SOFTWARE

MANCHESTER | URBAN DESIGN | LAB

MUD-Lab Toolkit

SketchUp Pro

SketchUp Pro is a vector based software that we use to create 3D graphics. It is a user-friendly software compatible with AutoCAD, Twinmotion and Ai. We use it to build our mass model, based on the CAD drawing, and to prepare the model for the final presentation in Twinmotion. This handout aims to familiarize you with SketchUp as an affective and flexible 3D visualization tool.

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'Manchester Urban Design LAB (2020) '***MUD-Lab Toolkit: SketchUp Pro*** accessible at www.seed.manchester.ac.uk/mudlab

1- INTRODUCTION

SketchUp takes a central position in the Technical Framework as it represents the starting point for producing all our 3D work. You will use the software to create serial vision shots, doing basic 3D analysis for site existing condition, exploring design alternatives and presenting the final design rough structure and getting it ready for Twinmotion rendering.

The process of using the software is simple. There are two way that we can use SketchUp based on the version you have:

SketchUp Free: This is a free online software that allow you to create 3D graphics based on raster scans (i.e. JPEG image of your master plan). You basically need to race over the lines you created in the master plan manually in order to vectorize the work. This version, while useful, has its limitations in terms of importing and exporting extensions. Only use it if you have no access to SketchUp Pro. You can find I from here:

https://www.sketchup.com/plans-and-pricing/sketchup-free

SketchUp Pro: This is the paid version of SketchUp and it is available in the University computer clusters 2.1 and 2.2. While SketchUp Pro can import images and use them as a ground just like the free version, it can also import .DWG AutoCAD drawings and use them as a vector base map to create the 3D space. You do not have to trace every single line to vectorize the base map. This is particularly useful when we are working on large projects such as masteplanning projects. As long as you have access to SketchUp Pro, you should use it

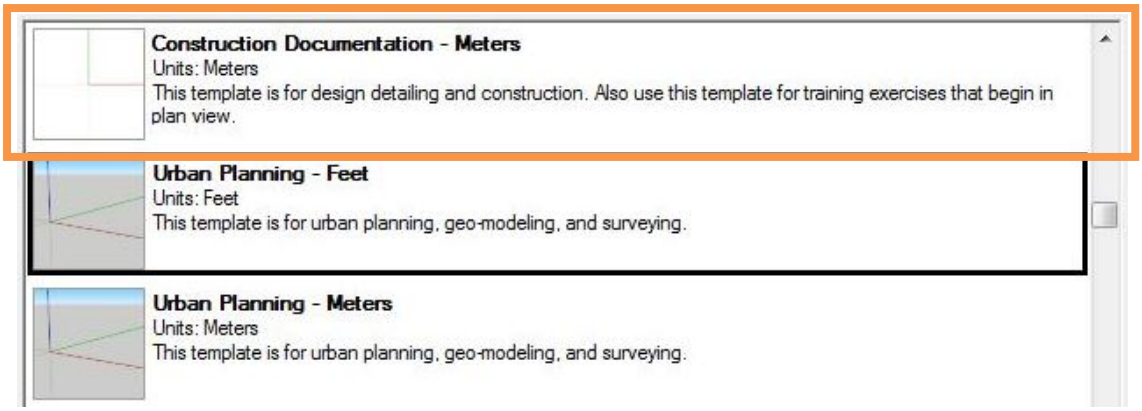
This handbook ***and*** the technical sessions should make you familiar with the software and how to use it to produce your 3D graphics professionally.

Disclaimer: this handbook does not replace the technical sessions. You must attend the technical session to get the full learning package.

2- Starting SketchUp Pro

1. Open SketchUp

2. A screen may show up asking you to select your preferred template, you should select ***Urban Planning/Meters*** *(or Urban Planning/Feet if you prefer this*)

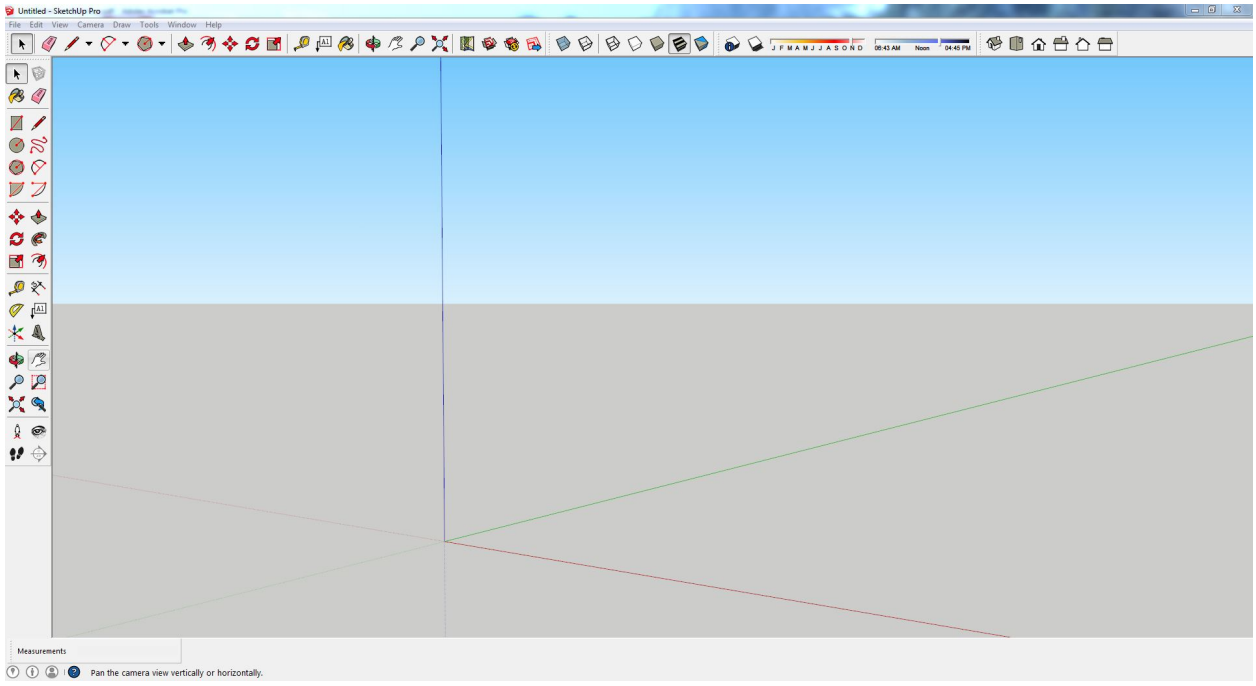


3. You then will be directed to SketchUp main screen. You may find that the screen is not set as shown below. To make the useful toolbar elements apparent make the following changes:

Select the ***View*** pull down menu > ***Toolbars***> and then turn on:

''Large Tool Set'' - ''Views'' - ''Shadows'' - ''Face Styles'' - ''Measurements''. ''Solid Tools''

Organize theses according to your preferences.



