

## An easy way to run a quick "Path Profile"

Often we are faced with the dilemma of what azimuth to point our antennas to hit a specific target, be it a distant station or repeater. This can especially be true when we are setting up away from our home QTH. Additionally, we might be concerned about terrain blocking a line of sight shot. In the old days this could involve large paper maps, special charts, calculations, etc, but today things are a bit easier. So, here is a simple way to run a very basic path profile to determine azimuth, line of sight issues, and distances. At this point we are not concerned with MUF/FOT/LUF charts, signal attenuation, or predicting receive signal levels, we just want some basic physical information.

First, go to <http://www.google.com/earth/explore/products/>. This will take you to the download page for the free version of Google Earth. The Pro version of Google Earth costs money and while it has some nice features, we don't really need them for what we are going to do.

When you have Google Earth installed, take some time to play around with it. In the Tools drop down under Options, you can tweak some of the settings as shown in Figure 1. Note that under the 3D View tab of the Options box you can change coordinate system between Decimal Degree (DD.ddddd°); Degrees, Minutes, Seconds (DD° MM' SS" H); Degrees, Decimal Minutes (DD° MM.mmmm' H); and UTM. The neat thing about this program is regardless of what you choose; it will accept a wide variety of formats and translate automatically. You are only changing how the program expresses the coordinates. For our purposes, it is probably a good idea to select "Feet, Miles" for Units of Measurement.

The more important thing to do is to click on the Navigation tab of the options box and click on "Do not automatically tilt while zooming" as in Figure 2. The auto-tilt feature is more than a bit annoying for what we are doing.

