

What is Geomaps?

Geomaps Mapping Service is Auckland's Geographic Information System (GIS).

It is useful for obtaining Satellite Imagery and DWG / Vector files to use for modelling, in this example Rhinoceros. Geometry for contours, building footprints and roads can be used for digital site models.

This tutorial will detail the process of extracting the information, importing it to Rhinoceros and using the information to fabricate a physical model (CNC / 3d Printing / Laser Cutting)

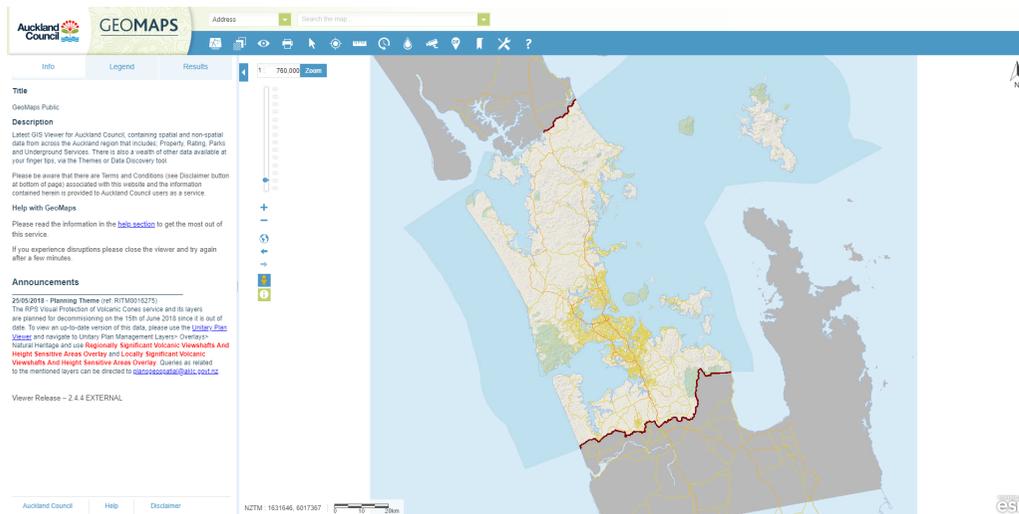
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1. GEOMAPS DATA EXTRACTION

Interface

Selecting DWG data to download

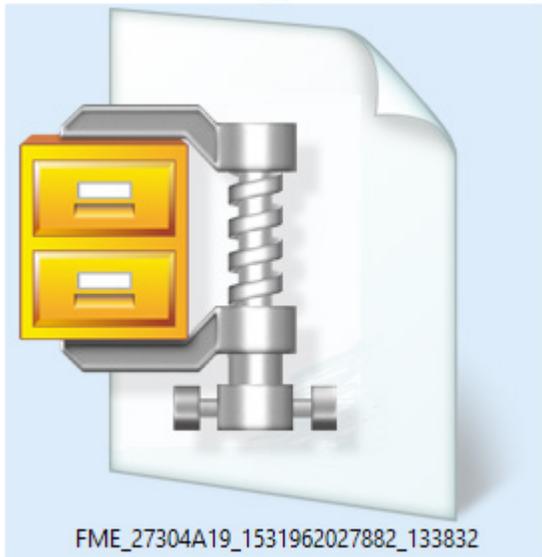


Interface

Collecting the geometry to import into Rhinoceros begins from Geomaps:
<https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>

The Auckland Council Website also provides more in depth guides to using Geomaps:
<https://www.aucklandcouncil.govt.nz/geospatial/geomaps/Pages/default.aspx>

Note: If your site is outside of Auckland then you will need to use a different resource to find DWG information to import to Rhinoceros

