



# Mid-Air Collision Avoidance (MACA)

JB SA-Randolph  
JB SA-Kelly Field



# Overview

- **Purpose**
  - **Mid-Air Facts**
  - **Local Aircraft**
  - **Military Operations Areas**
  - **Military Training Routes and Slow Routes**
- |                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• <b>JBSA-Kelly Field</b><ul style="list-style-type: none"><li>– Airfield Diagram</li><li>– Local Patterns at Kelly</li><li>– C-5 Patterns</li><li>– F-16 Patterns and SFOs</li></ul></li></ul> | <ul style="list-style-type: none"><li>• <b>JBSA-Randolph/Seguin</b><ul style="list-style-type: none"><li>– Airfield Diagram</li><li>– Local Patterns at Randolph</li><li>– Local Patterns at Randolph Aux (Seguin)</li></ul></li></ul> |
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# Purpose

- **Reduce the potential for a mid-air collision by increasing all users' awareness and understanding of all other users' flight operations in the San Antonio area**



*Don't let this be you!*





# Mid-Air Facts

- Most occur...
  - Daylight, VMC , 10 a.m. to 5 p.m.
  - Weekends of warmer months
  - Within 5 NM of an airport
    - Listen and look, sterile cockpit
  - 10% During takeoff and climb
    - Shallow S-turns, lower nose occasionally
  - 25% During cruise flight
    - Phase offers more time to look, yet many lapse into complacency; stay vigilant
  - 50% In the traffic pattern
    - 80% of traffic pattern collisions on final approach and landing
    - Check ahead, above, below, and behind; move for blind spots



Source: AOPA ASI Safety Advisor, Collision Avoidance





# Mid-Air Facts (Cont'd)

- In a Three-year NTSB study, most MACs:
  - Were on Pleasure Flights
  - No Flight Plan Filed
  - VMC Conditions (Nearly All)
  - Weekend Daylight Hours
  - Faster Aircraft Overtaking/Hitting Slower Aircraft
  - Experience Level Ranged Initial-Solo to 15,000 Hrs
  - Uncontrolled Airports Below 3,000 ft AGL.
  - Enroute MACs below 8,000 feet, within 25 NM of Airport
  - **CFIs Onboard One or Both aircraft 37% of time**



Source: National Transportation Safety Board



# Mid-Air Strategies

- Fly proper altitude
  - IFR/VFR, Direction of flight
- Avoid congested airspace
  - Approach fixes, NAVAIDs, SUA
- Turn on lights to be more visible
- VFR Flight following
- Sterile cockpit – limit conversations
  - Prepare for arrival before pattern/approach
- Monitor CTAF/Tower in vicinity of non-towered airports
- CFIs at High Risk
  - 10% of pilot population involved in 35.5% of MACs



*Is the conflict aircraft flying toward or away from your aircraft?*

Source: AOPA ASI Safety Advisor, Collision Avoidance



# MAC/ATC Resources

FAA:

<http://www.fly.faa.gov/Products/products.jsp>

<https://sua.faa.gov/sua/siteFrame.app>

[https://www.faasafety.gov/gslac/alc/libview\\_normal.aspx?id=6851](https://www.faasafety.gov/gslac/alc/libview_normal.aspx?id=6851)

AOPA:

<https://www.aopa.org/training-and-safety/online-learning/safety-advisors-and-safety-briefs/collision-avoidance>

SKYbrary:

[https://www.skybrary.aero/index.php/Mid-Air\\_Collision](https://www.skybrary.aero/index.php/Mid-Air_Collision)



# San Antonio Area Military Aircraft





# T-6 TEXAN II

Average cruising airspeed: 200-230 KIAS







# T-38 TALON

Average cruising airspeed: 300 KIAS





# T-1 JAYHAWK

Average cruising airspeed: 210-250 KIAS





# F-16 FIGHTING FALCON

Average cruising airspeed: 300 KIAS







# C-5 GALAXY

Average cruising airspeed: 250 KIAS





# Military Operations Areas (MOAs)



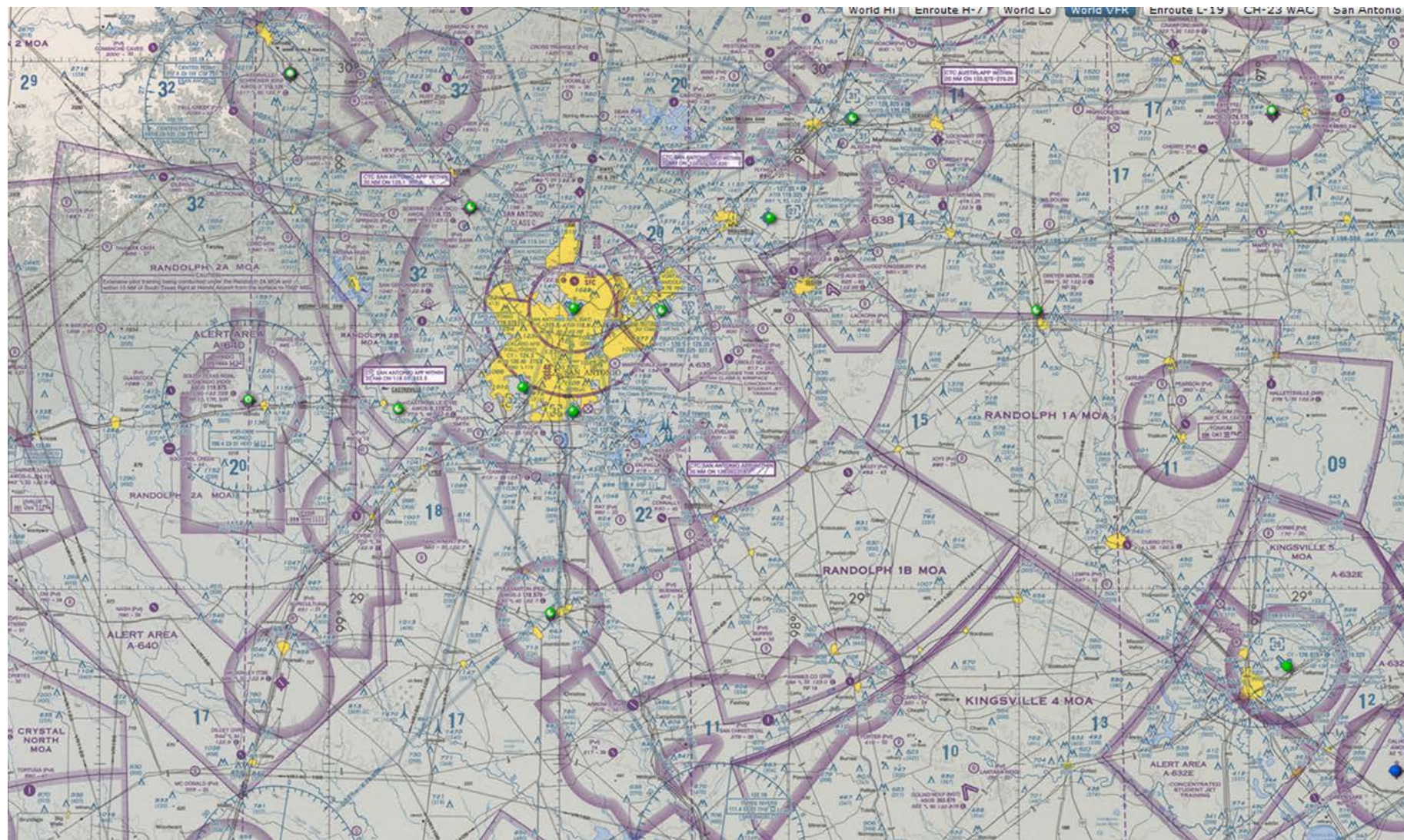
# Military Operations Areas (MOAs)

- The purpose of a MOA is to separate military flight training activities from other (incompatible) traffic
  - Airspace of defined vertical & lateral limits for military flight training
  - Depicted on Sectional Charts, Enroute Low Altitude charts and VFR Terminal Area Charts
  - Typical Missions: **aerobatic maneuvers** including **spins**, aircraft handling/**stall training**, **formation flying**, air **combat maneuvering**, **instrument** training
- **Bottom Line**: AGGRESSIVE EDGE-OF-ENVELOPE MANEUVERING, EXCESSIVE AIRSPEED and ALTITUDE CHANGES in a training/learning environment