3- Importing a base map into SketchUp – and scaling it

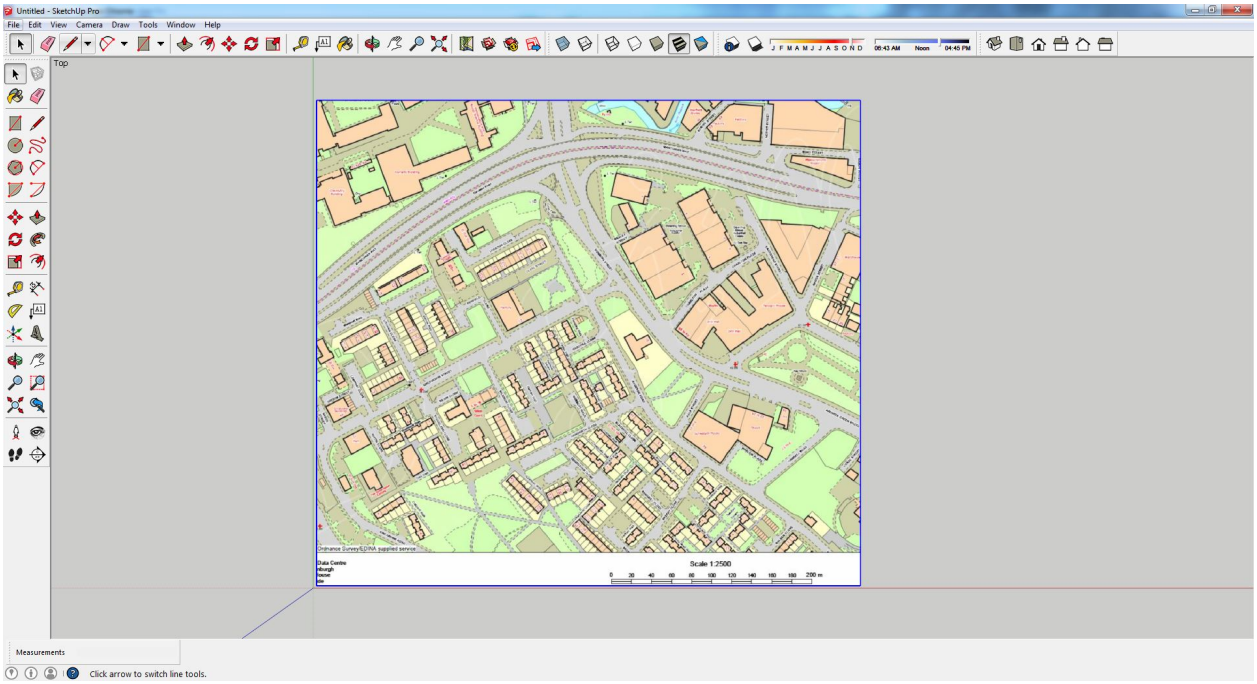
This is the first stage of building your model. You will need a map for your selected site in a .jpeg format (a picture from Digimap) or .dwg (CAD) format as explained in the introduction.

Importing an Image:

Make sure that you are in the ''plan-view'' (select 'Top' from the view bar) before importing the map.

- Go to ***File*** > ***New***
- Then, ***File*** > ***Import***
- Find your Digimap plan
- Click ***Open***
- Click once at the yellow Axial Intersection point
- Move your mouse to enlarge the image and click anywhere
- You can also drag the map from its location to SketchUp window.

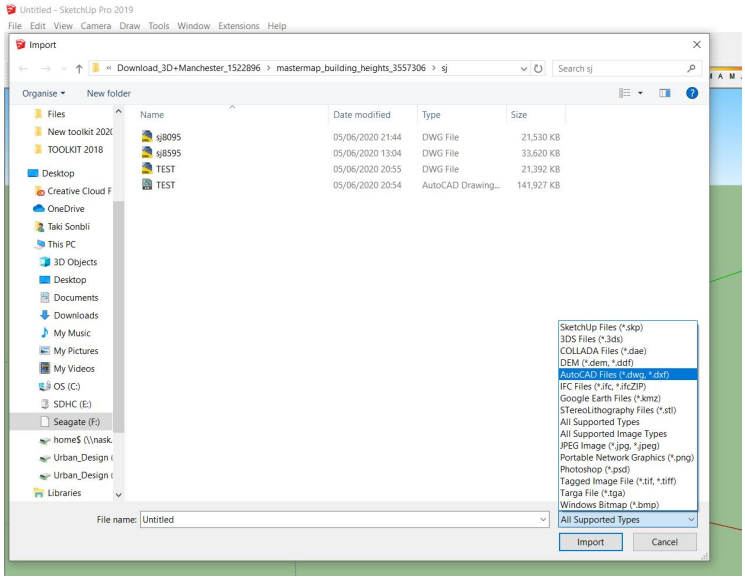
You now have the map of your area on SketchUp main screen, this needs to be scaled correctly before starting tracing objects and will be explained later.



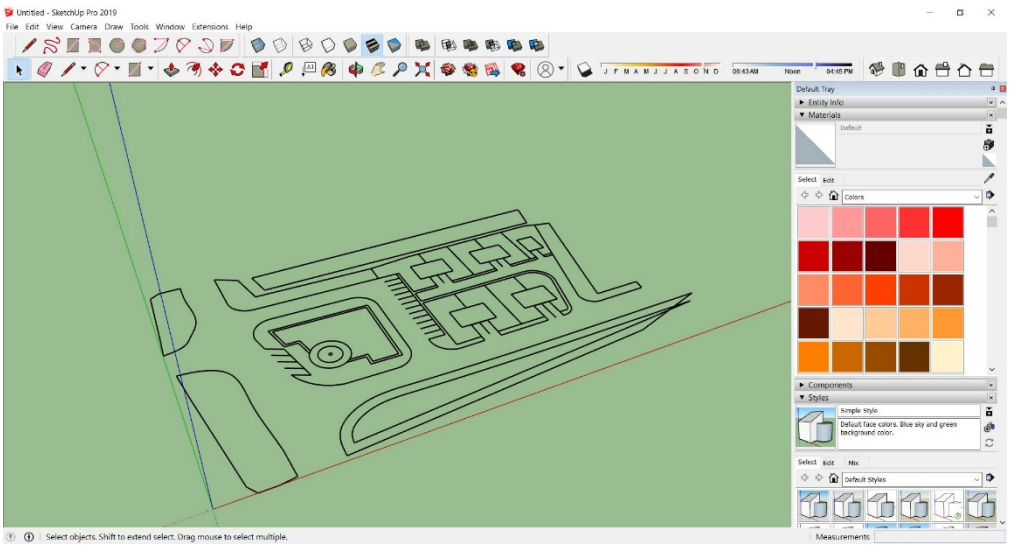
Importing a DWG file (preferred method):

In this preferred method you need your final master plan skeleton that has been done in CAD ready.

