

AAM



AIRSPACE WORKING GROUP



The National Airspace System (NAS)

Trusted Experience. Practical Solutions.



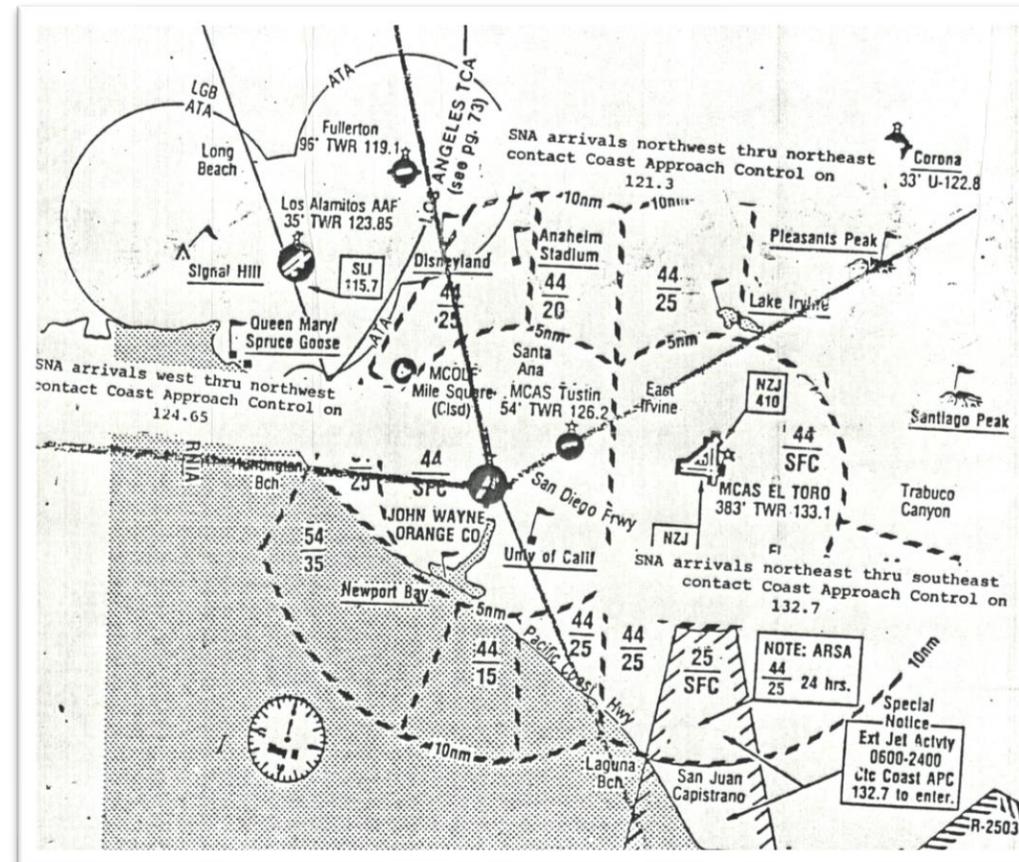
AAM
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NAS Airspace

Presenter: Ian Fullmer
Date: 9/29/2020

Evolution of Airspace

- Airspace Construct and Equipage requirements have evolved in response to:
 - Aviation growth
 - Public safety concerns after watershed events



1958-FAA Established

1989-Airspace becomes more restrictive

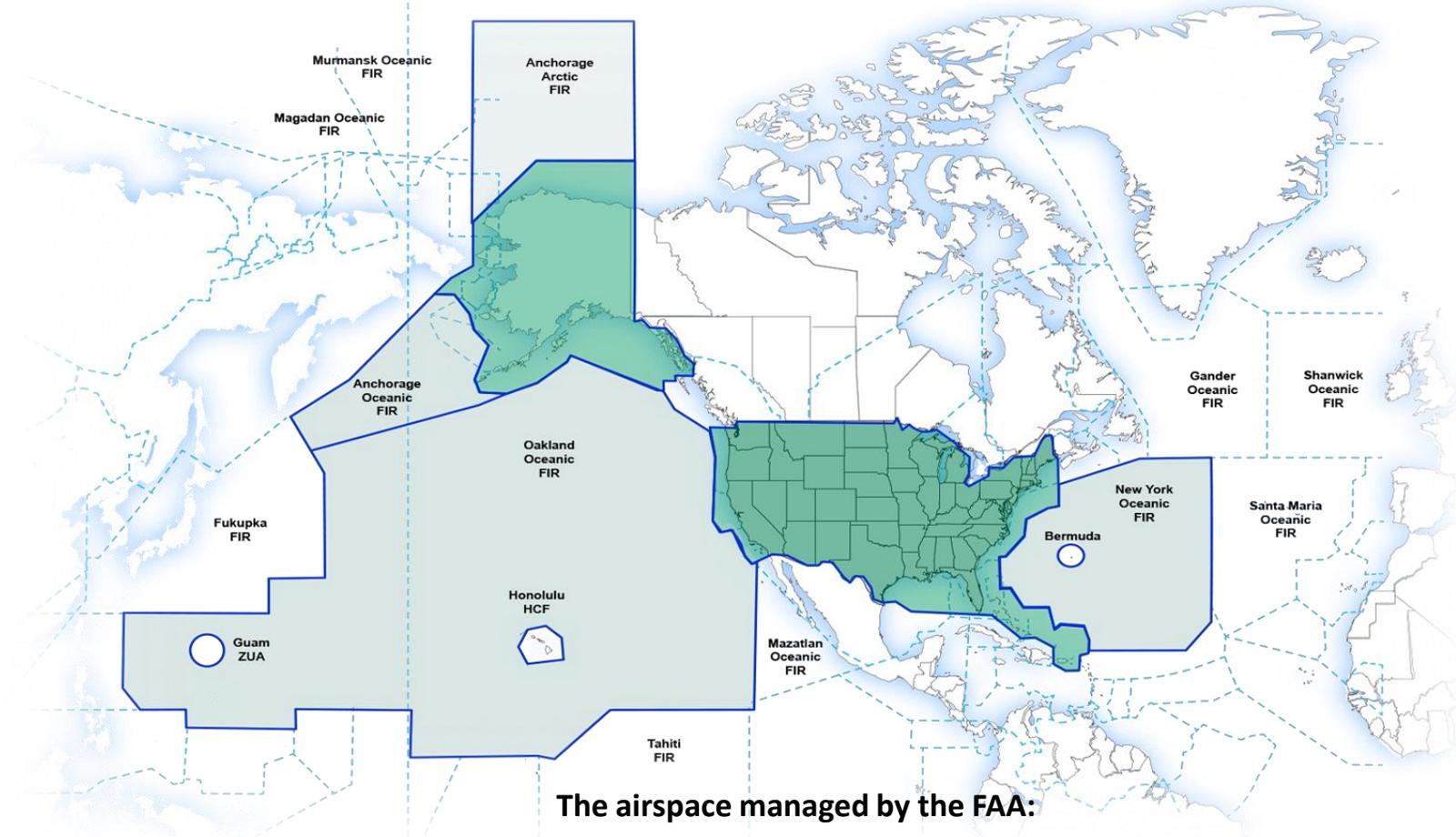


LS TECHNOLOGIES

National Aeronautics and Space Administration



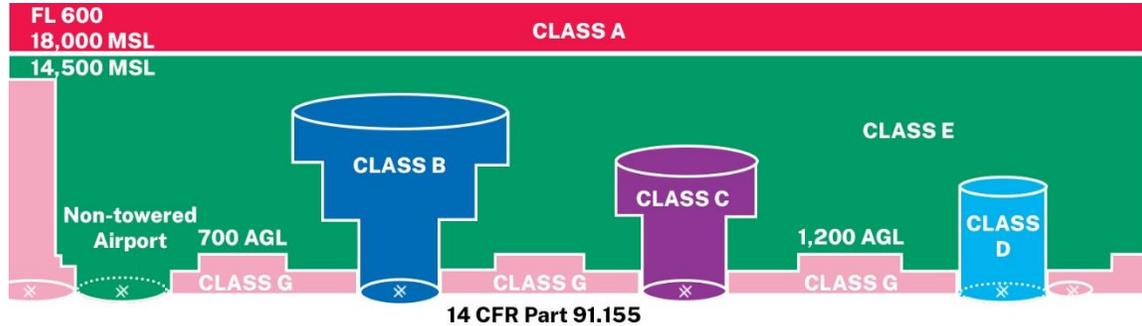
Breadth of NAS – Service Area



29 million square miles
15% of the earth's surface



Airspace Construct



Airspace Class	Entry Requirement	Pilot Certificate or Rating	Two Way Communication	Altitude Decoding Transponder	Aircraft Separation
A	ATC Clearance	Instrument	Yes	Yes	All
B	ATC Clearance	Private Certificate or Student Endorsement	Yes	Yes within 30 nm of the class B primary airport*	All
C	VFR: Radio Contact IFR: Clearance	Student Certificate	Yes	Yes within C space and above lateral limits of C space*	IFR, SVFR and runway operations
D	VFR: Radio Contact IFR: Clearance	Student Certificate	Yes	No unless required by other airspace	IFR, SVFR and runway operations
E	VFR: None IFR: Clearance	Student Certificate	Yes	No unless required by other airspace	IFR, SVFR
G	None	Student Certificate	No	No unless required by other airspace	None

*An altitude decoding transponder required above 10,000 MSL.