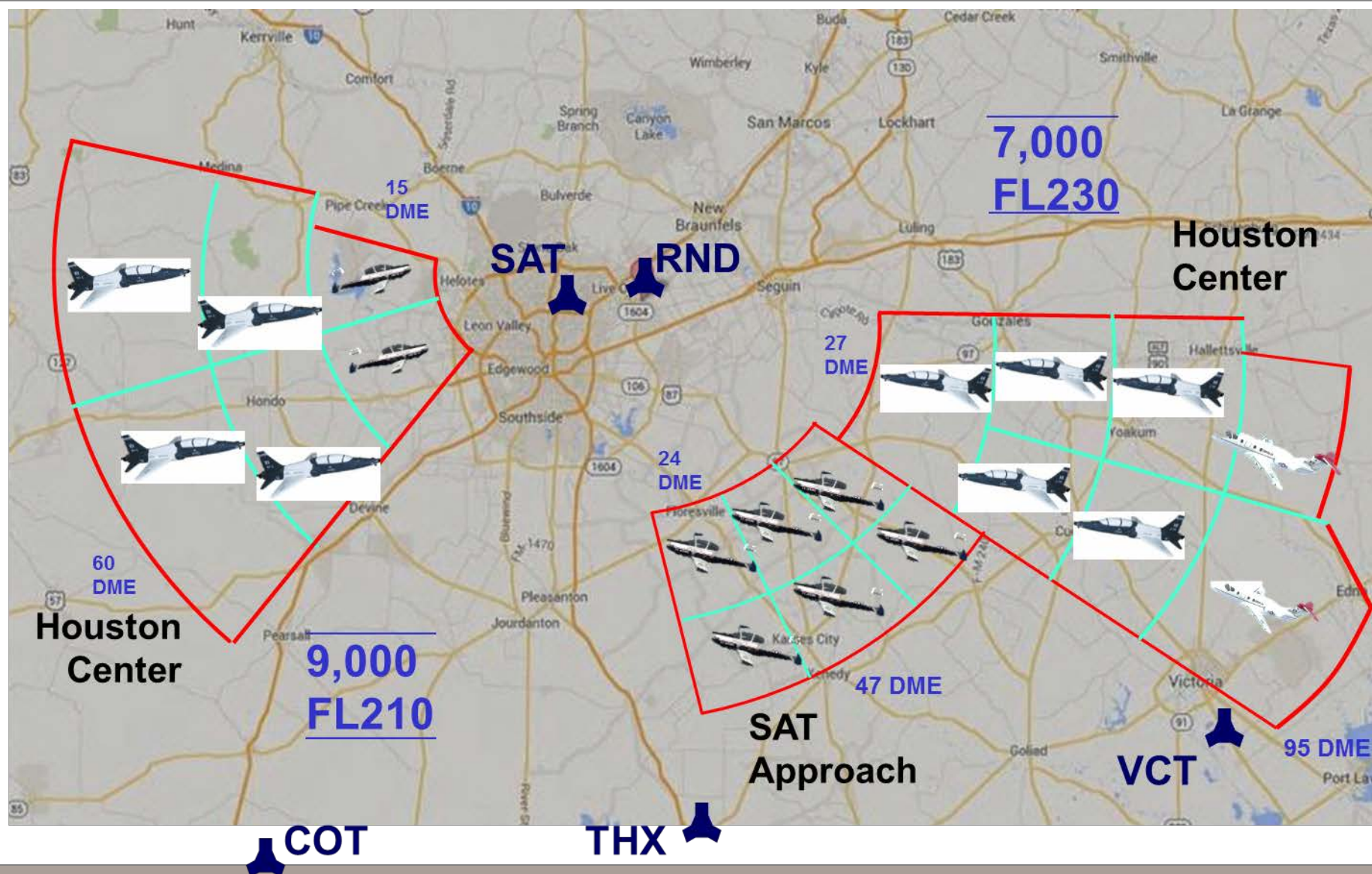
# Randolph MOAs







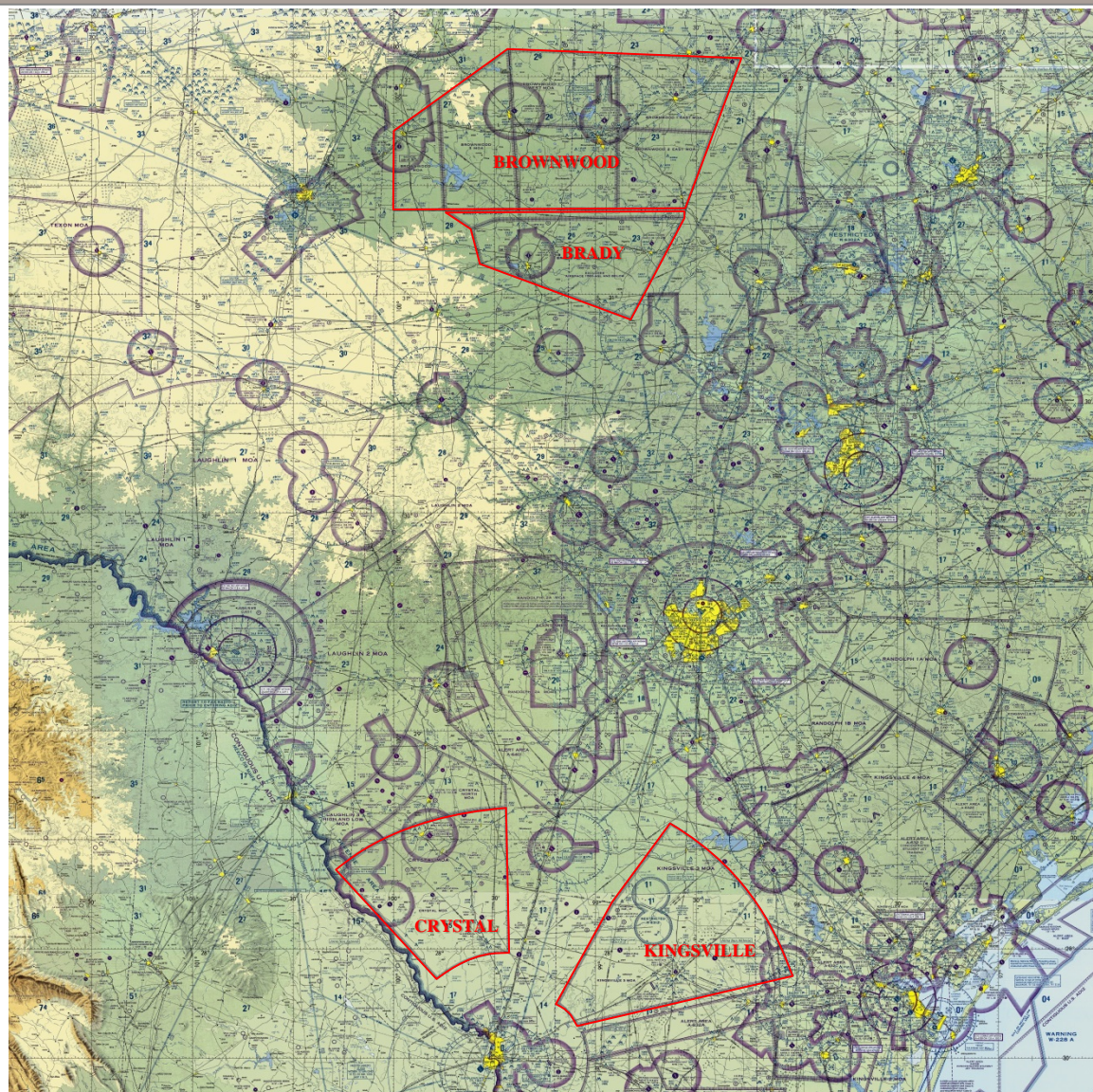
# Randolph MOAs







# 149 FW MOAs





# Military Operations Areas (MOAs)

- Operating times and altitudes published in FLIP unless changed by NOTAM (e.g. VFR Sectionals & Low Altitude Charts)
  - During flight, information can be obtained through FSS or ATC
- **IFR traffic** can be cleared through a MOA provided separation can be provided by ATC
- **VFR traffic** can transit a MOA with no clearance or communication with ATC—but it's **not safe!**
- Many MOAs are subdivided with multiple sectors or training areas both horizontally and vertically—i.e. SEVERAL times more aircraft than you might have expected!
- If you must transit an active MOA while operating VFR, PLEASE contact ATC and get FLIGHT FOLLOWING

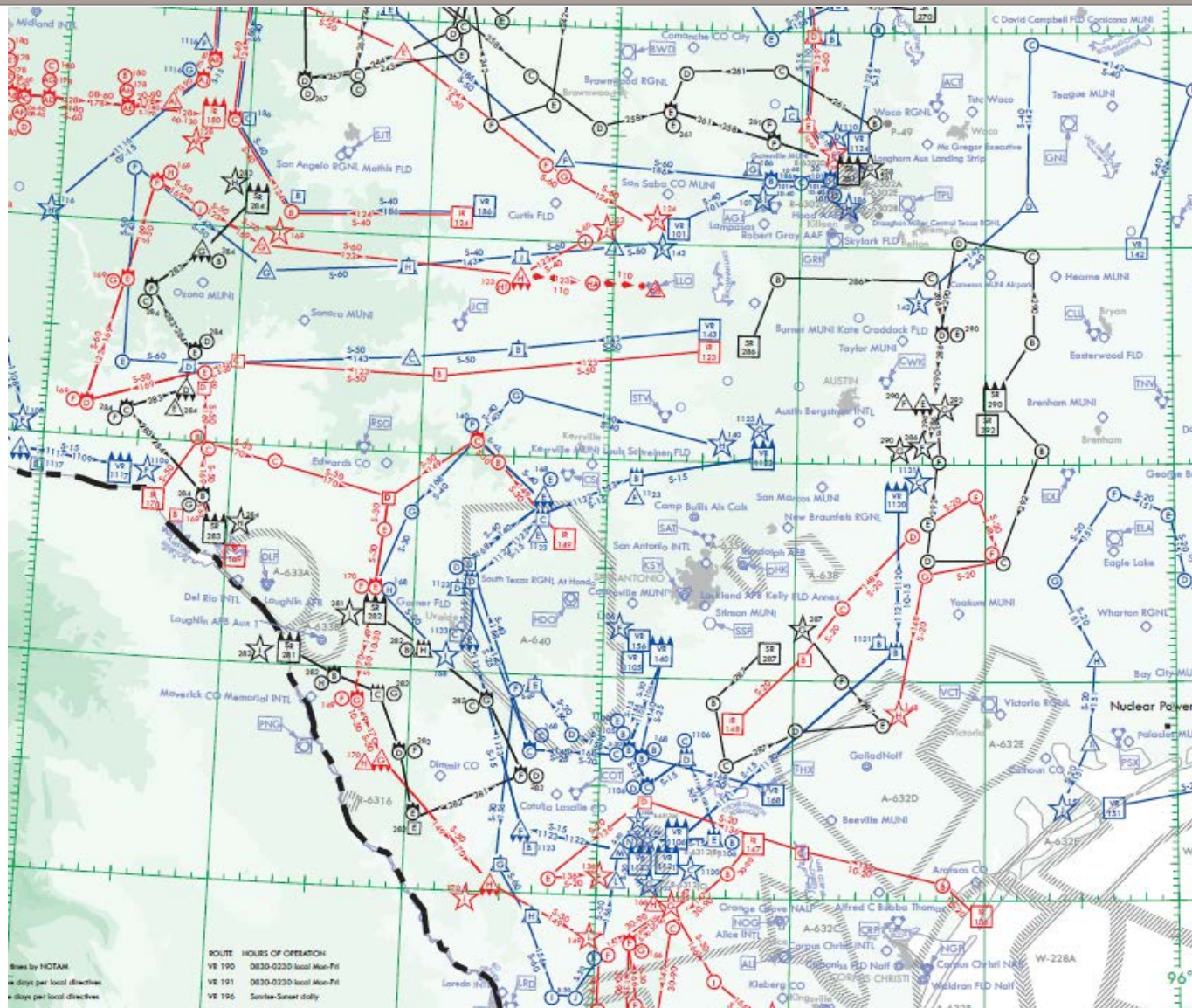


Military Training Routes (MTRs)  
And  
Slow Speed Low Altitude Training Routes  
(SRs)  
Commonly referred to as “low-levels”





# FLIP AP/1B Chart – MTRs and SRs



For informational purposes only. Not intended for navigational use.

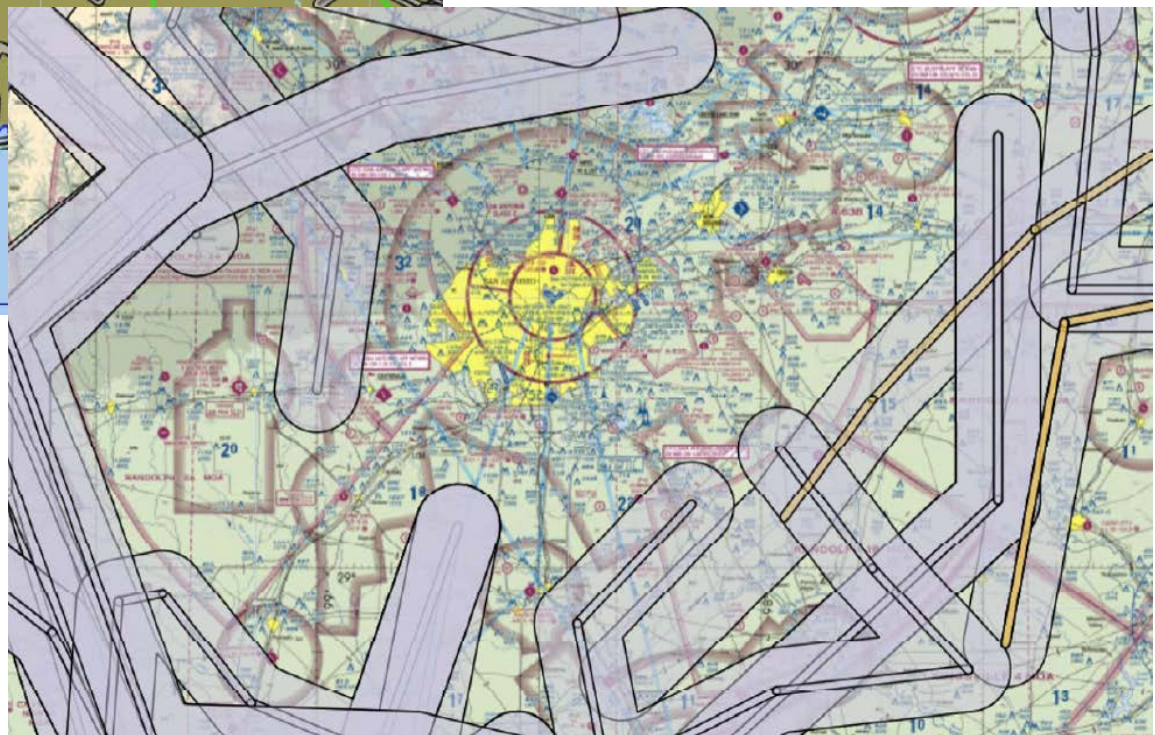




# FAA Special Use Airspace (SUA)



<https://sua.faa.gov/sua/siteFrame.app>



For informational purposes only. Not intended for navigational use.



