

Simplified Tutorial for cjb's Terrain Assist By Homeboy

In this tutorial, I hope to provide a simplified (albeit thorough) walk-through of the Terrain Assist (TA) program. With this tutorial, you should be able to find digital elevation model (DEM) data and orthoimagery (aerial photography) to help you lay out a real course on a plot in the Course Architect (CA) with the terrain elevations applied and the holes laid out to the correct yardages. Obviously, this is a huge help for a course designer trying to re-create a real course design. Kudos to cjb for this amazing program.

When I say “simplified,” I mean there are a number of steps in the TA manual that you can skip. You don't need to get any topographic data or the coordinate data at maptech.com. You also don't need to find correlation data for the topomap and you don't need to resize to a power of 2.

Things you will need:

1. TA
2. 3dem (which is a DEM viewer that can be found at: www.visualizationsoftware.com/3dem/downloads.html)
3. Google Earth
4. Paint Shop Pro/ Photo Shop Pro

Let's say we want to lay out Oakland Hills Country Club – South Course (site of the 2004 Ryder Cup) ... which I offered to lay out for jmwll24.

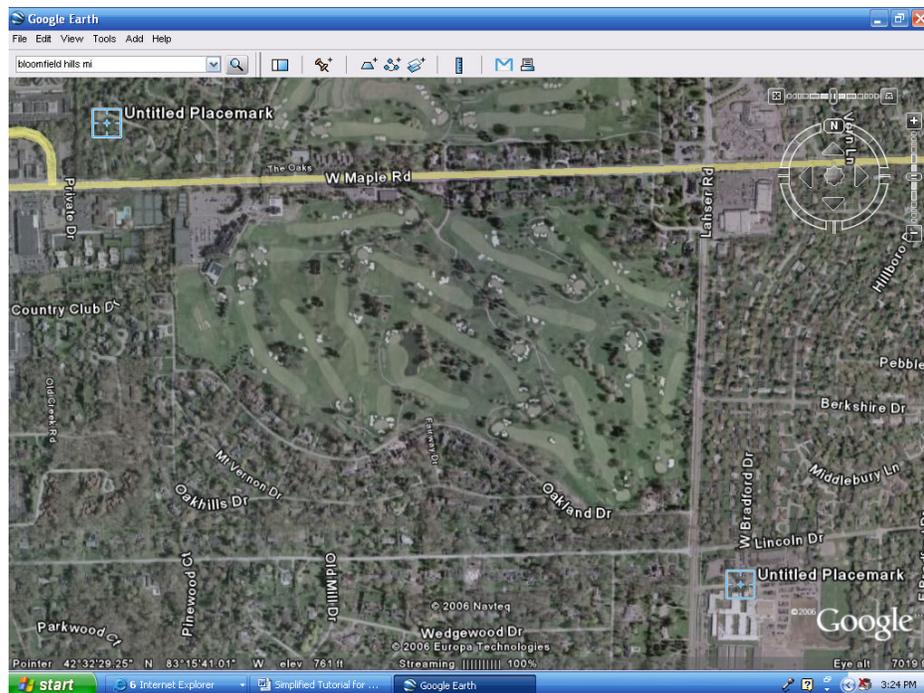
1. Find your plot on Google Earth. A quick Google search shows that the course is in Bloomfield Hills, Michigan. I find the course in Google Earth by searching for “Bloomfield Hills, MI” and then use the measuring tool to find two corner points at the perimeter of the course that will give you plenty of room to work with in CA. I usually try to have a 200-300 yard buffer around the outside of the holes.

