



[← PREVIOUS](#)
Drone Operations

[NEXT >](#)
Weather for Drone Pilots

How to Read a Sectional Chart for Drone Pilots

Knowing how to read a sectional chart is really important for drone pilots that want to pass the Part 107 test and it is probably more applicable to your actual flying than you might think. I would estimate that somewhere between 30% and 40% of the questions I answered on my most recent [Part 107 renewal](#) included reference to a sectional.

Here's my disclaimer: ***This may be the single most important section in this entire series.***

There's just no way around it. You really need to know how to read a sectional chart to do well on the Part 107 exam or renewal. Not all of the symbols on the sectional are as important as the others. The most important symbols are going to be those involving obstructions, airports, and symbols that will mean higher levels of manned air traffic. I'll cover those first and get the remaining symbols after that.

The first step in learning how to read a sectional chart is studying the sectional legend, pictured below. We will go through the images in the legend in this article but keep in mind that you will get a copy of the sectional legend during your test. Actually, you will get a copy of [FAA-CT-8080-2H](#), which includes a sectional legend. USE IT. Refer to it on every question that uses a sectional chart even if you are sure of the answer. These are easy points.

SECTIONAL AERONAUTICAL CHART

SCALE 1:500,000

LEGEND Airports having **Control Towers** are shown in **Blue**, all others in **Magenta**. Consult Airport/Facility Directory (A/FD) for details involving airport lighting, navigation aids, and services. For additional symbol information refer to the Chart User's Guide.

