Intro to Small Unmanned Aircraft Systems & Recreational Drones
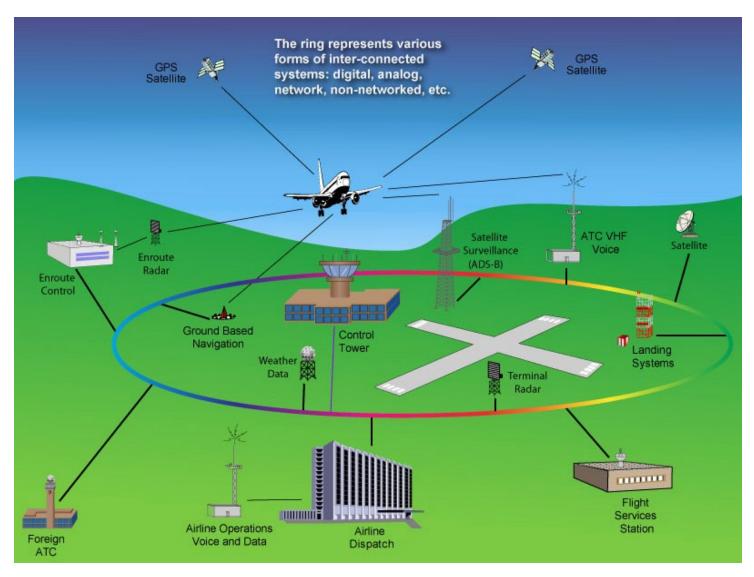
The mission of the FAA is **to provide the safest, most efficient aerospace system in the world** to satisfy the aviation needs of the United States

The FAA controls the **National Airspace System (NAS)**, which is a network of both controlled and uncontrolled airspace over land and sea. It includes air navigation, airports, aeronautical charts, information services, rules & regulations, procedures, and manpower & material.

National Airspace System (NAS)

Airspace & Drone Pilots

The FAA requires <u>all</u> drone pilots to have a basic understanding of the National Airspace.

The Part 107 Certified Remote Pilot test includes National Airspace questions. You must be able to proficiently read and understand the information and data on the FAA sectional charts used by Visual Flight Rule (VFR) pilots.

Sources of Information

Aeronautical Charts – 3 types of charts that cover any flying situation – Sectional, Terminal & En-Route

Chart Supplement U.S. – the most comprehensive information on a given airport

NOTAMs (Notice to Air Mission**) – Temporary time-critical aeronautical information**

Automated Terminal Information Service (ATIS) - weather, runways in use, specific ATC procedures and any airport construction activity that could affect taxi planning

Aeronautical Chart Types

VFR Sectional Chart – covers several states and provides information for VFR (Visual Flight Rules)

Terminal Area Chart (TAC) – covers the airspace around large airport in a larger format

En-Route Chart – provides navigation information for IFR (Instrument Flight Rules)

VFR Sectional Aeronautical Chart

Sectional Aeronautical Charts are designed for visual navigation of slow to medium speed aircraft. The topographic information consists of a selection of visual checkpoints used for flight under Visual Flight Rules (VFR). The checkpoints include cities & towns, rivers & streams, roads, railroads, obstructions, airports, controlled airspace, restricted areas, and landmarks. The Sectional Charts also include radio aids for navigation.

These charts are updated every 56 days.
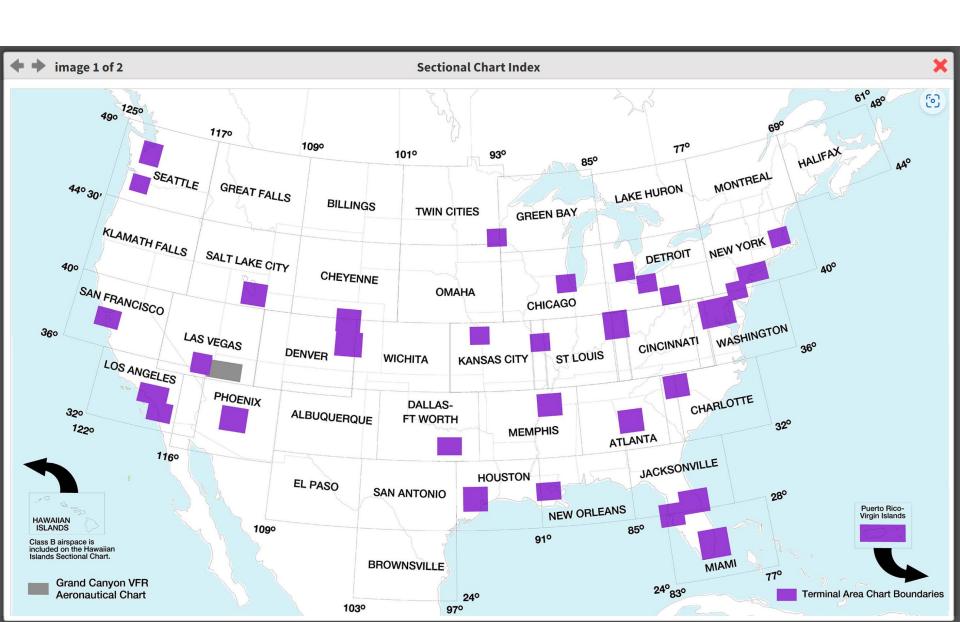
Terminal Area Chart (TAC)

Terminal Area Charts (TAC) are large-scale charts with more detail around major airports. They provide pilotage and local control requirements in airspace designated as Class B Airspace. Coverage of Terminal Area Charts are indicated by shaded boxes on the Sectional Chart.

These charts are updated every 56 days.

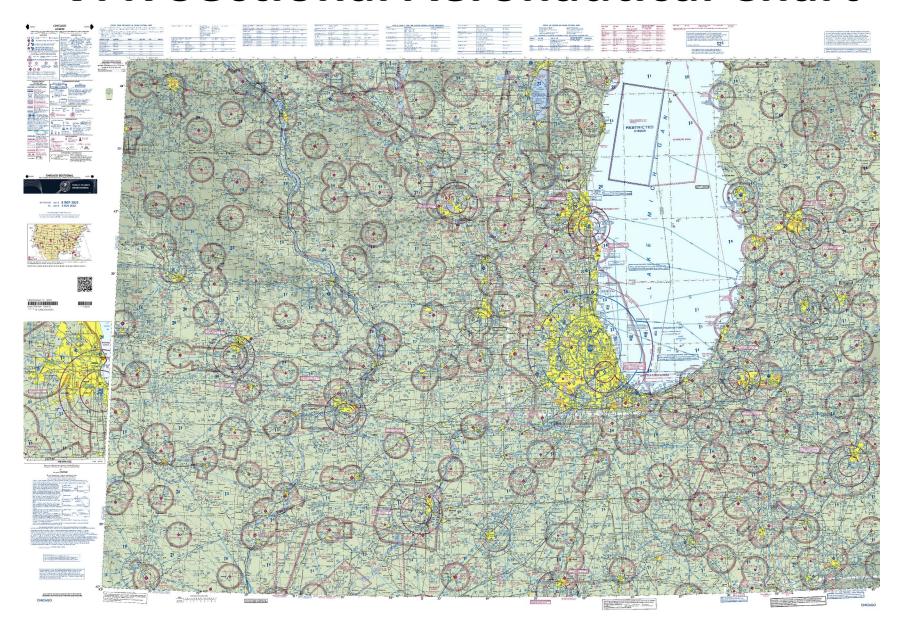**Charted VFR Flyway Planning Charts** are printed on the backs of selected Terminal Area Charts.

VFR Sectional Aeronautical Chart

VFR Sectional Aeronautical Chart

Why are Aeronautical Maps printed in funny colors?

You may be familiar with RGB digital color printing. Professional printing presses use four ink colors — cyan, magenta, yellow, and black — also known as the CMYK process. This method of printing limits the number of printing plates required to four.

VFR Chart Supplement

The Chart Supplements includes data that cannot be readily depicted in graphic form: e.g., airport hours of operation, types of fuel available, runway data, and lighting codes

May be downloaded as PDF files.

Waterloo Chart Supplement

WATERLOO RGNL (ALO)(KALO) P (ARNG)   4 NW   UTC–6(–5DT)   N42°33.51´ W92°24.06´
  873   B   ARFF Index—See Remarks   NOTAM FILE ALO
  RWY 12–30: H8399X150 (ASPH-GRVD)   S-55, D-75, 2D-140 PCN 59 R/A/X/T
    HIRL
    RWY 12: MALSR. PAPI(P4L)—GA 3.0° TCH 57´. RVR-T Tree.
    RWY 30: MALS. VASI(V4L)—GA 3.0° TCH 52´. RVR-R
  RWY 18–36: H6003X150 (ASPH-CONC-GRVD)   S-50, D-75 PCN
    51 F/B/X/T   MIRL
    RWY 18: REIL. VASI(V4L)—GA 3.0° TCH 42´. Tree.
    RWY 36: REIL. PAPI(P4L)—GA 3.0° TCH 51´. Tree.
  LAND AND HOLD–SHORT OPERATIONS

LDG RWY	HOLD–SHORT POINT	AVBL LDG DIST
RWY 30	18-36	4800
RWY 36	12-30	3650

  RUNWAY DECLARED DISTANCE INFORMATION
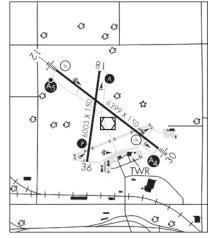
RWY 12:	TORA-8399	TODA-8399	ASDA-8399	LDA-8399
RWY 18:	TORA-6003	TODA-6003	ASDA-6003	LDA-6003
RWY 30:	TORA-8399	TODA-8399	ASDA-8399	LDA-8399
RWY 36:	TORA-6003	TODA-6003	ASDA-6003	LDA-6003