# MTRs and SRs

- Chart depiction:
  - IFR Low Altitude Enroute Charts depict all IRs, but only depict VRs with route segments above 1500 feet AGL.
  - Sectional Charts depict all IRs and VRs.
  - SRs are not depicted on IFR or VFR charts. The difference is that SRs are flown at 250 knots or less and are always at or below 1500 feet AGL.
  - Be advised that **depicted routes only indicate route corridor centerline**. The width of each route can extend several miles on either side of route centerline. Aircraft will travel in the direction of the route, but are typically off centerline, navigating through visual checkpoints located anywhere within the corridor!
- Many routes are flown in formation, so **watch for more than one aircraft!**



# MTRs and SRs

- Best Practices/Techniques:
  - Preflight planning and situational awareness with <https://sua.faa.gov>
    - Will show selected scheduled activity; to see all, select “not scheduled”
  - Mark your charts for situational awareness and/or print the map
  - Plan to cross routes above 2000 feet AGL
  - Plan to cross routes near 90 degrees if practical
  - Use Flight Following
  - Contact FSS for MTR status/activity in your area
  - Squawk appropriately
  - Use all available aircraft/anti-collision lights and strobes
  - Clear vigilantly – look especially in the direction of traffic, but look both ways on those routes which can be travelled in both directions
  - Don’t forget to look for multiple (formation) aircraft





# MTRs and SRs

## Big Sky Theory?

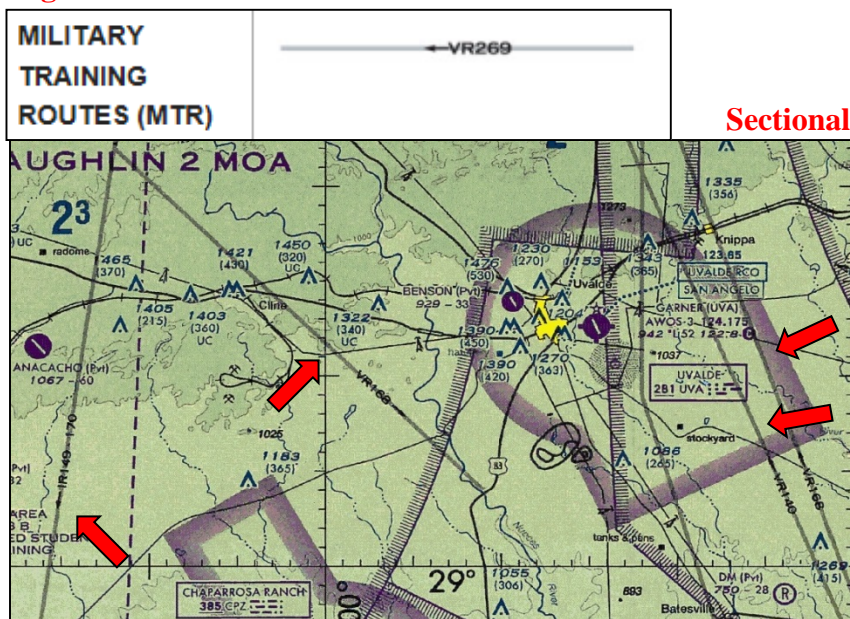




# Military Training Routes (MTRs)

- A Military Training Route is a low altitude route of flight defined by vertical and lateral dimensions established for the conduct of military flight training **in excess of 250 knots** below 10,000 ft MSL
  - Depicted on **Sectional Charts** (light grey lines) and **US IFR Enroute Low Altitude Charts** (light brown lines)

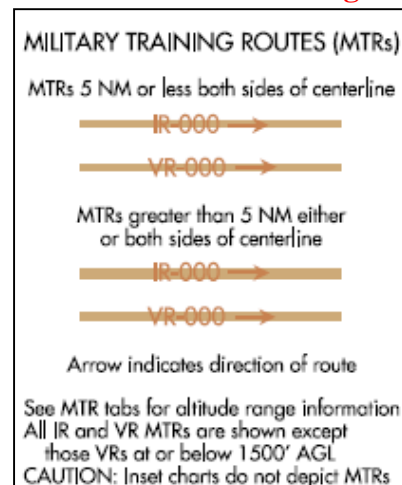
## Legend



## IFR Enroute LA



## Legend





# MTRs

- Typically flown **500-1500 ft AGL** and **300-420 Knots**, **possibly faster**
- 2 types of MTRs – IR & VR (IFR/ VFR)
- IR/VR MTRs that include one or more segments above 1500 feet AGL are identified by three number characters, (for example IR-XXX or VR-XXX). IR/VR MTRs with no segment above 1500 feet AGL shall be identified by four number characters, (for example IR-XXXX or VR-XXXX).
- All IR operations are conducted on IFR flight plans or an approved altitude reservation (ALTRV) regardless of weather conditions. Pilots must have an IFR or VFR flight plan to fly a VR or SR.





# MTR Locations

## Visual Route (VR)

500-1500'AGL,  
300-450 knots.

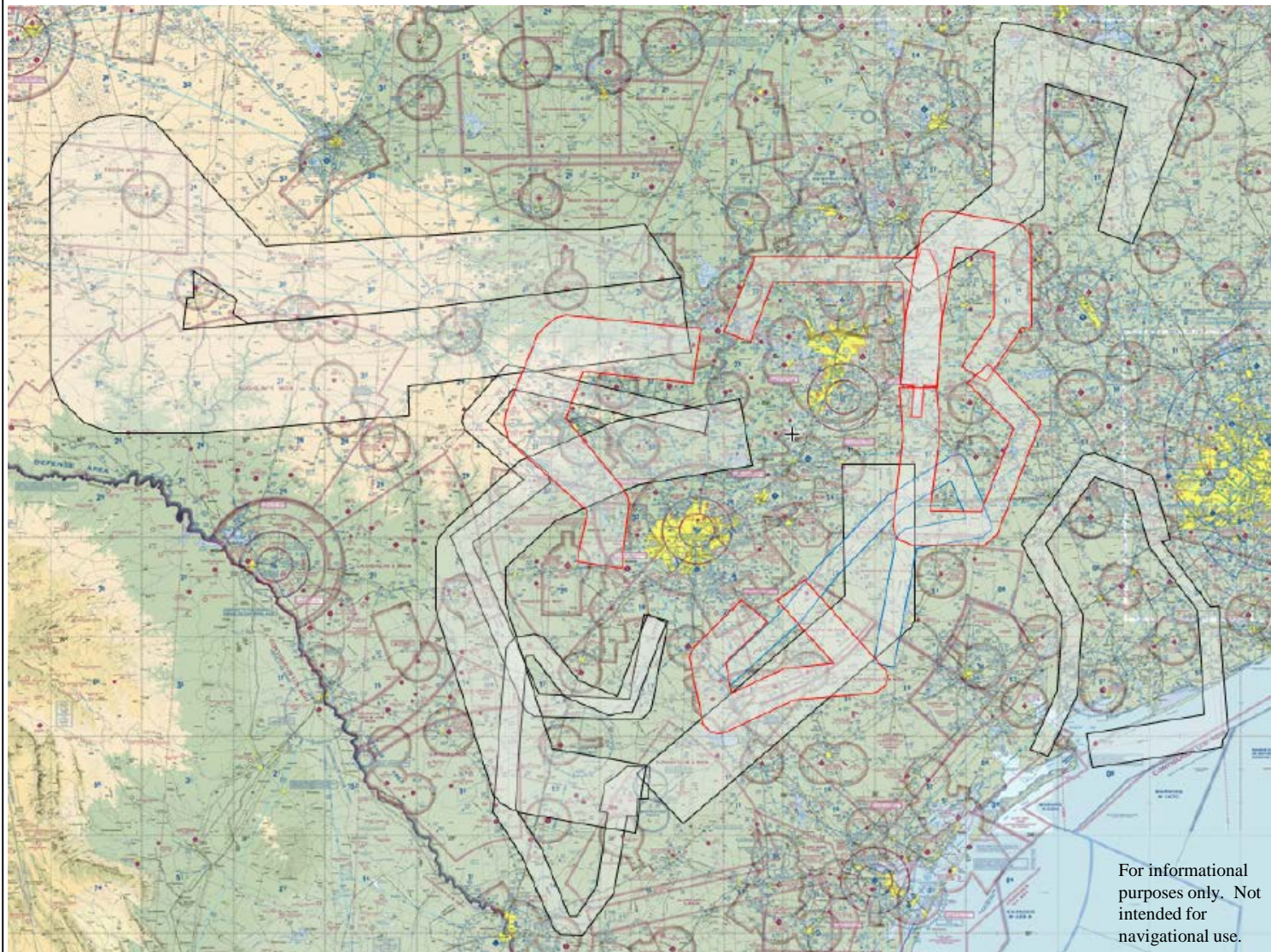
## Instrument Route (IR)

Same altitude and  
airspeeds as VR, but  
require an altitude  
reservation (ALTRV) and  
may be flown in IFR.

## Slow Route (SR)

Unlike IR/VR routes, FSS  
*will not* know if SRs are  
active.

\*\* Military aircraft can  
choose a route anywhere  
within the published  
boundary width -- not just  
the route centerline  
depicted on the charts.  
Watch out for formations!



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intended for  
navigational use.





# MTRs – Visual Routes (VR)

## VR143

Reagan County (E41)  
Rankin (49F)  
Ozona (OZA)  
Sonora (SOA)  
Kimble Co (JCT)  
Mason County (T92)  
Llano (AQO)  
Horseshoe Bay (DZB)

## VR140/1122/1123/156

Kerrville Schreiner (ERV)  
Garner (UVA)  
McKinley (T30)  
Dimmit Co (CZT)  
Cotulla-La Salle Co (COT)

## VR142

Cameron (T35)  
Marlin (T15)  
Mexia-Limestone (LXT)  
C. David Campbell Fld (KCRS)  
Palestine (PSN)

## VR151

Calhoun Co (PKV)  
Palacios (PSX)  
Jackson Co (26R)  
Wells (66R)  
Eagle Lake (ELA)  
Grawunder (06R)  
Covey Trails (X09)  
Bay City (BYV)

## VR1120/1121

Live Oak Co (8T6)  
Karnes Co (2R9)  
Dreyer Mem (T20)  
Carter Mem (T91)  
Lockhart (50R)

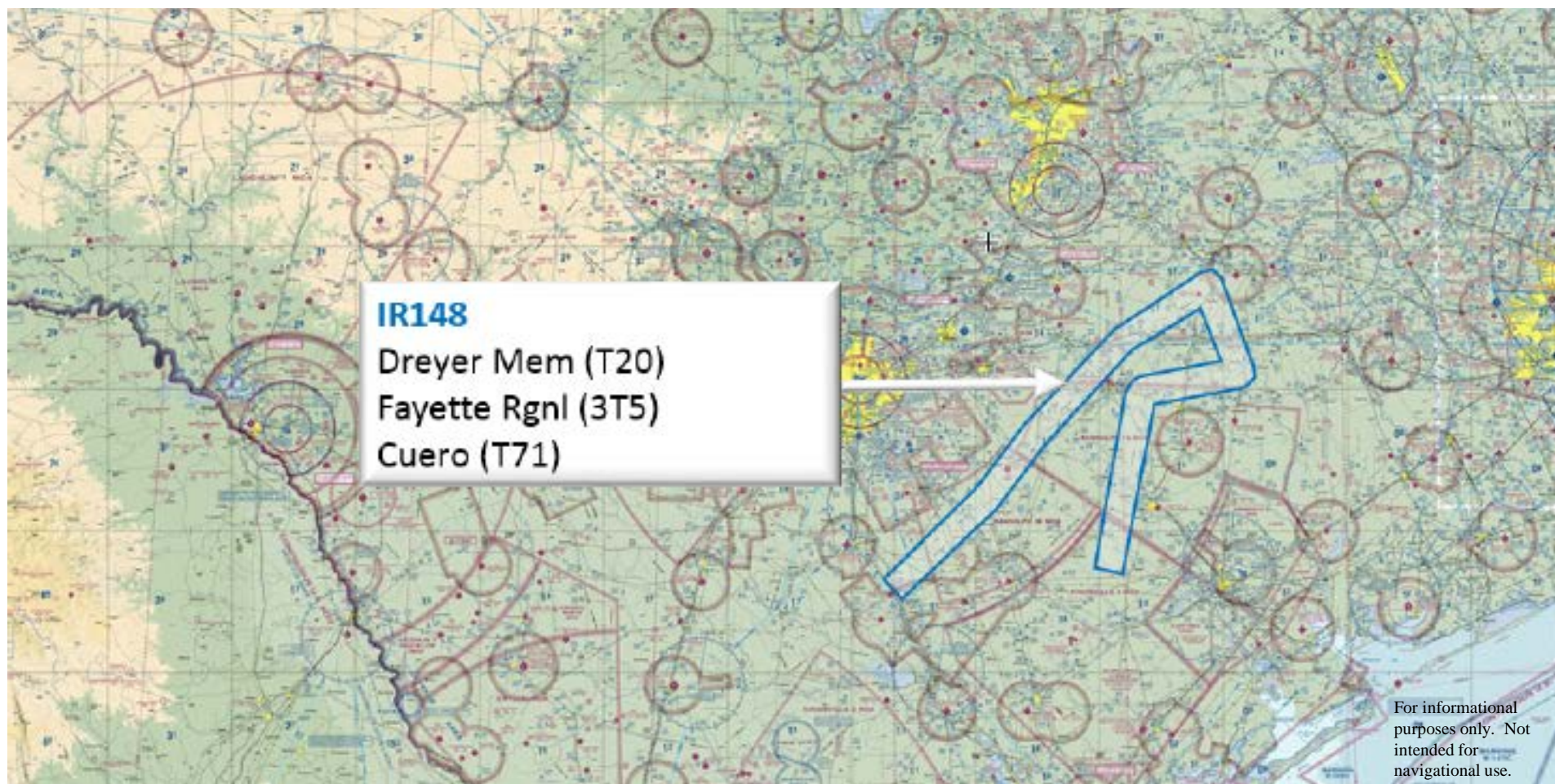
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Map Data ©2019