AIRPORTS	AIRPORT DATA	AIRPORT TRAFFIC SERVICE AND AIRSPACE INFORMATION	TOPOGRAPHIC INFORMATION
<p>Other than hard-surfaced runways Seaplane Base </p> <p>Hard-surfaced runways 1500 ft. to 8069 ft. in length </p> <p>Hard-surfaced runways greater than 8069 ft., or same multiple runways less than 8069 ft. </p> <p>Open dot within hard-surfaced runway configuration indicates approximate VOR, VOR-DME, or VORTAC location. </p> <p>All recognizable hard-surfaced runways, including those closed, are shown for visual identification. Airports may be public or private</p> <p>ADDITIONAL AIRPORT INFORMATION</p> <p> Private ("Pvt") - Nos-public use having emergency or landmark value.</p> <p> Military - Other than hard-surfaced. All military airports are identified by abbreviations AFB, NAS, AAF, etc. For complete airport information consult DOD FLIP.</p> <p> Heliport Selected Unverifield Abandoned-paved, having landmark value, 3000 ft. or greater Ultralight Flight Park Selected</p> <p>Services-fuel available and field attended during normal working hours depicted by use of ticks around basic airport symbol. (Normal working hours are Mon thru Fri 10:00 A.M. to 4:00 P.M. local time. Consult A/FD for service availability at airports with hard-surfaced runways greater than 8069 ft.)</p> <p>★ Rotating airport beacon in operation Sunset to Sunrise</p>	<p>Box indicators FAR 93 Special Air Traffic Rules & Airport Traffic Patterns</p> <p>FSS NO SVFR FAR 91 Location Identifier</p> <p>[NAME](NAM)(PNAM)</p> <p>CT - 118.3 ATIS 123.8</p> <p>285 L 72 122.95 RP 23, 34 VFR Advy 125.0 AOC UNICOM</p> <p>ICAO Location Identifier shown outside contiguous U.S.</p> <p>FSS - Flight Service Station NO SVFR - Fixed wing special VFR flight is prohibited. CT - 118.3 - Control Tower (CT) primary frequency * - Star indicates operation part-time (see tower frequencies) tabulation for hours of operation. Ⓞ - Indicates Common Traffic Advisory Frequencies (CTAF) ATIS 123.8 - Automatic Terminal Information Service ASOS/AWOS 125.42 - Automated Surface Weather Observing Systems (shown where full-time ATIS is not available). UNICOM - Aeronautical advisory station VFR Advy - VFR Advisory Service shown where full-time ATIS not available and frequency is other than primary CT frequency.</p> <p>285 - Elevation in feet L - Lighting in operation sunset to sunrise * L - Lighting limitations exist, refer to Airport/Facility Directory. 72 - Length of longest runway in hundreds of feet; usable length may be less.</p> <p>When information is lacking, the respective character is replaced by a dash. Lighting codes refer to runway edge lights and may not represent the longest runway or full length lighting.</p>	<p>Only the controlled and reserved airspace effective below 18,000 ft. MSL are shown on this chart. All times are local.</p> <p>Class B Airspace</p> <p>Class C Airspace (mode C) See FAR 91.215(AIM.)</p> <p>Class D Airspace</p> <p>40 Ceiling of Class D Airspace in hundreds of feet. (A minus ceiling value indicates surface up to but not including that value).</p> <p>Class E (fco) Airspace</p> <p>Class E Airspace with floor 700 ft. above surface.</p> <p>Class E Airspace with floor 1200 ft. or greater above surface that abuts Class G Airspace.</p> <p>2400 MSL Differentiates floors of Class E Airspace greater than 700 ft. above surface. Class E Airspace exists at 1200' AGL unless otherwise designated as shown above. Class E Airspace low altitude Federal Airways are indicated by center line. Intersection - Arrows are directed towards facilities which establish intersection.</p> <p>132° V 69 169</p> <p>Total mileage 169</p> <p>1319 TK313 RNAV (helicopter only) waypoint</p>	<p>Prohibited, Restricted, and Warning Areas; Canadian Advisory, Danger, and Restricted Areas</p> <p>Alert Area and MOA - Military Operations Area</p> <p>Special Airport Traffic Area (See FAR Part 93 for details)</p> <p>ADIZ - Air Defense Identification Zone Mode C (See FAR 91.215(AIM).)</p> <p>National Security Area</p> <p>Terminal Radar Service Area (TRSA)</p> <p>MTR - Military Training Route</p> <p>MISCELLANEOUS</p> <p>-1° E - Isogonic Line (2010 VALUE)</p> <p> Ultralight Activity</p> <p> Hang Glider Activity</p> <p> Glider Operations</p> <p> Unmanned Aircraft Activity</p> <p> Parachute Jumping Area (See Airport/Facility Directory).</p> <p> Marine Light</p> <p>NAME (VPXYZ)</p> <p> VFR Waypoints (See Airport/Facility Directory for latitude/longitude).</p> <p> Roads & Road Markers</p> <p> Railroad</p> <p> Power Transmission Lines</p> <p> Aerial Cable</p> <p> Landmark Feature - stadium, factory, school, golf course, etc.</p> <p> Outdoor Theatre</p> <p> Lookout Tower 618 (Elevation Base of Tower)</p> <p> CG Coast Guard Station</p> <p> Race Track</p> <p> Tank-water, oil or gas</p> <p> Oil Well Water Well</p> <p> Mine or Quarry</p> <p> Mountain Pass 11823 (Elevation of Pass)</p> <p>(Pass symbol does not indicate a recommended route or direction of flight and pass elevation does not indicate a recommended clearance altitude. Hazardous flight conditions may exist within and near mountain passes).</p> <p> Perennial Lake</p> <p> Non-Perennial Lake</p> <p> Dams</p> <p> Bridges and Viaducts</p>
<p>RADIO AIDS TO NAVIGATION</p> <p> VHF OMNI RANGE (VOR)</p> <p> VORTAC</p> <p> VOR-DME</p> <p> Non-Directional Radiobeacon (NDB)</p> <p> NDB-DME</p> <p> Other facilities, i.e., FSS Outlet, RCO, etc.</p>	<p>COMMUNICATION BOXES</p> <p>122.1R 122.6 123.6</p> <p>OAKDALE</p> <p>382 * OAK</p> <p>Underline indicates no voice on this frequency. Cross hatch indicates Shutdown Status</p> <p>• Operates less than continuous or On-Request. ASOS/AWOS</p> <p>A HIWAS</p> <p> FSS radio providing voice communication</p> <p>122.1R MIAMI</p> <p>122.1R CHICAGO CHI</p> <p>Heavy line box indicates Flight Service Station (FSS). Frequencies 121.5, 122.2, 243.0 and 255.4 (Canada - 121.5, 126.7 and 243.0) are available at many FSSs and are not shown above boxes. All other frequencies are shown.</p> <p>Certain FSSs provide Airport Advisory Service, see A/FD.</p> <p>R - Receive Only.</p> <p>Frequencies above this line box are removed to NAVDID site. Other FSS frequencies providing voice communication may be available as determined by a titude and terrain. Consult Airport/Facility Directory for complete information.</p>	<p>OBSTRUCTIONS</p> <p> 1000 ft. and higher AGL</p> <p> below 1000 ft. AGL</p> <p> Group Obstruction</p> <p> Obstruction with high-intensity lights May operate part-time</p> <p> Elevation of the top above mean sea level</p> <p>2049 Height above ground (1149) - Under construction or UC - reported; position and elevation unverified.</p> <p>NOTICE: Guy wires may extend outward from structures.</p>	

Airspace

While I have an entire section of this guide devoted to airspace, this sectional will outline the markings on a sectional chart that show the types of airspace and their altitudes because this is a really important part of learning how to read a sectional chart.