  SERVICE: S4 FUEL 100LL, JET A OX 1, 2, 3, 4 LGT When
    ATCT clsd ACTVT MALSR Rwy 12; MALS Rwy 30; VASI Rwy 18;
    PAPI Rwy 36; MIRL Rwys 18-36, and HIRL Rwy 12-30—CTAF.
    MILITARY—FUEL
    J4(Mil)-PPR. (NC-100LL, A – O/R 0400-1100Z‡, svc fee,
    C319-291-4483.)
  AIRPORT REMARKS: Attended 1100-0300Z‡. Birds on and invof arpt. Arpt sfc conds unmon 0400-1030Z‡
    dly. Fuel avbl on request, fee for service. Class I, ARFF Index A. Clsd to unsked acr opns with more
    than 10 psgr seats excp 72 hours PPR amgr. Call amgr 319-291-4483. Cell 319-529-1388. ARFF Index B
    provided. ARFF Index C avbl on 72 hrs req. Air carrier ops over 9 psgr seats not auth over 15 minutes
    before or after sked arr or dep times excp with prior coord with amgr. When departing all rwys, ends
    of other rwys not visible. Personnel and equipment performing snow removal ops will monitor CTAF.
    When ATCT clsd and durg snow events, all arr/dep acft annc their intns on CTAF 5 min prior to using
    the rwys. Rwy 30 is calm wind rwy.
  MILITARY REMARKS: ARNG ARNG OPS ctc DSN 431-5520, C319-234-1372.
  AIRPORT MANAGER: 319-291-4483
  WEATHER DATA SOURCES: ASOS 120.65 (319) 233-8984.
  COMMUNICATIONS: CTAF 125.075 ATIS 120.65 UNICOM 122.95
    RCO 122.05 (FORT DODGE RADIO)
  ®APP/DEP CON 118.9 126.75 (1200-0200Z‡)
  ®CHICAGO CENTER APP/DEP CON 118.9 (0200-1200Z‡)
    TOWER 125.075 (1200-0200Z‡) GND CON 121.9
    ANG OPS 36.7 142.6 231.55
    CLEARANCE DELIVERY PHONE: For CD ctc Waterloo ATCT at 319-233-4835.When Waterloo ATCT clsd, for
      CD ctc Chicago ARTCC at 630-906-8921.

  AIRSPACE: CLASS D svc 1200-0200Z‡; other times CLASS E.
  RADIO AIDS TO NAVIGATION: NOTAM FILE ALO.
  (L) (L) VORW/DME 112.2   ALO   Chan 59   N42°33.39´ W92°23.94´   at fld. 866/0E.
    VOR unusable:
      017°-062° byd 35 NM blo 2,500´
        063°-073° byd 18 NM
      074°-356° byd 35 NM blo 2,500´
        357°-016°
    DME unusable:
      007°-026° byd 25 NM
      027°-006° byd 35 NM blo 2,500´
    ILS/DME 111.7 I-ALO   Chan 54   Rwy 12.   Class IA.   Unmonitored when twr clsd.

WATERLOO RGNL (ALO)(KALO) P (ARNG) 4 NW UTC-6(-5DT) N42°33.51´ W92°24.06´

873 B ARFF Index—See Remarks NOTAM FILE ALO

RWY 12–30: H8399X150 (ASPH-GRVD) S-55, D-75, 2D-140 PCN 59 R/A/X/T
HIRL
RWY 12: MALSR. PAPI(P4L)—GA 3.0° TCH 57´. RVR-T Tree.
RWY 30: MALS. VASI(V4L)—GA 3.0° TCH 52´. RVR-R

RWY 18–36: H6003X150 (ASPH-CONC-GRVD) S-50, D-75 PCN 51 F/B/X/T MIRL
RWY 18: REIL. VASI(V4L)—GA 3.0° TCH 42´. Tree.
RWY 36: REIL. PAPI(P4L)—GA 3.0° TCH 51´. Tree.

LAND AND HOLD–SHORT OPERATIONS

LDG RWY	HOLD–SHORT POINT	AVBL LDG DIST
RWY 30	18-36	4800
RWY 36	12-30	3650

RUNWAY DECLARED DISTANCE INFORMATION

RWY	TORA	TODA	ASDA	LDA
RWY 12:	8399	8399	8399	8399
RWY 18:	6003	6003	6003	6003
RWY 30:	8399	8399	8399	8399
RWY 36:	6003	6003	6003	6003

SERVICE: S4 **FUEL** 100LL, JET A **OX** 1, 2, 3, 4 **LGT** When ATCT clsd ACTVT MALSR Rwy 12; MALS Rwy 30; VASI Rwy 18; PAPI Rwy 36; MIRL Rwys 18-36, and HIRL Rwy 12-30—CTAF.
MILITARY—FUEL
J4(Mil)-PPR. (NC-100LL, A – O/R 0400-1100Z‡, svc fee, C319-291-4483.)

AIRPORT REMARKS: Attended 1100-0300Z‡. Birds on and invof arpt. Arpt sfc conds unmon 0400-1030Z‡ dly. Fuel avbl on request, fee for service. Class I, ARFF Index A. Clsd to unsked acr opns with more than 10 psgr seats excp 72 hours PPR amgr. Call amgr 319-291-4483. Cell 319-529-1388. ARFF Index B provided. ARFF Index C avbl on 72 hrs req. Air carrier ops over 9 psgr seats not auth over 15 minutes before or after sked arr or dep times excp with prior coord with amgr. When departing all rwys, ends of other rwys not visible. Personnel and equipment performing snow removal ops will monitor CTAF. When ATCT clsd and durg snow events, all arr/dep acft annc their intns on CTAF 5 min prior to using the rwys. Rwy 30 is calm wind rwy.

MILITARY REMARKS: ARNG ARNG OPS ctc DSN 431-5520, C319-234-1372.

AIRPORT MANAGER: 319-291-4483.

WEATHER DATA SOURCES: ASOS 120.65 (319) 233-8984.

COMMUNICATIONS: CTAF 125.075 **ATIS** 120.65 **UNICOM** 122.95
RCO 122.05 (FORT DODGE RADIO)
Ⓡ**APP/DEP CON** 118.9 126.75 (1200-0200Z‡)
Ⓡ**CHICAGO CENTER APP/DEP CON** 118.9 (0200-1200Z‡)
TOWER 125.075 (1200-0200Z‡) **GND CON** 121.9

Attended 1100-0300Z Tower 1200-0200Z - Subtract 5 hours to convert to Central Daylight Time (CDT) or subtract 6 hours to convert to Central Standard Time (CST).
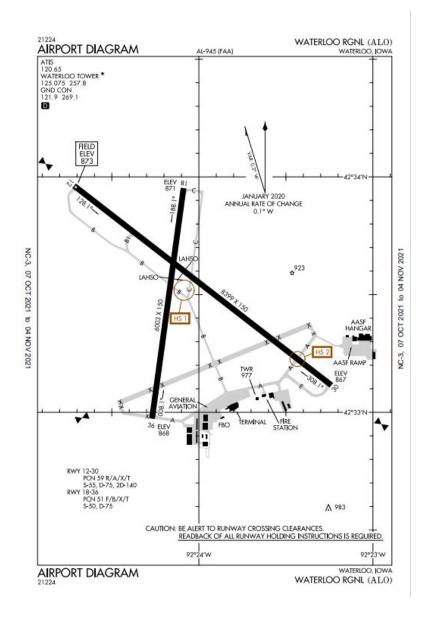
Waterloo Regional Airport

RUNWAY NUMBERS

Runway numbers are determined by rounding the <u>magnetic</u> compass bearing of the runway end to the nearest 10 degrees and truncating the last digit, meaning runways are numbered from 1 to 36....

So, if you're on runway 9, you're heading east (90° on a compass). The opposite end of runway 9 is numbered 27 (or 270° on a compass). If an airport has parallel runways, these would then be marked Left, Center and Right, e.g., 9L/9C/9R
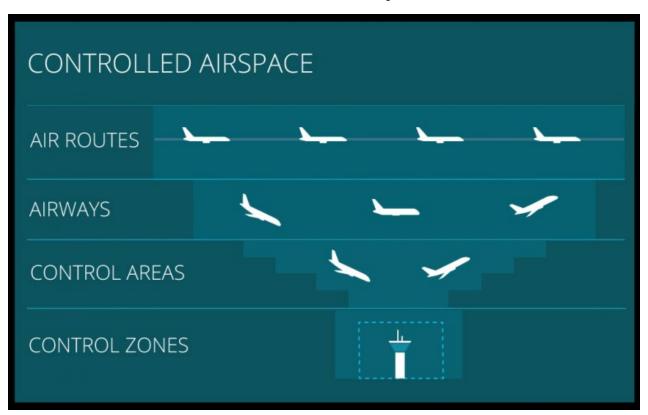
Waterloo Regional Airport

Runways
12/30
18/36
~~6/24~~

Controlled Airspace

Air Traffic Control services are provided in Controlled Airspace. The level of control varies with different classes of airspace.

Airspace Classes

Class A – Airspace from 18,000 to 60,000 feet (MSL)

Class B – Large Airports with control tower

Class C – Medium Sized Airports with control tower

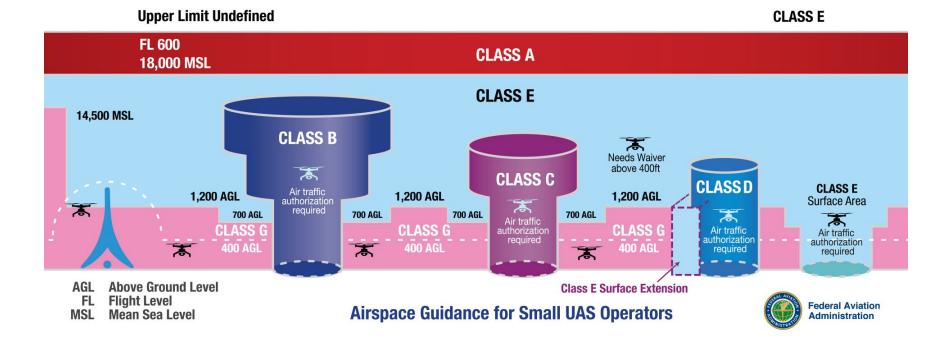**Class D** – Small Airports with control tower

Class E – Small Airports or surface (SFC) & lateral airspace

Class G – Uncontrolled (ground up to controlled airspace)

* There is no **Class F** airspace in the US.