# MTRs – Instrument Routes (IR)





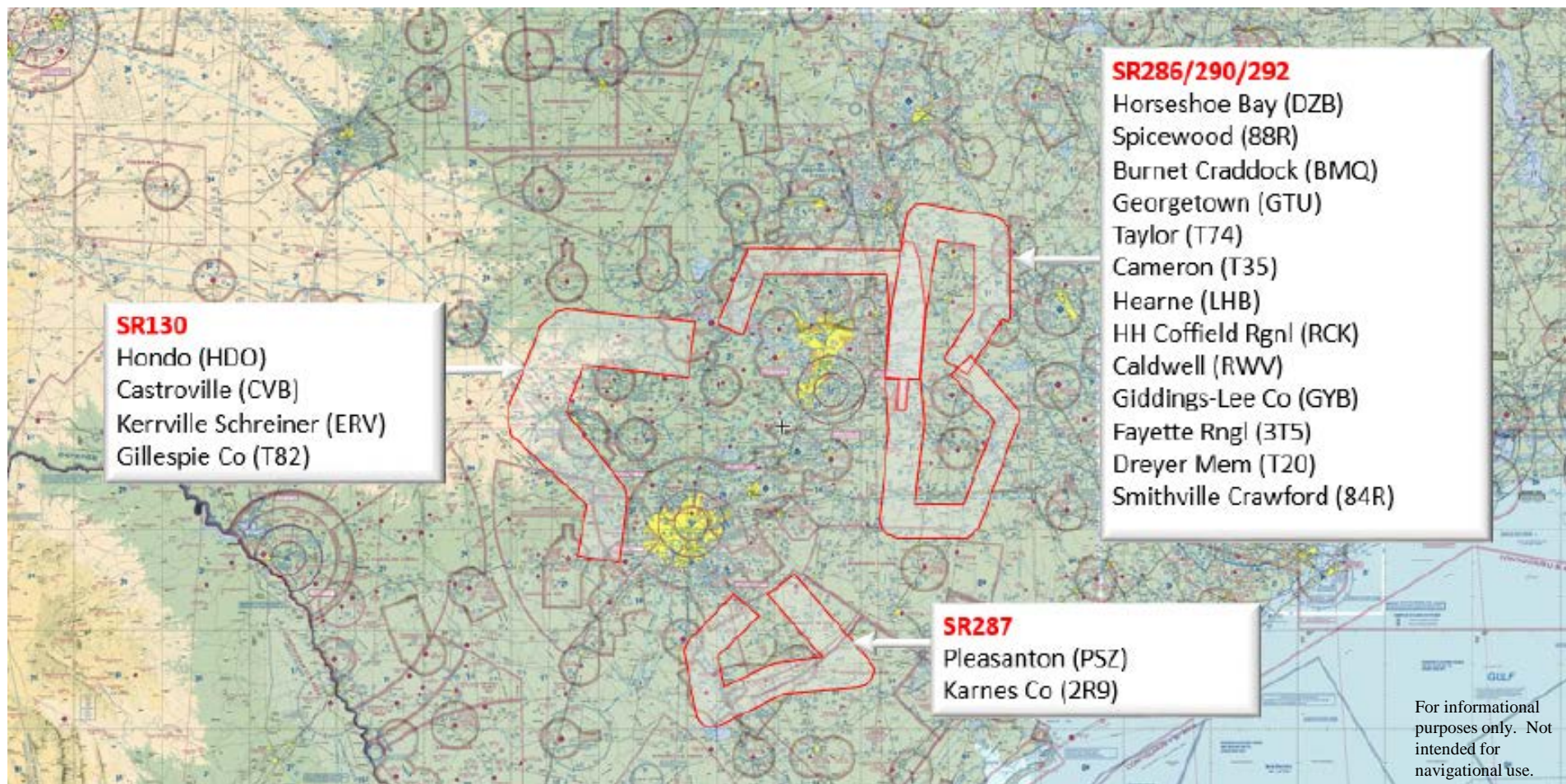
# SRs

- Typically flown **500-1500 ft AGL** and **250 knots or less**
- Unlike MTRs, the number of characters has no bearing on route altitudes, i.e. SR-XXX or SR-XXXX.
- All SR operations are conducted VFR, but navigation to/from may be conducted IFR. Pilots must have an IFR or VFR flight plan to fly an SR.
- In many cases, FSS is not notified of a scheduled SR





# Slow Speed Low Altitude Training Routes – SR

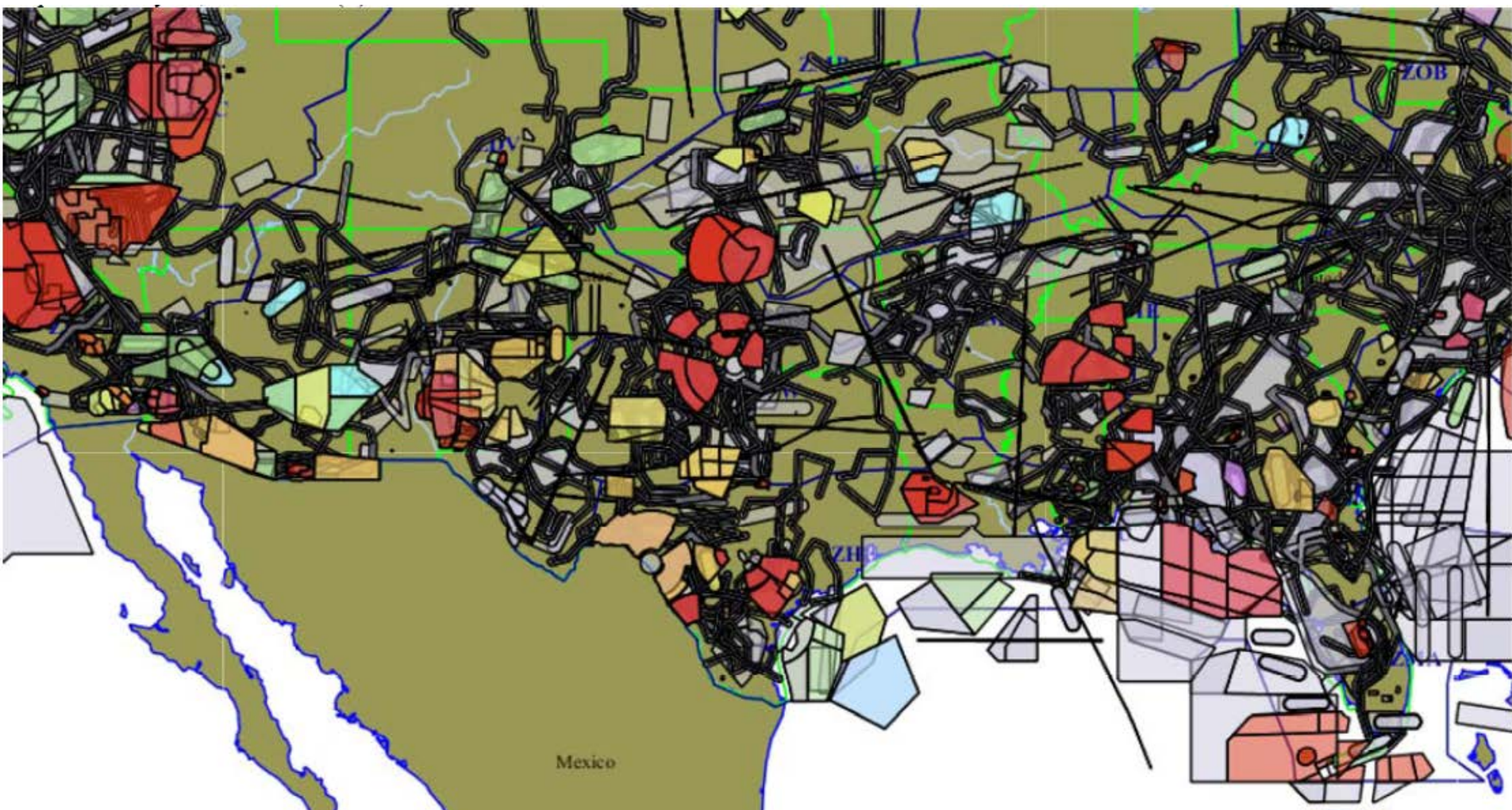






# Military, MOAs, SUAs, MTRs

Is it active? Contact FSS/ATC for enroute updates.





