CITIZENS SERVING AMERICA

Airmen Defending Freedom

South Dakota Air National Guard

114TH FIGHTER WING

114 Fighter Wing

Mid-Air Collision Avoidance

(MACA)

Lt Col Eric Knutson

6 April 2016

Mid-Air Collision Avoidance

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- South Dakota Native
- Joined SDANG in 1988

Flying Experience

- Instructor, Evaluator, Functional Check Flight Pilot
- Active duty assignments: Arizona, Florida, Texas, Utah, Korea
- Operations Provide Comfort, Southern Watch, Northern Watch, Noble Eagle, Iraqi Freedom, Coronet Nighthawk, *2010 SD Floods*
- 3,000+ hrs in F-16

Mid-Air Collision Avoidance

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- What is MACA
- Who we are
- What we do
- Where we fly
- What to look for

Mid-Air Collision Avoidance

- What is MACA?
  - Air Force program to minimize risk of mid-air collisions with other aircraft.
- What is MACA's goal
  - The goal of the Air Force MACA program is to promote a safe flying environment in areas Air Force aircrews conduct training.

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HISTORY

- ***175th Fighter Squadron established 20 September 1946***

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114 FW

- Sioux Falls F-16's
  - 22 Jets
  - Tuesday-Friday
  - One weekend per month
  - One night week per month

- 16 sorties per day

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F-16 Fighting Falcon

- "Viper"
  - 2 radios
  - Basic autopilot
  - APG-68 radar
  - Bubble canopy
  - Maneuverable
  - Datalink
  - GPS

  - NO TCAS
  - NO IFF interrogator
  - NO ADS-B

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LINGO

- Military terms you may hear at KFSD:
  - "**Initial**" - 3-5 miles on runway extended centerline at traffic pattern altitude. Can be single ship up to four airplanes.
  - "**Tactical Initial**" – same except jets are in Line Abreast formation.
  - "**Break**" – Position at which we start the 180 to downwind.
  - "**Downwind**" – Same as civilian term
  - "**Perch**" – The point to start a descending 180 turn to final.
  - "**Closed**" – Climbing 180 to downwind following low approach.
  - "**SFO**" – Simulated Flame Out pattern
  - "**High Key**" – "Break" over runway 7,000'-10,000'
  - "**Low Key**" – "Perch" at 3,000'-5,000'
  - "**Base Key**" – 90 to final approx. 2,000'

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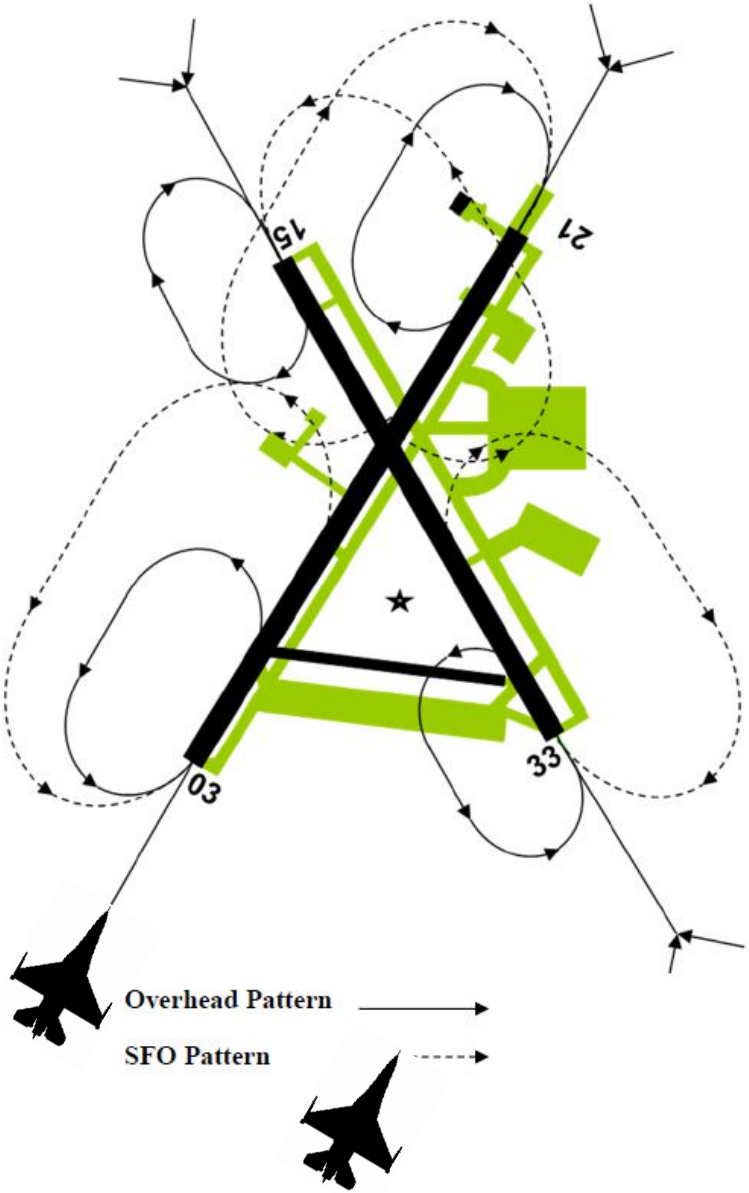
Traffic Pattern Formations

- ATC defines Standard Formation as all aircraft inside 1nm
  - Fingertip – 3’ wingtip spacing. Only the leader is clearing formation.
  - Route – 50’ – 500’ between aircraft.
  - Chase – approx. 500’
  - Only leader squawks.



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Arrivals

- Arrivals – Visual, ILS, TACAN
  - Straight In “Final, Gear Down”
  - Overhead - 1500’ AGL, 300 KCAS, “Initial” “Base, gear down”
  - Tactical Overhead - 1500’ AGL, 350 KCAS, “Tactical Initial”
  - SFO (Simulated Flame Out) – 3,000’-7,000’ AGL, 250 KCAS, “High Key”
  - Straight In SFO