Breadth of NAS – Operations

Airports

- 19,622 Public / Private
- 5,092 Public

Air Traffic Towers - 518 (2018)

- 264 - Federal
- 254 - FAA Contract

Terminals - 157 (2018)

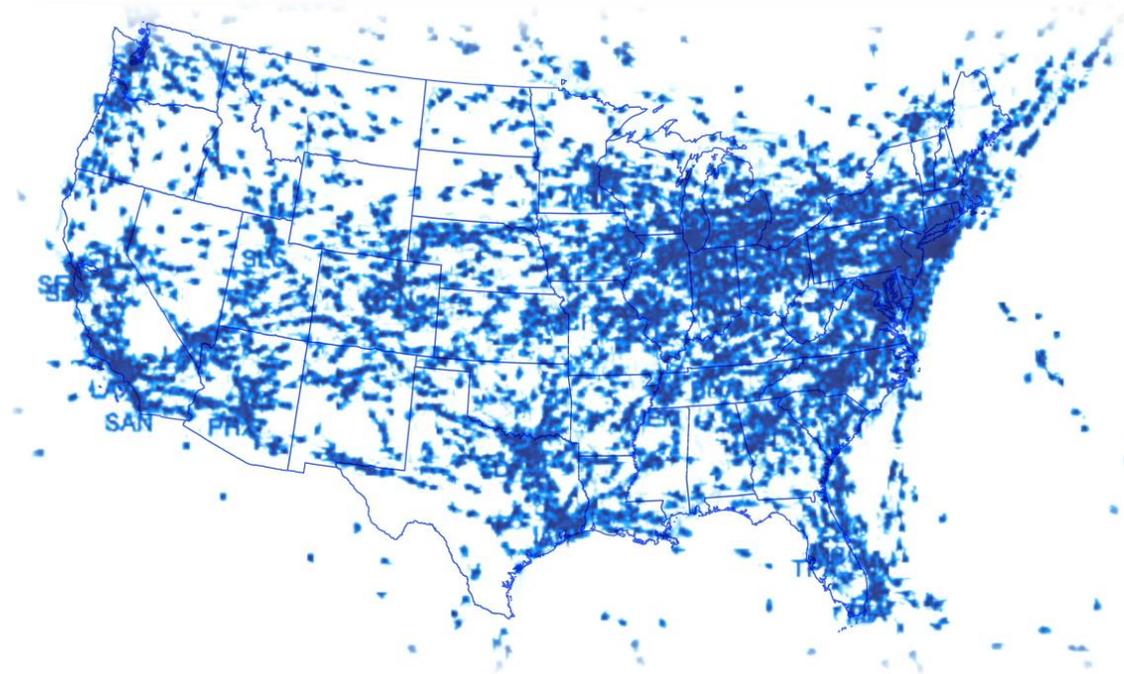
- 154 - Approach Control
- 3 - Offshore Sites

En Route Sites

- 21 - ARTCCs
 - 775 - Sectors

Oceanic Sites

- 3 Centers (ZAN, ZOA, ZNY)



Total Aircraft

~ 220,000 (Commercial & GA - 2020)

Flights Handled by FAA

- Over 44,000 flights per day

US Passenger Enplanements

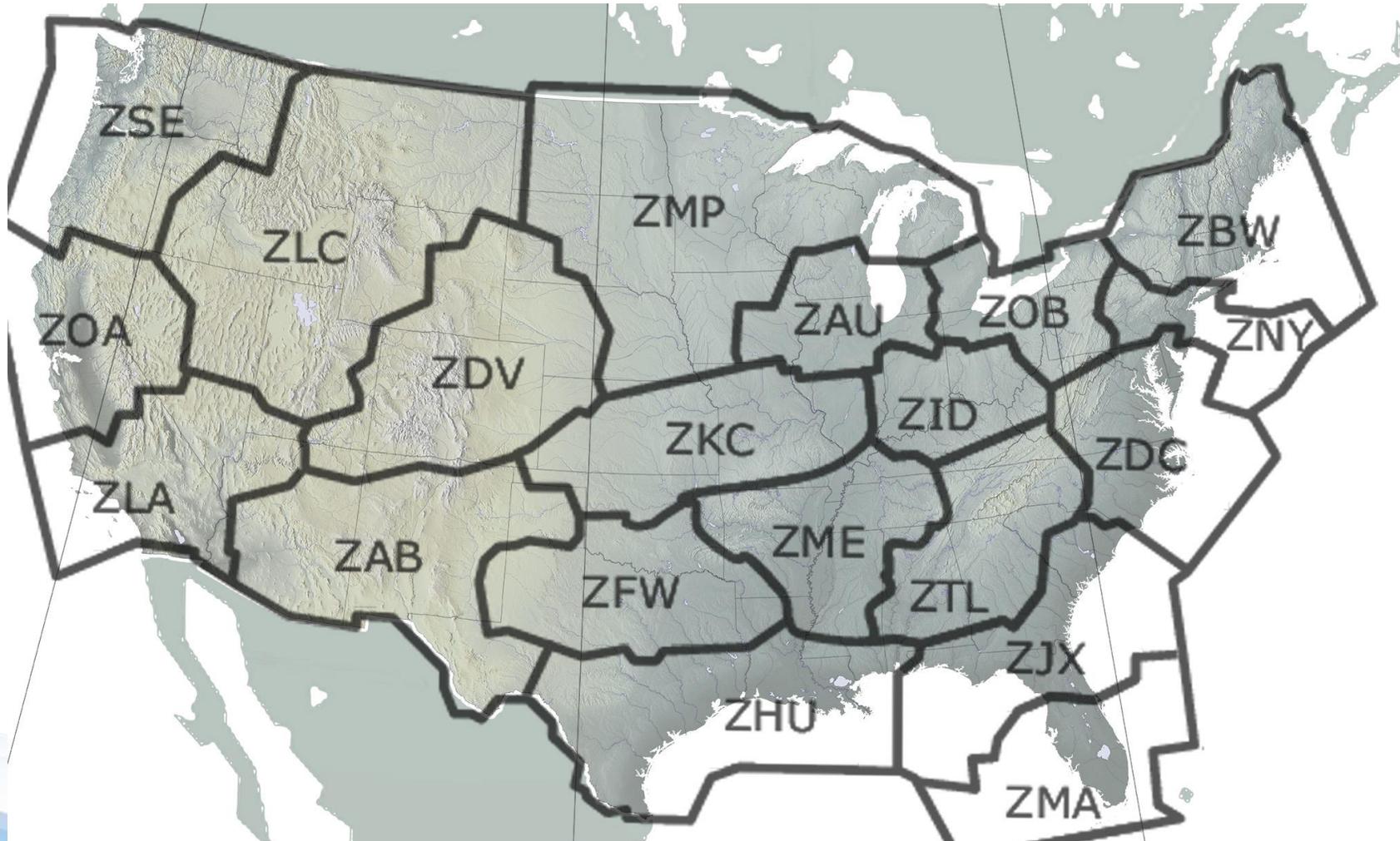
- Over 1 Billion (2019)

Operational Personnel

- 14,695 Controllers (2018)
- 664,565 Pilots (Active Airmen Certs 2019)
- 160,302 Remote Pilots (2019)



Organization of NAS





ARTCCs Delegate Airspace to Approach Controls

Oakland Air Route Traffic Control Center and Northern California Terminal Radar Approach Control

LETTER OF AGREEMENT

EFFECTIVE: SEPTEMBER 15, 2016

SUBJECT: Terminal Area Control

1. PURPOSE. This letter of agreement (LOA) delegates airspace to Northern California TRACON

(ZOA) and NCT. The procedures contained in this LOA may be modified on an individual basis with proper coordination. This agreement is supplemental to Order JO 7110.65, Air Traffic Control.

2. CANCELLATION. The Oakland Center and NCT LOA, subject: Terminal Area Control, dated August 20, 2015, is cancelled. Oakland Center and NCT Joint Notice N ZOA 7210.025/N NCT 7210.16, subject: Pre-Arranged Coordination of Optimum Profile Descent Aircraft, remains in effect until January 29, 2017.

3. GENERAL

a. NCT has continuous control of the airspace defined in Attachment 1.

b. Except for aircraft entering ZOA Sectors 11, 29, or 41, the minimum radar separation for aircraft being transferred between facilities must be 5 nautical miles (NM), constant or increasing, at the time of communications change. Aircraft entering ZOA Sectors 11, 29, or 41 with diverging courses may be separated by 3 NM constantly increasing to 5 NM at the time of communications change.

