SOFTWARE


MANCHESTER | URBAN DESIGN | LAB

# MUD-Lab Toolkit
# Software Practical Tutorials

*These are the basic software tutorials that we are presenting throughout the year. They are presented carefully in an easy to follow step-by step method. Revisit these tutorials again and again until you feel comfotable with the 6 software.*

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**The MUD-Lab Toolkit**

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MANCHESTER URBAN DESIGN LAB



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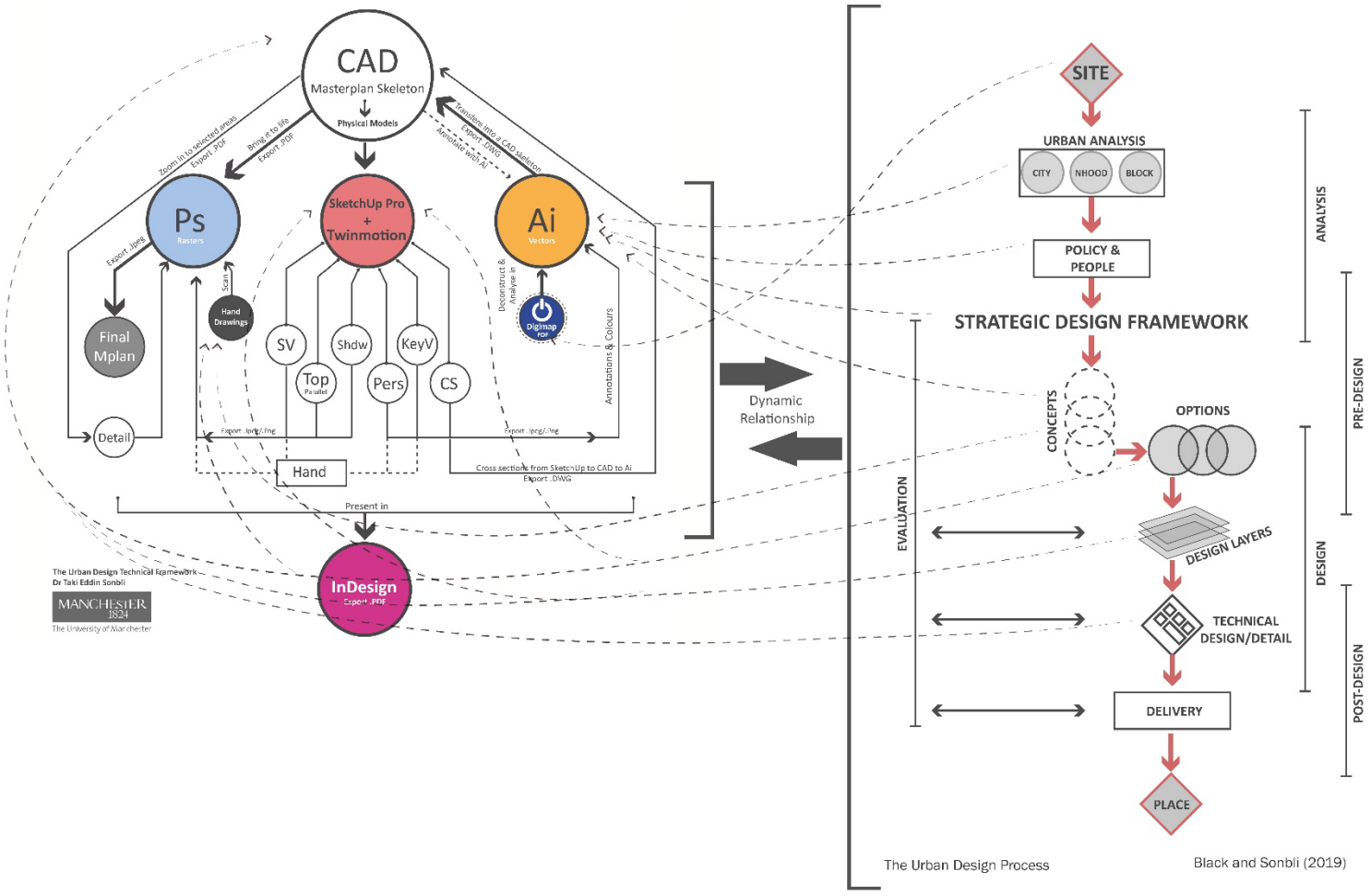



The Urban Design Technical Framework and the Urban Design Process are two carefully designed structures that go hand in hand to build your urban design applied skills. The technical framework (left) consists of 6 software that you will be using throughout the year to visualise your ideas and communicate your messages graphically. These will be delivered via Applied Skills module. This handbook includes the introductory tutorials of those 6 softwares. Make sure that you practice them again and again to get a grip with the software.

- **The Ai interface:** tool box, panel group, menu and control panel.
- **File/New/Print/View All Presets/A3:** To open a blank A3 page.

We will work first on this blank A3 sheet.

- **Zoom in and out:** Hold Alt + Use the mouse wheel
- **Selection:**

-The Direct Selection tool: Select *individual* segments (i.e. a point)

*The Direct Selection tool is useful but it is rarely used*

-The Group Selection tool: select an *object* (i.e. group of segments that form a shape)

*The Group Selection Tool is **the most popular** and will always be used*

-The Selection tool: Select the *whole* collection of groups

*The Selection tool is rarely used*

-The Lasso Tool: flexible path based selection that work similar to the Group Selection

*The Lasso Tool is **very popular** and will always be used*

***Note:** **Click and hold the Direct Selection tool symbol to reveal the rest of the tools***

- **Draw an Object:** From the tool box click on the Rectangle Tool, draw a rectangle with the left mouse button. Select the **Group Selection** tool and **click outside** the drawing sheet to deselect the shape.

- **Move:** To move an object to a different place on the A3 sheet select it with the Group Selection tool and drag it with the left mouse button
- **Copy:** To copy an object to a different place on the A3 sheet select it with the Group Selection tool **hold Alt +** drag it with the left mouse button

***Note:** **in MAC use Option instead of Alt – Use Command instead of Ctrl***

- **Changing colours: Select a shape.** We will use the fill and stroke tool (the two squares at the bottom of the tools box) – **Fill** (the top square) to change the inside colour of a shape, **Stroke** (the bottom square) to change the outline of the shape.

***Note:** The control panel changes when you select a new tool*

We will work now on a Digimap file

- **File/Open:** To open your PDF Digimap vector file – Or drag the file to the top bar.
- **Layers:** The layer panel is in the Panel Group – Screen right side – If you cannot find it: from the top of screen, Window/Layers.
  - We are going to deconstruct the Digimap map into layers. In order to do this, we will create a new layer for each category. We will selected the elements we want (e.g. all buildings) and move/copy them to a new layer.
  - Create a new layer (right top corner of the layer panel/new layer) – Or use the New Layer symbol (bottom of layer panel)
  - Select one building with the Group Selection tool
  - Click on the **Select Similar Objects** symbol in the Control Panel bar
  - In the Layers panel, to the right of the layer name, drag the **coloured square** up to a new layer – This square is called "Indicate Selected Art" – All buildings are now moved to a new layer
  - Turn off the original layer by clicking on the **eye symbol** to the left of the layer name
  - **Rename** the new layer by double clicking on the layer name, call it Buildings

- **Changing colours:** We will use the fill and stroke tool again
  - Click on the **circle** to the right of the Building layer name – This will **select all objects** in the layer
  - Change the fill to dark grey – you now have a **Figure Ground**
  - Create a new layer, call it Residential
  - With the Lasso tool select some random buildings from the Building layer- **Copy** them to the new layer by holding **Alt** and dragging the **coloured square** up.
  - Select all buildings in the Residential layer and give them a different colour.

- **Export and Save:**
  - File/Save (Ctrl+S) to save the current work (will maintain the existing file format))
  - File Save As – To save a new file as an editable PDF or Ai file.
  - File/Export – To save the file in a different format such as JPEG (solid image) or DWG (CAD file)

***Note:** Always be organized: The file name must make sense, and save your file in a named folder. A PDF file could be the file that you were working on, it is not a presentation file only.*

- **Recap:** Revisiting what we learned last week: selection, separating layers, changing colours – Please ask questions
- **File/New/Print/View All Presets/A3:** To open a blank A3 page.

We will work first on this blank A3 sheet.

- **Shift + O:** to open **Artboards.** You can check the sheet size, change sheet dimensions, create a new Artboard and change the sheet orientation to landscape or portrait.
- **View/Rulers/Show rulers:** You have now a ruler bar at the top of the screen – Right click on the ruler bar and select Centimetres. Use the ruler to estimate objects' sizes and checking the sheet dimensions.

- **Drawing and managing shapes:**

  *Drawing basic shapes:*

  -From the toolbar, click and old the Rectangle tool symbol to reveal basic shapes (circles, rectangles. Stars…etc.) – Select a shape and draw it on the sheet using the left mouse button.

  - Select the shape with the **Group Selection** tool.

  - Hold **Ctrl** (*Command* in Mac)

  - Put the mouse pointer at the **corner** of the shape – You can now change the size of the shape by dragging the corner with the mouse left button

  - While doing so, **hold Shift** to maintain proportions

  - While doing so, **hold Alt** to control the shape from its centre

  -Change the object **opacity** from the top bar to 60%

  - Hold **Alt** and move the shape to **copy** it

  - While holding Alt, hold shift to restrict movement to horizontal and vertical axis only

  - Hold **Shift** and select both shapes for multiple selection

  ***Note: Put the mouse pointer a bit further from the corner to rotate the shape***

  *Drawing lines*

  -Use the **Pen** tool to draw straight lines and the **Curvature** tool to draw curved lines

-Using the **Pen** tool: Select the Pen tool from the toolbar. **One mouse click** on the sheet will create a segment. Do not hold the mouse click at this stage.

-Using the **Curvature** tool: Select the **Curvature** tool from the toolbar. **One mouse click** on the sheet will create a segment.

***Note: hit escape to end drawing a line***

*Modifying lines:*

We can modify the shape Fill and Stroke in Adobe Ai.

- Use the fill/stroke tool (the two squares) to change shapes colours or to give them no colours (i.e. no fill/ no stroke colour).
- While selecting a shape with the group selection tool**,** from the **tool control panel** at the top of the sheet change the stroke weight from 1 pt to 10 pt.
- Click on the word **Stroke** to open more stroke options
- From this menu you can change stroke **weight**, stroke **shape** (from line to dashed line) stroke **head** (arrow or no arrow) and stroke **profile**.
- Check dashed line/ change the dash to 20 and the gap to 5.
- If the shape has a fill give it None fill

- *Exercise:*

  1- Draw **two lines** with the curvature tool, with two different shapes: change their stroke shape weight and colour, give them no fill and give them an arrow head.

  2- Select one of the lines with the Group Selection tool/ and hit **I** on the keyboard to activate the **Eyedropper.** The Eye dropper can match the properties of the object it touches. Click on the other line while the Eyedropper activated: note that the selected line now has the same shape, weight and colour of the other line.

- **Adding external elements to the sheet:**

  You can add external images to your sheet by simply dragging them to the sheet space. You want a PNG file as it supports transparency. Check out the two files in Blackboard.

- Drag the PNG north arrow to the drawing sheet
- Select it with the group selection tool/ make it smaller while maintaining proportions.

***Note: use this method to add north arrows, transportations symbols (i.e. buses, trams, railway symbol…etc.)***

- **Applying the above on our Urban Design practice:**

We will now move to the map: Open the PDF map in Blackboard /Week 4 folder.

We want first to select the buildings inside the highlighted Character 1 area and move them to a new layer. In order to do so:

- Use the **Lasso** tool and make a selection around the buildings in character 1. Notice that both buildings ***and*** the yellow shape around them are selected
- **Lock** the Character 1 layer
- Create a new layer and call it "Character 1 Buildings"
- Move the selected buildings to the new layer (by dragging up the small square as explained last week)

We want now to create Character 2 area (similar to Character 1 already highlighted).

