



# Terrain Profiles in Google Earth

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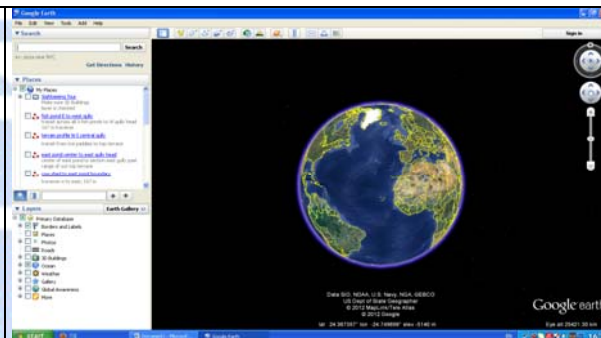
[www.neighborhoodlink.com/org/rtc2k5](http://www.neighborhoodlink.com/org/rtc2k5)

E-mail: [rtc2k5@gmail.com](mailto:rtc2k5@gmail.com)

*You may post questions / comments to the Discussion area of our website*

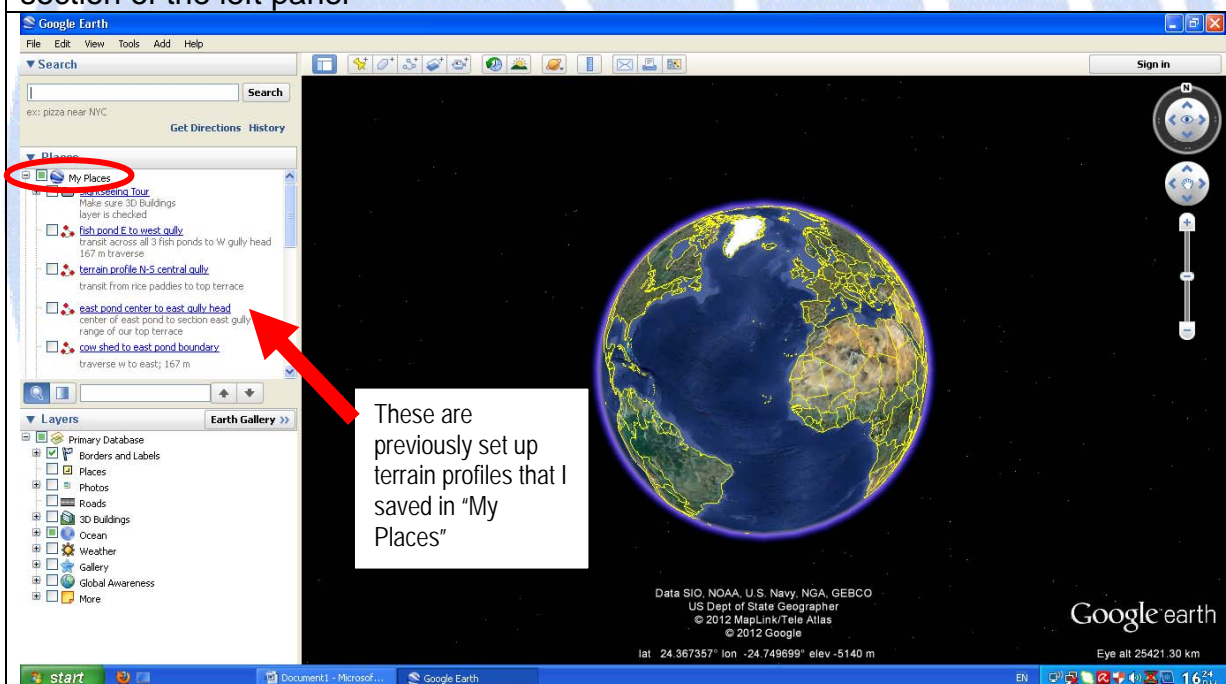
Terrain profiles are useful for ham operators to get a feel for the Line of Sight (LOS) in VHF operations. [Note: A better perspective is to calculate the radio horizon, but that is another topic.]

This article assumes you are familiar with Google Earth and its basic functions to navigate and locate places on the Earth. Google Earth is free and can be downloaded from [Google Earth](#)



*Google Earth starting page.*

Google Earth has a Terrain Profiling function embedded in the “My Places” section of the left panel



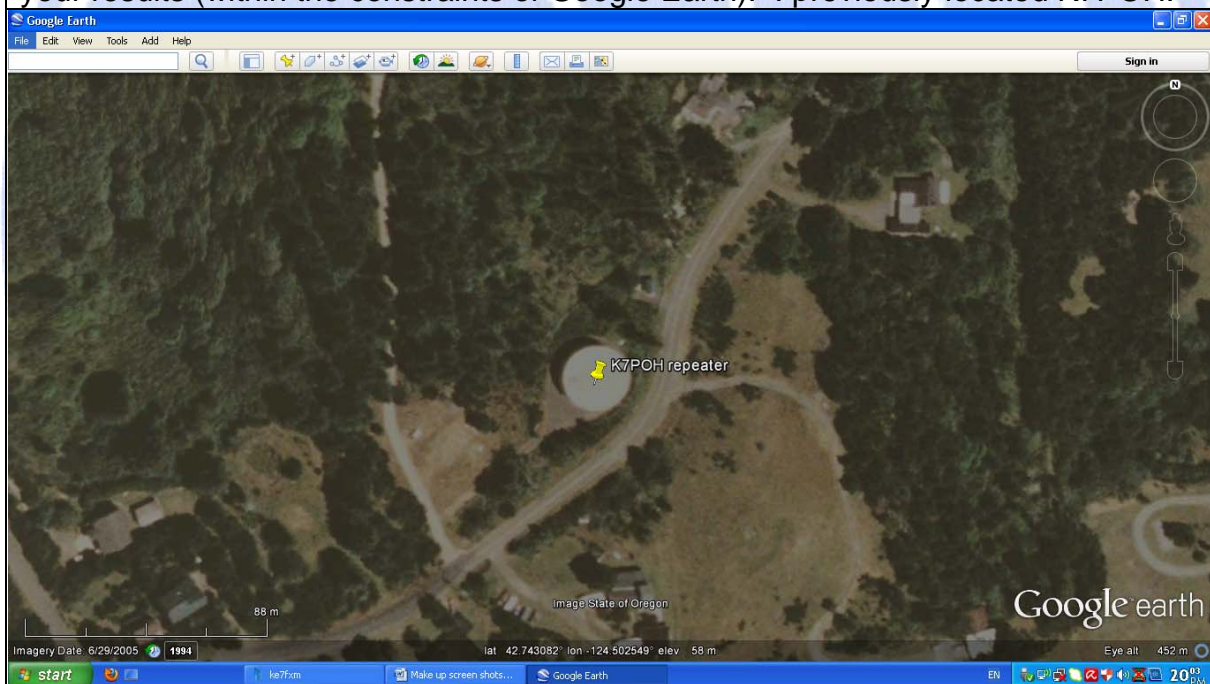
To create your own terrain profiles between two stations, you need to save the two locations in “My Places.” It is probably best to get the latitude / longitude / altitude of the station locations by direct field measurements. You can also get the data from Google Earth.