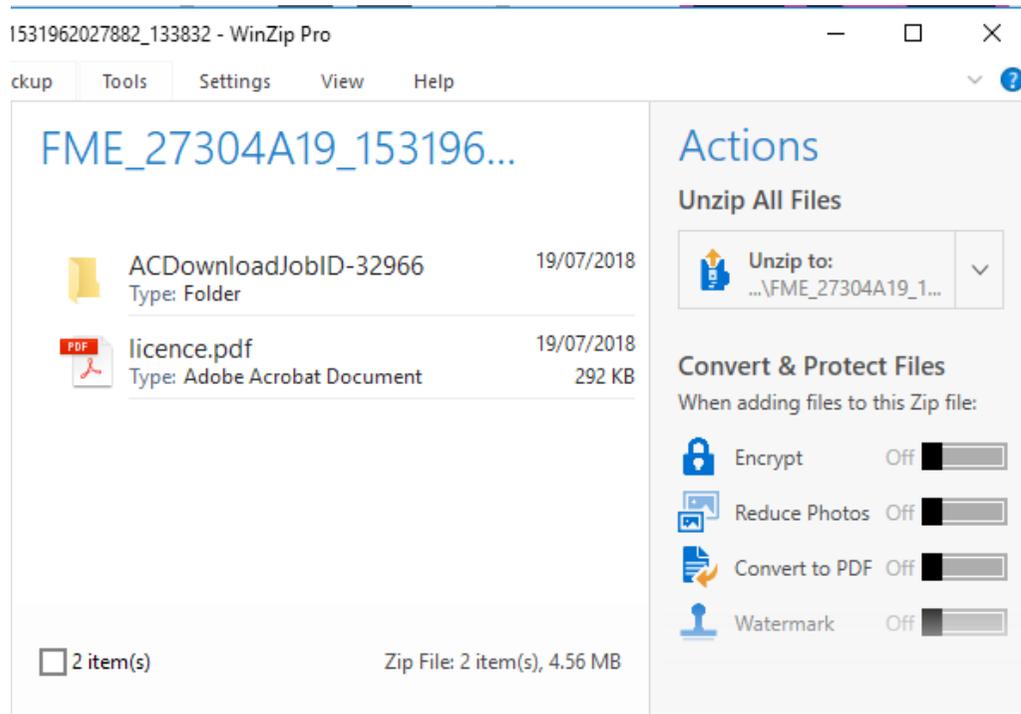


2. IMPORTING / PLACING IN RHINOCEROS

Unzipping the file

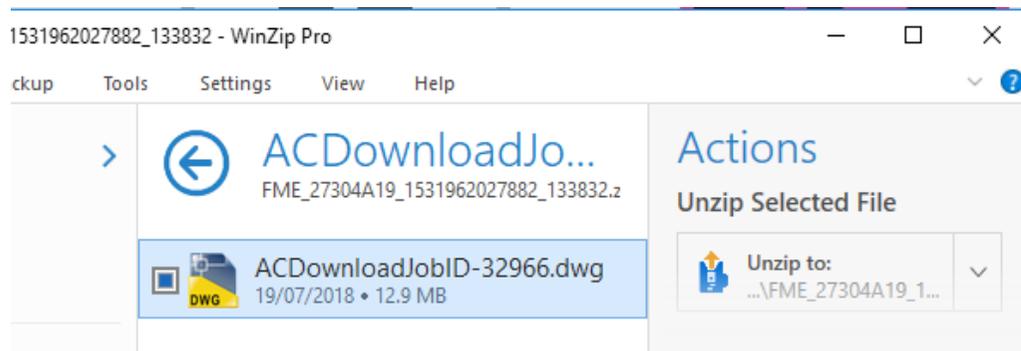
Importing into Rhinoceros / Scaling

Managing the Layers of the file



Unzipping the file

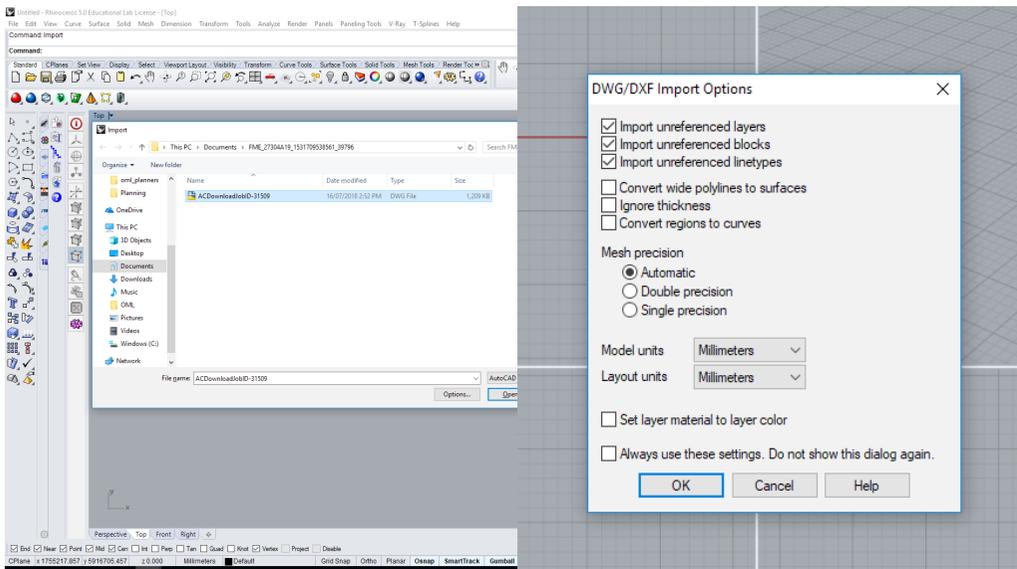
In the downloads folder, the zipped file will need to be extracted.



1. Open the file, and in the middle panel, open the folder "ACDownloadJobID..."

2. Select the DWG file

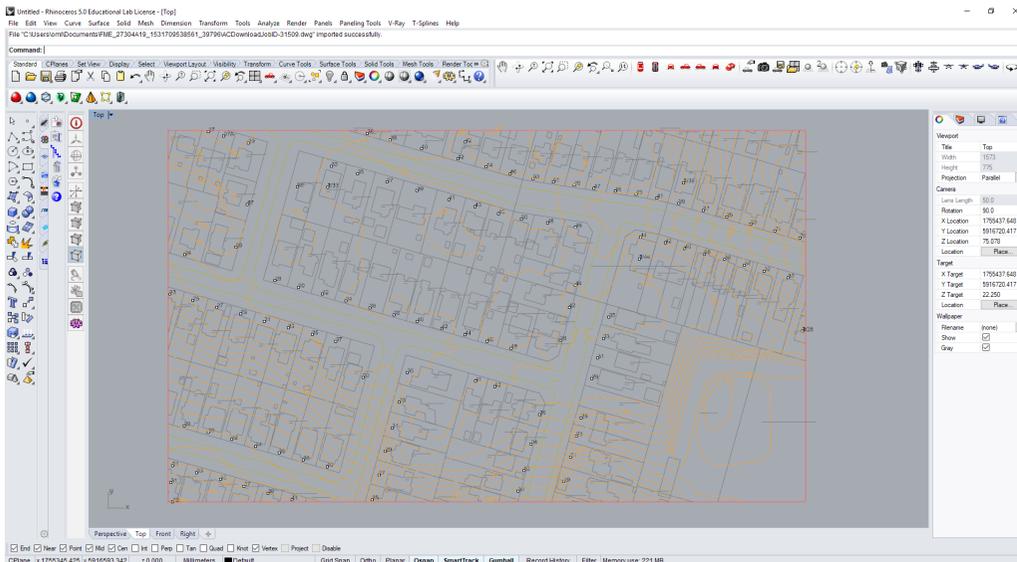
3. In the actions panel, click the drop down arrow to locate where you want to save the file. Click "Unzip to:" The resulting file can be imported into Rhinoceros and other compatible Softwares