- **Lock** all layers *except for* Buildings layer
- With the Lasso tool select a random area
- Create a new layer and call it "Character 2 Buildings"
- Move the selected buildings to "Character 2 Buildings" layer
- Select all buildings in the Buildings layer (use the circle to the right of the layer) and make them 60% fade (using opacity)
- **Lock** the Buildings layer
- Create a new layer and call it "Character 2"
- Draw outlines around the new random area you created using the **Pen** tool/ give them fill and dashed stroke, make it a bit fade by changing opacity.
- Move the "Character 2" layer to below the "Character 2 Buildings" layer by dragging it with the mouse left click

We need to add a legend, north arrow and scale bar to finish the map:

- Create a new layer and call it "Legend"
- Move this layer to the top and lock the rest of layers.
- Draw a long rectangle at the bottom of the map. Give it a white fill with no stroke.
- Create a small square/rectangle inside the white rectangle.
- With the Eyedropper (I), change the square colour to match one of the character areas colour.
- With the Type tool (T), create a text box and write Character 1
- **Hold Shift** and click on the square and the text to select them both

- **Hold Alt** and **Shift** to copy them **Horizontally**
- Re-match the colour of the new square with the other character, and change the text
- Add the North Arrow PNG to the map

*Moving the scale bar to the final map*

- Hide and lock all layer except for the baseman layer (layer 1)
- Select the scale bar with the **Direct Selection** tool
- Unlock the legend layer
- Move the selected scale bar up to the Legend layer
- Lock and hide layer 1
- Turn on the rest of the layers

- **InDesign interface:** Tool box, Pages and Links panels.
- **File/New/Document/Custom** enter 841 mm x 594 mm. This is an A1 sheet.
- Make the Orientation **Landscape** – Create **7 columns** – Make the **Gutter** 10mm

***Note:*** *To re-edit the current document go to: File/Document Setup – To edit Margins and Columns go to Layout/ Margins and Columns*

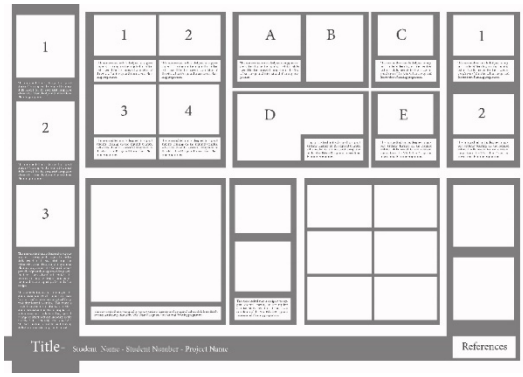
We will work first on this blank A1 sheet.

- **Zoom in and out:** Hold Alt + Use the mouse wheel
- **W:** To show/Hide the guides (i.e. columns and margins/ these will not be printed)
- **Rectangle Frame Tool:** to draw a frame
- Select the frame with either the selection tool or Direct selection tool
- **Fill and Stroke** to give the frame fill/stroke colours
- Drag an image to inside the frame
- Hold **Alt+Ctrl+Shift+E** to fit the images into the frame
- View/Display performance/High quality display to display the image as **non-pixelated**
- Use the **Selection tool** (V) to select **both** the frame and its contents (the image). Make sure a blue frame appears, this indicates the frame has been selected.
- Move the frame and change its size with V. This is a method of cropping images in Id
- Use the **Direct Selection Tool** to select the image only – Move the image or change its size. Make sure that an orange frame appears. This indicates the image only has been selected.
- Select the frame with the Selection Tool and then hold Alt+Ctrl+Shift and change the frame size with the mouse - This will **scale both** the image and the frame up or down maintaining proportions, and controlling them from their centre.
- Check out the Links panel. If you cannot find it go to Window/Links
- In the Links Panel, right click on the image thumbnail/ Relink – This will relink the image to another destination (i.e. change it or relink it to a different folder).

- Create two rectangle frames of different sizes and put them above each other: Select a frame/right click/arrange/send to back. This is a method to change the visibility of objects within one layer
- Type tool (T)/open a Text Box with the mouse – Copy a relatively long text and paste it into the text box you have created. Note that a red plus appears at the corner of the text box and an error circle shows at the bottom of the Id screen. This is Id way to tell you that there is something wrong in the document (i.e. there is a missing text in this case as the box was smaller than the text). Click on the red cross, this will allow you to create another text box that includes the missing text.

***Note:*** *InDesign and Illustrator share the basic commands that Alt, Shift and Ctrl do. So use Alt to copy objects and use Shift to restrict movement vertically and horizontally.*

Exercise: We will play around and create a layout similar to this:




**Export and Save:**

- File/Save (Ctrl+S) to save the current work (will maintain the existing file format))
- File Save As – To save a new file as Id file.
- File/Export (what we mostly use) – To save the file in a different format such as **Interactive PDF** (preferred), **PDF Print** (large file that allows printer related options) or **JPEG** (solid image, a safe way if size is small to print with no issues).
- When you export your file you must check that the export is **300dpi**: File/Export/Interactive PDF/ Compression

***Essential Notes:***

- *InDesign is a layout software that is designed to **link**. Do not send an Id file via email as you will lose all the sources. **Never** submit Id as a final work. You must export your work as PDF. If you change the location of the source images or change their names you will **lose the link**. You have to relink them manually. Please link images (jpeg/pdf), **not the Ai file** as this is less problematic for such large sheet.*

- *Always be organized: Create an Analysis folder and a Design Folder. Create sub-folders such as site scale/ neighbourhood scale/images and save your work strictly in them so you never miss links. The file name must make sense.*

- **Ps interface:** tool box, panel group, menu and control panel.
- **File/New/Print/View All Presets/A3:** To open a blank A3 Raster sheet. Make sure the **resolution** is 300dpi. Make page **orientation** landscape. Select RGB or CMYK

***Note:***

- *As Ps is a raster based software it is essential to select the right dimensions and resolution from the beginning. If you find out later that the image is small you will not be able to stretch it up as you will lose resolution.*
- *Note: If you are using MAC use Option instead of Alt – Use Command instead of Ctrl*

We will work first on this blank A3 sheet.

- **Zooming in and out:** Hold Alt + Use the mouse wheel
- To **draw objects** in Ps create a section and paint it. Below is how to make selection. We mainly use the Marquee tool (M) and the Lasso tool (L) to make a shape based selection in Ps. We use the Brush too (B) to paint in a selection area.
- Use the **Marquee tool** (M) to create a circular/rectangular selection. Hold Alt to start the shape from its centre. Hold Shift to maintain proportions.
- Hit B in the keyboard to activate the **Brush tool**. Right click to open the **Brush tool options**.
- From the Brush tool options you can change the **brush size.**
- From the top menu you can change the **colour opacity**
- Select the colour you want from the colour squares in the tool menu (same as Ai)
- Start painting the selection area by holding down the mouse left button.
- **Ctrl+D to deselect** area. You now have a painted shape.
- Use the **Lasso** or the **Polygonal Lasso** tools **(L)** to create a free selection.
- Paint the selection with a different colour, and then deselect the area (Ctrl+D).
- To select one of the two shapes use the **Magic Wand (W)**. The Magic Wand can select all similar pixels in a drawing based on their colours.
- Unlock the layer by clicking on the lock symbol to the right of the layer

- Activate the **Move tool** (V) and drag the shape to move it to a different place on the same sheet
- Ctrl+T is to **transform** an object (make it bigger, rotate it…etc.) This is an essential command.
- Hold Alt and then drag the shape to **copy** it. Create some copies from both shapes.
- Activate the Magic Wand (W). From the top bar you can change the Magic Wand tolerance and contiguous selection mode. Check Contiguous and notice the difference.
- Select a shape/ use the Eyedropper (I) to match the colour of another shape/Brush it.
- Select a shape/Ctrl C/Ctrl V: The shape is automatically **copied to a new layer**.
- Repeat the operation with another shape
- Turn off the base layer. You now have two shapes on two different layers that can be moved freely on the page. The more layers you have, the more flexibility you get.
- Drag layer two and put it above layer 1. This will change the order of objects.
- Select one layer and change its **opacity** from the layer panel
- Click on Layer 2 thumbnail while holding Ctrl. This will **select all pixels in the layer**. This is an essential technique of selection in PS.
- Hold shift and select both Layer 1 and Layer 2. Select the Move tool (V). Notice that the two shapes are moving.
- While both layers are selected, right click on a layer/ Merge layers. This will merge the two objects into one layer. You can also group the layers (Ctrl+G) in one folder to organize them.
- Hit (E) to activate the Eraser. The eraser works like a Brush. Right click to change its size and erase an object.
- **Add a PNG** file to the sheet by dragging it and placing it inside it. Hit Entre to place it. Ctrl+T to edit it. This is a **Smart object**. Right click on its layer/Rasterize to make it a normal object.
- Use the Type tool (T) to add text
- To save your work: File/Save as/ select PSD to save it as a PS file/ Select JPEG to save it as a solid image/ select ads PNG if you have transparency.

***Notes:***

- ***Select an area, "I" for eye dropper/ "b" for brush / right click to change brush size…and start painting. This is a frequently used process that you need to practice.***

- ***Always make sure that you are on the right layer before editing an object. Name and Organize your layers as you will end up with tens of them.***

We will work now on external maps. We want to deconstruct the map into layers and to organize these layers and changing their colours, add then shadows and patterns.

- **File/Open:** To open your PDF/JPEG/PNG file – Or drag the file to the top bar. Ps will rasterize the graphic if it is Vector.
- Open the map in Blackboard
- Select the grey buildings in the background and remove them. Use the Magic Wand and the Brush to do so. Change the Magic Wand tolerance to 30 to make a cleaner selection.
- Select a neighbourhood (Magic Wand) and separate it on a separate layer (Ctrl+C/Ctrl+V).
- Double click on the layer (not the thumbnail). This will open the **layer style panel**. This is a very important panel to drop shadows, add textures and create strokes to entire layers.
- Click on **Drop shadow** and edit the shadows from the right panel
- Click on **texture** to give the layer a texture. To add a pattern: open a new file with the patter you want (should be seamless). Edit/Define pattern. The image is now added to the patterns in the Layer Style panel.
- Click on **stroke** to stroke all elements in the layer
- Hide the stroke effect from the layer panel
- Applying a layer style transfers the layer into a smart object so you can hide/edit the effect you created. The layer is non editable in this mode i.e. you cannot darken the colours for example or delete the pixels. Right click on the layer/**Rasterize layer style** so you can edit it.
- After rasterizing the layer style, use the Clone Stamp (S) to make the texture seamless.
- Use the Burn or Dodge tools (O) to darken or lighten the texture respectively.

Let us play around with another graphic and use the same techniques to highlight the site, make the background transparent and annotations.

***Notes:***

***Have a look at the toolkit handouts Ps Explained and Ps Practical Guide for practical exercises and visualised examples.***

- **AutoCAD interface**
- **File/New/Open**

***Note:***

*-AutoCAD is a command based software. You should memorise all the commands below to insure efficient and quick performance. The red letters indicate the letter you need to hit following by space bar to activate the command. Always pay attention to the command bar at the bottom of the screen.*

*-If you are using MAC use Option instead of Alt – Use Command instead of Ctrl*

- **Zooming in and out:** Use the mouse wheel
- **F7** to turn the grid off/on
- **L**ine (**L/ Space**) – draws a line from one point to another. Press (**F8**) while drawing a line to make the line direction free (Ortho off). Hit F8 again to restrict its direction to horizontal-vertical only (Ortho on). Type (L)/ space/ select the starting point by clicking the left mouse button/ type the length (10 for example)/ space/space.

  **P**o**l**yline (**PL/ Space**) – draws a line/curve with multiple control points. It is a continuous line consists of multiple lines and curves, rather than a single line. Use **F8** for the same purpose of the previous command. Note that after each command name, you will see some options appear in the command bar. These options are useful to make the command more specific. For example in the Polyline (**PL**) command you see that you can make it and ***A****rch* by typing (**A**) and hitting Space before drawing, or you can modify the ***W****idth* of the Polyline by typing (**W**) and then specify the required width. You can change the colour of the polyline (and any other object) from the tool bar after selecting it.

Note that:

*-If you hit "Esc" while drawing a Polyline, the line is terminated from the last point you clicked or entered.*

*-If you type "cl" while drawing a Polyline, it draws a line segment from your last clicked point to the starting point (closing the shape that you were drawing).*

*-If you type "a" while drawing a Polyline, it allows you to draw an arc that are tangent to the last segment or arc. Notice that the arc only needs two points (starting and ending).*

- **Re**ctangle (**REC/Space**): draws a rectangle with two corners specified. Click to designate first corner of the rectangle. Click again to designate the opposite corner of the rectangle

- **Pol**ygon (**POL/Space**) – draws a polygon by the number of sides. Enter in the number of sides. Choose the center of the polygon using the mouse. If you choose "inscribed in circle", it will draw the polygon inside a circle with your given radius. If you choose "circumscribed in circle", it will draw the polygon with a circle inside of that polygon with your given radius.
- **C**ircle (**C/Space**) – draws a circle centred at a point. Click to pick the center of the circle. Pick the radius length by entering it in or clicking how large the circle should be.
- **SPl**ine (SPl)- draw a flexible line. Spl /space/draw points/ when you finish press space.
- **H**atch (**H/Space**) – adds hatch patterns or fills to an enclosed area or to selected objects.