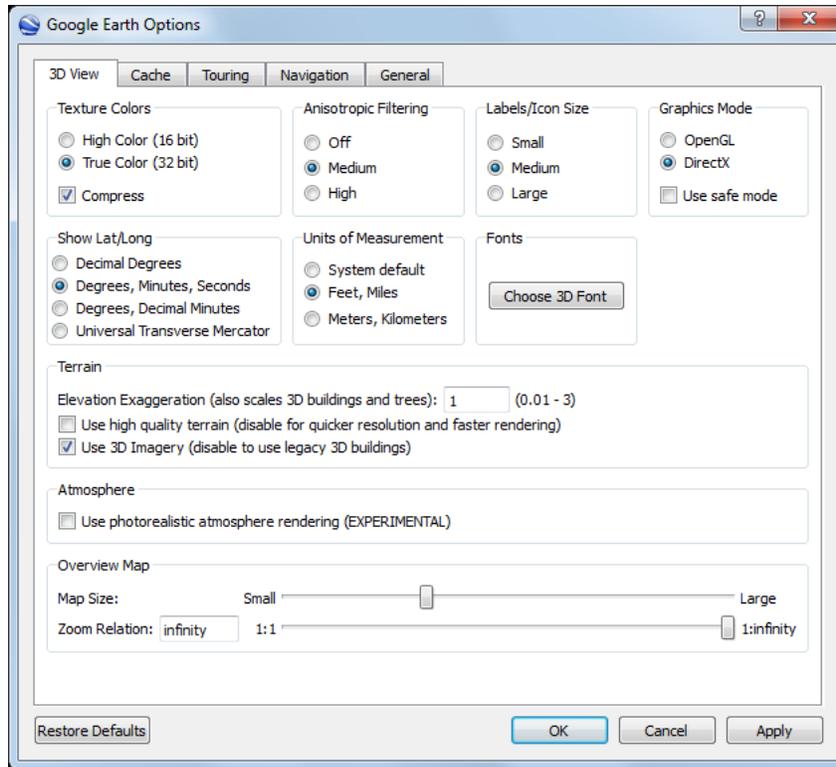


Figure 1, Options 3D View Tab

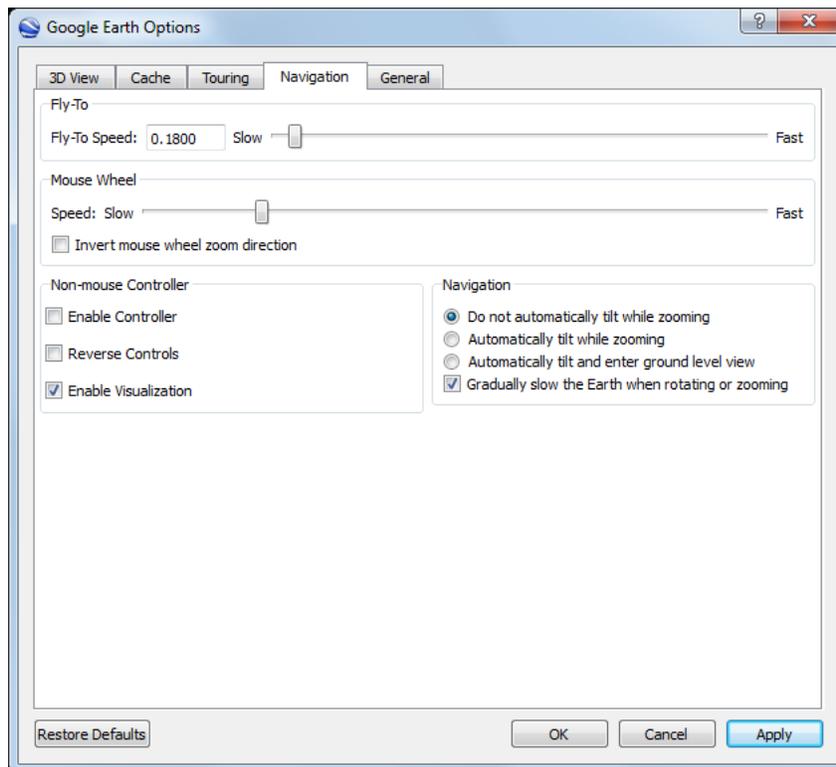


Figure 2, Options Navigation Tab

Once you have played around and found your house and other points of interest, it is time to play with some fun features that will help us out. Let's begin by typing in "1 N Academy Blvd, Colorado Springs, CO" in the Search box in the upper left and clicking the Search button. Your globe should spin and zoom to the intersection of Academy Blvd and Pikes Peak Ave. We are going to tag this location as our imaginary QTH. To do so, look at the top line of icons. You should see what looks like a yellow thumbtack. Click on this button. Now move the resulting icon to the middle of the intersection. Note that with the thumbtack, the sharp point is the anchor, not the center of the icon. In the New Placemark window that opened up, type in "QTH" and save this location.

With that done, let's find a good target. Try "Ellendale, DE" as it is very close to the same latitude as our QTH. Search on it and drop a new placemark at the intersection of the Main St and the railroad tracks. Save the place mark as "Ellendale".

At this time you should have two placemarks in the left "Places" window under My Places. If you double click on "QTH", it should take you back to Colorado Springs. What we are going to do next is to show that this program will do your Great Circle calculations for you. If we were to get a flat map and draw a line from QTH to Ellendale, we would go almost directly due East at 90 degrees. In the program, go up to the top line of icons again, but this time select the one that looks sort of like an old ruler. This should open a small "Ruler" window. Next to "Map Length" you can select your unit of measure – select Miles. Move your crosshairs over the placemark icon and left click once. If you move your cursor around now, you should drag a line around with you. On the left, double click on "Ellendale" to spin to that location. Notice that the program drags the line along behind you. Once again, move your crosshairs over the placemark icon and left click once.

In the Ruler box, it should now tell you that the distance between these two points is about 1,576 miles. More importantly, notice that it says the Heading from QTH to Ellendale is about 81 degrees – not the 90 degrees we would see on a map. So, if you had a beam antenna and you wanted to talk

to someone in Ellendale, you would spin the beam to 81 degrees true (not magnetic).