# JBSA-Kelly Field

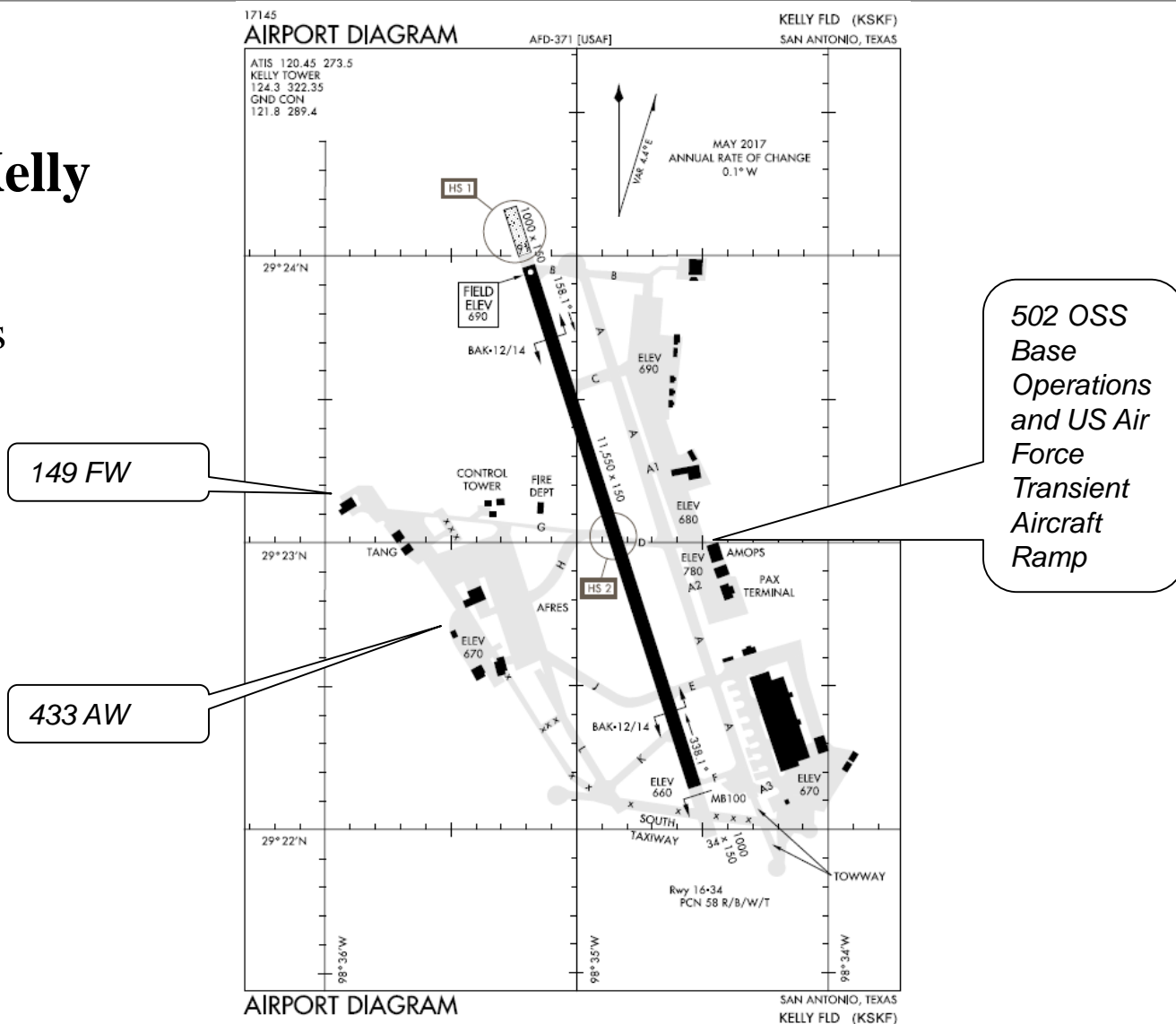




# Airfield Diagram – Kelly Field

## US Air Force Operations at Kelly Field

- 502 OSS Transients
- 149 FW F-16
- 433 AW C-5

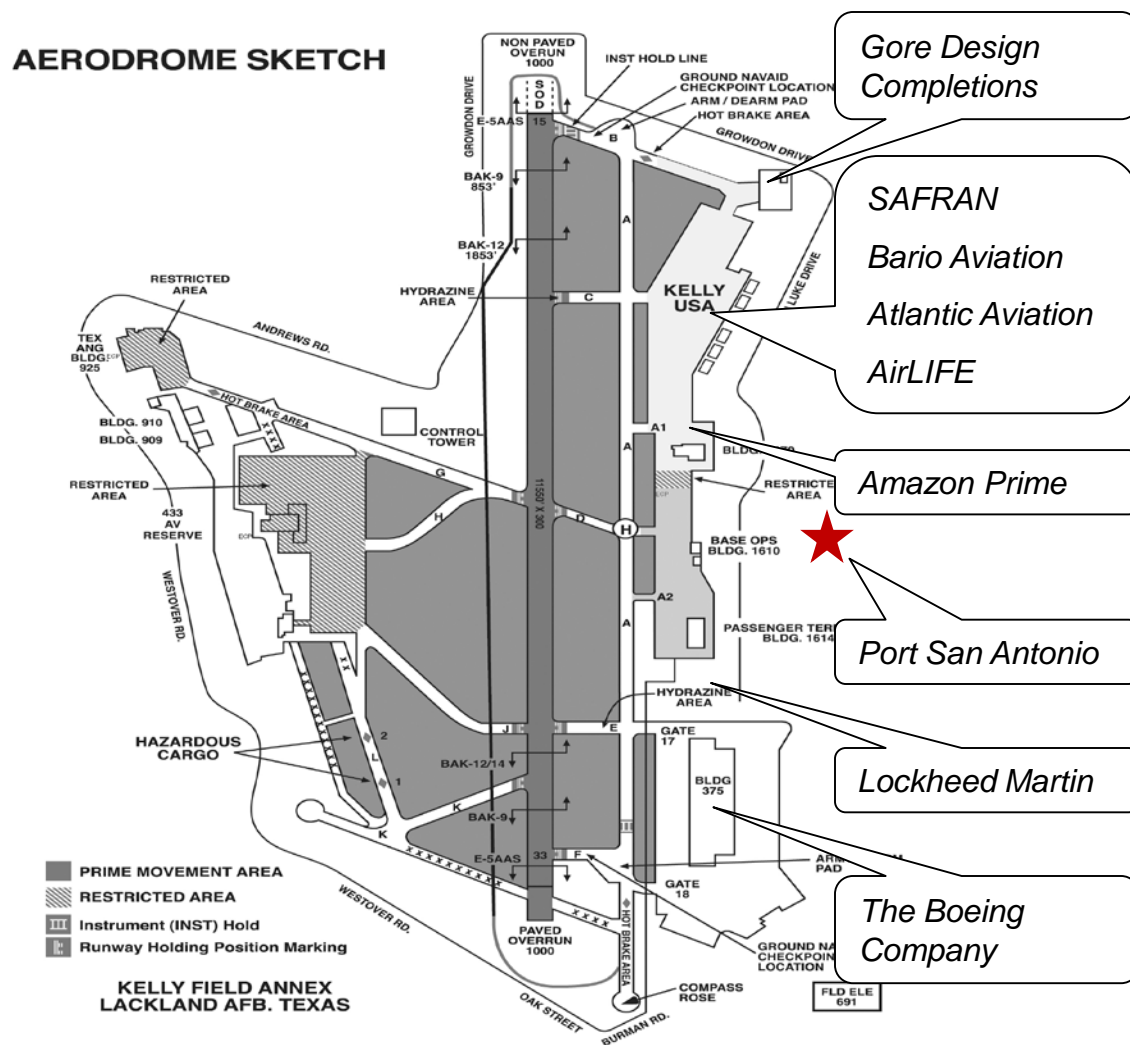




# Airfield Environment

## Other Operations at Kelly Field

- Port San Antonio



## Gore Design Completions

SAFRAN  
Bario Aviation  
Atlantic Aviation  
AirLIFE

## Amazon Prime

## Port San Antonio

*Lockheed Martin*

*The Boeing  
Company*





# Local Patterns

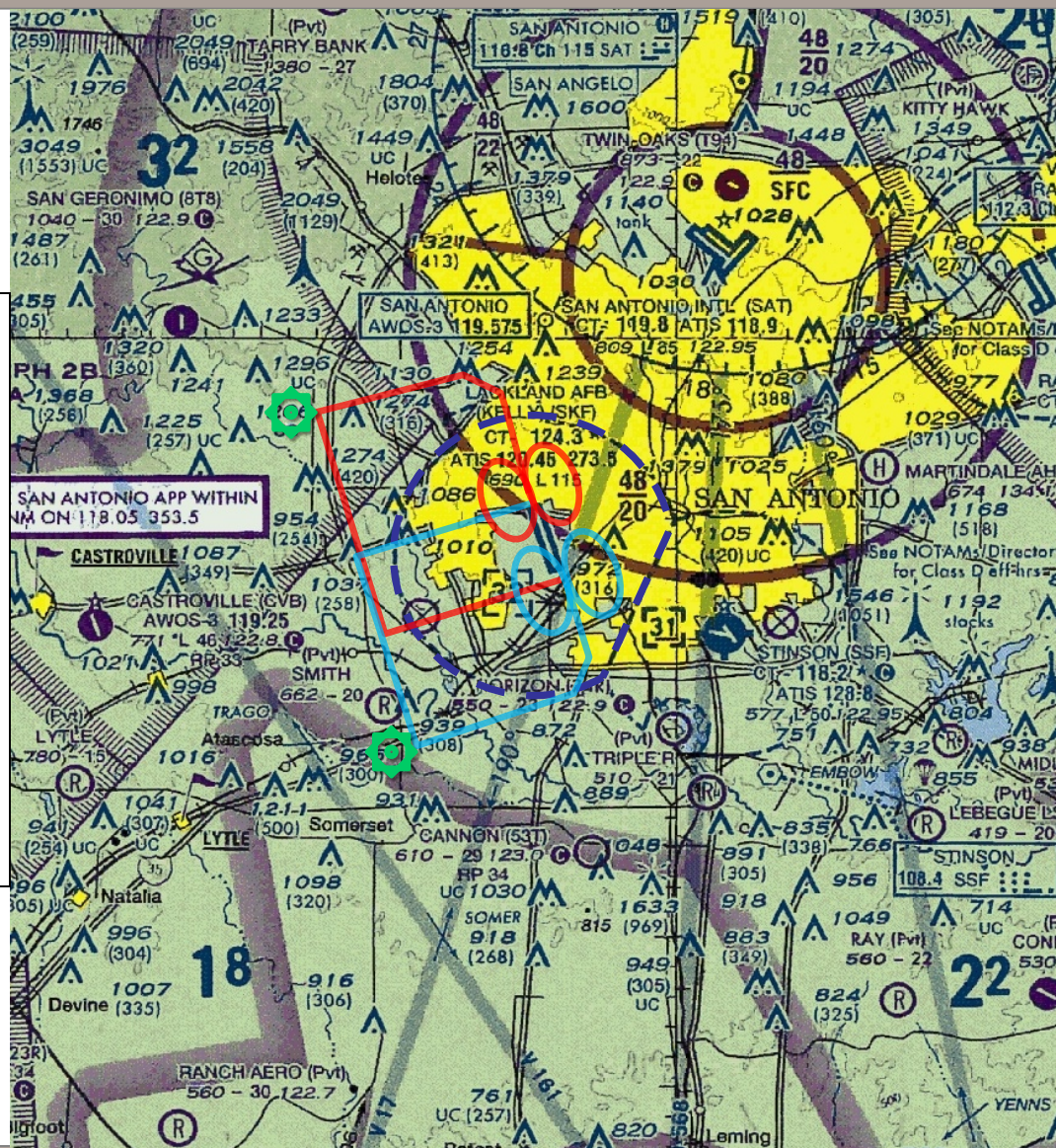
## LEGEND

□ Runway 16  
Visual Pattern

□ Runway 34  
Visual Pattern

□ Class D  
Airspace – Surface  
to 3200 MSL

⊗ Pattern Entry at  
Sea World or  
South Point



## INFORMATION

□ Pattern  
Altitudes:

- Overhead – 2700 MSL
- Visual Straight-in – 2200 MSL
- Breakout – 3200 MSL

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navigational use.





# 433 Airlift Wing (AFRC)



## C-5 Operations at Kelly Field





# 433 Airlift Wing (AFRC)

- C-5 School house (356 AS) and operational squadron (68 AS)
  - Up to three local flights daily, 3.5 to 4 hours in duration
- Profiles at KSKF
  - Normally Radar pattern west of field @ 3000' MSL
  - VFR Pattern flown @ 2200' MSL
  - Opposite direction circling approaches
  - Tactical Approaches





