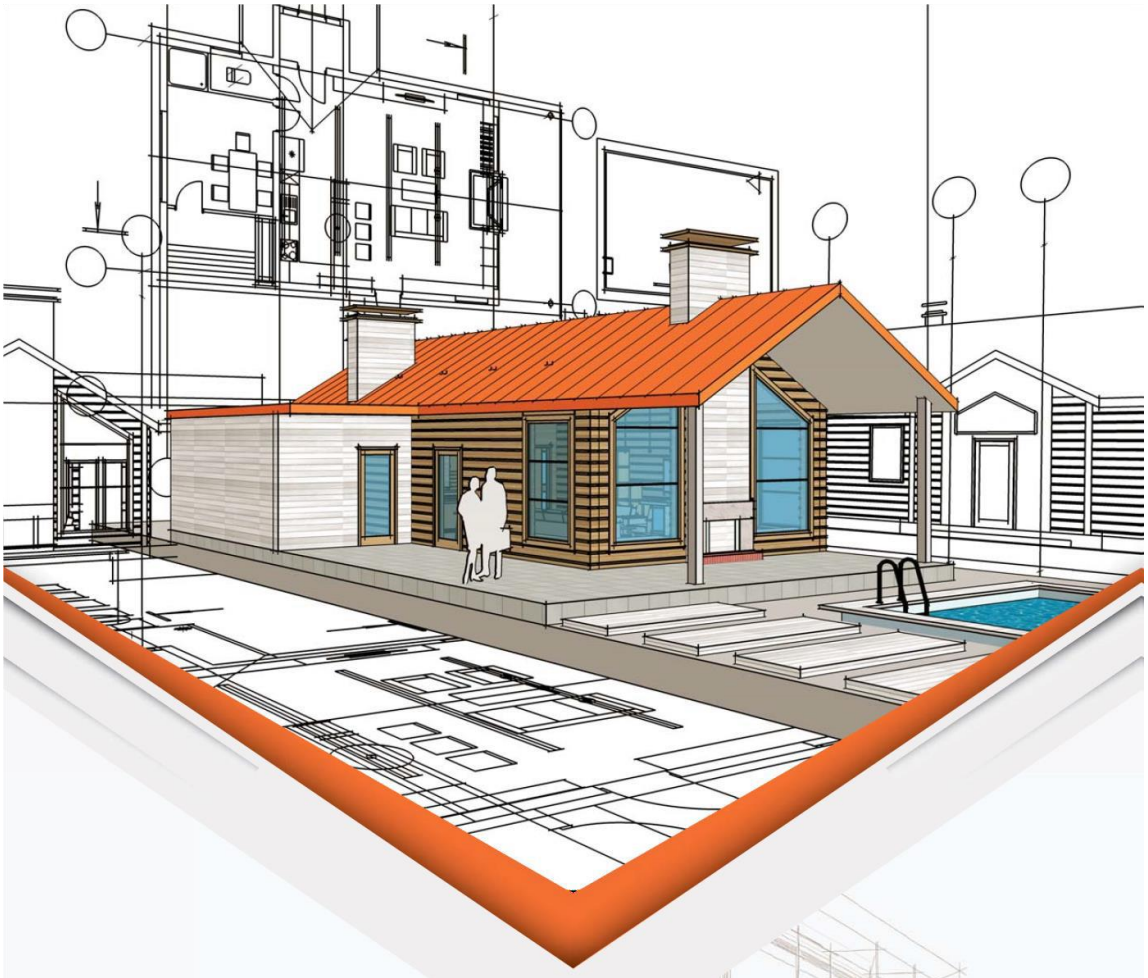

EASY STEPS TO ARCHICAD

by EZI

A teaching manual

EASY STEPS TO ARCHICAD

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Text design by Eziaku Rasheed

Reviewed by Yu Wang

Cover design by Akdan.co

Disclaimer

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This manual is NOT FOR SALE.

Dedicated to my girls - Tomi and Teni. May you learn to see obstacles as opportunities to shine!

– E.R.

Acknowledgement

I will like to appreciate all those who contributed to the production of this manual. The tutors and students of the School of Built Environment (SBE), Massey University who have provided me with valuable feedback that has played a significant role in shaping this manual.

I am grateful to my colleagues who have supported me through this process and Yu Wang - the tutor/instructor who reviewed the manuscript of this manual.

My sincere gratitude goes to my husband – Mr Eniola Rasheed for his utmost support and encouragement towards producing this teaching manual.

Contents

Preface

Intended Audience

Prepared for High School and first year students in Architecture and Construction-related programmes

Easy Steps to ArchiCAD is designed for students in construction-related programmes. It provides an easier means of learning how to draft designs using ArchiCAD software. This teaching manual helps you learn to use various tools in ArchiCAD while designing a simple residential building. The focus is on providing a good understanding of the major steps required to design a building in ArchiCAD. It illustrates basic information in ArchiCAD commonly used to design buildings. This manual simulates a real architectural project, in detail, and is perfect for everyone who wants easier and more explained steps to the use of ArchiCAD for building designs.

To gain the best out of this resource, you are advised to download ArchiCAD version 22 Educational version and have the any of the following[1]:

Recommended Operating Systems (OS):

- Windows 10
- macOS 10.14 Mojave
- macOS 10.13 High Sierra
- macOS 10.12 Sierra

Recommended Hardware:

- Processor: 64-bit processor with four or more cores
- RAM: 16 GB or more is recommended; for complex, detailed models 32 GB or more may be required

[1] Graphisoft. Retrieved from https://www.graphisoft.com/support/system_requirements/AC22/

- Hard disk: installing ARCHICAD on a SSD (or Fusion) drive is recommended; 5 GB free disk space is required for the installation, 10 GB or more is required per active project
- Graphics card: Dedicated OpenGL 3.2 compatible graphics card with onboard memory of 1024 MB or more is recommended to fully exploit hardware acceleration capabilities. You can find a list of recommended graphics cards at http://www.graphisoft.com/videocards
- Display: A resolution of 1440 x 900 or higher is recommended

About ArchiCAD

ArchiCAD is a drafting software used for Building Information Modelling (BIM) in the architecture, construction and engineering industry. It enables designers and architects to model a real-life building creating accurate construction details for building elements such as steel, timber, reinforced concrete and complex beams and columns. It also enables estimators or quantity surveyors to quantify the estimate of these building elements and entire projects.

How to Use this Manual

This book is divided into four modules. Each module takes you through steps to achieving specified drafting steps in ArchiCAD.

Module 1: In this module, you will be introduced to the design of a building. It presents the first steps such as setting up of the drawing template and story levels.

Module 2: The actual design of a simple one-bedroom residential building is presented in this module. It includes all the basic activities required to design the building. It includes creating the site mesh, the building envelope and roof.

Module 3: In this module, the sample building will be completed. It illustrates how to create openings, internal structures and foundations for the sample building.

Module 4: This module deals with the documentation aspect of a building design (working drawing). It presents how to create zones, dimension buildings, produce details of building components, take off Quantities/Schedules and share your design.

Videos are embedded in the texts at certain sections of the manual. You are required to watch the videos alongside the manual for a demonstration of the steps undertaken to gain the complete picture. The contents were produced from Graphisoft ArchiCAD manuals using ArchiCAD 22 Educational licence. You will need to register with myarchicad.com for more information and instructions on how to get the licence appropriate for you.

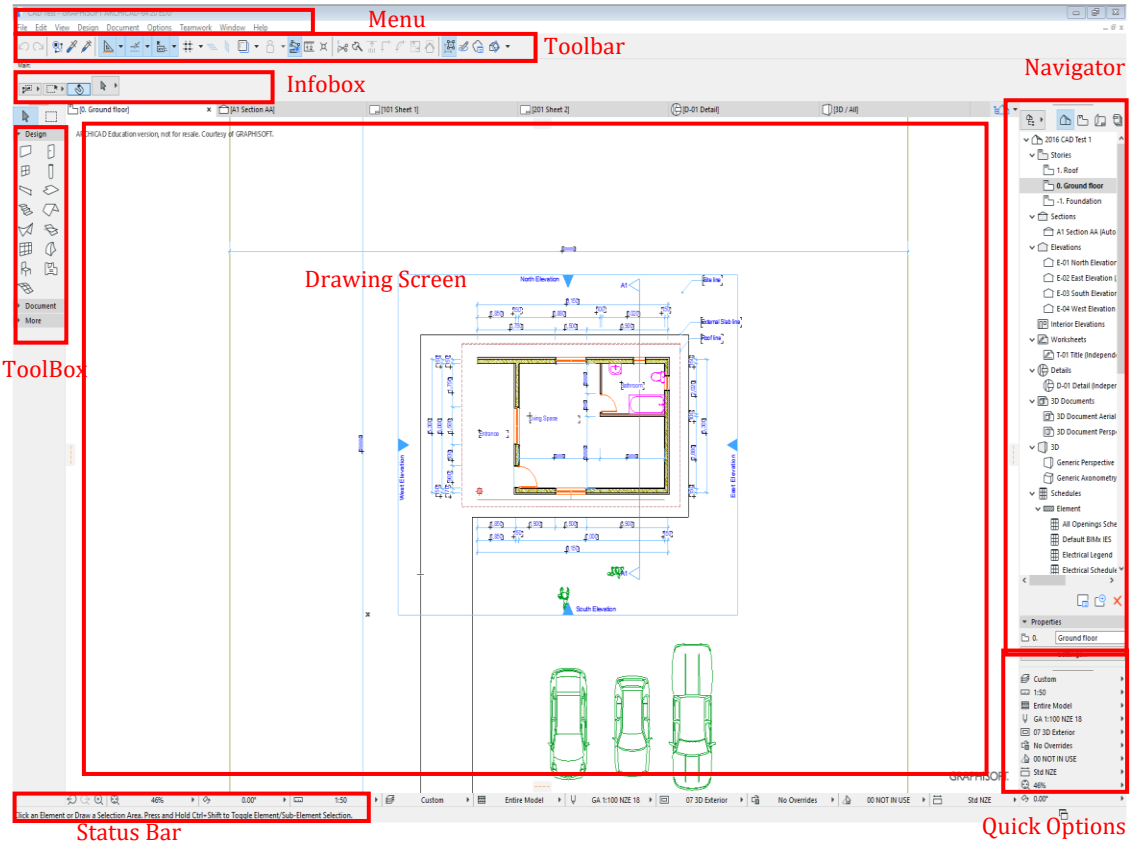
Exercises are included at the end of each module. These exercises will assist you in solidifying the lessons and steps described in the modules. You are advised to attempt all exercises provided.

ArchiCAD Platform

ArchiCAD platform is made of various elements for design. The figure below shows the important on screen elements you will be using for design. They are:

- **Menu**: It contains the major commands in an ArchiCAD project. It enables you manage the file you are working on and provides the various options required to manage the objects available to use for the project. Some actions you can do using the commands contains in this section open new or existing and save projects, add information about a project, import and export objects or files into or from ArchiCAD, access solution to common hiccups when using ArchiCAD.
- **Toolbar**: This contains commands such as undo and redo commands, pick-up and inject parameters from one object to another and show trace reference to a drawing.
- **Infobox**: It displays parameters of a tool in use as set up in its settings such as the size and height of a wall, the shape and building materials used for a floor slab or the materials used in a roof.
- **Navigator**: It contains the various drawing screens created in ArchiCAD for the project such as Ground floor plan, roof plan, elevations, sections, details, schedules etc. It enables you move from one drawing to another.
- **Quick Options**: It contains information about the drawing screen active. It enables you to modify the paper size, drawing scale and other options for your drawing.
- **Toolbox**: It contains the various tools used to design the building. it is divided into three sections (Design, documents and More). The Design section contains tools used for 3D drawings such as walls, roofs and slabs. The Document section contains tools used for 2D drawings such as lines, fill, dimensions and textbox. The More section contains others such as lamp, spline and camera.
- **Status bar**: The status bar states the next step that is required to perform an action using a tool that has been activated.
- **Drawing screen**: The drawing screen displays the drawing or building begin designed.

Noting these elements are essential to the use of ArchiCAD. We will use the tools in these elements to carry out the required steps while designing the building.



Module 1 - Setting Up the Project

Module 1 – Setting Up the Project

Learning Outcomes

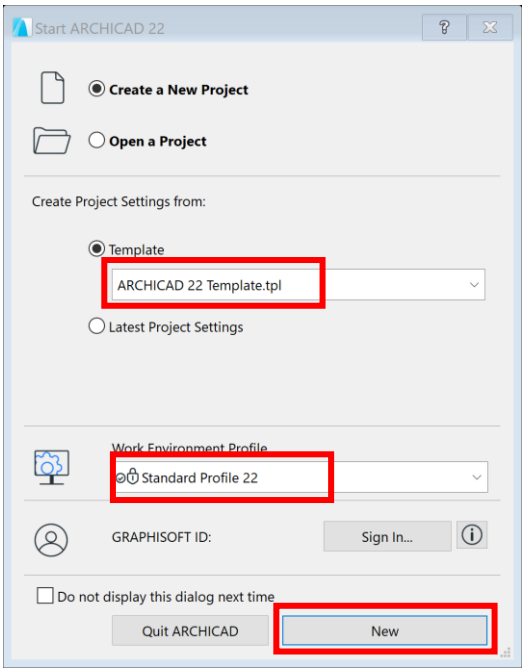
At the end of this module, you should:

- *Be able to set up a project*
- *Be able to add required information about the real-life project to your project in ArchiCAD.*
- *Be able to set up Story Levels and Working Units.*
- *Create the building site*

Setting Up the Drawing Template

To set up the drawing template on which you will design your project:

- Launch the ArchiCAD software and Create a new project by selecting the **File** > **New** > **New** command.



