left Side View Photo Courtesy of Rhode Island Airport Corporation

Piper Twin Comanche PA30



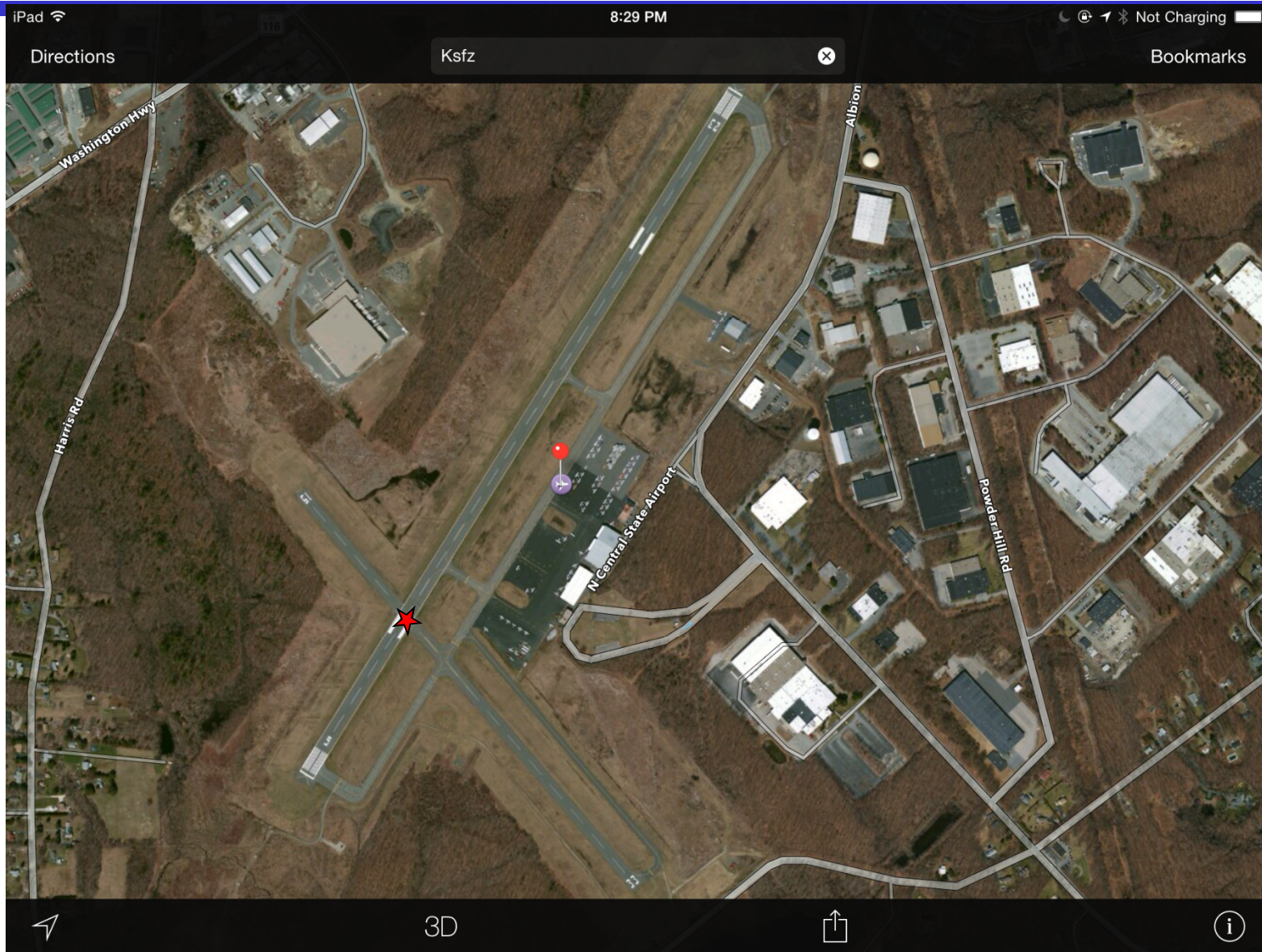
Photo 1: Piper Aircraft Front View photo courtesy of Rhode Island Airport Corporation

Piper Twin Comanche PA30



Photo 2: Piper Airplane Left Side View (Photo Courtesy of Rhode Island Airport Corporation)

KSFZ – North Central State, Pawtucket, RI 6-6-2008



PAWTUCKET, RHODE ISLAND

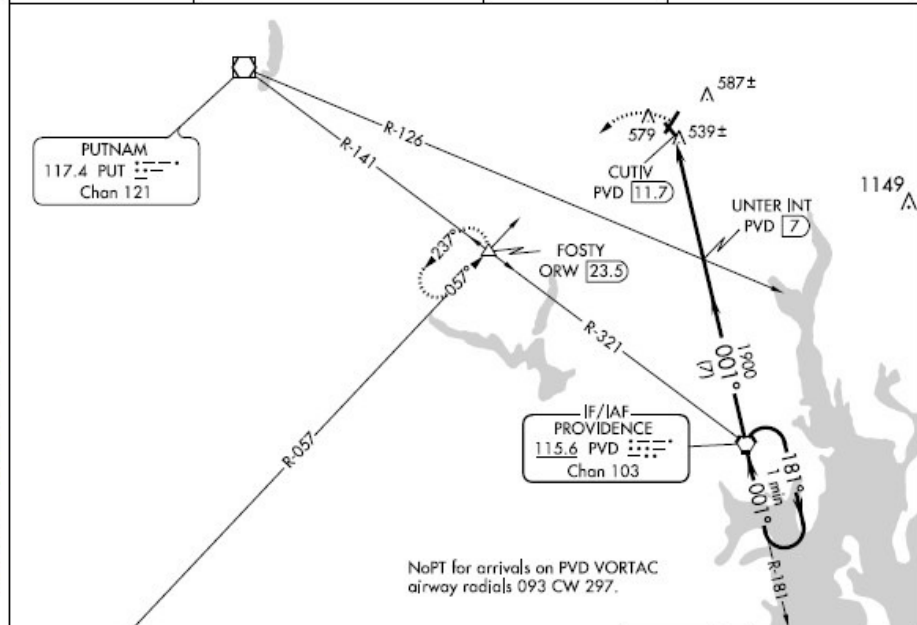
AL-5256 (FAA)