Controlled Airspace

Airspace Guidance for Small UAS Operators

Class A Airspace

- Not an issue for drone pilots – info only
- From 18,000 feet (MSL) to 60,00 feet (MSL)
- Instrument Flight Rules (IFR) only
- Altitudes are in "Flight Levels" not "Feet"
  - Flight Level 200 = 20,000 feet
  - Flight Level 500 = 50,000 feet

MSL = above Mean Sea Level

AGL = Above Ground Level

ALO is 873 feet above MSL

Class B Airspace
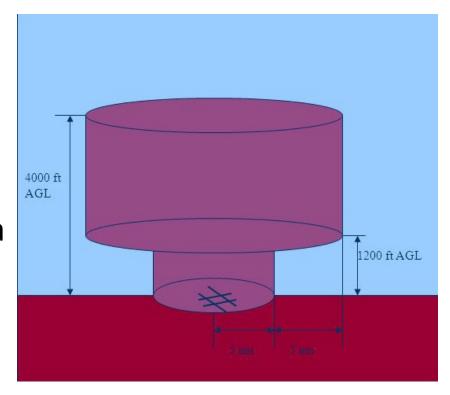
- Busiest Airports and Airspace
- Control from surface to 10,000 feet (AGL)
- Diameter of 30 NM (34.5 statute miles)
- There are 37 Class B airports in the USA. The nearest Class B airports are:
  - **ORD** – Chicago O'Hare
  - **MSP** – Minneapolis – St. Paul
  - **STL** – Lambert St. Louis
  - **MCI** – Kansas City
- Limited VFR allowed
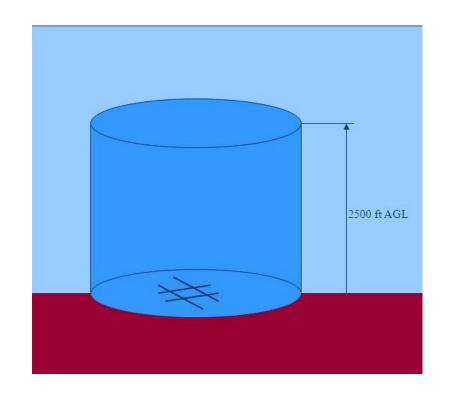- Information provided on Terminal Area Charts (TAC)

Class C Airspace

- Airport Traffic Control Tower (ATC)

- Radar approach control

- Requires a minimum number of Instrument Flight Rule (IFR) operations or passengers.

- Airspace usually consists of a surface area with a 5 NM radius (5.8 statute miles), an outer circle with a 10 NM (11.5 statute miles) radius that extends from 1,200 feet to 4,000 feet (AGL)

Class D Airspace

- Airport Traffic Control Tower (ATC)

- Instrument Flight Rule (IFR) operations

- Radar is optional

- May not have 24/7 operation

- Airspace usually consists of a surface area with a 4 NM radius (4.6 statute miles) that extends to 2,500 feet (AGL)

2500 ft AGL

Waterloo Airport (ALO)

Waterloo Airport is FAA **Class D** airspace.

Class D airspace is generally cylindrical in form and normally extends from the surface to 2,500 feet AGL (above ground level).

On the chart, ALO airspace is 3,400 feet above MSL (mean sea level) or 2527 AGL.

Class E Airspace

- Class E Airspace is the most common Controlled Airspace and the most confusing!

- IFR aircraft must have ATC clearance to fly in Class E Airspace.

- VFR aircraft must have minimum clearance with clouds and 3 statute miles visibility.

- If an IFR aircraft comes out of the clouds, both aircraft have enough time to see and avoid the other aircraft.

Class C & D

1,000 FT

3 SM

2,000

500 FT

Class E Airspace

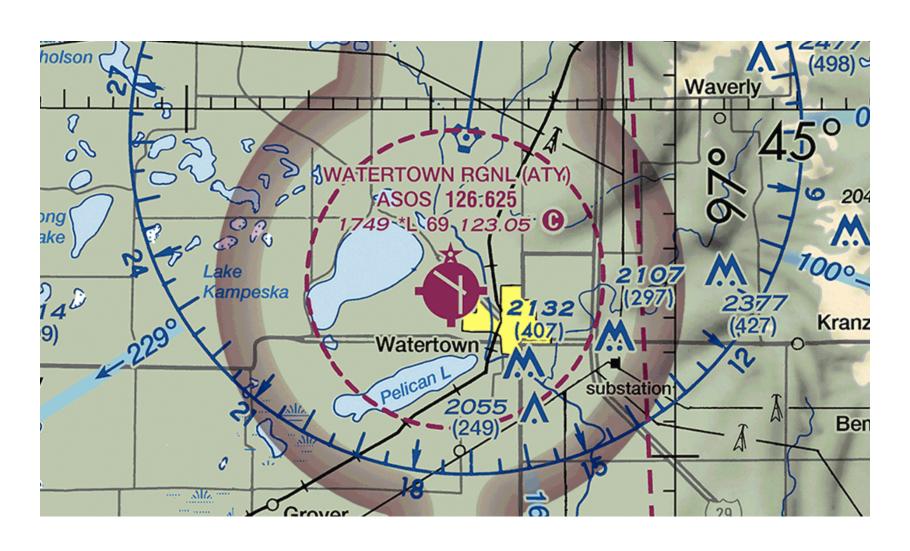**Class E** airspace is all the controlled airspace not described as A, B, C or D airspace.

- Most of this airspace is not near the surface, but aloft, where aircraft flying under IFR are in an en-route segment of flight.

- Over most of the country, the base of Class E airspace is at either 700 feet or 1,200 feet above the ground, so this isn't an issue for a drone operating at 400 feet and below.

Class E Surface (SFC)

Class E surface airspace extends down to the surface at some airports. All Class E surface airports are required to have a weather station and the ability for aircraft to contact Air Route Traffic Control Center (ARTCC) from the ground.

Class E surface airspace has a **dotted magenta** line indicating the Class E area.

Class E Surface Airport

Lateral Class E Airspace
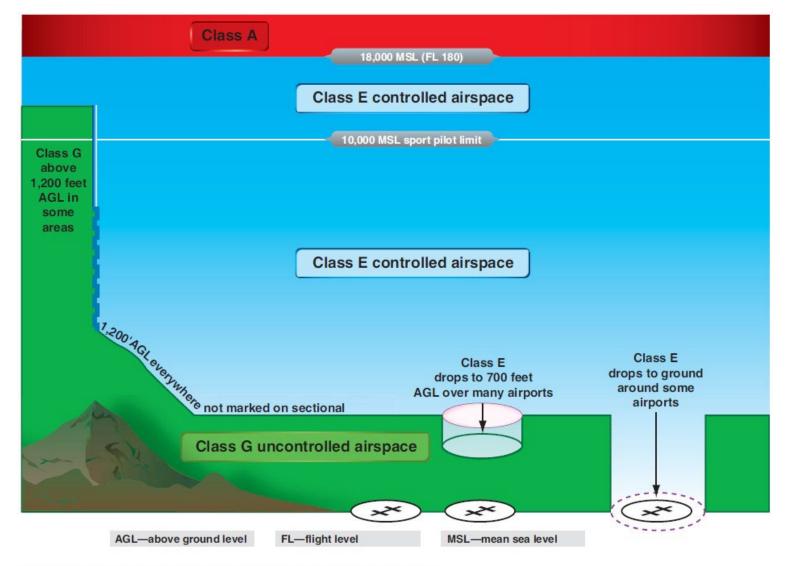
Figure 8-2. *Class G uncontrolled airspace and Class E controlled airspace.*

Lateral Class E Airspace

The lateral Class E Airspace lower altitude limits are shown on the Sectional Chart as follows:

Thin, dashed magenta (purple) line – surface up

Shaded magenta (purple) – 700 feet (AGL) up

Shaded cyan (greenish-blue) – 1200 feet (AGL) up

Lateral Class E Airspace

Waterloo airport has Class E airspace extending from the runways beyond the normal 4 NM (4.6 statute miles) radius down to ground level shown with a thin, dashed **magenta** line on the Sectional Chart.

Waterloo Airport (ALO)

Class E Airspace

Approval is <u>not required</u> to fly a drone in Class E Lateral Airspace, but a minimum of 1000' cloud ceiling is required when flying a drone in Class E Lateral.

Authorization <u>is required</u> to fly in Class E Surface airspace.

Class E Surface Airports in Iowa

CODE	AIRPORT	CITY
AMW	Ames Muni	AMES
BRL	Southeast Iowa Regional	BURLINGTON
CWI	Clinton Muni	CLINTON
DVN	Davenport Muni	DAVENPORT
FOD	Fort Dodge Regional	FORT DODGE
IKV	Ankeny Regional	ANKENY
MCW	Mason City Muni E	MASON CITY
MUT	Muscatine Muni	MUSCATINE
OTM	Ottumwa Regional	OTTUMWA
SLB	Storm Lake Muni	STORM LAKE
SPW	Spencer Muni	SPENCER
TNU	Newton Muni	NEWTON

Class E Airspace

Class E Airspace

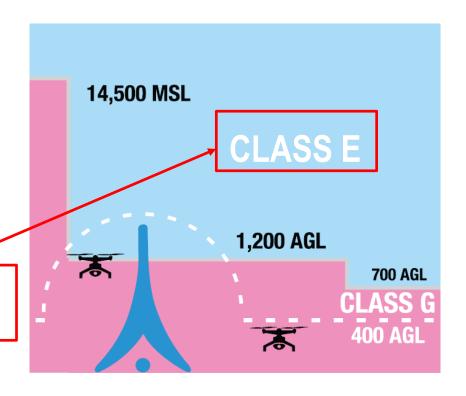- Generally Class E begins where Class G ends
  - Typically, 700ft or 1,200ft Above Ground Level
  - Unless associated with an airport surface area