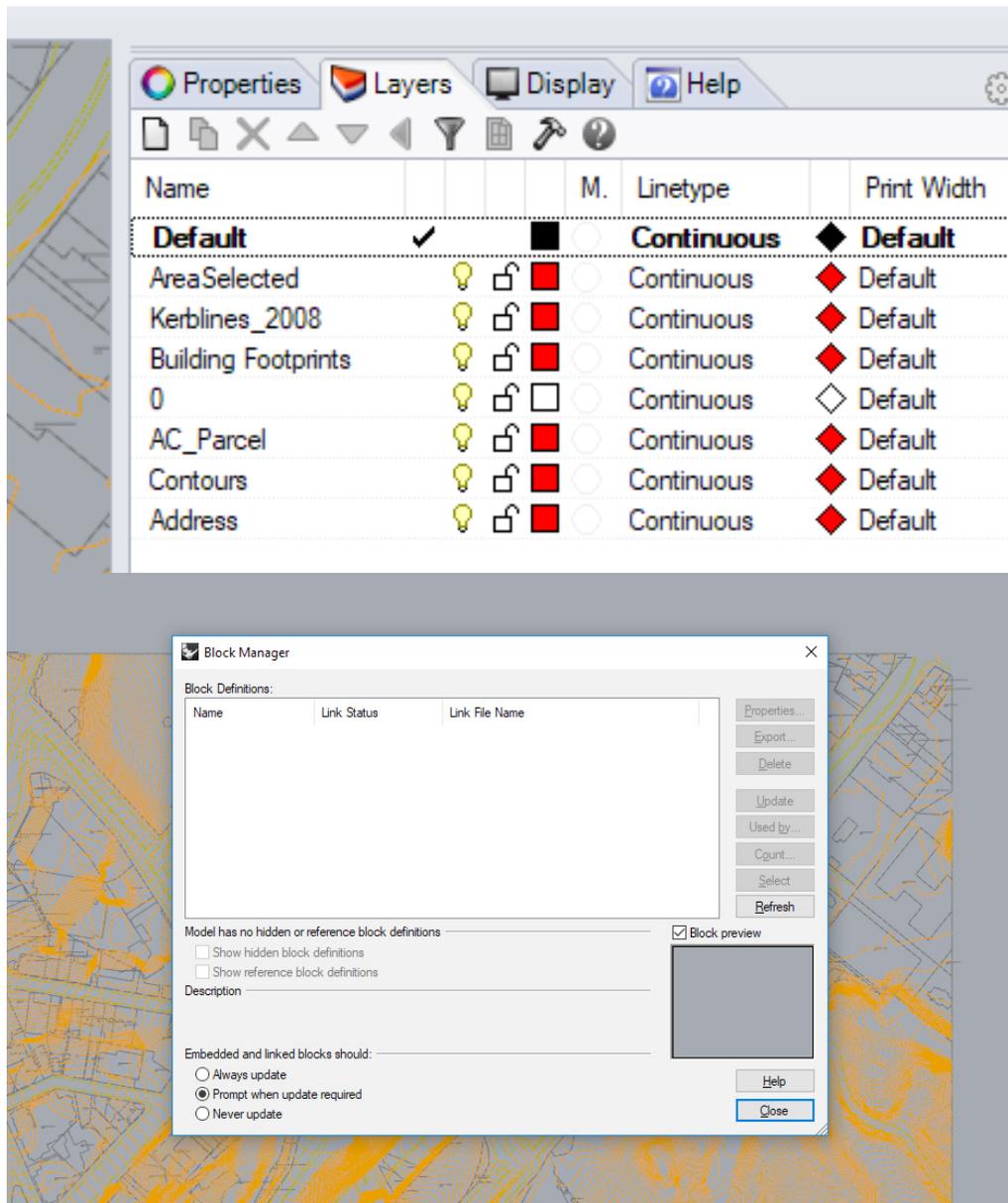


Importing into Rhinoceros / Scaling

1. On Rhino, type in *Import*, and with the default import options, click OK.
2. The Geometry will import in separate layers, and at scale 1:1000.
3. Working at any scale will be fine, but if needed, change to scale 1:1 by selecting the model, typing *scale*, clicking once and type 1000.
4. The Model is most likely nowhere near the origin point (shown by the grey grid). Moving the model to the origin will help processing speed and exporting later on. Select the model, type *move*, click on the top right corner of the model and type 0.

Note: Moving the top right corner to the origin ensures that the area to the top right of the origin is clear of geometry when using Make2d later.





Managing the Layers of the file

1. Each layer from GeoMaps imports into its own layer in Rhinoceros. The layers *AreaSelected*, *0* and *Address* can be deleted.

2. The geometry may contain Block Instances which should be turned into curves instead.

SelBlockInstance > Explode

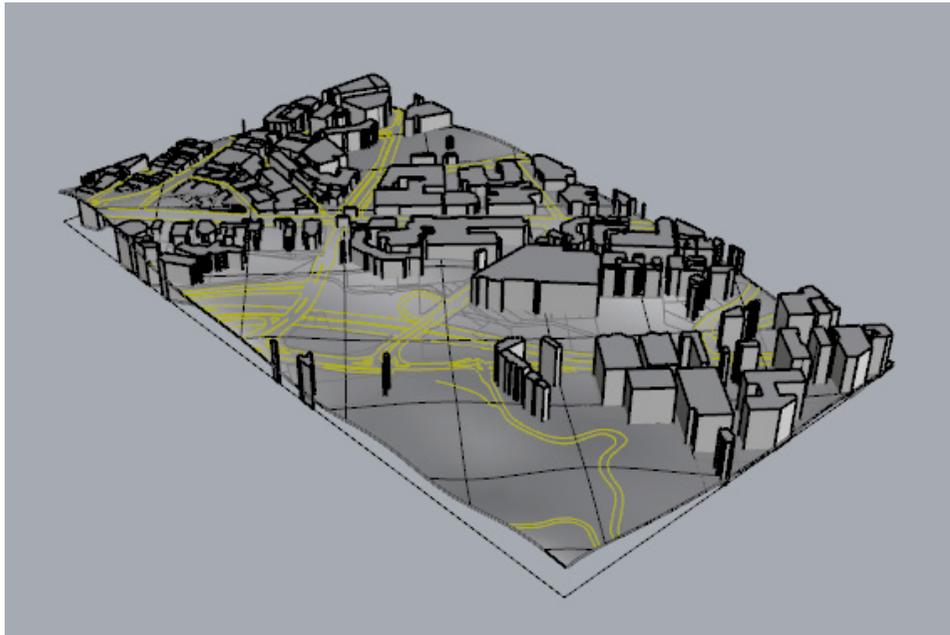
3. If the layer *AreaSelected* is unable to delete if it contains Block Definition, they can be deleted with the command *BlockManager*.

4. There are text objects in the *Contours* and *AC Parcel* layers. They may be useful later but for this tutorial they should be deleted or hidden.