**Direct Field Measurements:** If you have a GPS this will be easy. Here are some suggestions:

- **Use Decimal Degrees:** Decimal numbers are easier for computers to handle. In EmComm situations and dealing the aerial operations, most navigation systems use decimal values. If using traditional degrees, minutes, seconds format, you can use an online conversion program.

- **Average Your Measurements:** Set the GPS unit on a clear level spot and average the position reading over several minutes. This will increase the accuracy of your positioning data.
- **Record the EPE (Estimated Probability Error):** When you “mark” your position check to see what data are saved. (My GPS doesn’t save the EPE data.) Write down the EPE if necessary. This gives you an idea of the +/- horizontal distance error for your location.
- **Altitude:** Again, check to see if this is saved when “marking” points in your GPS. If not, write it down. [Note: Consumer grade GPS units are not known for accuracy in reporting elevation data. More sophisticated survey units use differential GPS for increased precision.] You can use the GPS data as a guide and then confirm it with topographic map data and the altitude given in Google Earth. I tend to favor topographic maps and to tie to benchmarks if greater accuracy is needed.

**Location Data from Google Earth:** You can visually search Google Earth to find the locations you want. This requires you to navigate about the Earth and zooming in to get a fairly clear view of the locations. The closer you zoom, the more accurate your results (within the constraints of Google Earth). I previously located K7POH.



*This is the Google Earth image of the Port Orford water tank K7POH repeater site.*



Photo from K7POH website.



Photo from K7POH website.

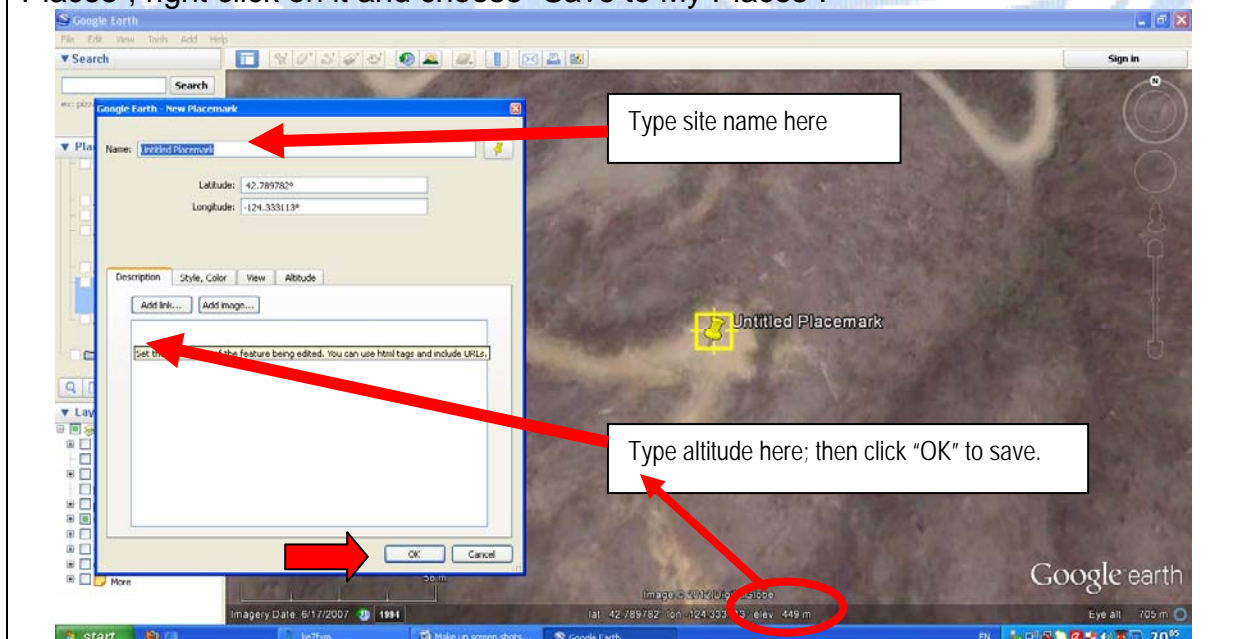


For this article, I picked a possible portable radio operating location in the mountains inland from Port Orford. This sample site will be used to demonstrate how to mark, label, and save a location to “My Places” in Google Earth.

Once you have homed in on your location, watch carefully as you move your cursor over the scene. The Latitude, Longitude, and Altitude appear at the bottom center of the screen. Looking at the image you may or may not be able to get a feel for the shape of the land. Move the cursor around and watch the altitude number change. This is a good way to tell what is higher or lower in the area of interest.