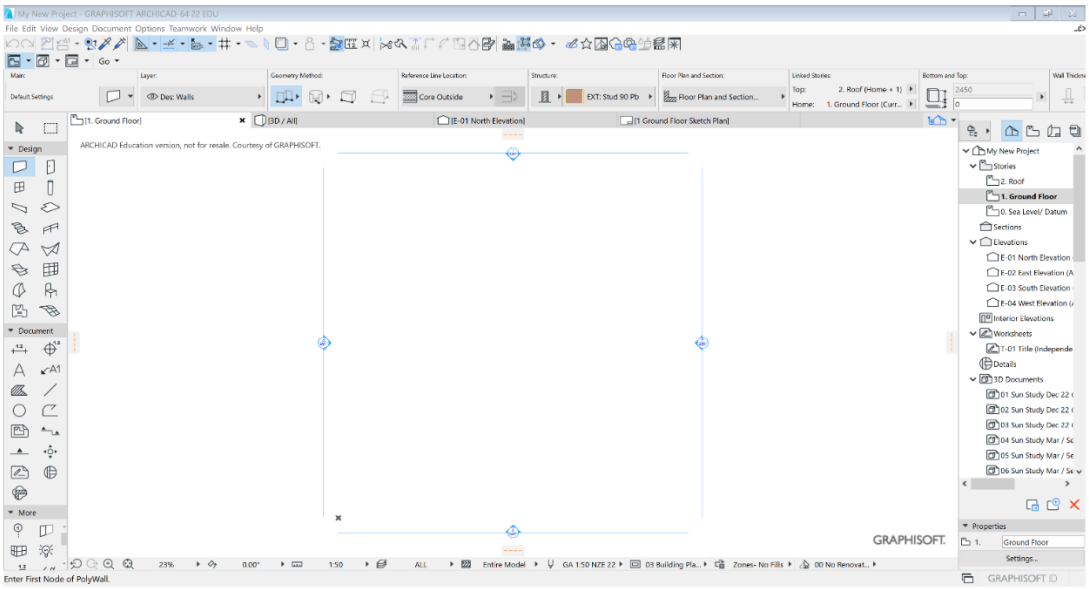
- Select **ARCHICAD 22 Template.tpl** from the Template palette
- Select the **Standard Profile 22** from the options in the Work Environment Profile dropbox
- Click the **New** button. *If Save Changes dialogue appears, choose **Don't Save.***

Wait a few seconds for the template to be created

Tip:

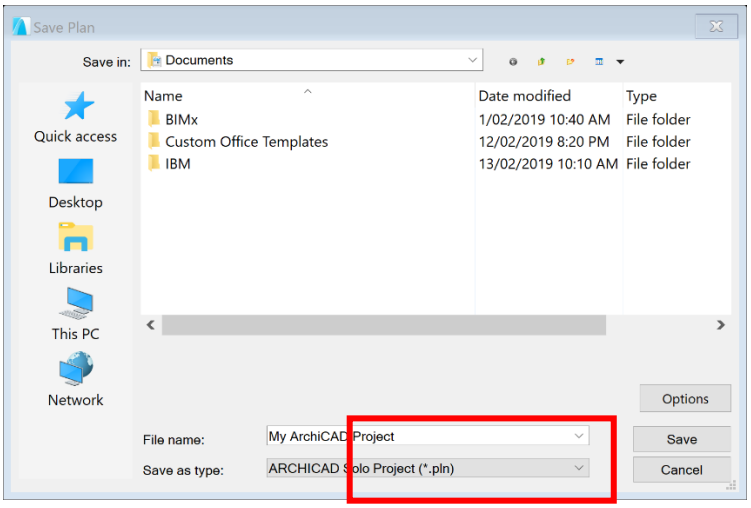
The template you have produced is a default template. It contains the basic data and tools and objects (layers, building materials, composites etc.) you will need in this manual. However, you can customise your template to suit your preference.

- Check out the new template. It looks like the one above (ArchiCAD Platform) without the building design on it.



- Now that we have created our project, we need to save the file to ensure that we do not lose the data we will be adding into the project.
    - Select **File > Save As…**

- Save the file as **My ArchiCAD Project** (make sure the file type is set to save as a .**pln**) in a location, you can access (e.g. Desktop or Documents).



- Hit **Save**

Adding Project Information

Before you begin designing your project, you should add all the information about the project into Project Data.

These are information that identifies the project such as client's details, site details, your company details, consultants' details if applicable etc.

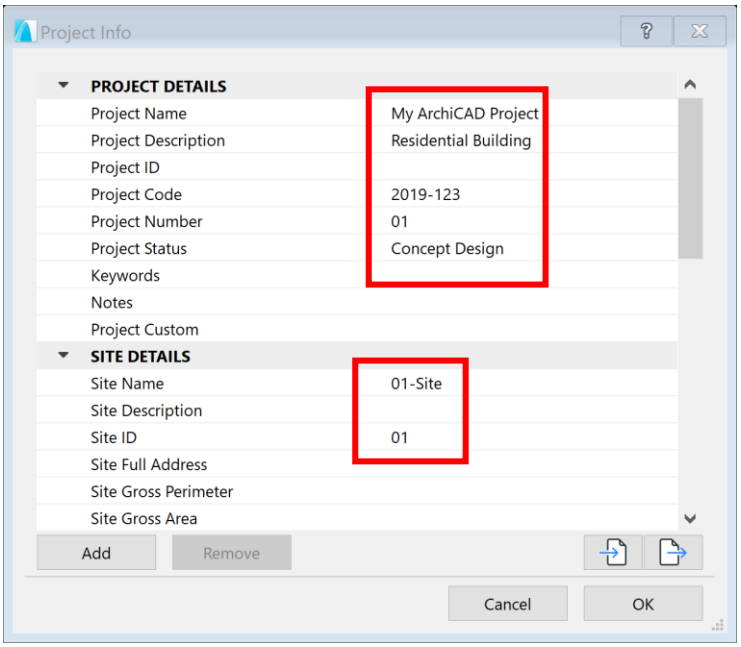
This information will be used automatically in the Title Blocks etc. later on.

To add the project information;

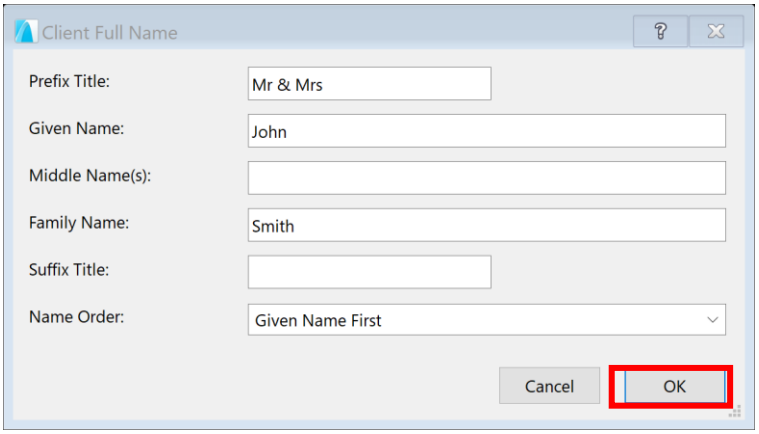
- Go to **File** > **Info** > **Project Info**
- Within **PROJECT DETAILS,** set:
  - Project Name = **My ArchiCAD Project**
  - Project Description = **Residential Building**
  - Project Code = **2019-123**
  - Project Number **= 01**

- Project Status = **Concept Design**

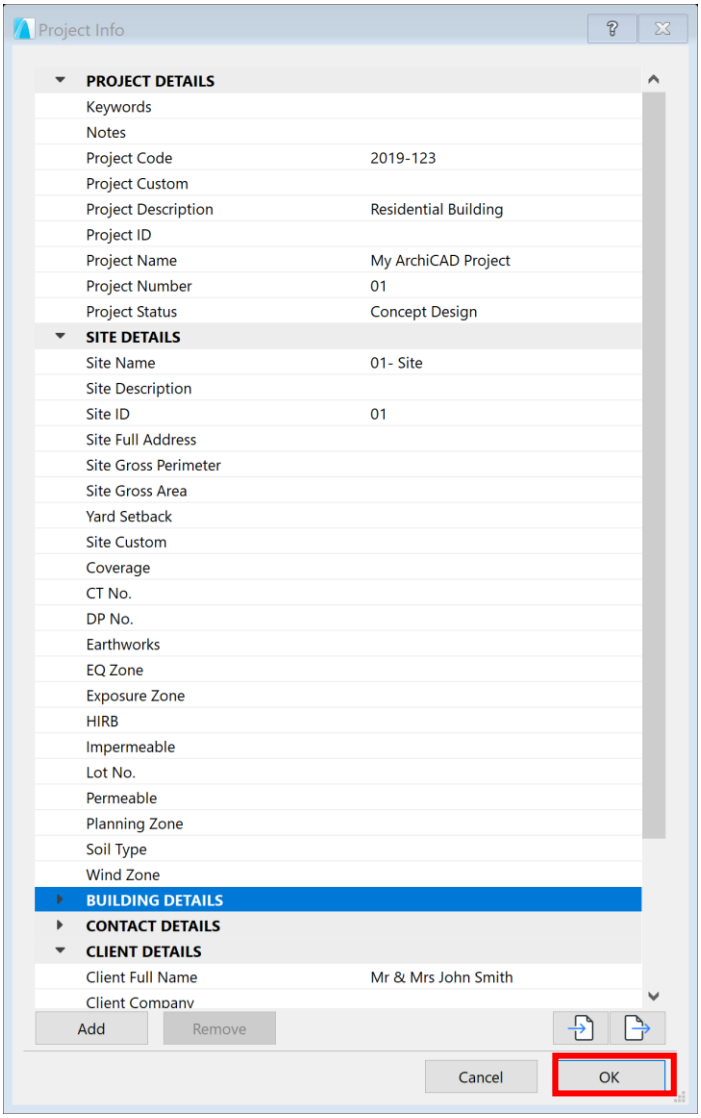
- Within **SITE DETAILS**, set:
  - Site name = **01-Site**
  - Site ID = **01**



- Scroll down to **CLIENT DETAILS**, and set:
  - Client Full Name = **Mr & Mrs John Smith**



  - Hit **OK**



- Hit **OK**

Tip:

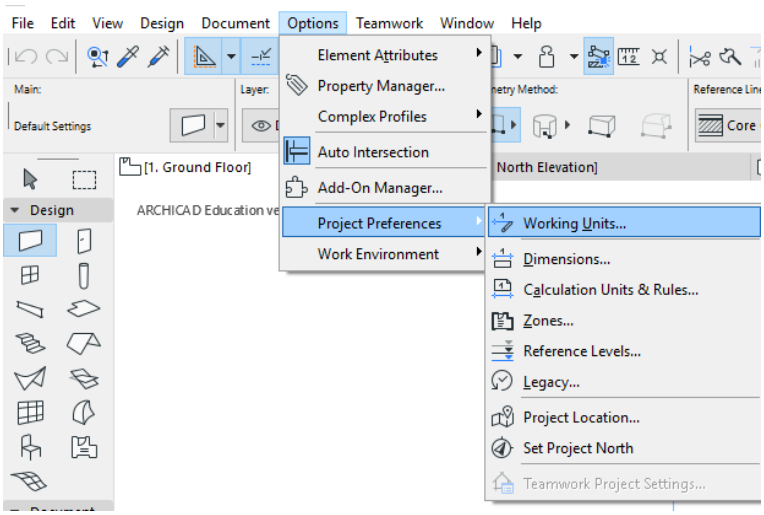
.pln = The main ArchiCAD file that contains all the information on the project. Always save this file as you design.

.bpn = The backup file. It usually has a red arrow on it.

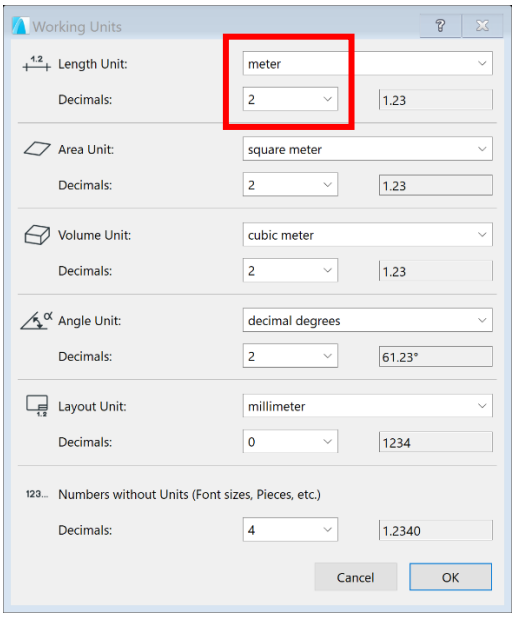
Working Units

To enable us to design using the appropriate and standard drawing units, we will modify the drawing template to suit our preference. To do this:

- Go to **Options** > **Project Preferences** > **Working Units**



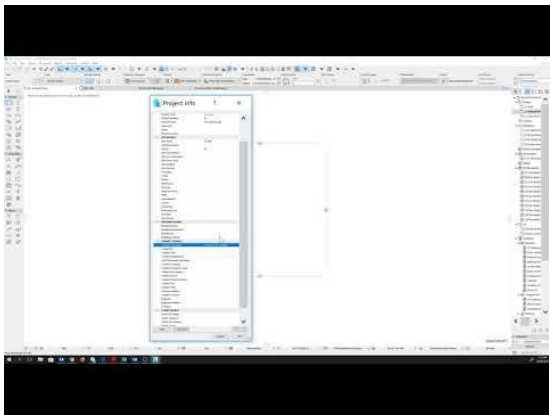
- Set the units as below**.**



- Hit **OK**

Now, we have created our project and we can begin to design our project.