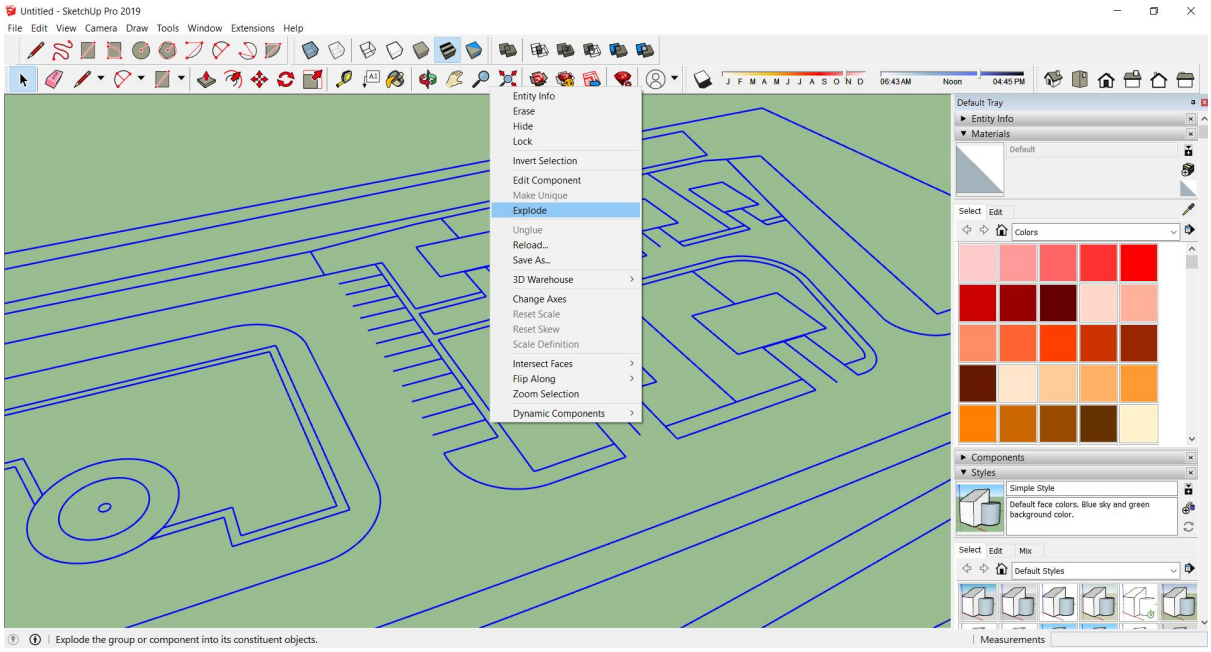
- **File/import**
- Select **AutoCAD Files** from the drop in menu
- Select your CAD file



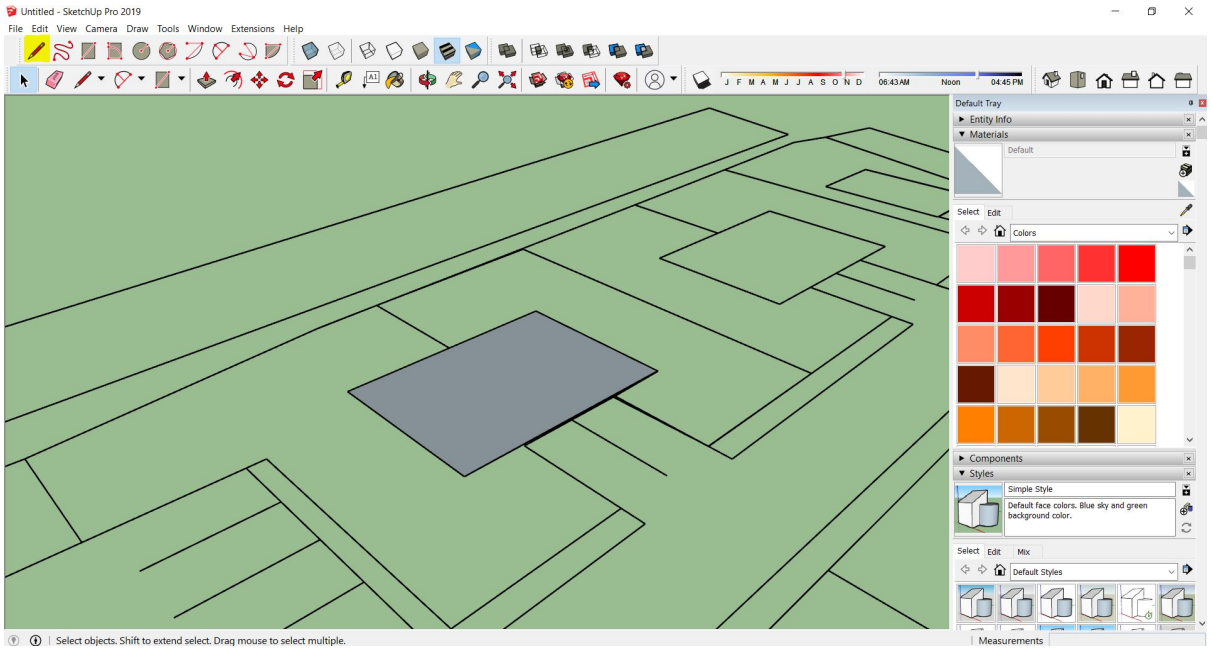
You will end up with this:



- You will note that the whole plan when imported is a one-block object. You need to use the 'explode tool' to make it adjustable: Select the masterplan using the select tool  / right click / explode.



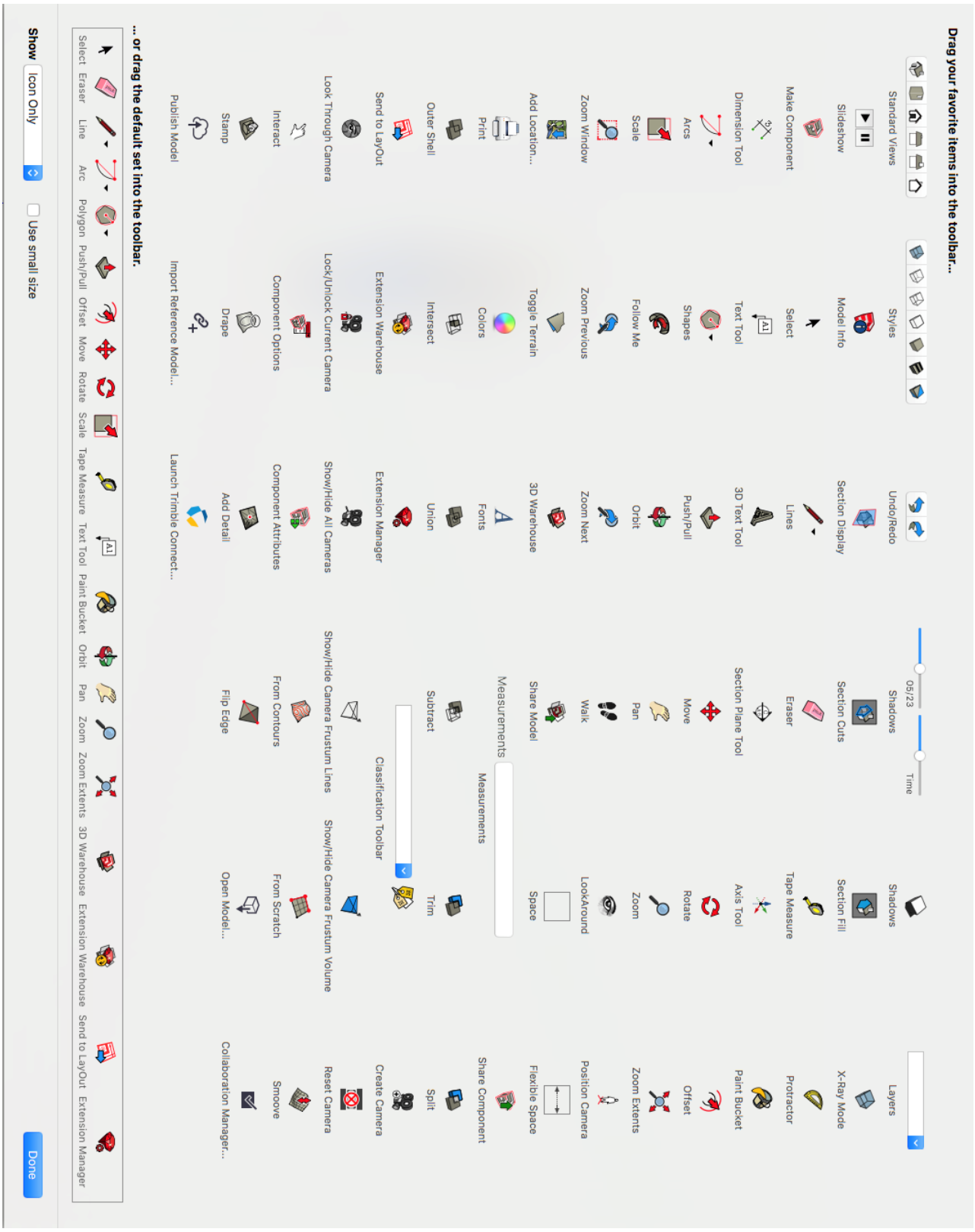
- You can now trace lines easily as there is a snap tool activated allowing you to easily click on intersections. Trace a building outlines with the pen tool until the whole object is highlighted in grey as “shape” ready to extrude. The more joints shapes you have in CAD the easier for SketchUp to recognize the shapes.