# 433 Airlift Wing (AFRC)

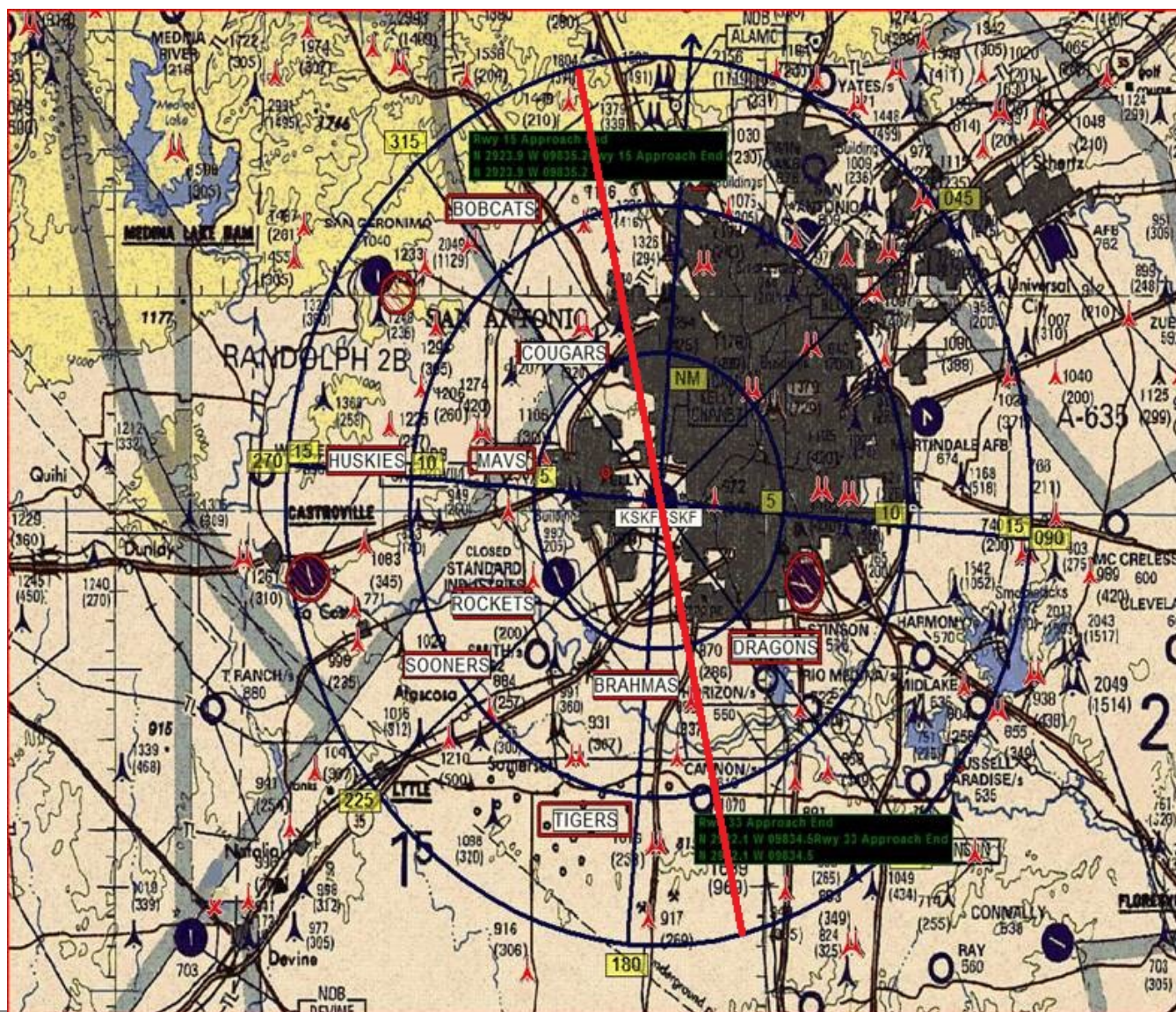
- Tactical Training
  - Required by Real World Events
  - Primary Training Group – Pilots (Approximately 75)
  - Aircrew Currency
    - 2 events every calendar quarter
  - Flown VFR
  - Duration: 5-10 minutes / maneuver
  - Altitude: Low @ 2500' MSL                      High @ 5500' MSL
  - Speed: Low @ 230 KIAS                      High @ 250 KIAS







# 433 Airlift Wing (AFRC)





# F-16 Pattern Procedures

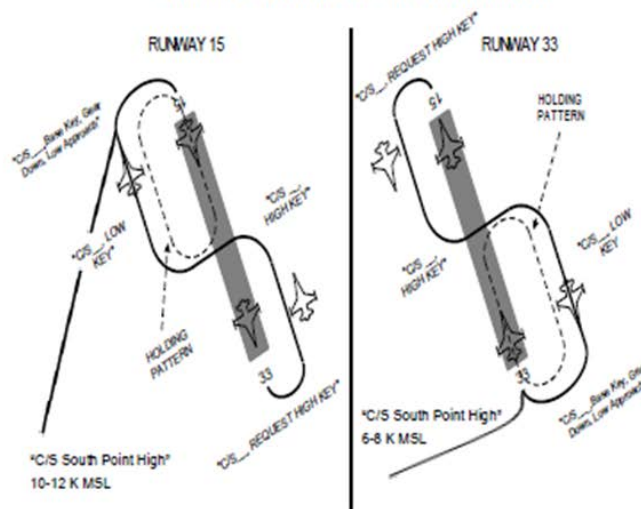
- High Key
  - Straight-In: 7-10 NM from runway, 7500-8000' MSL
  - Overhead: Above runway 8000' MSL
- Low Key
  - Straight-In: 5 NM from runway, 6000' MSL
  - Overhead: On downwind 3000-5000' MSL
- Local use only by 149 FW, day VFR only



# F-16 Pattern Procedures



## KELLY OVERHEAD SFO PATTERNS



- Request SFO 2 minutes prior to Kelly Control Zone with SAT App.
- Minimum WX required is 1000' above entry alt, 5 miles visibility
- SFO availability may be limited during 4/22 operations at SAT.

### OVERHEAD SFO PROCEDURES

1. SFO Entry: If requesting hi-key on recovery (i.e. not already established in the VFR pattern), pilots will flow to the approach end of the active runway for a 360° pattern. Pilots will avoid the eastern side of the airspace when transiting to hi-key. If already established in the VFR pattern, SFOs will be 270° as depicted above.
2. Maximum altitude of 8,000' MSL unless approved by SAT App
3. Remain within 3nm during Overhead and 270°
4. Holding is at High Key in a racetrack with visual de-confliction.

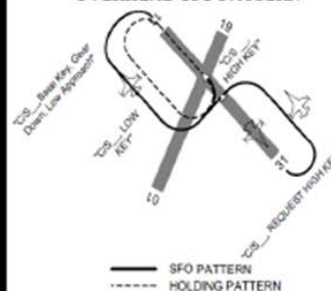
### SOUTH POINT HIGH SFO PROCEDURES

1. Request "South Pt High Arrival" with SAT App
2. Switch to tower 5 miles prior to South Point
3. Report "South Pt High" with tower at 10-12K (Rwy 15); 6-8K (Rwy 33)
4. Proceed direct and report "Base Key"

## ORANGE GROVE NALF TRAFFIC PATTERNS

KINGSVILLE APPROCH: 290.45/119.90  
ORANGE GROVE TOWER: 281.425/318.85  
ORANGE GROVE ATIS: 254.35

### OVERHEAD SFO PATTERN



### OVERHEAD PROCEDURES

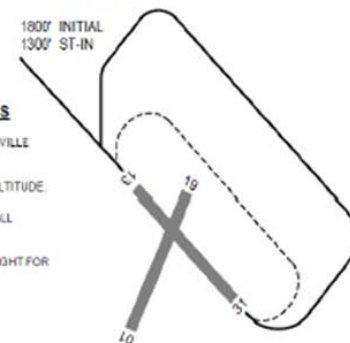
1. Request overhead SFO, with requested altitude and time to high/low key, with Kingsville Approach
2. Wx minimum: 1000' above high/low key
3. High key altitude: 7,500-9,500' MSL
4. Low key altitude: 3,500-5,500' MSL
5. Remain within 5 NM of Orange Grove NALF
6. Do not exceed 250 KCAS during maneuver
7. Report high key, low key, and base key with gear/intentions to tower.

### STRAIGHT-IN PROCEDURES

1. Runway 13 only
2. Request straight-in SFO, with requested altitude & time to start of procedure, with Kingsville Approach
3. Wx minimum: 1000' above any start of the procedure (any portion of straight-in SFO)
4. Report distance in miles at start of procedure: 10 NM, 7,500-9,500' MSL, wx permitting ("C/S, xx mile, simulated flameout final")
5. Report gear/intentions at 5 NM

### TRAFFIC PATTERN PROCEDURES

1. STATE REQUEST ON INITIAL CONTACT WITH KINGSVILLE APPROACH AND ORANGE GROVE TOWER.
2. REPORT SNM INITIAL OR FINAL AT APPROPRIATE ALTITUDE
3. OVERHEAD PATTERNS WILL BE LEFT TURNS FOR ALL RUNWAYS.
4. SFO PATTERNS WILL CLIMB LEFT AND DESCEND RIGHT FOR ALL RUNWAYS.
5. REMAIN WITHIN 5 NM OF RUNWAY.
6. ALL HOLDING AS DIRECTED BY TOWER.
7. COORDINATE DEPARTURE WITH ORANGE GROVE TOWER - DIRECT KELLY AT 15,500 VFR.



Note: Pilots shall contact Orange Grove NALF Tower as early as possible (whether pre-flight or in-flight) prior to planning on using these procedures in order to deconflict from heavy traffic expectations at KNOG. These procedures will be employed by 149 FW aircraft on a non-interference basis (i.e. TRAWING 2 training requirements/operations take priority over 149 FW training requirements).



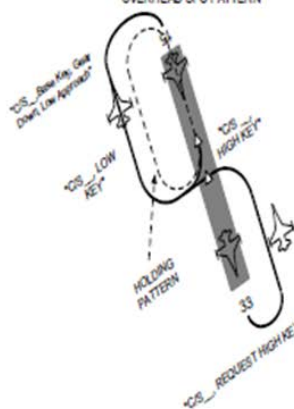
# F-16 Pattern Procedures



## ROBERT GRAY AAF TRAFFIC PATTERNS

GRAY APPROACH: 203.18 (CH 15)  
GRAY TOWER: 285.5  
GRAY ATIS: 111.8

### OVERHEAD SFO PATTERN



### OVERHEAD PROCEDURES

1. REQUEST SFO WITH GRAY APPROACH - PROVIDE ALTITUDE AND TIME TO HIGH KEY.
2. WX MINIMUM - 1000' ABOVE HIGH KEY, 5 MILES VISIBILITY.
3. REPORT INITIAL TO ACTIVE RUNWAY AT HIGH KEY ALTITUDE 7500' - 9500' MSL.
4. CANCEL IFR PRIOR TO HIGH KEY.
5. REMAIN WITHIN 5NM OF RUNWAY.
6. CLIMB LEFT AND DESCEND RIGHT FOR ALL OVERHEAD SFOs.
7. 250 KIAS MAXIMUM DURING MANUEVER.
8. ALL HOLDING AS DIRECTED BY TOWER.

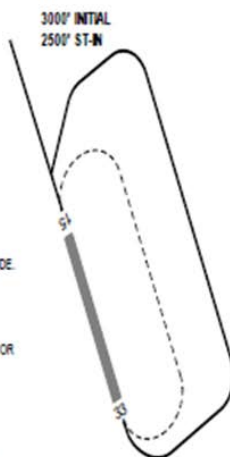
### STRAIGHT-IN PROCEDURES

1. REPORT 10NM FINAL ON EXTENDED CENTERLINE AT 7500' - 9000' MSL.
2. REPORT GEAR/INTENTIONS AT 5NM.

— SFO PATTERN  
--- HOLDING PATTERN

### TRAFFIC PATTERN PROCEDURES

1. STATE REQUEST ON INITIAL CONTACT WITH GRAY APPROACH.
2. REPORT 5NM INITIAL OR FINAL AT APPROPRIATE ALTITUDE.
3. OVERHEAD PATTERNS WILL BE LEFT TURNS FOR ALL RUNWAYS.
4. SFO PATTERNS WILL CLIMB LEFT AND DESCEND RIGHT FOR ALL RUNWAYS.
5. REMAIN WITHIN 5 NM OF RUNWAY.
6. ALL HOLDING AS DIRECTED BY TOWER.
7. COORDINATE DEPARTURE WITH GRAY TOWER - DIRECT STONEMALL (STV55) AT 16,500 VFR.