The red arrows in the picture above are pointing to some of the solid blue lines that indicate Class B airspace. And the markings that look like this  show the ceiling (10,000 feet mean sea level) and the floor (down to the surface) of that airspace.

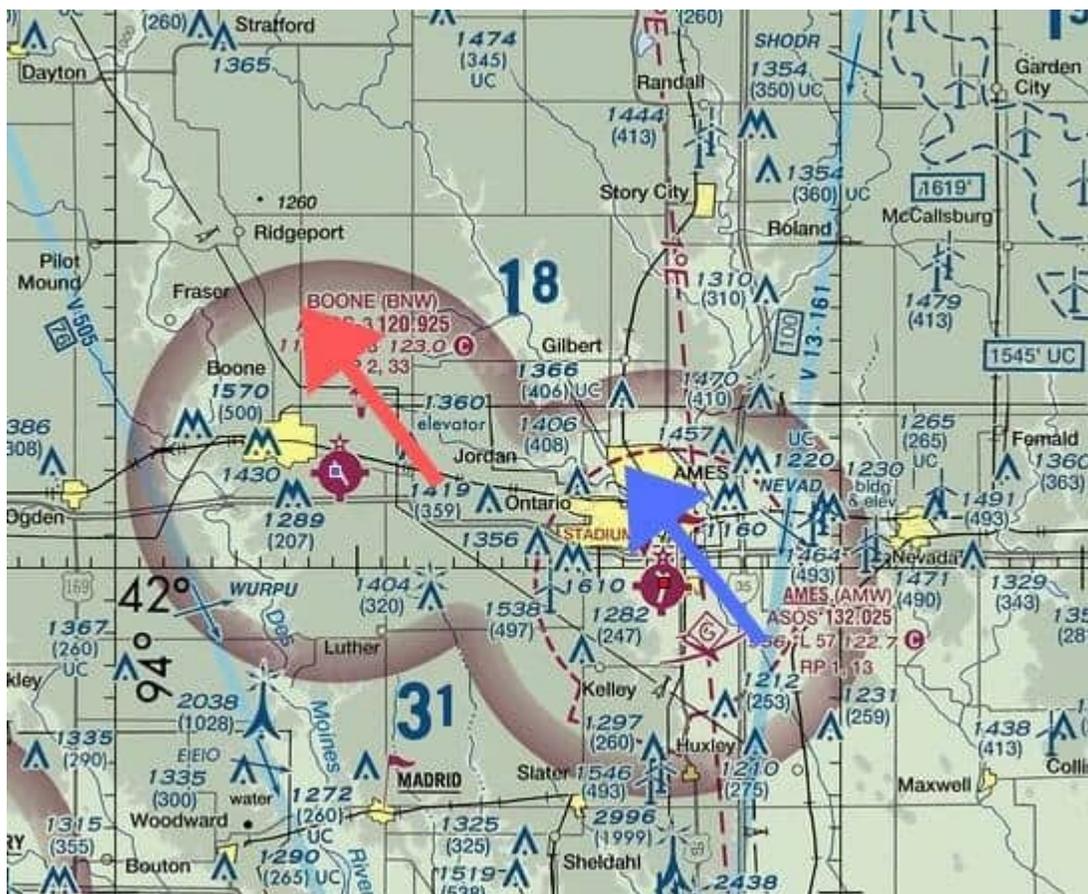


The red arrows in the above picture point to the magenta ring around Indianapolis' international airport, indicating Class C airspace. Again, the  indicates the ceiling and the floor of the airspace within that ring.



The red arrow in this next picture (below) shows an airport surrounded by Class D airspace.

Remember, Class D airspace is indicated by the dashed blue line. Additionally, while Classes B and C have the fraction numbers to indicate the floor and ceiling of the airspace, Class D is a bit different. Class D airspace will begin at the ground and extend upward. The ceiling in Class D airspace is shown by the  symbol, where the number represents the ceiling in hundreds of feet. In this example, the ceiling of the Class D airspace is 3,400 mean sea level (MSL). If you ever see a ceiling symbol with a minus in front of it, this just means that the ceiling is up to *but not including* the number provided.