  - Unable GPS, VOR, NDB approaches

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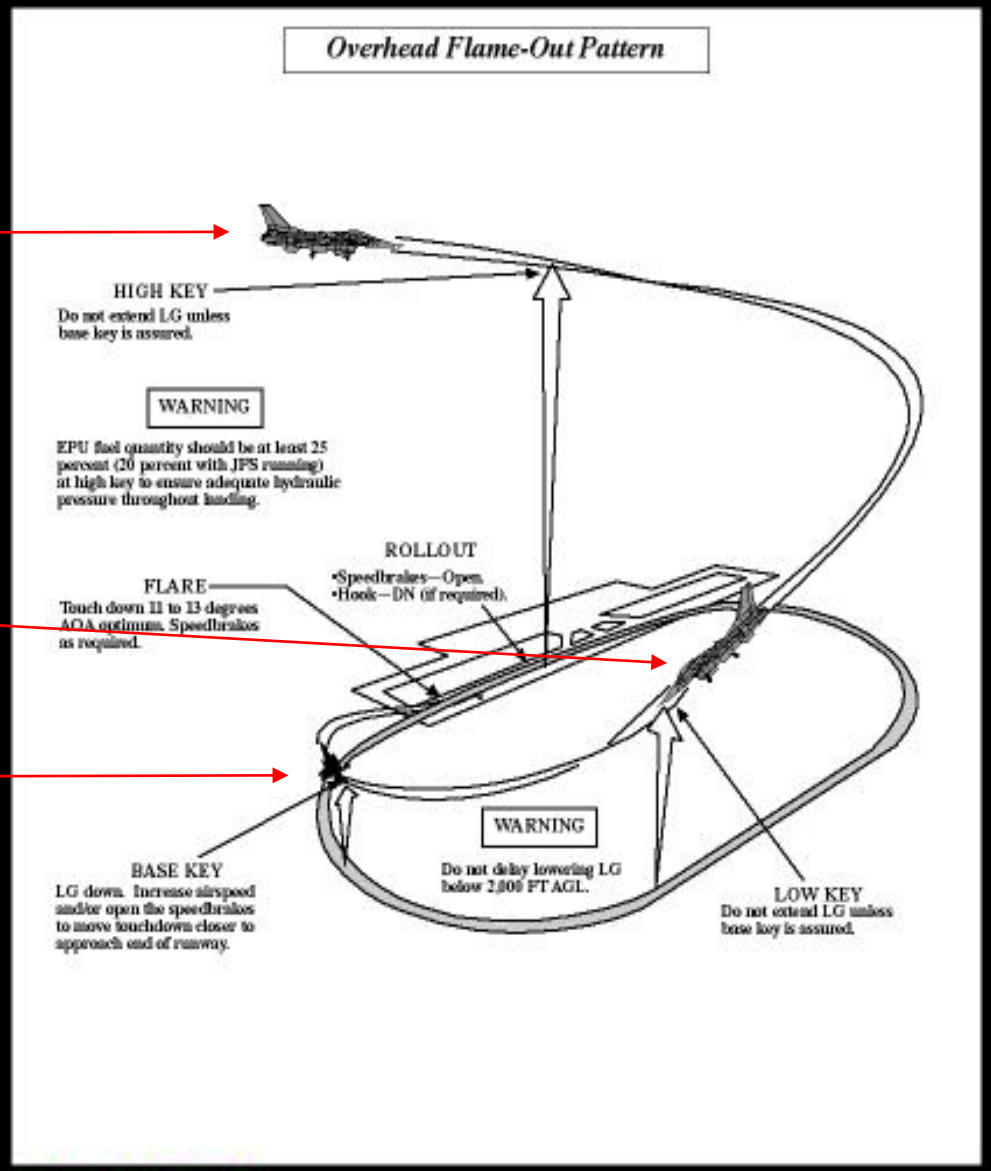
Arrivals

SFO Pattern

High Key
7-10K

Low Key
3-5K

Base Key
2K min



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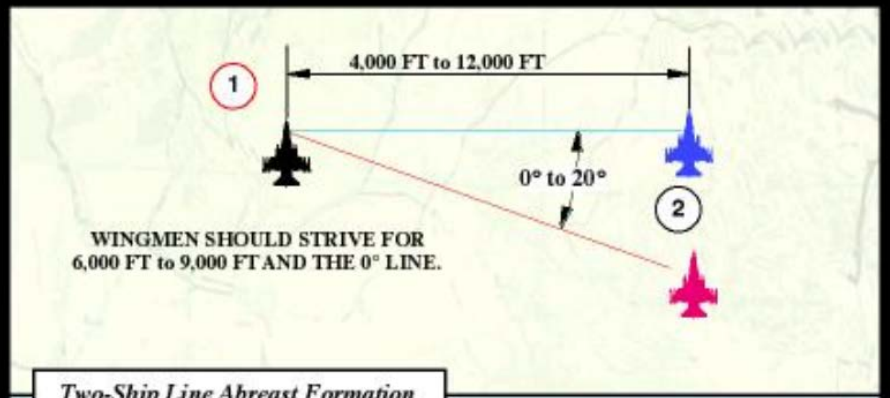
Formation

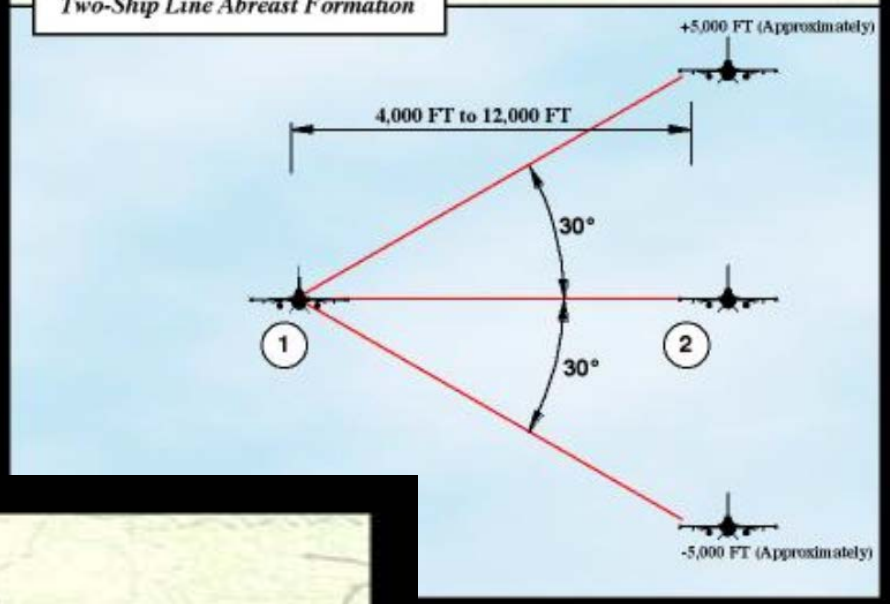
- What to look for:
  - 2-4 aircraft

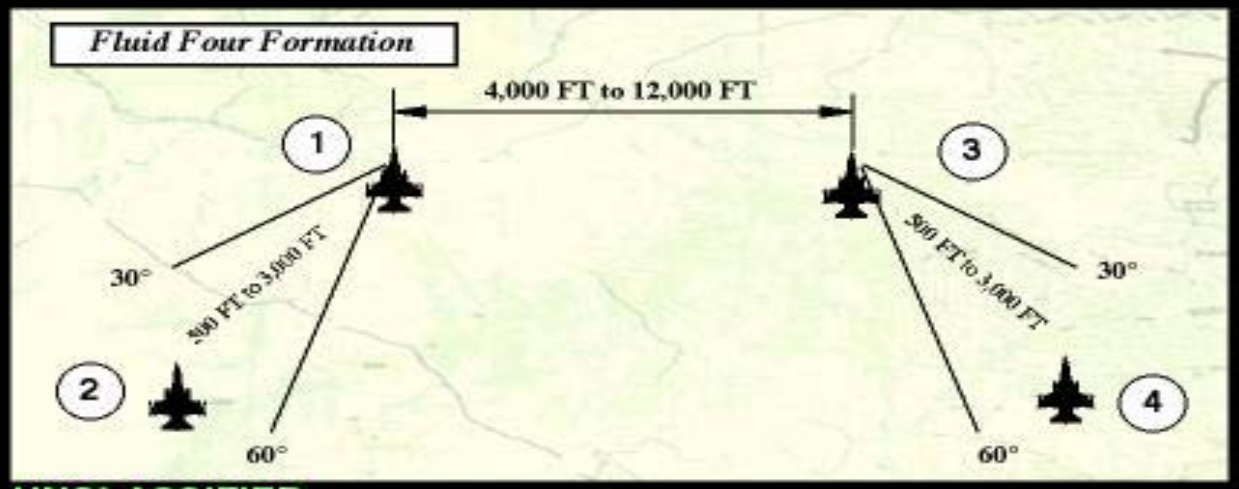
    Fingertip or route is possible
  - Outside SUA - 250-350K

    VFR Standard formation

    IFR trail – 2nm between aircraft
  - Inside SUA - 200-800K, Mach 2.0 is possible







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Special Use Airspace (SUAs)

FAA Order JO 7400.8X

No person may operate aircraft within these areas unless authorized by using agency!