Please click on the video below to watch a demonstration



Video 1: Setting up the Project

Setting up Story Levels

Story Levels are the horizontal levels that ArchiCAD uses to define the height of building floors. Similar to horizontal plane levels used in Architectural plans, they represent the height limit for the building head rooms and floors. We also use them to identify the height (or depth) of the building site where the foundation of the project will be modelled.

The Story levels are labelled as *Story 0, Story 1, Story 2* etc.

For a standard single-story building, we would create 3 Stories.

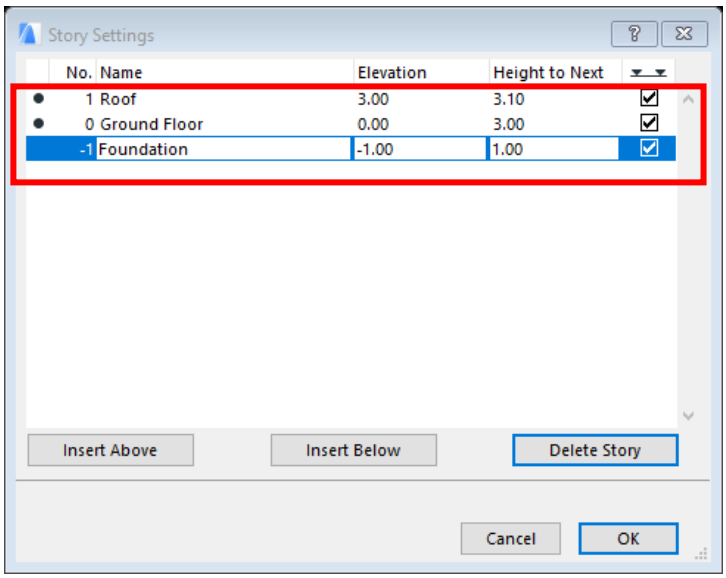
- Story -1 = Datum or Sea Level (this is where we model the Site Terrain)
- Story 0 = Ground Floor
- Story 1 = Roof

To set the story level:

- Go to **Design** > **Story Settings** or **Navigator** > Right-click **on Stories** > Select **Story Setting**.

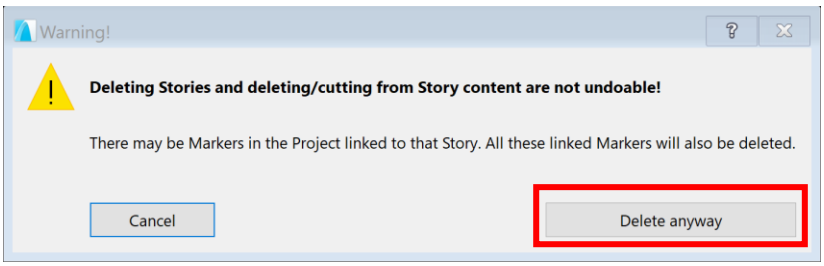
By default, ARCHICAD creates the project with 3 Stories. We will change this to suit the building we are creating. To do this:

- Click on **0 Sea Level/Datum** to highlight it
- Click on **Insert Below** to create a new *-1 Story Level* after the Sea Level/Datum.
- Name it as **Foundation**
- Select **2 Roof** and click on **Delete Story** to remove this Story Level
- Rename and set the parameters of the remaining stories as shown in the image below:



- Hit **OK**.

If the notification below comes up, hit **Delete anyway** to continue



Creating the Site Mesh

The site mesh simulates the construction site on which our building will be erected. To create the site mesh, we will need to draw the 2D representation of the site and then create the terrain. There are two methods to create the site mesh:

A. From a DWG file or similar supplied via a Surveyor. With this DWG drawing, we can trace around the Boundaries to form the mesh, then use the drafting tools to automatically create the 2D representation of the site (boundaries and contours).
B. From a Certificate of Title (C.T.) obtained from Council that has the boundary angles and lengths. Using the drafting tools, we can add the boundary angles and lengths, then create the mesh from these objects.

We will use method B in this instance.

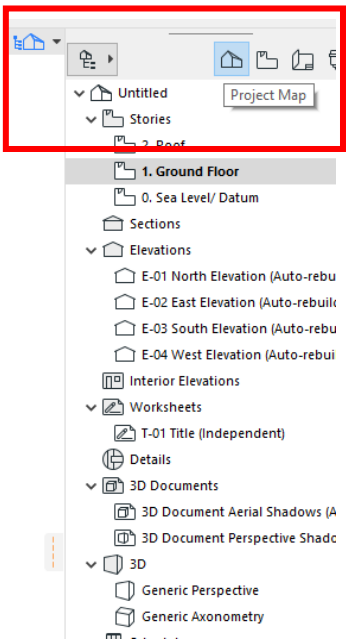
Method B: Creating the Site Mesh

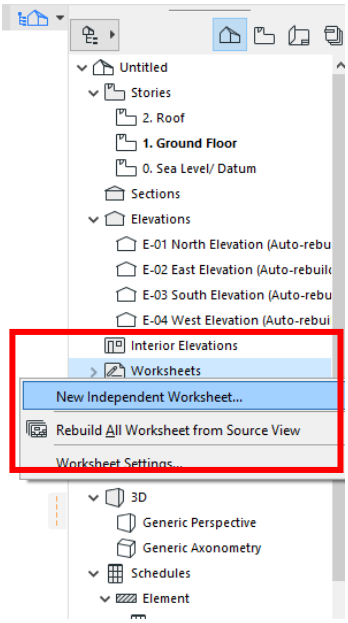
For this method, you may follow the instructions from Central Innovation https://youtu.be/XlITEExjtmE

Or you can follow the steps below. Before we begin, we will create the worksheet on which our site boundaries and contour lines will be defined.

The steps are:

- Open **Navigator** – click on **Project Map**
- Right-click on **Worksheets,** then select **New Independent Worksheet**
- Set **Reference ID** as **W-01**, and **Name** as **Site.**
- Click on **Create.**





We have just created the 2D worksheet where we will draw the lines for the site boundary and contour using the following dimensions:

- 30m x 15m (L x W)
- Contours at 3m interval from point B

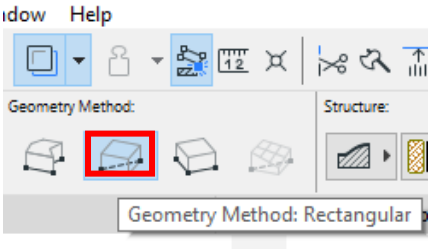
  Height @ a = 1m

  Height @ b = 0.5m

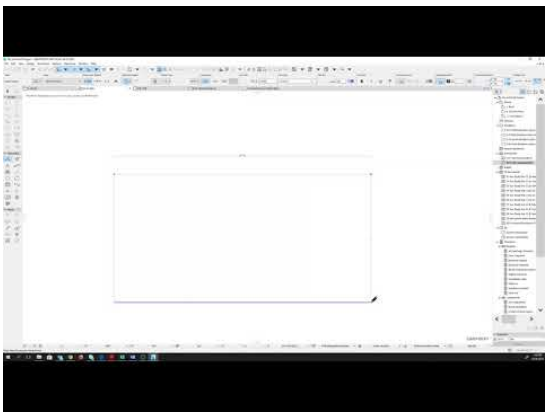
  Height @ c = 0.0m

To do this, make sure you are on **W-01 Site** drawing screen

- Click on the **Line tool** in the **Document** toolbox to activate the tool
- Select the **Rectangular** Geometry Method
- Click on the hotspot to start drawing the site. Move your hand up-left on the drawing screen to form a rectangle
- Type **30** in the first distance space in the palette box that appears to define the length of the site
- Type **15** in the second distance space to define the width of the site (you can use the button on your keyboard to move down to the palette)
- Hit **Enter**



Please click on the video below to watch a demonstration



Video 2: Site Boundary

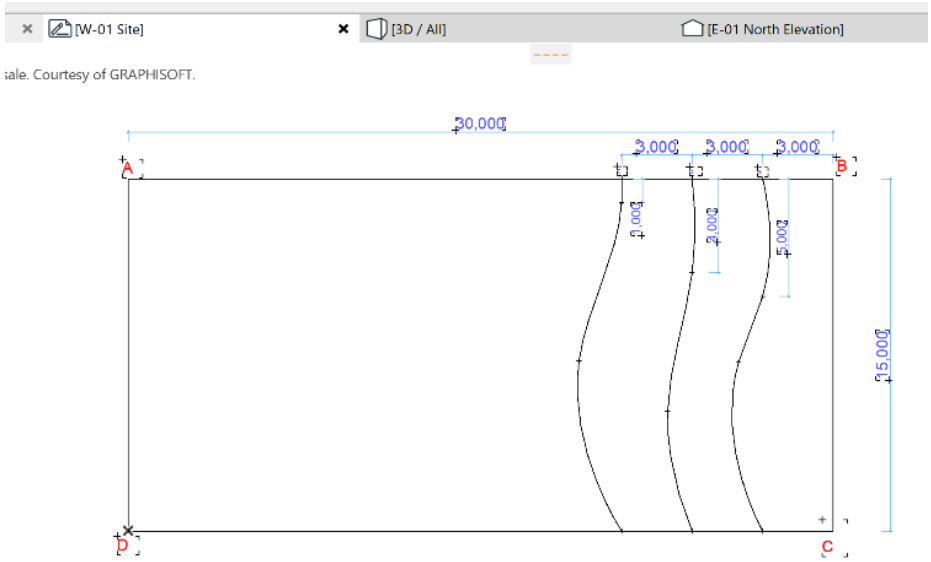
Now we have defined the boundaries of the site. Next, we will define the contours on site.

- Pick up a guideline from any side of the drawing screen and place on the vertical right edge of the site boundary
- Hover your mouse over the guideline and click on the orange pick-up spot that appears to pick up the guideline
- Place it **3m** left from the edge by typing in 3 in the distance box that appears
- Pick up the guideline and click on CTRL to add a copy (a plus sign appears net to the cursor)
- Place it **3m** left of the guideline (you will notice that a copy of the guideline is placed)
- Repeat the same process to place a third guideline at the same distance from the last guideline
- Click on the **Spline tool** in **More** section of the toolbox to activate the tool
- Click on the intersection between the first guideline and the upper horizontal edge of the site boundary
- Move a distance **5m** from the edge of the guideline and hit **Enter** on your keyboard to place the first line of contour 'a'
- Move the cursor toward the left of the drawing screen and type in the next distance **3m** at an angle **20^{o}**
- Hit **Enter** to place the second line of contour 'a'.
- Move further down to the intersection between the guideline and the lower horizontal edge of the site boundary and click to place the last line of contour 'a'.
- Right-click and select OK to end the contour line 'a'.
- Repeat the process to draw contour b and c using the following dimensions:
    - Contour 'b':
        - Distance 4m; Angle 90^{o}
        - Distance 6m; Angle 10^{o}
    - Contour 'c':
        - Distance 1m; Angle 90^{o}
        - Distance 7m; Angle 15^{o}

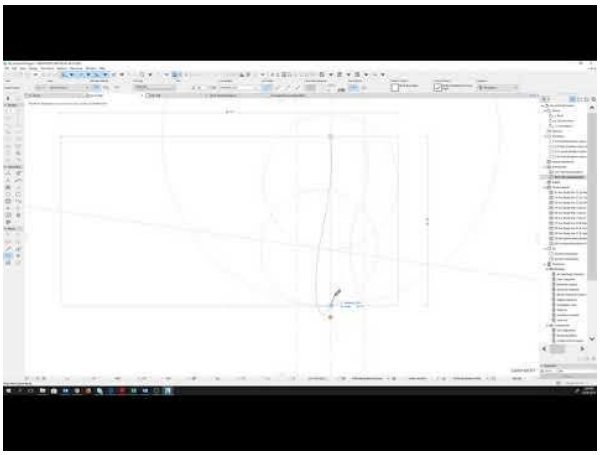
- Hit **Esc** to deactivate the Spline tool

The site boundaries and the contour lines have been created. You can dispose of the guidelines as we no longer need them.

- Change the colours of the site boundaries and the contour line to black pen by selecting them one by one (or hold down on Shift and select all the lines at once) and choose colour **1** on the Pen box in the Infobox.