14065

VORTAC PVD 115.6 Chan 103	APP CRS 001°	Rwy Idg TDZE Apt Elev N/A N/A 441
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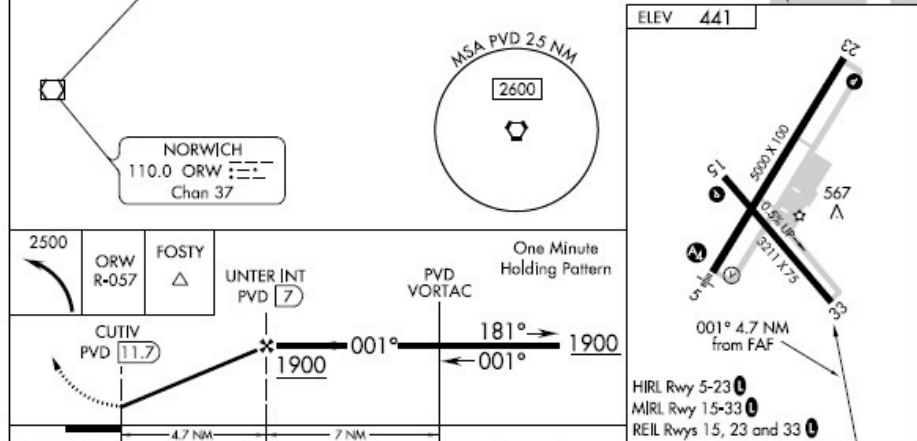
VOR-A
NORTH CENTRAL STATE (SF'Z)

<p>⚠ When local altimeter setting not received, use Providence altimeter setting and increase all MDA 100 feet, increase Circling visibility Cat C ¼ mile. Circling to Rwy 15/33 NA at night.</p>		<p>MISSED APPROACH: Climbing left turn to 2500 via ORW VOR/DME R-057 to FOSTY INT/ORW 23.5 DME and hold.</p>	
AWOS-3 120.025	PROVIDENCE APP CON ★ 123.675 244.875	CLNC DEL 124.35	UNICOM 123.075 (CTAF) 0



NE-1, 26 JUN 2014 to 24 JUL 2014

NE-1, 26 JUN 2014 to 24 JUL 2014



2500	ORW R-057	FOSTY	UNTER INT PVD 7	PVD VORTAC	One Minute Holding Pattern
CUTIV PVD 11.7		1900		181°	1900
4.7 NM		7 NM		001°	001°
CATEGORY	A	B	C	D	FAF to MAP 4.7 NM
CIRCLING	980-1	539 (500-1)	980-1½ 539 (500-1½)	NA	Knots 60 90 120 150 180 Min.Sec 4:42 3:08 2:21 1:53 1:34

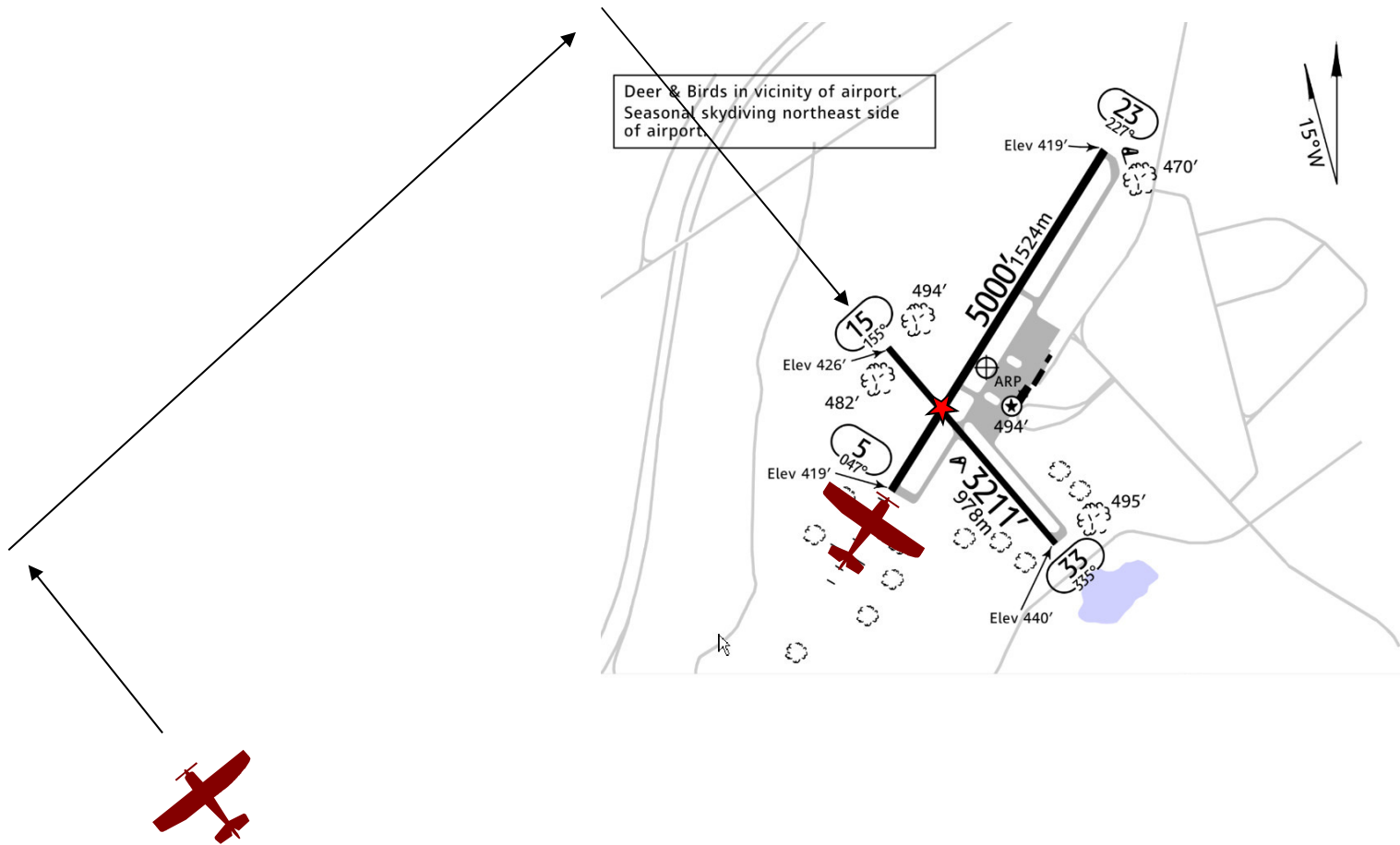
PAWTUCKET, RHODE ISLAND
Amdt 7A 06MAR14

41°55'N-71°29'W

NORTH CENTRAL STATE (SF'Z)
VOR-A

KSFZ Circle to Land 15 / Takeoff 5

- Comanche Circle to Land; Beech awaiting Takeoff



Unicom Frequency

PAWTUCKET, RHODE ISLAND

AL-5256 (FAA)