- ATC authorization not required for Part 107 operations

14,500 MSL

CLASS E

1,200 AGL

700 AGL

CLASS G

400 AGL

Federal Aviation Administration

AUVSI

Class E Airspace

Class E begins at 700' AGL

Class E begins at 700' AGL

Class E begins at 1,200' AGL

Class E Airspace
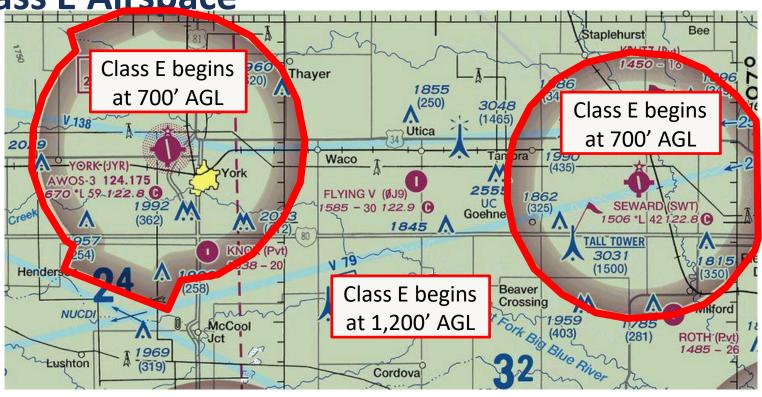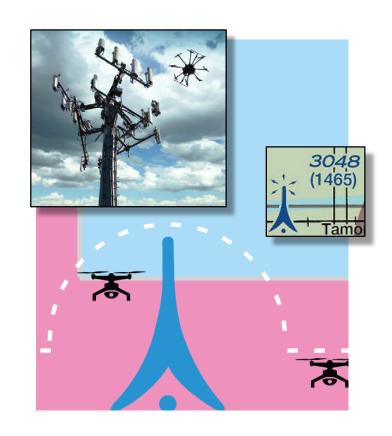
Tower Inspections:

- **§107.51(b)**
  - Limits maximum altitude to 400 ft Above Ground Level

- **Exceptions:**
  - Is flown within a 400-foot radius of a structure; and
  - Does not fly higher than 400 feet above the structure's immediate uppermost limit

No person may operate a small unmanned aircraft…within the lateral boundaries of the surface area of Class E airspace designated for an airport unless that person has prior authorization from Air Traffic Control (ATC)

(Small UAS Operating Rules) 14 CFR §107.41

FAA UAS SYMPOSIUM

#UAS2019

Surface Class E Airspace

Starts at ground level:

- **Type E4**
  - Extension to Class D or E surface area
- **Type E3**
  - Extension to a Class C surface area
- **Type E2**
  - Surface area designated for an airport
  - **AUTHORIZATION NEEDED**

Surface Class E Airspace

SURFACE E - E4

No ATC
Authorization

SURFACE E - E3

No ATC
Authorization

SURFACE E - E2

ATC Authorization Needed

Three different types of surface Class E airspace extensions

Surface Class E – Type E4

No ATC authorization needed (Type E4)

Magenta dashed line segregates the airspace

ATC authorization needed (Type E2)

Extension to a Class E2 surface area

#UAS2019

Surface Class E – Type E4

No ATC authorization needed (Type E4)

Blue dashed line segregates the airspace

ATC authorization needed (Class D)

Extension to Class D airspace

Surface Class E – Type E3

No ATC authorization needed (Type E3)

Solid magenta line segregates the airspace

ATC authorization needed (Class C)

Extension to Class C airspace

#UAS2019

Surface Class E – Type E2

No dashed line segregating the airspace

ATC authorization needed (Class E2)

Class E2 surface area

#UAS2019

Class G Airspace

- Uncontrolled Airspace – No ATC

- From the ground to the bottom of the overlying Class E airspace
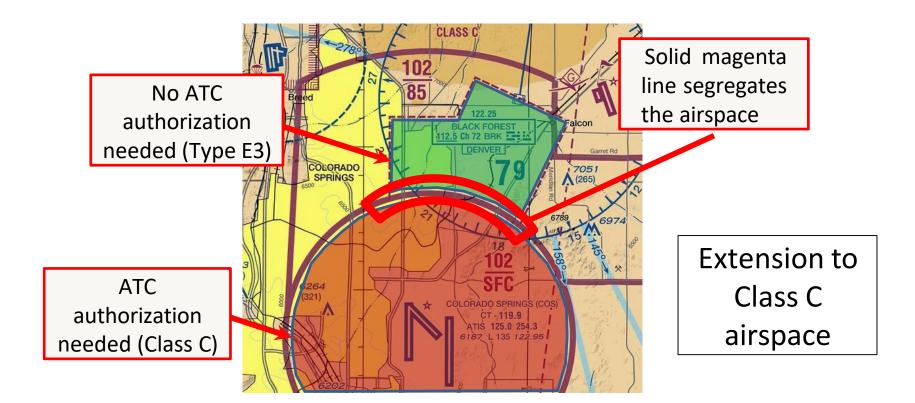
- Upper level is typically 700 feet to 1200 feet AGL with a maximum of 14,500 feet MSL in some areas over mountains.

Airspace Symbols

Controlled airspace floors of 700' above the ground are defined by a **magenta** vignette.

Controlled airspace floors other than 700' that laterally abut uncontrolled airspace (Class G) are defined by a **blue** vignette.

Differing floors greater than 700' above the ground are annotated by a symbols and a number indicating the floors.

2400 AGL

4500 MSL

Sectional Chart Airspace Identification

AIRPORT TRAFFIC SERVICE AND AIRSPACE INFORMATION

Only the controlled and reserved airspace effective below 18,000 ft. MSL are shown.

Class B Airspace

Class C Airspace (Mode C - see FAR 91.215/AIM.)

Class D Airspace

40 Ceiling of Class D Airspace in hundreds of feet (A minus ceiling value indicates surface up to but not including that value.)

Class E (sfc) Airspace

Class E Airspace with floor 700 ft. above surface that laterally abuts Class G Airspace.

CLASS G

Class E Airspace with floor 700 ft. above surface that laterally abuts 1200 ft. or higher Class E Airspace

Class E Airspace with floor 1200 ft. or greater above surface that laterally abuts Class G Airspace

Class D Airspace Ceiling

---- Class D Airspace

[40] Ceiling of Class D Airspace in hundreds of feet. (A minus ceiling value indicates surface up to but not including that value).

Generally, Class D airspace extends from the surface to 2,500 feet above the airport field elevation. The number in the box represents the ceiling of Class D airspace in hundreds of feel MSL (mean sea level).

Airport Symbols

Airports with a **control tower** and their data are shown in **blue**. All other airports and their data are shown in **magenta**.

AIRPORTS

Other than hard-surfaced runways

Seaplane Base

Hard-surfaced runways 1500 ft. to 8069 ft. in length

Hard-surfaced runways greater than 8069 ft. or some multiple runways less than 8069 ft.

Open dot within hard-surfaced runway configuration indicates approximate VOR, VOR-DME, DME or VORTAC location.

All recognizable hard-surfaced runways, including those closed, are shown for visual identification. Airports may be public or private.

ADDITIONAL AIRPORT INFORMATION

Ⓡ   Private "(Pvt)" - Non-public use having landmark value

◎ ◉   Military - Other than hard-surfaced; all military airports are identified by abbreviations AFB, NAS, AAF, etc.

Ⓗ   **Heliport Selected**

Ⓤ   **Unverified**

⊗   **Abandoned - paved having landmark value, 3000 ft. or greater**

Ⓕ   **Ultralight Flight Park Selected**

Fuel availability indicated by use of tick marks around basic airport symbol. Consult Supplement for details and availability at airports with hard-surfaced runways greater than 8069 ft.

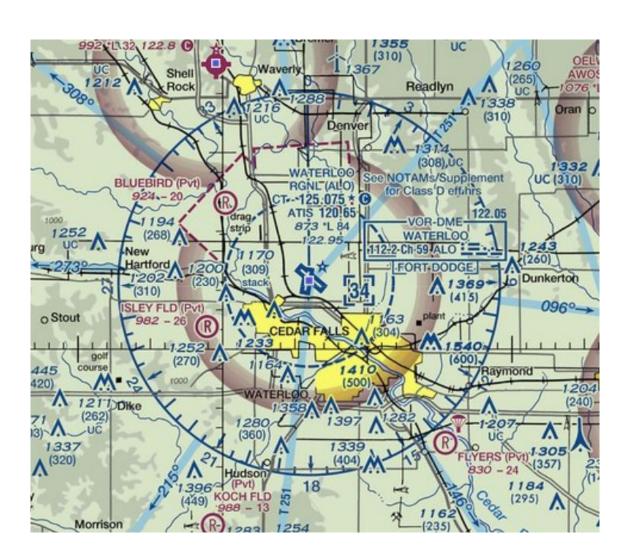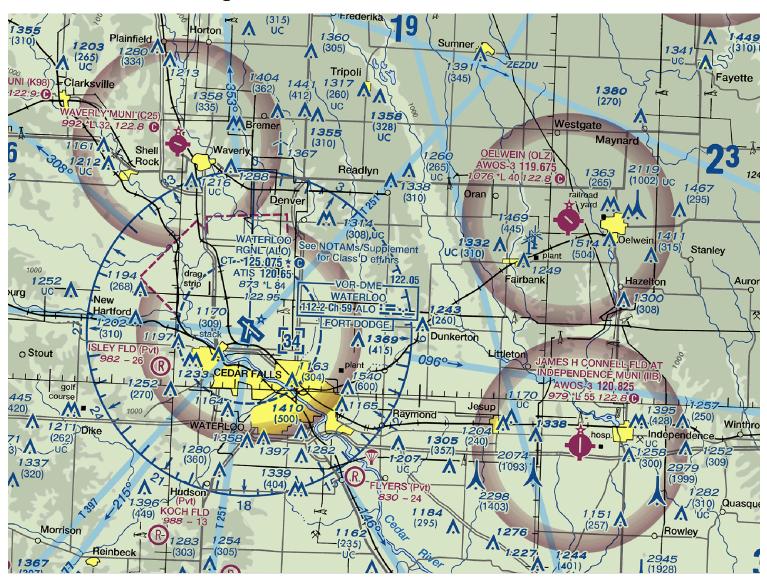★   Rotating airport beacon in operation Sunset to Sunrise

OBJECTIONABLE - Airport may adversely affect airspace use.

