



Making a Good 3D Model of an Underbridge Survey with the Sontek M9

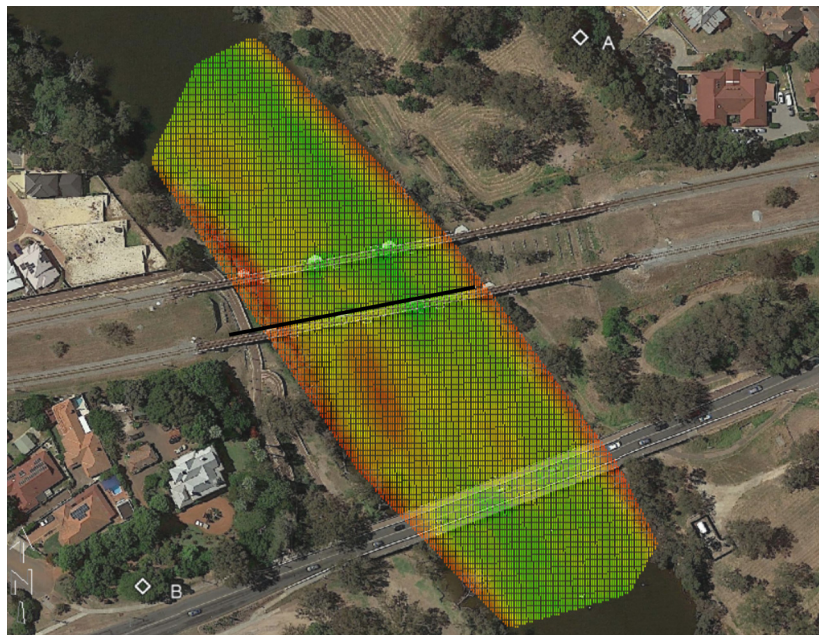
By Ivan Izaak

Here is the case - a bridge across a river was to be studied to try to determine the scours around bridge supports. It was done by [Xylem Australia](#) and I've helped to visualize the data.

My idea is to use the 3D TERRAIN VIEWER for the modelling and visualization. I want to review the bathymetric model over the surrounding terrain and see the bridge supports over it. Figure 1 shows the area where the bridge in the middle is my point of interest.

Let's see the steps for that. I am not talking about the preparation/survey/data collection/data processing. I just have the resulting gridded XYZ file with the bathymetry.

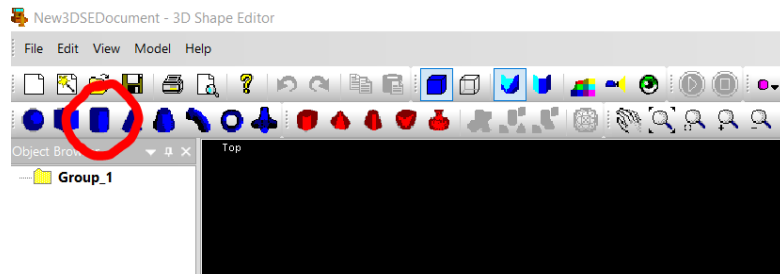
*Figure 1. Bathymetric Survey of the Bridges. Courtesy of Xylem Australia.
Bridge in the Middle is Marked by the Black Line*



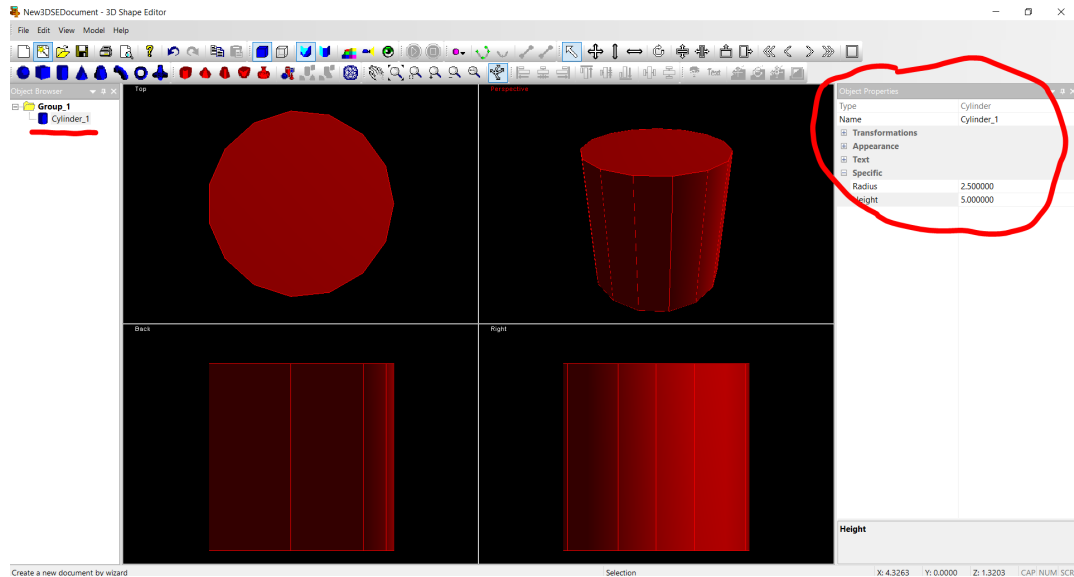
1. Creating the model of the bridge supports.