14065

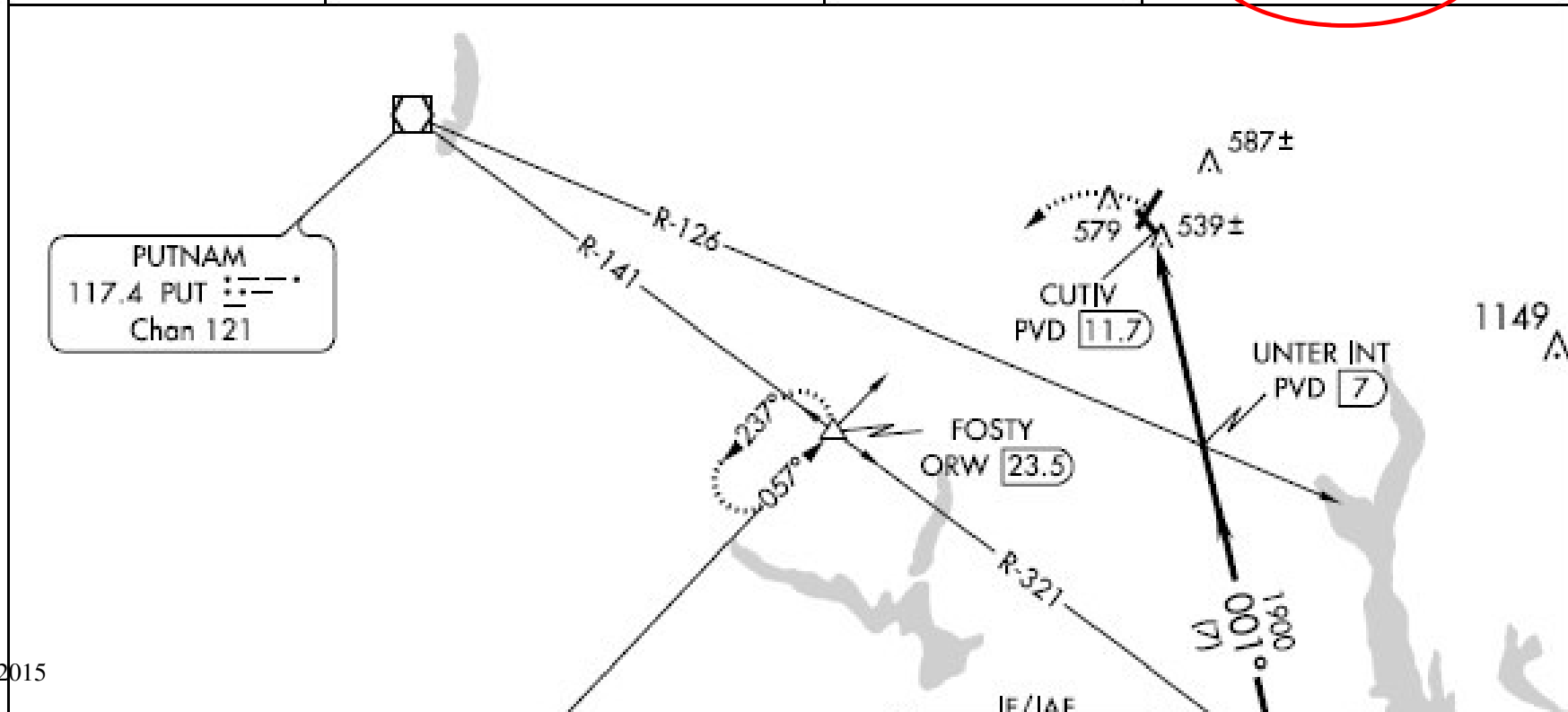
VOR-A

NORTH CENTRAL STATE (SFZ)

VORTAC PVD 115.6 Chan 103	APP CRS 001°	Rwy Idg TDZE Apt Elev	N/A N/A 441
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<p>⚠ When local altimeter setting not received, use Providence altimeter setting and increase all MDA 100 feet, increase Circling visibility Cat C ½ mile. Circling to Rwy 15/33 NA at night.</p>	<p>MISSED APPROACH: Climbing left turn to 2500 via ORW VOR/DME R-057 to FOSTY INT/ORW 23.5 DME and hold.</p>
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AWOS-3 120.025	PROVIDENCE APP CON ★ 123.675 244.875	CLNC DEL 124.35	UNICOM 123.075 (CTAF) 0
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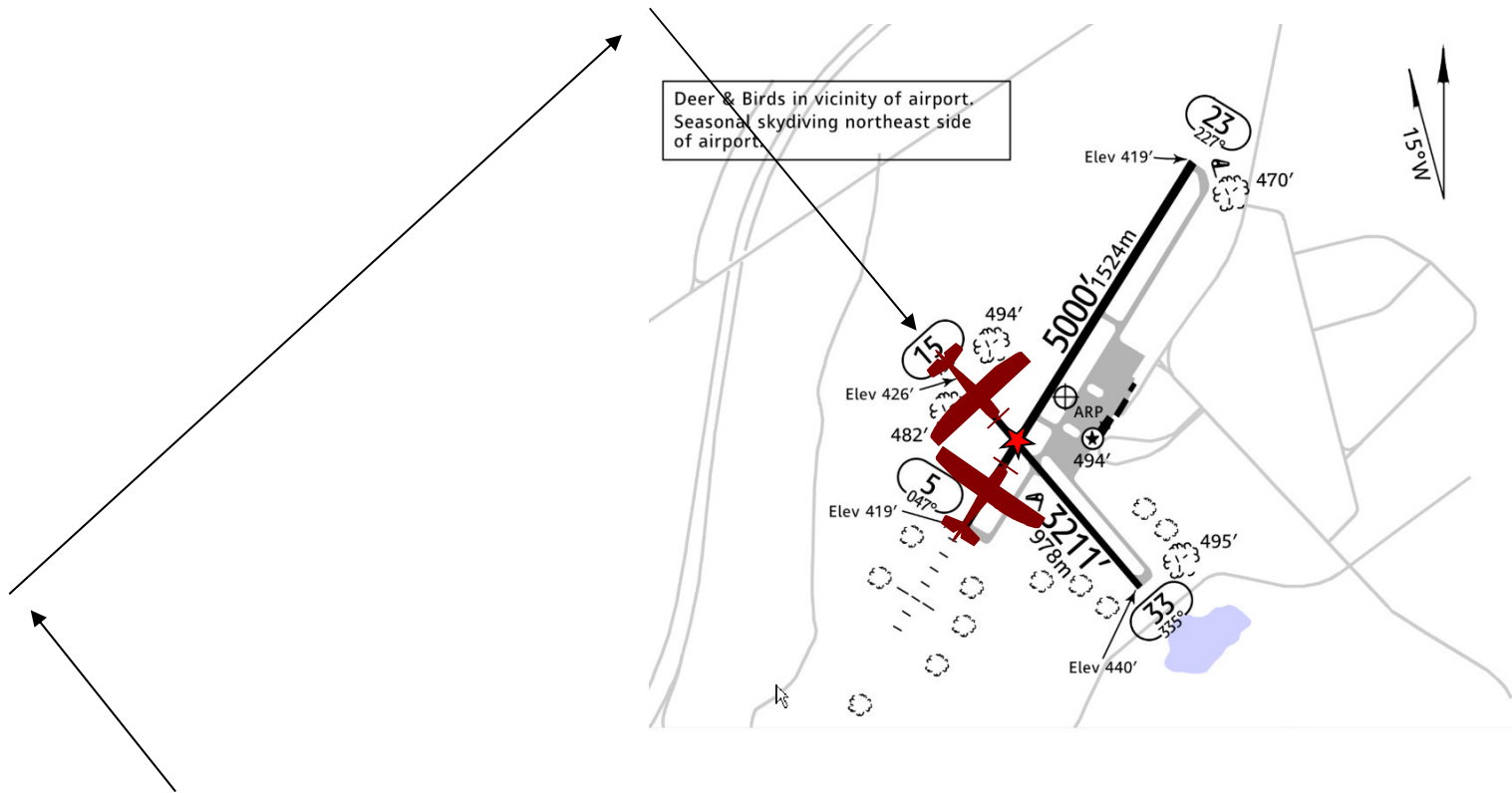
NE-1, 26 JUN

27/2015

JUL 2014

KSFZ Circle to Land 15 / Takeoff 5

- Comanche Circle to Land; Beech awaiting Takeoff



Tools and Practices

- Whenever possible, load all frequencies from the GPS database instead of manual dial entry

Avoid-A-Bump: Weather

1954 Paper – University of Illinois

20 VFR pilots with VFR instruments continuing into IMC

All lost control within 20 to 480 seconds; Average 178 seconds

Continued VFR into IMC: 90% are fatal...