Please click on the video below to watch a demonstration



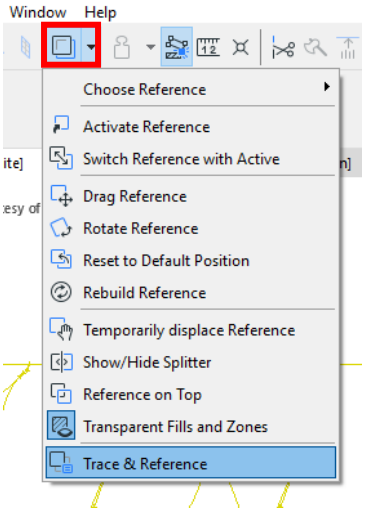
Video 3: Placing Contour Lines

Modelling the Terrain

Now we need to model the Terrain Mesh (Site) using the site boundary lines and contour lines. The contour lines will be used as base geometry for our terrain mesh.

Switch to **Navigator** - **Project Map > 0. Ground Floor**

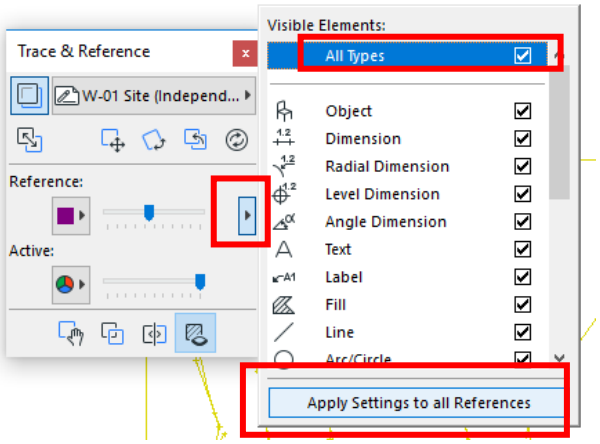
- Right-click the **W-01 Site** worksheet in the navigator and choose **Show as Trace Reference** to have the 2D representation of the site showing as a traced view.



If you cannot see all the lines and dimensions, do this:

- Click the arrow next to the **Trace** button in the Toolbar and choose **Trace & Reference** from the bottom of the list to open the Trace & Reference palette.

- Open the settings of the **Reference**, check the **All Types** checkbox and click **Apply Settings to all References** to ensure that the trace will always behave the same way.



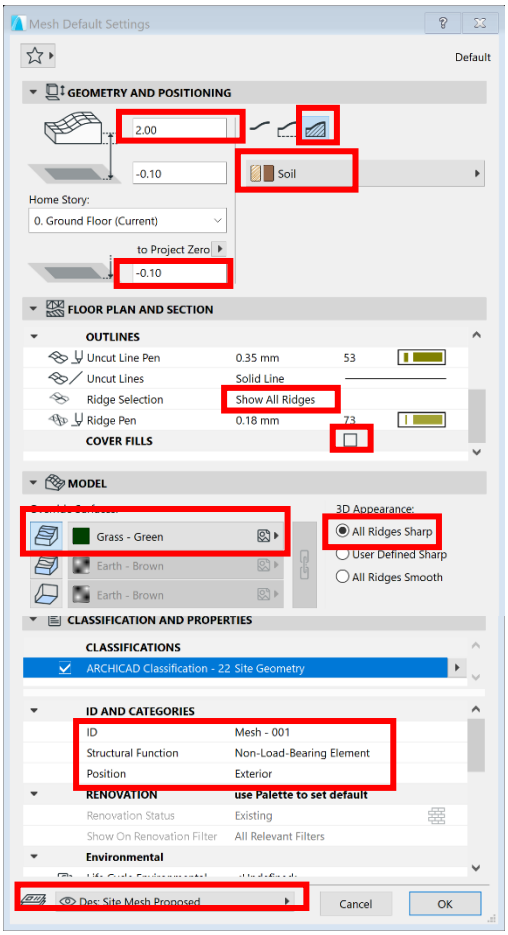
- Close the Palette

Note: If you still cannot see the lines, it could be that their layers are hidden. **Open the Layer Settings dialog** by pressing **Ctrl+L,** scroll down in the list of layers. Click the eye icons for the layers assigned to the lines and dimensions to make them visible. Click **OK** to close the layer settings.

Now we have the site boundary and contour lines showing as a trace reference on the story level 0. Ground Floor where we will model the Site Terrain.

To create the Site Terrain, first, we need to set the parameters of the Terrain. To do this,

- Activate the **Mesh Tool** (click on the Mesh Tool icon in the Design section of the Toolbox (on the left) so that it will be active) and double-click on its icon to open its settings.
- The Mesh Settings dialog opens. Set the mesh properties as follows:
  - **Geometry and Positioning**:
    - Mesh Height: **2.0m**
    - Home Story to **0. Ground Floor**
    - Elevation **to Project Zero** to **-0.10**
    - Select **Solid Body** as the Structure
    - Select **Soil** as the Building Material
  - **Floor Plan and Section:**
    - Select **Show all Ridges** in the Ridge selection tab
    - Uncheck **Cover Fills** in the **Floor Plan and Section** panel
  - **Model**:
    - Override Top Surface with **Grass – Green**



Layers

    - Select **All Ridges Sharp** for 3D Appearance
  - **Classification and Properties** Set Structural Function as
    - **Non-Load-Bearing Element**
    - Position as **Exterior.**
  - Layers: Des: **Site Mesh Proposed**
- Click **OK**

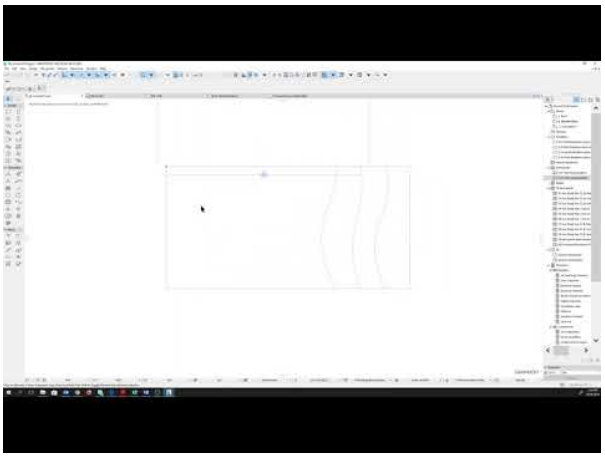
NB: If you are going to communicate your design to any engineers who work with 3D applications, you have to fill in the fields for Classification and Properties, so the external application can recognize them properly.

From the parameters we have set, our site terrain will be 2 meters high, starting from 0.1 meters below the Datum. We have selected to have All the Ridges as sharp so that we can identify the points where the contours on-site are. The cover fill is unchecked so that the site is clear of any graphics since we are working on it.

Now that we have set the parameters, we can create the terrain. To do this,

- Select the **Rectangular Geometry Method** in the Info Box and click the two opposite points of the site rectangle (A & C; or B & D) to create a mesh.
- Hit the **Esc** button on the keyboard to deactivate the Mesh tool

Please click on the video below to watch a demonstration



Video 4: Site Mesh

The site has been created. The next step is to create the contours on site. To do this:

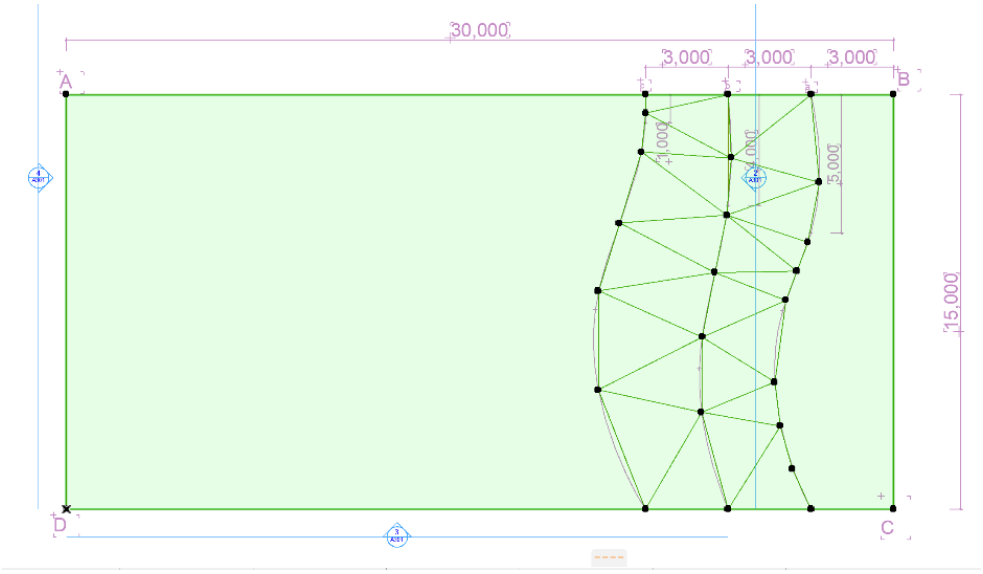
- Select the mesh with **Shift + click or** click on any edge in the Mesh
- Activate the Mesh Tool if deactivated
- **Space + click** (hold down the space bar on your keyboard and click with the mouse cursor) on the curved level lines (contour lines) one by one to add them to the mesh.
- Select **Fit to User Ridges** in the **New Mesh Points** dialog.
- Click **OK**
- Hit the **Esc** button on the keyboard to deactivate the Mesh tool

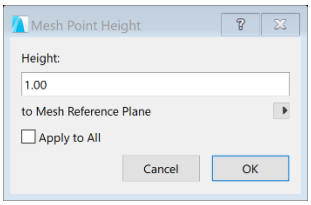
To set the height of the points of the mesh that are on the same height level,

- Select the **Mesh** and click on a **Node** of contour 'b':
- When the Pet palette appears, click on **Elevate Mesh Point**.
- Set Height to **0.5** and check the **Apply to All** checkbox, so that all nodes on this line will be elevated to the same height.
- Click **OK**.

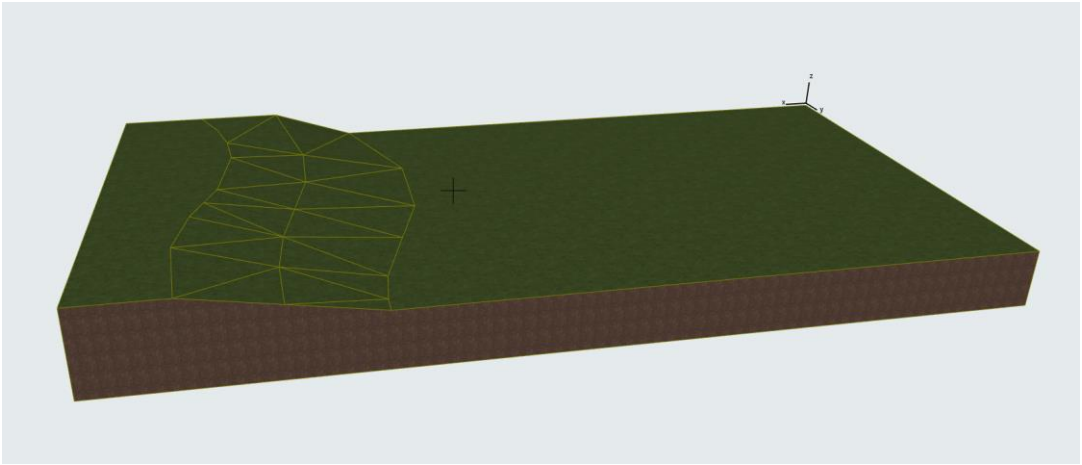
Repeat this action with the line on the right (contour a) and set the **Elevate Mesh Point** to **1.0**.

- Now elevate the two corners of the site (B and C) on the right one by one by clicking on the node.
- Select **Elevate Mesh Point** again and set **1.0** as the Height but, leave the Apply to All checkbox unchecked; otherwise, all points of the rectangle would rise.
- Repeat this with the corner below (D and C).