  **Note:** Make sure that the area you are hatching is closed
- **A**rc **(A/Space):** Draw an arch. CAD will give you two options: Either specifying the first and end points to draw it, or just the centre of the arc.
- **Div**ide (**DIV/Space**): divides a selected object into certain length or perimeter segment. You can draw from the node or you can place objects along the nodes (place trees 20 feet from each other on a sidewalk down a street). Select the object to divide (a line or an arc for example). Enter the number of segments
- **Di**stance (**DI/Space**): to measure distances between points
- **U**ndo (**U/Space**): to undo any command or move you did.

*Note:*

*If you want to select objects using the mouse: Pressing from right to left you will see a green selection area and it select everything inside the area even if a small part of the object appears inside the area, whereas pressing from left to right you will see blue area that will select only the objects that are fully included in the blue area so a half line will not be selected.*

- **E**rase (**E/Space**): erases the selected objects. You can get the same effect by selecting objects and hitting **Delete**.
- **F3** to turn snap on/off
- **Co**py (co): copies the selected objects from one place to another. Select the object(s). Click or enter in the coordinates for your base point. Choose the second point, which will be where you want the copied object to go, and finally left mouse click. Use the reference points while snap is on to copy objects.

*Note:*

*You can copy objects from an AutoCAD file to another, but you need to use the common method of copy-paste: Select objects you want to move from the first file, Ctrl+C to copy them, open the other file, and Ctrl+V to paste.*

- **M**ove (m): moves your selected objects from one place to another. Select the object(s). Choose your base point. Choose the point to move it to.
- **Mi**rror (mi): mirrors objects along the line that you define. Select your object(s). Hit enter when all of them are selected. Pick your first point, and then pick the end point of the mirror line. (Notice the mirrored object shows up as a preview while you draw the line. It will prompt you to erase the original object. Type "y" for yes or "n" for no.
- **O**ffset (o): offsets objects to a distance of your choice. It will prompt you for a distance to offset first. Enter in that number or click two points on the screen giving the distance that you want. Pick the object that you want to offset and then choose the side you want to offset it. If you're offsetting the object(s) multiple times at the same distance, you can click on the new object that was offset and click on the side you want to continue offsetting it to.
- **Sc**ale (**SC/Space**): scales objects by a given ratio. Select the objects. Click or enter in the base point. Click or enter in the scale numerically (ex: 2 means double)
- **Sc**ale with Reference (**SC/Space/select object/ R**): Very important to scale our maps from Digimap. Please consult the toolkit for a detailed explanation.
- E**x**plode (**X/Space**): break selected complex objects such as blocks and polylines down to lines and arcs. Select the blocks or polylines you want to explode.
- Hit "esc" to finish. Select objects to ensure they were successfully broken down. You should multiple end points for lines and arcs if successful.
- **Tr**im (TR/Space/Space): trim objects using specified objects
- Select the object you want to use as the "trimmer." For example, in this case, if you want to cut the circle and make it into an arc, you select the line first. And hit enter. Then choose the side you want to trim of the object you will be trimming. So for the example, if I want the arc to be the larger side of the circle, I would select the right side of the line, deleting the smaller side of the circle. Notice that it will trim the object immediately.
- **Ex**tend (EX/Space/Space): extend objects to reach specified objects. Select the object that you want to "extend to." In this case, if you wanted to extend the line to the north end of the circle, you would select the circle first. Then hit enter. Then choose the object you want to extend, which in this case would be the line itself. The line will extend immediately.
- **Fil**let (FIL/SPACE): connects two objects with an arc that is tangent to the objects and has a specified radius. Select or type in fillet. Type "r" for radius and enter in your radius (e.g. 5). Select the first object and then select the second object. You can fillet: rectangles, tangential lines, arcs, etc. If the radius is 0, or you didn't enter a number for the radius, fillet will just connect the two lines together (extends the lines so they join together).

- **Ro**tate (RO/Space): To rotate an object. Remember using F8 to make the object rotating freely or strictly horizontal-vertical.
- **Mi**rror (MI/Space): create a mirror to your selected object (a very useful command)
- Reselect the **p**revious objects (p/space): sometimes you select a lot of objects to move or rotate them for example. You want then for example to copy or mirror them, so you do not have to select them again. Insert your new command/space/ p /space/ and CAD will select them again. This order is very useful and will save you time and efforts.
- **Re**generate (RE): always use this command when you feel the CAD working space becomes small, the movement becomes slow or the curved lines do not appear smooth. It is a command to refresh CAD working space.
- Save (Ctr+S): always remember to save you work by clicking Ctr+S. Make this routine command
- **Al**ign (AL/Space): allow you to align objects with selected objects, lines, pointes: Al/space/select object/space/select the first point you want to align/select the new base point for the first point/ select the second point you want to align/ select the new base point for it/ space/space.
- **Re**gen (re) – regenerates the display, smoothing it out after zooming in or out and updates the screen, essentially a refresh button. This is a very useful command especially when CAD screen is stuck in a specific scale in which that you cannot zoom out. This command will solve this issue.
- **Ma**tch (MA/Space): Matching the colour/hatch of one object with other object. MA/Space/select the object with the colour or hatch you want/Space/ select the new object that you want its colour to be changed/space. The second object will have the colour of the first object.
- **Ar**ray (Ar/Space): creating an array of objects. It is a very useful command if you want to create a long row of trees for example, or if you want to distribute buildings on a regular grid:
- **T**ext (T/Space): Adding text to your work.
- After finishing using a command, when you press *space* again (i.e. without typing any command), the program will re-bring the last command you used.

***Note:***

*-Sometimes you spend a lot of time and effort in selecting several objects for a specific operation (e.g. you want to copy, rotate or mirror 20 selected buildings or trees). If you want to reselect them again for the next operation, you do not need to reselect them manually if you do the following:*

*-After giving CAD the second command and hitting space, type: P/Space. CAD will reselect the objects you selected for the previous operation.*

*Example: M/Space/P/Space: CAD will reselect the objects used in the previous operation and will prepare them to Move command.*

- Layers: Assign objects into different layers to organize them. Layers allow you to organize your drawings in a clearer manner. Organizing buildings, streets, trees, greenery...etc into different layers will allow you to generate different types of maps easily (e.g. street maps only, green infrastructure map only...etc). From Layer properties, you can select a layer, turn off selected layers, lock selected layers or change the colour of selected layers. When you select a layer, all new objects are automatically assigned to this layer. The default layer is "0" which cannot be deleted. To allocate an object to a layer you just have to select the object and then select its desired layer from the layer bar.

**Printing/Saving your work:**

- Draw a rectangle that represents your printed sheet (For example: A3 is 297x420 – A1 is 594x420).
- To save your work in CAD you need to use the command Plot (or Print): **Ctrl+P**
- This method allows you to export your work from the CAD environment to a JPEG or a PDF ready print file.
- We recommend exporting as PDF so you can edit the file in Ai or PS
- Hit Ctrl+P/ in the 'name' section select 'AutoCAD PDF'/ select paper size (A3 or A1 for example) according to your desired output, / change "display" to "window"/ choose your area of print (the rectangle you created)/ tick "fit to paper" and press preview. If you are satisfied press the mouse right button and press "plot".

***Notes:***

*-Use the toolkit handout and YouTube for more details on how to use the software*

*-SketchUp is the 3D modelling software we will be using to construct our 3D space. The construction process is based on the CAD drawing we created. The better the CAD base is the easier for you to create your mass model. After creating the mass 3D model in SketchUp we will take it to the rendering software Twinmotion to create realistic graphics. Please download Twinmotion as it is currently free.*

***If you are using SketchUp Pro***

*- Your CAD skeleton drawing should consist of buildings, pavements (and possible curbs, edges of green spaces, land lots, any essential street furniture (fountains…etc.). Lines that construct a certain object (such as a building) should be joined using the command* ***Join: J/Space/Select lines. So you should have most of your pavements joined, each building is joint…etc.*** *This will make working in SketchUp easier. Please note that only connected lines can be joined.*

***If you are NOT using SketchUp Pro***

- *You will use SketchUp Free. It is an online web-based basic software, it does not support .dwg files. You have to export your CAD file as .JPG and trace your masterplan manually. Please refer to the attached guide on how to export your file as .JPG*

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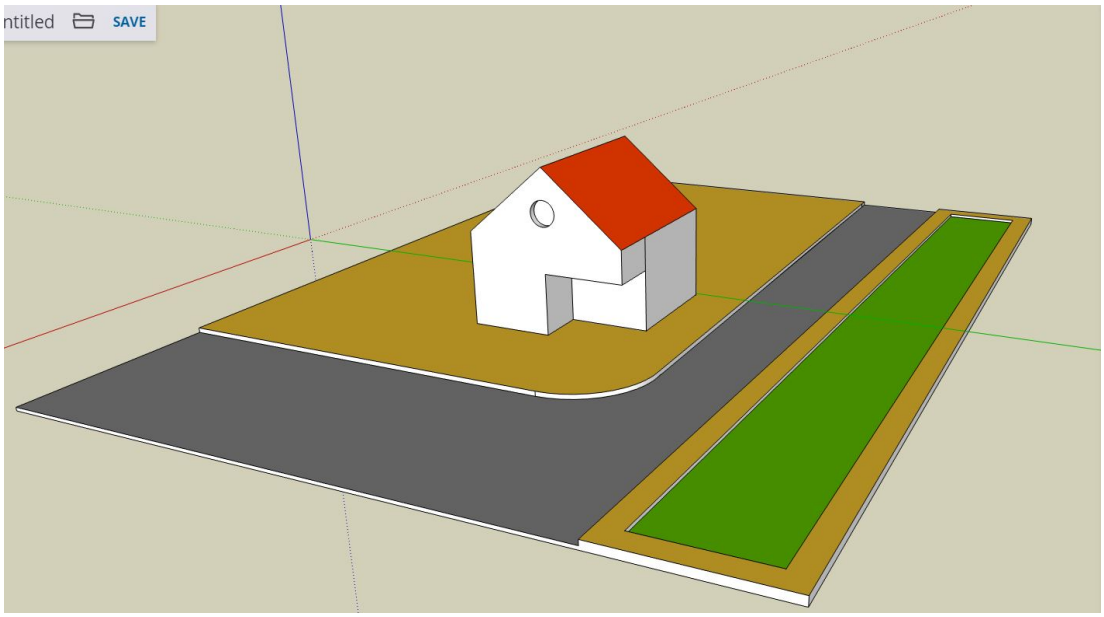
We will start by exploring the software interface and drawing the model below:



- SketchUp interface
- If you are using SketchUp Pro**:** File/New. If you are using SketchUp Free: Create New/ Simple Template Meters.
- In SketchUp Pro: Window/Model info/Units: Change the settings into Decimal – Meters. In SketchUp Free: This has already been set.
- **Zooming in and out:** Use the mouse wheel
- Hold down the mouse wheel and move the mouse to change the view
- Use the **Line** tool **to draw surfaces** and make them ready for extrude. **In SketchUp Free** you have to trace the whole surface manually. In Pro you just need to highlight a few lines. Hit **escape** when you finish drawing.
- Once the shape turns grey this means it is now a surface and it can now be extruded. Do this for all shapes (everything you want to create a 3D model from or to give it a material, including buildings, pavements, green spaces, water surfaces… etc.)
- Use the **Rectangle** tool and repeat the step above
- Use the **Push Pull** tool to extrude objects: Click on the shape, move the mouse up /type the height (3 m for each floor) then hit Enter.
- For the other rectangle, select the push-pull tool, click on the surface you want to extrude, click on the top surface of the other extruded cube/ the two heights are now matched.