- **Prohibited Areas** (i.e. DC Mall, Camp David)
- **Temporary Flight Restrictions or TFRs** (i.e. Disaster/Hazardous Relief Areas, Presidential travel, Ai Shows, Sporting Events, Space Flight)
- **Restricted Areas** (Smoky Hill, Hardwood)

Non-Regulatory

Special Use Airspace Areas

Type of SUA	*Regulatory*	*Dimensions & Purpose*	*Depicted on chart*	*ATC clearance needed for VFR*
Warning Area	No	3 nm from US coast Warns non-participating pilots of activities that may be hazardous	Yes	No, but advisable!
Military Operations Area	No	Defined vertical and lateral limits Separates certain military training activities, such as air combat tactics, aerobatics, and formation training, from IFR traffic	Yes	No, but exercise caution!
Alert Areas	No	Defined area Informs non-participating pilots of areas that may contain a high volume of pilot training or unusual aerial activity	Yes	No
Controlled Firing Areas	No	Not charted Includes activities that could be hazardous to non-participating aircraft CFA activities are suspended immediately when spotter aircraft, radar, or ground lookouts observe the approach of a non-participating aircraft.	No	No

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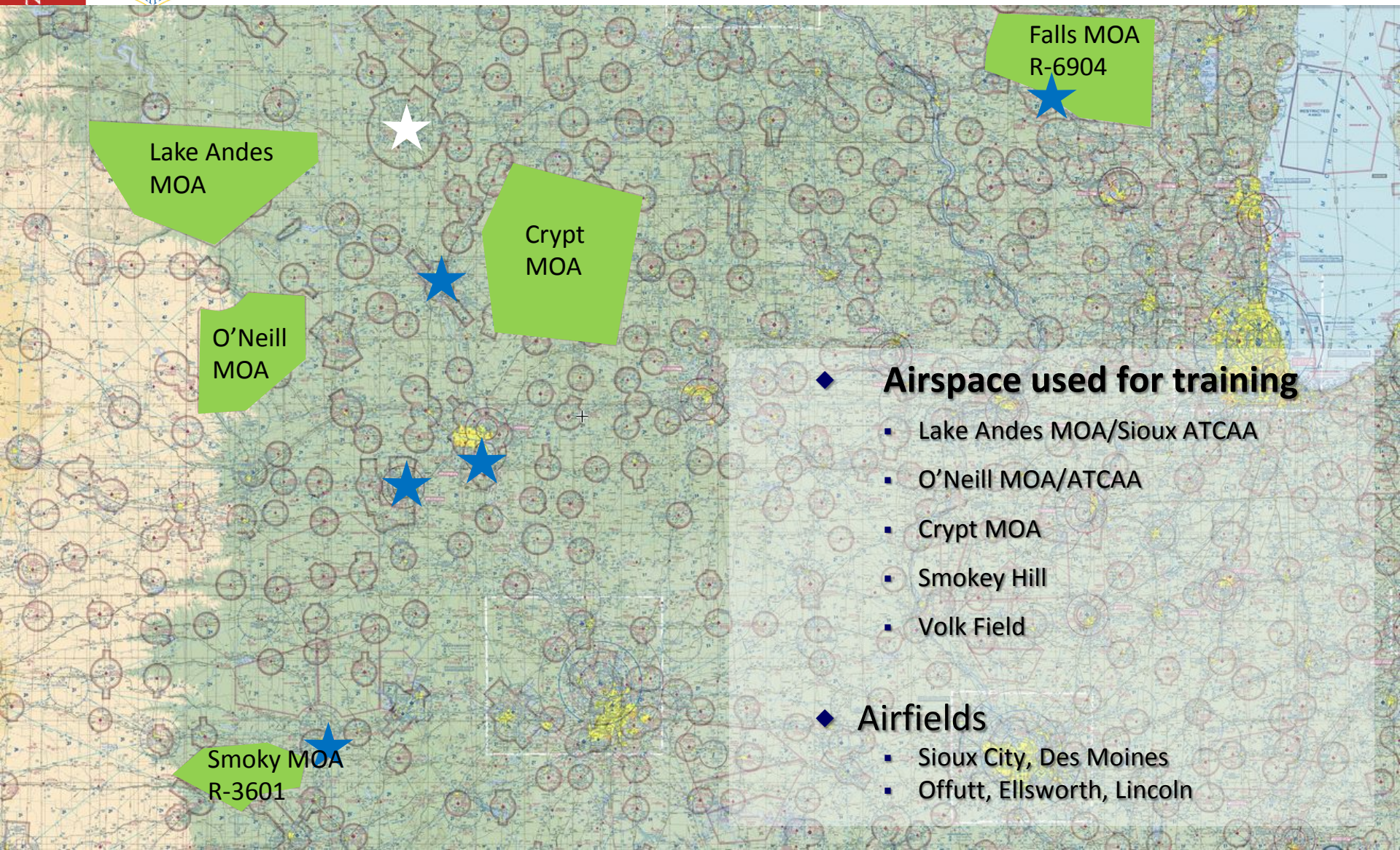
Local Area



- **Airspace used for training**
  - Lake Andes MOA/Sioux ATCAA
  - O'Neill MOA/ATCAA
  - Crypt MOA
  - Smokey Hill
  - Volk Field
- Airfields
  - Sioux City, Des Moines
  - Offutt, Ellsworth, Lincoln

Mission Training

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Missions

- Multi-mission fighter
- 2-20 aircraft
- All NOTAM altitudes, 200-1500 KIAS
  - Air-to-air – Point defense, asset protection
  - Air-to-ground – Interdiction, close air support
  - Common to work with other airframes, services
    - AWACS, WADS, JTACs, autonomous control

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Restricted Areas

- Smoky Hill / Hardwood
  - R-3601 / R-6904
    - Weapons delivery
      - 25 lb BDU-33 up to 2,000 lb inert BDU-56
      - 20 MM training round
    - Low altitude tactical navigation
    - Close air support
    - Air Interdiction
    - Basic Surface Attack

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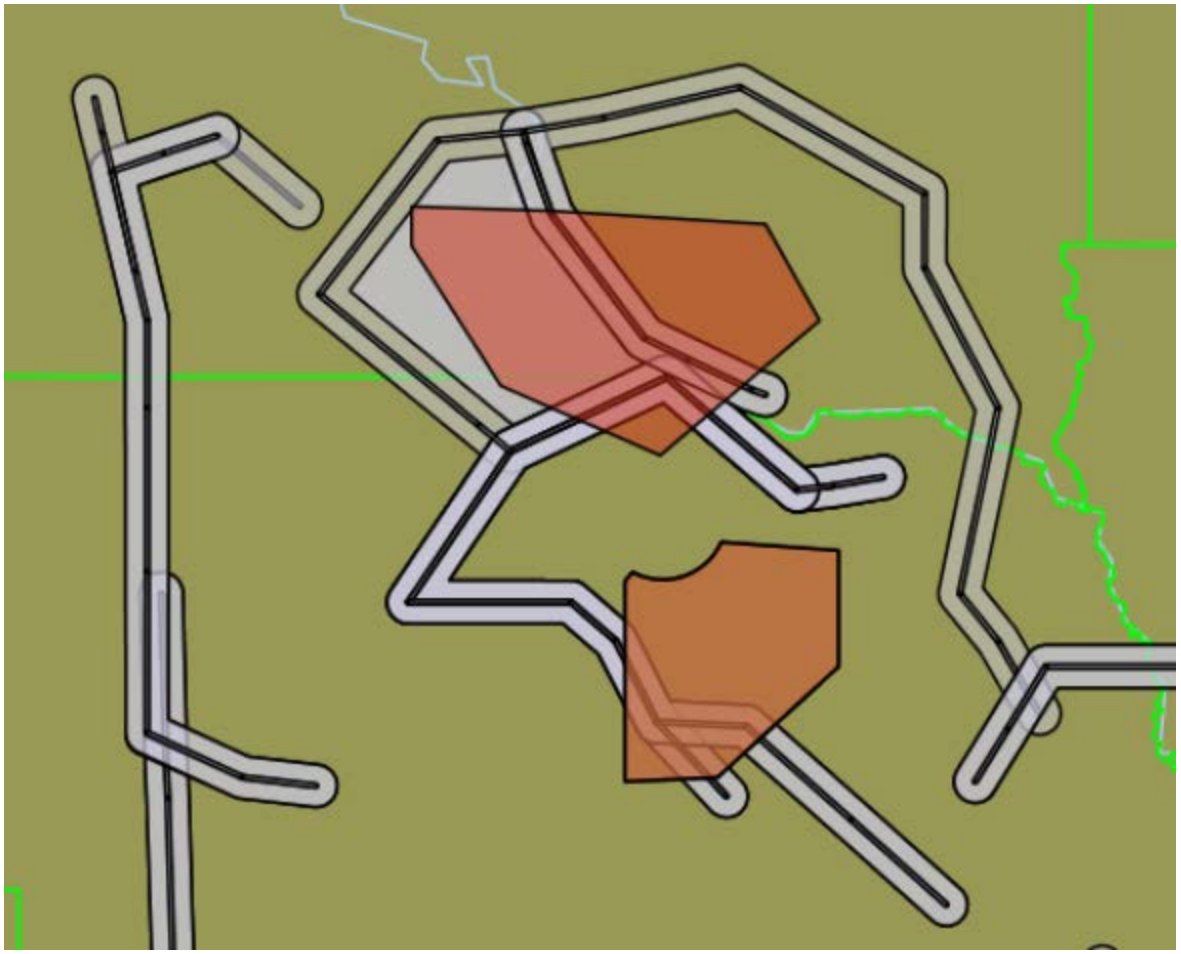
Low Level Tactical Nav