THE #1 CAUSE OF FATAL WEATHER RELATED ACCIDENTS

Tools and Practices

- Practice Unusual Attitude Recovery at every Flight Review
- Get an Instrument Rating

Hazard for Instrument Rated Pilots

- Flight into Convective Activity, Icing, or Fog

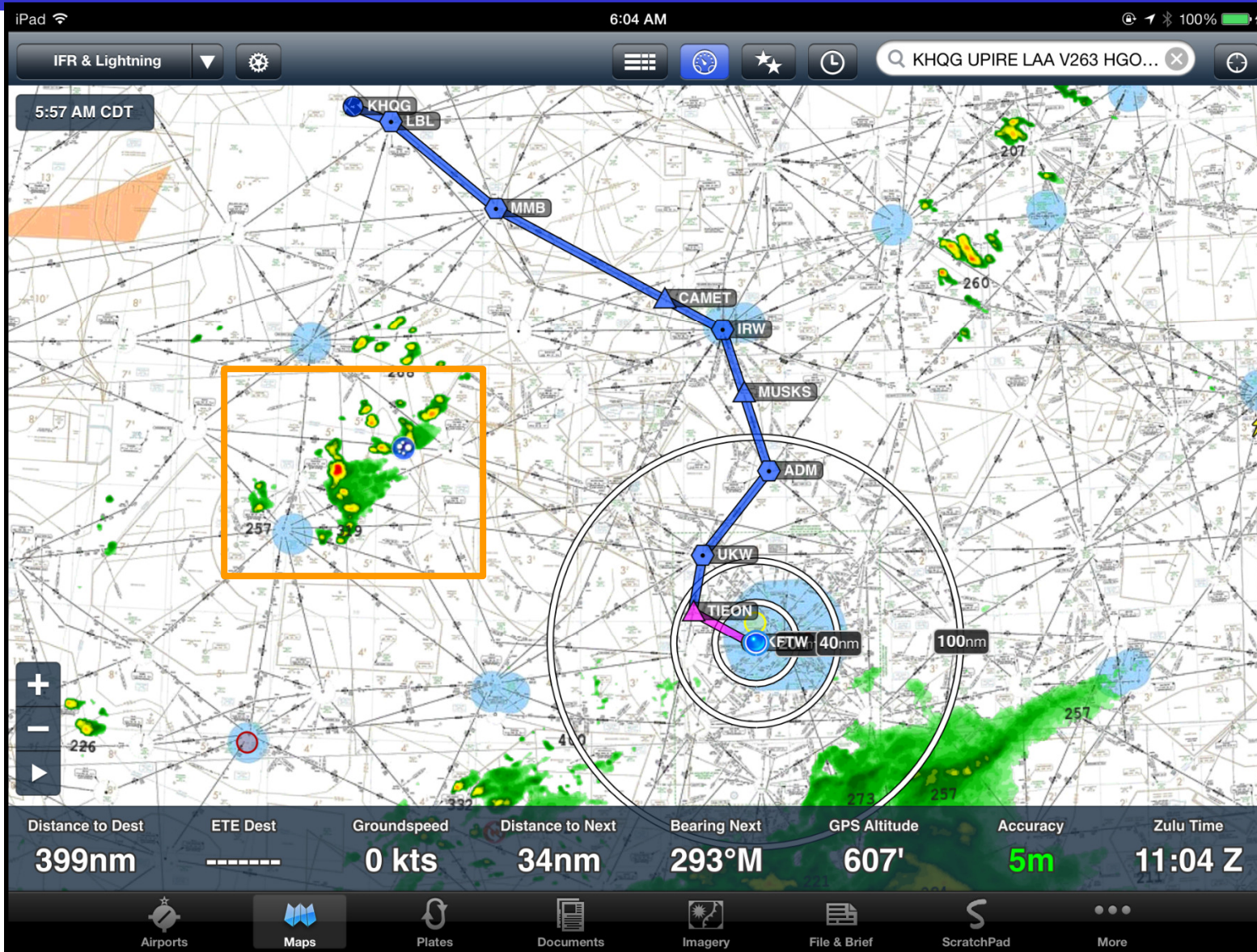
Tools and Practices

- Have weather situational awareness in your airplane
 - XM
 - FIS-B (ADS-B)