Add a placemark at those two points ... you don't need to set all 4 corners – just 2 will do the trick. If you right-click on the placemark and select properties, you'll see its latitude/longitude coordinates. The coordinates for our placemarks are:

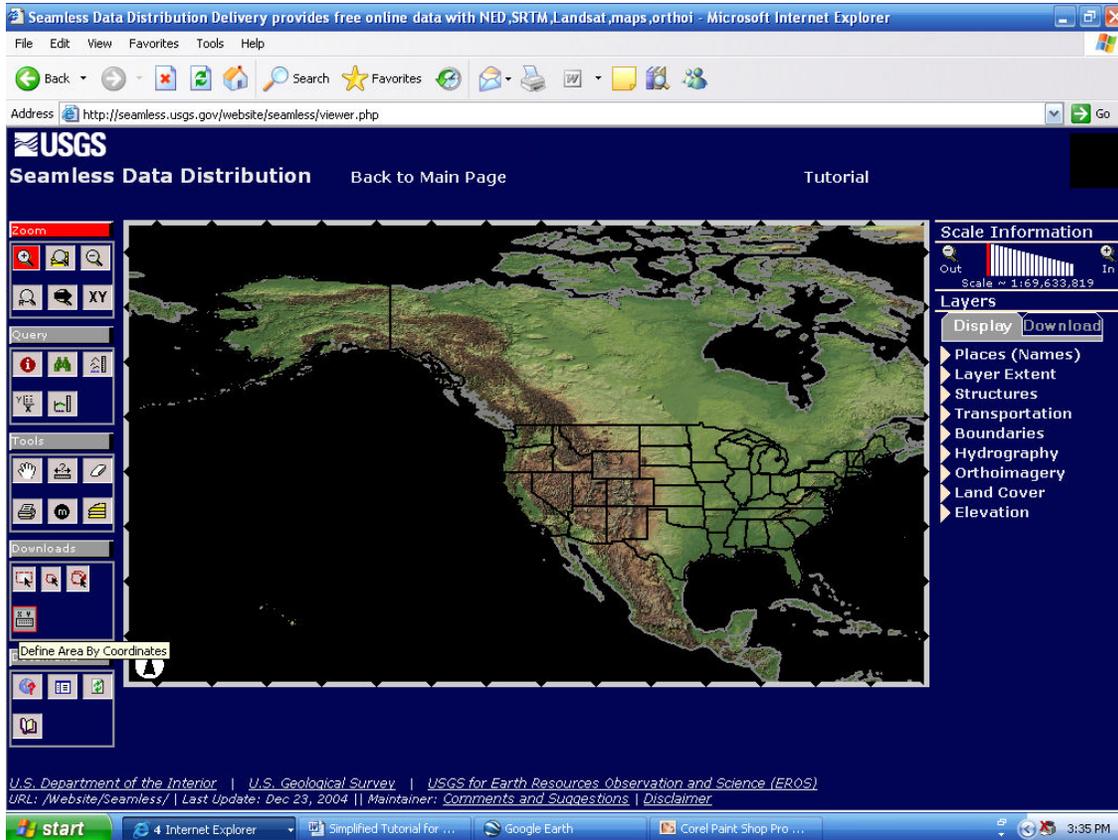
Top left: 42° 32' 46" N 83° 16' 52" W.

Bottom right: 42° 32' 12" N 83° 15' 46" W.