Waterloo Airport (ALO)

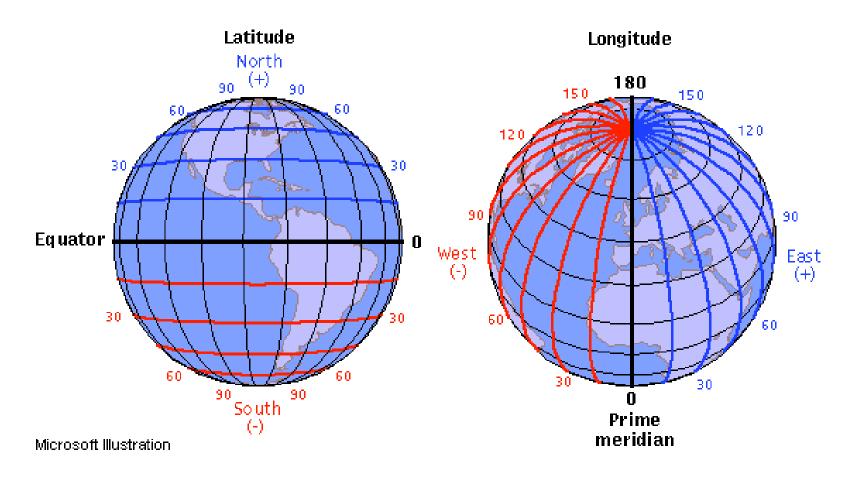# Airport Color Code

Latitude & Longitude
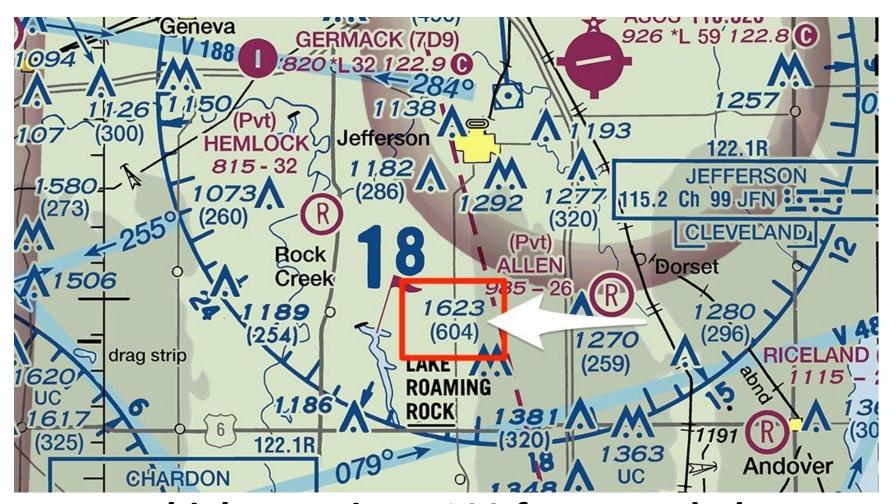
KALO Latitude 42° 33.51' & Longitude -92° 24.06'

Latitude & Longitude

Maximum Elevation Figure (MEF)

MEF = highest point + 100 feet rounded up to the next 100' increment.

Sectional Chart Symbols

MISCELLANEOUS

A - Aerobatic Practice Area
(See Supplement.)
G - Glider Operations
H - Hang Glider Activity
U - Ultralight Activity
UA - Unmanned Aircraft Activity
Parachute Jumping Area (See Supplement.)

STADIUM
Intermittent TFR site (within 3 NM, up to & incl 3000' AGL)

Marine Light

VPXYZ
VFR Waypoints

Space Launch Activity Area

$-1°E-$ Isogonic Line (2020 VALUE)

NAME (VPXYZ)
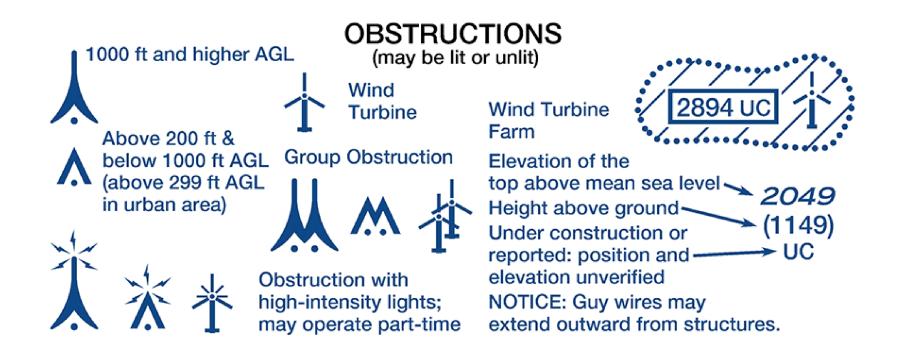
Isogonic lines are drawn on your sectional charts to show different lines of magnetic variation to help with planning your magnetic heading.
VFR Waypoints or Flags are VFR navigation aids. You would expect increased VFR activity around waypoints.
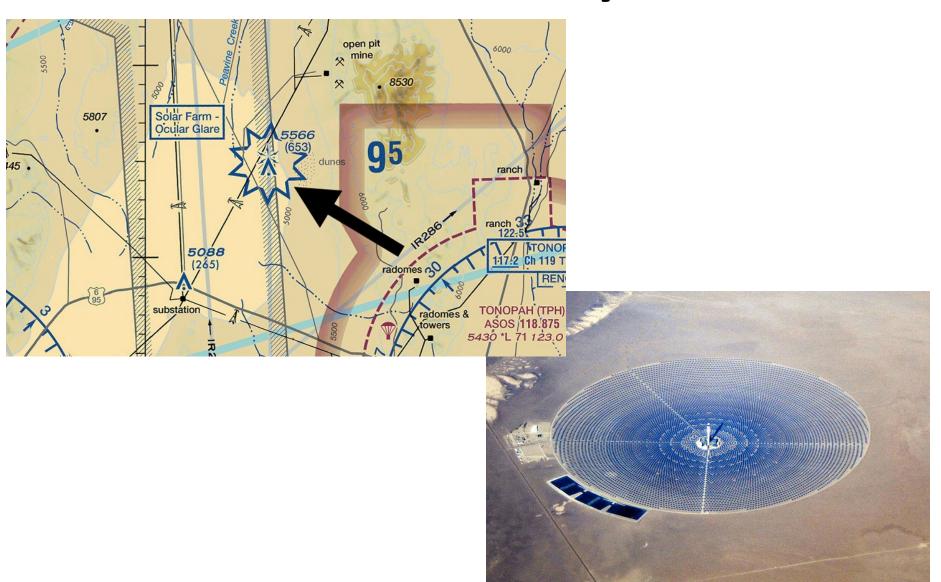
Sectional Chart Symbols

OBSTRUCTIONS
(may be lit or unlit)

1000 ft and higher AGL

Above 200 ft & below 1000 ft AGL (above 299 ft AGL in urban area)

Obstruction with high-intensity lights; may operate part-time

Wind Turbine

Group Obstruction

Wind Turbine Farm

2894 UC

Elevation of the top above mean sea level → 2049

Height above ground → (1149)

Under construction or reported: position and elevation unverified → UC

NOTICE: Guy wires may extend outward from structures.

Sectional Chart Symbols

Sample Test Question

The most comprehensive information on the Waterloo airport is provided by:

1) Chart Supplements U.S.

2) Notice to Air Missions (NOTAMs)

3) Terminal Area Chart (TAC)

Sample Test Question

The most comprehensive information on the Waterloo airport is provided by:

    1) **Chart Supplements U.S.**

    2) Notice to Air Missions (NOTAMs)
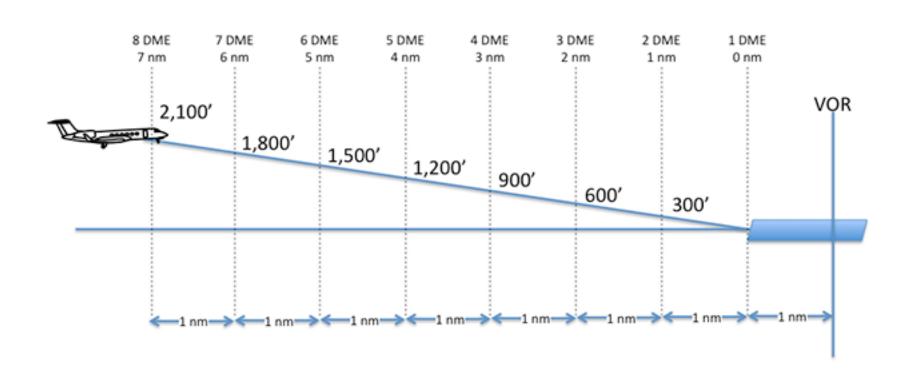
    3) Terminal Area Chart (TAC)
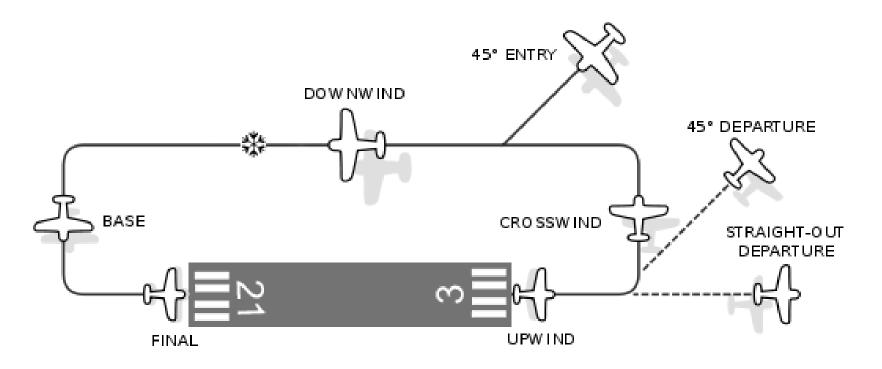
Aircraft Altitude (AGL) on Approach to Runway

Standard Airport Traffic Pattern
for uncontrolled airports

There are five different legs of the traffic pattern: Upwind, Crosswind, Downwind, Base and Final.

Sample Test Question

When flying near the Independence Iowa Airport, what direction will landing aircraft approach from?

1) Northwest
2) Southwest
3) Northeast

Sample Test Question

When flying near the Independence Iowa Airport, what direction will landing aircraft approach from?

1) **Northwest**
2) Southwest
3) Northeast

Sample Test Question

You are listening on a Common Traffic Advisory Frequency (CTAF) and an aircraft announces, *"left downwind for runway two six".* What is the aircraft's current heading?

