Tip Sheet

This TIP Sheet has been updated from July 2007

ArchiCAD 12
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March 2009

Site Modelling

When modelling a site in ArchiCAD you normally use a Surveyor's DXF/DWG. The information provided on the Surveyor's plan is normally measured from a particular Datum. Most site plans are given relative to sea level and some are given relative to a fixed location near or on the site. To make the most of the information provided, you should model your site in its true given location, relative to the levels given to you by your surveyor. By doing this you are inputting the true heights given for the site, reducing the possibility of mistakes by trying to reduce the levels yourself and keeping your model consistent with the information provided by the surveyor.

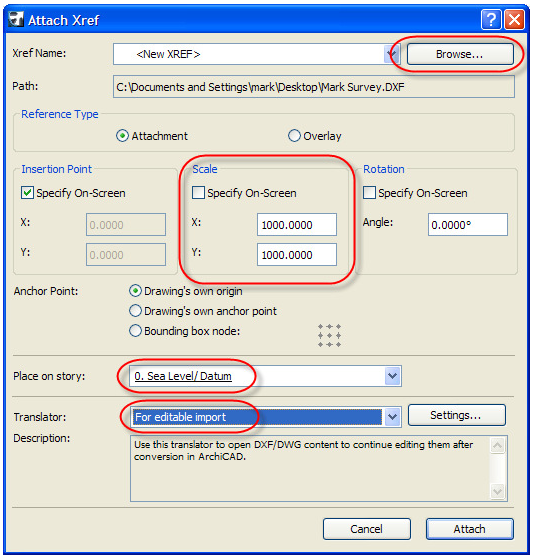
Importing survey information

Importing a DXF or DWG file quickly and in a manageable method is very important in extracting the information from these files efficiently. To this end we will **Attach** the file as an **Xref**. Having the surveyor's file as an Xref groups the layers prefixed with the name of file in the Layer List, and cleans up all attributes associated with the Xref when it is removed.

As the surveyor's drawing is an external document we are going to store it in an *Independent Worksheet*. Right Click on the **Worksheet** tree in the Project Map and choose **New Independent Worksheet**. Give it an appropriate Name and ID and click **Create**.

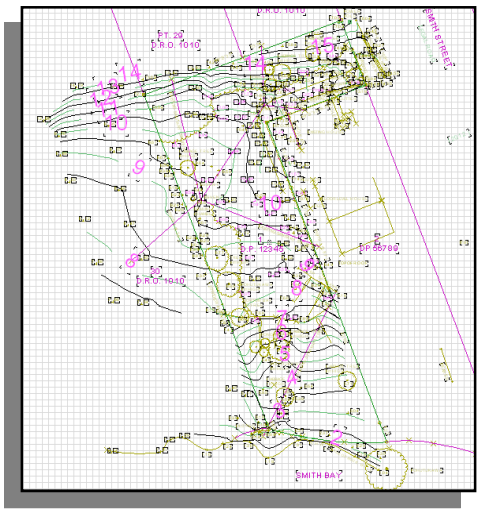
Select **File> External Content> Attach Xref**

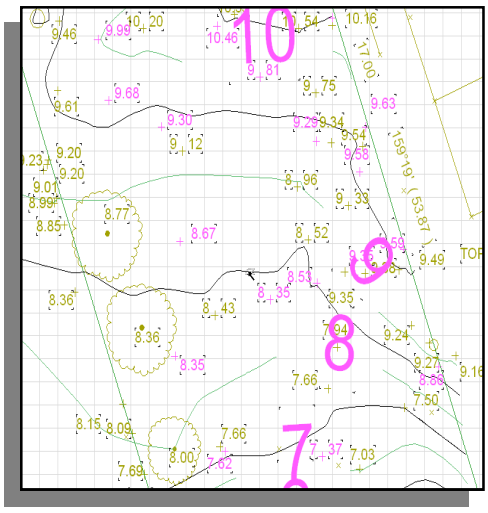
- Browse for the surveyor's file then click **Open**.
- When selecting a scale factor we need to know what scale the surveyor has used, typically this is 1:1 but as surveyors use meters rather than millimeters, we set the x & y scales to 1000. Set the file to come in on Story 0 and set Translator to 'For further editing'
- Place on Story 0
- Set Translator to **For editable import**



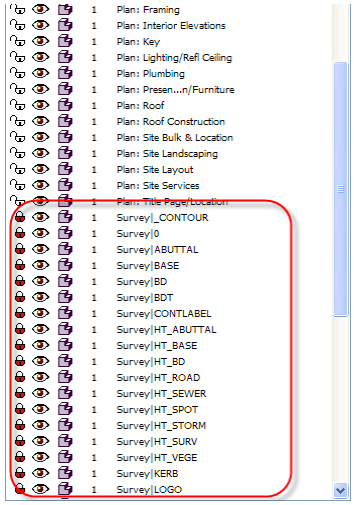
Use the **Fit in Window** to locate the survey; it maybe a long way from your project origin.