- VR-510
- IR-509
- IR-508
- IR-514
- IR-613



- Day
  - 500' AGL
  - 480 KTS
  - Line Abreast or Box formation (2+2)
  - Potential for abrupt maneuvering for attacks or "threat" reactions
  - 4-16 NM wide
  - SFC to 3-5,000' AGL (check FLIP)

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Low Level Tactical Nav

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IR-509

ORIGINATING ACTIVITY: 114 FW (ANG), Joe Foss Field, Sioux Falls, SD 57104-0264 DSN 798-7745, C605-988-5745.

SCHEDULING ACTIVITY: 114 FW (ANG), Joe Foss Field, Sioux Falls, SD 57104-0264 DSN 798-7754/7746, C605-988-5754/5746.

HOURS OF OPERATION: Daylight hours, Tue-Sat, OT by NOTAM

ROUTE DESCRIPTION:

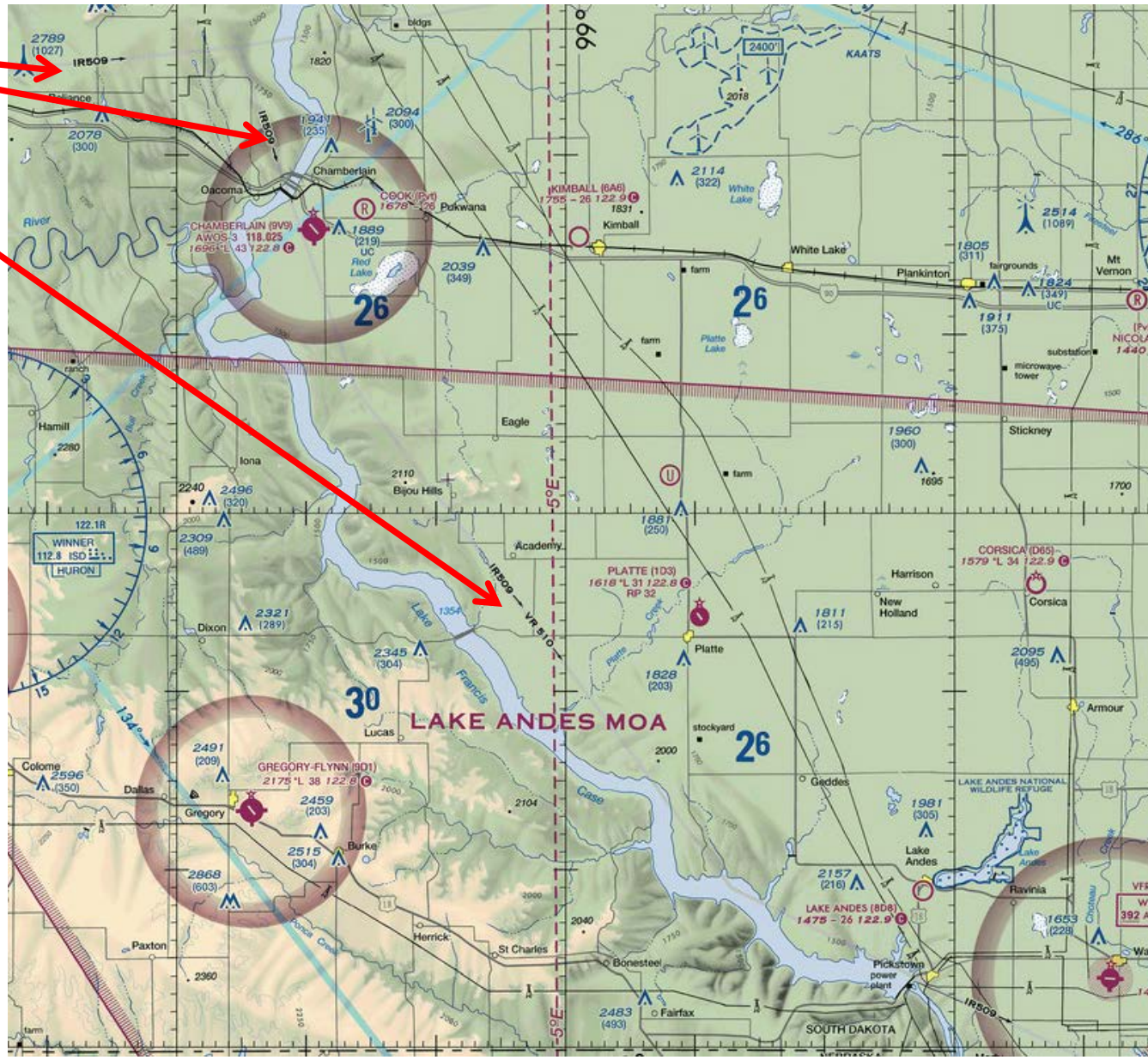
Altitude Data	Pt	Fac/Rad/Dist	Lat/Long
Cross at 100 MSL to or as assigned descend to cross	A	ONL 070/52	N42°37.00' W97°32.00'
50 MSL to	B	ONL 070/40	N42°35.00' W97°48.00'
01 AGL B 50 MSL to	C	ONL 069/32	N42°34.00' W97°59.00'
01 AGL B 50 MSL to	D	ONL 352/32	N43°00.00' W98°40.00'
01 AGL B 50 MSL to	E	ONL 283/38	N42°43.00' W99°29.00'
01 AGL B 50 MSL to	F	ONL 286/47	N42°49.00' W99°39.00'
01 AGL B 50 MSL to	G	PIR 181/66	N43°19.00' W100°29.00'
01 AGL B 50 MSL to	H	PIR 146/32	N43°54.00' W99°52.00'
01 AGL B 55 MSL to	I	PIR 119/42	N43°56.00' W99°25.00'
01 AGL B 55 MSL to	J	ONL 330/90	N43°53.00' W99°24.00'
01 AGL B 55 MSL to 01 AGL B 90 MSL to cross	K	ONL 330/73	N43°37.00' W99°16.00'
01 AGL B 90 MSL to	L	ONL 344/41	N43°09.00' W98°47.00'
90 MSL to	M	ONL 360/36	N43°04.00' W98°33.00'
90 MSL to climb to cross	N	ONL 026/35	N42°57.00' W98°13.00'
100 MSL to	O	ONL 030/37	N42°56.00' W98°09.00'

TERRAIN FOLLOWING OPERATIONS: Authorized from Point C to L.