KFTW → KHQG; 7:30am View at Hotel – Day Before Flight



6am View at Hotel – Day of Flight



7:18 View at Airport With Clearance Route



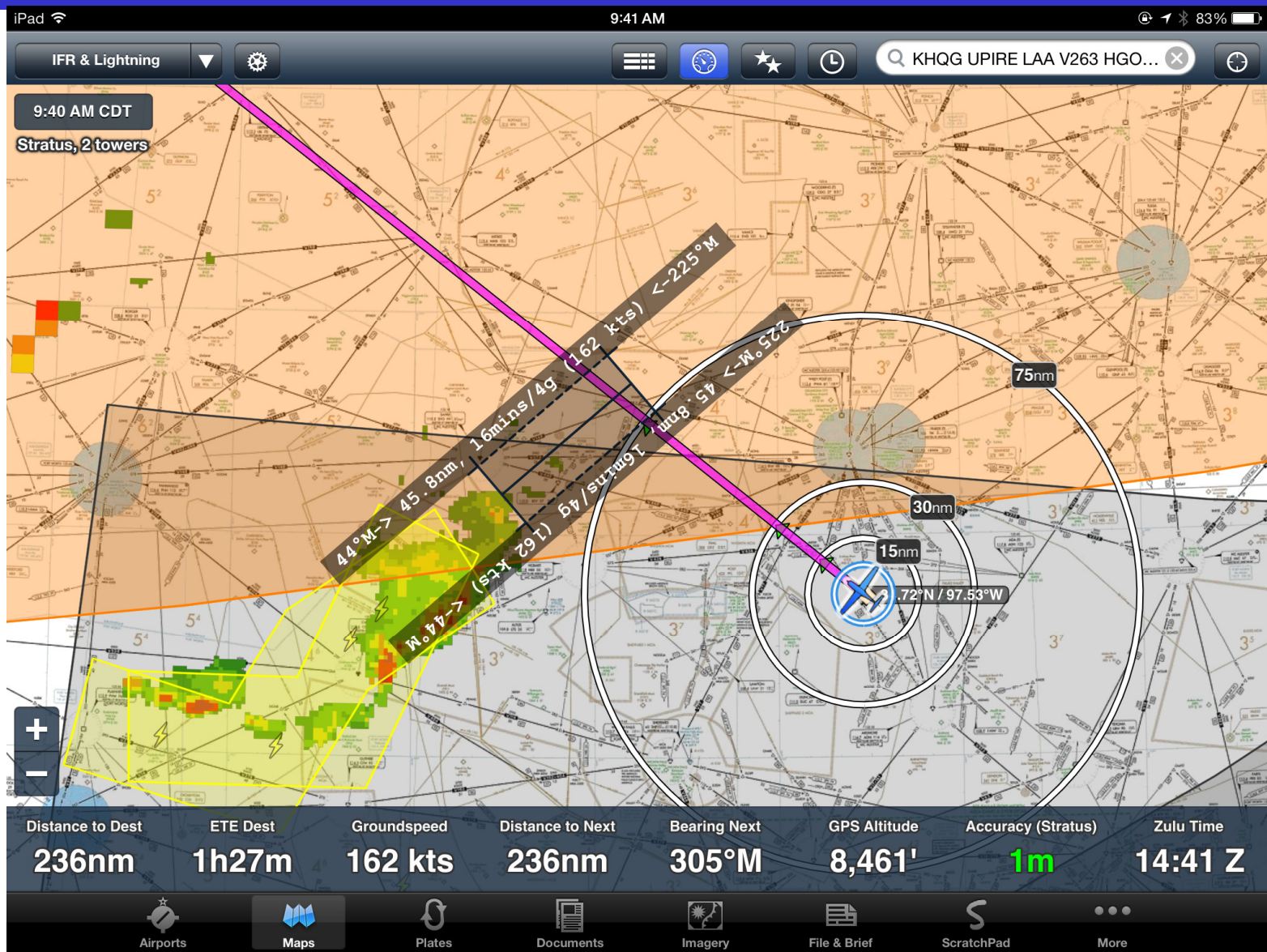
In the Air at 9:10 - Radar Vector Departure – ATC Has an Offer!



The Offer is Declined at 9:18 and I do it “My Way”