The above picture here covers two variations of Class E airspace. First, you need to know that Class E airspace is always going to be on a sectional chart using above ground level (AGL) as a measurement instead of mean sea level (MSL). This is different than other airspace types, which typically use MSL. The red arrow is pointing to the faded magenta ring, which represents Class E airspace beginning at 700 feet AGL. The blue arrow is pointing to the dashed magenta ring, which represents that, inside of the ring, Class E airspace goes down to the ground. There is one other way that Class E airspace will show up on a sectional, and it is called Class E enroute airspace. It is not associated with an airport, but it will be shown on a sectional with a faded blue line. While it is important to understand this for the Part 107 knowledge exam, enroute Class E airspace begins at 1,200 feet AGL and will usually not be an issue when flying a drone. Either way, know that it exists.

There are other variations on Class E airspace, but that is covered in more detail in the section on [airspace classifications](#). For purposes of how to read a sectional chart, these three variations cover the ways that Class E airspace will show up.



One final thing to note on airspace. This type of hashed line *does not* indicate any type



of airspace, but will always have something like this at the middle to show manned pilots that there is a navigational aid there. Take a look at the variations of navigational aids on the

sectional legend if you need to. Likewise, the light blue lines show what is called a victor airway. These are routes that manned pilots use between navigational aids and *do not* indicate any type of airspace.



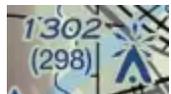
Obstructions & Topographic Information

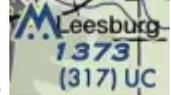
The next type of symbol we will look at are symbols that relate to physical obstructions or points of reference on the ground. As far as obstructions go, there are symbols for objects that are less than

1,000 AGL, which look like this . The top number, in our example 1,153, indicates the object's height above mean sea level. The bottom number in parentheses, in our example 305, indicates the height above the ground. The lower number will always be in parentheses. If there is no lower number, or the letters UC show up, this means that the obstruction is under construction or has been reported but its elevation is unverified. There is no easy way to remember this. Just practice. The good news is that the numbers remain the same on the rest of the obstruction symbols.

For obstructions that are higher than 1,000 AGL, the symbol will look like this . Most of the time though, when towers are above 1,000 AGL, they will have lightning bolts coming out from the top

like this , which just means it has a light. An obstruction that is less than 1,000 AGL can

also be lighted and would look like this .

When there are multiple obstructions grouped together, it will look like this  or this



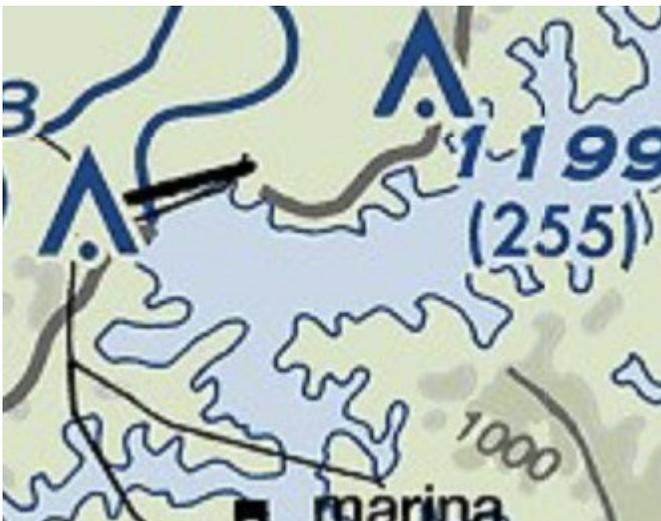
There are also a number of visual points of reference for manned pilots that you should know. These are all pretty self explanatory but I'll go over them briefly here. Double gray lines with a road sign like

this  indicate a larger road or highway and single gray lines with a road sign like this  indicate a

smaller road. These  are power lines. This  is a racetrack. This  is an outdoor theater.

This  is a rock quarry. There are other ground landmarks that show up, like oil wells and water tanks, but these are provided in the sectional legend, and we don't need to see all of them here.

Water features like lakes and rivers also show up. In the picture below, the lake is the light blue section, and the river is the snaking blue line.



Miscellaneous Traffic Symbols

There are a number of symbols that don't really fit into a specific category, other than to say that they

indicate some type of air traffic. This  indicates regular parachute activity, which is certainly

something you'd want to be aware of if you're flying a drone nearby. This magenta flag  indicates a VRF checkpoint, and the black words "BUCKEYE LAKE" provide the name of the checkpoint. These are used by manned pilots as a reference on their way to and from another location, which means that there will be a higher number of VFR pilots flying to/from this location.