ROUTE WIDTH - 4 NM either side of centerline from A to C; 8 NM either side of centerline from C to L; 4 NM either side of centerline from L to O.

Special Operating Procedures:

(1) Route is common with IR-508 between A to E, VR-510 from I



Resources

NOTAMS - https://pilotweb.nas.faa.gov/PilotWeb/

Airspace - http://sua.faa.gov/sua/

Airspace - http://www.seeandavoid.org/

TFR - http://tfr.faa.gov/tfr_map_ims/html/

FAA - http://www.faasafety.gov/

NOTAMS

https://pilotweb.nas.faa.gov/PilotWeb/

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Federal Aviation Administration

Tue, 29 Mar 2016 15:32:34 (UTC)

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NOTAM Retrieval

Report Format Type: Domestic

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Text Type: Report

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Report Format Type: Domestic

Accountability or Location:

NOTAM Number:

Text Type: Report

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KZMP MINNEAPOLIS (ARTCC),FARMINGTON,MN. [Back to To

Check All KZMP | UnCheck All KZMP

- !PNM **03/162** ZMP AIRSPACE AIRDROP WI AN AREA DEFINED AS 3NM EITHER SIDE OF A LINE FM BRD199027 TO BRD276022 SFC-3300FT AVOIDANCE ADVISED DLY 0001-0230 1603300001-1603310230
- !SUAC **03/830** ZMP AIRSPACE R4201A ACT SFC-FL230 1603292001-1603292030
- !SUAC **03/828** ZMP AIRSPACE ONEILL MOA ACT 500FT UP TO BUT NOT INCLUDING FL180 1603292001-1603292130
- !PNM **03/160** ZMP AIRSPACE AIRDROP WI AN DEFINED AS 3NM EITHER SIDE OF A LINE FROM BRD202008 BRD255021 BRD272021 BTN SFC-3300FT AVOIDANCE ADVISED 1603300100-1603300330
- !PNM **03/159** ZMP AIRSPACE AIRDROP WI AN AREA DEFINED AS 3NM EITHER SIDE OF A LINE FM BRD202008 TO BRD255021 TO BRD272021 SFC-3300FT AVOIDANCE ADVISED 1604010100-1604010330
- !PNM **03/158** ZMP AIRSPACE AIRDROP WI AN AREA DEFINED AS 3NM EITHER SIDE OF A LINE FM BRD202008 TO BRD255021 TO BRD272021 SFC-3300FT AVOIDANCE ADVISED 1603311700-1603312030
- !PNM **03/157** ZMP AIRSPACE AIRDROP WI AN AREA DEFINED AS 3NM EITHER SIDE OF A LINE FM BRD202008 TO BRD255021 TO BRD272021 SFC-3300FT AVOIDANCE ADVISED 1603301700-1603302030
- !PNM **03/156** ZMP AIRSPACE AIRDROP WI AN AREA DEFINED AS 3NM EITHER SIDE OF A LINE FM BRD202008 TO BRD255021 TO BRD272021 SFC-3300FT AVOIDANCE ADVISED 1603310100-1603310330
- !SUAC **03/823** ZMP AIRSPACE FALLS 2 MOA ACT 500FT UP TO BUT NOT INCLUDING FL180 1603291800-1603292015
- !SUAC **03/821** ZMP AIRSPACE VOLK WEST MOA ACT 100FT UP TO BUT NOT INCLUDING FL180 1603291800-1603292015
- !SUAC **03/820** ZMP AIRSPACE FALLS 1 MOA ACT 500FT UP TO BUT NOT INCLUDING FL180 1603291800-1603292015
- !SUAC **03/819** ZMP AIRSPACE AR632 ACT FL220-FL270 1603291745-1603291930
- !SUAC **03/818** ZMP AIRSPACE AR105(W) ACT FL190-FL330 1603291730-1603291830
- !SUAC **03/817** ZMP AIRSPACE AR406L(W) ACT FL200-FL220 1603291715-1603291815
- !SUAC **03/816** ZMP AIRSPACE R4301 ACT SFC-10000FT 1603301100-1603301229
- !SUAC **03/810** ZMP AIRSPACE AR105(E) ACT FL190-FL330 1603291600-1603291700
- !SUAC **03/806** ZMP AIRSPACE ONEILL MOA ACT 500FT UP TO BUT NOT INCLUDING FL180 1603291546-1603291700
- !SUAC **03/794** ZMP AIRSPACE FALLS 1 MOA ACT 500FT UP TO BUT NOT INCLUDING FL180 1603291345-1603291615
- !SUAC **03/793** ZMP AIRSPACE FALLS 2 MOA ACT 500FT UP TO BUT NOT INCLUDING FL180 1603291345-1603291615

AIRSPACE ONEILL MOA ACT 500FT UP TO BUT NOT INCLUDING FL180 1546-1700Z

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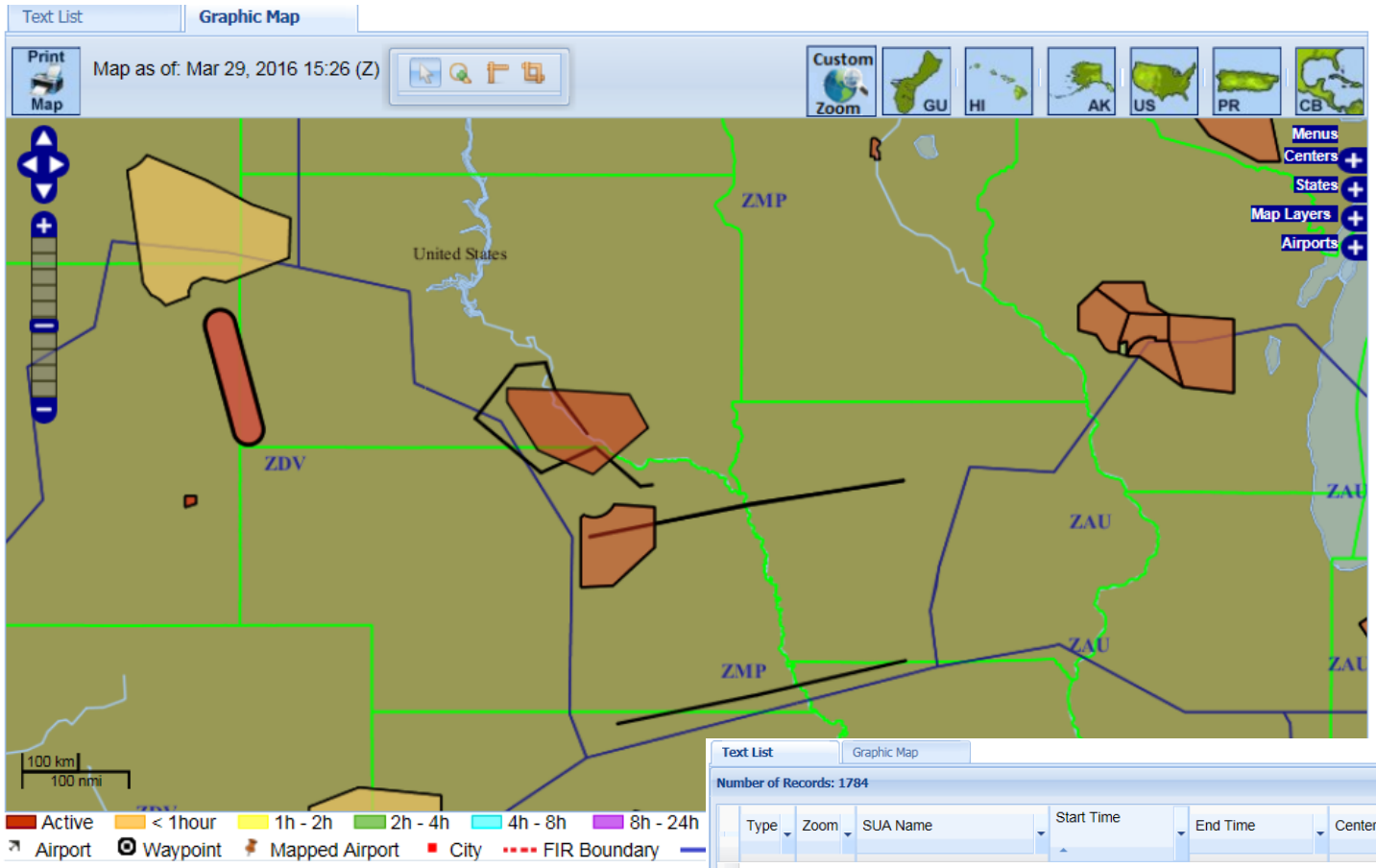
http://sua.faa.gov/sua/