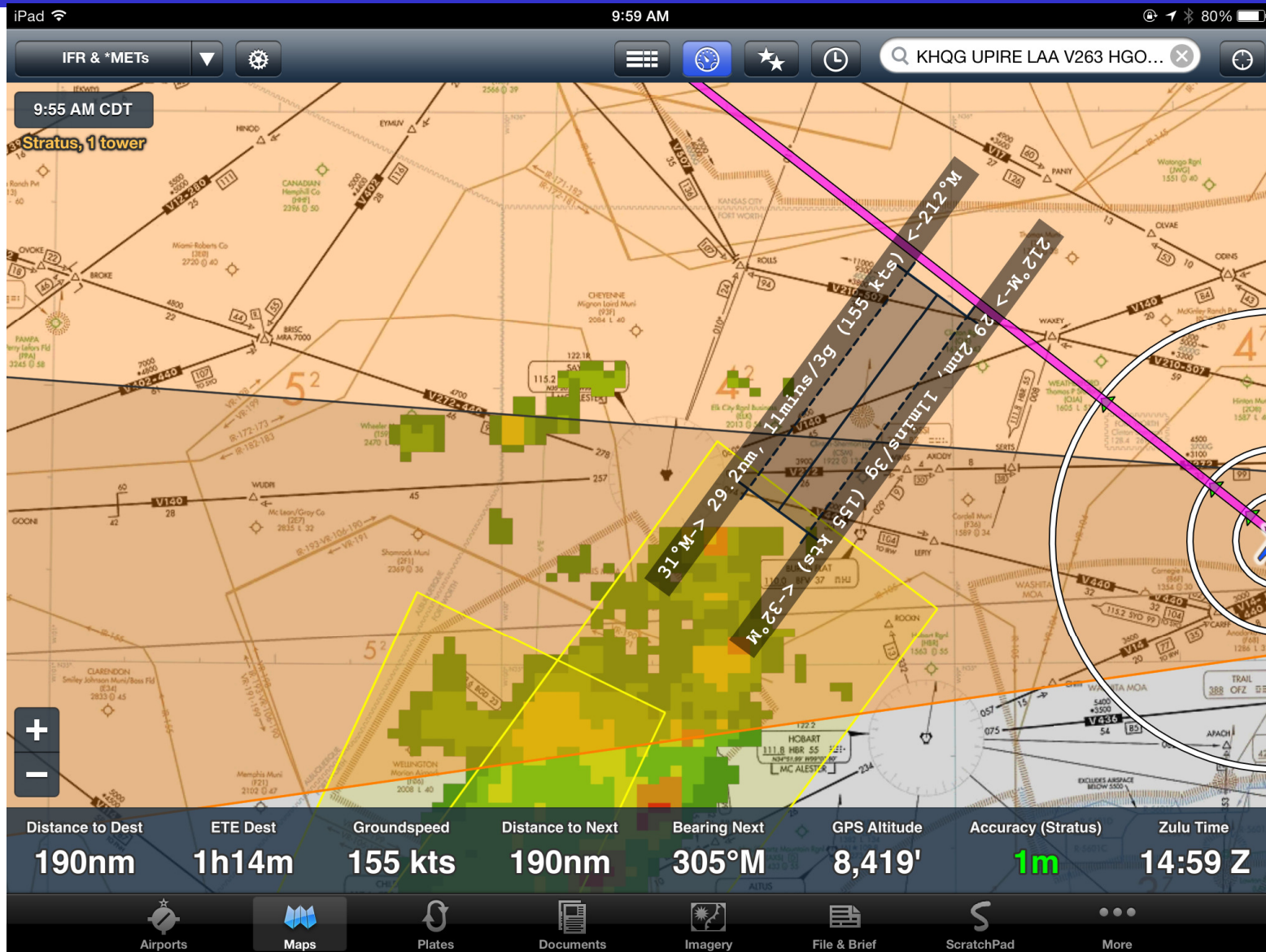
9:41 Now Direct is OK with Safety Zone



Big TS in the Convective Sigmet



Safe Passage With 30nm Safety Zone

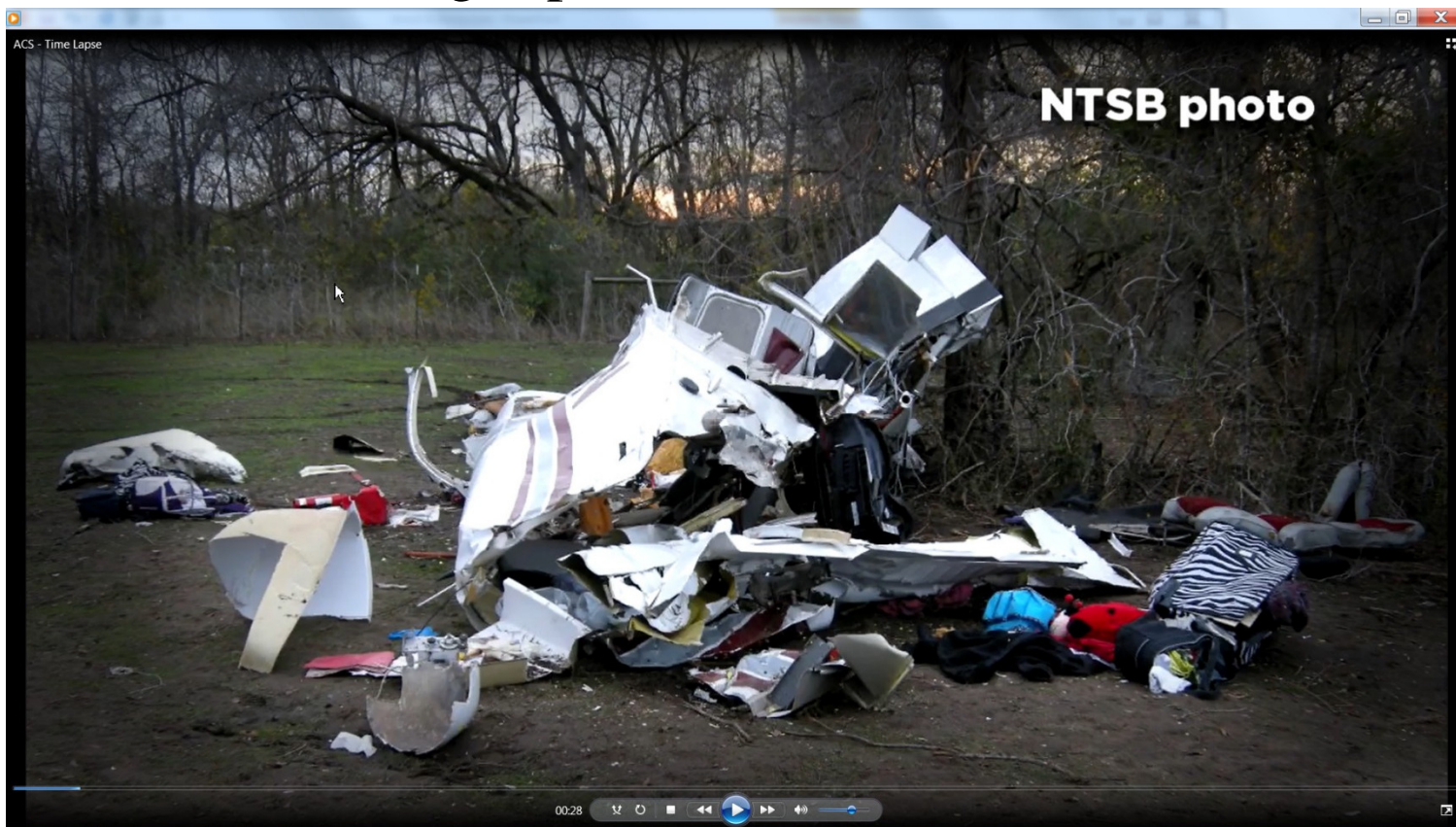


Time to Leave KBJC?