## LAREDO INT'L AIRPORT TRAFFIC PATTERNS

HOUSTON CTR: 307.2 (CH 20)  
LAREDO TOWER: 257.9 (CH 19)  
LAREDO ATIS: 125.77

### OVERHEAD PROCEDURES

1. INITIAL ALTITUDE 2000' MSL (1500' AGL)
2. RUNWAY AND DIRECTION OF BREAK AS DIRECTED
3. DO NOT OVERFLY IAP TERMINAL OR PARKING LOT DURING BREAK OR CLOSED PULL-UP
4. COORDINATE VFR DEPARTURE WITH LAREDO TOWER - IFR PICKUP IF REQUIRED WITH HOUSTON CENTER

**MAIN TERMINAL & PARKING - DO NOT OVERFLY**

### SFO PROCEDURES

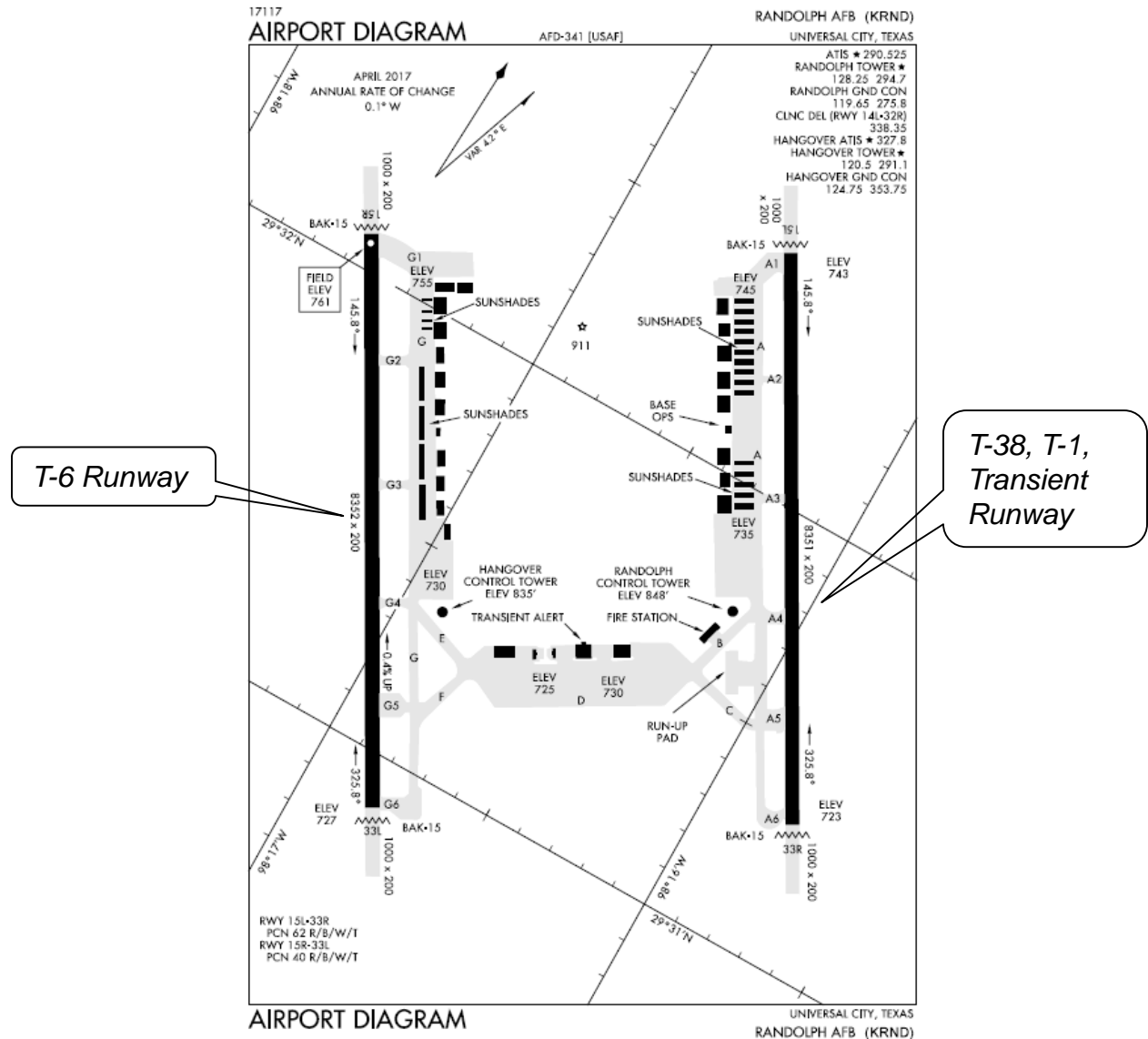
1. PROCEED VFR. ADVISE HOUSTON CENTER AND REQUEST SFO UPON INITIAL CONTACT WITH LAREDO TOWER.
2. STRAIGHT-IN SFO: COORDINATE TO ARRIVE AT 10 NM ON EXTENDED CENTERLINE AT 7,500-9,000' MSL. REPORT GEAR AND INTENTIONS AT 5 NM.
3. ALL OVERHEAD SFOs ARE 360 PATTERN
4. KEY ALTITUDES - HIGH: 7500' MSL. LOW: 3500' - 5500' MSL. BASE: 2500' - 3500' MSL
5. PATTERNS FOR 17L/35R ARE EAST OF FIELD. PATTERNS FOR 17R/35L ARE WEST OF FIELD (STAY WITHIN 2 MILES OF AFCD CENTER OF MASS)
6. LAREDO TOWER WILL DIRECT RUNWAY AND DIRECTION OF BREAK
7. COMM: "HIGH KEY", "LOW KEY", "BASE KEY", "GEAR DOWN"
8. USE CAUTION FOR INTERNATIONAL BORDER 3 NM WEST OF AIRFIELD!!
9. COORDINATE VFR DEPARTURE WITH LAREDO TOWER - IFR PICKUP IF REQUIRED WITH HOUSTON CENTER



**USE CAUTION FOR  
SIMULTANEOUS  
APPROACHES TO  
PARALLEL RUN-  
WAYS DURING VMC  
OPERATIONS**



# JBSA-Randolph / Seguin Aux Field







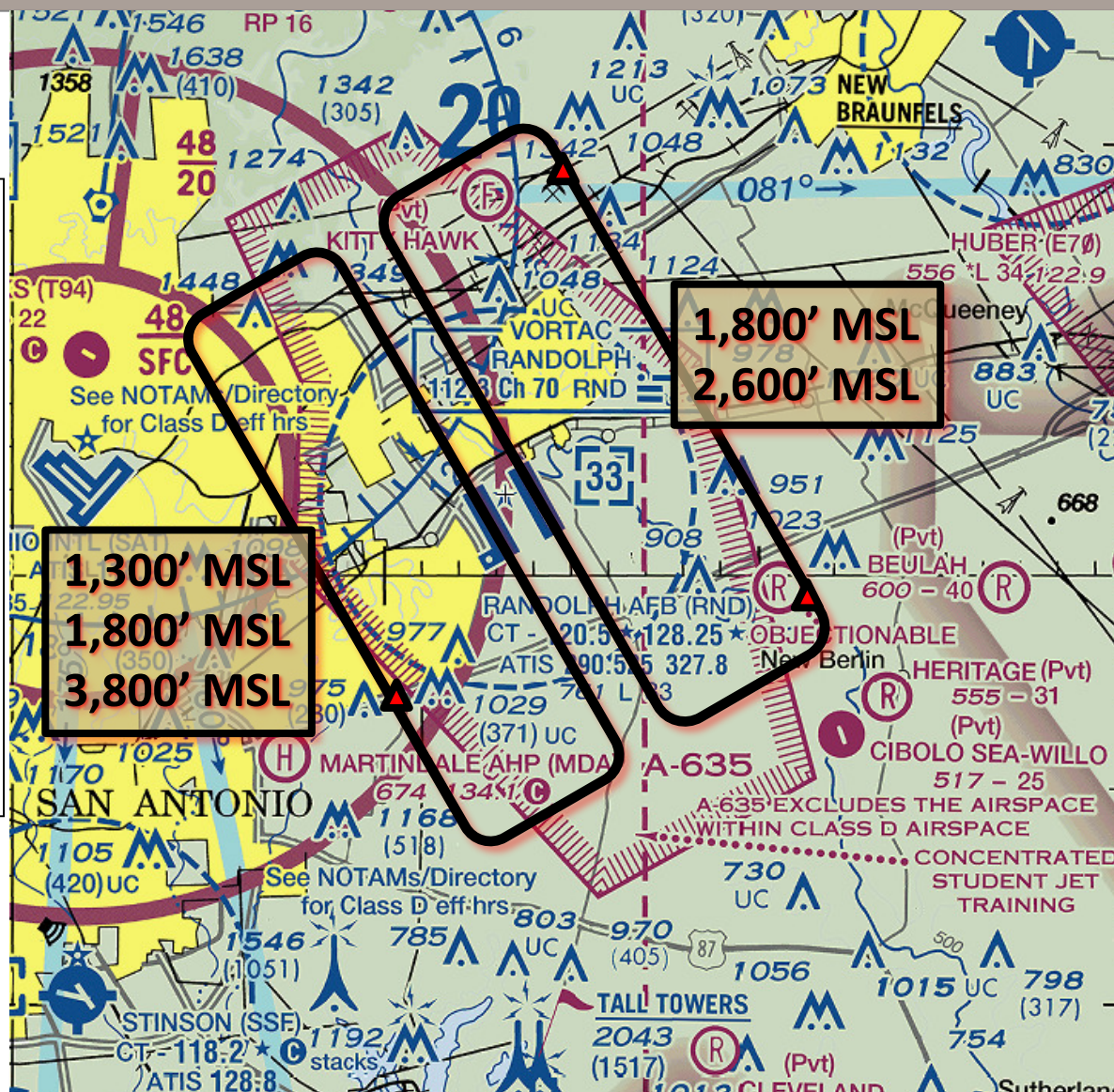
# Randolph Patterns

## INFORMATION

☐ Runway 15 L/R or  
33 L/R Visual  
Patterns in use

☐ Class D Airspace  
– Surface to 3300  
MSL

Alert Area 635:  
(USAF – Randolph)  
1500 – 4000 MSL  
except for RND  
Class D. Effective  
M-F, SR-SS +3 hr,  
VFR





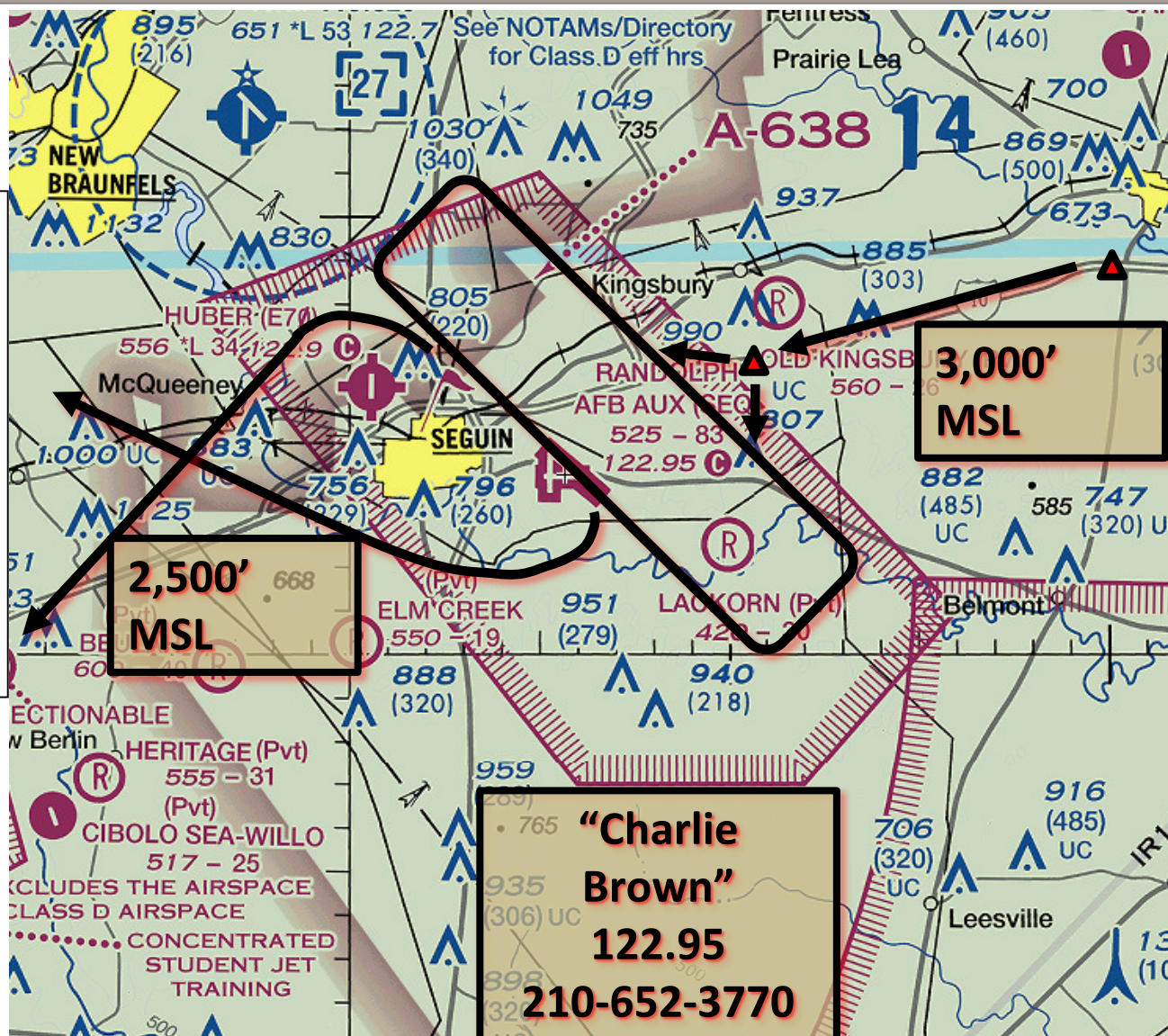


# Local Patterns – Randolph Aux Seguin

**INFORMATION**  
**“Charlie Brown”**  
USAF Training  
Only

☐ Runway 13 or 31  
Transition and  
Visual Pattern

**Alert Area 638:**  
(USAF – Randolph)  
SFC – 3000 MSL  
Effective M-F, SR-  
SS, VFR



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navigational use.