Text List | Graphic Map

Number of Records: 1784 *AGL Download

Type	Zoom	SUA Name	Start Time	End Time	Center ID	State	Min Alt (100s ft)	Max Alt (100s ft)	Group
A		ONEILL ATCAA	03/29/2016 14:45	03/29/2016 17:00	ZMP	NE	180	230	SUA
M		ONEILL MOA	03/29/2016 14:45	03/29/2016 17:00	ZMP	NE	005	<180	SUA
M		ONEILL MOA New	03/29/2016 18:45	03/29/2016 21:30	ZMP	NE	005	<180	SUA
A		ONEILL ATCAA New	03/29/2016 18:45	03/29/2016 21:30	ZMP	NE	180	230	SUA

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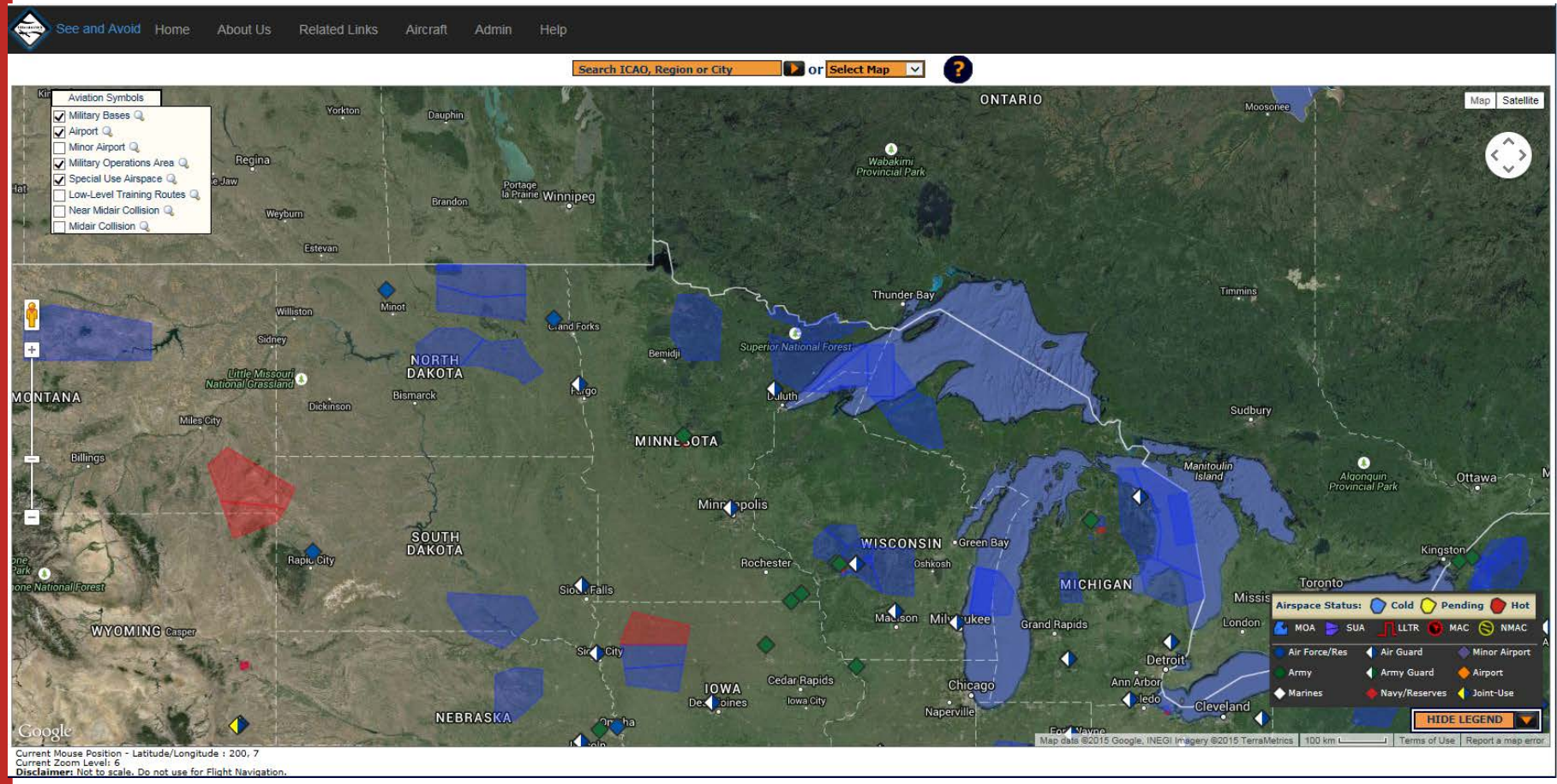
http://www.seeandavoid.org/



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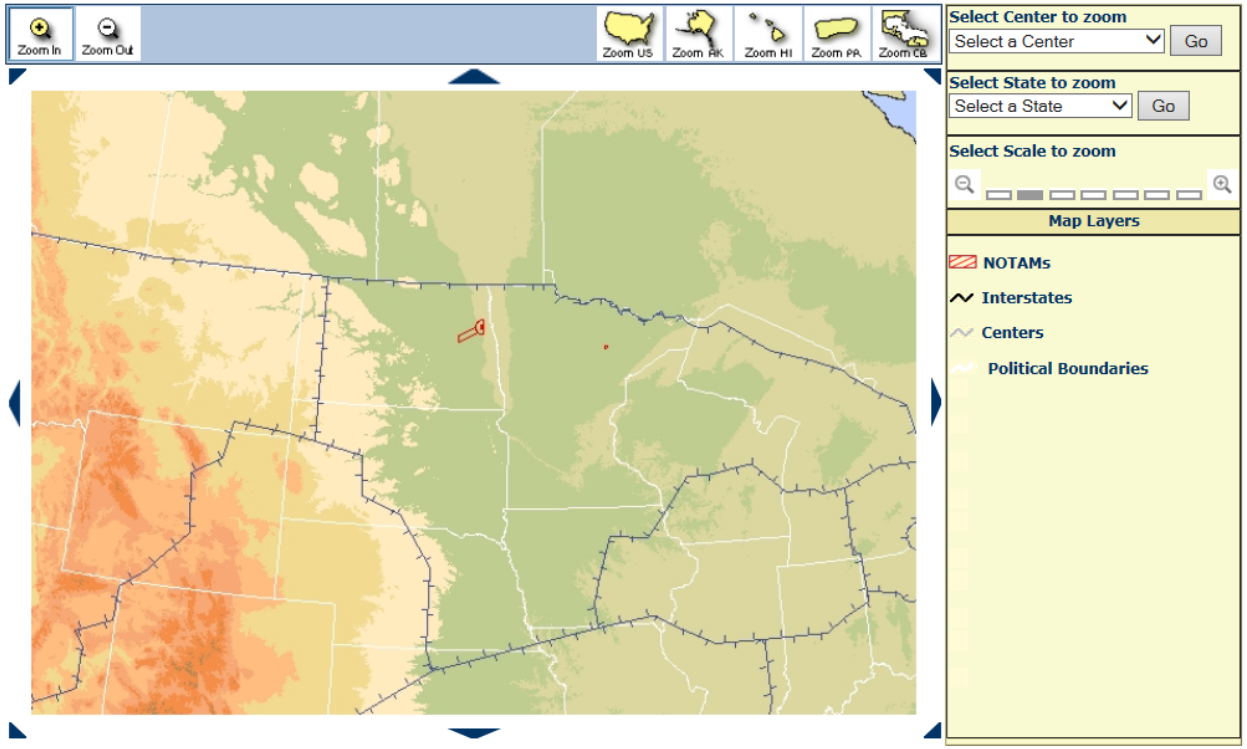
http://tfr.faa.gov/tfr_map_ims/html/