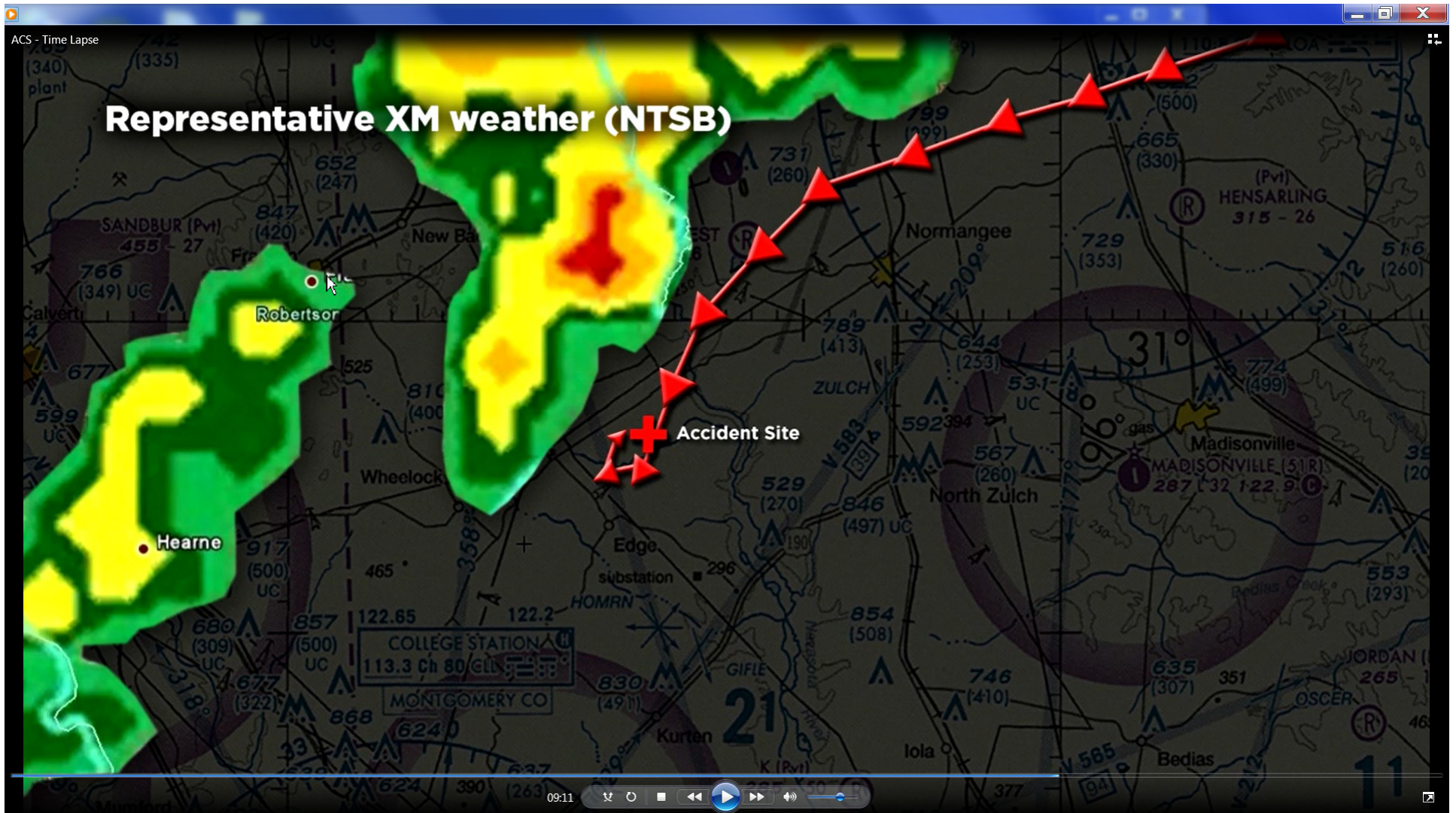


Accident History: Waco TX,

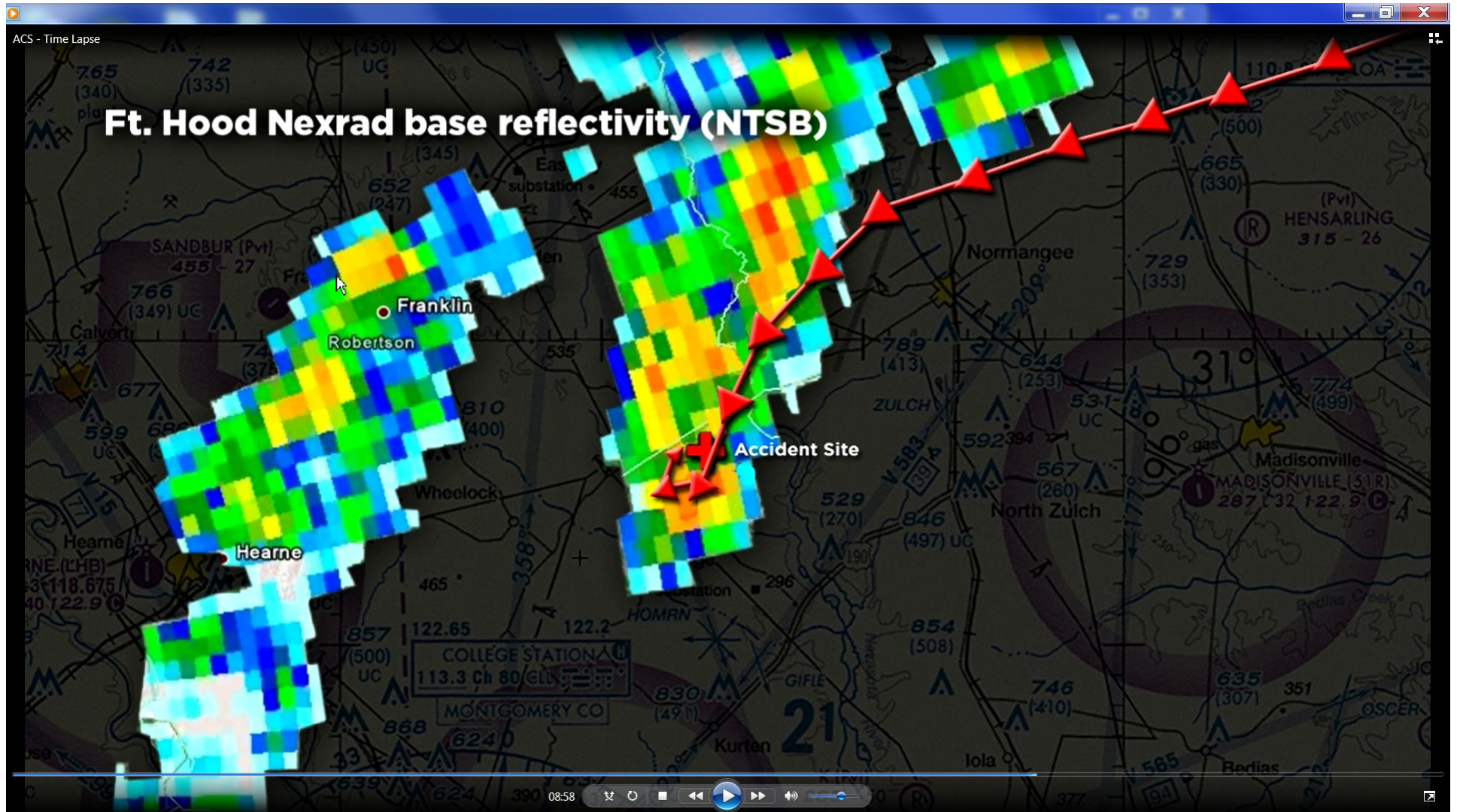
- AOPA ASI Accident Case Study Video: Time Lapse
- <http://www.aopa.org/AOPA-Live.aspx?watch=CF22DA35-E748-4E1A-8ACF-6300CDA8CCD0>
- 12/19/2011; N3590T; Bryan, TX; pilot and 4 passengers killed: wing spar failed and left wing separated



WACO accident – Where He Thought He Was



WACO accident – Where He Really Was



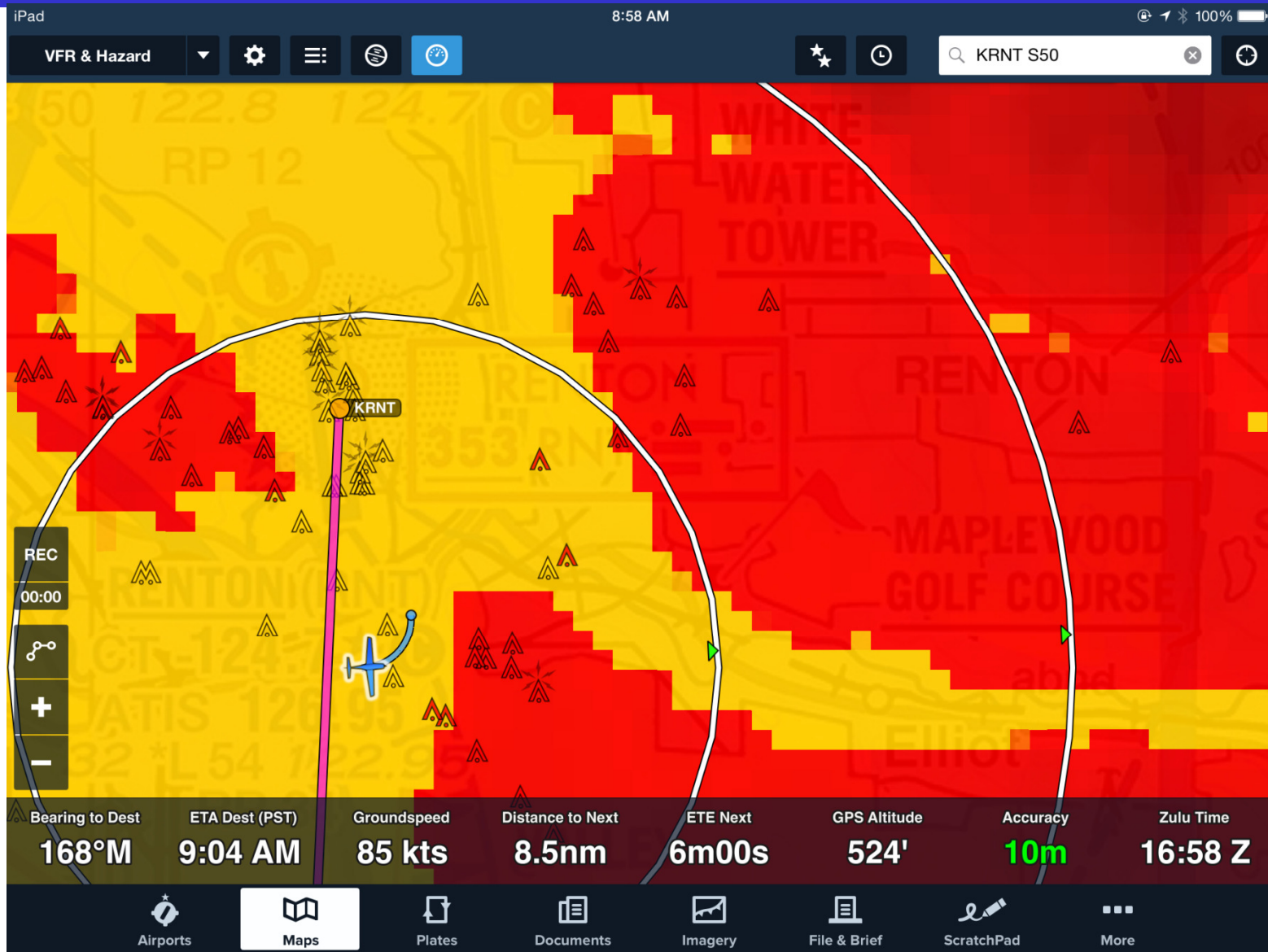
WACO accident – Radar Shows Only Precipitation, Not Convection