To mark this location, click on the Push Pin icon at the top of the page. A Push Pin symbol appears on the screen. Put it on the spot you want as the portable operating site. In the dialog box, type the name of the location. For this example, “Portable Site”. I also type in the altitude so it will be saved with this label tag. Then click [SAVE]. It should appear in “My Places” to the left. If it is in “Temporary Places”, right click on it and choose “Save to My Places”.

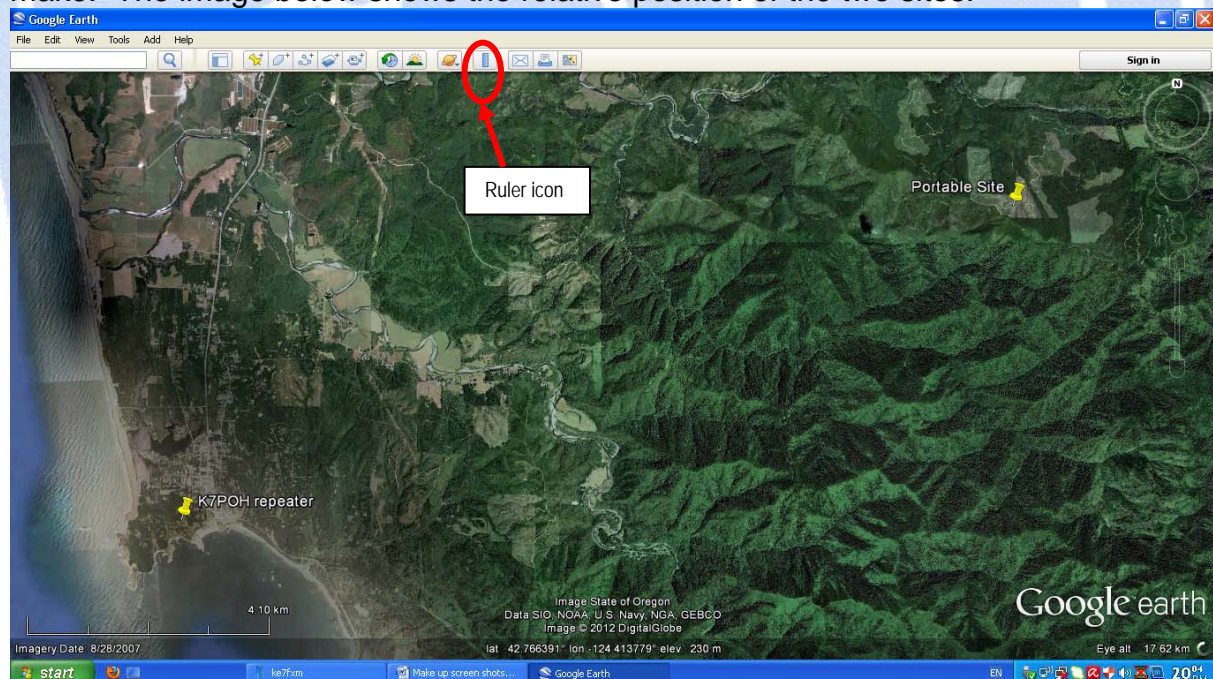






The Push Pin and label show up in the image because the box is checked next to the tag in My Places. Uncheck the box and the push pin and label for "Portable Site" will not appear. Double clicking on the tag for "Portable Site" in "My Places" will activate the push pin symbol and label and cause Google Earth to zoom to it.

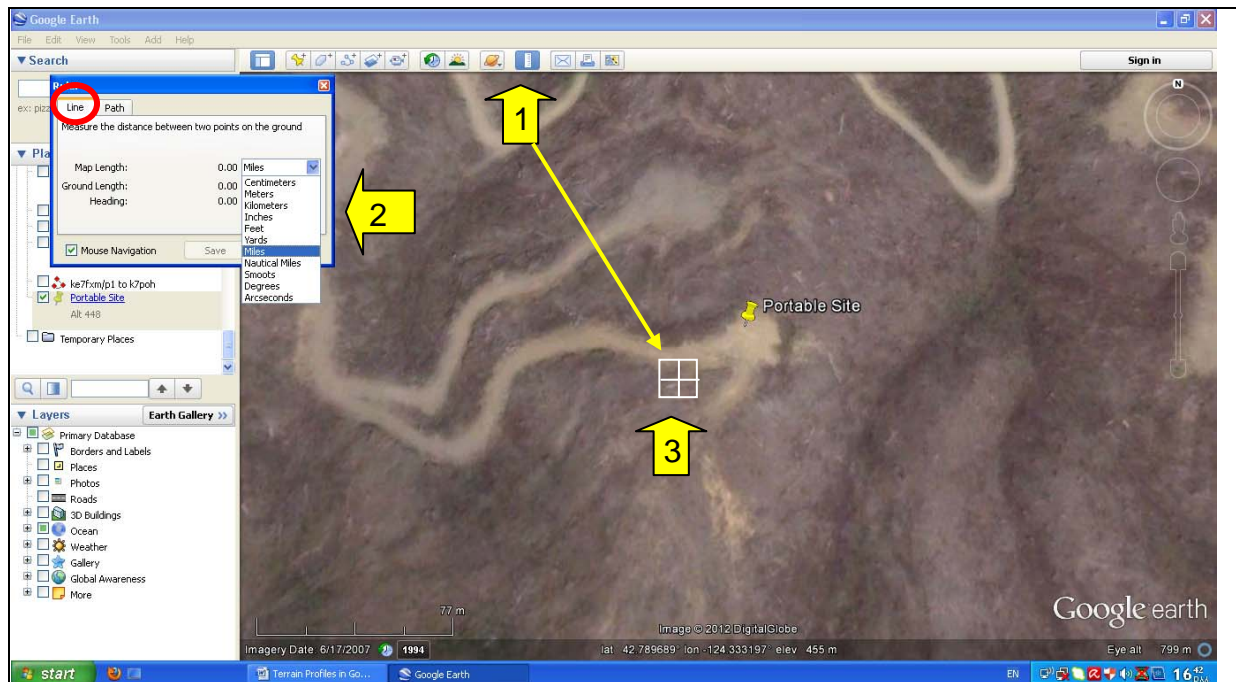
Recap: OK, so far we have located the two ends of the terrain profile we want to make. The image below shows the relative position of the two sites.