SelText > Delete/Hide

5. Double Lines can create errors in the model.

SelDup > Delete

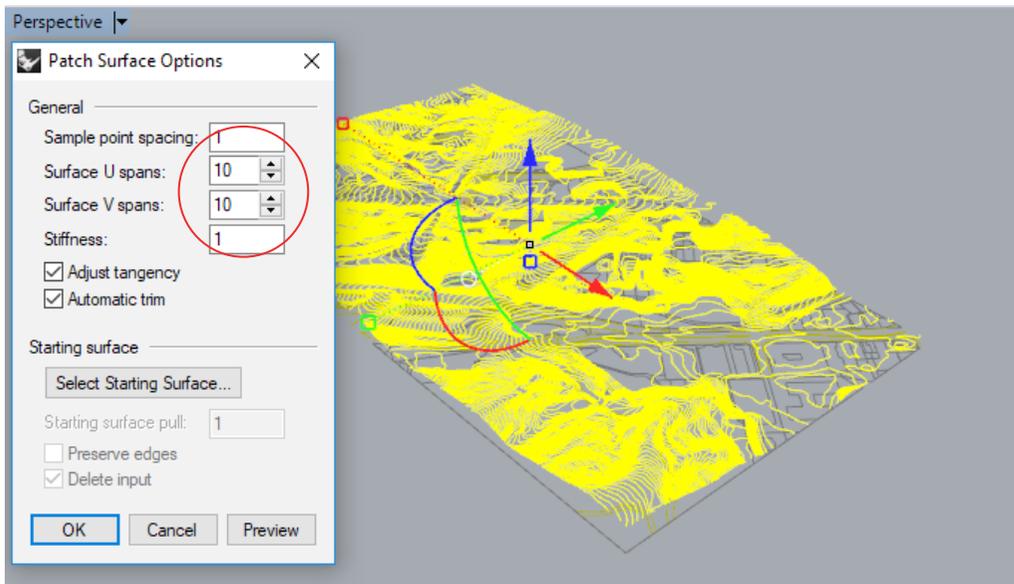


3. MODELLING A SITE FROM DWG

Creating a surface terrain from Contours

Projecting Geometry onto the terrain

Modelling the buildings



Creating a Surface terrain from Contours

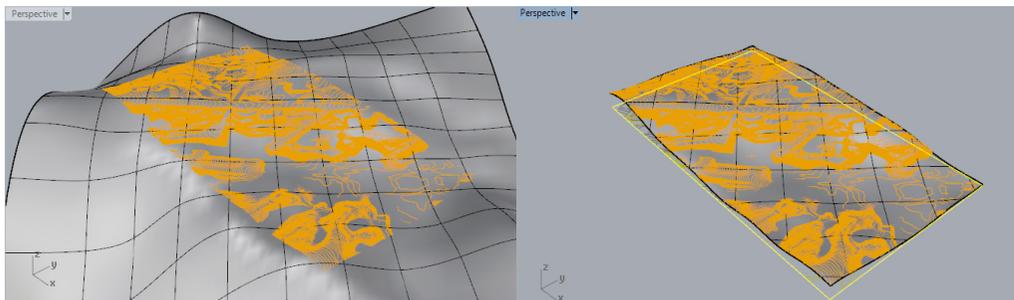
1. Within the model so far, there are text objects that label the contours. Hide/Delete these objects so that they do not interfere in the coming steps.
 Select > Hide (or Delete)

2. Select the Contour Lines either by manual selection or, with the Layers menu:
 Right-Click Contours layer > Select Objects > Group

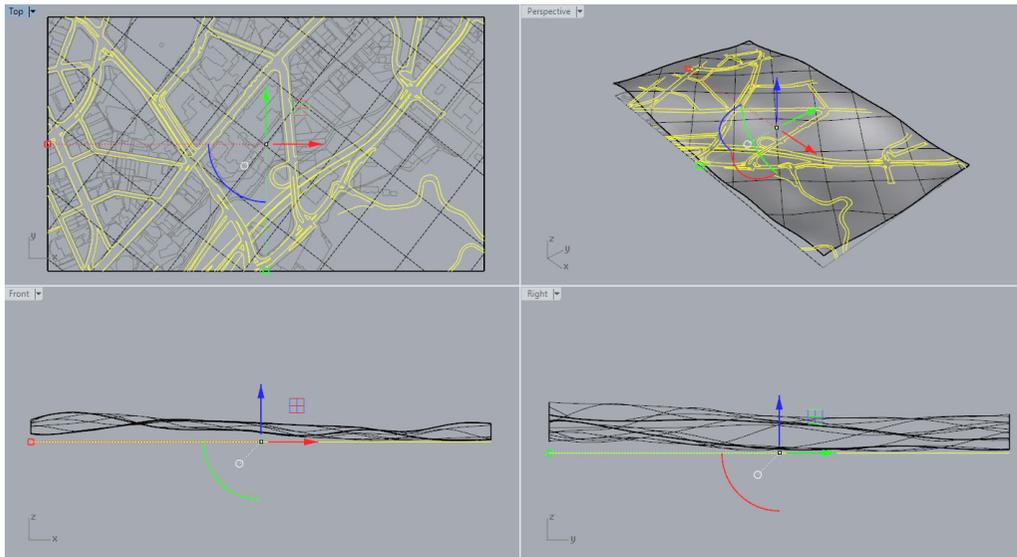
Note: Grouping the objects as you go makes file management faster rather than selecting by layer every time later on.

3. With the contour lines selected, the surface is created with the *Patch* Command.

Note: The default options will create a surface with a vague resolution. To make a surface that follows the original Contour Lines the best, increase the "Surface U spans" / "Surface V spans" values. In this case, the default 10x10 grid is used.