Tools and Practices: Weather

- Get an Instrument Rating
- Have some sort of weather situational awareness in your airplane
 - XM
 - FIS-B (ADS-B)
- Recognize the **time delay** in non-radar weather presentations and use them for **Strategic ADM**, not **Tactical ADM**
- Give Convective SIGMETs and lightning strikes a respectful distance, even with radar!

Hazard Awareness



Synthetic Vision

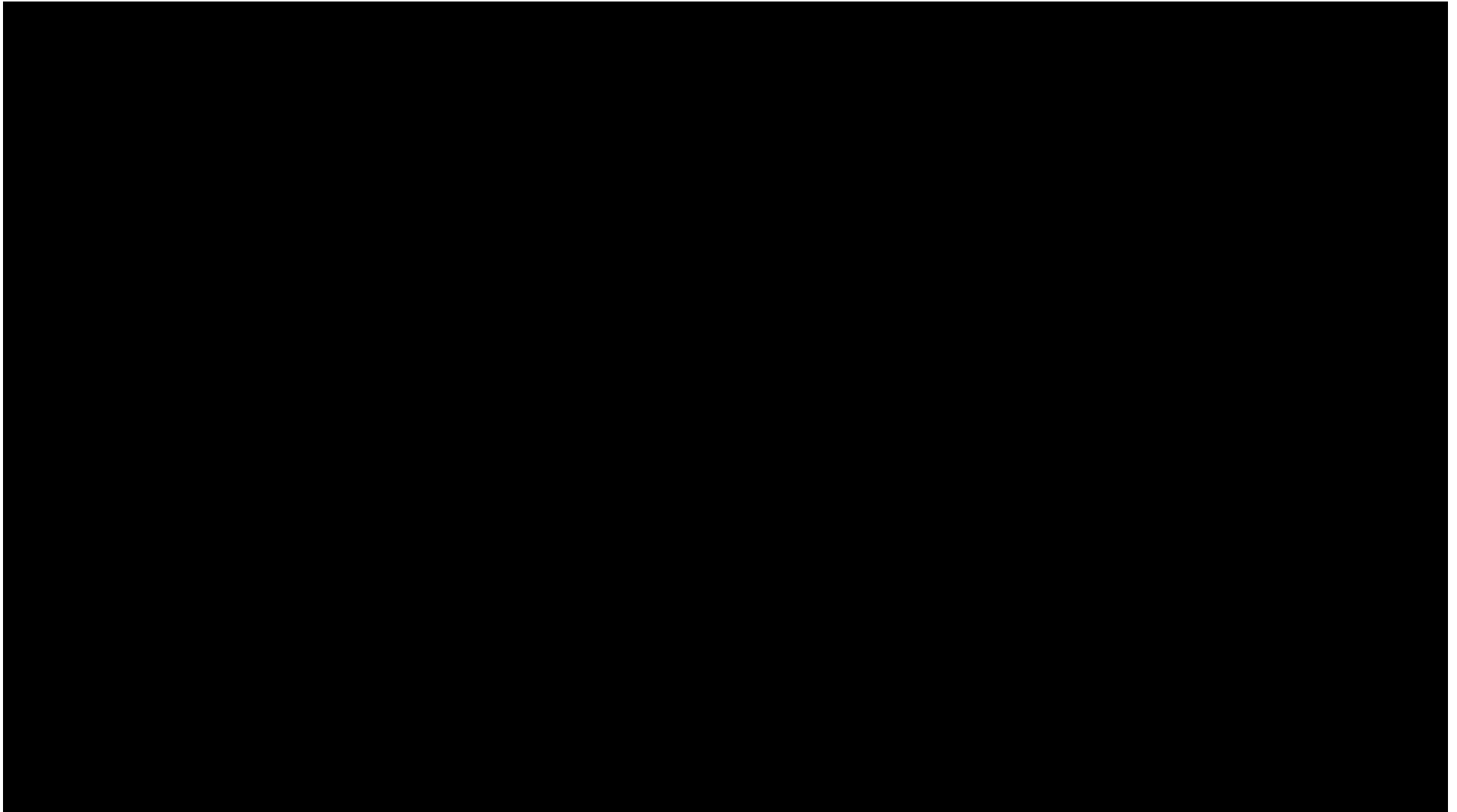


Synthetic Vision



iPod – iPhone – iPad - ...

Video courtesy of AOPA Air Safety Institute



Summary: Tools and Practices to Avoid-A-Bump

1. Neither pilot nor passengers exit nor approach an airplane when the engine is running
2. Have a Taxi Diagram – at least paper!
3. Have panel avionics or a portable tablet with a **georeferenced** taxi diagram always in use during taxi
4. Never multitask during taxi
 - Don't text and drive; Don't text and taxi
 - No programming of the GPS
 - No call and copy of IFR clearance
 - No conversations with passengers
 - Listen Up!
5. Turn your transponder to **ALT** and leave it there **ALWAYS!**

Summary: Tools and Practices to Avoid-A-Bump

6. Unless you fly only in sparsely populated areas, **get and use some sort of traffic system** that helps you know where to look and enhances See-And-Avoid
7. Whenever possible, load all frequencies from the GPS database instead of manual dial entry
8. Practice Unusual Attitude Recovery at every Flight Review
9. Get an Instrument Rating
10. Have some sort of weather situational awareness in your airplane
11. Recognize the **time delay** in non-radar weather presentations and use them for **Strategic ADM**, not **Tactical ADM**
12. Give Convective SIGMETs and lightning strikes a respectful distance!
13. Always maintain situational awareness and **Fly the Airplane!!!**

Questions?

Avoid-A-Bump

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