Once you have successfully imported your survey plan, you may find (as shown here) that there is extensive detail, text and lines making the plan very hard to work with.





To make things easier we suggest you open up the **Layer Manager** (**Ctrl+L** PC or **Command+L** MAC) and turn off any layers which are not needed for creating our mesh. The Xref layers will be grouped at the bottom of the layer list with the Xref file name as the Prefix. For now you will only need the contour lines and survey boundary of the site.



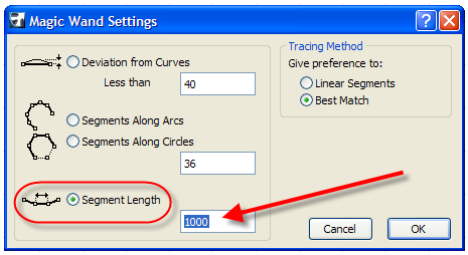
Now Save a View of the Survey drawing so you don't have to remember this layer combination. You can use a *Custom* layer combination as we don't need to recreate the view.

Double click on your **0 Story level** in your Project Map. **Important:** Make sure you are on the 'zero story' of your project because this is the 'project zero' which we will use as our Sea Level / Datum to measure from.

Now right click on your Saved View of the Survey Drawing and choose **Show as Trace Reference**. Again **Fit in Window**; the survey is again a long way from your project and user origin. Use **Drag Reference** to move the Trace Reference of the survey back to the project origin. At this point if you know the orientation of your building on the site you can rotate the Trace of the survey to orientate the site to your proposed building.

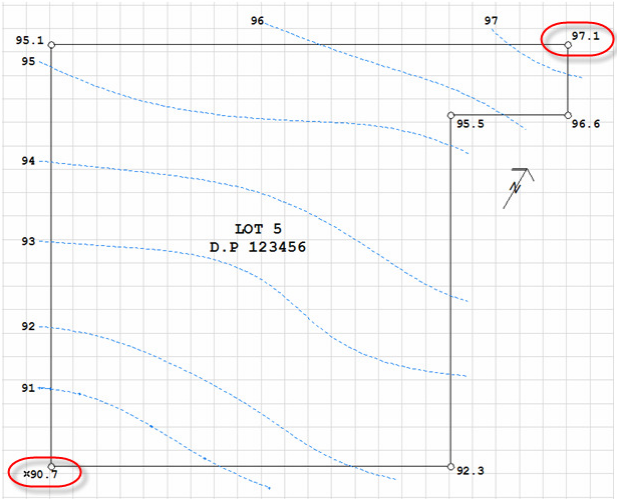
Once the plan is easier to read we can then select the 'Spline' tool from the ArchiCAD tool box. Using the 'Magic Wand' (hold down the space bar); we can now convert the surveyor's contour lines into ArchiCAD lines by clicking on them. If your contour lines are broken with the contour text it may be easier to manually trace the contours with either the 'Spline' tool or the 'Polyline' tool.

When you have applied splines to all of your surveyor's contour lines you should now open up the settings of your 'Magic Wand.' **Options**> **Magic Wand Settings**, activate 'Segment Length' method and enter in the smallest segment length you want to have on your physical mesh contour. For this example we have set it at **1000**mm. Now click '**OK**.'



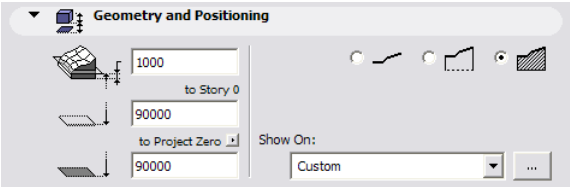
Creating you Mesh

Have a close look at your imported DXF/DWG and find the lowest level given on your site.



This particular plan has been measured relative to 'Sea Level' and has a lowest point of '90.7m above sea level.' The site has a highest level of 97.1m so overall the site has 6.4m of fall across it from 97.1 to 90.7m at the lowest point. The contours are measured at 1m intervals and site peg (corner) levels have been given.

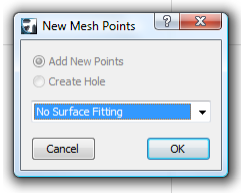
Open up the 'Mesh' tools default settings by double clicking on the 'Mesh' tool icon. Under the 'Geometry and Positioning' tab you will need to input your lowest site level into the field shown here. In our situation we have a lowest level of 90.7m so it is recommended you use the **nearest round meter** below your lowest level. In this case it would be 90m (90000 mm).