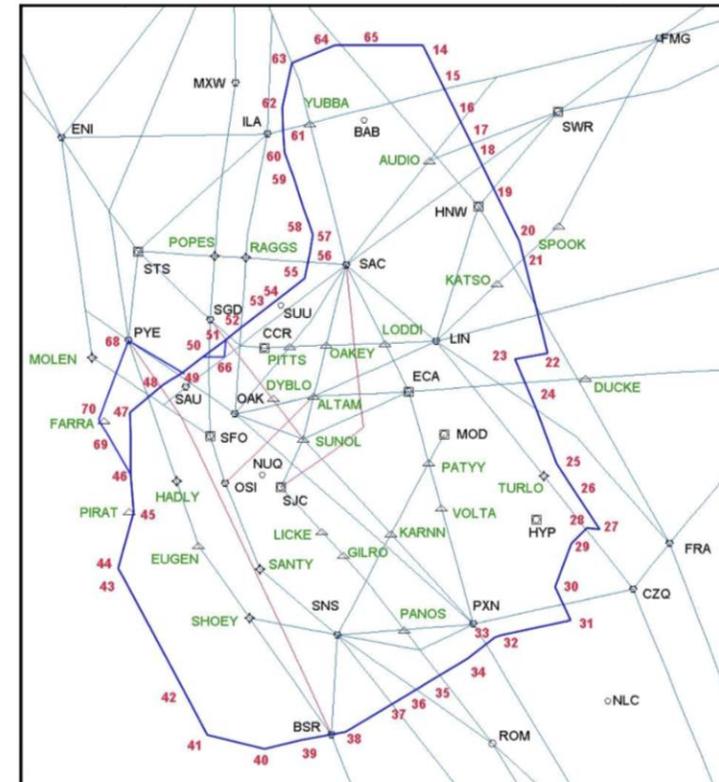
c. NCT has control for RV 30 degrees left/right, and descent except where noted in Attachment 3

d. ZOA has control for RV 30 degrees left/right, and climb except where noted in Attachment 3

Oakland Center and NCT LOA
Subject: Terminal Area Control

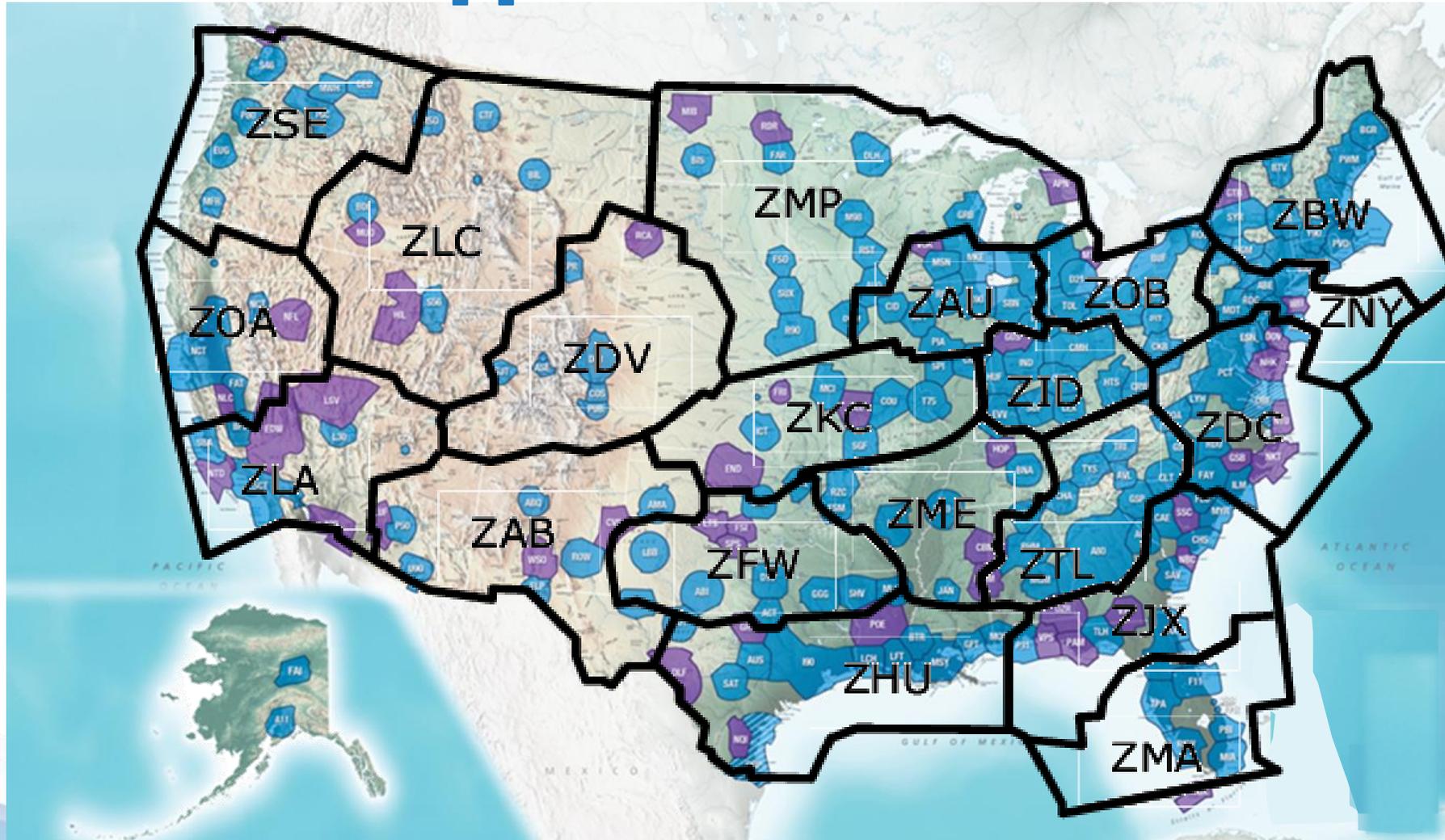
Attachment 1
Page 4
Effective: 09/15/16

6. NCT Delegated Airspace Graph - Central Polygon, Coast Area, and Skippy Shelf





Approach Controls





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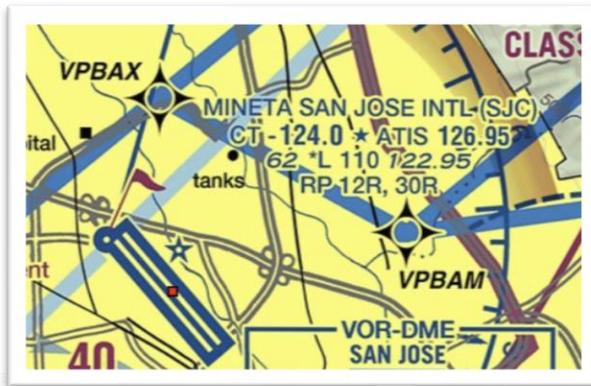
Approach Controls (and Centers) delegate Airspace to Towers

 **Federal Aviation Administration**

ISJC 08/120 SJC SVC TWR CLSD CLASS D SERVICE NOT AVBL CTC NORCAL APP AT 125.35 DLY
0600-1300 2008210600-2009221300

-----End of PDF Report-----

PDF generated by Federal NOTAM Systems on: 2020-09-02 00:44:45 UTC Page 1 of 1



CALIFORNIA 217

SAN JOSE

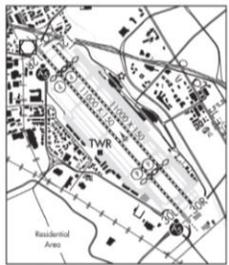
NORMAN Y MINETA SAN JOSE INTL (SJC)(KSJC) 2 NW UTC-8(-7DT) N37°21.78' W121°55.72' SAN FRANCISCO
62 B TPA—See Remarks LRA Class I, ARFF Index D NOTAM FILE SJC H-3R, L-25, 3R, A
RWY 12L-30R: H11000X150 (CONC-GRVD) S-220, D-250, 25-175, 20-605 PCN 91 R/B/W/T HIRL CL
RWY 12L: REIL, PAPI(P4R)—GA 3.0° TCH 70'. Thld displcd 1308'. Pole.
RWY 30R: PAPI(P4L)—GA 3.0° TCH 69'. Thld displcd 2537'. Tree. Rgt tlc. 0.3% down.
RWY 12R-30L: H11000X150 (CONC-GRVD) S-220, D-250, 25-175, 20-605, 20/202-8 PCN 67 R/C/W/T HIRL CL
RWY 12R: MALSR, PAPI(P4R)—GA 3.0° TCH 75'. RVR-TR Thld displcd 1297'. Pole. Rgt tlc.
RWY 30L: MALSR, PAPI(P4L)—GA 3.0° TCH 70'. RVR-TR Thld displcd 2537'. Fence. 0.3% down.

RUNWAY DECLARED DISTANCE INFORMATION

RWY 12L:TORA-10139 TODA-11000 ASDA-10139 LDA-8833
RWY 12R:TORA-9883 TODA-11000 ASDA-9883 LDA-8587
RWY 30L:TORA-10152 TODA-11000 ASDA-10152 LDA-7614
RWY 30R:TORA-10134 TODA-11000 ASDA-10134 LDA-7597

SERVICE S4 FUEL 100LL, JET A Q1, 2, 3, 4. Lgt Rwy 30L PAPI unusable btd 7' of centerline of rwy. ACTIVATE MALSR Rwy 12R, MALSR Rwy 30L, HIRL Rwy 12L-30R, HIRL Rwy 12R-30L—Frequency 124.0 when twr clsd.