The rest of the steps below apply to both methods of importing maps.

4- SkechUp Tools

This is a list of SketchUp tools. To a tool that you cannot find in the tools bar, go to **Tools in** the top bar and activate it. We will explore in this handbook the most useful tools we will be using regularly. However do play around and explore the rest of the tools.



5- Setting the base map to scale

The map you imported has no specific scale. To set it to scale you will need a known measurement on the map (a distance between two buildings, the length of an object on the map, the scale bar...etc). In the example in this handout, we will use the linear scale that Digimap provides with each downloaded map. (If you do not have this scale, because for example you are using your own sketches as a base map, you can measure a specific building from your map using Google Earth to be your base measure).

- From the tool bar select the ''lines''  tool and draw a line exactly above the linear scale.
- From the tool bar select the ''Tape Measure Tool''  and measure the length of the linear scale. You will have an incorrect number. This measurement needs to be exactly the same one on the scale (200m in this example).
- Type 200m (see the VCB box at the bottom corner of the screen) and press enter.
- You'll get a dialogue box to which you enter 'yes'.
- Then your whole model will be re-scaled based on one accurate measurement.
- This method is used to scale the whole model, to scale a specific object in your model use  the ***Scale*** tool.

  Note: for more tips on how to scale in SketchUp see YouTube:
  http://www.youtube.com/watch?v=eXh6y5b0pdg

Generating 3D forms

First take some time to explore the variant tools in SketchUp. You will mainly need the Pan tool, and the mouse wheel to hover through SketchUp environment. Press and hold the mouse wheel to turn around the map. Scroll the wheel to zoom in and out. Press ''Top'' again to return to the plan view.

- Now select the ***''line tool''*** and draw a line around a building in you map.
- Use the ***Push/Pull*** tool ,  click inside the drawn area and move your mouse upwards to extrude the shape. You can double click at any point to finish the height, or type a distance (ex: 3m for a residential storey) into the VCB box at the bottom of the screen and press *ENTER.*
- Continue using this method with the rest of the building. You need to know the approximate height of the buildings for a more realistic perspective.

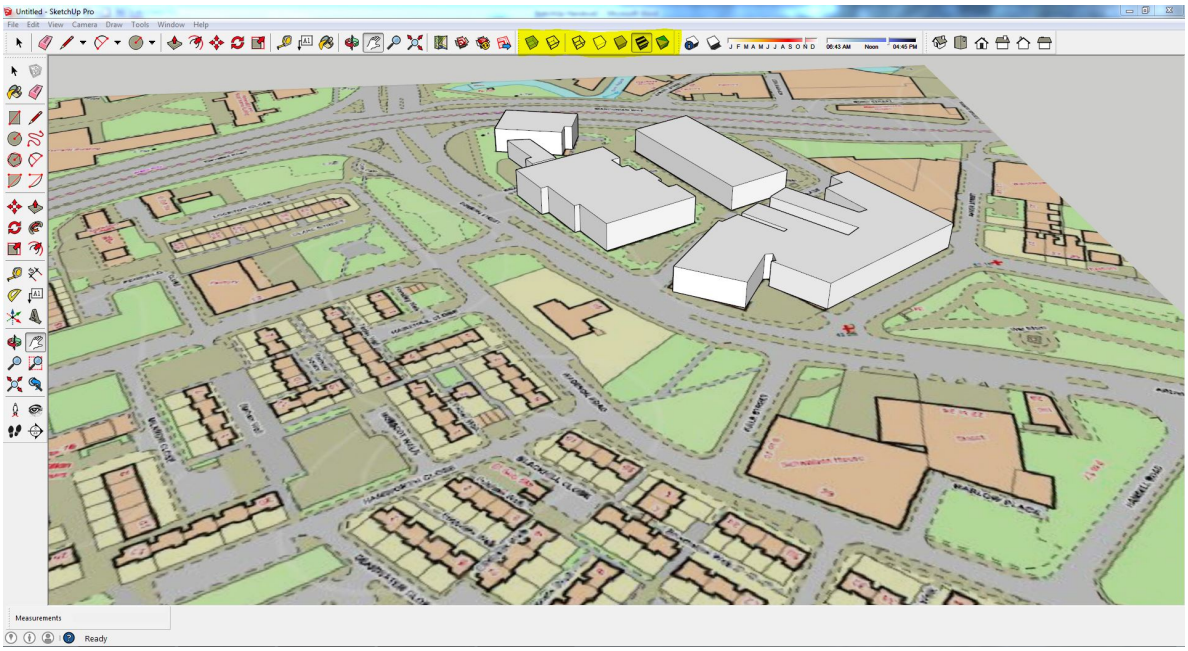
  Note: when you create a block it will be constructed as separated parts (lines, faces and points) , you can make it as one group by selecting all the block using the select tool (Hold **Ctrl** to add elements and Shift to deselect elements) and then **right click/**

make group. This will make moving or rotating it easier, however, editing it will be restricted unless you explode it again.

- When you make a 3D object ''a group'', make sure it is solid (closed) if you want to use the ***solid tools*** (subtract, intersect...) as these tools work only on solid groups.
- Try to ***move***  , ***rotate***  and copy objects (Move+ hold Ctrl). Try to use the ***offset*** tool on edges and then extrude the resulted shape up or down.

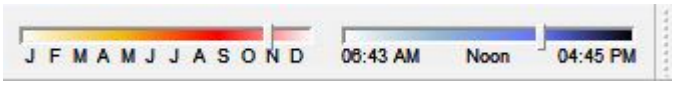
- When you are moving an object it will move freely, pressing the arrows (up, down, right or left) can restrict the movement making the object follows only one axis (x,y, or z) .

Applying different 'Face Styles' to your 3D forms



Explore the styles using the ***Face Style*** buttons (highlighted).

Casting shadows from your 3D forms[1]



Use the icon above to cast shadows from your 3D model. This tool will give you the option of dropping shadows on selected time and date. This can be useful for your space analysis and also for giving more realistic appearance to your final work. Shadows represent an important part of your design which cannot be ignored. North arrow is by default trending upwards.

[1] Go to **https://sites.google.com/site/sketchupsage/master/geo/creating-real-world-shadows** for more advanced options.