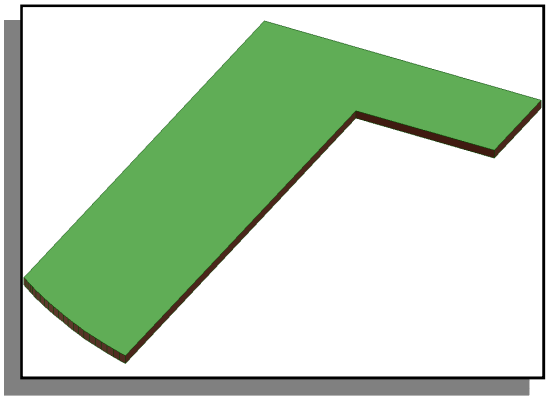
This will elevate your mesh to or slightly below the lowest point of your site when you first model the shape.

Close the mesh settings once you have input your lowest level and set the settings to your requirements. Using the mesh tool draw around the perimeter boundary of the site or, alternatively, you can 'Magic Wand' the perimeter line of your site and the mesh should take on its shape.

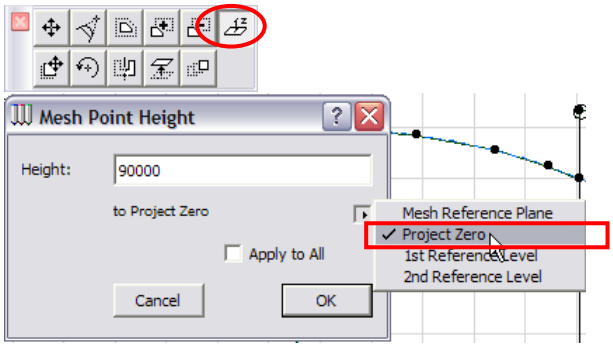
Once you have completed your shape you need to create your Mesh Contours. Making sure that you are on the **Mesh Tool** and your mesh is selected, you now need to 'Magic Wand' your splines that you created previously one-by-one. A dialog box will pop up when you 'Magic Wand' each of your splines. Always choose **No Surface Fitting** from this box.

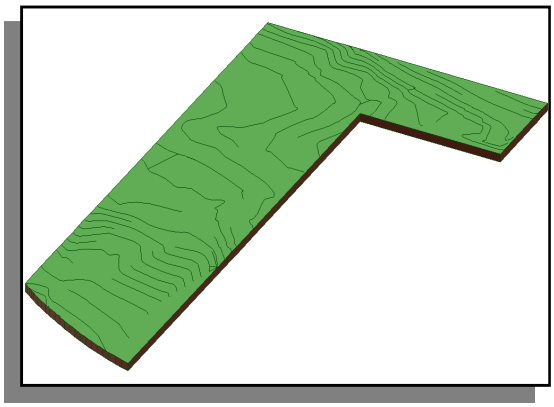


TIP – It may be clearer to hide the Xref layers before Magic Wanding the splines.



If you need to create Spot heights: with your mesh selected, and the Mesh Tool selected in the Toolbox, set the mesh Geometry method to Polygonal and double click on the Spot location. As before, choose **No Surface Fitting** and click **OK**.

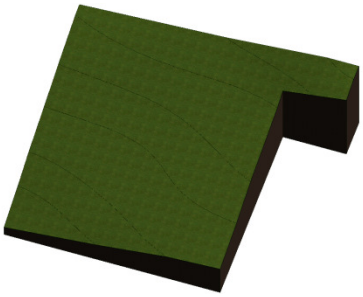




The next step is to give your mesh height by selecting a contour or corner node, clicking on it and choosing the 'elevate mesh point' command from the pet palette. At this point it would be a good idea to turn back on the layers containing the spot and contour level labels from your surveyor's plan.

You will be prompted with the 'Mesh Point Height' dialog box. Set the height to measure from 'Project Zero' rather than the default 'mesh reference plan' and then input your survey level provided e.g. 90,000, 91,000 etc and be sure to choose **'Apply to All'** if editing a contour line.