AIRPORT REMARKS: Attended continuously. Birds frequently on or in vicinity of arpt. First 400' Rwy 30R and Rwy 30L CLOSED for tld DC10, MD11, L1011. High intensity light activity: High intensity lights (lasers and large media screens) may be visible to arrival and departure acft to San Jose international arpt during events at the stadium complex (37°24.15' N/ 121°58.14' W, SJC VORTAC R-303/2.1 DME) Flight crews should use caution when opr in this area during stadium events. Cockpit illumination and glare effect reducing visibility may be intensified during arrival and departure ops especially at night. Noise abatement procedure: Rwy 12R-30L is preferred arrival rwy for jet acft and Rwy 12L-30R is the preferred departure rwy for jet acft. All jet acft take-offs are to be initiated from end of rwy unless directed otherwise by twr. TPA—1004(942) single-engine acft, 1504(1442) multi-engine and turbine powered acft. Unscheduled ops by group 5 acft (B747) and larger not authorized except with prior arpt approval ctc: arpt manager 408-392-3500. All turbine engine run-ups require prior arpt approval, ctc: manager on duty 408-392-3500. Curfew hours 0700-1500Z; FAR 36 Stage II, 0730-1430Z; FAR 36 Stage III acft listed on the schedule of authorized acft issued by the Director of Aviation. Delayed scheduled flts and alternate emerg ops may be exempt from curfew hr restrictions. Prior arpt notification is required for all late/early arrivals. Ctc: manager on duty at 408-392-3500. Twy D between Twy W and Twy V ltd to acft with a wingspan of less than 118' (B-737-900 or smaller). Twy Y will be periodically rstd to acft with a wingspan of less than 171 ft (MD-11 or smaller) drg B-787 and B-747 ops on Rwy 12L-30R. Twy Z will be periodically rstd to acft with a wingspan of less than 118 ft (B-737-900 or smaller) drg B-787 and B-747 ops. Twy Z btd 200 ft NW of Twy H and 200 ft NW of Twy K ltd to acft with wingspan of less than 135 ft (B-757-300 or smaller). Twy W between Twy J and Twy L can support Group IV acft. Twy V ltd to acft with wingspan of less than 135' (B-757-300 or smaller). RRP rstd from FBO for tournament heli ops. Rwy 12R-30L 900' displcd thld on NW end not grvd. Rwy 30L 1873' displcd thld on SE end not grvd.

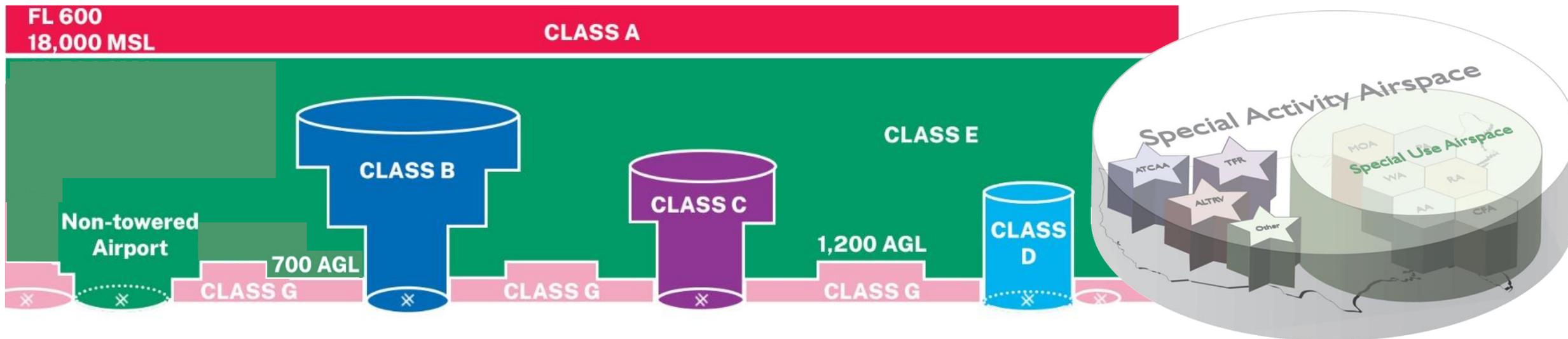


TOWER 124.0 (1400-0800Z±) GND CON 121.7 CLNC DEL 118.0 PRE TAXI CLNC 118.0
® NORCAL DEP CON 121.3

SPECIAL OPERATIONS:
CLEARANCE DELIVERY PHONE: For CD when ATCT is clsd ctc: NorCal Appch at 916-361-3748.
AIRSPACE, CLASS E: svc ctc: APP CON svc 1400-0800Z; other times CLASS E.
RADIO AIDS TO NAVIGATION: NOTAM FILE SJC.
SAN JOSE (L) VOR/DME 114.1 SJC Chan 88 N37°22.48' W121°56.68' 116° 1.0 NM to fld. 35/16E.
 VOR unusable:
 000°-070° btd 25 NM bto 6,500'
 140°-160° btd 25 NM bto 6,100'
 170°-240° btd 30 NM bto 6,700'
ILS/DME 110.9 I-SLV Chan 46 Rwy 12R. Class IE. Unmonitored when ATCT closed.
ILS/DME 110.9 I-SJC Chan 46 Rwy 30L. Class IIE. Unmonitored when ATCT closed.
COMM/NAV/WEATHER REMARKS: Emerg frequency 121.5 not avbl at tower.

SW, 16 JUL 2020 to 10 SEP 2020

Airspace Construct



- Each Airspace Class has minimum operating requirements
 - **Level of Communication with ATC**
 - **Equipment**
 - Distance from clouds (VFR pilots)
 - Pilot rating
- Special Activity Airspace
 - Contains activity hazardous to non-participants
 - Usually off-limits