Start the 3D SHAPE EDITOR from the Preparation -> Editors menu.

Click on existing Cylinder model in the tool panel:



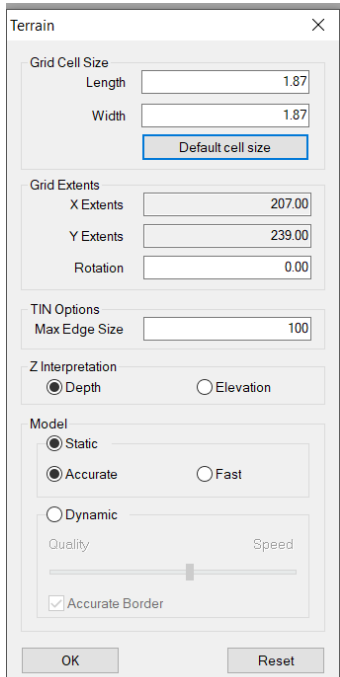
Left Click in the middle of either Back or Right section of the model window. You can always drag the cylinder over any of the sections to adjust its location - remember, its center will be used to position it in the next steps.



Set the cylinder's height and radius - it is in real world units. In our case the bridge support is 5m in diameter so I've set the radius of the cylinder to 2.5m. The height is the tricky one! I set 5m only though real one is higher - I'll explain why later on.

You may set the model colors, text, and so forth as you'd like.

Save the 3D object - it is saved into the C:\HYPACK 2023\Shapes folder - I'd keep it there.



2. Visualization of the survey data using the 3D TERRAIN VIEWER.

Run the 3D TERRAIN VIEWER (3DTV) from the Final Products menu.

Open XYZ file - program is asking for it when you run it.

In the Terrain dialog, set the properties of the bathy model - grid size (default is what the program considers the best based on your dataset - mine is 1m grid so 1.87 seems to be fine). Also, Max Edge Side may help you to avoid connecting uncorrelated points into the model.

I've set the Static Accurate Model as the best option. Set Fast if your model is big. I don't use Dynamic as it does not allow rotating the model as I like. Click [OK] when you're done with the settings.