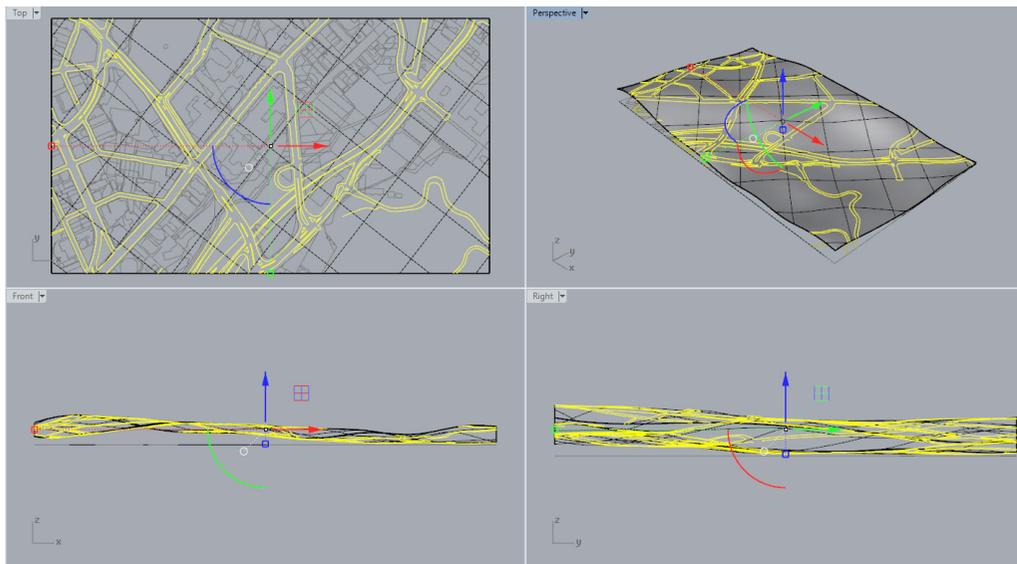


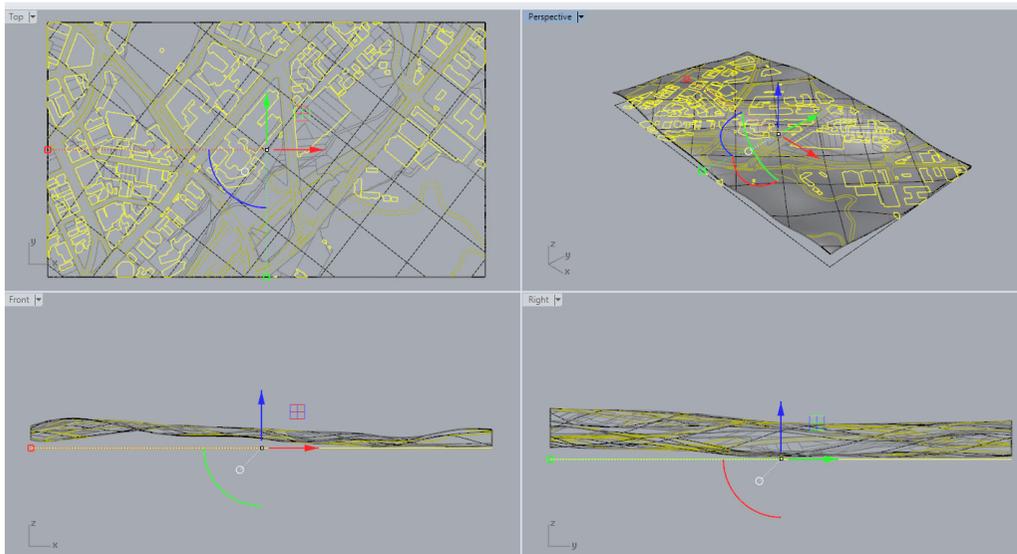
4. The patched surface may take some time to load. once complete, there will probably be excess surface that extends past the boundary. To remove this, draw a rectangle over the model and use the Trim tool to remove the surplus.



Projecting Geometry onto the terrain

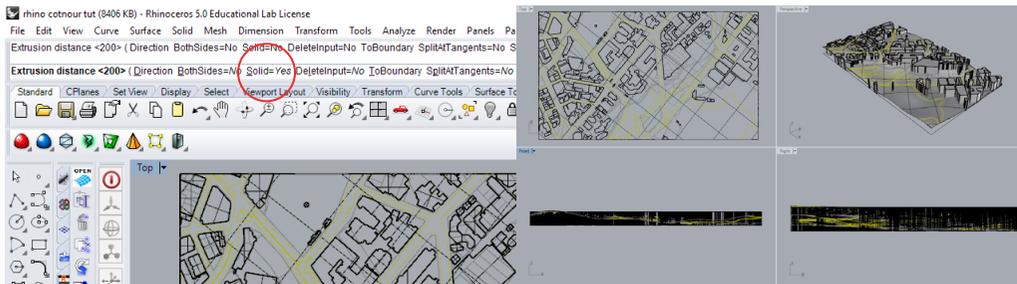
1. Both the Kerblines and AC_Parcel Layers should be applied to the surface terrain. Begin by right clicking on the Kerblines Layer on the Layers Menu and Click "Select Objects"
2. Project > Click on the Patch Surface
3. Group the new curves to make selection later on easier.
4. In the Layers tab, either Delete or Hide the original 2D Kerblines as they are not needed any longer.
5. Repeat the same steps with the AC_Parcel Layer.





Modelling the Buildings

1. Select the Layer Building Footprints through the Layers Menu
2. Type ExtrudeCrv; ensure Solid=Yes in the tool menu
3. Estimate the height of extrusion and press Enter. The heights of the buildings can be easily adjusted with the Gumball tool.