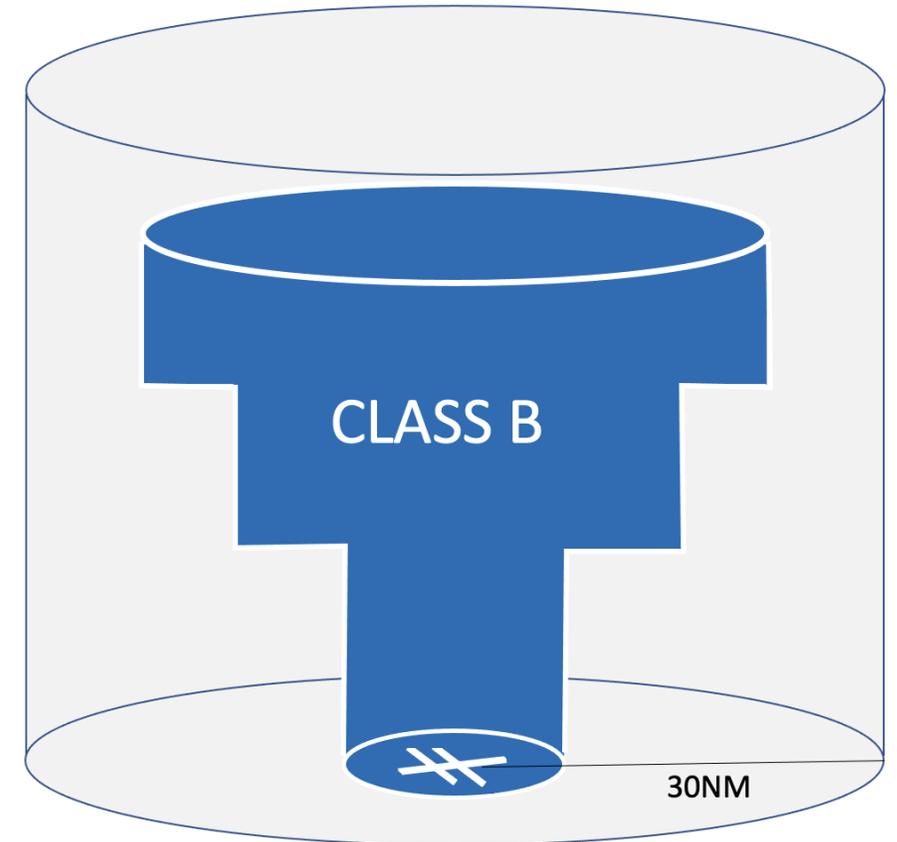
Class A



- IFR flight only

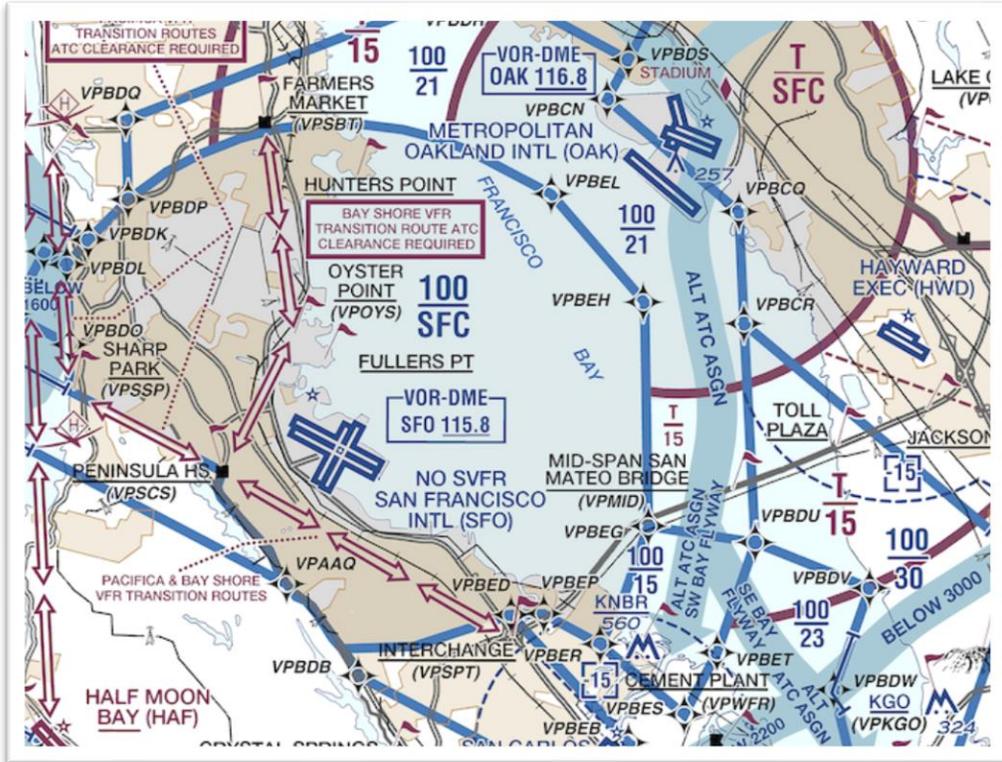
Class B

- Structure:
 - "Upside-down wedding cake" surface to 10,000 MSL
 - Designed to protect instrument procedures at primary airport
- Operating Requirements:
 - ATC clearance is required to enter and operate within Class B
 - ADS-B out required within the "Mode C Veil"
 - Within 30NM of primary airport
 - Surface to 10,000 MSL





Class B



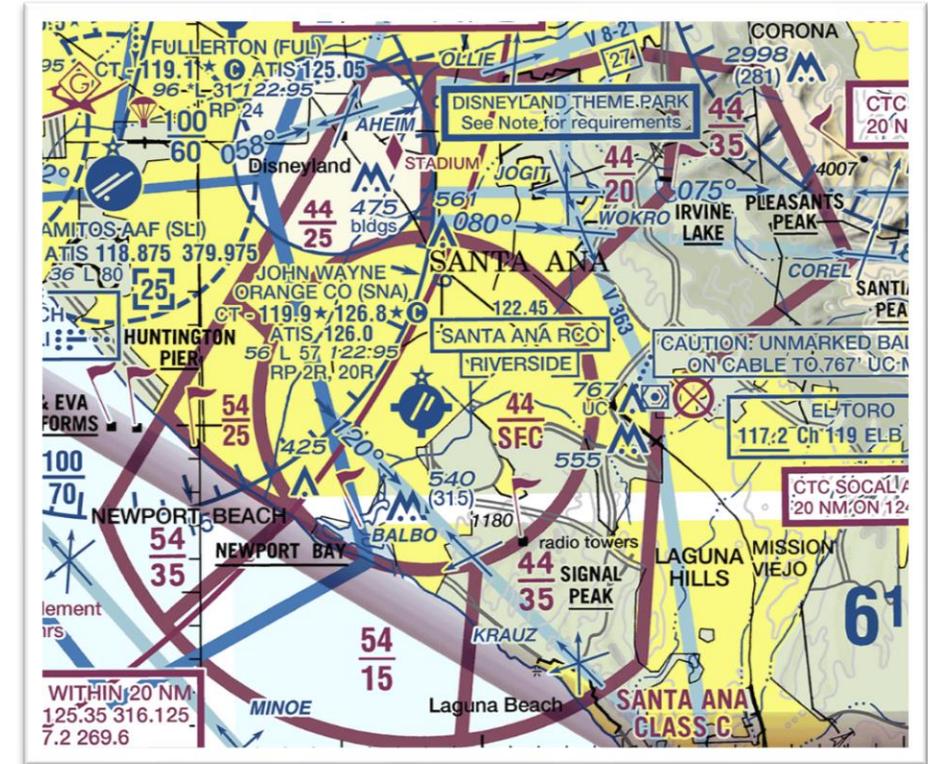
- Example: KSFO



Class C



- Structure:
 - Inner core
 - 5NM radius
 - SFC to 4,000 AGL
 - Outer core:
 - 10NM radius
 - 1,200 AGL to 4,000 AGL
- Operating Requirements:
 - Two-way radio communication must be established with ATC



Example: KSNA

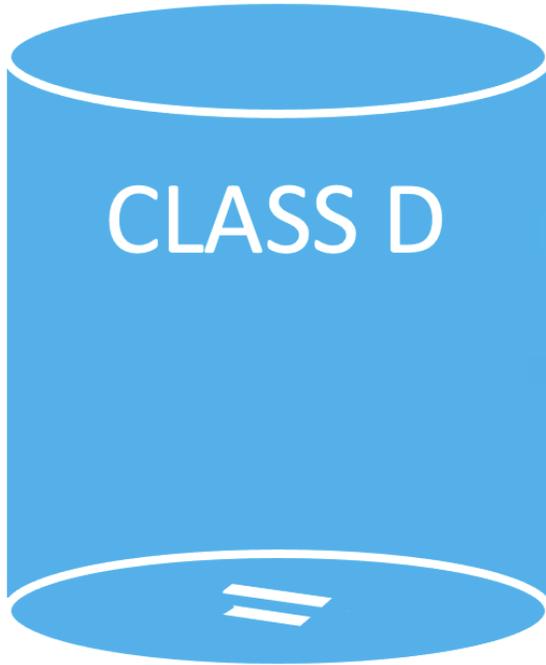


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Class D



- Structure:
 - SFC to 2,500 AGL
 - Laterally defined to accommodate instrument procedures
- Operating Requirements:
 - Two-way radio communication must be established with ATC prior to entry

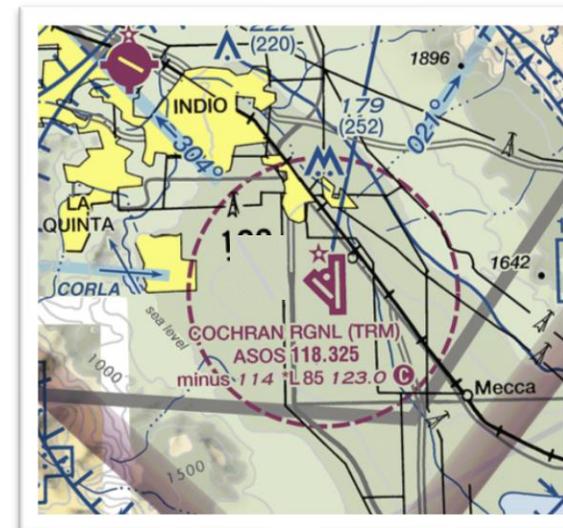
Class E

17,999
MSL

700 AGL

1200 AGL

- Structure:
 - Usually 1,200 AGL to 17,999 MSL
 - May extend downward to 700 AGL or SFC where needed
- Operating Requirements:
 - ADS-B out above 10,000 MSL
 - No Communications requirement





Class G

- Structure:
 - Airspace that has not been designated as Class A, B, C, D, or E
 - Usually:
 - SFC-1,200 AGL
 - SFC-700 AGL
 - Other geometries exist but are rare
- Operating Requirements:
 - VFR: Minimum flight visibility and distance from clouds still apply
 - IFR: Obstacle clearance and proper altitude for direction of flight rules still apply