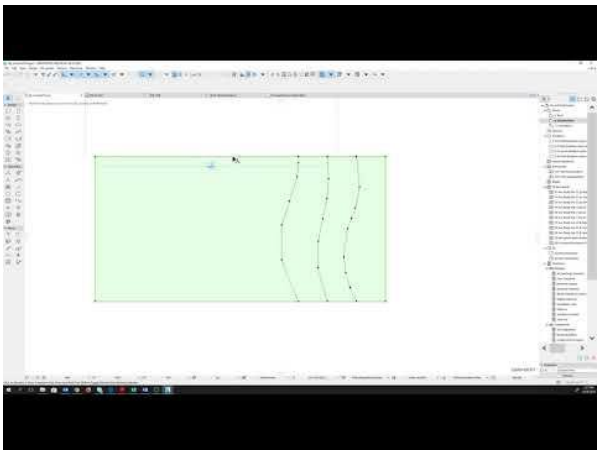




- With the mesh selected, Right-click and select **Show Selection/Marquee in 3D** to check its shape
- Click on the **Fit in window** button in the bottom of the screen if it is not fully visible
- Go to **View** and click **Editing Plane Display** to turn off the editing plane if it is displayed



Please click on the video below to watch a demonstration



Video 5: Site Contours

Exercise

1. What is the ArchiCAD work environment profile used for the design of the sample building?
    a. Standard Profile 20
    b. ArchiCAD Template 20
    c. ArchiCAD Template 22
    d. Standard Profile 22
2. What is the name of the client for the sample building?
    a. Mr & Mrs Jane Smooth
    b. Mr & Mrs John Smith
    c. Mr & Mrs Josh Snet
    d. Mr & Mrs Steve Smith
3. What unit of measurement is set as the working unit for the design?
    a. Millimeters (mm)
    b. Meters (m)
    c. Centimeters (cm)
    d. Kilometers (km)
4. How many story levels were created for the building design?
    a. 5
    b. 4
    c. 3
    d. 1
5. Which of these options is not a story level used for this building design?
    a. Datum
    b. Foundation
    c. Ground Floor
    d. Roof
6. What do the story levels represent in a building design?
    a. The height of the head room of a building floor
    b. The height of the doors in a building
    c. The height of the windows in a building
    d. The height of the tallest furniture in a building
7. The 2D representation of the site boundaries was created using all of the following except?
    a. Lines
    b. Guidelines
    c. Worksheet
    d. Site mesh
8. What are the dimensions of the building site?
    a. 30m x 15m
    b. 25m x 50m
    c. 30m x 40m

   d. 20m x 10m
9. What is the height of 0 Ground Floor story level?
   a. 3.00
   b. 3.10
   c. 1.00
   d. 6.00
10. What is the use of the contour lines?
   a. They define the ground levels on a building site
   b. They represent the heights of the buildings on site
   c. They show the boundaries of the site
   d. They measure the length of the contours on site
11. Which icon shows a hidden layer in the layer settings?
   a. The eye icon
   b. The trace icon
   c. The freeze icon
   d. The lock icon
12. What is the height of the site mesh?
   a. 4m
   b. 3m
   c. 2m
   d. 1m
13. Why is "Show all Ridges" selected from the ridge selection in the Mesh settings?
   a. To ensure that the edges of the contours on site are visible
   b. To ensure that the nodes of the contours on site are visible
   c. To ensure that the site mesh is visible
   d. To ensure that the site boundaries are visible
14. What is the layer used for the site mesh?
   a. Site Mesh-defined
   b. Site Mesh-Proposed
   c. Structural bearing
   d. Non-load bearing
15. What geometry method is selected to draw the site mesh?
   a. Polygonal
   b. Circular
   c. Rectangular
   d. Square
16. What are the heights of contours a, b and c?
   a. 1.0m; 0.5m; 0.0m respectively
   b. 0.0m; 0.5m; 1.0m respectively
   c. 0.5m; 1.0m; 1.5m respectively
   d. 1.0m; 0.5m; 1.5m respectively
17. What are the angles for drawing the 2D representation of contour b?
   a. 90^{o} & 10^{o}

b. 90^{o} & 165^{o}
c. 90^{o} & 20^{o}
d. 180^{o} & 10^{o}

18. Does the site mesh start 1 m below the datum?
    a. Yes
    b. No
19. What is the top surface material used for the site mesh?
    a. Pavement -Brick Moss
    b. Brick - Finish
    c. Green – Grass
    d. Sand - Gravel
20. What is the project status for this design?
    a. Documentation
    b. Residential building
    c. Working drawing
    d. Concept design

Module 2 - Designing the Building Project

Module 2 - Designing the Building Project

Learning Outcomes

In this module, you will model your building. You will create the following elements:

- Exterior Walls
- Floor Slab
- Interior Walls
- Roof

As we are modelling in 3D, we need to think about more than simply the length of the building elements. We will be considering the height and thickness of the building elements we are to design. This will allow us to get adequate information such as its Surface finish; the paint on the interior and weatherboards on the exterior, etc. for the building. This is the major difference between a 2D and #D model.

Creating the Building Envelope

Before creating the building envelope, which includes the walls, slabs and roof, we will need to set the features or materials of the building components. We will also define the layers associated with the building components, building materials, composite structures and component parameters.

Creating Layers

It is good practise to allocate layers to all the building components that will be used in the design. The benefit is that we can work on different elements collectively when they are in the same layer without affecting other elements in the building. We will now create layers for the components we will use in creating the building envelope.

We need to create the following layers:

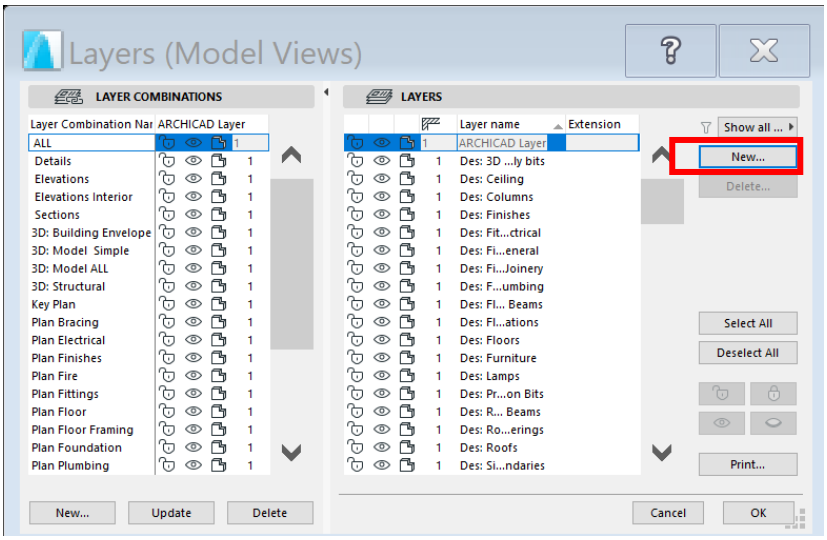
- **Structural – bearing** for the exterior walls and internal floor slab

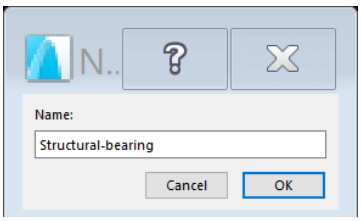
- **Site & Landscaping – Terrain** for the external pavement
- **Shell – Roof** for the roof

You must have noticed that we used the layer –**Site Mesh Proposed**- for the Site Terrain we created (refer to Module 1). This layer was created by default in ArchiCAD. However, we will create new layers for the building components listed above. Later on, we will create more layers for other building components.

To create the layers, do the following:

- Go to **Documents** > **Layers** > **Layers (Model Views)**
- Select **New** to create the layers specified above.



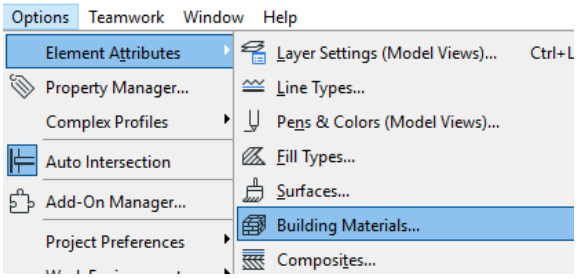


- Click on **OK**

Repeat the process to create the other 2 layers

- Hit **OK** on the Layers (Model Views) when you finish creating the 3 layers' to close the layer settings.

Note: We can have layer combinations, as shown in the picture above. This allows for further manipulations and groupings depending on the task we want to carry out. You may wish to have a look at the various layers created by ArchiCAD for your use.



Building Materials – Exterior Wall

Now that we have created the layers for our building elements, we can start defining the individual materials of our building components. For the exterior wall, we will be using a **White Brick** material as the finish material.

To create this material,

- Go to **Options > Element Attributes > Building Materials...**.

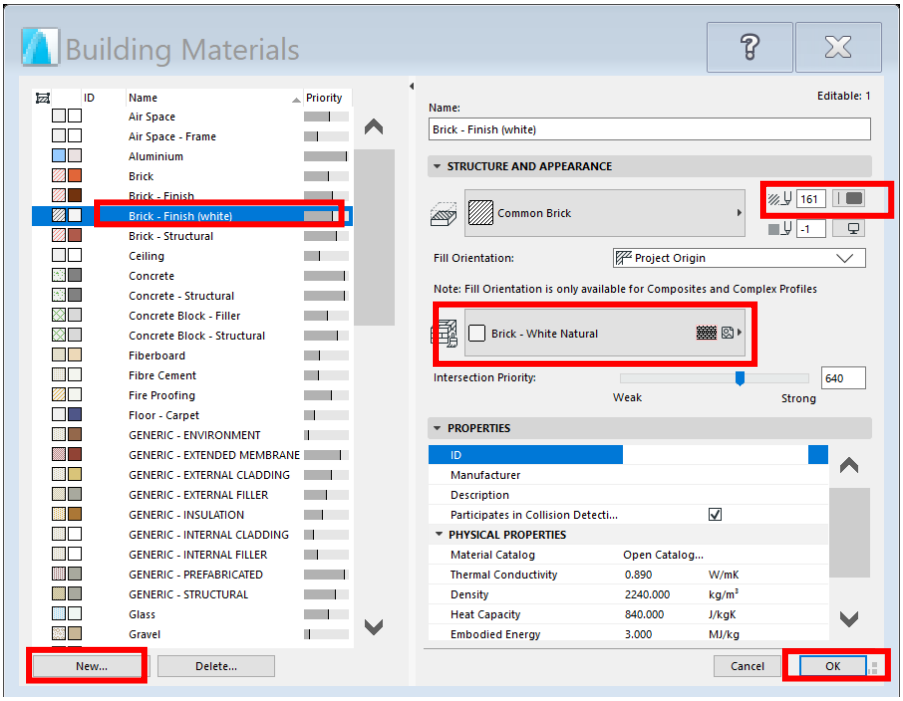
In the upcoming dialog for Building Materials, you can see the list of the building materials created by default for use. Each material is simulating a real-life building material and has a palette with various options for its characteristics (Structure and Appearance and Properties). It also has an "Intersection Priority" setting. This priority setting will control how the intersection points of building materials will appear when created and used in the building. The higher priority a material has, the more visible it will be at a junction on the plan, section or detail of the building.

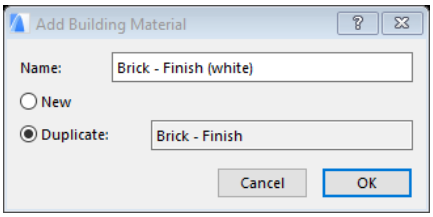
Tip:

Every building component is made up of certain features that differentiate it from others. For instance, a wall is different from a window because of the elements it comprises of such as insulation, structural elements for load-bearing walls, finish etc.

To create a building material, you can either duplicate and edit an existing material or create a new one from scratch. To duplicate an existing material:

- Select any existing material from the options in the dialogue box (we will use **Brick – Finish** in this instance) and click **New** (in the bottom) to duplicate the existing material.
- In the upcoming dialog choose **Duplicate** and set a name - **Brick - Finish** (**white**) and click **OK**.
- Change the Cut Fill Foreground Pen colour to **161** and Surface to **Brick - White Natural**.



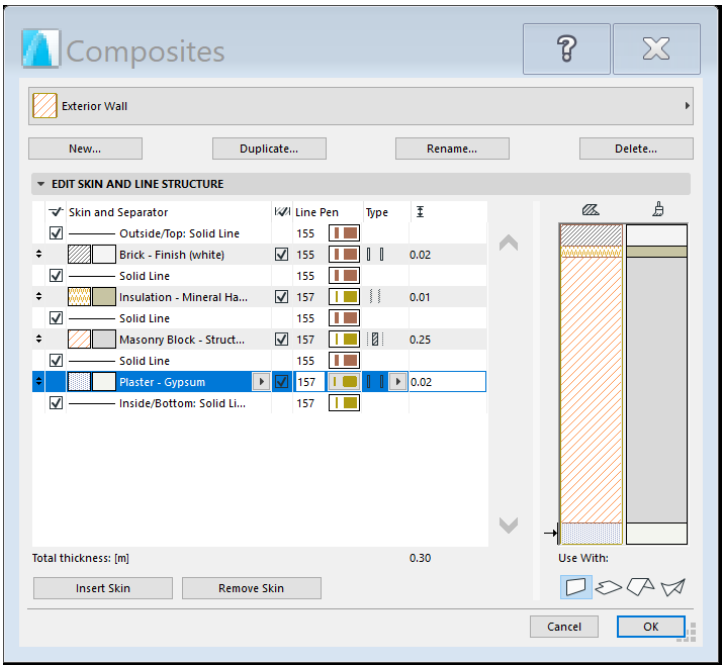


- Leave other specifications as they are and hit **OK** to close the dialog.

Composite Structures

A building composite structure is made up of several materials that have specific functions they perform. We will create the composite form for the exterior walls. To do this:

- Open **Options > Element Attributes > Composites….**
- Select the composite, which fits the best to the needed skin structure (in this case, it is EXT: **Stud 140 Thermal Pb**) from the dropbox
- Click **Duplicate…** and set a new descriptive name: **Exterior Wall**;
- Hit **OK**
- Select the 1st skin and change its building material to **Brick - Finish** (**white**), by pressing the arrow button next to the skin name and selecting Brick – Finish (white) from the dropbox.