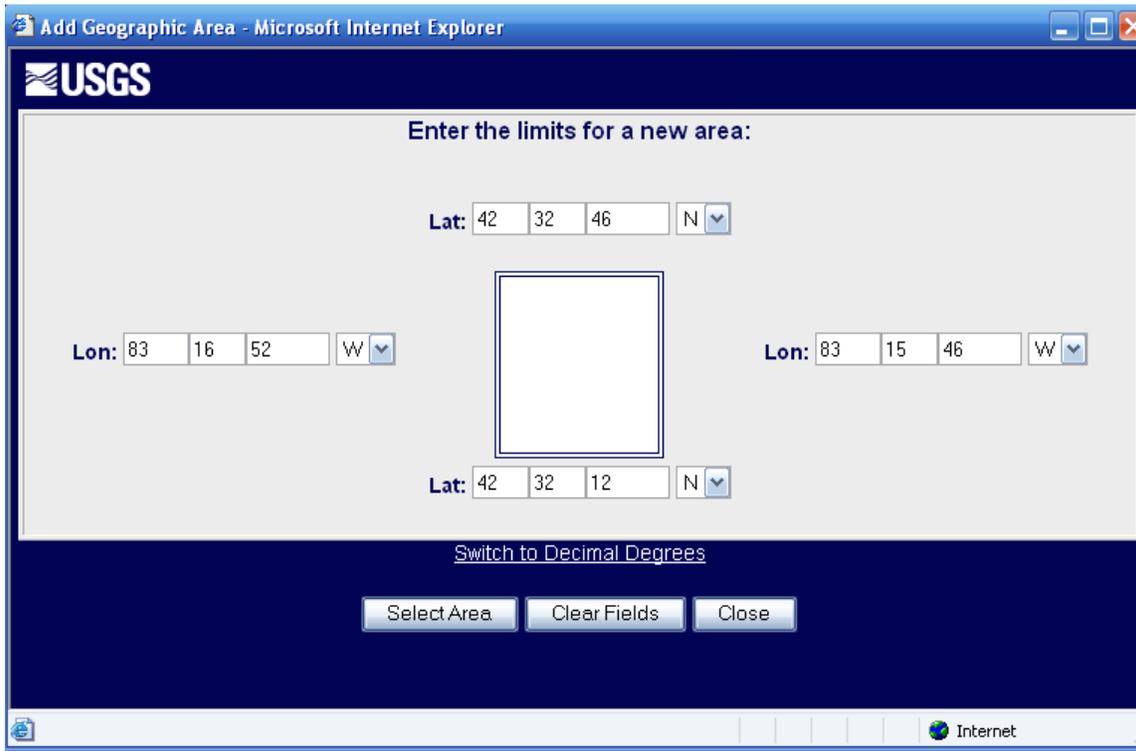
Here's a screenshot with my two placemarks added in the corners:



- Go to the seamless data website provided by the USGS (seamless.usgs.gov). Click on the map of the US for the US data link. Now click on the keyboard icon that says "Define Area By Coordinates".



Now enter the coordinates from your placemarks and hit Select Area and, check yes, you really want to select this area ...



And you will get a page that looks like the one below. This is DEM data for the exact coordinates for our plot. Note that the Output Format is ArcGRID, which is a format that is not handled by 3dem, so we need to push hit the Modify Data Request button to change the output to GeoTIFF, which is an output format compatible with 3dem.

On this page, you'll find list of data that is available for the coordinates that we have requested. Scroll down to our National Elevation Dataset (NED) data request and change the ArcGRID to GeoTIFF. Also, looking down further on this page, you'll see Orthoimagery, which appears to be very high resolution color imagery, with focus to 0.3m. Check that box. Now scroll down and hit "Save Changes & Return to Summary". On the summary page, you'll see that we have a 1MB DEM file ready to download and a whopping 56MB orthoimagery file ready to download. For those of you on dial-up, this imagery will be worth the wait ... Click on the download buttons to download each of the files.