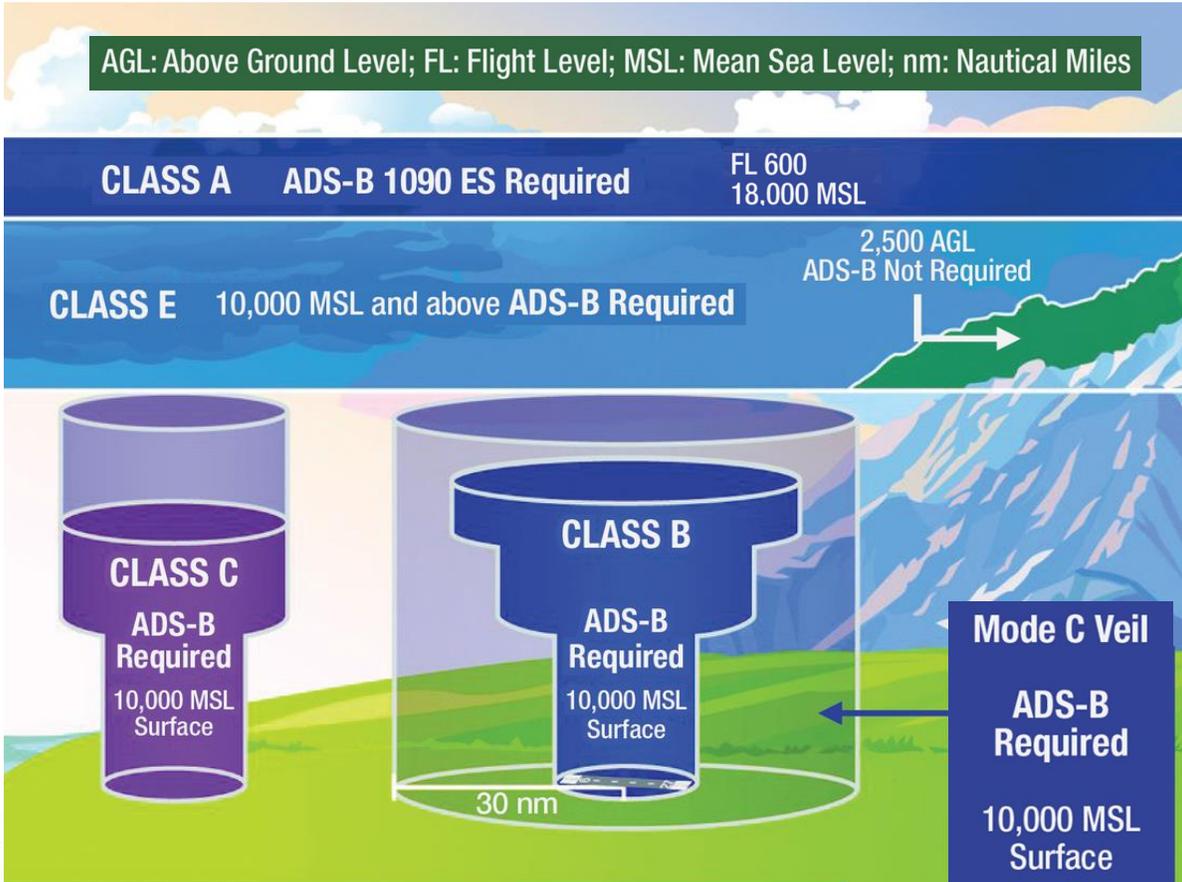
SFC-1,200 AGL

SFC-700 AGL

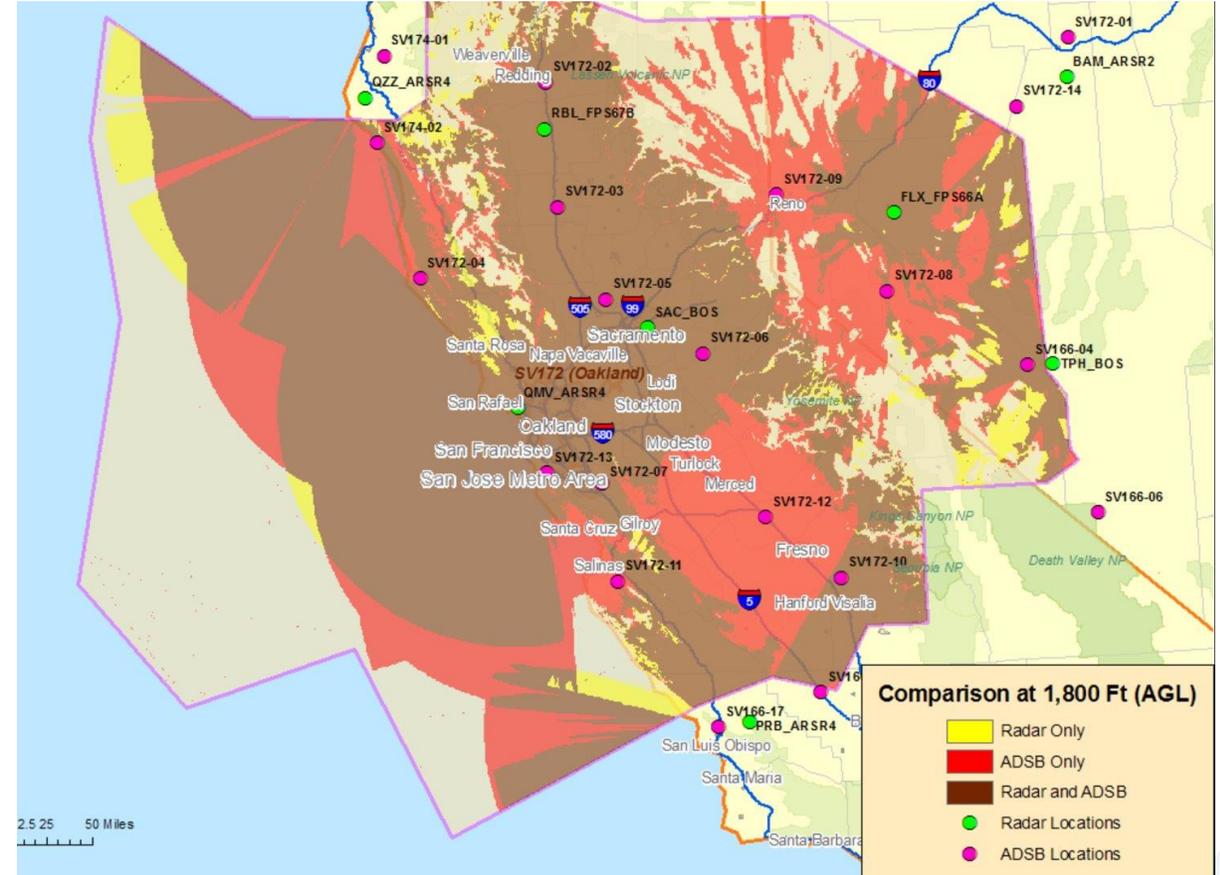




ADS-B



Requirements

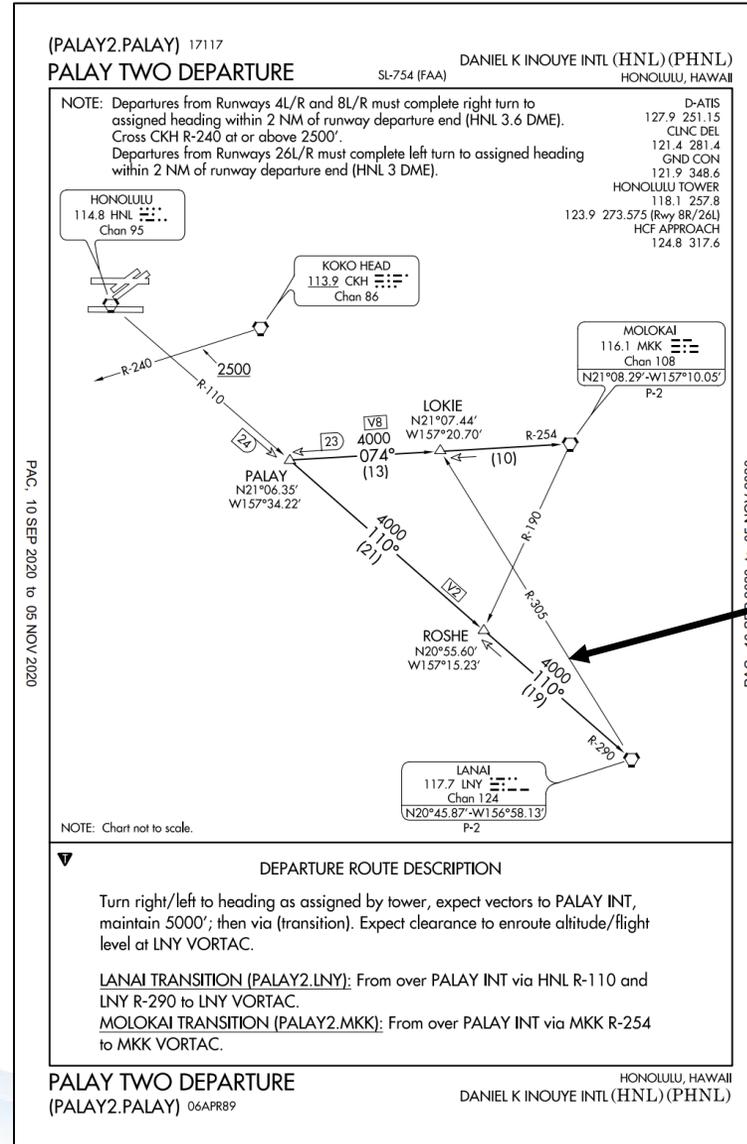


Oakland Center ADS-B Coverage at 1,800 AGL

Minimum Altitudes

MEA (Minimum Enroute Altitude)	The lowest published altitude between radio fixes that assures acceptable navigational signal coverage and meets obstacle clearance requirements.
MRA (Minimum Reception Altitude)	MRAs are determined by FAA flight inspection traversing an entire route of flight to establish the minimum altitude the navigation signal can be received
MOCA (Minimum Obstruction Clearance Altitude)	The lowest published altitude in effect between fixes on VOR airways, off-airway routes, or route segments that meets obstacle clearance requirements
MCA (Minimum Crossing Altitude)	The lowest altitude at certain fixes at which the aircraft must cross when proceeding in the direction of a higher minimum enroute IFR altitude
MSA (Minimum Safe Altitude)	Altitudes depicted on approach charts which provide at least 1,000 feet of obstacle clearance for emergency use within a specified distance from the navigation facility upon which a procedure is predicated
MIA (Minimum IFR Altitude)	Minimum altitudes for IFR operations as prescribed in 14 CFR Part 91
MVA (Minimum Vectoring Altitude)	The lowest MSL altitude at which an IFR aircraft will be vectored by a radar controller