Figure 2. Initial Look of the Bathymetric Model in 3DTV

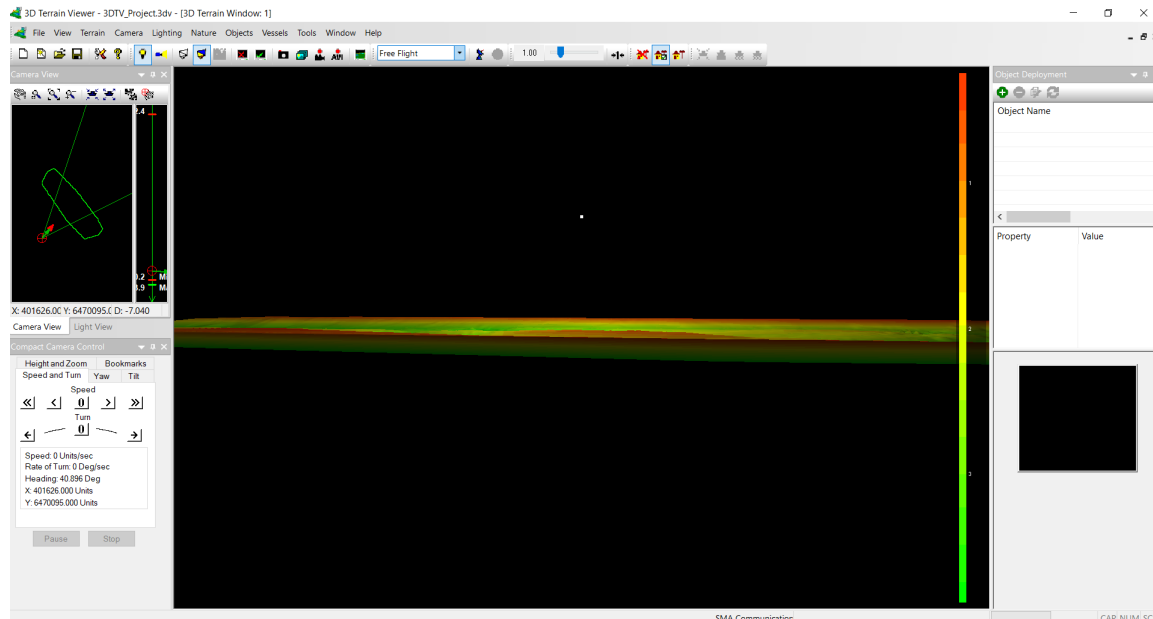
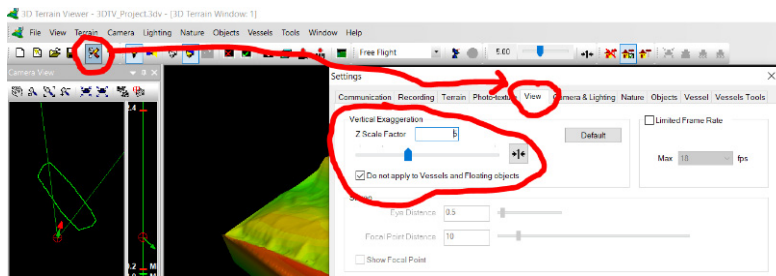


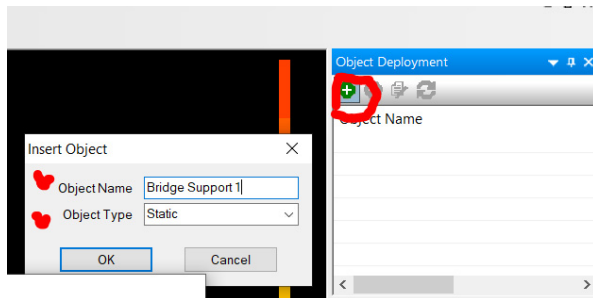
Figure 2 shows what you may get without any adjustments. No joy at all! We need to improve the visualization here! Let's do it.



First off, I've rotated the model so I can see it better. This operation is a bit complicated in 3DTV compared to the TIN where you can just left click and drag to rotate it and right click and drag to move. In 3DTV you manipulate with the camera, not the model. For

this, you can either use the Camera View small window to the right OR (not many users know that!) you can press **Shift + Left Click and drag** to move it and **Ctrl + Left Click and drag** to rotate. Finally, to exaggerate the Z scale, go into Settings -> View menu and set the Z Scale Factor there.

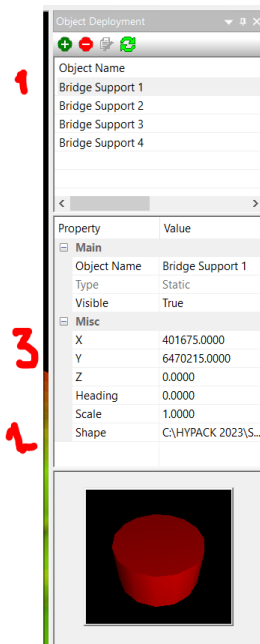
Next - I want to see the bridge supports. There are four of them under the bridge.



Find the Object Deployment window (usually it is on the right side of 3DTV. If not, open it up from the View -> Toolbars menu).

Click the + button and name the object - I named it as Bridge Support 1 - I'll repeat it four times since there are four supports there.

Now we need to set up the properties of each object deployed.