<input type="checkbox"/>	National Atlas Vegetation Growth - Peak: 2005	Not selected.		
<input type="checkbox"/>	National Atlas Volcanoes	Not selected.		
<input type="checkbox"/>	National Atlas Waterbodies	Not selected.		
<input type="checkbox"/>	National Atlas Wilderness Preservation System Areas	Not selected.		
<input checked="" type="checkbox"/>	National Elevation Dataset (NED) 1 Arc Second	GeoTIFF	ZIP	HTML
<input type="checkbox"/>	National Elevation Dataset (NED) 1/3 Arc Second	Not selected.		
<input type="checkbox"/>	National Elevation Dataset (NED) 1/9 Arc Second	Not selected.		
<input type="checkbox"/>	National Land Cover Dataset 1992 - Land Cover	Not selected.		
<input type="checkbox"/>	National Land Cover Dataset 2001 - Canopy	Not selected.		
<input type="checkbox"/>	National Land Cover Dataset 2001 - Impervious Surface	Not selected.		
<input type="checkbox"/>	National Land Cover Dataset 2001 - Land Cover	Not selected.		
<input checked="" type="checkbox"/>	Orthoimagery - Detroit, MI - 0.3m Color Apr 2002	GeoTIFF	ZIP	HTML
<input type="checkbox"/>	RA Fire Regime Condition Classes	Not selected.		
<input type="checkbox"/>	RA Fire Regime Departure	Not selected.		
<input type="checkbox"/>	RA Potential Natural Vegetation Groups	Not selected.		
<input type="checkbox"/>	RA Reference Fire Regime	Not selected.		
<input type="checkbox"/>	RA Succession Classes	Not selected.		
<input type="checkbox"/>	SRTM 1 arc sec - Shuttle Radar Topography Mission [Finished]	Not selected.		
<input type="checkbox"/>	SRTM 3 arc sec - Shuttle Radar Topography Mission [Finished]	Not selected.		

3. Now we need to prepare the GeoTIFF data with the 3dem program for use in TA. Extract the data folder from the zip to a convenient location. Now open 3dem and hit “File” and then “Load Terrain Model”. Select GeoTiff DEM in the top right. Now find the location where you unzipped the folder. Open the folder and double-click on the tif file. Your DEM will now open in the viewer.

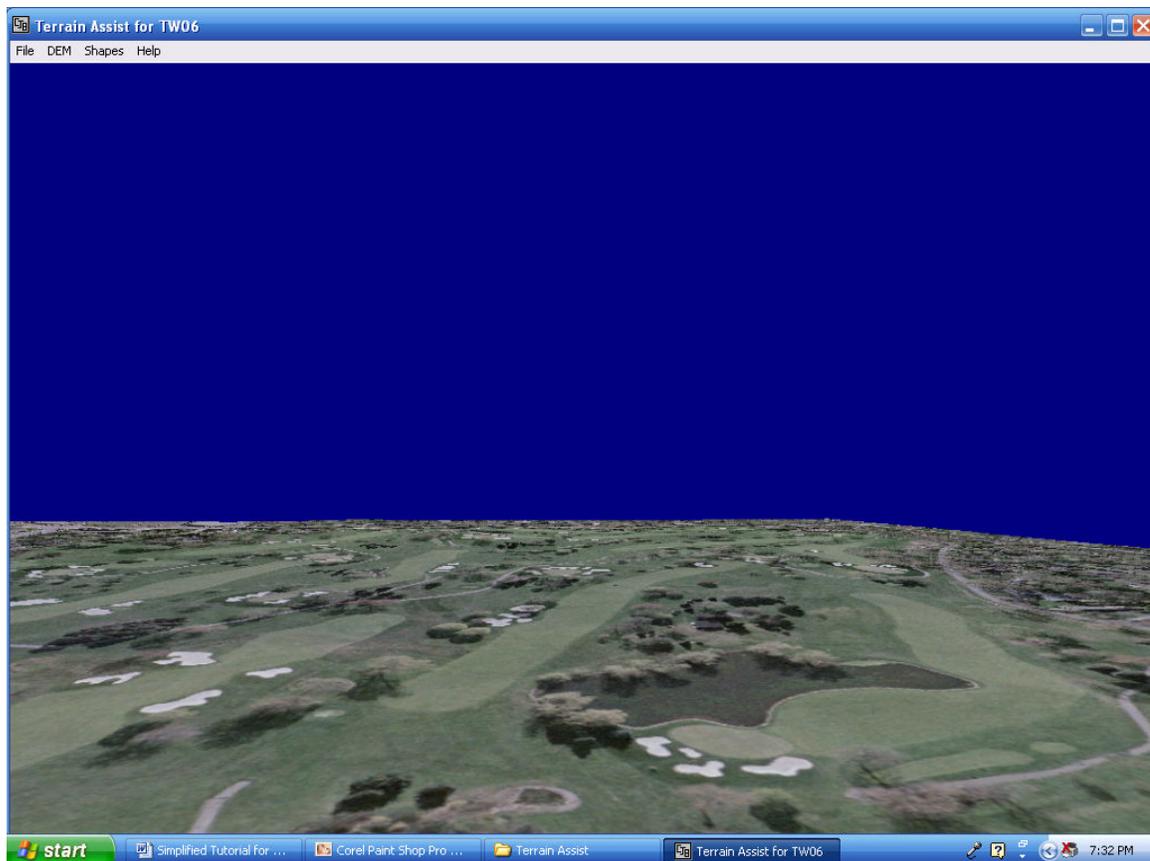
Because the seamless data is available only in geodetic (latitude-longitude) projection, it must be converted by 3dem to UTM projection. Go to Operation=>Change Projection=>Change UTM Ellipsoid ... make sure that you check NAD27 and hit OK. Now you just need to save the data. Go to File=>Save Terrain Matrix=>File Format ... select ASCII Text String and hit OK. For convenience, I create a folder with just the data I need for that course in TA. So I'll save the file as Oakland Hills DEM in my newly-created Oakland Hills data folder. Now you have your DEM data ready for TA.