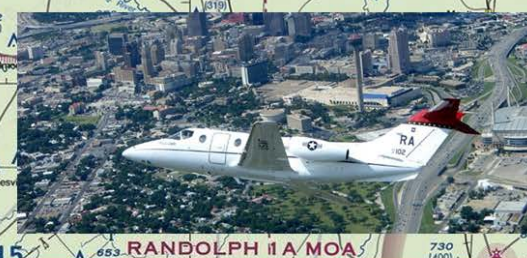




# JBSA MACA Information

<http://www.jbsa.mil/>

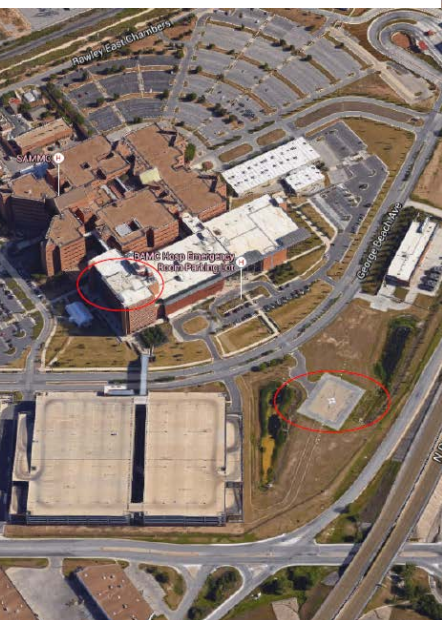
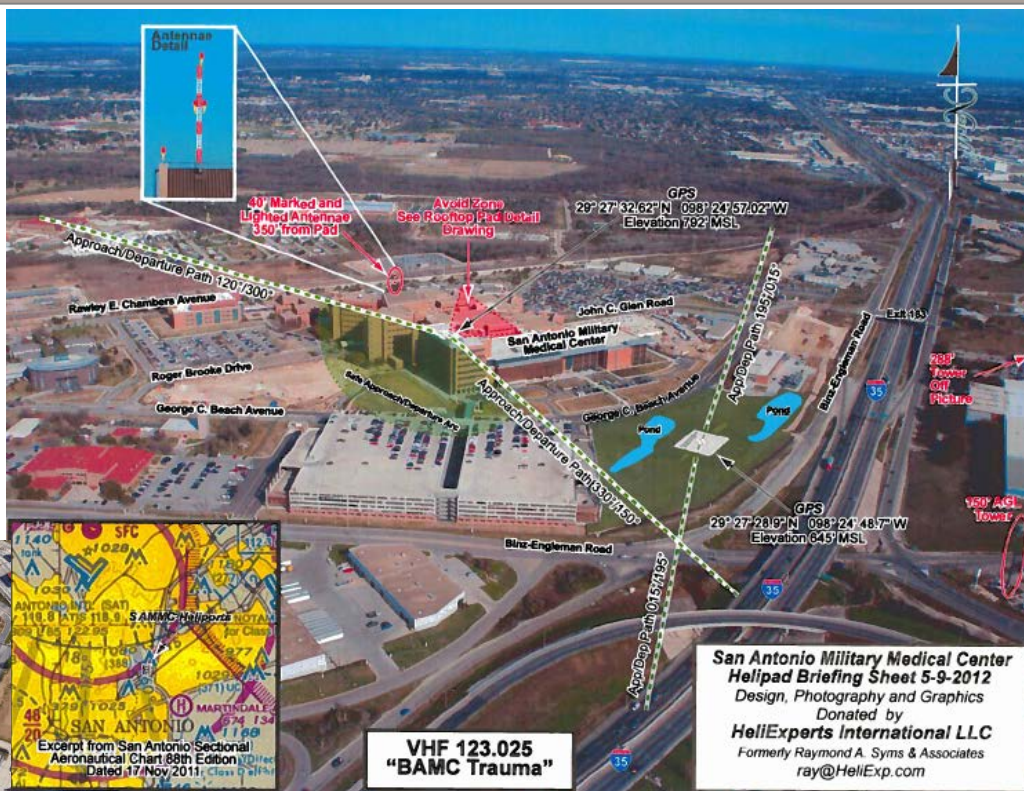
**JBSA**  
**Airspace**  
**Safety**  
**CLICK HERE**





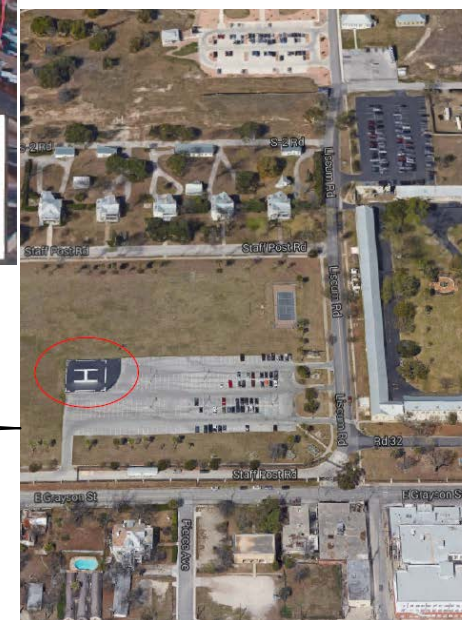


# JBSA-Fort Sam Houston/SAMMC



SAMMC  
Rooftop and  
Ground  
Helipads

FSH Helipad







# JBSA-Camp Bullis

Parts of JBSA-Camp Bullis are coordinated with the FAA to be **Controlled Firing Areas**. A CFA is airspace designated to contain activities that if not conducted in a controlled environment would be hazardous to nonparticipating aircraft.



CFAs provide a means to accommodate, without impact to aviation, certain hazardous activities that can be immediately suspended if a nonparticipating aircraft approaches the area. SEE FAA JO 7400.2 current version, Chapter 27.



JBSA-Camp Bullis Helipad

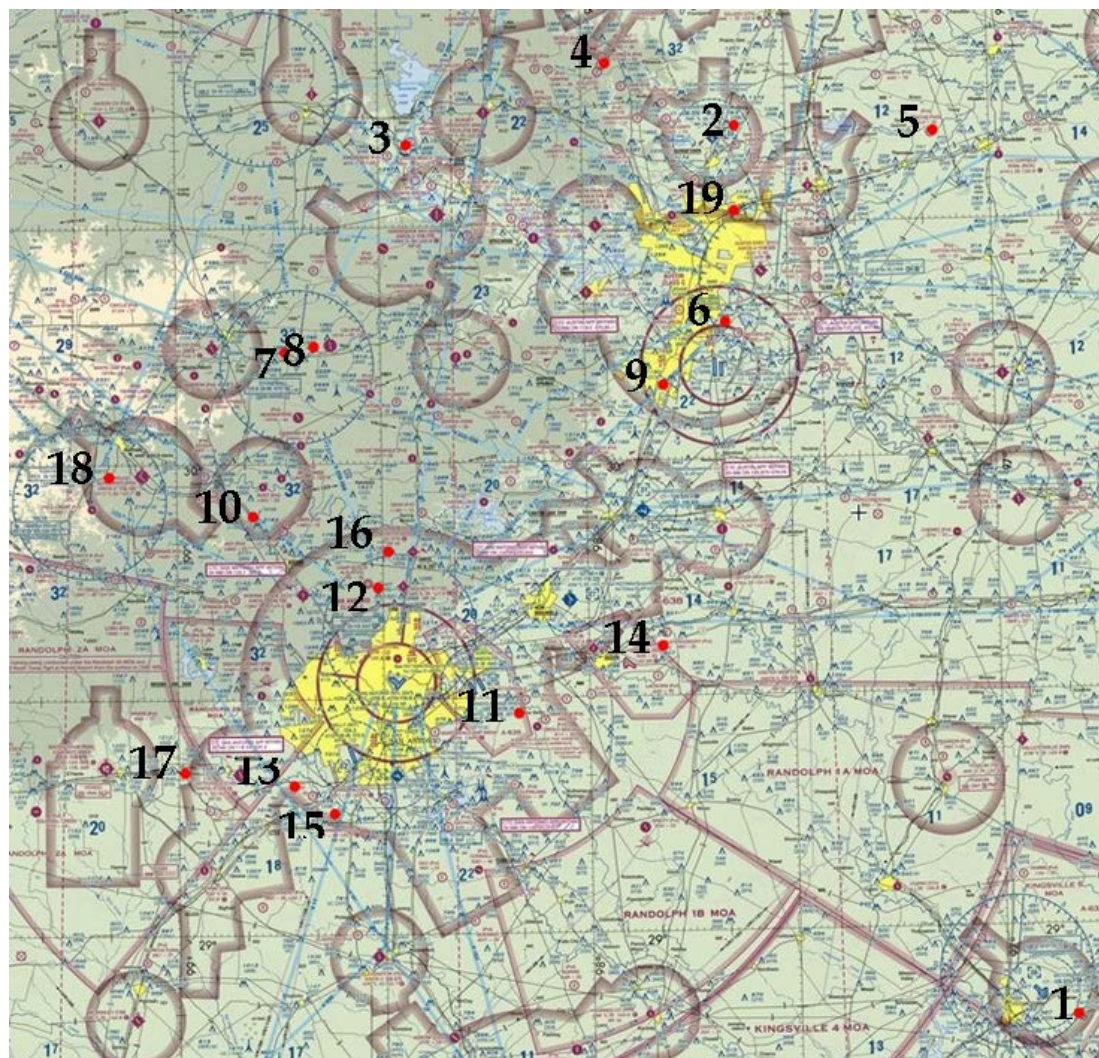
JBSA-Camp Bullis Combat Assault Landing Strip







# sUAS Awareness



1. Victoria Radio Control Flyers, Inex TX
2. Georgetown Aero Modelers Assn, Georgetown TX
3. Highland Lakes Flyers, Kingsland TX
4. Briggs Radio Control Flyers, Bertram TX
5. Fly Apache Pass RC, Thorndale TX
6. Austin RC Assn, Austin TX
7. Fredericksburg Wingdingers Aero- Modelers, Fredericksburg TX
8. Hill Country Aeromodelers, Austin TX
9. Boerne Area Model Society, Comfort TX
10. Heart of Texas Soaring Society, St Hedwig, TX
11. Bulverde Aero Modelers, San Antonio TX
12. Alamo Radio Control Society, Atoscosa, TX
13. Sandhills RC Flyers, La Vernia TX
14. Tri City Flyers, Seguin TX
15. San Antonio Prop Busters, Somerset TX
16. River City Radio Control, Bulverde TX
17. Medina Valley Flyers, Hondo TX
18. Kerrville RC Flyers Kerrville TX
19. Lone Star Aeronuts, Round Rock TX

Source: Academy of Model Aeronautics





# Questions/Comments