1. Select the first object under the Object Name.

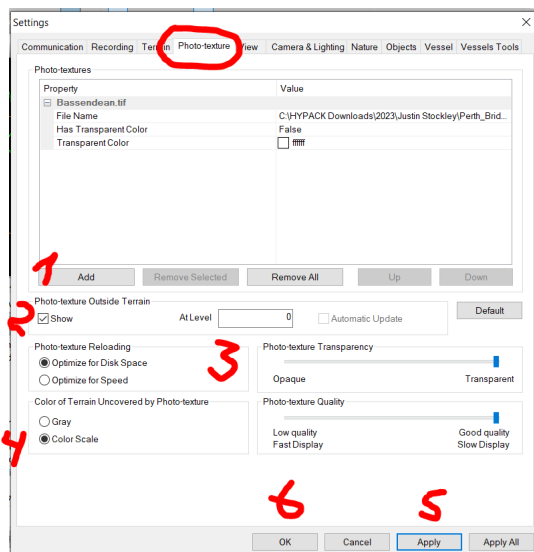
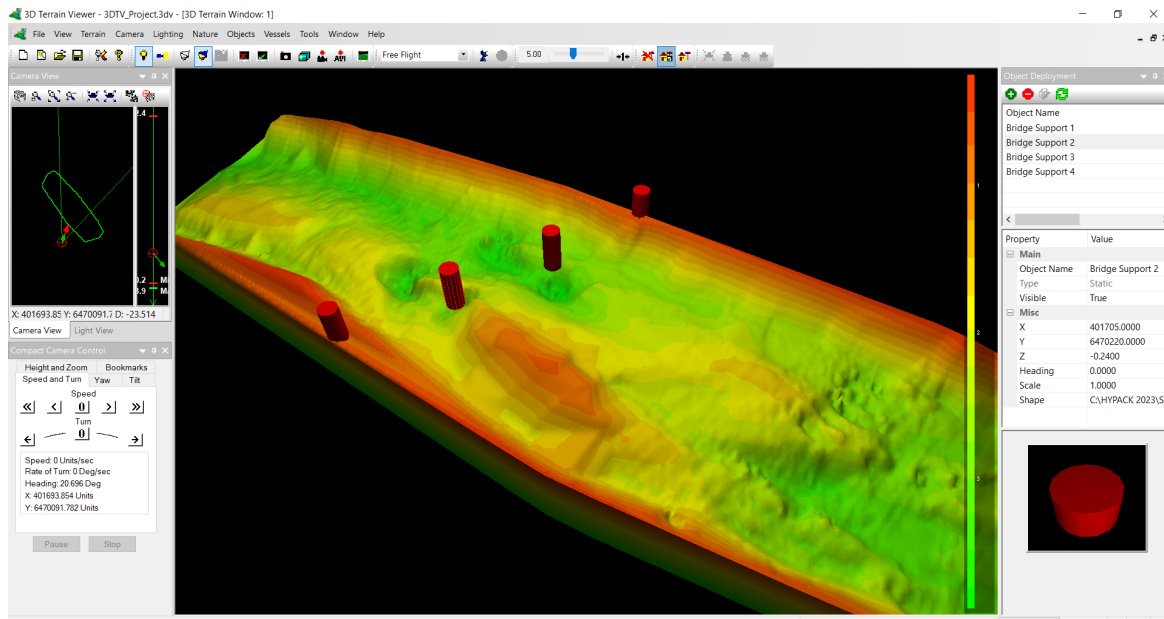
2. Add Shape - It's our 3D Shape Editor object we created at the beginning.

3. Type the coordinates of a support - I normally use the Main Shell Map window, move the cursor over the location of the support, and check its coordinates at the bottom of the Map.

Repeat the steps for all other objects.

Look at Figure 3 below - way better now, isn't it?

Figure 3. Bathymetric Model After Adjustments



Let's now add some additional 'brushes' to the look! I want to see the GeoTIFF background there.

Open the Settings and go into the Photo-Texture tab.