Date	NOTAM	Facility	State	Type	Description	Zoom
03/25/2016	6/9894	ZMP	MN	HAZARDS	HIBBING, MN, Thursday, March 31, 2016 UTC	
03/24/2016	6/9449	ZMP	ND	SECURITY	Grand Forks AFB, ND, Saturday, April 02, 2016 through Saturday, April 02, 2016 Local	
03/24/2016	6/9447	ZMP	ND	SECURITY	Grand Forks AFB, ND, Thursday, March 31, 2016 through Thursday, March 31, 2016 Local	
03/24/2016	6/9448	ZMP	ND	SECURITY	Grand Forks AFB, ND, Friday, April 01, 2016 through Friday, April 01, 2016 Local	
03/24/2016	6/9446	ZMP	ND	SECURITY	Grand Forks AFB, ND, Wednesday, March 30, 2016 through Wednesday, March 30, 2016 Local	
03/24/2016	6/9444	ZMP	ND	SECURITY	Grand Forks AFB, ND, Monday, March 28, 2016 through Monday	

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MACA

http://www.faasafety.gov/

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- Tutorial for Employers

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WINGS AC 61-91J

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Eliminate midair collisions

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www.seeandavoid.org

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Ellsworth Air Force Base

Mid-air Collision Avoidance

Airfield Identifier: KRCA
Coordinates: 44° 08’N 103°06'W
Elevation: 3276’
Frequencies:

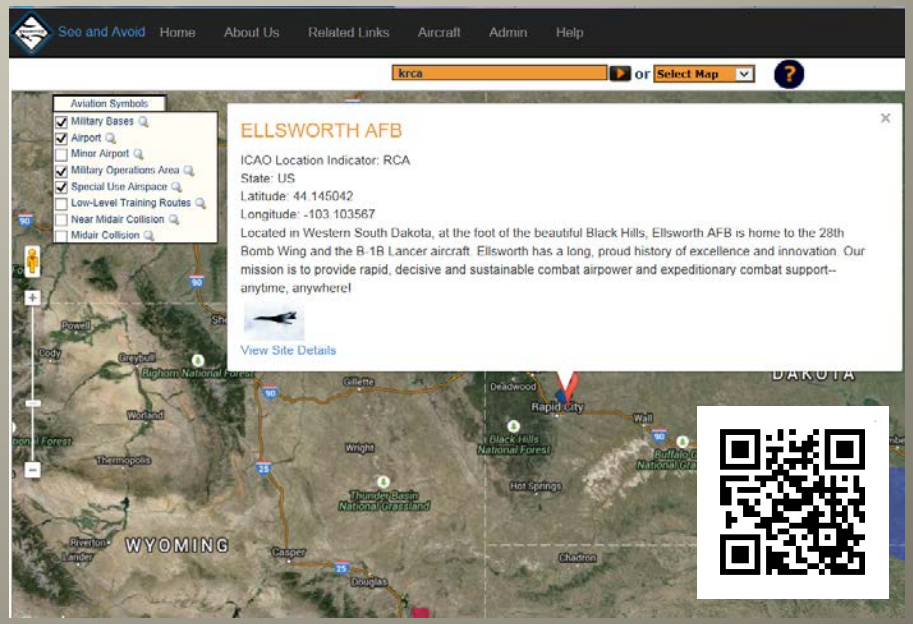
- **Approach – 119.5**
- **Tower – 126.05**
- **Ground – 121.8**
- **ATIS – 120.625**

Operating Hours:
Mon. – Thur. 0700L – 0030L
Fri. 0700L – 2100L
Closed Weekends and Holidays

28th Bomb Wing Flight Safety
2300 Vandenberg Court, Suite 113
Ellsworth AFB, SD 57706-4729
(605) 385-2599 or 4419

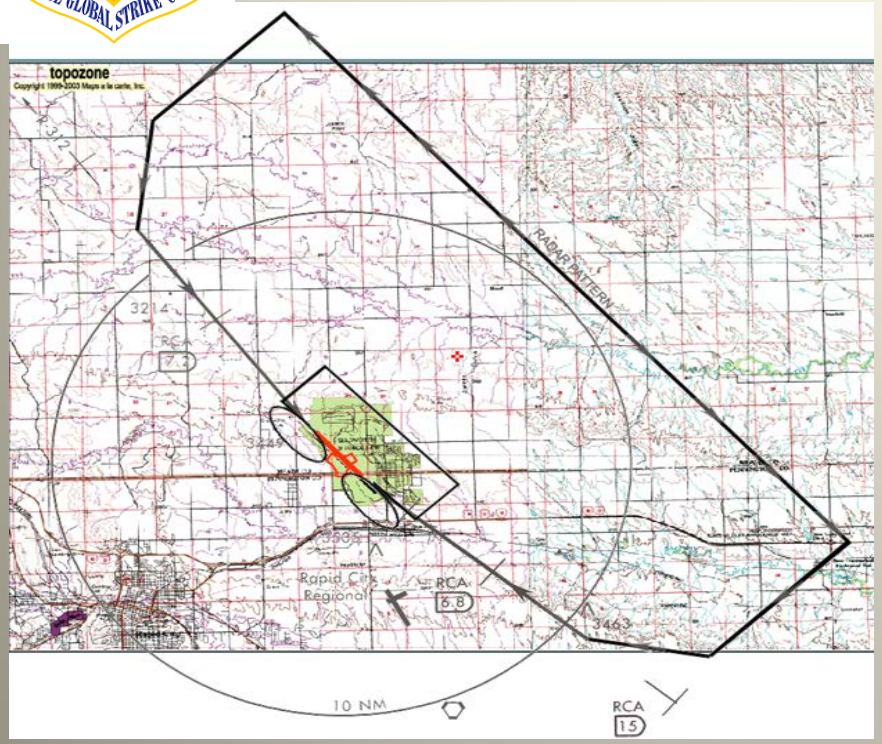
http://sua.faa.gov/

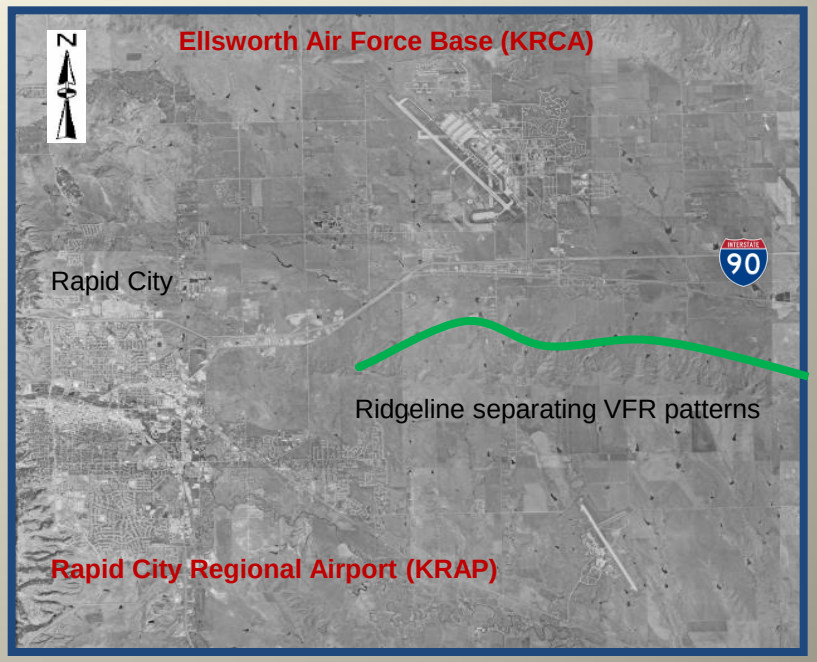
http://www.seeandavoid.org/



Ellsworth Air Force Base

Mid-air Collision Avoidance





Ellsworth AFB is closed to all civil traffic.