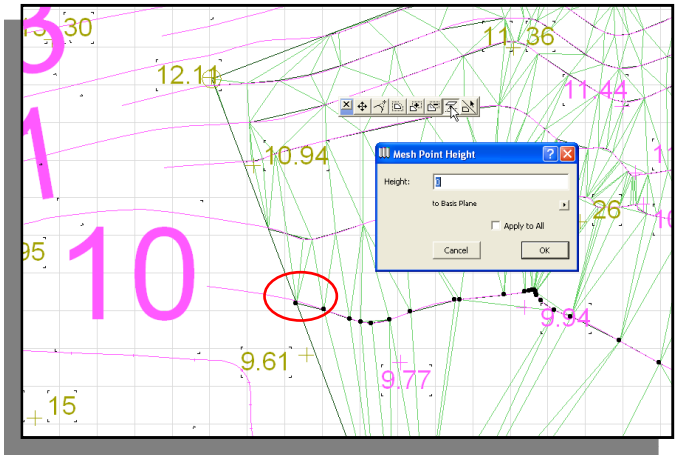
> **Important:** You must ensure you are measuring relative to 'project zero' because this is our datum and it allows us to put in the true survey levels. If you measure from 'mesh reference plane' the levels you put in will measure from the top surface of the mesh and you will end up with a 'Skyscraper mesh' as shown below, one of the most common mistakes made by ArchiCAD users.



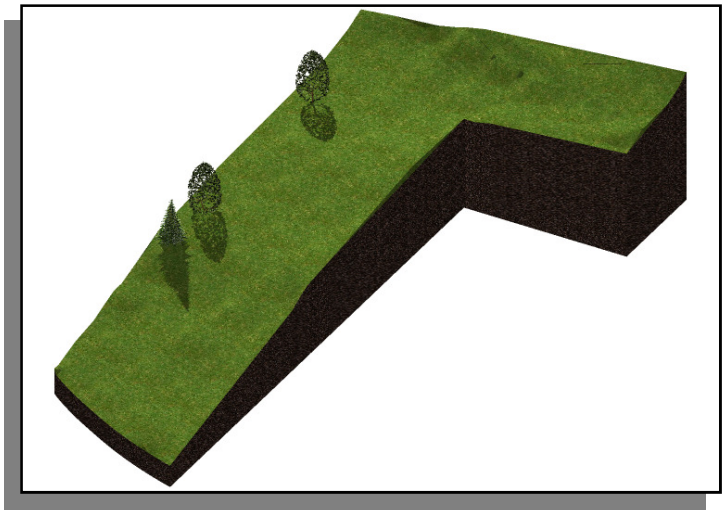
Project Zero

Mesh Reference Plane

You may find in some instances end nodes that sit on the intersection point of a contour line and the boundary of a mesh may sometimes require individual heights allocated to them too. It is a good idea at this point to view your mesh in your 3d window to determine which mesh points are still sitting at zero and need to be edited.



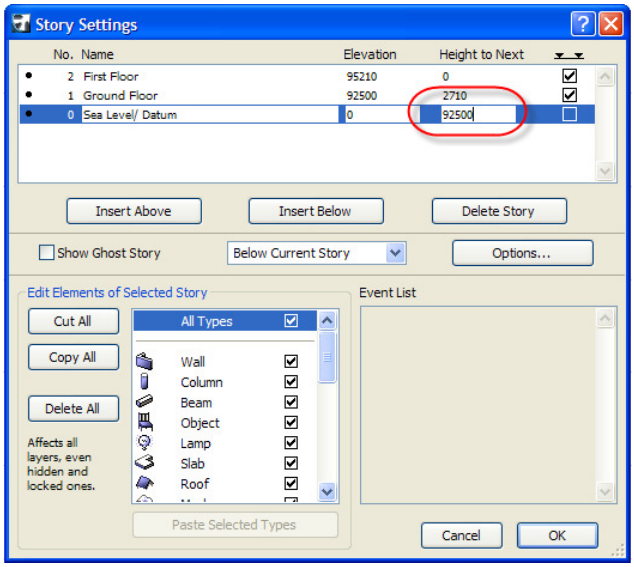
Once all mesh points and contours have been given heights you will now be left with your three dimensional site mesh.



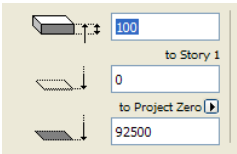
Setting up Stories

Now that your mesh is complete you can decide on the finished floor level of your building and set up your stories to match. From ArchiCAD's **Design** menu you can open up **Story Settings**.

Up until now we have been modelling our site and it has been on 'Zero Story' ArchiCAD's 'Project Zero.' Because this story has been used as our datum it should be named appropriately, in this case 'Sea Level.' Do not use this story for your Ground Floor as it will not be relative to your mesh. Put your desired Finished Floor Level height in the 'Height to Next' field of your 'Zero Story' and 'Insert Above' your Ground Floor. In this case we have set our finished floor level to be 92500 (92.5m) above sea level. By setting our finished floor level relative to sea level we are giving an accurate height corresponding to our surveyor's data.