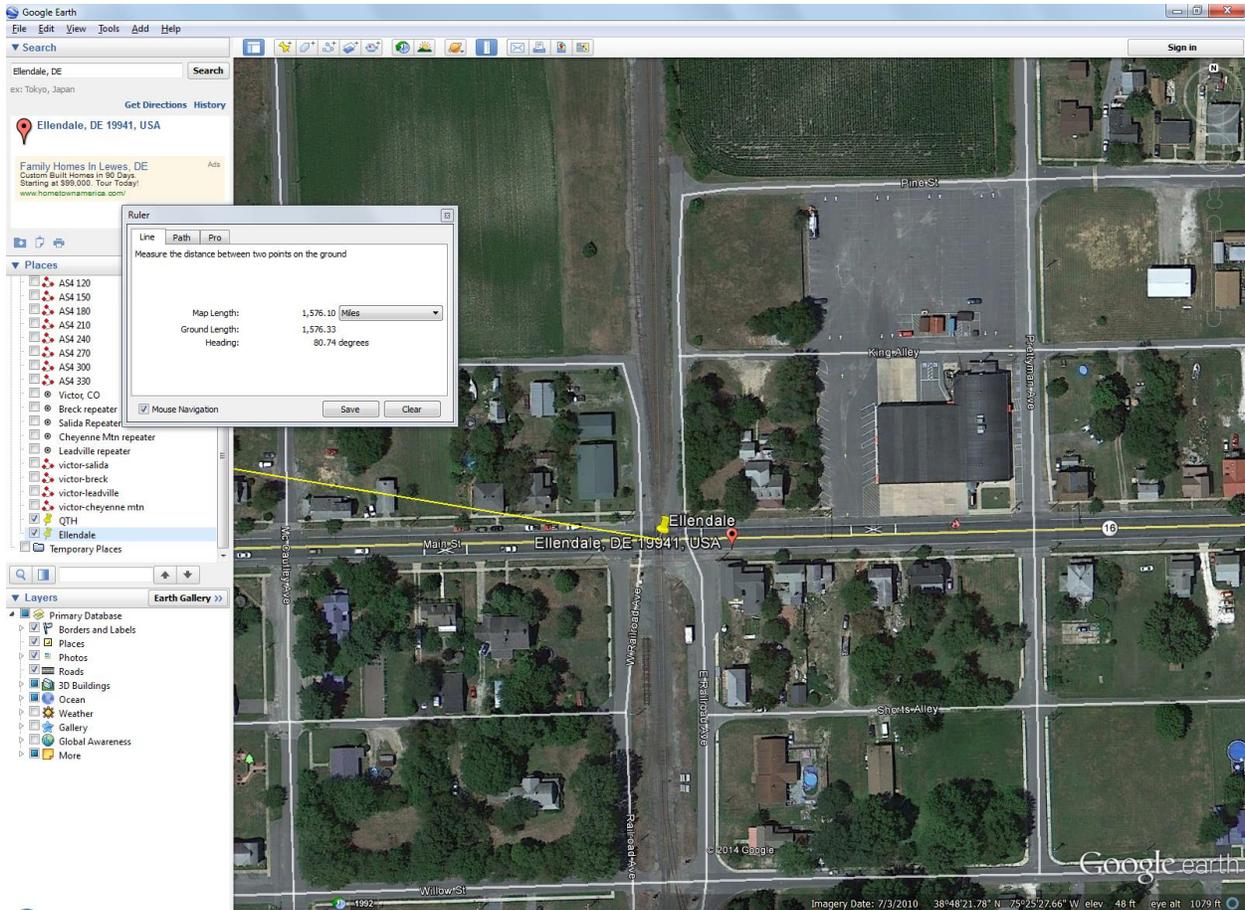


Figure 3, Great Circle Profile, QTH to Ellendale

Now, let's play with some line of sight tools. This time in the Search bar, let's enter some coordinates. We will use  $38^{\circ}53'20.82''N$ ,  $104^{\circ}47'8.06''W$ . When you search on this, it should drop you directly onto the Austin Bluffs/Union Blvd intersection. Go ahead and drop a new placemark here called "Target".

Double click on your QTH placemark on the left to jump back to our starting location and again, click on the Ruler tool icon and single click the crosshairs to start drawing your line. Double click on the new Target placemark to jump to our target location and single click there to stop your line. This

time, select "Save" for the line and call it "QTH - Target". Now, on the left side in Places you should see "QTH - Target" under Temporary Places.

Right click on "QTH - Target" and select "Properties". Then click on the "Altitude" tab and make sure the Altitude says "Clamped to ground" and click OK.

Right click on it again, but this time select "Show Elevation Profile". You should see something like Figure 4.