*NOTE: Lines must be connected and situated **on the same plane** in order to create a surface that can be pushed. If the surface does not turn grey this is most likely related to disconnected lines or a line outside the plane surface.*

- Use the Line tool to divide surfaces. Drawing a line on a surface will divide the surface into two surfaces. This will allow you to push/pull every surface individually.
- Divide the flat roof of the shape (the cube) into two surfaces using the Line tool. Draw a line from the mid-point of the first line to the mid-point of the second line.
- With the **Selection** tool select this line/ Click on the **UP** arrow (to **lock the movement** into up and down only)/ select the **Move** tool/ Move the line up. This will create a gable roof.
- Draw a **circle** on the front elevation and push it inside using the Push/Pull tool

- Select this building with the mouse (make sure you select all faces)/Right click/Make group. Notice that selection from left to tight and right to left is different just like AutoCAD. If you want to edit this group: select it/right click/explode
- Using the **Rectangle** tool draw a large rectangle under the house, push the rectangle **down** a little bit with the Push/Pull tool.
- Draw a pavement on the rectangle using the **Line** tool and the **Two Point Arc** tool.
- Draw the pavement on the other side of the road/ the road will be created as a surface
- Push the street surface down with the Push/Pull tool by 0.25m: Push-Pull tool/ click on the surface/ move the mouse down/ hit 0.25/ hit Entre
- Use the **Offset** tool to create the green space in the image above: select the Offset tool (under the push-pull tool if you are using SketchUp Free)/click on the pavement/click inside the surface/ use the push-pull tool and push the inner surface down.
- Give different surfaces different **materials** using the material icon on the bar to the right side of the screen. This is essential for Twinmotion rendering. If you are using the model for basic illustration at this stage, you can give it some light colours and edit it and add annotations with Ai.
- **Styles:** You can change the style of you model from sketchy to solid to wireframe…etc. using the style menu to the right. Remember that this is going to be used for the basic informative graphics about your design justifications and 3D space analysis, and not for the final design presentation.
- **The 3D Warehouse:** A useful source of models done by people. Use it sparingly. Trees, cars, boats, people, street furniture…etc. Are going to be done in Twinmotion
- In SketchUp Pro: File/Export/2D graphic/ to save the image as JPEG. File/Save as/ to save the file. In SketchUp Free: Click on Save to save the file in the cloud. Click on the Folder symbol to download the file to your computer as SketchUp file/or click on Export to export as a PNG image for annotation in Ai.

Let us now play around with the software using the files attached in Blackboard. This is the same corner site we created in AutoCAD, exported as .JPG for SketchUp Free users. If you are using Pro, you need to import the dwg file to SketchUp Pro as below.

- If you are using SketchUp Pro**:** File/New/Open. **Import** the .dwg CAD file that I attached in blackboard: File/Import. If you are using SketchUp Free: Create New/

Simple Template Meters/ Click on the folder symbol /**Insert/** drag the JPG image I attached in Blackboard to the software space.

- In Pro: Click on the drawing/ Right click/**Explode (ESSENTIAL).** In SketchUp Free: the JPG is ready.
- Setting the drawing to scale: Use the **Measure Tape** tool and measure a parking space/ hit 5 (i.e. 5 meters) / enter. The whole model is rescaled.
- Start constructing the model as above
- In SketchUp Pro: Use the **Line** tool (the pen) to draw lines between a few segments of each shape **to highlight it as a surface** and make it ready for extrude. **In SketchUp Free** you have to trace the whole surface manually. Once the shape turns grey this means it is now a surface and it can now be extruded. Do this for all shapes (everything you want to create a 3D model from or to give it a material, including buildings, pavements, green spaces, water surfaces… etc.).

Note: Your SketchUp file will be linked with Twinmotion for the final rendering. Before using the file in Twinmotion make sure that your model is close to the XYZ axis in SketchUp so you do not struggle to find it in Twinmotion space. If not, move the model and place it by them.

**PLAN60950 – Urban Design Applied Skills**

Week 11- S2 : Twinmotion - Session handout — Dr Taki Eddin
Sonbli

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*-Use YouTube for more details on how to use the software. I suggest the following channel:*

https://www.youtube.com/watch?v=ZdB7cCWAr7o&list=PLoTRsQY2aZe7d-E3N2rJjdRqrZ_EBYpbQ *Start with this video:*

https://www.youtube.com/watch?v=zbGz0w2FV14&list=LLIkBmHBcCBgXzW7YEJF3FKw&index=38&t=277s

*-Twinmotion is the rendering software we will be using to finish and present our final 3D design. The rendering software can give realistic materials and elements, street furniture, sky, people and vegetation to your model. It can help you to communicate the **feel** of your design and public spaces.*

***Preparing your SketchUp model:***

*-While the software is very powerful, it is entirely based on the SketchUp model you created. The better the SketchUp structure the easier and more flexible the software. Twinmotion cannot give raw objects any materials, it can however **replace** existing materials. So in order to give surfaces materials in Twinmotion (TM), **you need to give them colours or material in SketchUp first**. Every material in the SketchUp model will be assigned to a material in Twinmotion from your choice. So if you decide to give a red surface in SketchUp a concrete or marble material in Twinmotion for example, all red surfaces will be assigned to this material. The more colours/materials you have in SketchUp the more flexibility you will have in Twinmotion.*

*- **We do not need too many materials however**. We basically want one or two materials to our **new buildings** (buildings and roofs for example), darker materials to **existing and surrounding buildings** and one or two materials to the **ground**. We also need separate materials for **water** surfaces, and for **green** surfaces. So make sure to give these surfaces above different materials/colours in your SketchUp model.*

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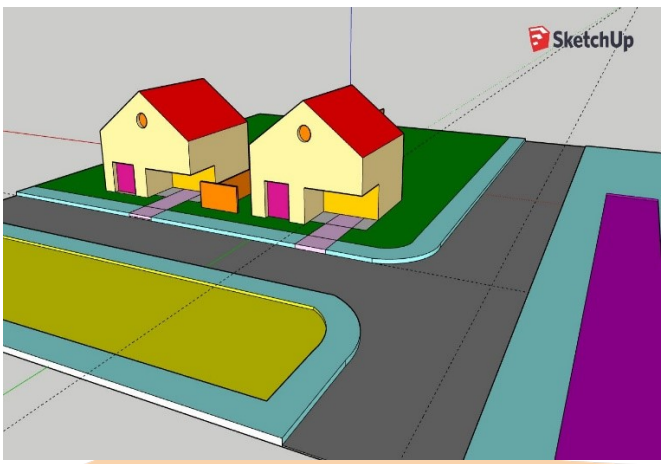
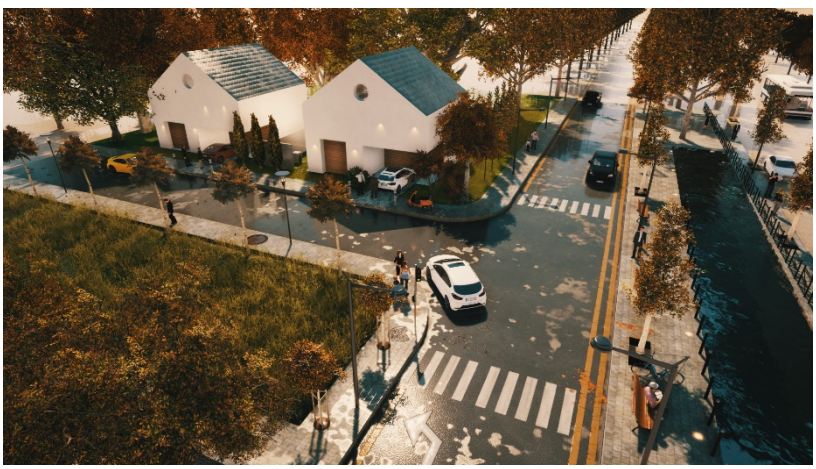
Please use the SketchUp model provided in BlackBoard. In this tutorial we will be taking this model (left) to Twinmotion and render it to finish with the model below. Please see how the model is given different materials and how these materials are replaced in the Twinmotion version. All other elements are added in Twinmotion.

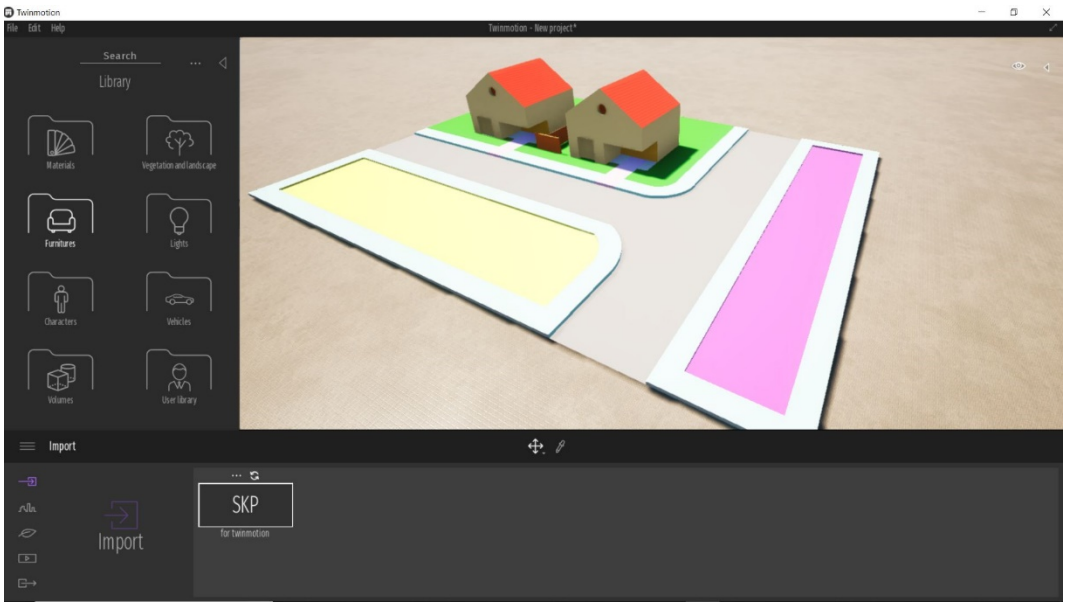


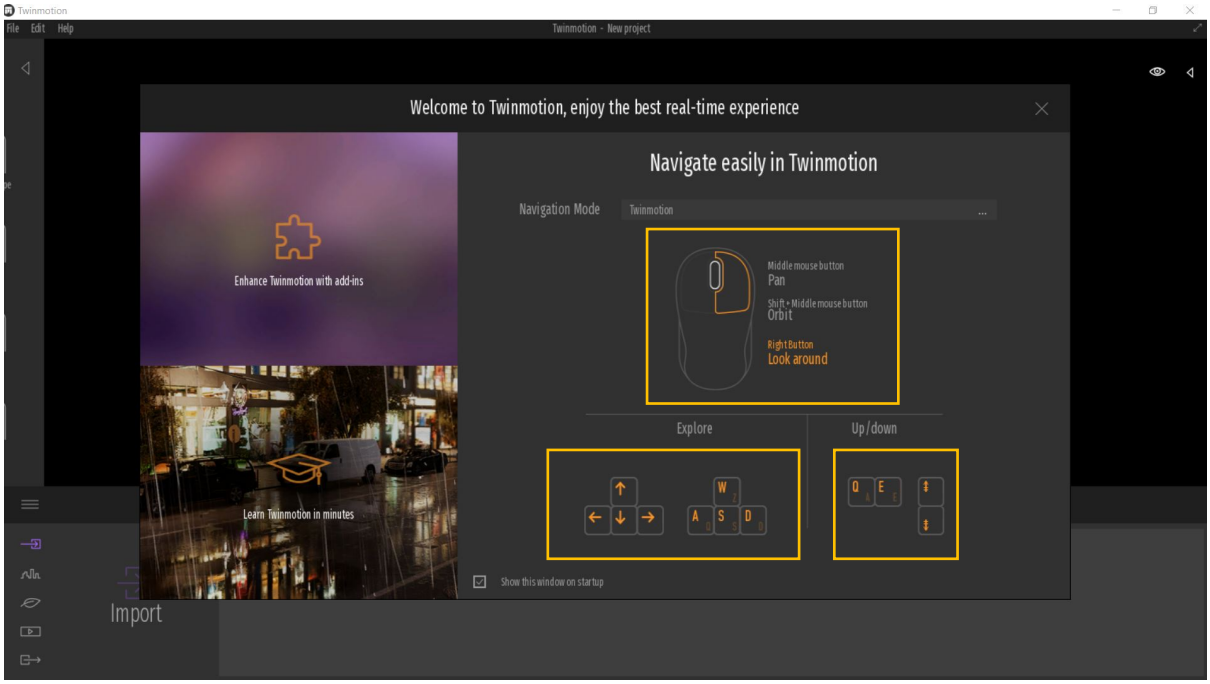
- Open Twinmotion (I am using Twinmotion 2019 in this tutorial, if you have the better version Twinmotion 2020 you should still be able to follow the main steps, however, check this video for the difference between the two version: https://www.youtube.com/watch?v=lWOofm10y1M

- Twinmotion interface: Library-Import-Urban-Nature-Media-Export-View-Search
- Import the SketchUp file into Twinmotion:

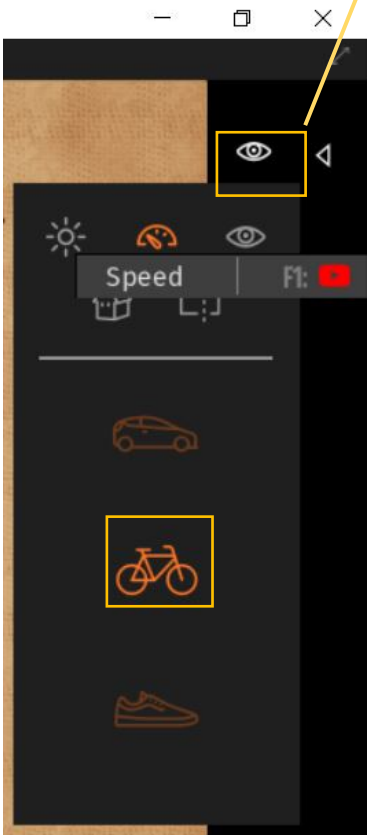

- You should now see the model imported. Please make sure that the model is **close to the XYZ axes in SketchUp** in order to find it easily in Twinmotion.