1) 80 degrees
2) 160 degrees
3) 260 degrees

Sample Test Question

You are listening on a Common Traffic Advisory Frequency (CTAF) and an aircraft announces, *"left downwind for runway two six".* What is the aircraft's current heading?

1) **80 degrees**
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3) 260 degrees

Sample Test Question

While monitoring Cooperstown Common Traffic Advisory Frequency (CTAF) an aircraft announces, *"left midway downwind to runway one three".* Where is the aircraft located relative to the runway? (Figure 26, area 2)

1) The aircraft is East

2) The aircraft is South

3) The aircraft is West

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While monitoring Cooperstown Common Traffic Advisory Frequency (CTAF) an aircraft announces, *"left midway downwind to runway one three".* Where is the aircraft located relative to the runway? (Figure 26, area 2)

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Sample Test Question

While monitoring the Common Traffic Advisory Frequency (CTAF) an ATC issues an advisory to a manned aircraft flying north, *"unmanned aircraft activity at 9 o'clock, 2 miles"*. Where should the Remote Pilot look for the aircraft?

1) The aircraft is East
2) The aircraft is South
3) The aircraft is West

Sample Test Question

While monitoring the Common Traffic Advisory Frequency (CTAF) an ATC issues an advisory to a manned aircraft flying north, *"unmanned aircraft activity at 9 o'clock, 2 miles"*. Where should the Remote Pilot look for the aircraft?

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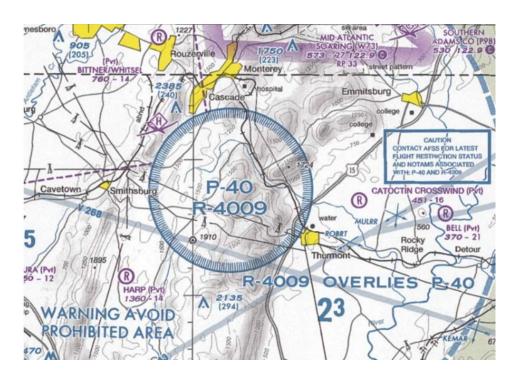
Two types of Airspace

- **Regulatory** – FAA rules apply
  - Class A, B, C, D, and E
  - Restricted
  - Prohibited
- **Non-Regulatory** – areas <u>outside FAA control</u> used by the military or over the ocean
  - Military operations area (MOA)
  - Warning Areas
  - Alert Areas
  - Controlled Firing Areas

Special Areas

‖‖‖‖‖‖‖‖‖‖‖‖‖	Prohibited, Restricted, and Warning Areas
‖‖‖‖‖‖‖‖‖‖‖‖‖	*Alert Area and Military Operations Area (MOA)

*Alert Areas do not extend into Class A, B, C and D airspace, or Class E airport surface areas.

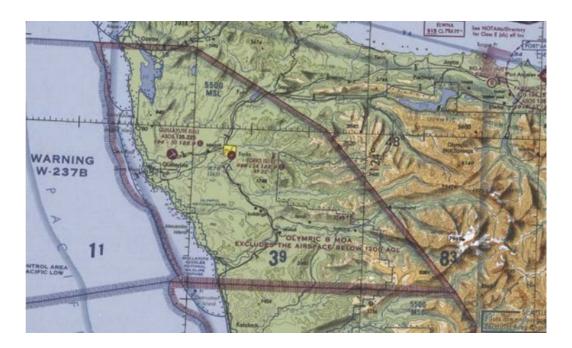|	
/////	Special Airport Traffic Area (See FAR 93 for details.)
/////	National Defense Airspace Temporary Flight Restriction Area
∙∙∙∙∙∙∙∙∙∙∙∙∙	ADIZ - Air Defense Identification Zone
▬▬▬▬▬	MODE C (See FAR 91.215/AIM.)
▬ ▬	National Security Area
▬▬▬▬▬	Terminal Radar Service Area (TRSA)
← IR211	MTR - Military Training Route

Special Use Airspace (SUAS)

Prohibited Area – charted as a "P" followed by a number (e.g., P-49) and a blue hatched line. Examples of include Camp David and the National Mall in Washington, D.C. Drone flights are always prohibited.
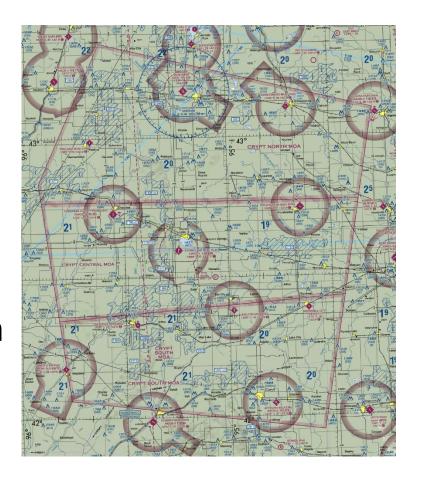
Special Use Airspace (SUAS)

Restricted – charted with an "R" followed by a number (e.g., R-6901) and a blue hatch line. Restricted airspace is usually a military base or facility, and drone flights are prohibited unless approved by the controlling military command.

Special Use Airspace (SUAS)

Warning Area – designated with a "W" followed by a number (e.g., W-237) and a magenta hatched line is only found 3 NM offshore in US and international waters. It's might be cool to fly there but it's hazardous to nonparticipating aircraft..

Special Use Airspace (SUAS)

Military Operation Area (MOA) – depicted on sectional charts in magenta with a name (e.g., "CRYPT MOA"). MOAs are not restricted but require extra caution as military operations may take place in the area. For activity, altitude, time of use contact the controlling agency.

Military aircraft may fly at airspeeds in excess of 250 knots below 10,000 feet MSL within active MOAs.

CRYPT MOA in Iowa

The **CRYPT MOA** covers much of NW and Central Iowa. It's divided into 3 sections and has a floor of 8000 feet MSL.

Controlling Agency: Iowa Air National Guard, 133rd Air Control Squadron (ACS), Fort Dodge, IA

Special Use Airspace (SUAS)

Alert – depicted on aeronautical charts with an "A" followed by a number (e.g., A-211) and a magenta hatched line. May contain pilot training or an unusual type of aerial activity. Pilots should exercise caution in alert areas.

Special Use Airspace (SUAS)

Controlled firing areas (CFA) – CFA include rocket testing, ordinance disposal, small arms fire, chemical disposal, static testing of rockets and blasting.
* They are never found in NOTAMs
* There are no dimensions
* They are not charted
* There is no controlling agency to contact

CFA activities are suspended when a spotter aircraft, radar or ground lookout indicates an aircraft is approaching the area.

Drone pilots are not allowed in CFA. They are usually fenced and/or posted "No Trespassing – Keep Out"

Special Area Of Operation (SAO)

Military Training Route (MTR) – routes used by military aircraft to maintain proficiency in tactical flying. VFR sectional charts depict IR and VR areas. Routes are identified in gray as IFR (IR), and VFR (VR), followed by a number.

- MTRs with no segment above 1,500 feet AGL are identified by four number characters (e.g., IR1206, VR1207).
- MTRs that include one or more segments above 1,500 feet AGL are identified by three number characters (e.g., IR206, VR207.

Sample Test Question

A Sectional Chart shows a gray line with *"VR1642 and VR1678"*. Could these areas present a hazard for small UAS operations?

1) No, all operations will be above 400 feet.

2) Yes, these are military training routes with a least one segment below 1500 feet AGL.

3) Yes, military training routes are used to separate civilian air traffic from military air traffic.

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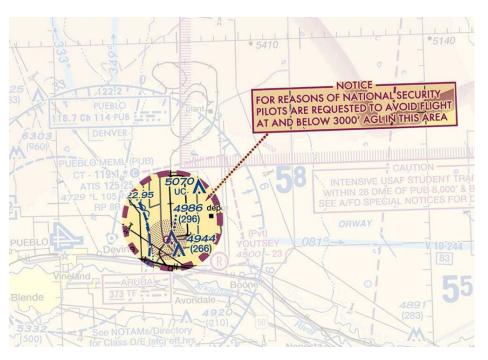
Special Area Of Operation (SAO)

- **Temporary Flight Restriction (TFR) –** A Notice to Missions (NOTAM) is issued to designate a TFR.
- **Charted VFR Flyways–** for transitioning around, under, or through some complex airspace. These routes are generally found on VFR Terminal Area Charts.
- **Terminal Radar Service Areas (TRSA) –** areas with additional radar services. The purpose is to provide separation between IFR operations and VFR aircraft.

Special Area Of Operation (SAO)

National Security Areas (NSA) – NSAs are delimited by a **heavy dashed magenta border** and a special notation. An NSA airspace needs increased security of ground facilities. Pilots are requested to voluntarily avoid flying through these areas

RADIO AIDS TO NAVIGATION

⬡ VHF OMNI RANGE (VOR)

⬡ VOR-DME   ☐ DME

⬡ VORTAC

☉ Other facilities, i.e., FSS Outlet, RCO, WX CAM (AK) (see Supplement), etc.

☉ Non-Directional Radio Beacon (NDB)

☉ NDB - DME

VOR – VHF Omni Range – directional radio – gives pilot the heading to the VOR station – being phased out in favor of GPS

DME – Distance Measuring Equipment – indicates distance to DME station

VORTAC – VOR + TACAN (tactical air navigation system) – military DME system

NDB – non-directional radio beacon

RCO – Remote communications outlets relay communications to Flight Service Station (FSS)

3 Levels of Air Traffic Control
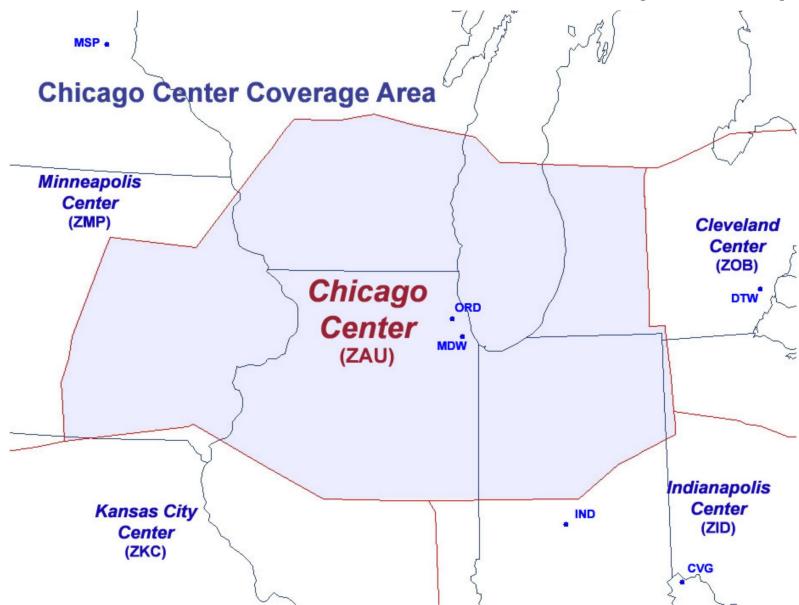
AIR TRAFFIC CONTROL TOWER (ATC)...

TERMINAL RADAR APPROACH CONTROL (TRACON)...