Contact Ellsworth Approach for traffic advisories.

Extensive, high speed heavy aircraft in and around Ellsworth AFB.

Use extreme caution!

VFR Traffic Pattern

Altitude: 4500' MSL

Downwind: 3.5 miles from runway (east and west side)

Base: 3 miles from approach/departure end

Final: 3 mile final from approach/departure end

Overhead: 5000' MSL / 4nm Initial / West Break

Radar Pattern Runways 13 and 31

Downwind: 6000' MSL/ 10-20 miles

Base: 5200' – 6000' MSL/ 6-20 miles from end of runway

Final: 5200'- 6000' – Descending 6 – 20 miles from end of runway

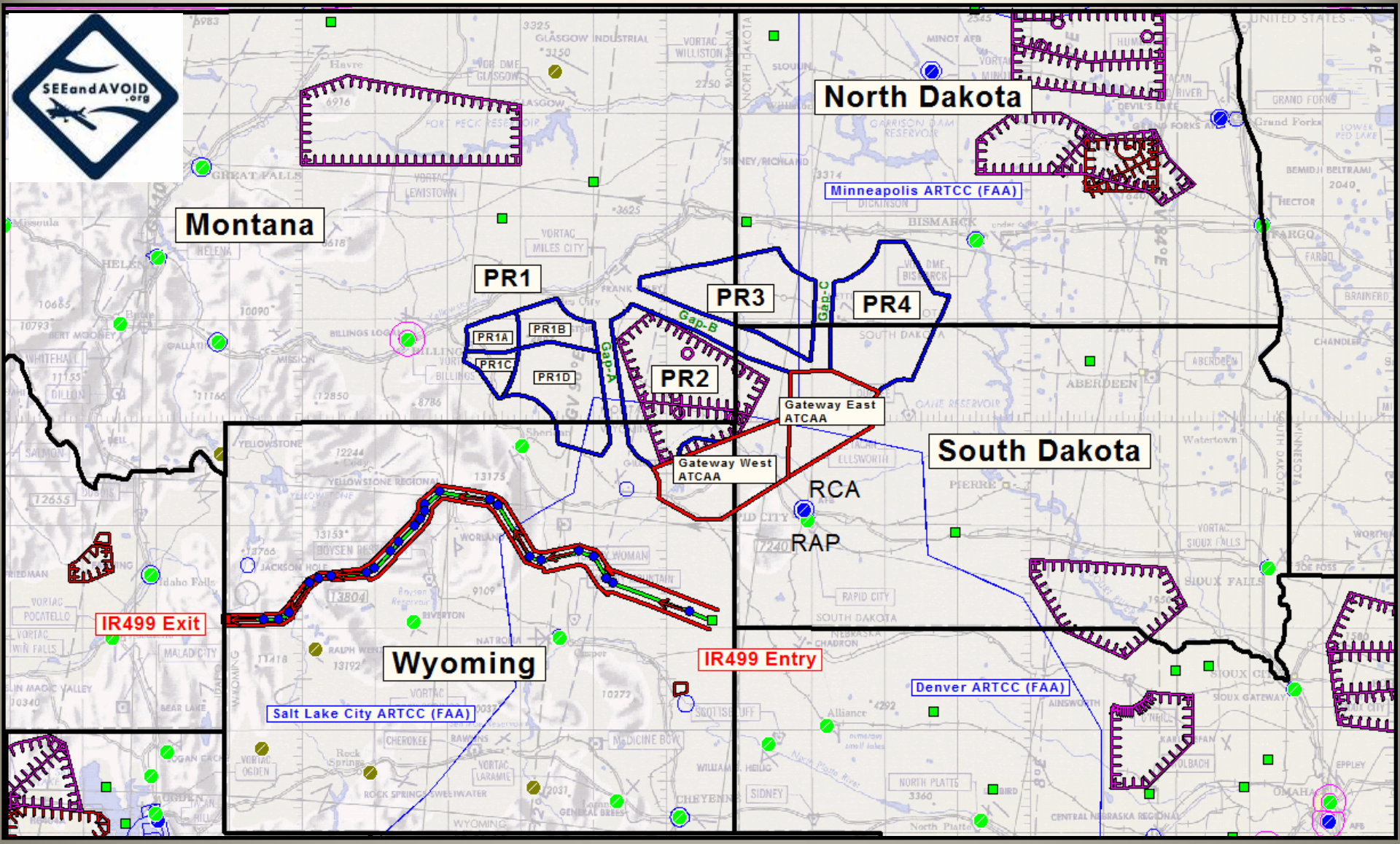
VFR Overhead Pattern

Altitude: 5000' MSL

Initial: 3-4 miles from end of runway / West break

Rollout: 1 1/4 mile & 3600' MSL

*Aircraft will normally proceed to initial at 5000' MSL unless otherwise directed by ATC



Military Operations Areas (MOAs)
- Low MOAs – 500' AGL to 12,000' MSL
- High MOAs – 12,000' MSL to FL180
- Primary Day-to-Day use MOAs
  - -- PR1 (PR1A, PR1B, PR1C, PR1D)
  - -- PR2
  - -- PR3
  - -- PR4 (No Low MOA, only High)

Air Traffic Controlled Airspace (ATCAA)
- Gateway West (FL180-FL260)
  - -- Day-to-Day use
- Gateway East (FL180-FL260)
- PRTC MOAs have ATCAAs above them

Published Hours
- 0730-1200 and 1800-2330 Mon-Thr (2 hr NOTAM)
- 0730-1200 Fri (2 hr NOTAM)
- Other times by NOTAM (4 hr NOTAM)
- These are times you can anticipate usage
- The airspace will only be activated when scheduled

MACA
General Tips & Techniques

- **Announce your Intentions on UNICOM –** we <u>use/monitor</u> same freqs you use
  - Use **standard traffic patterns** at uncontrolled airfield….***BE PREDICTABLE!!***
  - Use **landing lights** at lower altitudes, especially when near airports
- **Request Flight-Following and radar services to the MAX extent possible**
  - **Stay alert and communicate** your intentions to MSP Center
  - **Use your Transponder**; helps with early ID on Traffic Collision Avoidance Systems (TCAS)
  - ATC can assist in resolving traffic conflicts and help you traverse controlled airspace

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MACA
General Tips & Techniques

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- **Know your flying responsibilities**
  - Use appropriate **hemispherical altitudes** and don't let your altitude 'wander'
  - Understand **visual limitations** and proper **scanning techniques**
    - If an aircraft appears to have ***'No Relative Motion; you're on Collision Path'***
  - Keep windscreen's clean; bugs on the windscreen can obstruct other traffic.
  - Flying at night, **avoid** white/bright lights in cockpit; disturbs your night vision (>10 min recovery)
  - **Complacency kills**

SEE and BE SEEN!

Questions?

Procedural deconfliction works if we all follow the published procedures.

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Mid-Air Collision Avoidance

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MACA

South Dakota Air National Guard
114th FW Safety Office (605) 988-5841/5842

Air Force
28th BW Safety Office (605) 385-2599/4419