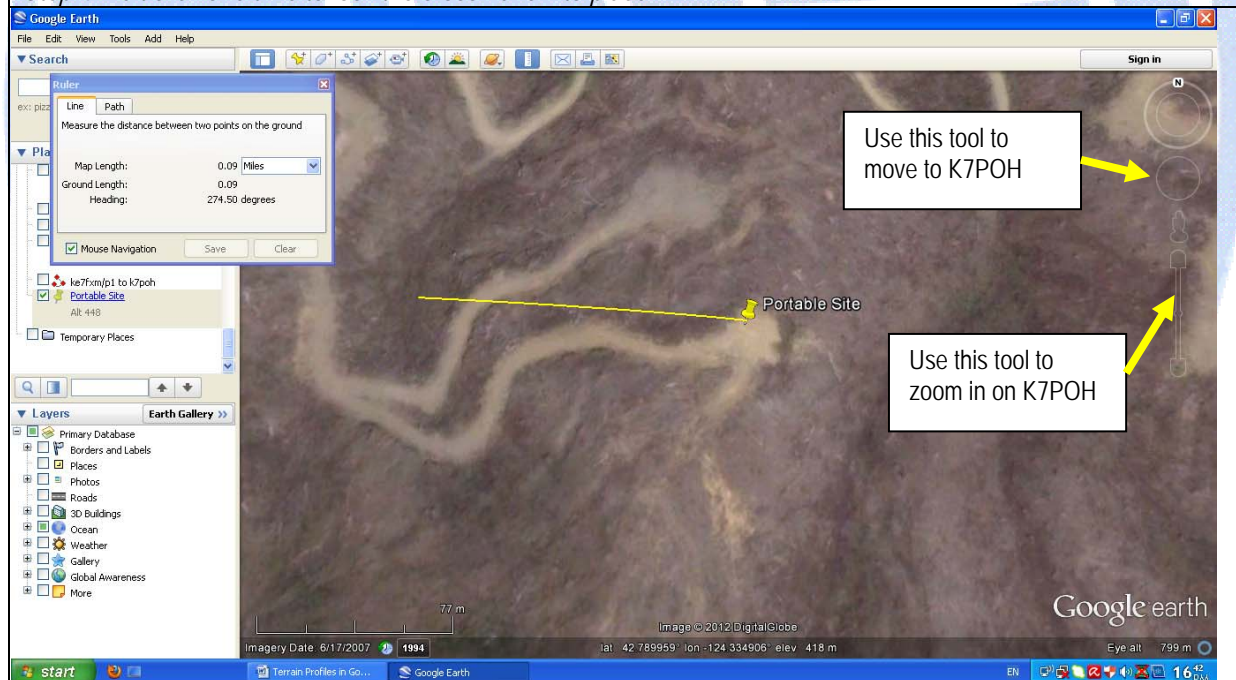
We need to get the distance and direction from one point to the other before we can generate the terrain profile. We will start with the Portable Site because a typical scenario is to set up a portable yagi antenna aimed toward the repeater. It is best to zoom in to make it easier to anchor the starting point for the scale measurement.

Click on the "Ruler" icon at the top of the screen. We will use the scaling function to get the distance and direction from the Portable Site to the K7POH repeater.