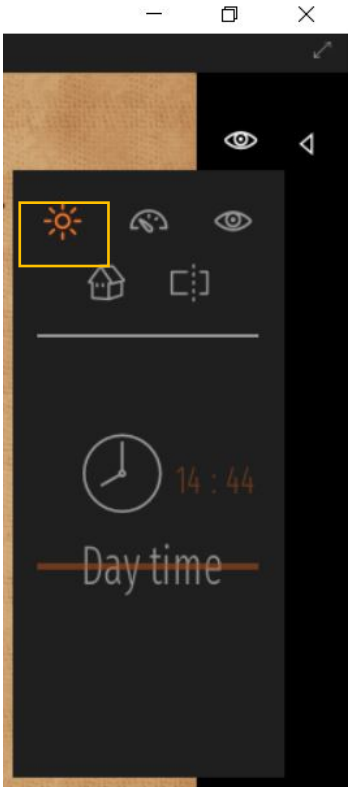
- **Looking around**: hold down the mouse right button and move the mouse.
- Moving the camera in and out, left and right to Zoom in, S to zoom out, D to move right, A to move left

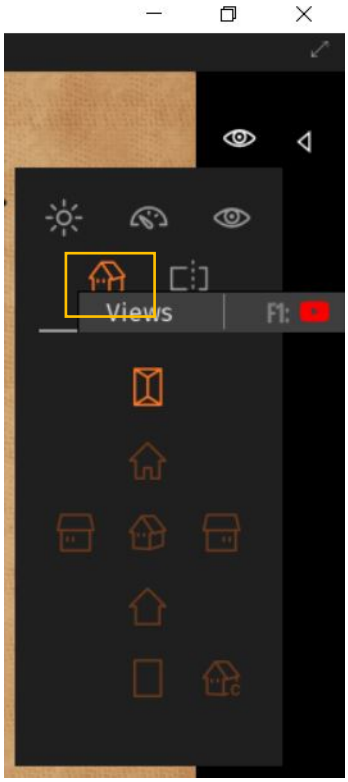



- Change movement speed in space from the top right **view** menu: Select the bike speed



- From the same menu you can change the daytime, and change views:

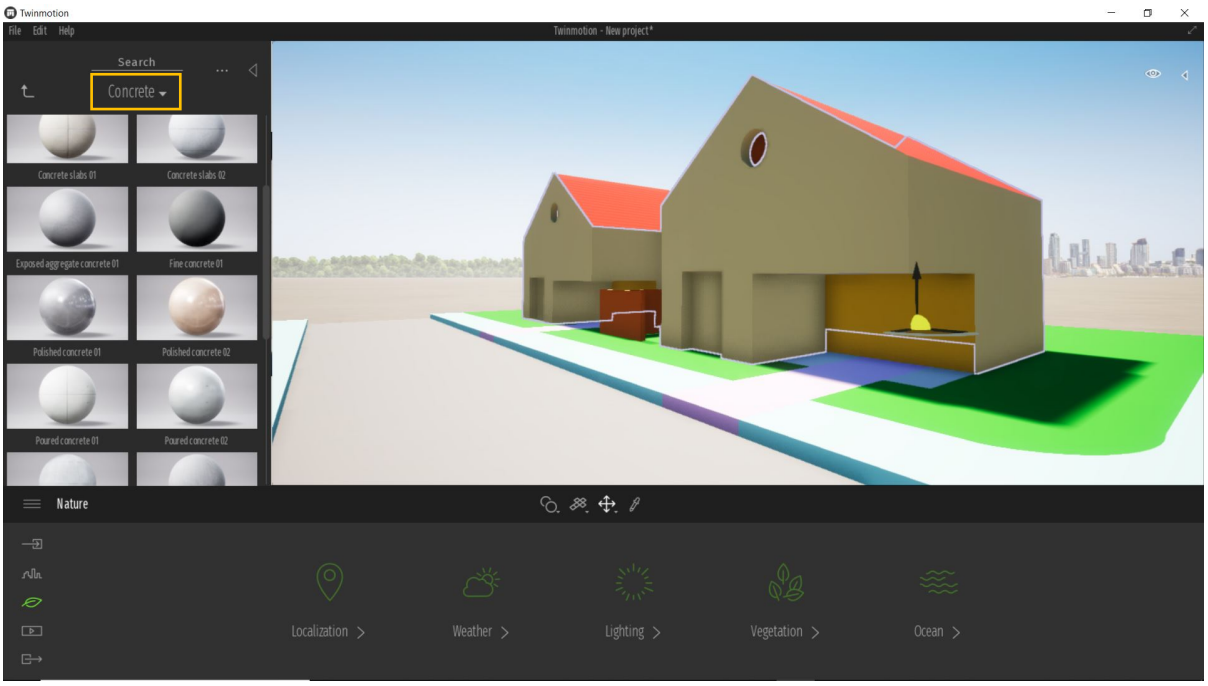


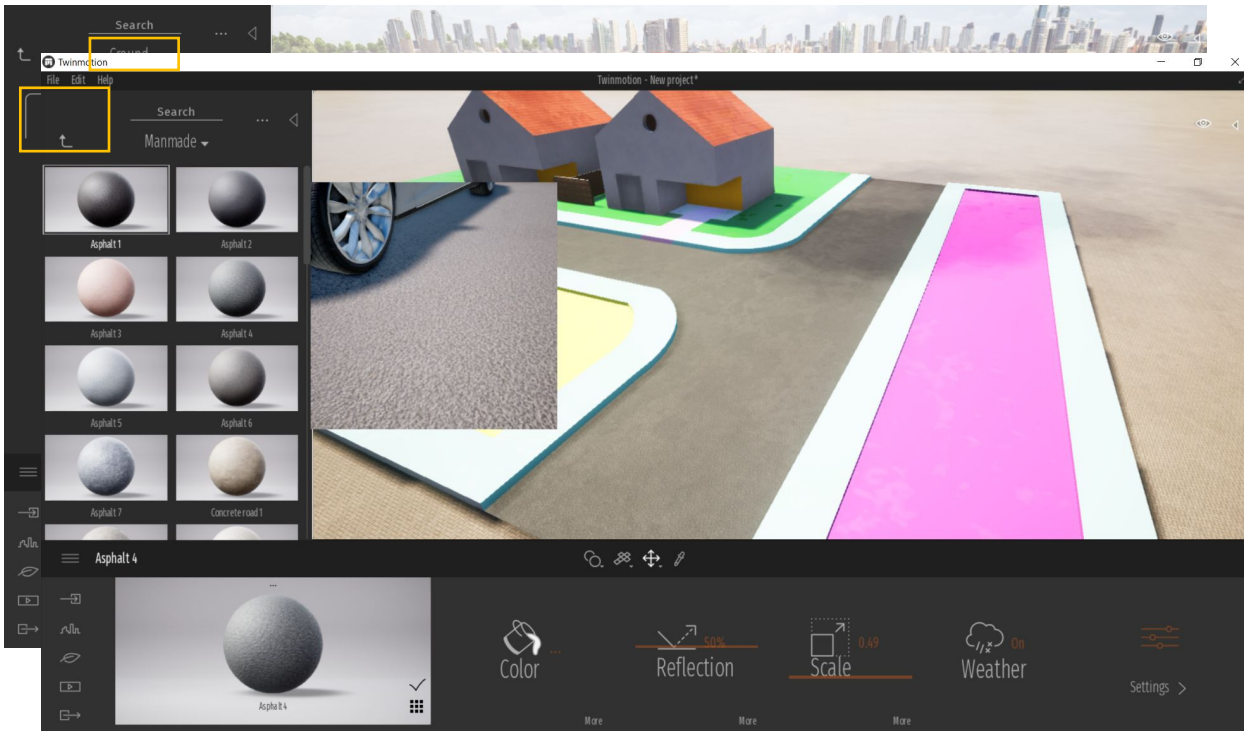

- **The Library:**

  Let us have a look at the Library. From here you can add materials, trees, people, street furniture, cars and lights to your model. It is the most important panel in Twinmotion.


- Open the **Materials** folder in the library and explore the different materials you can use. Open the concert folder and give building a plain concert texture by dragging the material to the buildings. As buildings were given a certain colour in SketchUp, this colour will now be replaced by concert in Twinmotion.




- Go back to materials and give streets an asphalt materials: **Ground/Handmade/Asphalt.**



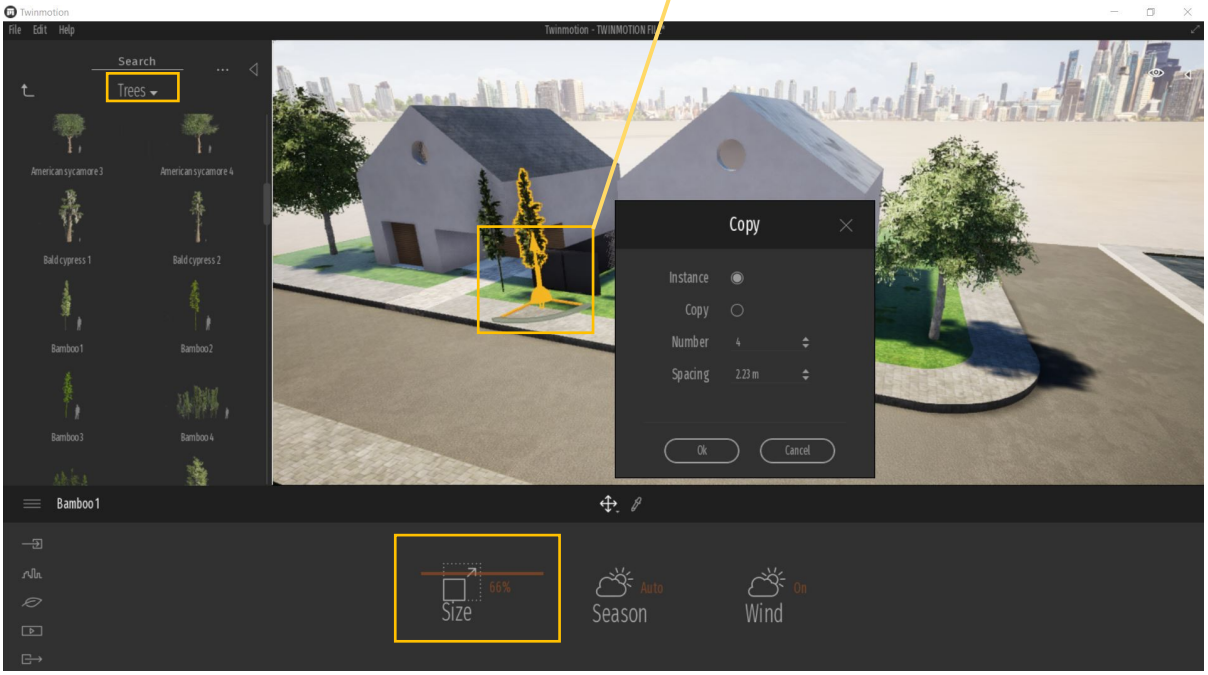

- Give pavements Square Cobblestones again from the folder **Ground/Handmade**

- Give the greenspace a simple texture from folder: **Ground/Nature**. This will apply a simple 2D green texture.