3. FABRICATION WITH CNC

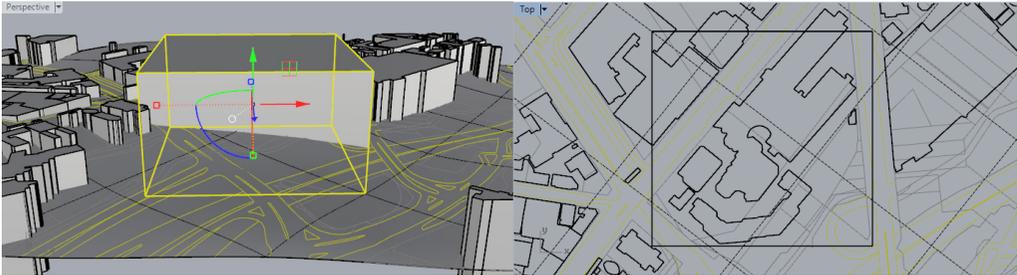
Trimming the model to scale

Placing Building Footprints into terrain

Modelling roads and kerbs

Engraving Parcel Lines

Completion of CNC file preparation



Trimming the model to scale

1. Select the entire model and scale it to the desired scale. This model was scaled to 1:1000.

Select Model > Scale > Click on Model once > 1/1000 > Enter

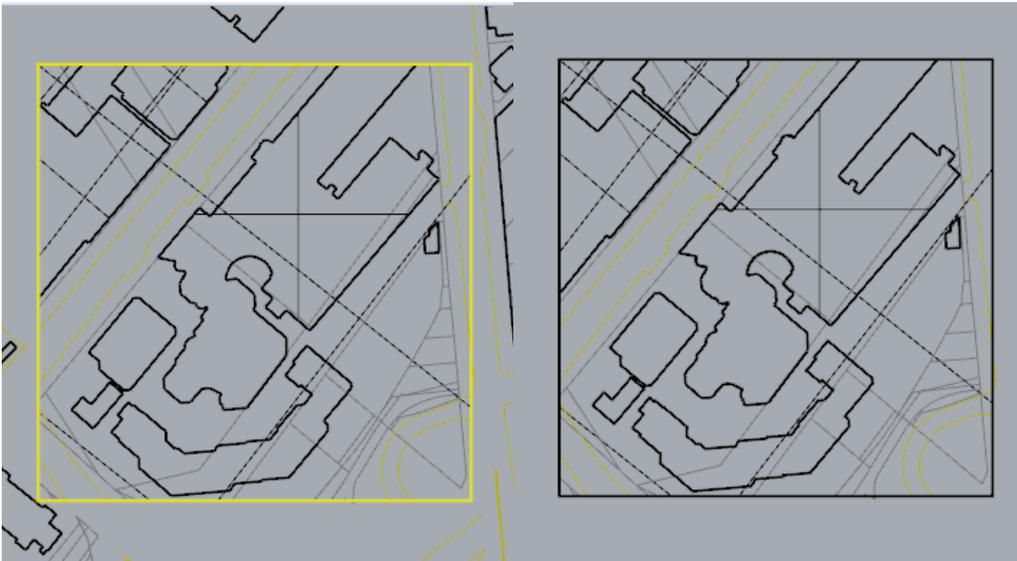
Note: Preserve the original 1:1 model by copying the model to another area in the file or saving it in a duplicate file.

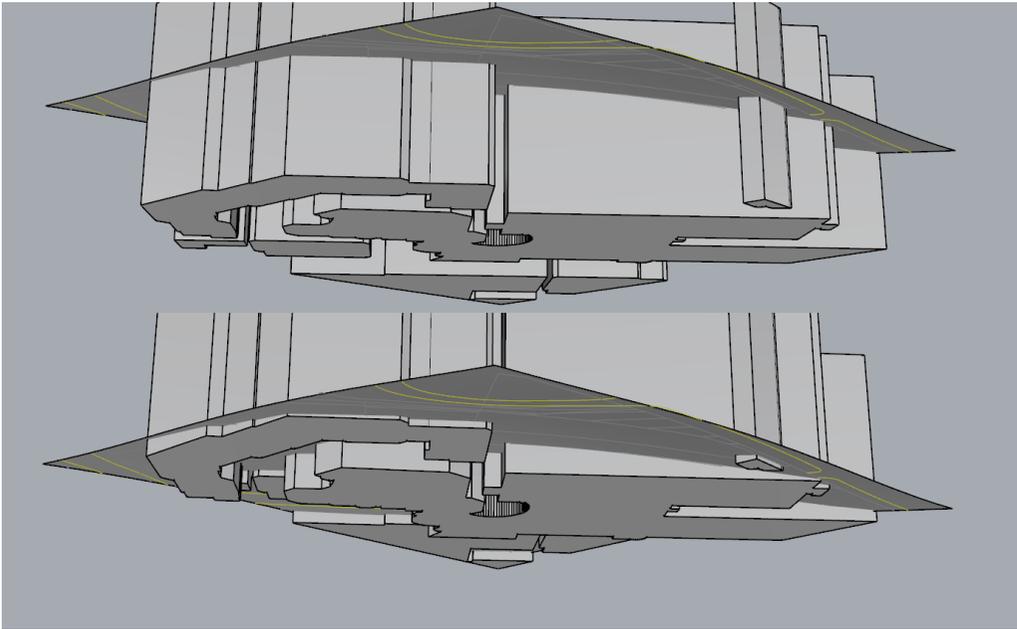
2. Type ZS (Zoom Selected) to zoom into the model.

3. Draw a box with a width and length of the final model. The height must be tall enough to intersect through all the geometry.

4. Select the box and use the Trim tool to delete all the outer geometry that intersects with the box.

5. Some of the geometry outside the box would not have been deleted as it did not intersect with the box. These can be manually deleted.





Placing Building footprints into terrain

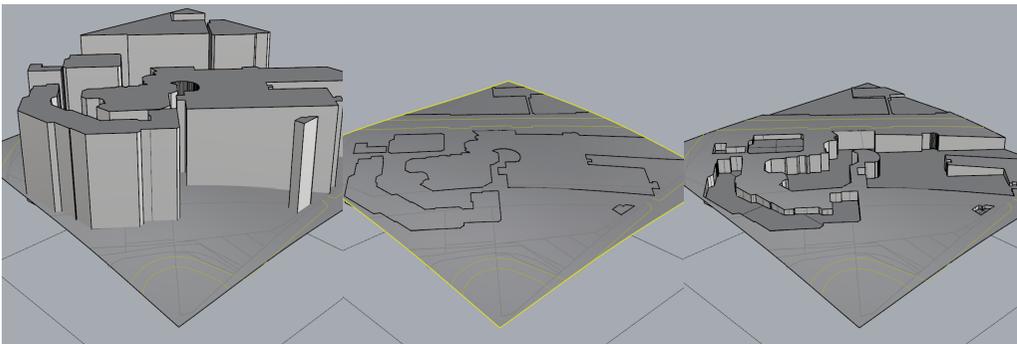
1. Viewing the model from underneath, use the gumball tool to move the building extrusions upwards so that the entire bottom face sits below the terrain, but with the lowest indentation possible.