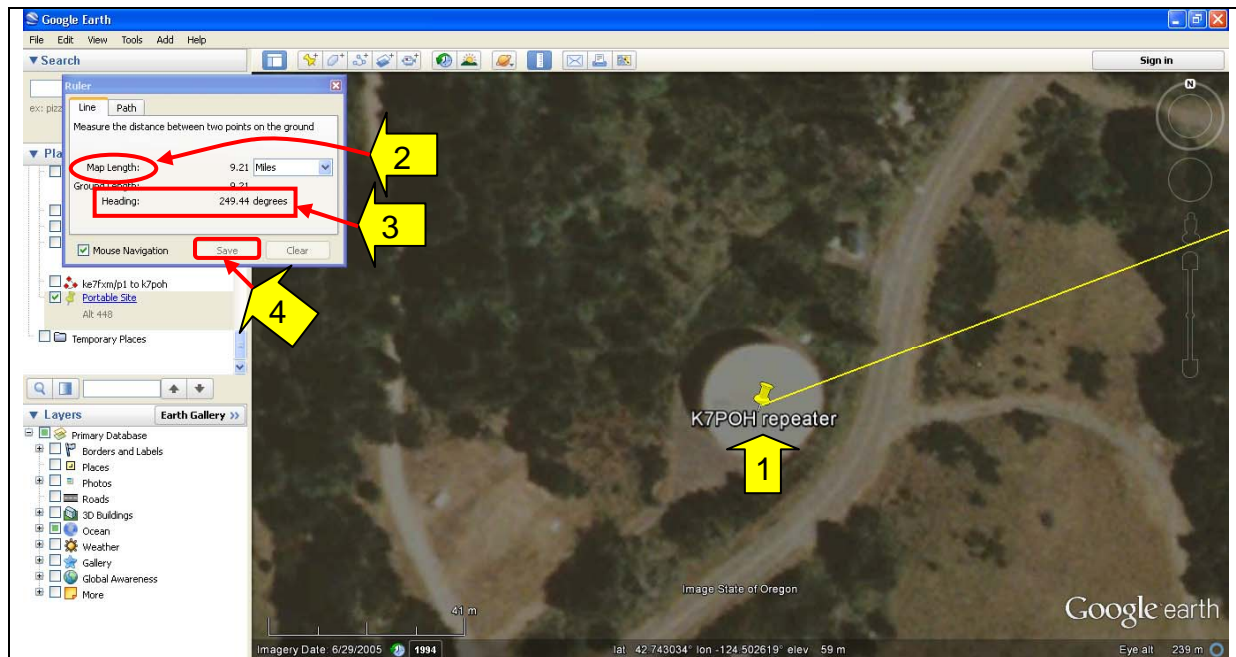




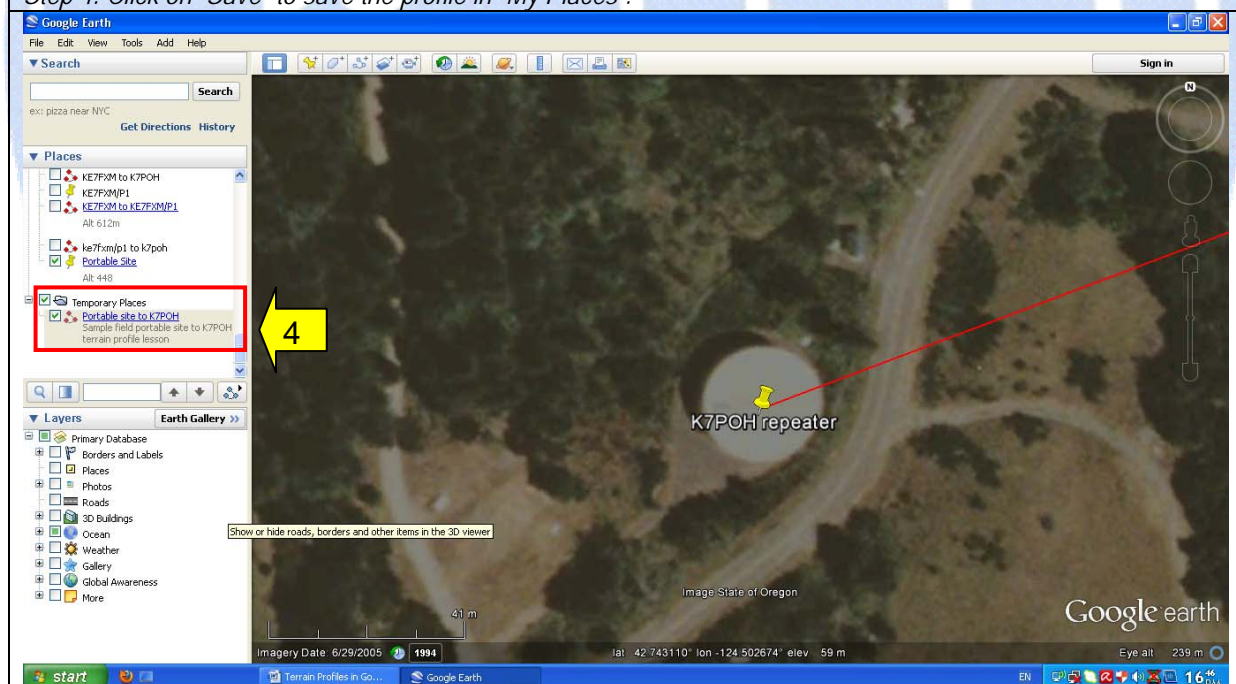
*Step 1: Click on the "Ruler" icon to open the dialog box and a white set of cross hairs.*  
*Step 2: In the "Line" tab, click on the drop down menu to select the units (in this case "miles").*  
*Step 3: Click on the white cross hairs and drag it to the center of the push pin for the "Portable Site".*  
*Step 4: Left click one time to lock the cross hairs into place.*



*This shows the Ruler line anchored to the Portable Site coordinates. You need to use the navigation tools to zoom out (to see the K7POH push pin), to move over to it, to zoom in on it, and anchor the other end of the measuring line. You can move the cursor to the navigation buttons for direction and zoom, but be careful NOT to click anywhere in the image area or you will anchor the loose end of the Ruler line. This is probably the trickiest part of the entire process. Be patient. Practice, practice, practice. The results will make it worthwhile.*