EN-ROUTE CENTERS...

EN-ROUTE CENTERS

Air Route Traffic Control Center (ARTCC) or EN-ROUTE CENTERS... 24 centers across the country in locations away from airports. They control traffic above 17,000 feet over several states. These controllers give aircraft instructions, air traffic clearances and flight conditions during the en-route portions of flights.

Air Route Traffic Control Center (ARTCC)

MSP

Chicago Center Coverage Area

Minneapolis Center (ZMP)

Cleveland Center (ZOB)

DTW

Chicago Center (ZAU)

ORD

MDW

Kansas City Center (ZKC)

IND

Indianapolis Center (ZID)

CVG

TERMINAL RADAR APPROACH CONTROL (TRACON)

TERMINAL RADAR APPROACH CONTROL (TRACON)...the radar rooms, usually in airport towers. Controllers are responsible for the safe separation and movement of aircraft departing, landing, and maneuvering in the airport environment. Working in radar rooms, these controllers use radar to direct aircraft until they reach the edge of the facility's airspace, usually about 20 to 50 miles from the airport and below 17,000 feet.

AIR TRAFFIC CONTROL TOWER (ATC)

AIR TRAFFIC CONTROL TOWER (ATC)... the glassed-in towers at airports. ATC controllers manage traffic from the airport to a radius of 3 to 30 miles out. They give pilots taxiing and take off instructions, and air traffic clearance. They provide separation between landing and departing aircraft, transfer control of aircraft to the TRACON or En-Route center controllers when the aircraft leave their airspace and receive control of aircraft on flights coming into their airspace.

Air Traffic Control Tower (ATC)

A tower controller's primary responsibility is to separate traffic on the runway. Aircraft in the air must not rely on controllers for separation. Pilots are always responsible to <u>see-and-avoid</u> other aircraft. The smaller the aircraft is, the harder it is to see.

Drones, because of their extremely small size are nearly impossible for pilots in the air to see-and-avoid.

Low Altitude Authorization and Notification Capability (LAANC)

LAANC (pronounced "LANCE") enables drone pilots to fly in controlled airspace near airports through real-time processing of **airspace authorizations** below approved maximum altitudes in controlled airspace.
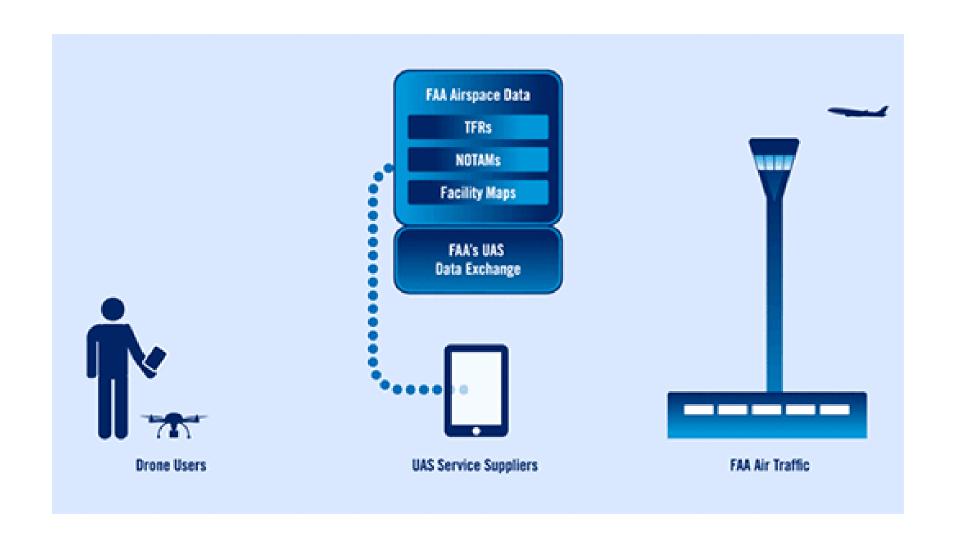
FAA approved UAS Service Suppliers (USS) provide access to the LAANC capability.

Airspace Authorization

An **airspace authorization** grants a recreational or Part 107 pilot <u>permission to fly</u> in controlled airspace at a specific time and location.

LAANC Process

Unmanned air traffic management (UTM or U-space)

The FAA rolled out the LAANC system in 2018, in partnership with commercial UAS service suppliers.

LAANC is now available at 732 airports.

LAANC is available to both Recreational and Part 107 commercial drone pilots.

The LAANC authorizations are usually processed in less than a minute.

LAANC Authorizations

Both **Part 107 Pilots** and **Recreational Flyers** can receive a real-time authorization for operations up to 400 feet in controlled airspace around airports. Unless specifically requested in an authorization, drone pilots do not need to notify the tower before they fly.
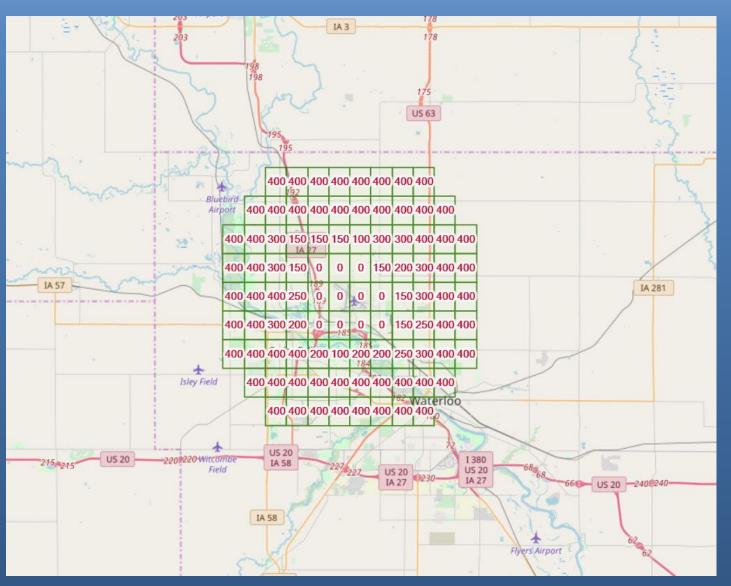
- **Recreational Flyers** cannot request airspace authorizations that exceed the normal limits.

- **Part 107 Pilots** – can submit a "further coordination request" if you need to fly above the designated altitude ceiling in a UAS Facility Map, but not above 400 feet. You can apply up to 90 days in advance of a flight and the approval is coordinated manually through the FAA.
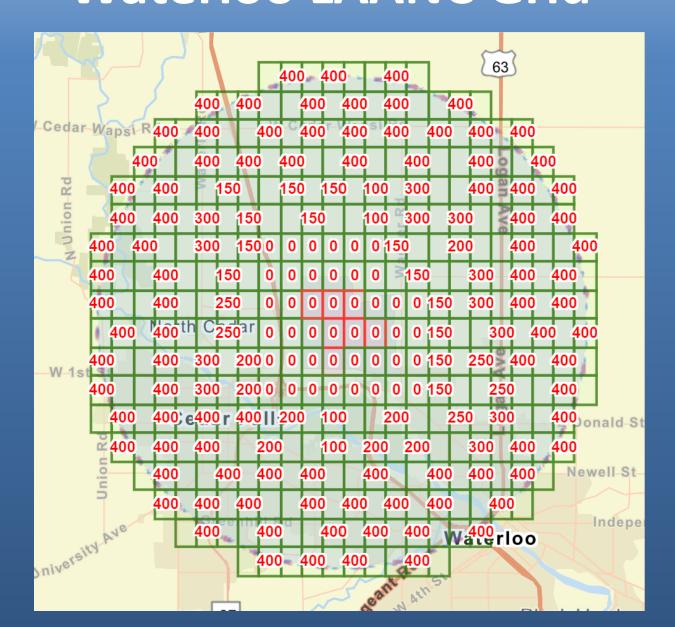
Companies Providing Public LAANC Services

Approved Service Supplier	Part 107 Near — Real Time Authorization	Part 107 Further Coordination	Exception for Recreational Flying/Section 44809	App on IOS	App on Android	Desktop
AirMatrix	✓	✓	✓			✓
Airspace Link	✓	✓	✓	✓	✓	✓
Aloft	✓	✓	✓	✓	✓	✓
AstraUTM	✓	✓	✓	✓	✓	
AutoPylot	✓		✓	✓	✓	✓
Avision	✓	✓	✓	✓	✓	✓
eTT Aviation	✓	✓	✓			✓
FlightReady	✓	✓	✓	✓		
UASidekick	✓	✓	✓	✓	✓	✓
Wing	✓		✓	✓	✓	

LAANC
CONNECTED

Waterloo LAANC Area

Waterloo LAANC Grid

Waterloo LAANC Grid

Newton LAANC Grid

Newton airport with Class E lateral surface airspace.

Waterloo Airspace

Waterloo Airspace

The 5-mile perimeter around Waterloo Municipal Airport is highlighted. Isley Field and Waterloo Airport are shown in **RED** and hospital heliports are shown in **GREEN**

The Black Hawk R/C Pilots FRIA zone near New Hartford

B4UFLY desktop link

https://b4ufly.aloft.ai/

https://www.uasidekick.app/

LAANC Rules for Recreational Pilots

- Follow all 49 USC §44809 rules for Recreational flyers.

- Check the airspace prior to flying and comply with all restrictions.