- Give the water area a water texture from folder: **Materials/Water**. This will apply an animated realistic water texture.

- Give the roofs a grey roof material: **Materials/Roof Covering**

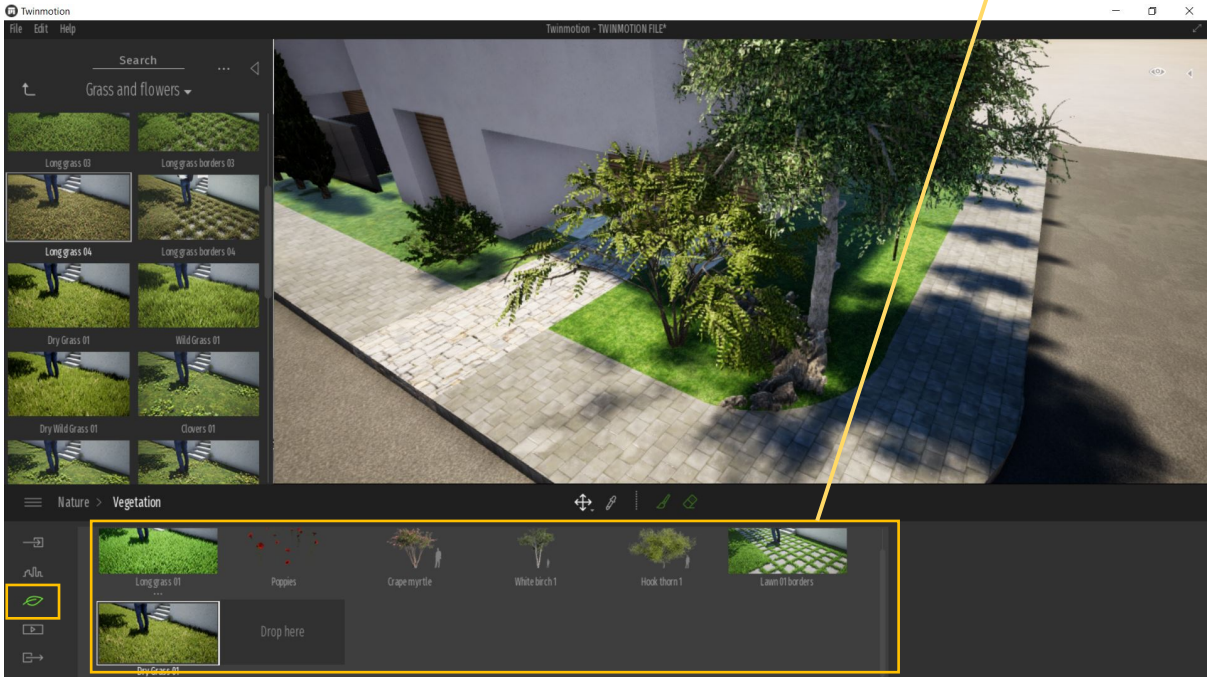
- **Add trees** from **Library/Vegetation and Landscape/Trees**
- You can change the tree size by clicking on the tree and changing the size from the Size tool in the bottom panel (see below).
- You can also rotate it and move it from the yellow selection tool
- Select a tree and **copy** it by holding Ctrl and dragging it. You can select the number of copies from the copy window.



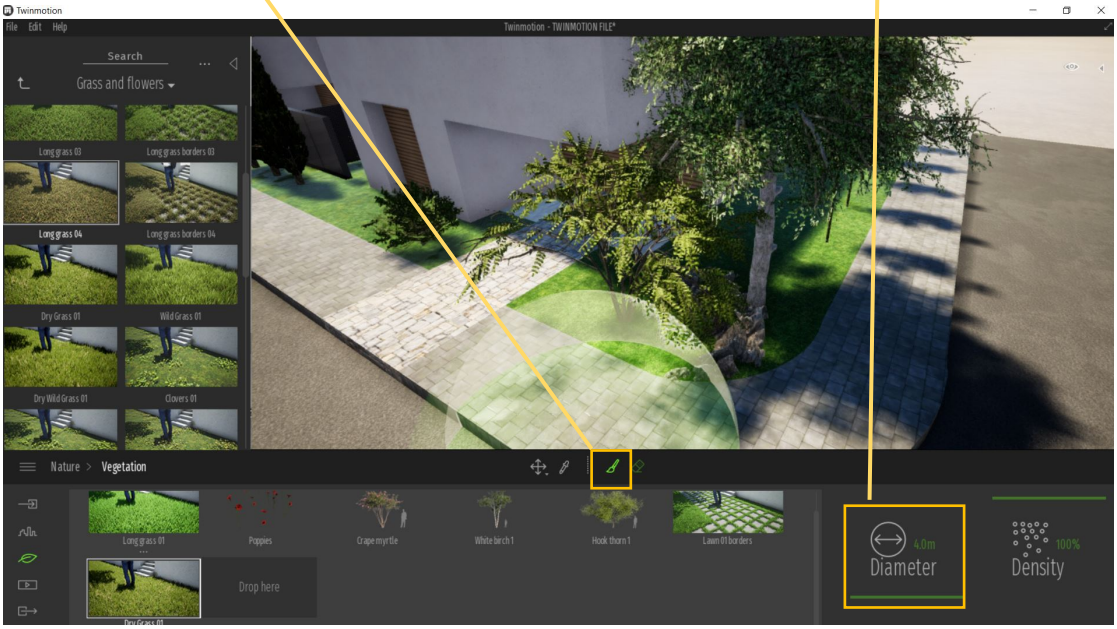
*Note:*

*Do use different types of trees, however, consider the environmental context and select trees that look common in the area under study.*

- Let us give **grass** a realistic **3D effect**: click on the leaf symbol in the bottom left panel (Nature menu), and then click on Vegetation. Go back to the **library /Vegetation and Landscape/ Grass and flowers**. Now **drag** a grass material to the bottom panel.

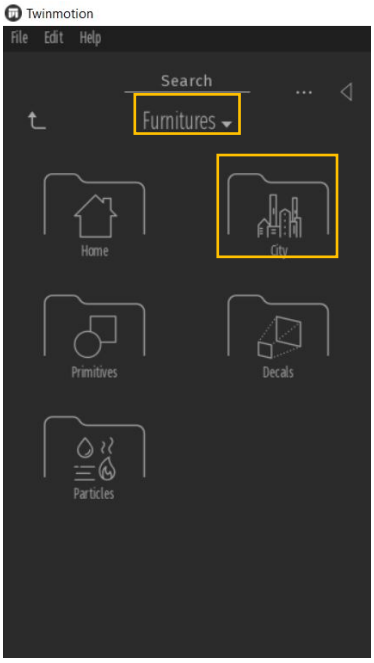



- Click on the **brush tool** to show the bubble brush and change the **diameter** of the brush and start brushing above the green space.

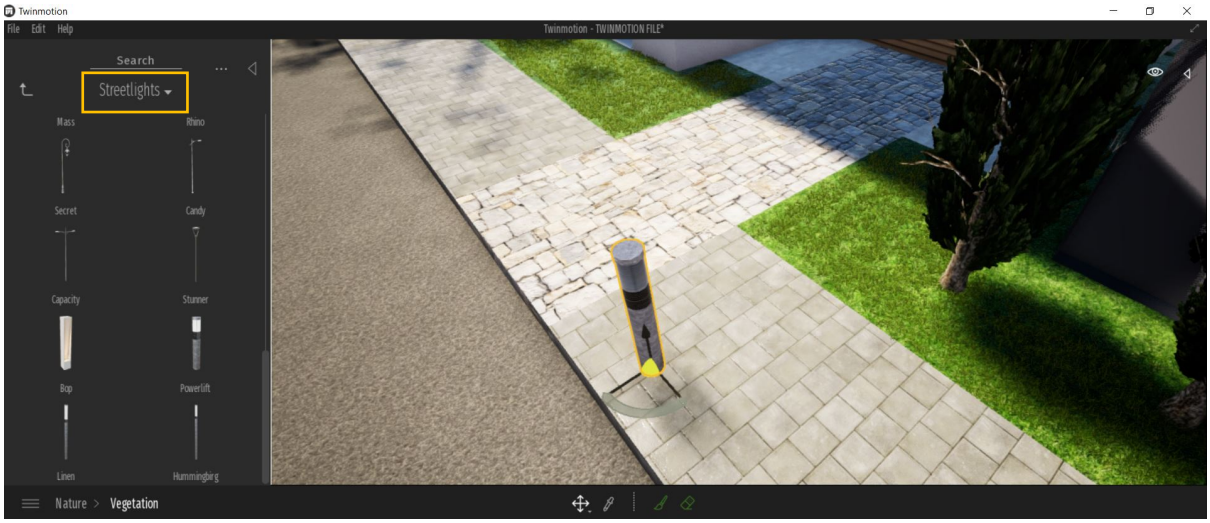


- By brushing on a surface you are actually giving that surface a realistic tall grass material. The new TM 2020 has a more refined and accurate approach the TM 2019.


- Let us start adding **street furniture**: **Library/Furniture/City**. You can add street lights, benches, street signs and more from this folder.

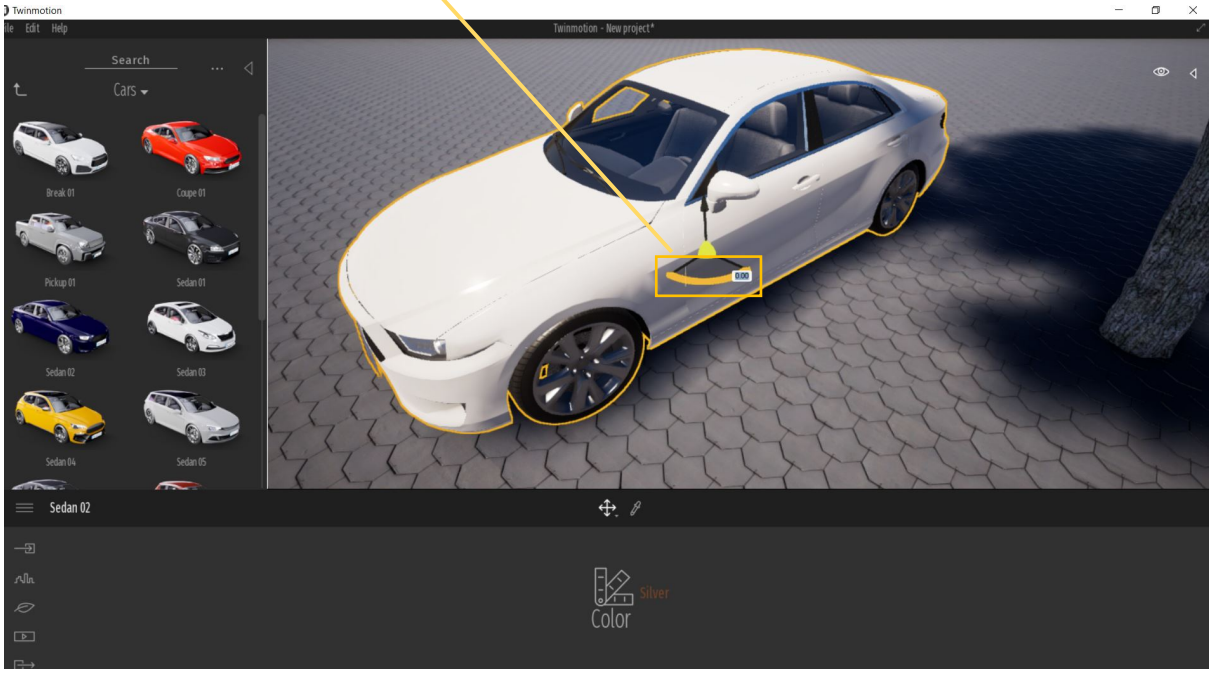


- Add street lights to main access and along streets. These lights are **functional** and they are important if you want to add a **night scene**.




- Add cars from Library/vehicles. Give cars a natural movement such as rotating a car on a curve…etc as below.

- To rotate a car or any objects in Twinmotion, again click on the object and then click and drag the yellow arc in the xyz axes as below




- Add people to the scene from **Library/character/Humans.** You can change people's positions (standing or sitting) by selecting the person, and select Pose from the menu at the bottom.