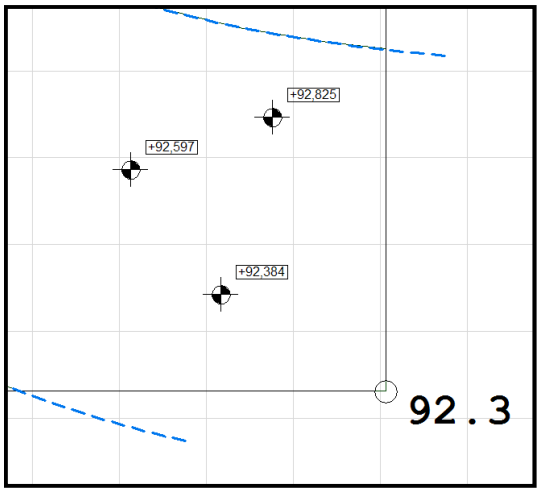


Under most of the modelling tools you will now find you can set a height relative to the story you're on or to your 'Project Zero'/'Sea Level.'

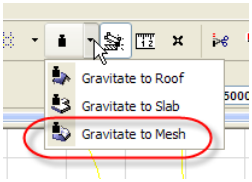


Relative Spot and Elevation Levels

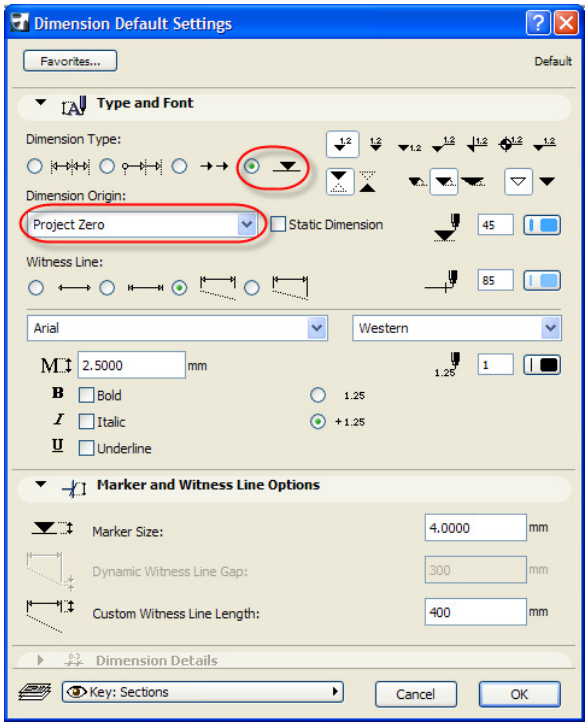
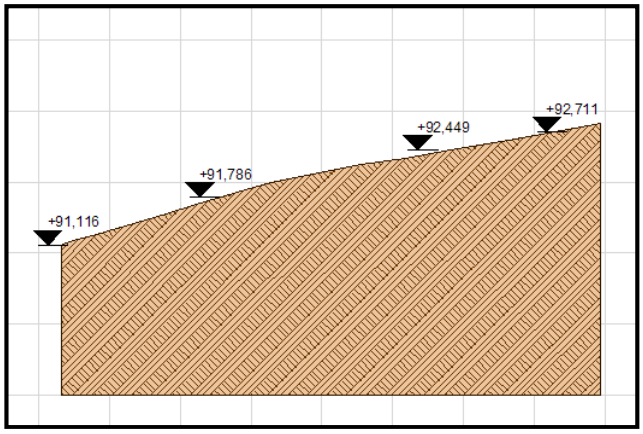
Now that you have a mesh modelled relative to your Surveyor's data you can now generate your own spot levels that may be currently unknown. To do this just activate the 'Level Dimension Tool' and set ArchiCAD's 'Gravity' option to 'Gravity to Mesh' and 'To Project Zero.' 'Gravity' can be found on your 'Standard Toolbar' along the top of your screen. Select **Gravitate to Mesh**.



Now all you have to do is click on your mesh at the desired spot level locations and you will get 'relative' spot levels.



You can also place 'Elevation' levels using the 'Dimension' tool



Go to a section or elevation window. Open up the 'Dimension' tool setting by double clicking on the 'Dimension' tool icon. Set the 'Dimension type' to 'Elevation Dimension.' This will change the interface allowing you to set the 'Dimension Origin.' Make sure it is set to 'Project Zero' (Sea Level) and now place the dimensions the same as you would with a standard dimension. Click on any point to dimension and then double click to finish. Now click the placement hammer to place the dimension label.