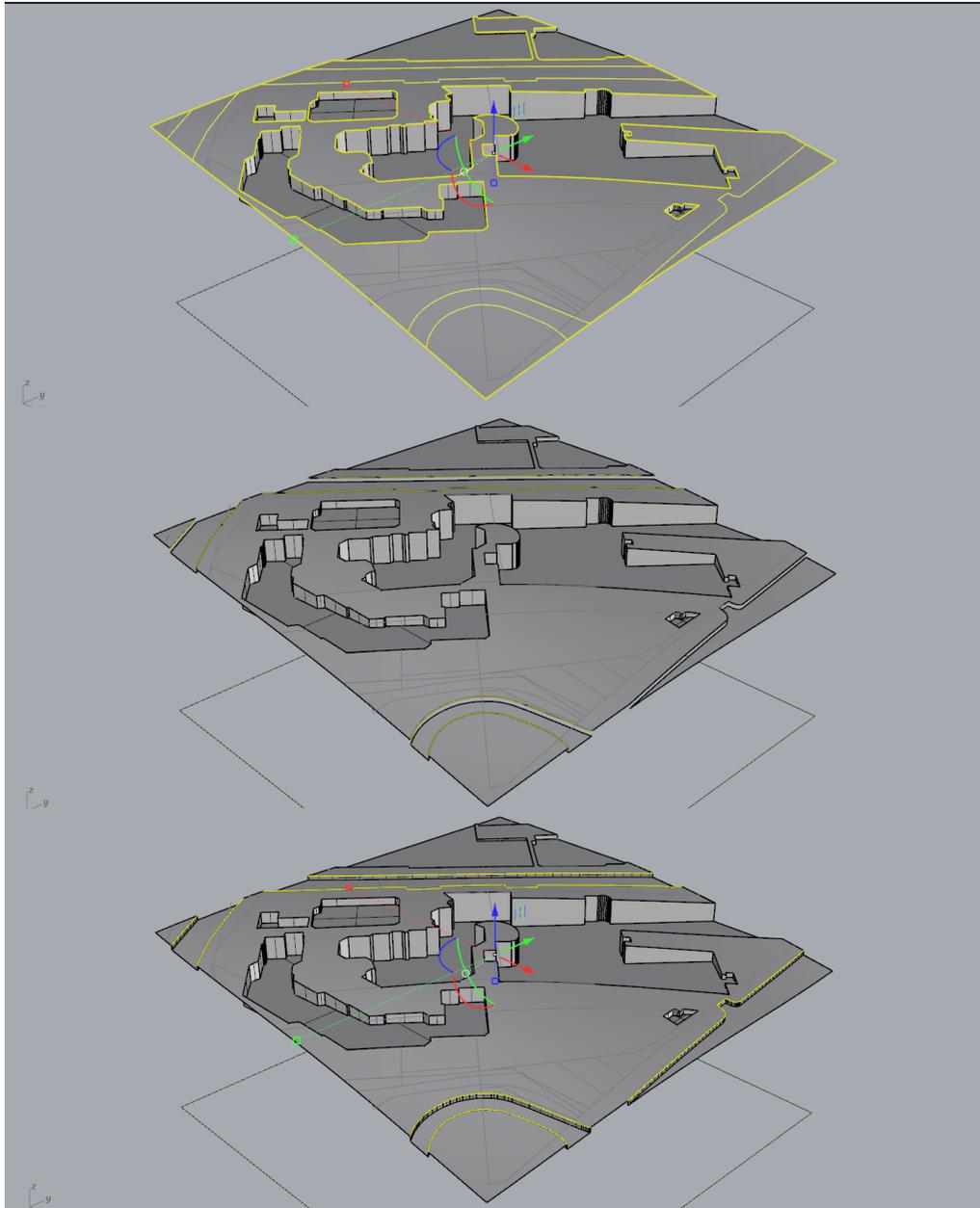
Note: The heights of the buildings do not matter at this stage, as long as the extrusion runs past the surface of the contour.