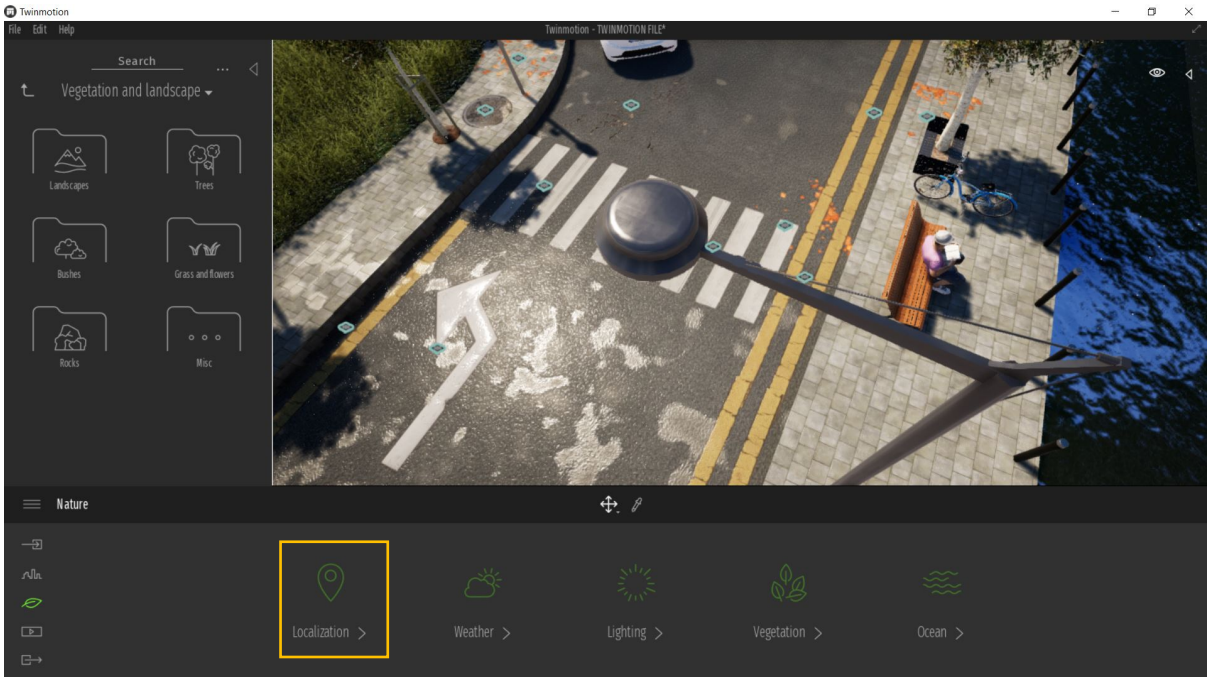
- Add **road markings** from: **Library/Furniture/ Decals**


- **Changing weather:**

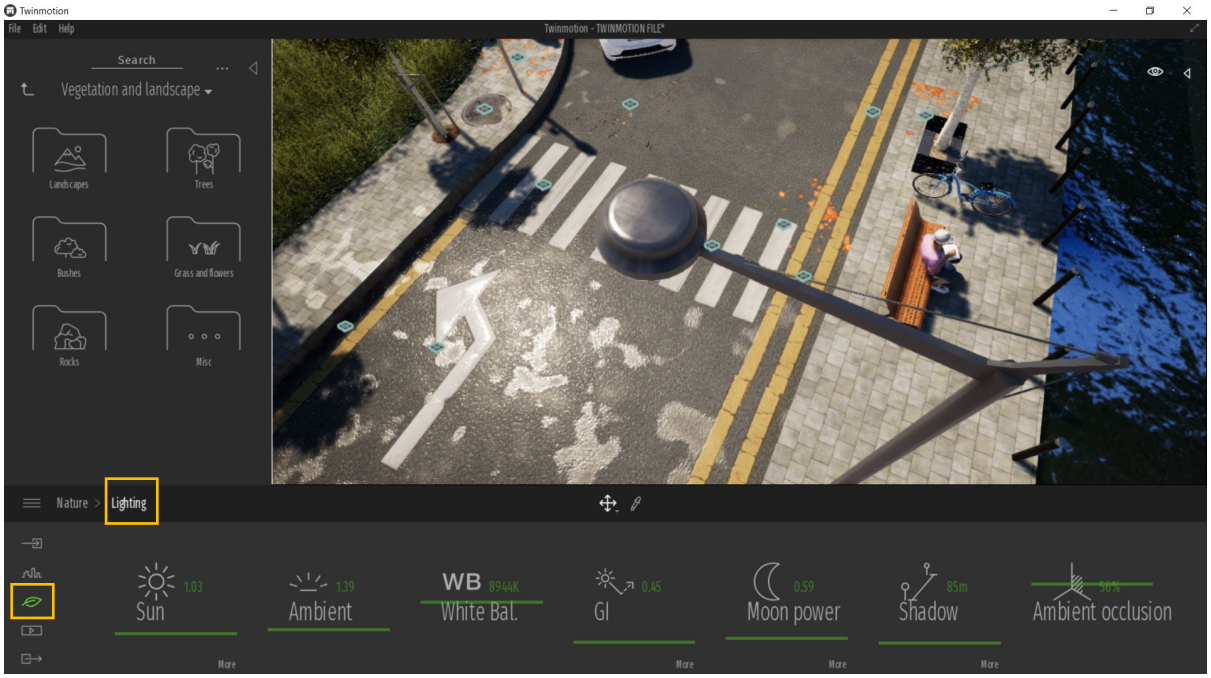
  There are two ways to change weather in Twinmotion: The first is changing weather for the whole model, the second is changing weather for individual shots. To change weather for the whole model, go to the **Nature** menu (the leaf symbol) and find **weather** settings:


The settings below create wet floor which looks realistic and reflects lights well

- From the same menu (nature) select the location (click on Manchester on the map) to reflect accurate shadows

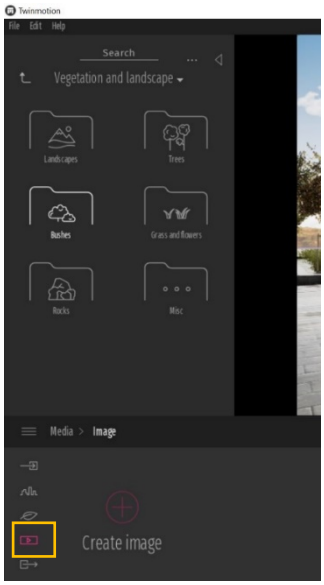



- You can change light settings from the lighting menu under the nature menu. Play around with these settings (shadows, sun and ambient) to create the desired feel. Change moonlight all the way up to improve night shots quality.

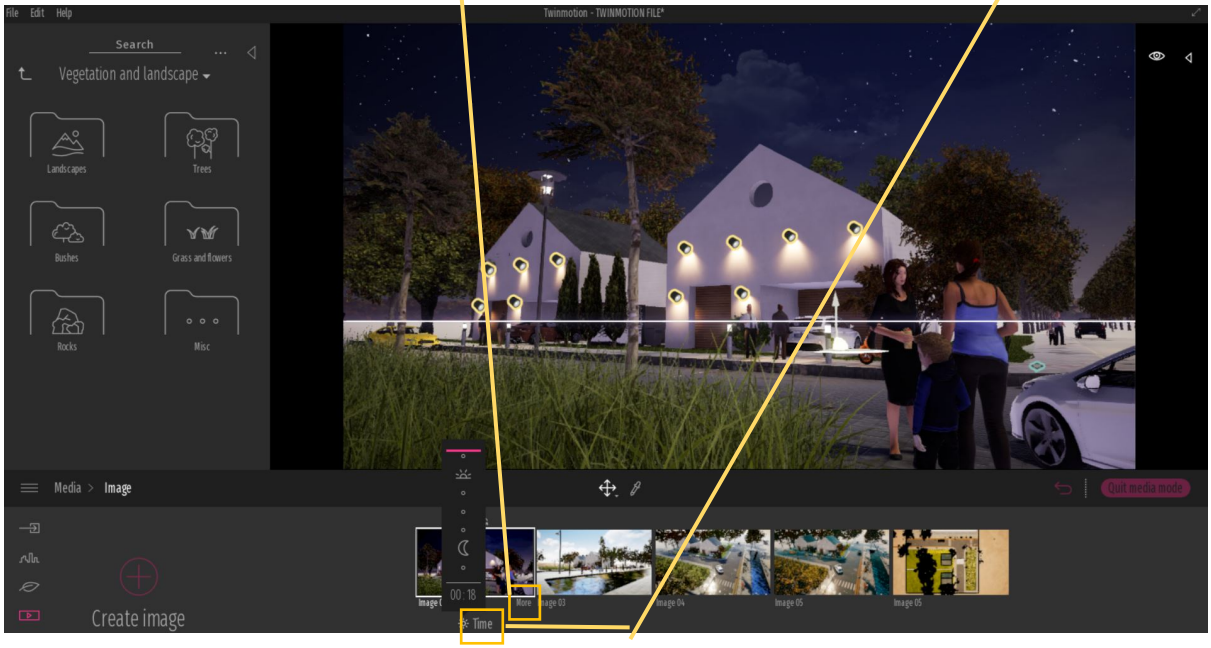


- **Media Menu**:

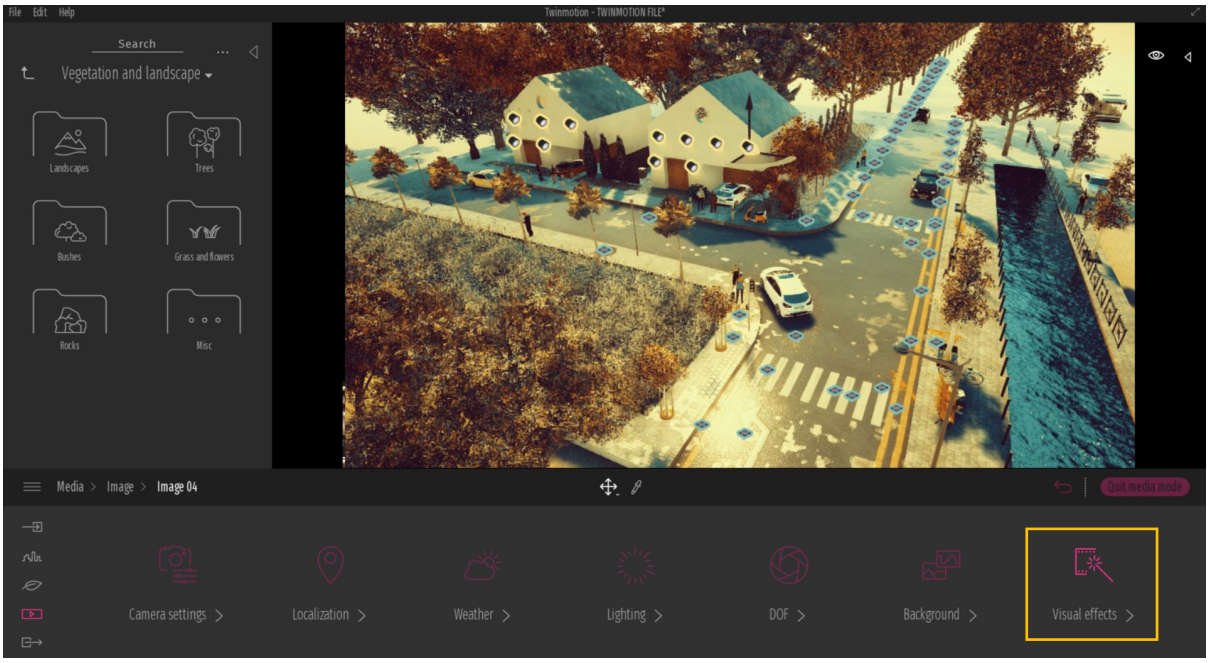
This is where we will select our shots and control their appearance. One of the key features of creating shots in TM is that we can give individual shots their own settings in term of day time, lighting and weather.  Select the shot you want and then click on create image




In the example below, I have 5 different shots with different settings. Click on **Time** to select the day time of the shot. Click on **More** for more options (weather…etc.)