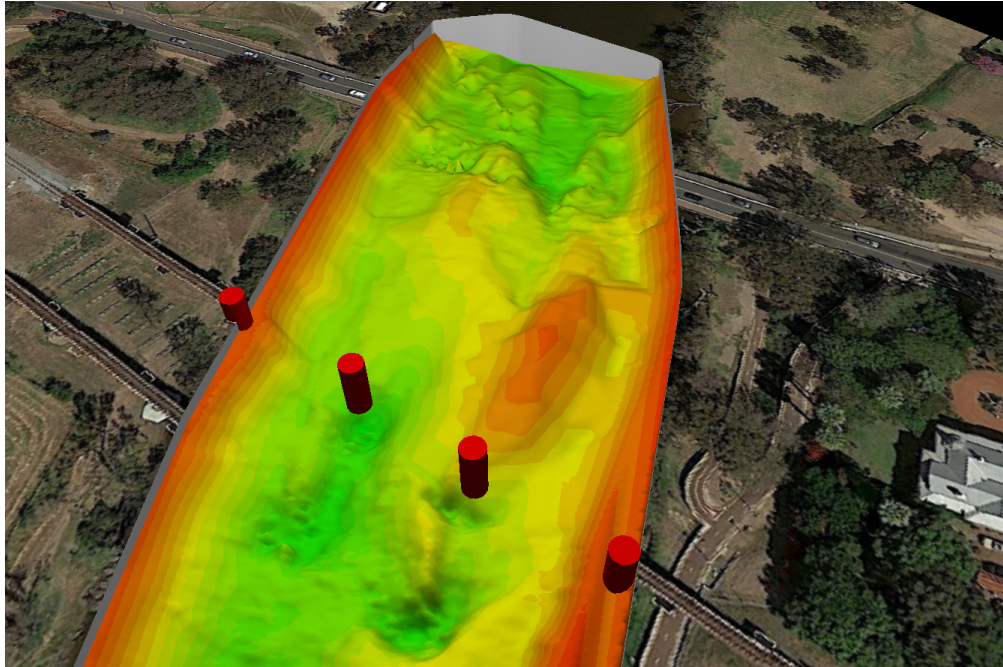
1. Click [Add] and pick your background chart (only GeoTIFF is supported).
2. Check [Show] so that you could see the background map outside the bathymetry.
3. Set the Photo-texture Transparency to fully transparent - this is to see the bathymetry behind the map.
4. Check the Color Scale option to see your model as a color scaled one.
5. Click [Apply] and wait - this may take some time for the program to drape the TIFF. You may

look at the progress indicator at the bottom right of the 3DTV main frame.

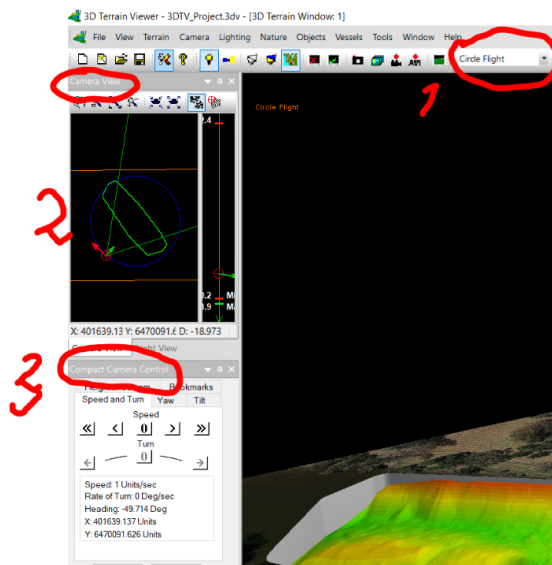
6. Click [OK] once you are satisfied with the image.

After some more adjustments of the camera height, position, rotation, and view angle, I've got the image shown in Figure 4.

Figure 4. M9 Bathymetric Model with the Bridge Supports (Red Pillars Across the River) and the Background GeoTIFF Image



In addition, you can set the camera to the Circle Flight.



1. Click the dropdown menu.

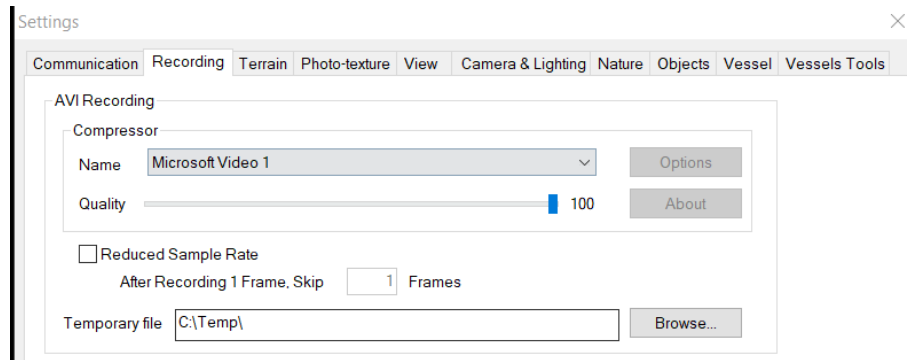
2. Left click in the center of the model and drag the cursor to set the pivot center of the camera and its flight radius.

3. Set the camera height, zoom, and so forth in the Compact Camera Control window.

4. Click the arrow buttons in the Speed and Turn tab of the control to start the camera motion.

Finally, you can record the AVI movie out of it.

Set the recording options in the Recording tab of the Settings dialog:



Go to Tools -> Record AVI menu to start recording.

Stop recording by either clicking the corresponding button on the Tool panel or go into Tools -> Stop AVI menu. A File Dialog will appear for you to name the AVI file.