MEA Example



MEA=4000

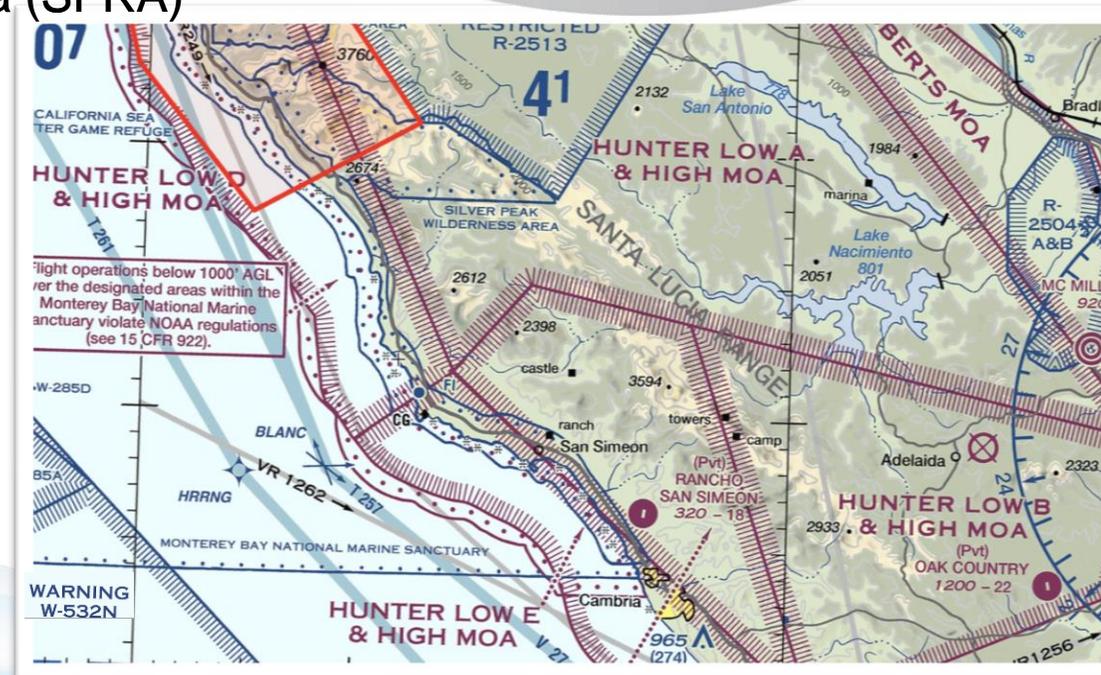


Special Activity Airspace

- Air Traffic Control Assigned Airspace (ATCAA)
- **Temporary Flight Restriction (TFR)**
- Altitude Reservation (ALTRV)
- Other
 - **Military Training Routes (MTR)**
 - Orbit Area (OA)
 - Special Flight Rules Area (SFRA)
 - Soaring Area
 - Parachuting Area



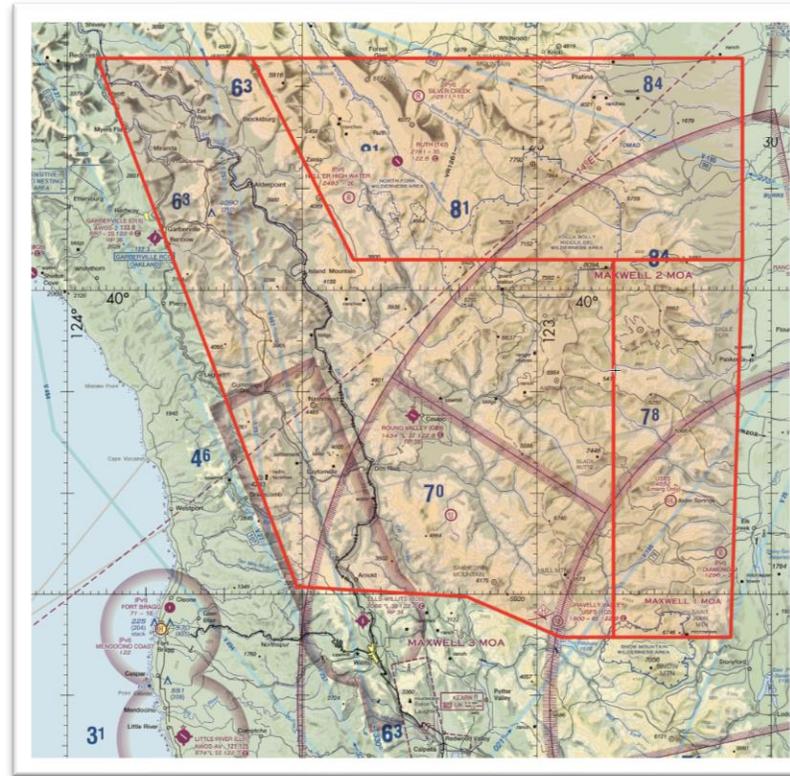
- Special Use Airspace (SUA)
 - Prohibited Area (PA)
 - Restricted Area (RA)
 - Warning Area (WA)
 - Military Operations Area (MOA)
 - Alert Area (AA)
 - National Security Area (NSA)
 - Controlled Firing Area (CFA)





Temporary Flight Restrictions (TFRs)

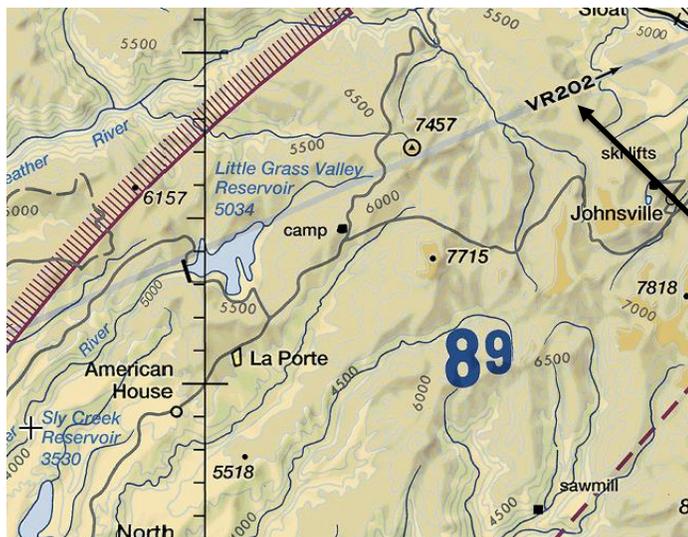
- Protect from hazard associated with an incident on the surface when the presence of low flying aircraft would magnify, that hazard
- Operation of disaster relief aircraft
- Prevent unsafe congestion of sightseeing aircraft above an incident or event which may generate a high degree of public interest
- Protect the President, Vice President, or other public figures
- Provide a safe environment for space agency operations



NorCal Fire Fighting TFR

FDC 0/5335 ZOA CA..AIRSPACE 25 NM NW UKIAH, CA..TEMPORARY FLIGHT RESTRICTIONS WI AN AREA BOUNDED BY 402245N/1235615W (FORTUNA VORTAC FOT123022.2) TO 402245N/1233630W (FORTUNA VORTAC FOT102033.6) TO 400300N/1232330W (RED BLUFF VORTAC RBL249053.3) TO 400300N/1225015W (RED BLUFF VORTAC RBL246027.8) TO 392545N/1225015W (MENDOCINO VORTAC ENI026030.4) TO 392545N/1225700W (MENDOCINO VORTAC ENI018027.1) TO 392945N/1230900W (MENDOCINO VORTAC ENI356027.2) TO 393045N/1233045W (MENDOCINO VORTAC ENI322029.7) TO POINT OF ORIGIN **SFC-12000FT. TO PROVIDE A SAFE ENVIRONMENT FOR FIRE FIGHTING ACFT OPS.** PURSUANT TO 14 CFR SECTION 91.137(A)(2) TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT. CAL FIRE MENDOCINO UNIT TEL 707-459-7403 OR FREQ 132.5750/AUGUST COMPLEX WEST FIRE IS IN CHARGE OF THE OPS. OAKLAND /ZOA/ ARTCC TEL 510-745-3331 IS THE FAA CDN FACILITY. **2009170450-2011170759EST**

Military Training Routes



AP/1B

DoD
FLIGHT INFORMATION PUBLICATION

AREA PLANNING

MILITARY TRAINING ROUTES

VR-202

ORIGINATING ACTIVITY: Commander, Strike Fighter Wing, U.S. Pacific Fleet, 001 K Street, NAS Lemoore, CA 93246-5022 DSN 949-1034 (1530-2400Z Mon-Fri), C559-998-1034.