- Comply with all Notice to Air Missions (NOTAMs)

- Authorization does not constitute a waiver of any state law or local ordinance.

- Each authorization corresponds to a single operator controlling at most one aircraft at a time.

49 USC §44809 rules for Recreational flyers

(USC §44809) is the law that describes how, when, and where you can fly drones for recreational purpose

- Fly only for recreational purposes (personal enjoyment).
- Follow the safety guidelines of an FAA-recognized Community Based Organization (CBO) such as the Academy of Model Aeronautics
- Keep your drone within the visual line of sight (VLOS) or use a visual observer (VO) who is co-located (physically next to) and in direct communication with you.
- Give way to and do not interfere with manned aircraft.
- Fly at or below FAA-authorized altitudes in controlled airspace (Class B, C, D and surface Class E designated for an airport) only with prior FAA authorization by using LAANC. Authorized altitudes are absolute and shall not increased when flying over structures.

49 USC §44809 rules for Recreational flyers

(USC §44809) is the law that describes how, when, and where you can fly drones for recreational purpose

- Fly at or below 400 feet in Class G (uncontrolled) airspace. *Note: Anyone flying a drone in the U.S. National Airspace System (NAS) is responsible for flying within the FAA guidelines and regulations. That means it is up to you as a drone pilot to know the rules.*

- Take The Recreational UAS Safety Test (TRUST) and carry proof of test passage when flying.

- Carry your current FAA registration card and mark your drones on the outside with the registration number. Broadcast Remote ID information (unless flown within a FRIA).

- Do not operate your drone in a manner that endangers the safety of the national airspace system.

LAANC Authorization

- Submit your request for Authorization online.
- Pilot will be available at listed cell phone during the flight per FAA regulations.
- Prior to the flight, the Pilot will check for any NOTAM and TFR restrictions for the flight area and check for Special Use Areas (SUA).
- Pilot has read and understands the FAA data collection, privacy statement, and submission requirements.
- By submitting a request, you are agreeing to the Terms and Conditions as well as the Privacy Policy of your UAS Service Supplier (USS).

Authorization Confirmation

UASidekick: Flight Submitted - SDKUEMZZDG80 / ALO

From UASidekick NOTICE <NOTICE@UASidekick.com>
Date Wed 11/6/2024 1:17 PM
To nealleeper@gmail.com <nealleeper@gmail.com>

Recreational LAANC Application

§44809

Status: Approved (authorized to fly)

FAA Reference Code: **SDKUEMZZDG80 (ALO)**

NOTICE

Check for any NOTAM and TFR restrictions for your flight area prior to flight operations. Search NOTAMs at https://notams.aim.faa.gov/notamSearch/. For the latest TFR information, go to https://tfr.faa.gov. For the latest SUA schedule information, go to https://sua.faa.gov

Pilot: Neal Leeper
Email: nealleeper@gmail.com
Phone: 3198302338
Flight Type: Recreational
Maximum Altitude: 400'
Start: 2024-11-06T19:20:00Z
Duration: 15 minutes
End: 2024-11-06T19:35:00Z
Notes: Test flight

Warnings

No warnings

AUTHORIZATION TERMS

SDKUEMZZDG80 / ALO, START: 2024-11-06T19:20:00Z, END: 2024-11-06T19:35:00Z, MAX ALT: 400: In accordance with 49 U.S.C. § 44809(a)(5), your operation is authorized within the designated airspace and timeframe constraints. Altitude limits are absolute values above ground level which shall not be added to the height of any structures. This Authorization is subject to cancellation at any time upon notice by the FAA Administrator or his/her authorized representative. This Authorization does not constitute a waiver of any State law or local ordinance. Neal Leeper (nealleeper@gmail.com, 3198302338) is the person designated as responsible for the overall safety of UAS operations under this Authorization. During UAS operations for on-site communication/recall, Neal Leeper (nealleeper@gmail.com, 3198302338) shall be continuously available for direct contact at 3198302338 by Air Traffic. Neal Leeper (nealleeper@gmail.com, 3198302338) is responsible to check the airspace in which the UAS will be operated and comply with all restrictions that may be present in accordance with § 44809(a)(5), such as restricted and prohibited airspace, night operations, temporary flight restrictions, etc. This authorization is subject to the following conditions: (1) operations are not authorized in Class E surface area airspace when there is a weather ceiling less than 1,000 feet AGL; (2) if the UAS loses communications or loses its GPS signal, it must return to a predetermined location within the operating area and land; (3) night operations are only permitted if the operator has completed FAA training/testing and lighted their sUAS with anticollision lighting visible for at least 3 statute miles that has a flash rate sufficient to avoid a collision. and (4) the person manipulating the controls of the UAS must abort the flight in the event of unpredicted obstacles or emergencies. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.

NOTE

Only portions of the flight time that are within active class airspace are submitted to LAANC for authorization. If part of your flight time is outside of time when an airspace is active, that portion of the flight time was not submitted to LAANC for authorization.

Airport Authorities/Class Airspace/Facility Maps

Waterloo Rgnl (KALO): Eligible for automatic approval, Class: D; LAANC ready, Effective 10/31/2024, Last edited 10/11/2017, Ceiling: 400' (UASFM FAA ID c929cce4-c1e5-4996-99b1-194b55d009bb)
Eligible for automatic approval, Class: D; LAANC ready, Effective 10/31/2024, Last edited 10/11/2017, Ceiling: 400' (UASFM FAA ID 4fa14edc-34f1-4383-96dc-be70e6d5ba0c)
Eligible for automatic approval, Class: D; LAANC ready, Effective 10/31/2024, Last edited 10/11/2017, Ceiling: 400' (UASFM FAA ID 16855b56-957a-48fc-aee6-c200da8545f0)
Eligible for automatic approval, Class: D; LAANC ready, Effective 10/31/2024, Last edited 10/11/2017, Ceiling: 400' (UASFM FAA ID 83916bf5-0fc7-4725-943c-9f80b2e6b4b3)

UASidekick is a provider of UAS services within the FAA's Low-Altitude Authorization and Notification Capability (LAANC). LAANC may be used to satisfy compliance with Air Traffic authorization. Information provided here is based on real-time and available projected information on airspace status

and airport-specific maps, and that information is subject to change. Planning tools should be checked prior to flight for any changes that could impact the operation.

Map Layers: ⑦

Notify and Fly

This layer displays active flight volumes of other recreational, commercial, and government / law enforcement drone pilots who have shared their flight intent to aid in the total situational awareness of all pilots in the area.

Temporary Flight Restrictions

This layer displays TFRs for areas restricted to flight due to a hazardous condition, a special event, or a general warning for the airspace.

This layer will display a yellow (warning) state for upcoming TFRs, and switch to a red (restricted) state for active TFRs.

Special Use Airspace

This layer displays areas where drones and other aircraft are not permitted to fly without special permission.

National Security UAS Flight Restrictions

This layer displays security-sensitive restrictions that prohibit drones from flying over designated national security-sensitive facilities.

Special Air Traffic Rules

Part 93 sites, including the Washington DC Special Flight Rules Area (SFRA) and Flight Restriction Zone (FRZ), where drone flights are prohibited.

Stadiums

This layer displays the corresponding radius of stadiums where flights would be restricted during Major League Baseball, National Football League, NCAA, and motor speedway events.

Note: TFRs will also be in effect for these areas when events are active.

Controlled Airspace

This layer displays different classifications of airspace and defined dimensions within which air traffic control (ATC) service is provided in accordance with the airspace classification.

Note: Operations in Class B, C, D, and E airspace are allowed with the required permission/ authorization such as LAANC.

Airports

This layer displays areas on land or water intended to be used either wholly or in part for the arrival, departure, and surface movement of aircraft/ helicopters.

Note: Not all airports are controlled or towered, but extreme caution should be used in these areas.

National Parks

This layer displays National Parks that have been classified as "no drone" zones after 2014. Flying here could incur stiff fines and penalties.

Note: Local or state parks and such may have their own takeoff/landing restrictions, regardless of the airspace above.

Local Advisories

This layer provides localized situational awareness to aid in a safe and compliant flight with information about local regulations, operational advisories, and airspace activity.

Geo Portal Advisories

This layer provides localized situational awareness to aid in a safe and compliant flight with information about local regulations, operational advisories, and airspace activity.

Map Styles:

Restore defaults

Air Control Light

Offers the greatest contrast for airspace planning.

Air Control Terrain

Features elevation and contour details for flight planning

Satellite

Map style displayed in satellite view

Iowa Airports with LAANC Service

CODE	AIRPORT	CITY
ALO	Waterloo Regional	WATERLOO
AMW	Ames Muni	AMES
BRL	Southeast Iowa Regional	BURLINGTON
CID	The Eastern Iowa	CEDAR RAPIDS
CWI	Clinton Muni	CLINTON
DSM	Des Moines Intl	DES MOINES
DVN	Davenport Muni	DAVENPORT
FOD	Fort Dodge Regional	FORT DODGE
IKV	Ankeny Regional	ANKENY
MCW	Mason City Muni E	MASON CITY
MUT	Muscatine Muni	MUSCATINE
OTM	Ottumwa Regional	OTTUMWA
SLB	Storm Lake Muni	STORM LAKE
SPW	Spencer Muni	SPENCER
SUX	Sioux Gateway/Col Bud Day Fld	SIOUX CITY
TNU	Newton Muni-Earl Johnson Fld	NEWTON

Sample Test Question

A drone can fly near airports in Class G airspace if this rule is followed:

1) No permission is required, but you cannot interfere with the airport operations.

2) The local airport operator must be contacted.

3) The local airport operator must give permission to fly nearby.

Sample Test Question

A drone can fly near airports in Class G airspace if this rule is followed:

1) **No permission is required, but you cannot interfere with the airport operations.**

2) The local airport operator must be contacted.

3) The local airport operator must give permission to fly nearby.

Authorization vs Waiver

The difference between an FAA authorization and a waiver is that an authorization is associated with <u>controlled airspace</u>, while a waiver is associated with <u>operations</u>.

- An **airspace authorization** grants a recreational or Part 107 pilot <u>permission to fly</u> in controlled airspace at a specific time and location.

- A **waiver** grants a Part 107 pilot permission to <u>deviate from the rules</u> at a specific time and location.