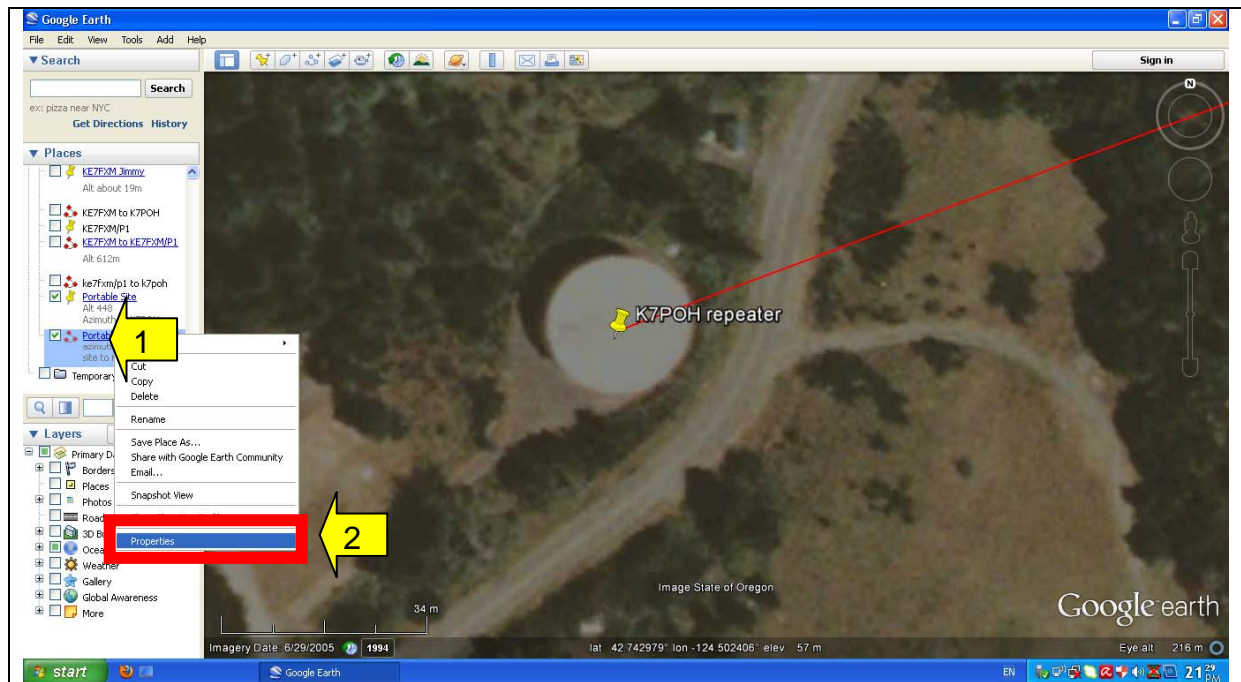


*Step 1: Once you zoomed in to K7POH, position the cross hairs on the point, left click once and the Ruler line is anchored. Notice the Ruler line is Yellow when making measurements.*  
*Step 2: Look at the "Map length" (this is as the crow flies) to get the distance from the Portable Site to K7POH.*  
*Step 3: Look at and write down the "heading" (azimuth). [Note: You need to write down the azimuth. It won't be saved even when you click "Save".]*  
*Step 4: Click on "Save" to save the profile in "My Places".*



If the profile is saved in "Temporary Places", select it, right click to open the menu, and click on "Save to My Places" and it will be there any other time you open Google Earth. A green check in the box will display the traverse line joining the Portable Site to K7POH. [Notice the traverse line is now Red.]