TERRAIN FOLLOWING OPERATIONS: Authorized entire route.

HOURS OF OPERATION: Daylight hours, OT by NOTAM

Consult NOTAMS for latest information.



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NSN 7641014109670
NGA REF. NO. PLANXAP1BBOOK



EFF. DATE 08325

- Used by the military for low-altitude, high-speed training
 - Can be IFR or VFR
 - Routes at 1,500 feet AGL and below are generally developed to be flown VFR
 - MTRs are established below 10,000 feet MSL for operations at speeds in excess of 250 knots

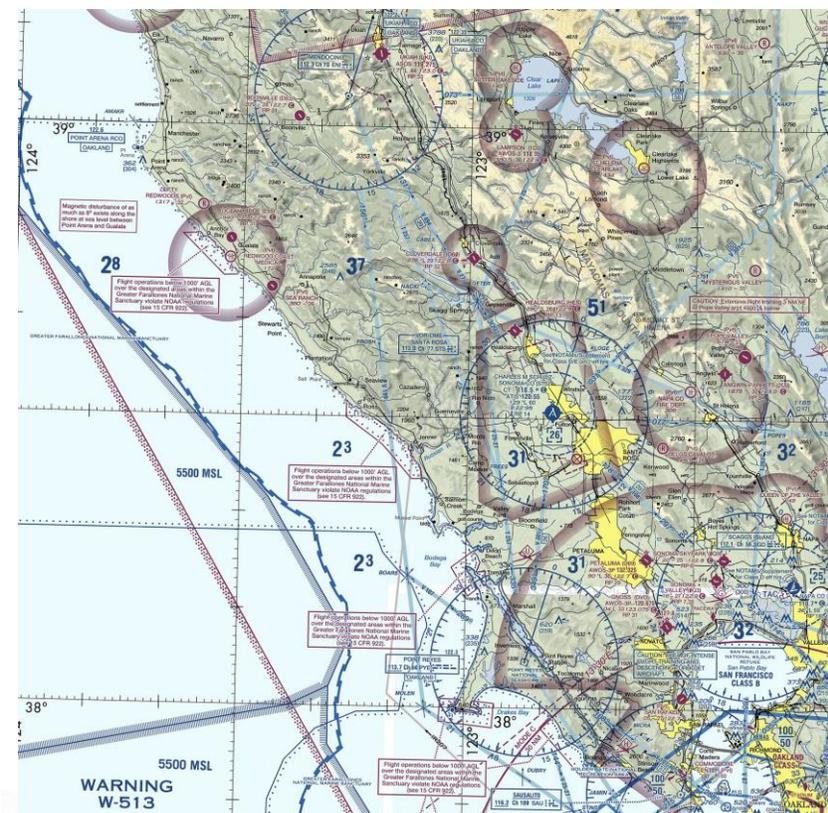


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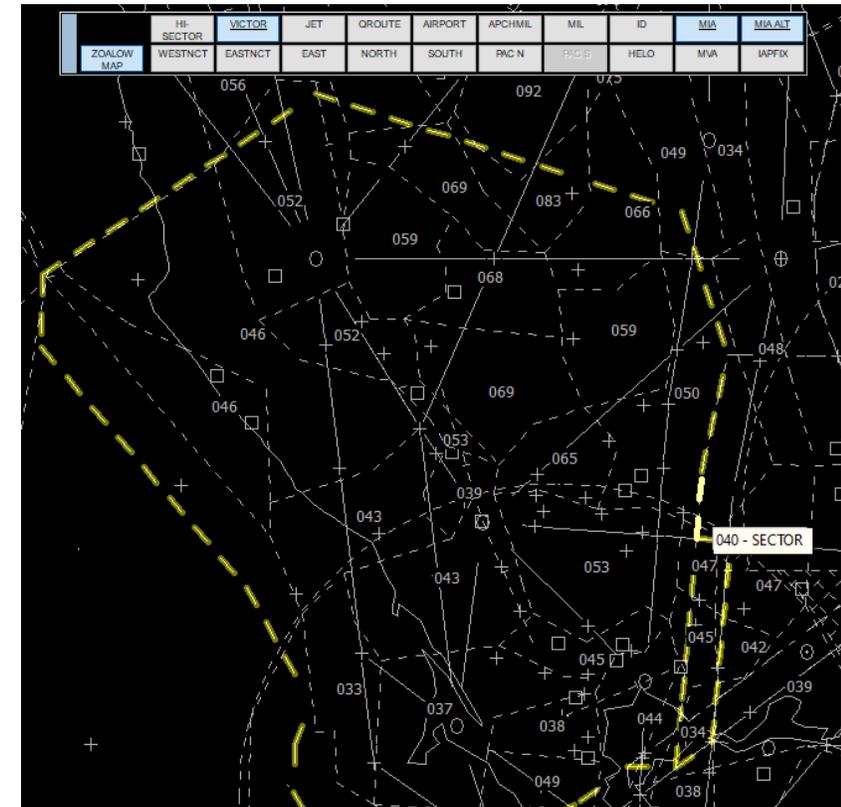
Airspace is in the Eye of the Beholder



VFR Pilot



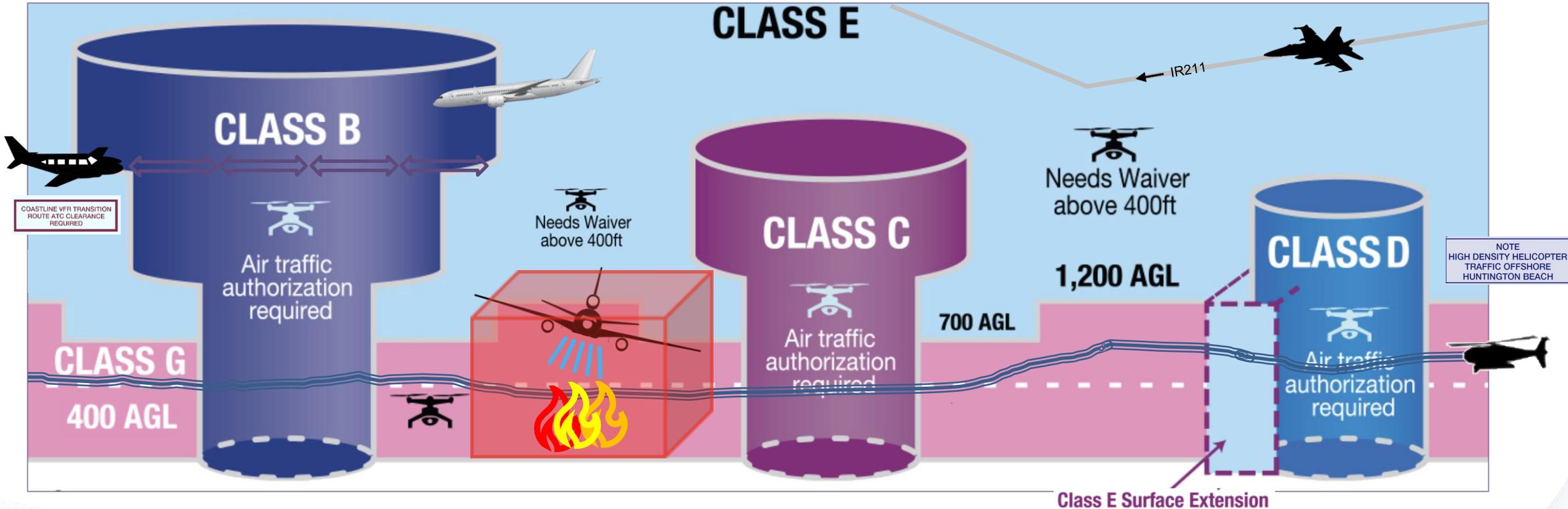
IFR Pilot



Controller



Airspace is in the Eye of the Beholder



UAM/AAM ?

Trusted Experience. Practical Solutions.

AAM



**AIRSPACE
WORKING GROUP**

Overview/Recap





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The Future???

National Aeronautics and
Space Administration

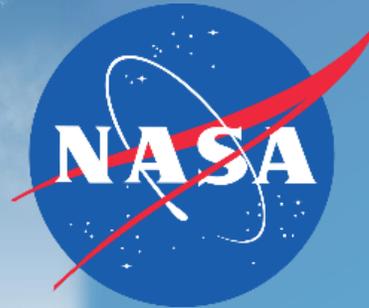


Video excerpt – “*The Fifth Element*”
Released May 1997





LS Technologies, LLC



National Aeronautics and
Space Administration

LS Technologies, LLC
Phone: (703) 205-9146
Web URL: www.lstechllc.com

2750 Prosperity Avenue,
Suite 400
Fairfax, Virginia 22031

600 Maryland Avenue,
SW, Suite 940W
Washington, DC 20024