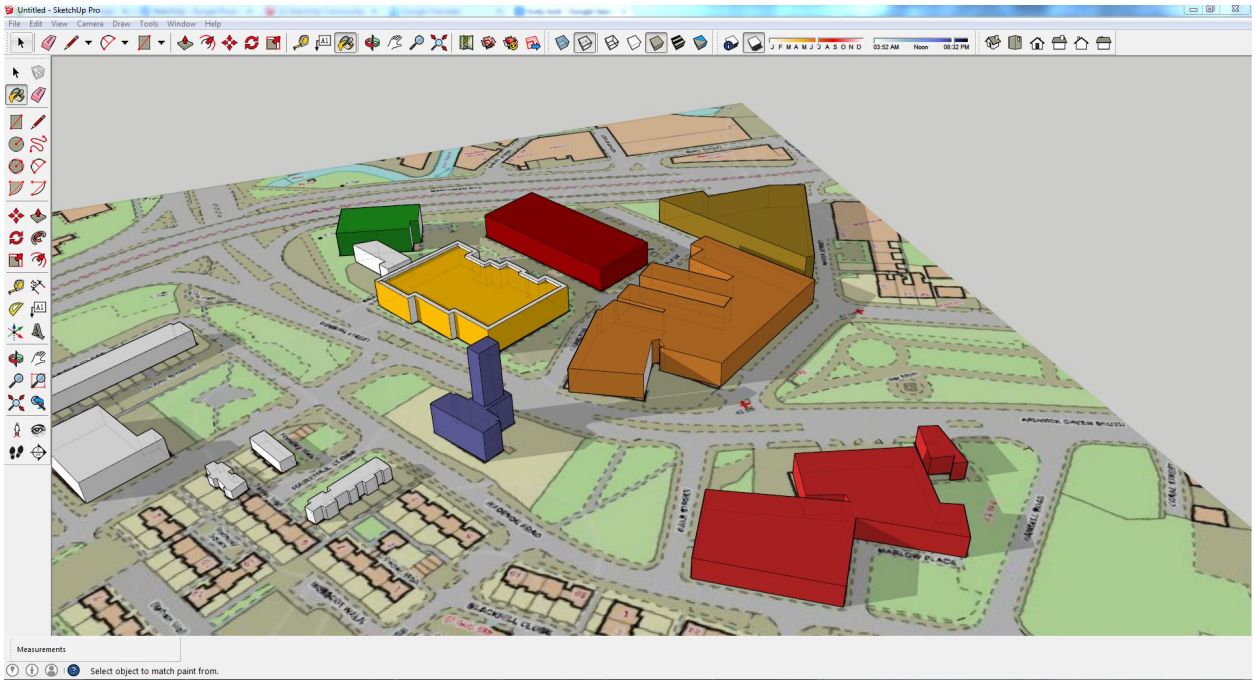
-If shadows didn't show make sure they are activated by selecting show/hide shadows icon

-Use Shadow Settings icon for some more manipulation with light intensity 

Note: Shadows will be dropped on the surface of the Ground Plane (The plane where the red and green Drawing Axes lie). Make sure that you model is situated on the Ground Plane too. You can place the drawing axes on your model base plane if required. Right click on an axis (x, y or z), and then select ***place.***

6- Adding colors and materials to your 3D model

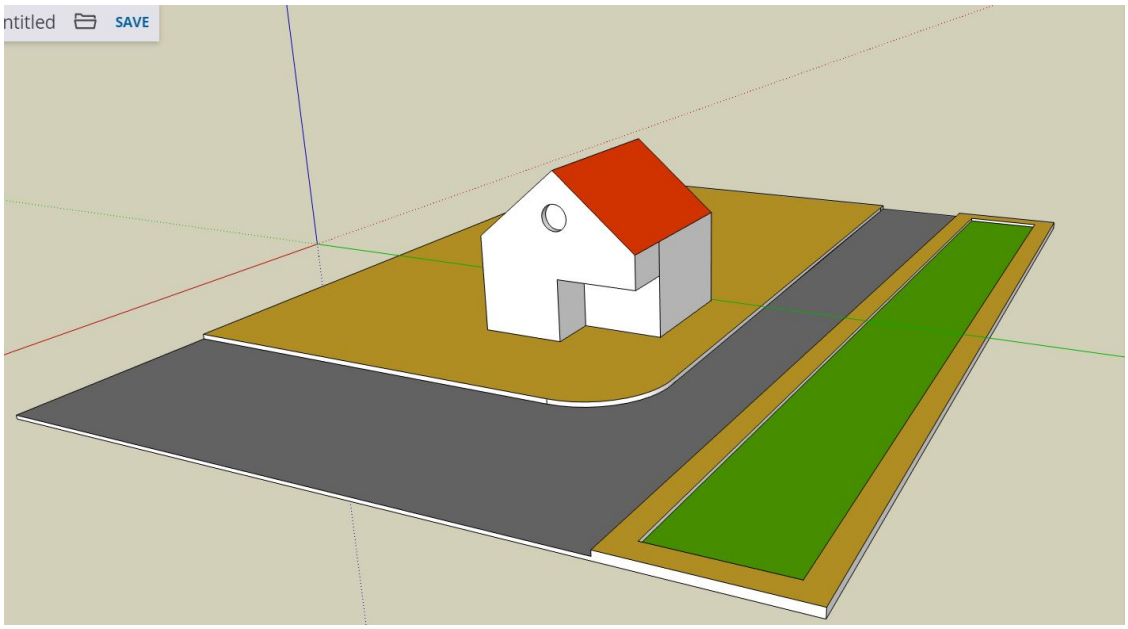
We need to add materials to the model shapes and faces in order to prepare it for Twinmotion rendering. This is explained in details in Twinmotion handbook. You can add materials to your model using the ***Paint Bucket***  tool. If you cannot find the Materials panel, go to **Window/Default Tray** and check Materials. Explore the pull down list for variant materials and colors that you can use to give your final model a lively look.



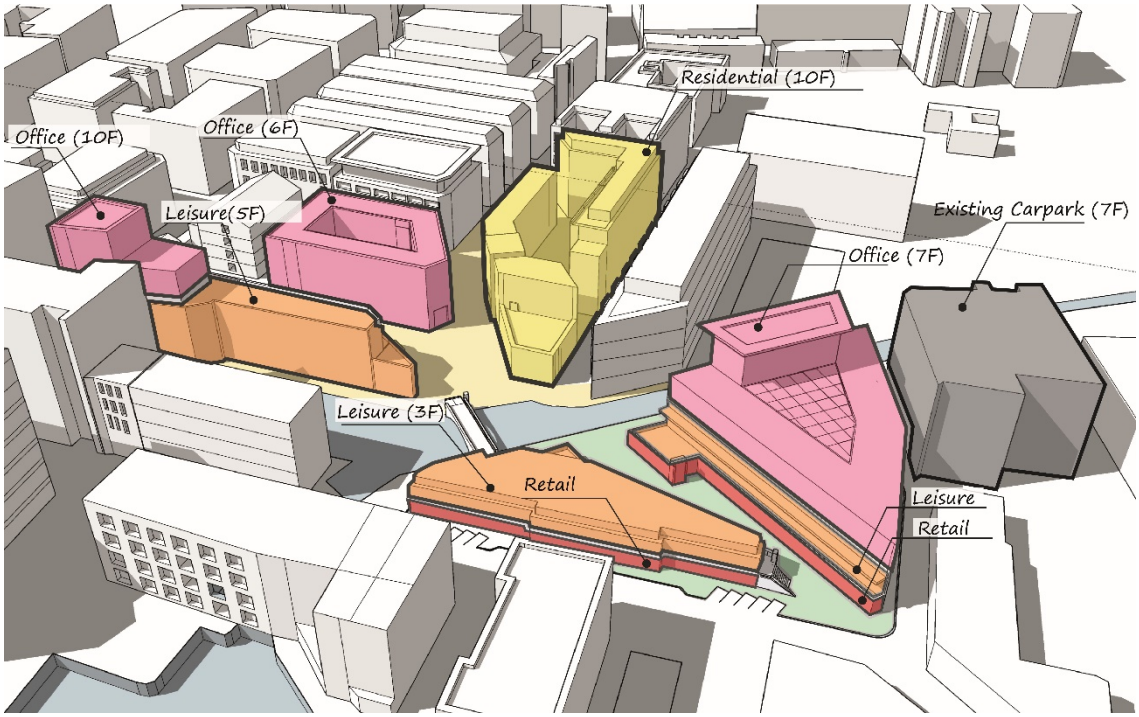
After applying a material onto objects you can manipulate its scale, color, brightness and opacity by selecting ***Edit*** in the ***Material*** window. This is not essential though as Twinmotion does not take the materials properties into consideration, it simply replace the materials you used in SketchUp with more realistic ones.