4. Now we need to prepare the overhead imagery for use with TA. Open up PSP and find the tif image that we downloaded. Note that this image has already been cropped to the exact dimensions of our placemarks that we selected in Google Earth. Save the image as a .tga file in your Oakland Hills data folder.

5. Now it's time to fire up TA. Go to File=>New Project and key-in a project name and Save. I called it Oakland.

Go to DEM=>Step 1: Import 3DEM. Find the folder where you saved your DEM file that you created with 3dem and open it. TA will ask you whether the data is 10m, 30m or SRTM. In this case, our data is 30m. You will now see the elevations of your plot appear as mesh in TA.

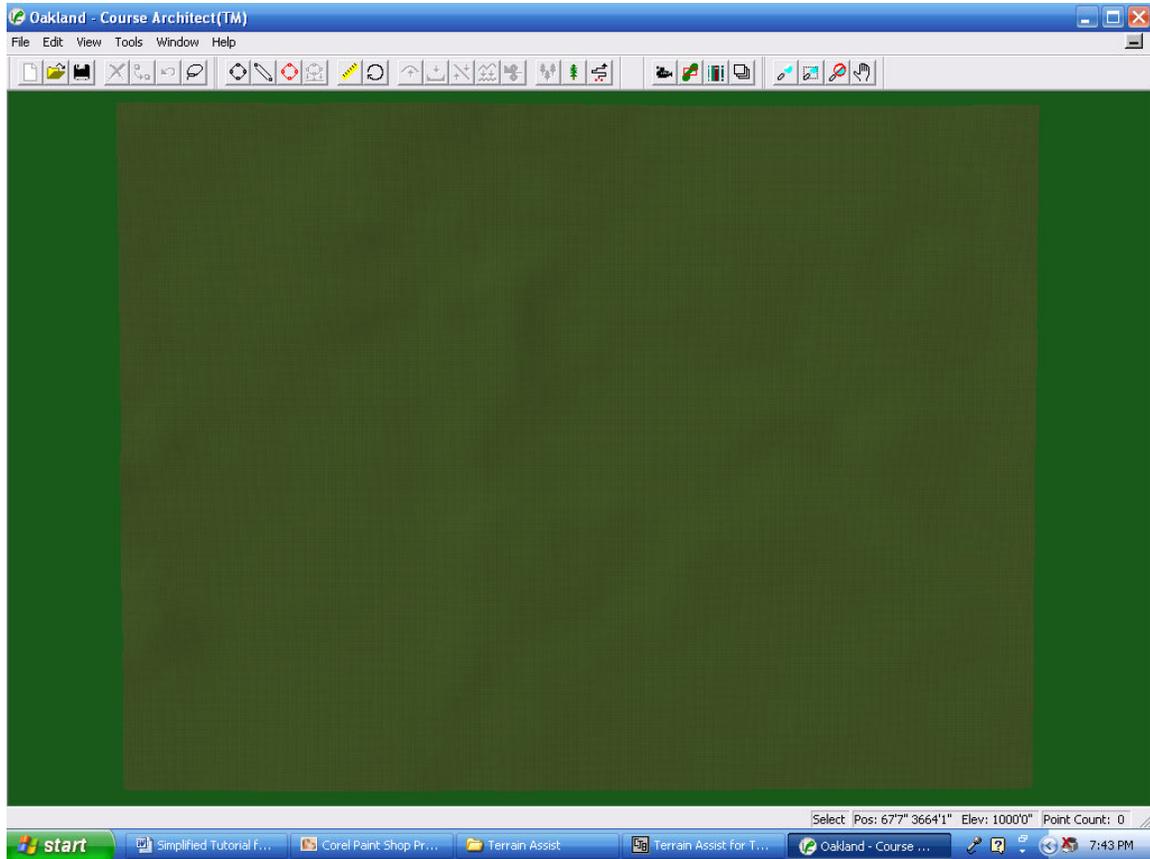
Go to DEM=>Step 2: Import Photo. Find the folder where you saved your .tga image and open it. Your photo will now appear as an overlay on the mesh:



Go to DEM=>Step 3: Make CA Starting Plot. TA tells us to open CA and create a flat plot exactly 1600 yard wide and 1200 yard high. Do not use the Course Wizard. Save the file as “flat” in the normal place where you keep your .tca files.

Go to DEM=>Step 4: Export DEM to CA. TA will ask you to select your flat CA plot. Go to the location where you saved your flat.tca file, select the file and hit open. Now TA will ask you to key-in a name for your new CA DEM plot. I'll call it Oakland and then hit Save. Now go back into CA and open the newly named tca

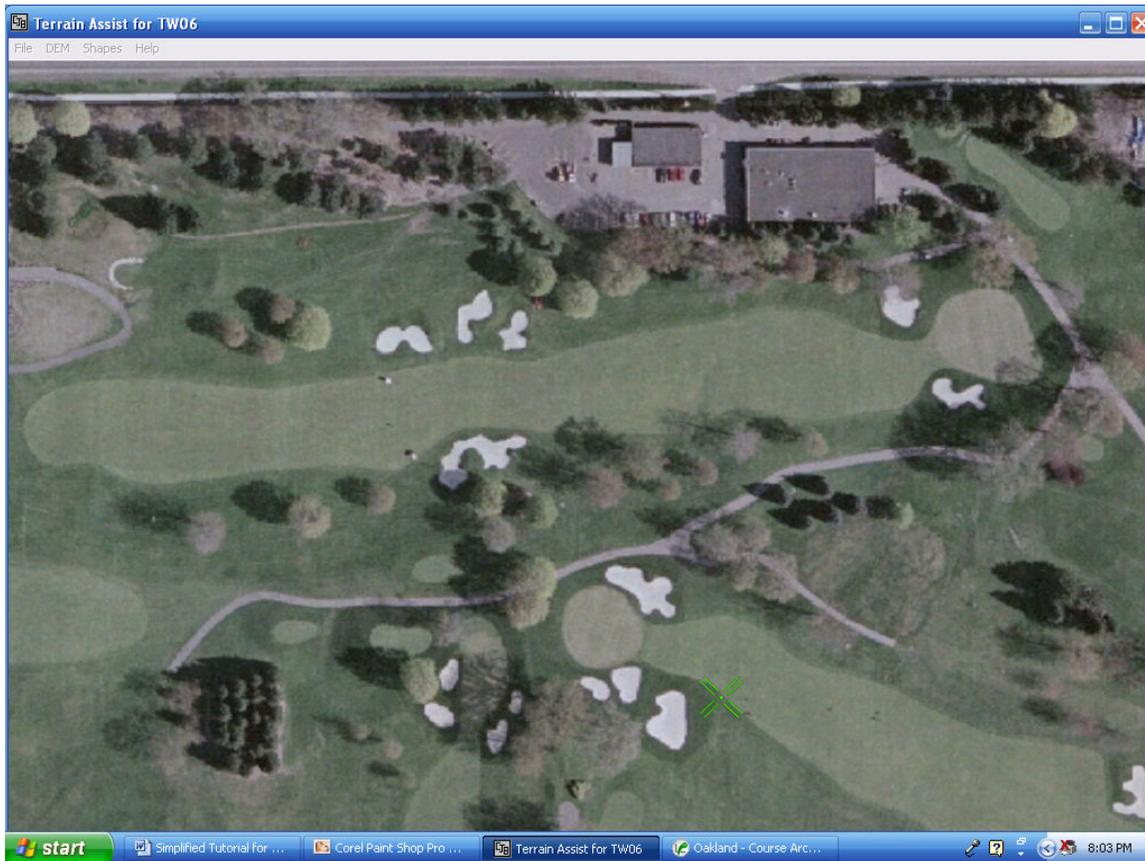
file. Here is our CA DEM plot, which is 1600 x 1200 yards and includes the subtle rolling terrain of the real-life Oakland Hills:



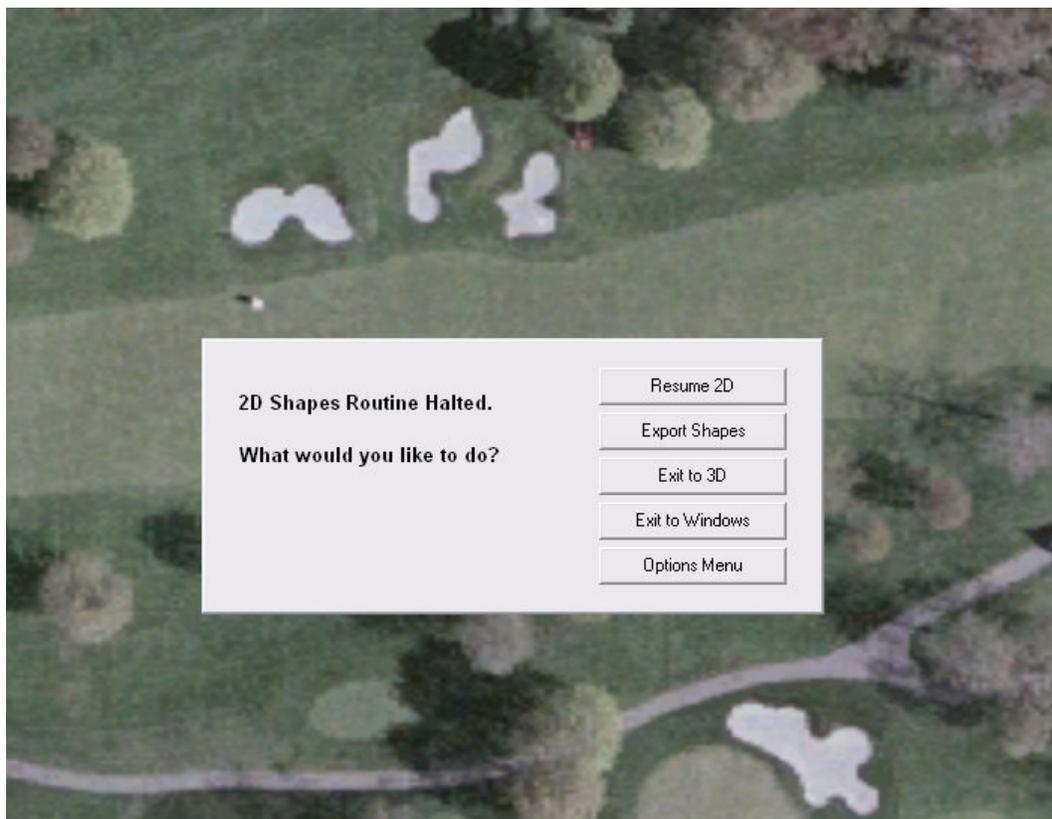
6. Now it's time to draw the shapes that make up our golf course. This step can be a bit tedious, but you can always export a series of holes so you can see the immediate results and keep yourself inspired. Go to Shapes=>Step 1: Draw Shapes. You will now have an overhead view of your course, which will allow you to draw the shapes that form the golf course ... fairways, bunkers, ponds, etc. There are a number of important keys that you'll need to use here to move around the course. Use your arrow keys to move left, right, up and down. Use your + and - keys to move in and out.