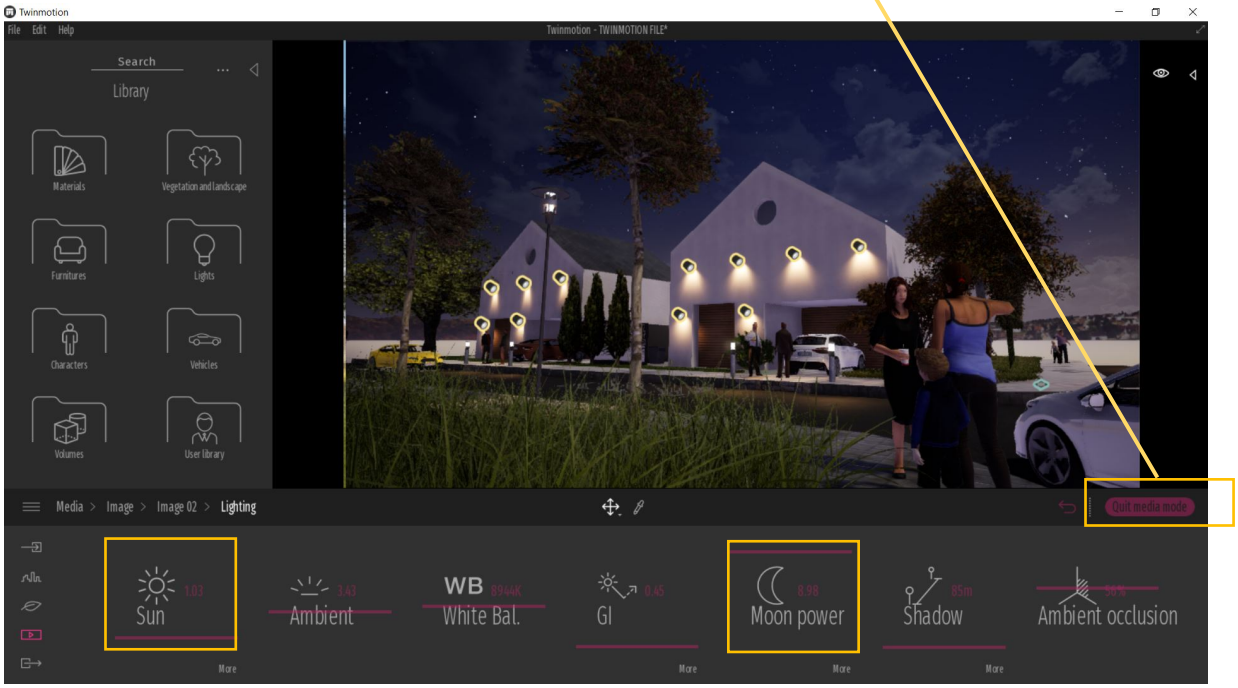


- Click on **Visual effects** under the same menu (Media).

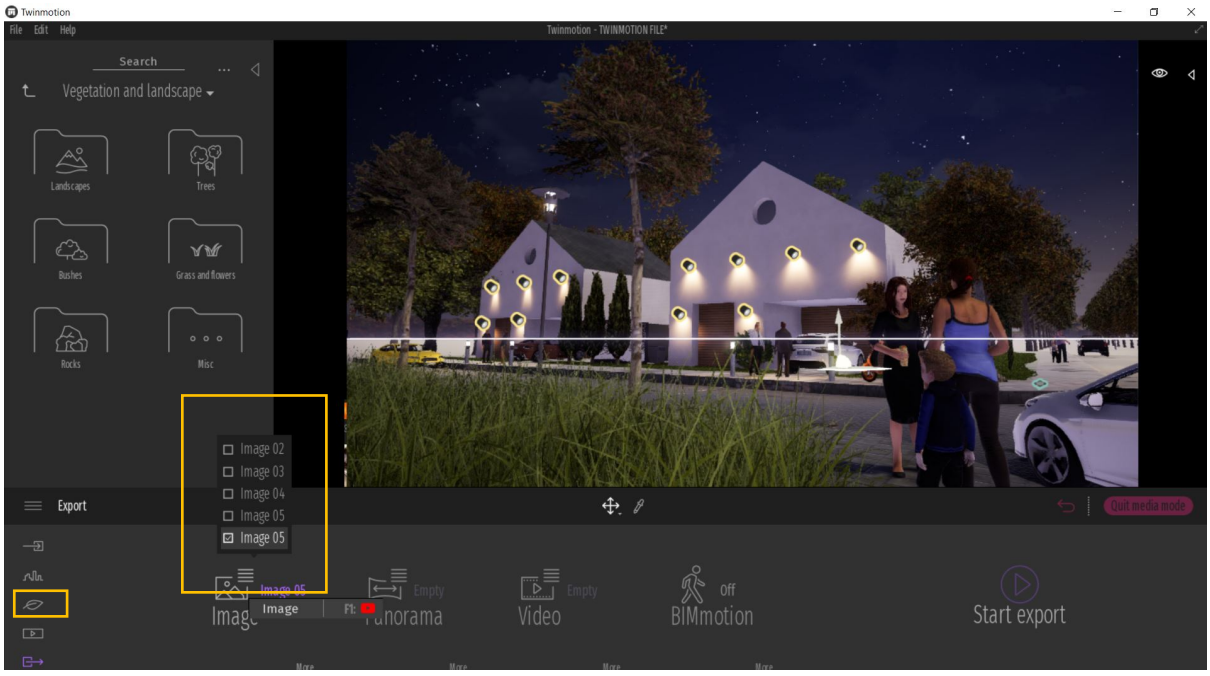



Click on **colour gradient**, and explore the **Types** window, change contrast and saturation to get the desirable effect. Be careful and try to keep your graphics natural.

- To create a night scene: **select** the shot you want/**more/ lightings**/ move the sun all the way down/move moon power all the way up. You scene is totally depending on the actual street lights and building lights you added to the model with street lights have the biggest effect. When you finish editing a shot, **exist media mode.**




- **Exporting your file:** To export your image: go to the export menu/image/ and **check all the images you want to be exported** then hit Start Export. The export is usually of higher quality than the live screen.



Exported day time shot:

Exported night time shot:

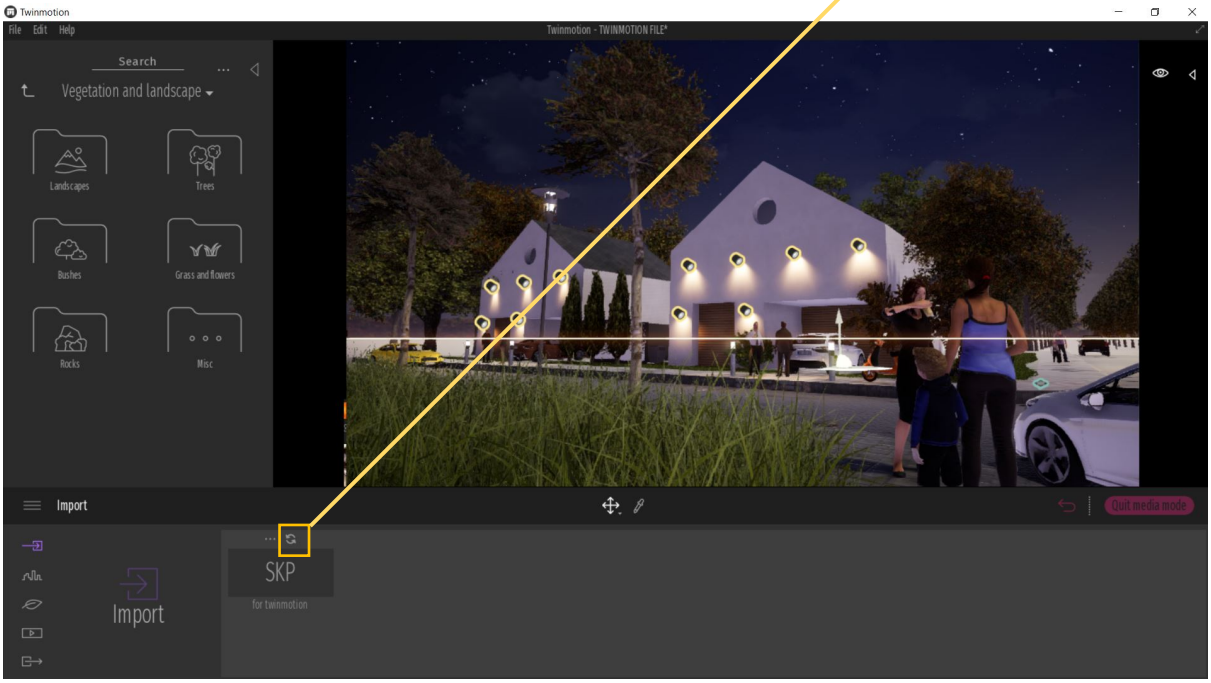
**Final Notes:**

- You are likely to go back and forth from SketchUp to TM while you are creating your model (to change some heights for example). This is very practical and easy in TM. You need to do the followings:

A. Make the required changes in SketchUp

B. Save the changes in SketchUp (hit Ctrl + S). If you do not save changes then they will not apply in TM.

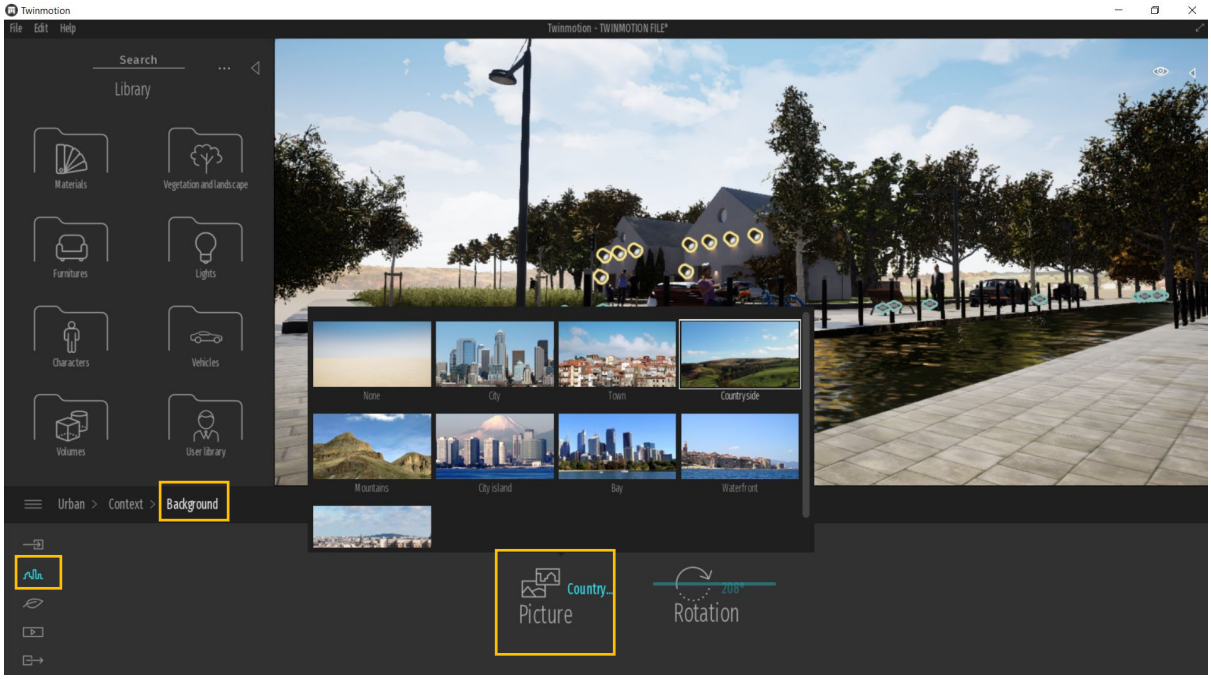
C. Go to TM import menu and refresh the model by clicking on the **refresh** symbol as blow. The changes will apply immediately.




- **Select your shots carefully**. Less is more. They should communicate your vision based on your analysis and urban story.

- Try to be consistent, you do not have to change weather settings for different shots!

- The Urban menu (see below) allows you to change the background of the 3d model. These backgrounds are of generic characters of urban/rural/…etc. If the background is faraway then this should be adequate. Select the background that is closet to your context.




- You can find and manage (hide, search and change layer hierarchy) all the elements you used in your model in the **Search** menu. Lick on the small arrow to the top right to reveal it.

- You can create and export animated videos in TM. From **Urban** menu you can add **Paths** of people and cars. Click on the pen tool to create the path. However this is not required as part of your submission though so it is up to your time and interest to explore this feature further.