Note: All objects need to be given colors or materials in order to render them in Twinmotion.

Your model should look like the image below after assigning materials to it. You can now change these materials in TM.



You can also export your plain 3D graphic as JPEG and trace it in Ai to give the effect below. This abstract graphic is not meant to the final rendered presentation though, but it is useful for the analysis stage or communicating technical information.



7- Creating a Cross Section

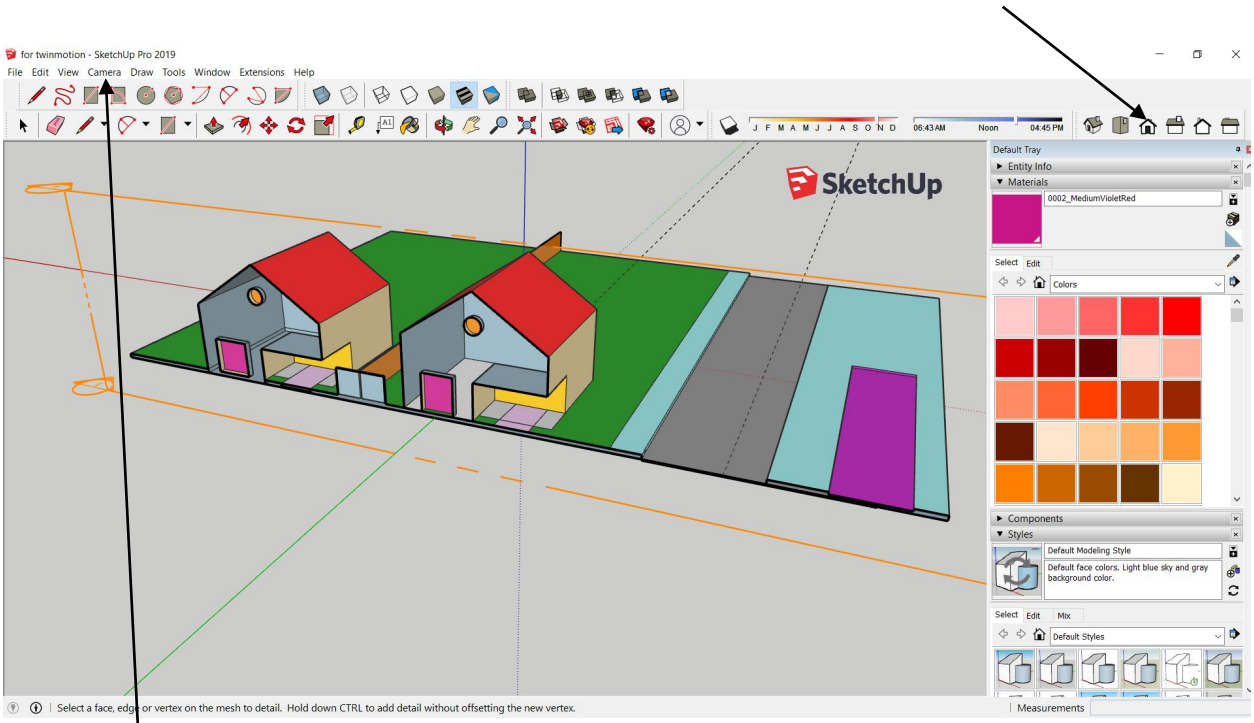
You can use SketchUp to create a basic cross section and make it ready for AutoCAD and Ai. The role of SketchUp in this process is to ease the process of creating the section as in some cases this tend to be complex with many angles and odd shapes that are difficult to imagin in 2D.

Use the ***Section Plane Tool***  to slice through you model. (If you cannot find it go to Tools/Section Plane). Select the plane you want the tool to show by selecting a face in your model. Give the section a name.

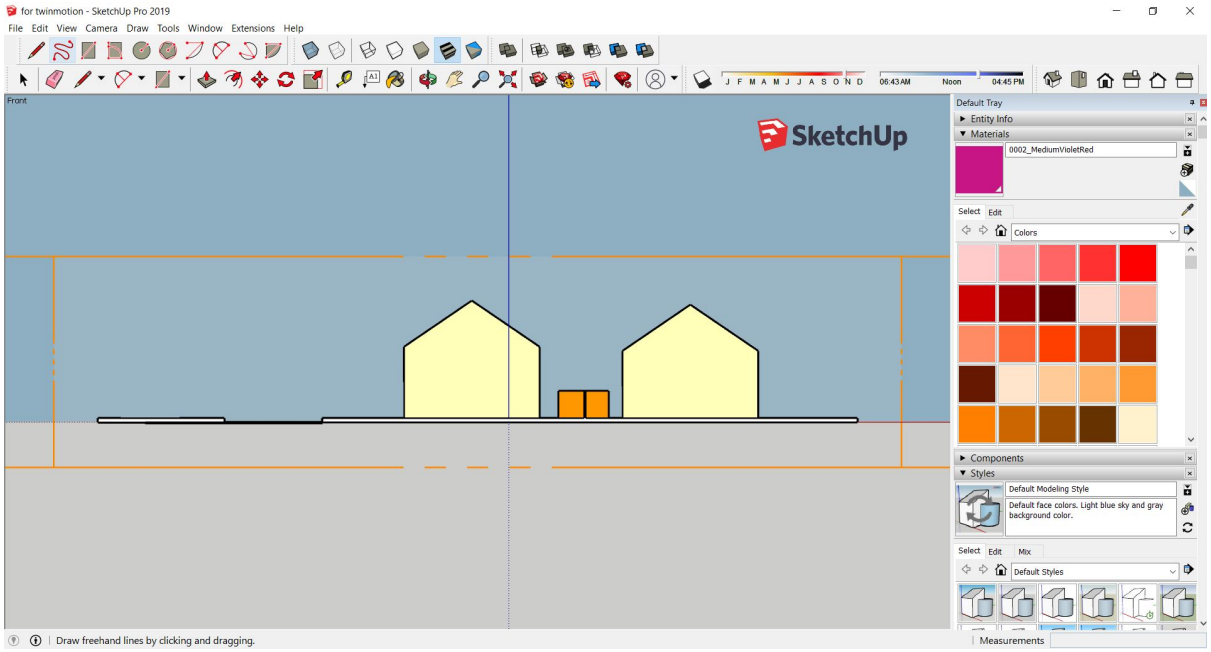
The tool now is created and it can be treated as any object in which it can be moved freely using the  ***Move*** tool or deleted using ***delete***.