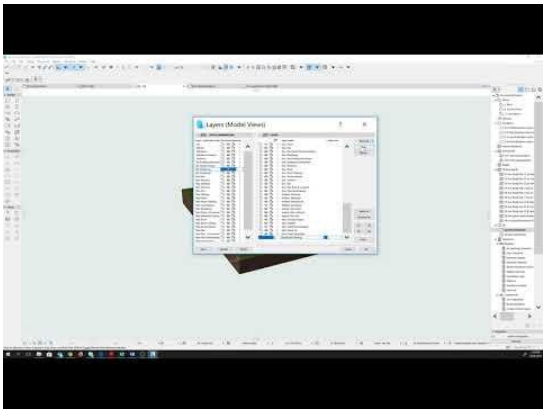
  Choose **Finish** as the Skin Type and type in **0.02** as the thickness

- Change the 2nd skin's building material to **Insulation - Mineral Hard** and thickness to **0.01**. Choose **Other** as the skin type

- Click on **Insert Skin** to add a new building material to the composite and change the 3rd skin's building material to **Masonry Block - Structural** and its thickness to **0.25.** Choose **Core** as the skin type
- Insert another skin and change the 4th skin building material to **Plaster - Gypsum** with thickness **0.02 and** skin type as **Finish**

- Ensure that all the boxes on the left are ticked and that this composite is to be used with only walls
- Hit **OK** to close the dialogue box

Please click on the video below to watch a demonstration



Video 6: Creating layers, building materials and composites

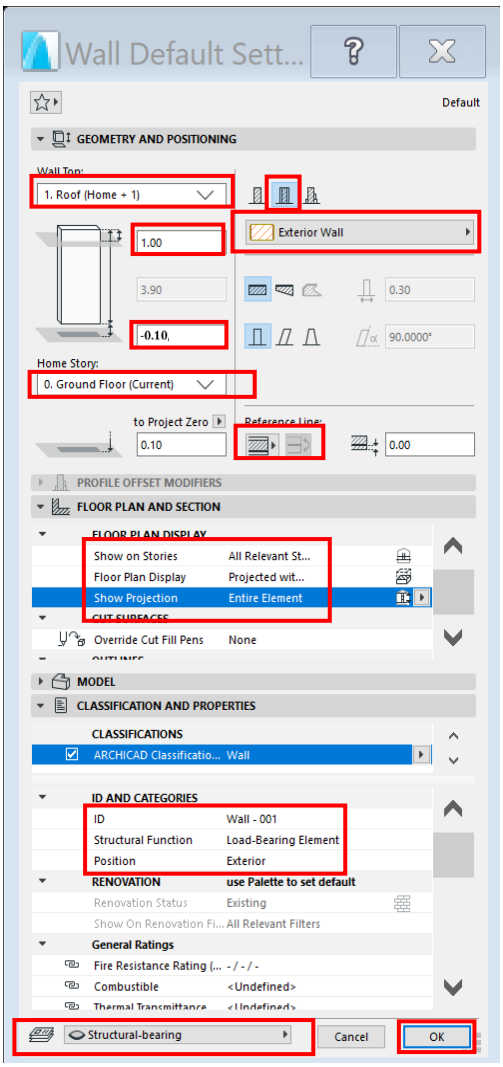
NB:

Composite skins may represent different structural functions, like load-bearing, finishing or others. You can set this up skin-by-skin in the Edit Skin and Line Structure panel. Note: Composites can be also assigned to other structures, like slabs and shells. This particular structure is typical for walls, but by clicking on the "Use With" icons you can assign the composites to other building structures too. Later on, the composite structure will appear in the settings dialog of the assigned element types only.

Defining the Wall's Settings

- Switch to **Pop-up Navigator - Project Map > 0. Ground Floor** and deselect the mesh if still selected (Hit **Esc**).
- Activate the **Wall Tool** (in the Design section of the Toolbox) and open its Settings dialog (double click on the icon).
- Set the Wall settings as **follows:**

- **Set the Wall Top linked to Roof (Home +1)** and **1.0** as **Top offset to Top Linked Story**. This function will make sure that the wall height will automatically follow story height changes.
- Set the Bottom offset to Home Story as **-0.10**, because it will start on top of the foundation structure that we will model later.
- With the Composite Structure selected, choose the **Exterior Wall** composite.
- Set the Reference Line to **Core Inside**
- In the **Floor Plan and Section** panel set Floor Plan Display as:
    - Show on Stories: **All Relevant Stories**
    - Floor Plan Display: **Projected with Overhead**,
    - Show Projection: **Entire Element**. This way the entire wall will be visible (even parts above floor plan cut plane) on all relevant stories.

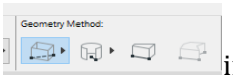


- Open the **Classification and Properties** panel. Set ID and Categories as
    - ID: **Wall-001**
    - Structural Function: **Load-Bearing Element**,
    - Position: **Exterior,**
- Layer: **Structural - Bearing**

- Click **OK**

Creating the Wall

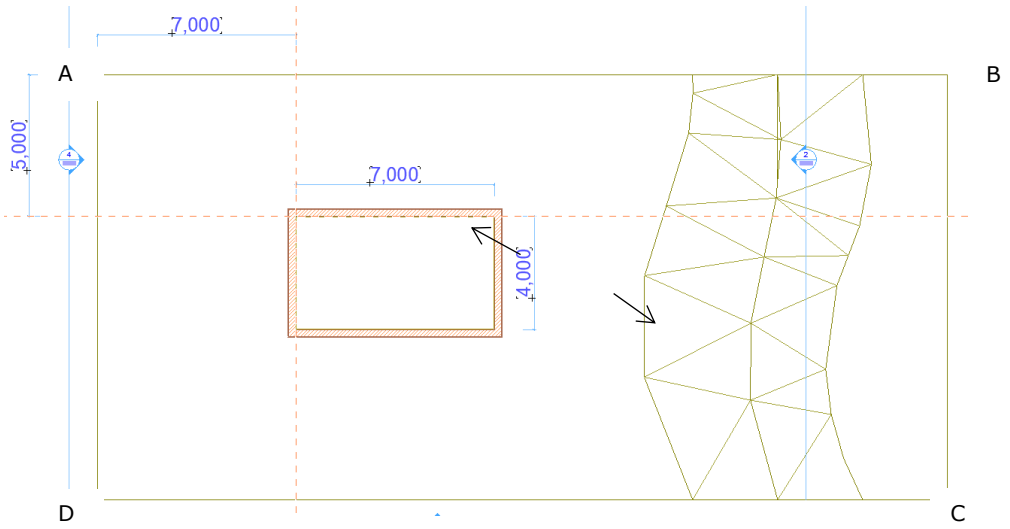
Now we are done selecting the features of the exterior wall for our building project. The next step is to create the walls on the site. To do this:

- Still, with wall tool active, select the **Rectangular geometry method** 

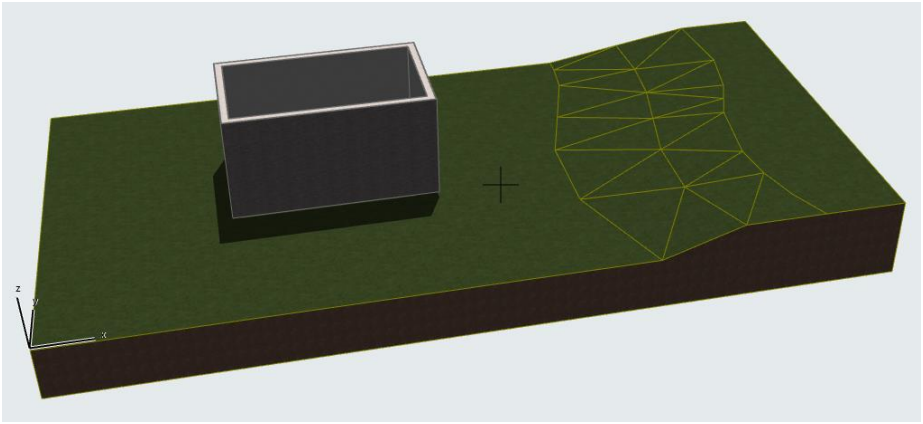
in the Info Box (click-hold on the arrow to display the options)
- Draw a rectangular wall 7m x 4m starting from the intersection 7m of boundary A & B and 5m of boundary A & D as shown below. Use the guidelines to locate the distances.

For this action, it is highly recommended that the grid display is turned off. To do this, go to **View > Construction Grid Display.** We can turn the grid on again later on if required.

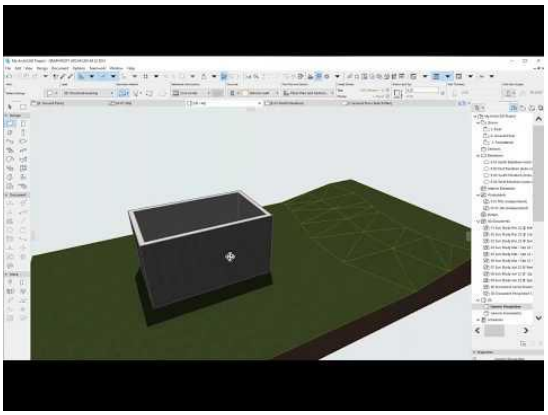
The site drawing on the W-01 Site worksheet is still showing. To turn it off, click on the **Trace** icon on the Toolbar or use **Alt+F2** to deactivate the Trace tool. The traced drawing disappears.



- Hit **Esc** to deactivate the Wall tool
- Press **Fn+F4** on MAC or **Ctrl+F5** on Windows to show all in 3D.



Please click on the video below to watch a demonstration



Video 7: Exterior Walls

Floor Slab

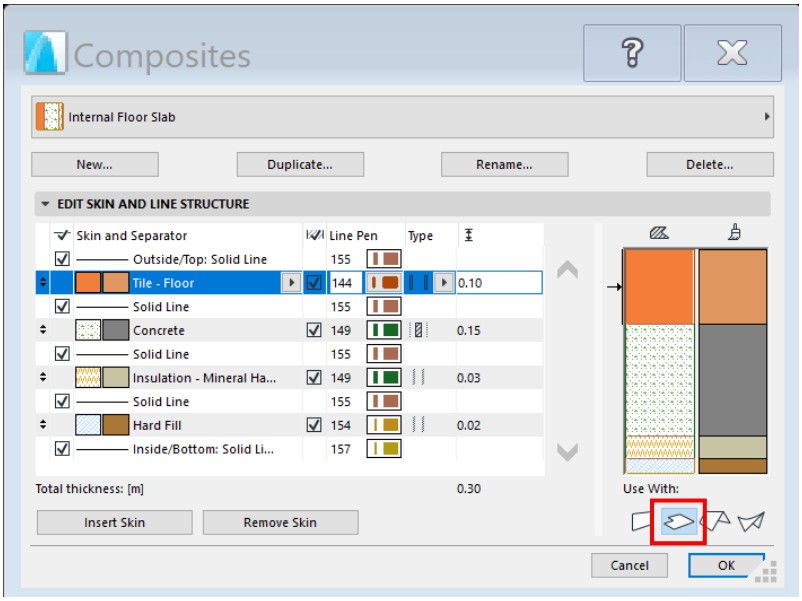
As was done for the exterior wall, we will create a composite - **Internal Floor Slab**. To do this:

- Go to **Composite** (Options>Element Attributes>Composites)
- Click on **New** to create a new composite named **Internal Floor Slab**
- Set the parameters as below:
    - 1st Skin:
        - Material: Tile –Floor;
        - Len Pen – 144;

        - Type – Finish;
        - Thickness – 0.10
    - 2nd Skin:
        - Material: Concrete;
        - Len Pen – 149;
        - Type – Core;
        - Thickness – 0.15
    - 3rd Skin:
        - Material: Insulation-Mineral Hard;
        - Len Pen – 154;
        - Type – Other;
        - Thickness – 0.03
    - 4th Skin:
        - Material: Hard Fill;
        - Len Pen – 154;
        - Type – Finish;
        - Thickness - 0.02
    - Outside/Top: Solid Line; Len Pen 155
    - Inside/Bottom: Solid Line; Len type 157

If you notice, we do not have the building material – **Hard Fill** by default as an option. We will need to create this material.