Finally, this  indicates glider traffic. If the diamond had a “U” in it, the symbol would indicate ultralight activity. If the diamond had an “H” inside it, the symbol would indicate hang glider activity. If the diamond had “UA” inside it, the symbol would indicate unmanned aircraft activity.

Airports

One thing that holds true for all airport markings. If the airport marking is magenta, it is uncontrolled. If it is blue, it is controlled.



This airport is for public use but has no hard-surfaced runway longer than 1,500 feet.



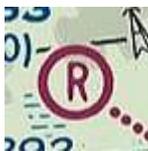
This airport has one hard-surfaced runway that is between 1,500 feet to 8,069 feet in length.



Notice that this airport is not a circle. Each individual outline represents a runway, but the lack of a circle here indicates that this airport has at least one runway that is longer than 8,069 feet in length.



This airport has a lot going on but I’m only going to address one part of this symbol here. We will look at the others below. This symbol is important because of the open dot within the circle. This dot indicated the location of a navigational aid for pilots (either a VOR, VOR-DME, or VORTAC).



This symbol indicates a private airport. If you open up a sectional, you will see this type of airport all over the place. These are really only good for pilots as a landmark or in the event of an emergency.



This indicates that the airport is military and has a runway that is not hard-surfaced.



This is a helipad. Don’t expect any fixed wing aircraft here, but this symbol can be very helpful to make you aware of helicopter traffic in the area. This is way more of a hazard when flying a drone than most fixed wing aircraft.



This indicates that the length of the runway is unverified.



This is an airport that is abandoned. It is just there for its landmark value and to make sure that pilots don't land there.



This indicates an ultralight flight park.



The star on top of this airport indicates that this airport has a rotating beacon that operates from sunset to sunrise. Civilian land airports will have a green and white rotating beacon.



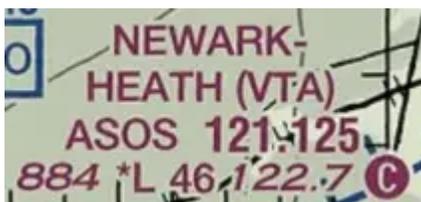
The tick marks coming out of this airport indicate that the airport has fuel service.



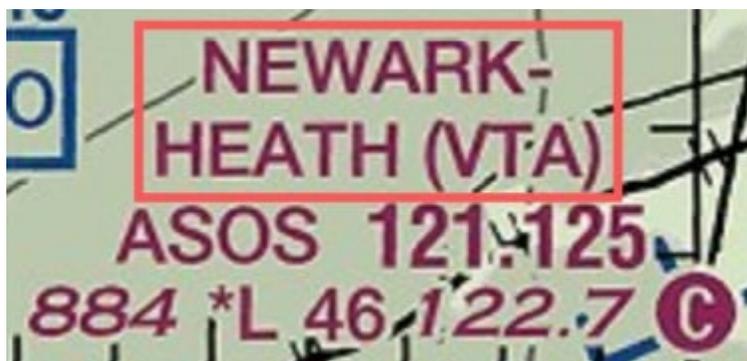
This is a sea plane base.

Airport Data

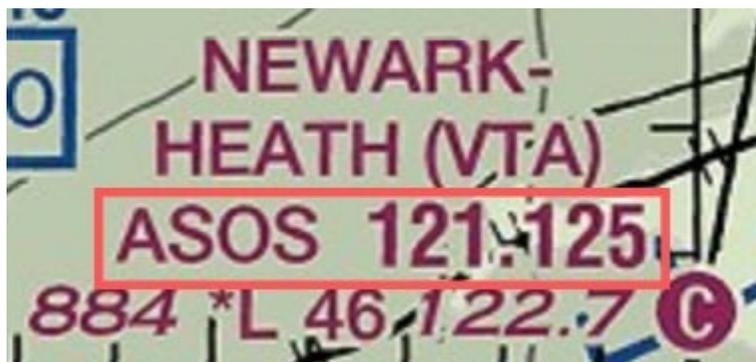
When you see this information on a sectional, it may just look like a jumble of numbers and letters because, sometimes, that's what it is. But, each set of numbers and letters means something, and we're going to review this information here. We will be using this same example for each piece of information.