Press the **Esc** key at any point during the operation to start over.

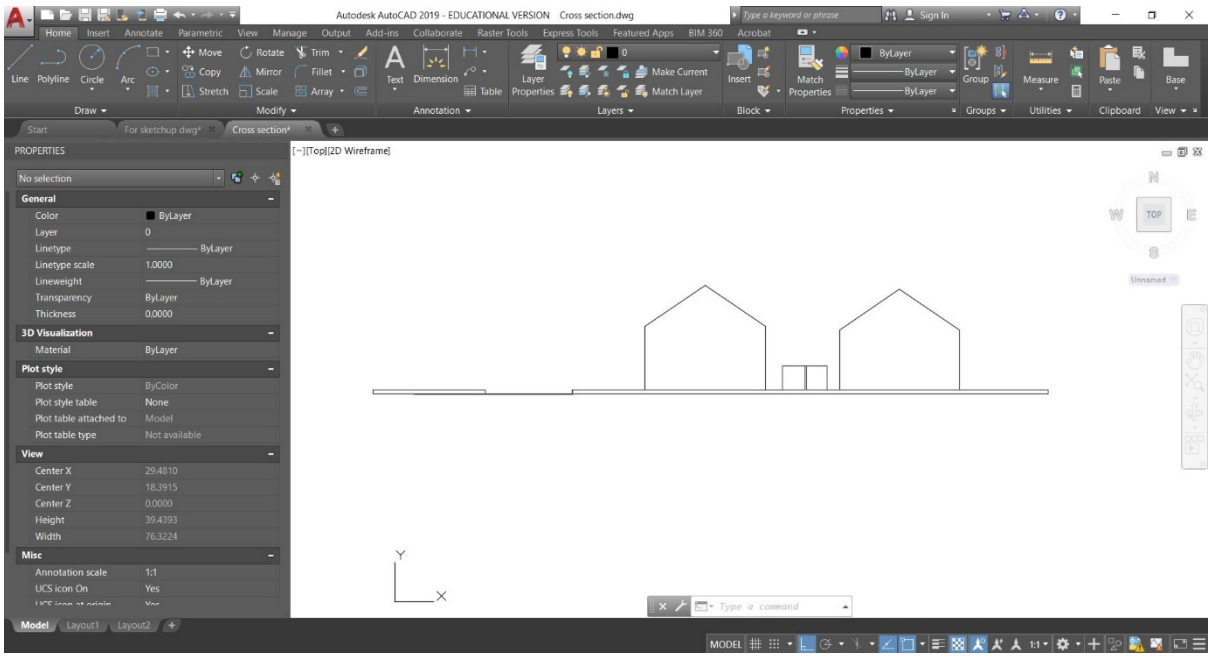
After selecting the section you want, you can use the View options for the ***View*** you need.



Go to **Camera/Parallel Projection.** You will end up with the image below.

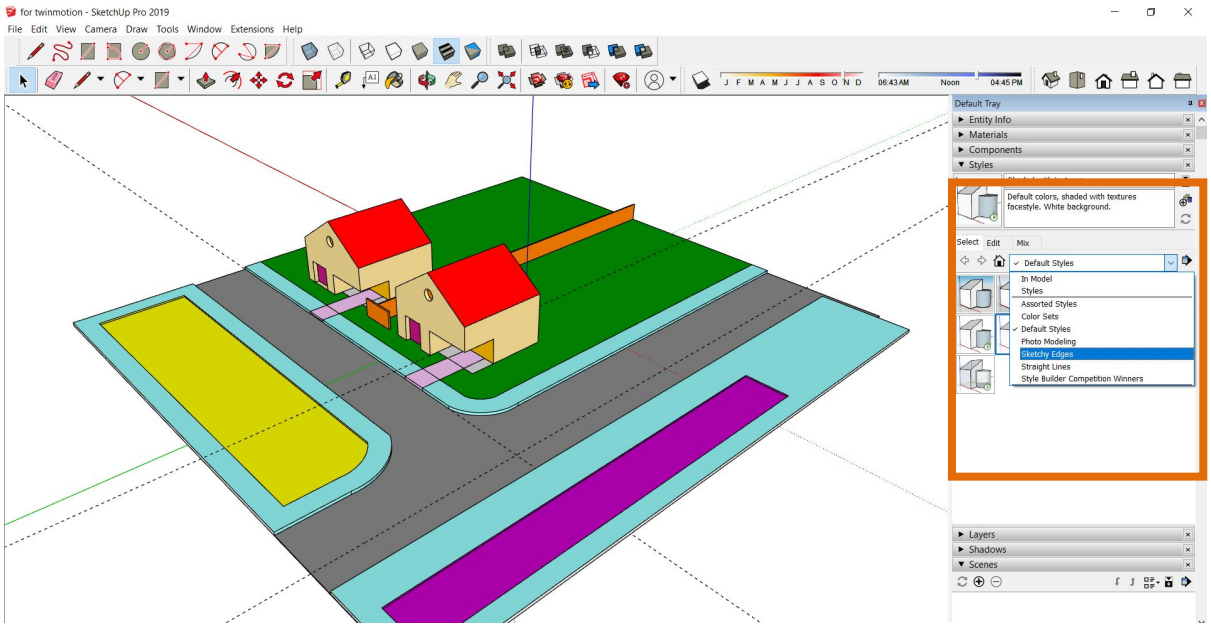


Go to **File/Export/2D Graphics/ DWG** to export this graphic as a CAD file. Open the file in CAD. This graphic is now ready to be edited, cleaned and scaled in CAD and then exported to Ai later to add annotations.

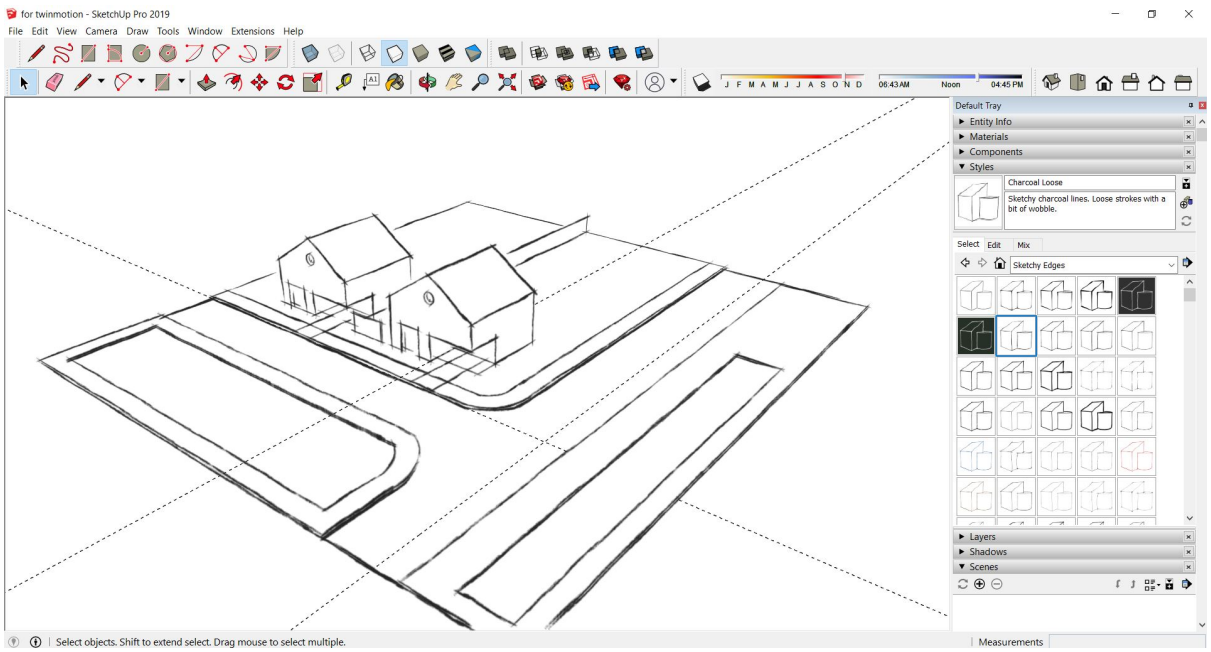


8- Changing graphics style

From the ***style panel*** to the right of the screen you can change the appearance of the whole model according to your preferred style.