2. Selecting both the building extrusions and the terrain, use the Trim command.

3. Begin by trimming away the top halves of the buildings so that only the lower parts remain.

4. Using the leftovers of the extrusions, delete the parts of the terrain where the building footprints intersect.





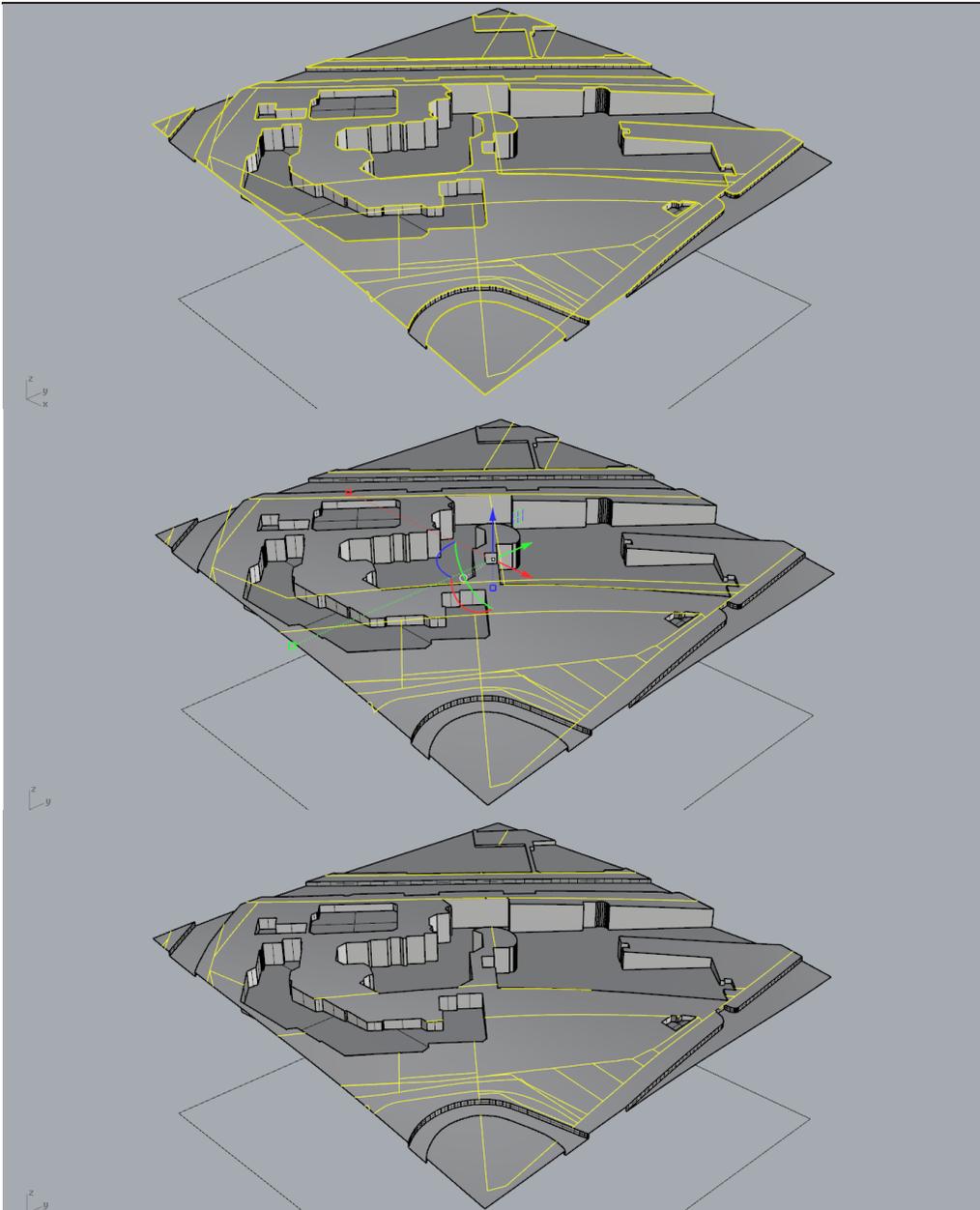
Modelling Roads and Kerbs

1. Select the terrain of the model and use the Split command
Split > Select Kerblines Layer > Enter

2. The parts between the kerbs are now isolated and can be moved down (ie the Roads). Select these and move down by the height of the kerb, but to the scale of the model.

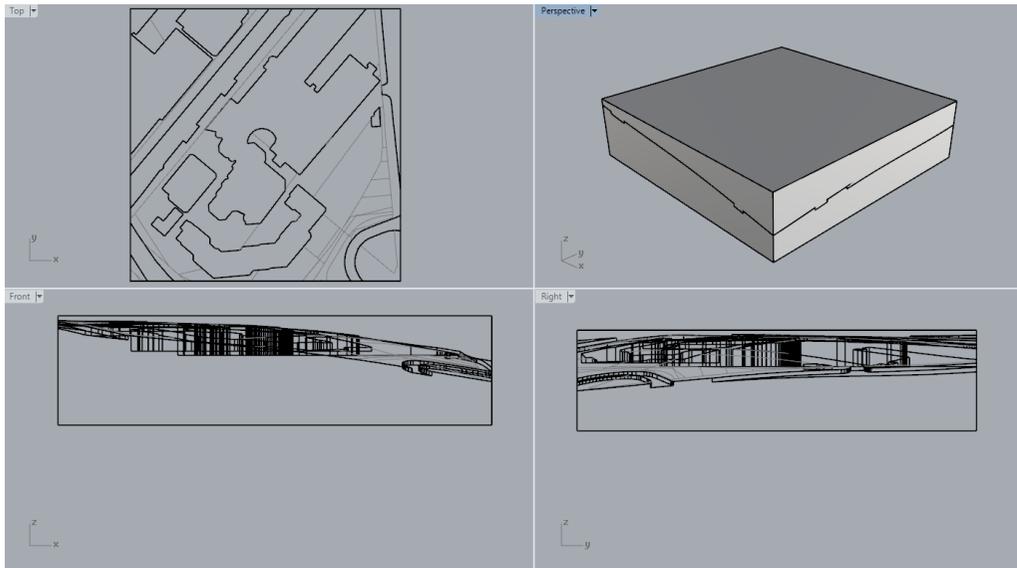
Note: This model is at 1:1000 so a kerb at this scale is not visible. So moving it down at 1mm will ensure it is visible in the finished model.

3. Using the same Kerblines Layer, extrude these lines downward to meet the roads.



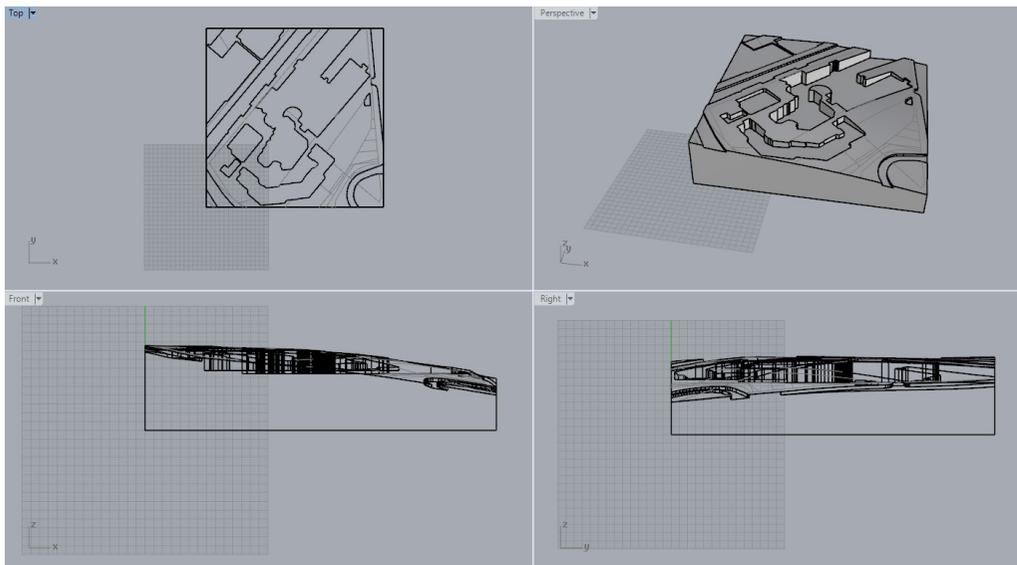
Engraving Parcel Lines

1. The AC_Parcel layers can be engraved onto the model but it is made more efficiently if the lines are removed where the building footprints are.
2. Select the layer AC_Parcel and use the Project tool
Project > Select all parts of the terrain (Not the Kerbs or the Roads) > Enter
3. The result should be the same set of lines as before but they will only be on the original terrain surface, not the roads or inside the building footprints.



Completion of CNC file preparation

1. Using the original outline used to trim the original model to the size of the CNC file, extrude the shape to the height of your stock material. It can be shorter than the material but making it higher can create issues with the cut file.
2. Move the box so that the entire model is within its volume.
3. Trim away the top part of the box, using the model as the cutting object.
4. Select everything and use the Join Tool.



5. To complete the file, it should be moved to the origin. Use the move tool, and click on the lower left corner of the model and Type 0. This will move the model to the origin and to the +X and +Y area of the Rhino Viewport.
6. Ensure that only this model and nothing else is on the file.

Note: There should be two parts to the model:
The terrain of the model and the box underneath it (this should all be joined by now as one polysurface), and a set of lines.