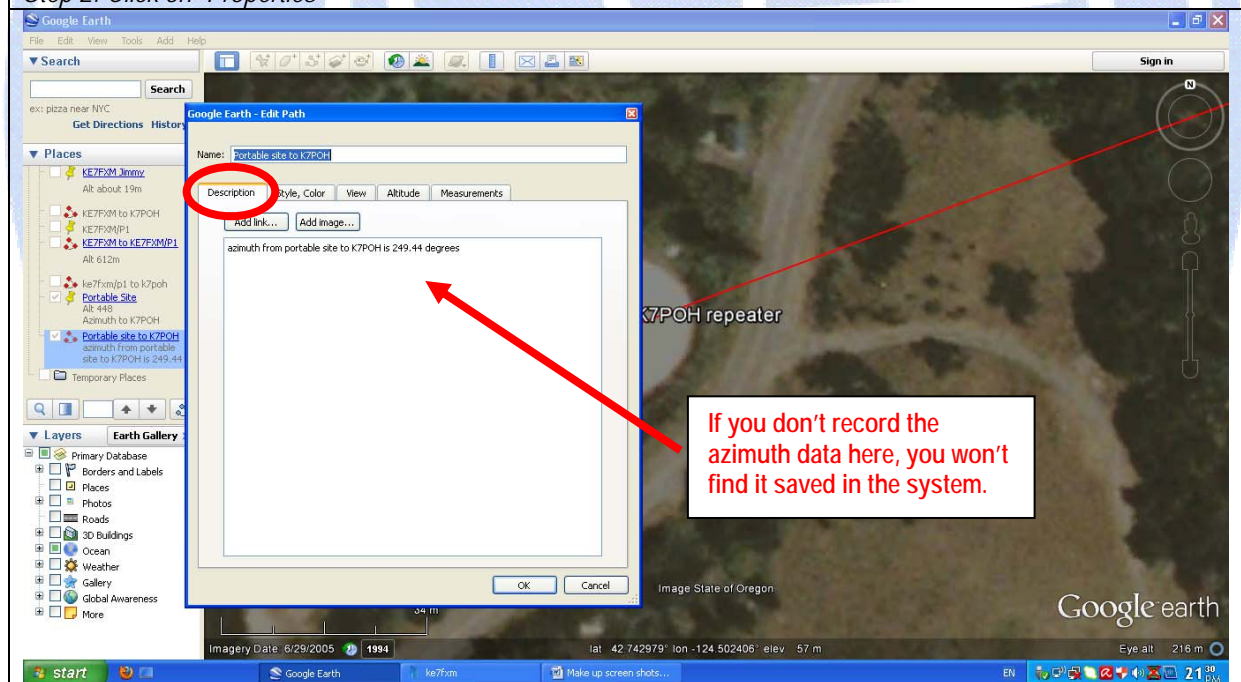




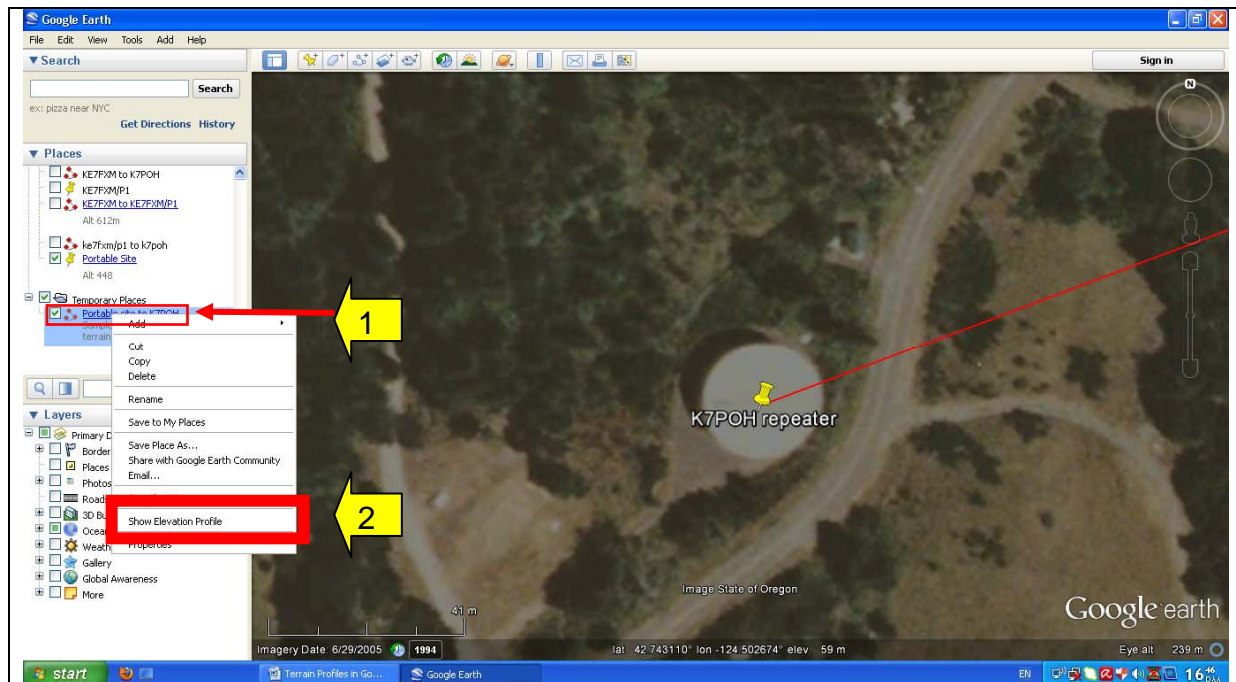
Before going on, we need to do some housekeeping. We need to record the azimuth from the Portable site to K7POH in the Terrain Profile file. To do this:

Step 1: Select the Profile and right click to open the menu

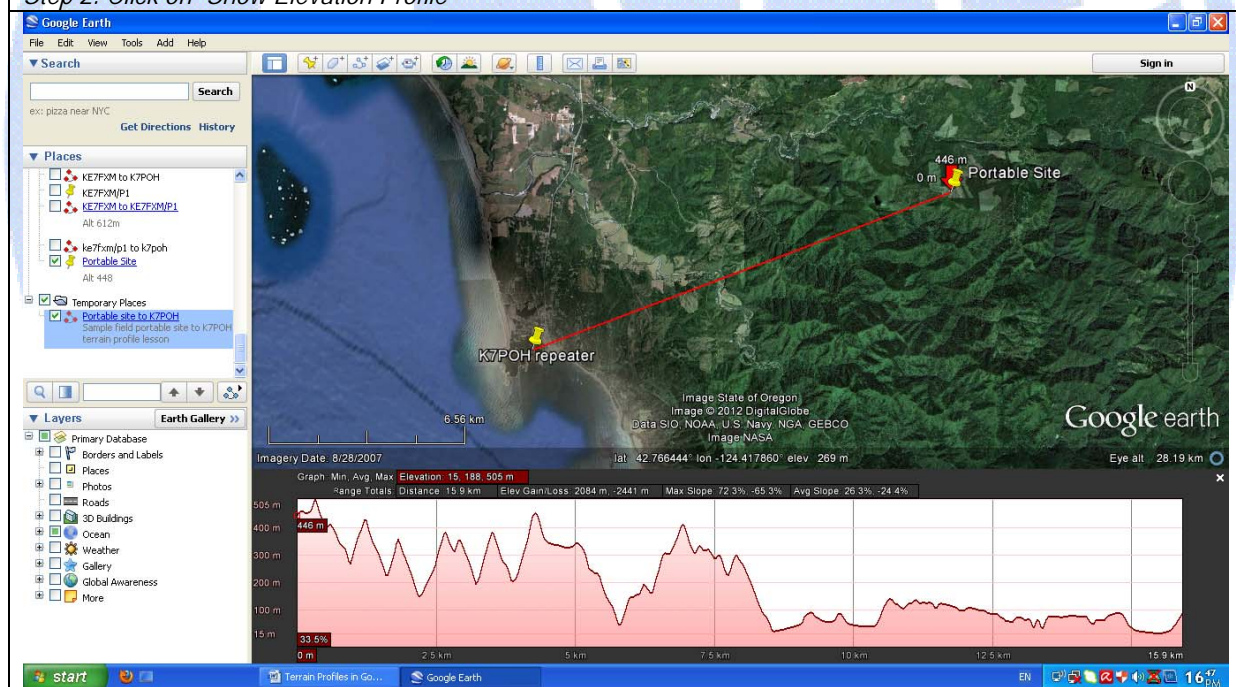
Step 2: Click on "Properties"



The Google Earth Edit Path dialog box opens. Click on the "Description" tab, and type "Azimuth from portable site to K7POH is 249.44 degrees." If you don't write down the azimuth, you won't be able to find it saved anywhere in the system. [Note: The "Measurements" tab will give you the distance, but no azimuth. The altitude tab will not have the altitude data for the end points of the traverse.]