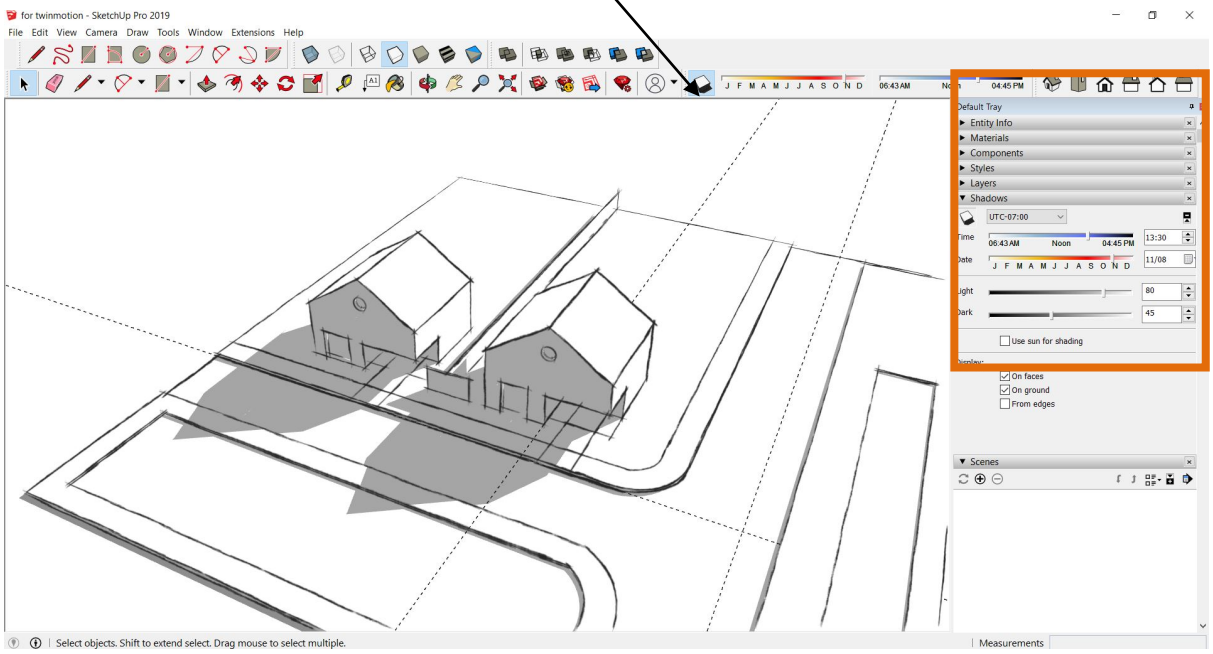


One of the useful styles is the sketchy edges style that make the models looks like as if it is drawn by hand. This will look professional if taken to Ai and annotation/highlights added.

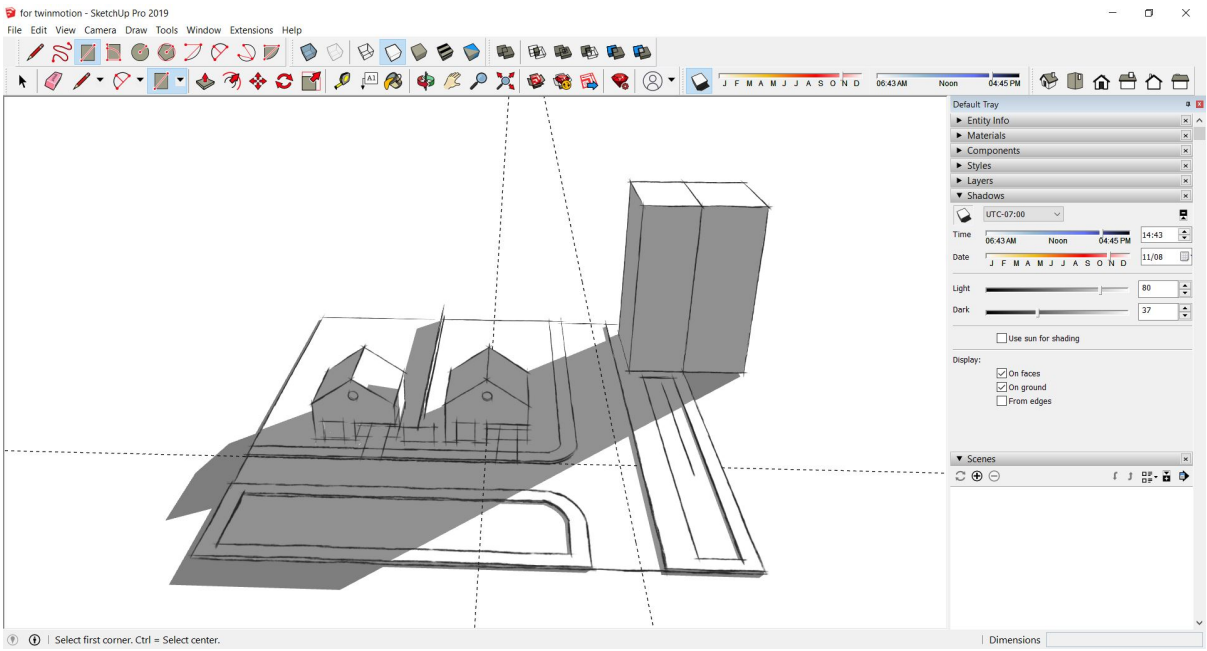


9- Dropping Shadows

Dropping shadow is a very useful tool to explore the effect of buildings' shadows on spaces and other buildings. Click on the **shadows tool** to activate shadows and use the shadow panel to the right to change your shadows date/time. To get more accurate shadows, add the Geo Location to your model: **File/Geo Location**



Notice the effect of the shadow of this higher building down the street on those two houses at certain times of the day. Do use this technique in your analysis.



10- Import elements from Google 3D Warehouse

You can import people, trees, cars and other objects from Google 3D Warehouse. This can be useful to give your model a sense of scale, but you do not need this for your final presentation as all these elements will be added in Twinmotion. Adding objects to your model can make the file much heavier and sometimes the file may crash. So add one or two elements only for reference.

You can use the 3D warehouse however to obtain and edit certain street furniture such as canopies…etc. and then take the top view and export as image to add it to your Photoshop library.

- Click the ***Get Models***  button to download models from the Google 3D Warehouse.
- Select the model you want and download it into the file.
- Rescale the model using the Scale tool.

Final Note:

You are using SketchUp for explaining the essence and features of your design in the third dimension. The level of details of buildings should not be very high, and unnecessary details should *not* be downloaded. Windows, doors, ornaments and other architectural details are of architects' concern.