Click your mouse as you draw the outline of each shape. Just like drawing shapes in CA, you'll need more control points for tighter turns and fewer for straighter lines. Remember: all shapes need to be drawn in a counter-clockwise direction, or else your shapes will have reverse handles (i.e. enlarging a shape will actually reduce its size). Get used to drawing shapes counter-clockwise. Each shape needs its own name. For example, on the 1st hole, I would call the fairway 1f, and each bunker 1b1, 1b2, 1b3, etc.

Let's start with the 1st hole at Oakland Hills as an example. Looking at the hole in the overhead view (zoomed out as much as possible), I can see that there are 6 bunkers and 3 tees (the tees are outside of this view). So, I'll have 1t1, 1t2, 1t3 and also 1b1 through 1b6 as well as 1f for the fairway. I'll add the green later in CA.



So let's start drawing. If you get more than one control point with each mouse click, go to options to adjust the mouse delay speed. If you don't like the placement of a control point, just right-click to erase it. Once you've finished drawing a shape, hit the Ctrl key and enter the name for the shape. When you'd like to export the shapes to your CA DEM plot, hit the space bar and you'll see this pop up:



7. Now it's time to see all our hard work pay off by exporting the shapes to our CA plot that already has the basic elevations added. Hit the Export Shapes button and you'll see a window open that says "Pick Shape Files to Queue". While holding the Ctrl key, click on each of the shapes and then hit Open. TA will ask you:



Since I've only done one hole so far, we'll hit Export. If I had done more holes or even the whole course, then I would select all the shapes in one column and hit Queue and then continue adding the shapes in each column before hitting Export. When I hit Export, I get a message warning that the .tca file I select cannot have any active (or floating) shapes or the resulting file will be corrupt.

Now you'll see a window that says "Open the CA file that you want to add Shapes to". I select my Oakland tca file and TA asks me to key-in a new name for the output file. I call it Oakland1 and hit Save. TA thinks for a little bit ... when it's done, go back to CA and open your new output file. I open my Oakland1.tca file, left click and drag to highlight any floating shapes and hit the Drop Shapes button to drop all the shapes at once. I then assign the appropriate textures to each shape. The real-life scorecard for the US Open shows a yardage of 435 yards ... you can see that we're pretty darn close with a nice 26 ft change in elevation from tee to green:



Not too shabby!! I'll continue to lay out the remaining 17 holes and even draw any surrounding shapes that may be visible from the course (adjacent roads, clubhouse parking lot, ponds, streams, etc.)

NOTE: This is only one way of gathering the data necessary to use TA and not necessarily the best. For example, if I use the data.geocomm.com website and locate the plot, I would discover that a 10m DEM is available. Clearly, that is a much better DEM than the 30m one that I used in this example.

However, I do believe this is the easiest – you don't need to trim your DEM with the 3dem program and you don't need to crop any overhead imagery with PSP.

Hope this helps! Let me know if you have any questions.