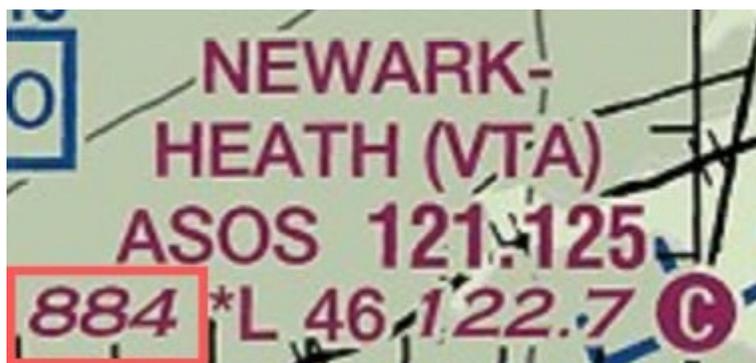
The red rectangle below shows the name of the airport. Here it is "NEWARK HEATH (VTA)". In the United states, each airport has a three digit code. The code for Newark Heath airport is "VTA."



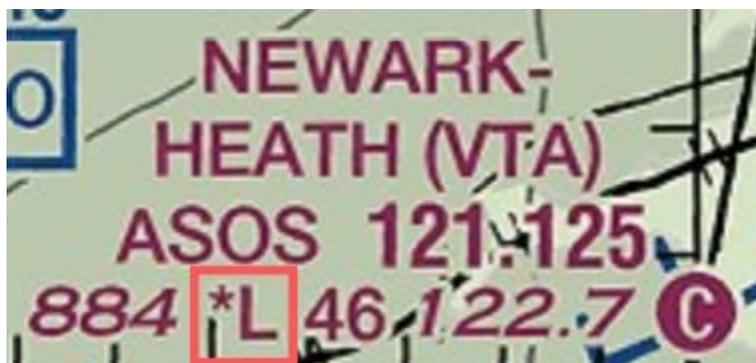
The red rectangle below shows that the airport has an Automated Surface Observing System or ASOS, which can be accessed on frequency 121.125. There's a whole section covering this in more depth dealing with [radio communication](#).



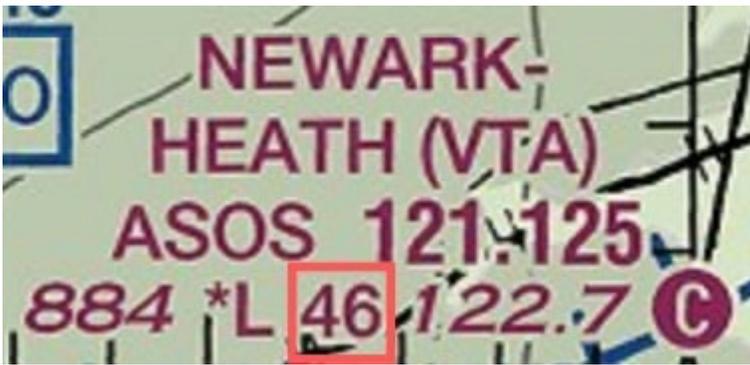
The red rectangle below shows that the airport altitude is 884 feet above mean sea level.



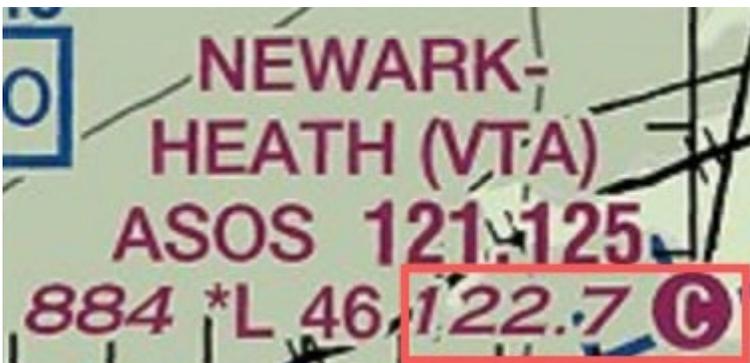
The red rectangle below shows that the airport has lighting, which is the "L," but the asterisk indicates that the lighting has limitations, and you should check an airport facility directory to find out more about the limitation.



The red rectangle below is to show the longest runway in hundreds of feet. So here, "46" indicates that the longest runway is 4,600 feet long.



The red rectangle below tells you the UNICOM frequency, which is 122.7. The C inside a circle indicates that the UNICOM is also the Common Traffic Advisory Frequency or CTAF. For more information on radio frequencies, check out our section on [radio communication](#).



Learning how to read a sectional chart will take some time, mostly because it appears so completely overwhelming at first. But if you study the sectional legend and take your time, you can typically figure out the questions asked on the Part 107 exam.

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