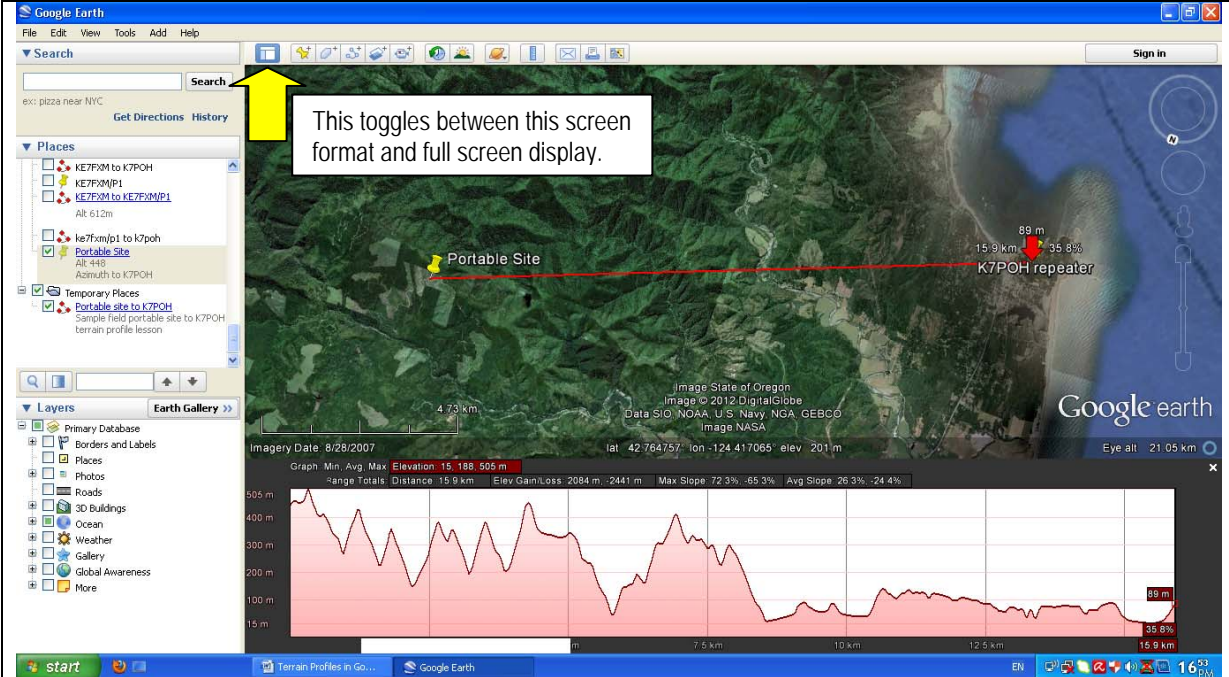
To make the Terrain Profile,  
 Step 1: Select the item, right click to open the menu,  
 Step 2: Click on "Show Elevation Profile"



When the screen opens, you can see the map display and the terrain profile below. But notice that the Terrain Profile has the Portable Site on the left end and the K7POH site on the right end. This is the opposite of their relative map positions. So I rotate the map using the navigation tool to change the North orientation.

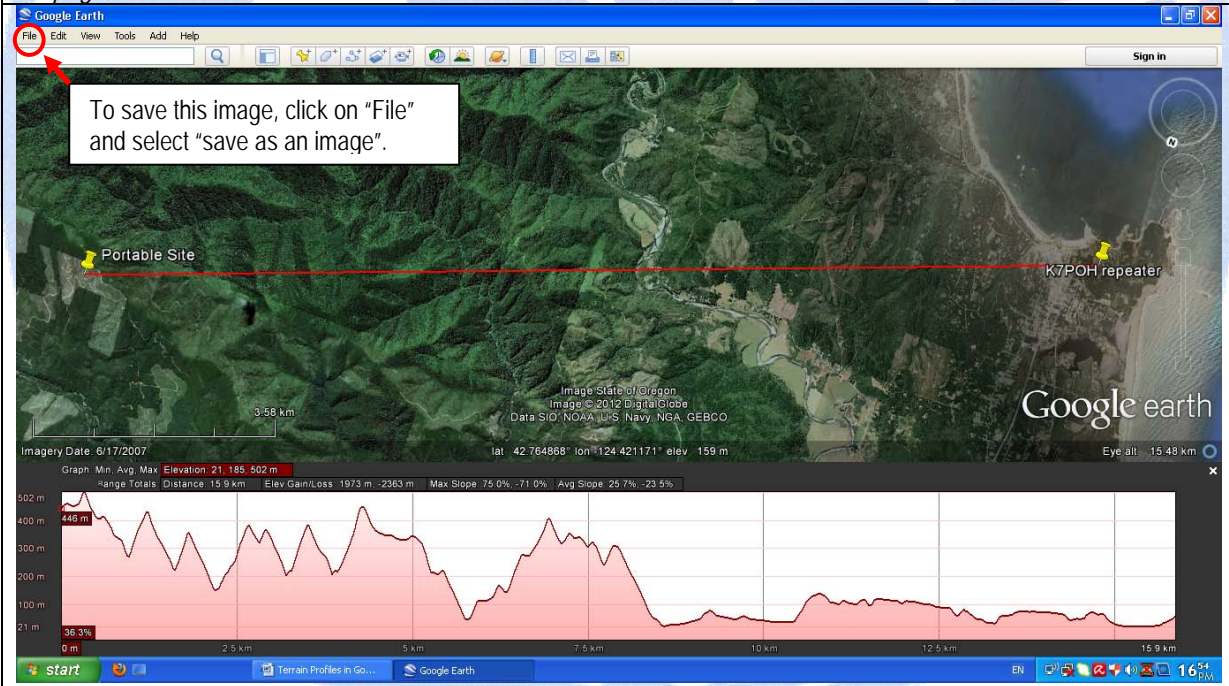
**Technical Note:** The profile is vertically exaggerated. Notice the horizontal scale is in kilometers and the vertical scale is in meters. This is done to accentuate the terrain profile. If the vertical scale were in kilometers, the profile would appear much flatter making it harder to detect the peaks.





This toggles between this screen format and full screen display.

Now the relative map positions match the terrain profile layout. At this point, I don't need to see the information in the left column. So to make the display larger, I click on the toggle to go from showing the Search column to full page.



To save this image, click on "File" and select "save as an image".

In full screen display, I then adjust the scale and position to optimize the display graphic for readability. [Note: when you have the Terrain Profile open, you can use your cursor to drag the indicator along the terrain profile to see the elevation data of the various peaks. The horizontal scale will give you distances. A red arrow will move along the Red traverse line to show you the location along the traverse.

You can save the combined map / terrain profile graphic as a JPEG image. To do this, click on File, then from the pull down menu select "save as an image". Then decide on the file into which you will save the image.

Now you should be able to map and profile the various operating locations in your area.