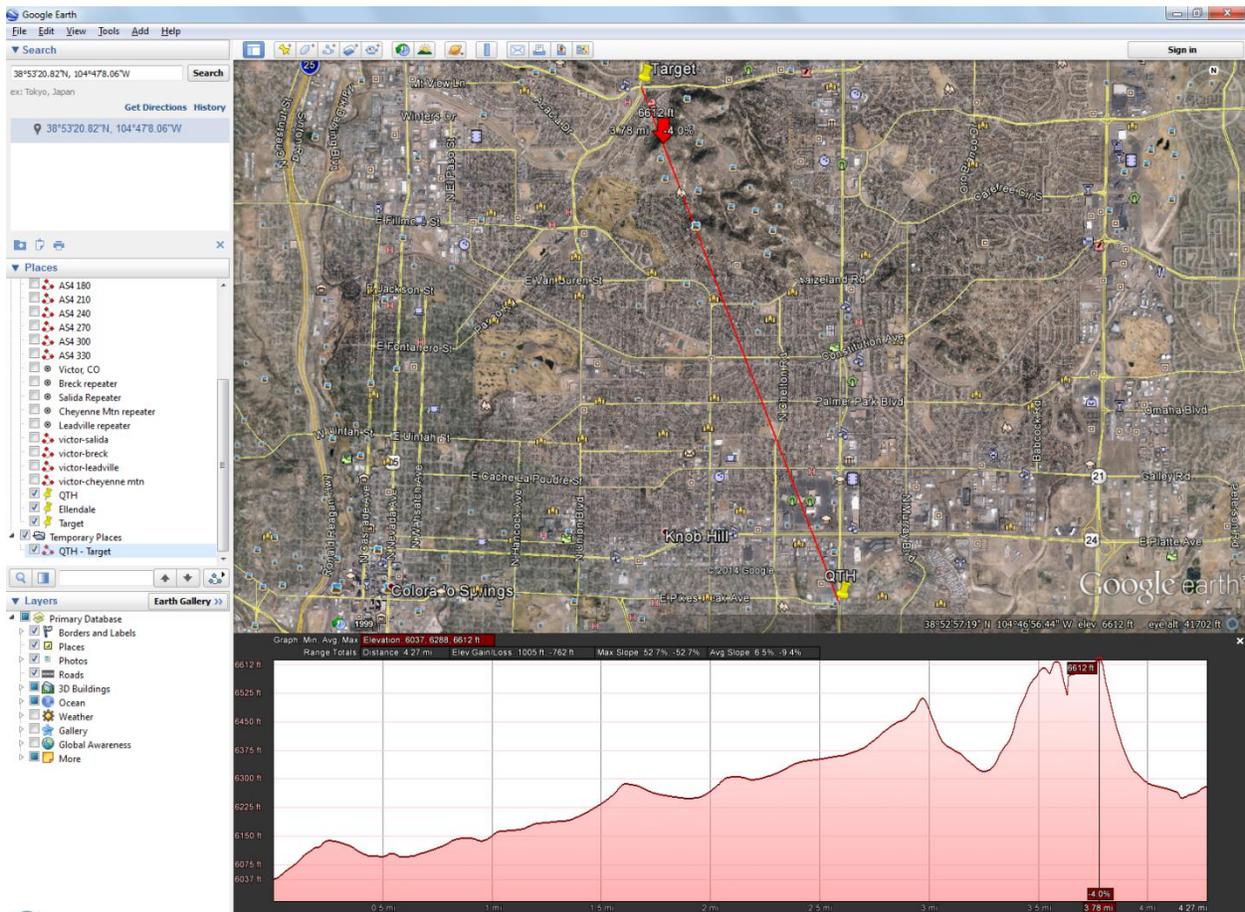


Figure 4, Elevation Profile, QTH - Target

As you can see, there are some hills in between these locations. If you slide your cursor left to right in the bottom profile window, you will see that it gives you some information about the spot you are hovering over and the red arrow moves along the line in the satellite view to show you where you

are. In this case, we can see that there is a 6,510 ft hill 2.97 miles from QTH and then at 3.52 miles to 3.78 miles we have hills ranging from 6,590 to 6,612 ft. Obviously there is no line of sight between these locations. Communication may still be possible by reflections or penumbras, so this does not rule out the ability to communicate between the locations, but it means it is probably not going to be very good.

Just to show this a different way, close the Elevation Profile and right click on "QTH – Target" and select "Properties" again. This time under the Altitude tab, select "Absolute" instead of "Clamped to ground". Now open your Elevation profile for "QTH – Target". Your profile at the bottom should look like a ramp. Look in the satellite view and you will see the red line has all but disappeared except at the very ends. This is because the line is going underground!

You can do this procedure without storing placemarks, but saving them makes it easy to run profiles to multiple locations and to revisit them in the future.