- Close the dialogue box and follow the steps for **"Building Materials"** to create the building material named – Hard Fill. The Surface is **Wood – Mahogany Horizontal** and Cut Fill is **Earth.**
- Go back to the Composite – Internal Floor Slab and edit the 4th skin with the building material **Hard Fill**
- Ensure that all the boxes on the left are ticked and that this composite is to be used with Slabs only (click on the others to deselect them)
- Click on **OK** to close the dialogue box

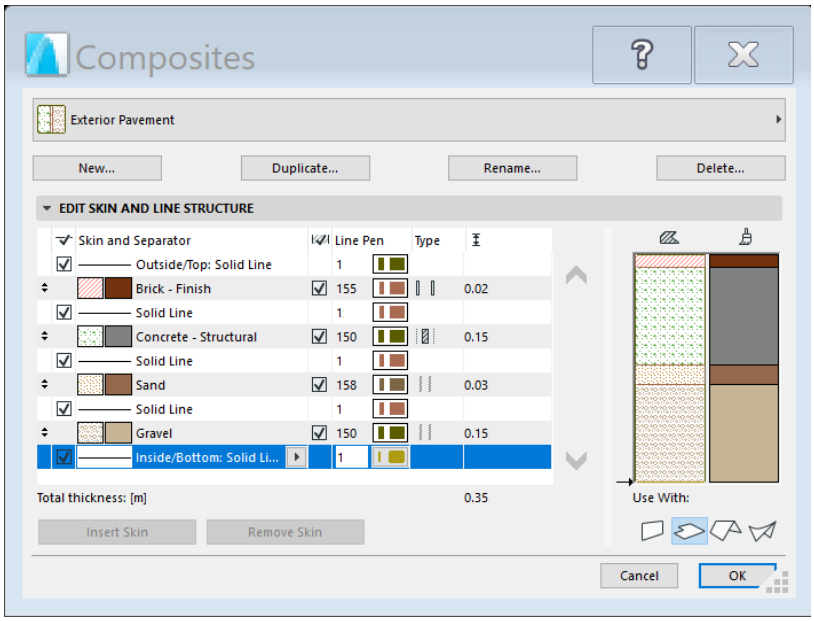


We will also create a Composite - **Exterior Pavement** with parameters as below:

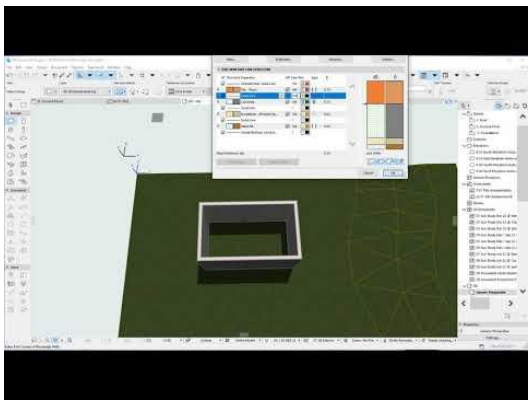
- Ist Skin:
  - Material: Brick Finish;
  - Len Pen – 1
  - Type – Finish;
  - Thickness – 0.02
- 2nd Skin:
  - Material: Concrete - Structural;
  - Len Pen – 1
  - Type – Core;
  - Thickness – 0.15
- 3rd Skin:
  - Material: Sand;
  - Len Pen – 1
  - Type – Other;
  - Thickness – 0.03
- 4th Skin:
  - Material: Gravel;

- Len Pen – 1
- Type – Other;
- Thickness - 0.15

- Outside/Top: Solid Line; Len Pen 1
- Inside/Bottom: Solid Line; Len type 1



Please click on the video below to watch a demonstration



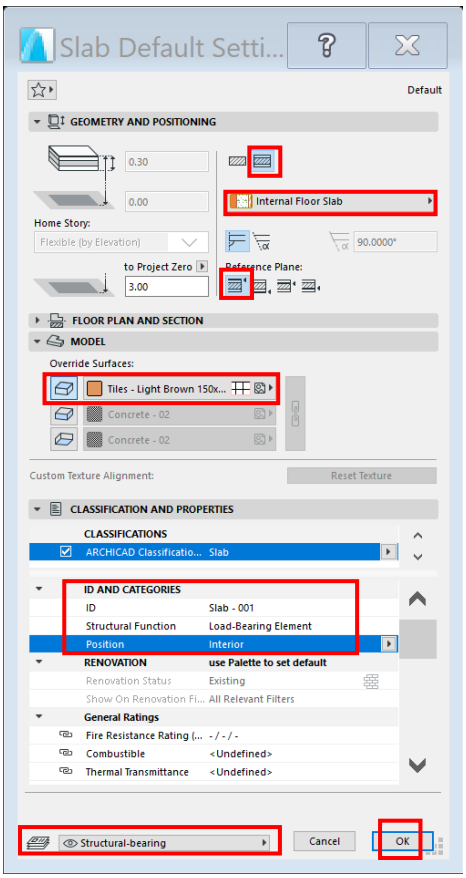
Video 8: Internal floor slab and exterior pavement composites

Creating the Slabs

We will first create the internal floor slab.

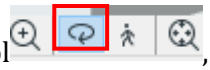
- Activate the **Slab Tool** from the Toolbox and open its settings

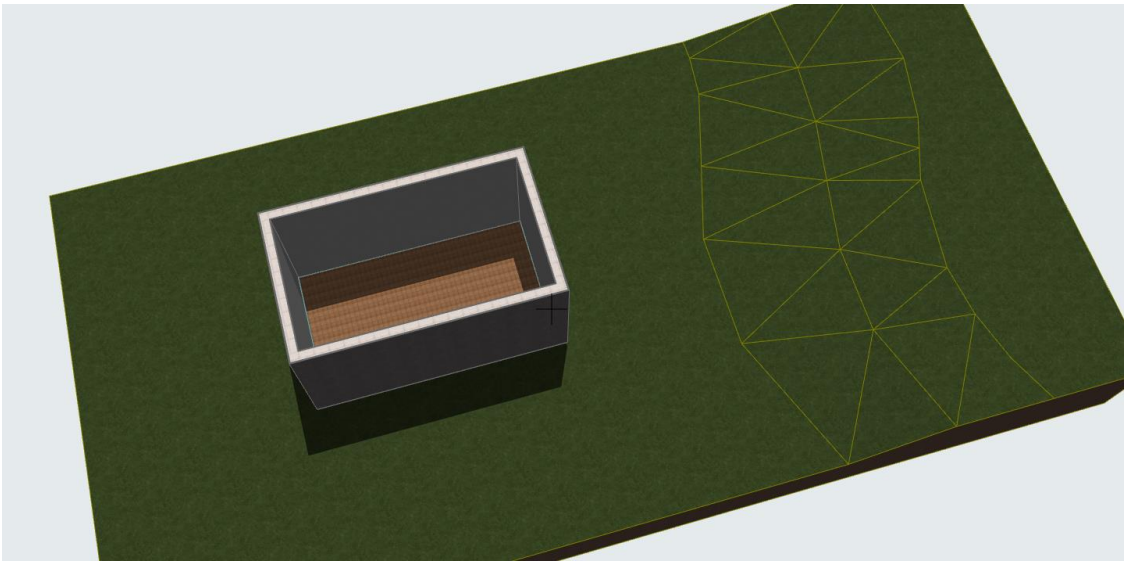
Set its properties as follows:



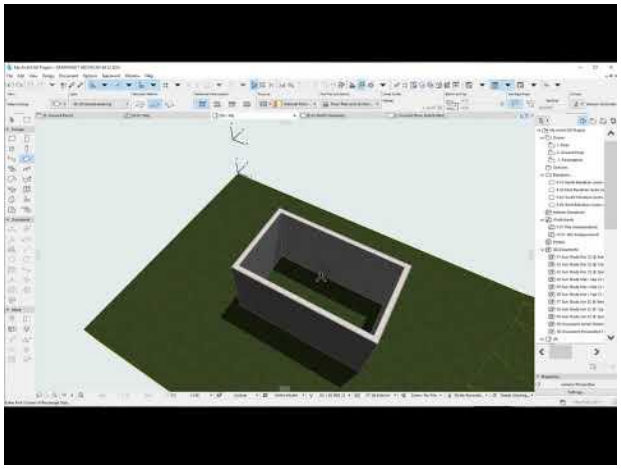
- In the Geometry and Positioning panel:
  - Select **Internal Floor Slab** as the composite structure.
  - Set Reference Plane to **Top**
- On the **Model** panel:
  - Activate **Top Override Surface** with **Tiles –Light Brown 150x150**
- On the Classification and Properties panel:
  - Set as **Load-Bearing Element** and **Interior**
- Set Layer as **Structural-Bearing**
- Click on **OK** to close the settings

We can now start creating the floor slabs.

- Select the **Rectangular Geometry Method** in the Info Box.
- Using the Orbit tool  , rotate the building so that you can see the internal part of the walls on the site.
- Hit Esc to deactivate the Orbit tool and the slab tool will be activated
- Hold down the **Space bar** on your keyboard and move the cursor towards the **bottom on the exterior side of the walls.** This activates the Magic Wand feature that can recognise closed contours.
- Click when the plane indicator turns into **darker grey** close to the bottom of the wall, and the slab will immediately appear in the middle and at a correct elevation.



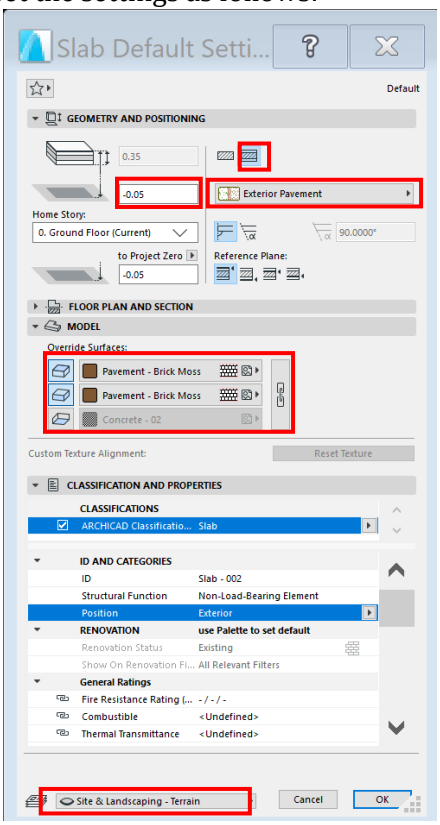
Please click on the video below to watch a demonstration

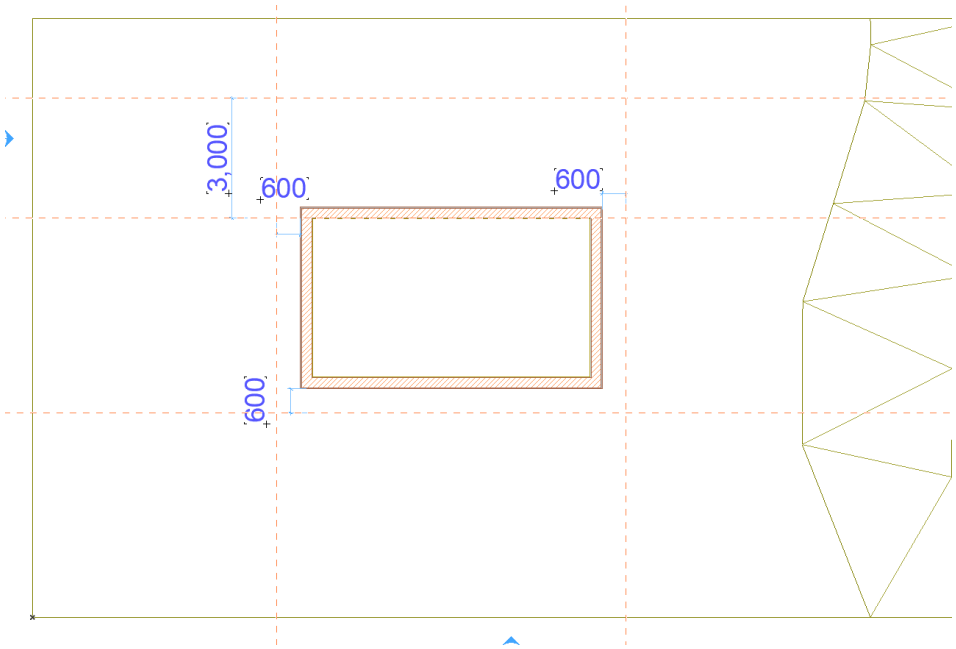


Video 9: Placing the internal floor slab

Now continue with creating the exterior pavement on the floor plan view.

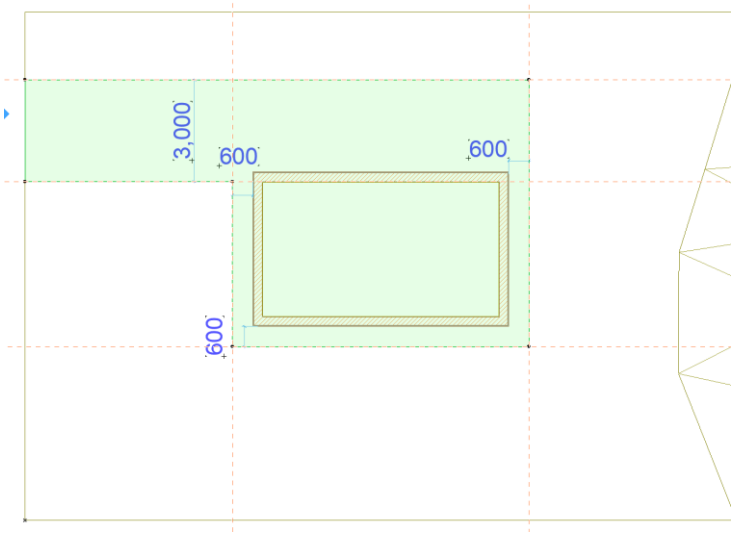
- Switch to **Pop-up Navigator - Project Map > Ground Floor**
- Activate the **Slab Tool** (if deactivated) and set the settings as follows:
  - Set **Ground Floor** as Home Story and Offset to Home Story as **-0,05**.
  - Choose the **Exterior Pavement** as the composite structure
  - Override the top and side materials and choose **Pavement - Brick Moss** and no override for the bottom surface.
  - Set the ID and Categories as **Non-Load-Bearing Element, Exterior**
  - Choose **Site & Landscape - Terrain** as the layer.
  - Hit **OK** to close the settings
- Using the guidelines, locate the distances, as shown below:

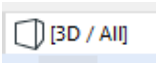




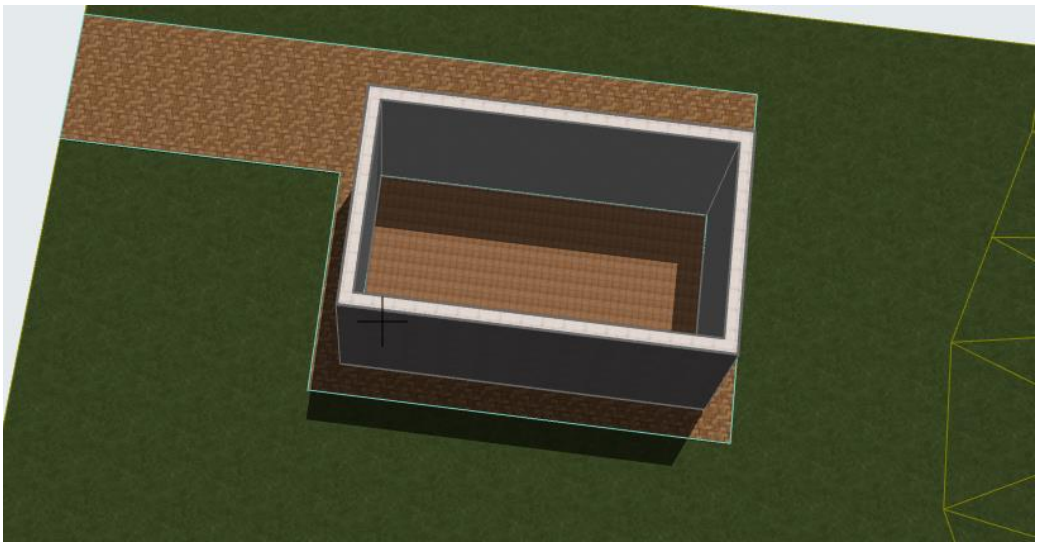
- Select the **Polygonal geometry method** 

and draw the exterior pavement on the area mapped out with the guidelines, as shown below:

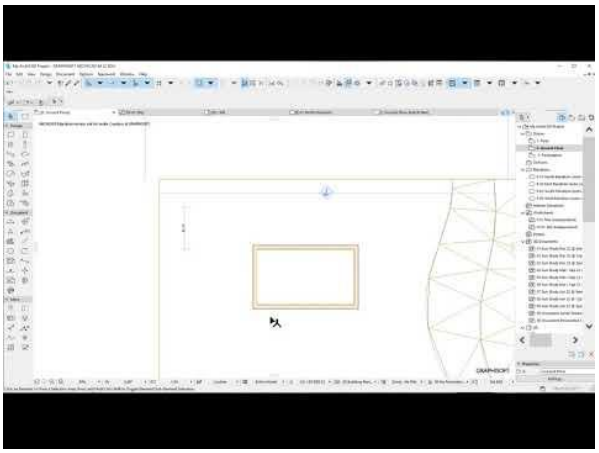


- Open the **3D All** window 

to see the result.



Please click on the video below to watch a demonstration

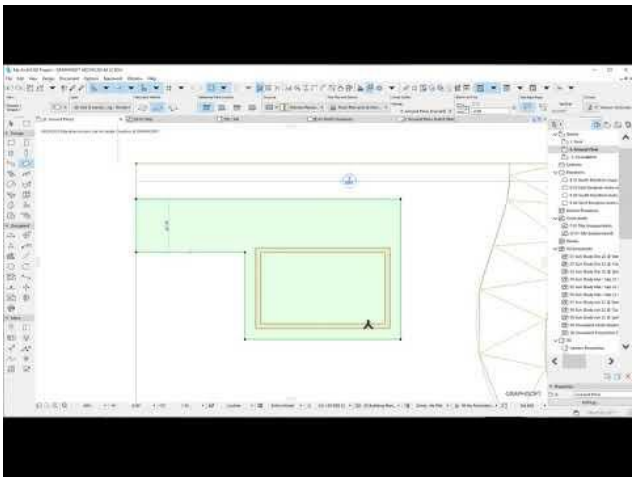


Video 10: Placing the exterior pavement

You must have noticed that the exterior pavement covers the interior floor slab. We cannot have both in the same space. We need to cut out the space occupied by the floor slab from the exterior pavement. To do this,

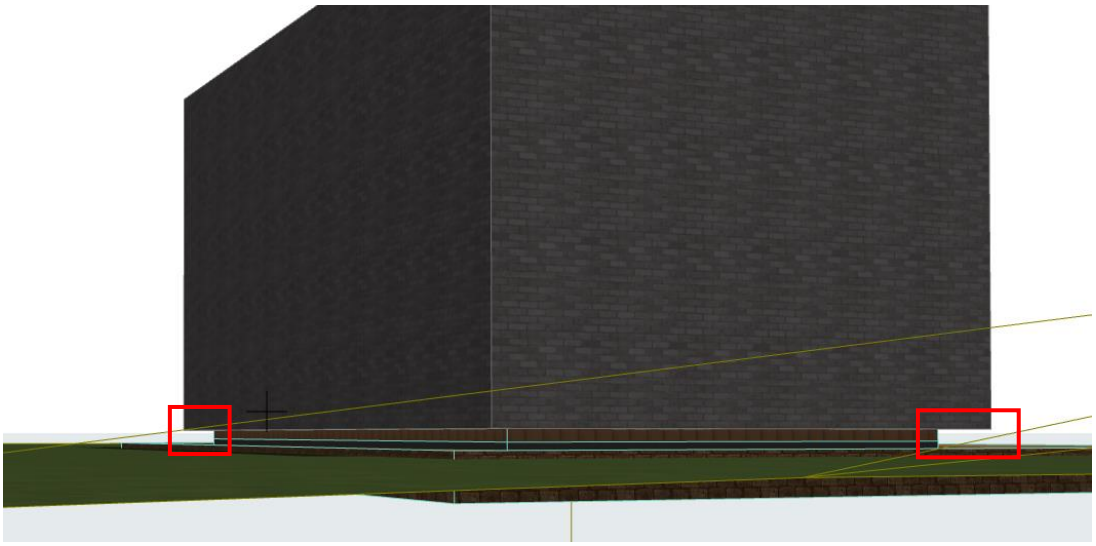
- Select the **Exterior pavement**
- Activate the **Slab tool** by clicking on it in the Toolbox
- Select the **Rectangular Geometry Method**  from the Infobox and draw on the space occupied by the Interior Floor slab. This will cut out the area needed.
- Hit **Esc** to deactivate and deselect the exterior pavement

Please click on the video below to watch a demonstration



Video 11: Cutting the exterior pavement

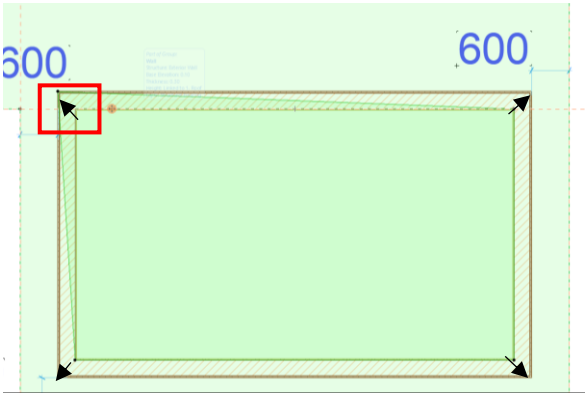
If you will notice that the internal floor slab does not flush with the exterior walls, we will need to stretch the slabs to correct it. The interior floor slab is situated inside the walls of the building and we have set the reference line to “Inside face”.

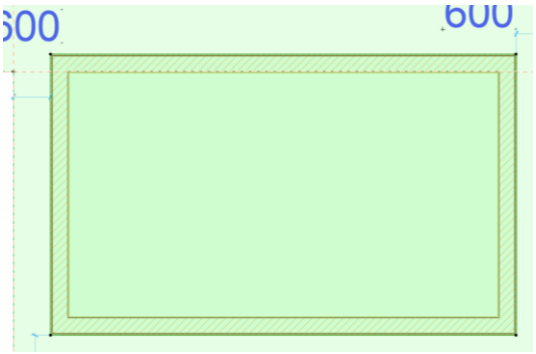


To extend the floor slabs, do the following:

- Switch to **0. Ground Floor**

- Activate the **Slab tool** and type in Ctrl + A to select all the slabs on the site (the internal floor slab and exterior pavement will be selected)
- Select the Arrow Tool  from the Toolbox and stretch the **four nodes** of the internal floor slab to meet the outer face of the exterior walls as shown below:

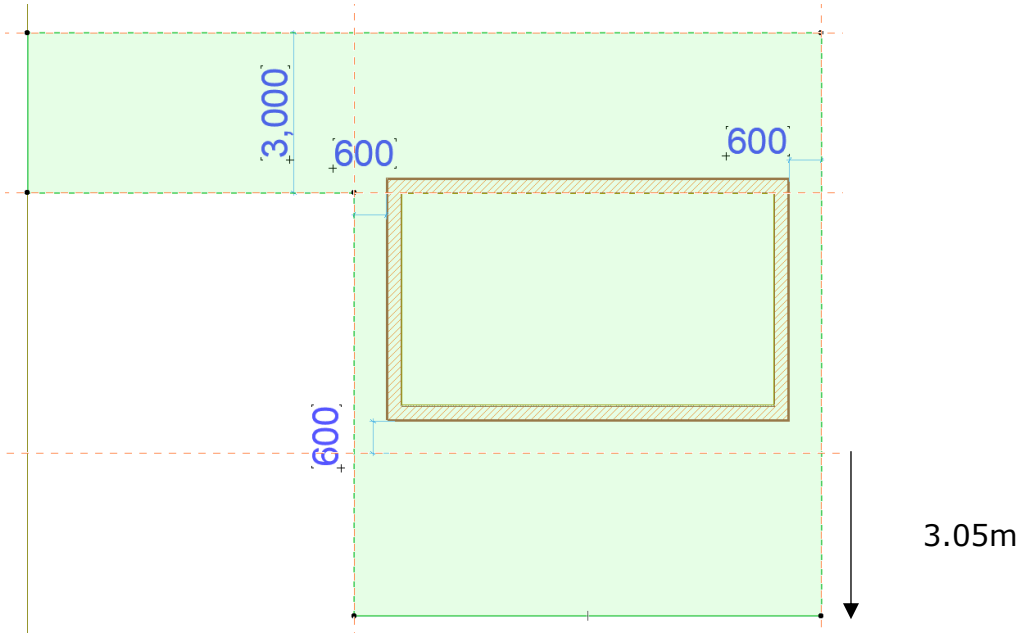




We will now extend the exterior pavement to create a verandah. To do this:

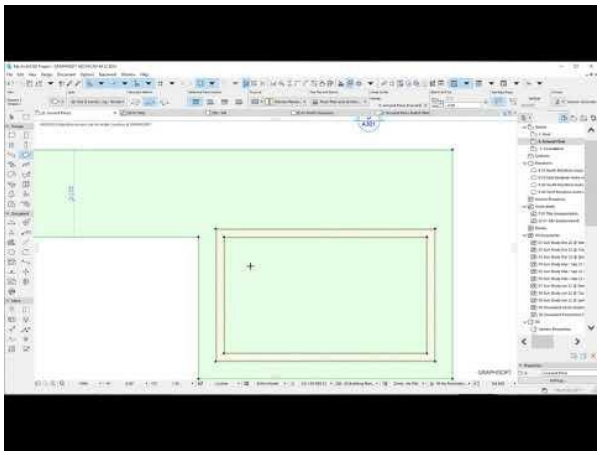
- Select the exterior pavement slab and click on the **edge of the lower side** (this is the side we want to extend)
- Choose the **Offset Edge** option in the **pet palette** 
- Extend the slab for **3.05m**

- The drawing should look like the one below



Hit Esc to deactivate all tools and deselect all objects.

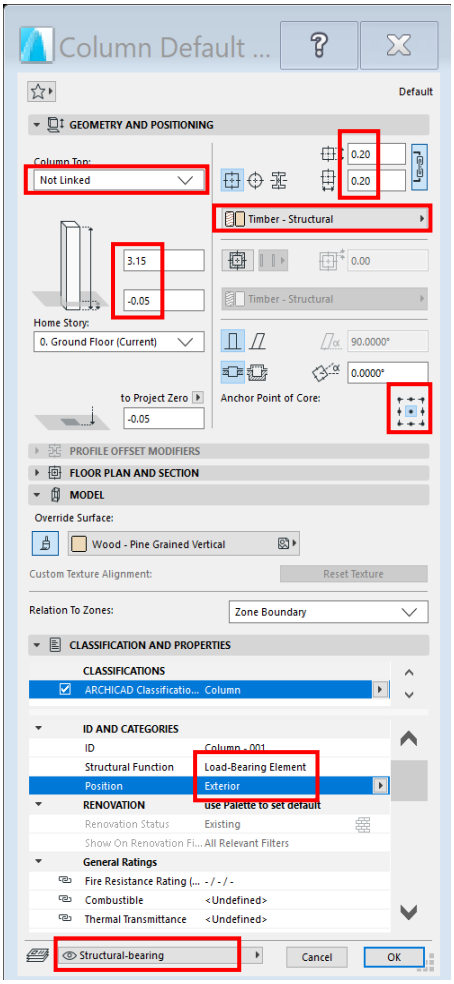
Please click on the video below to watch a demonstration



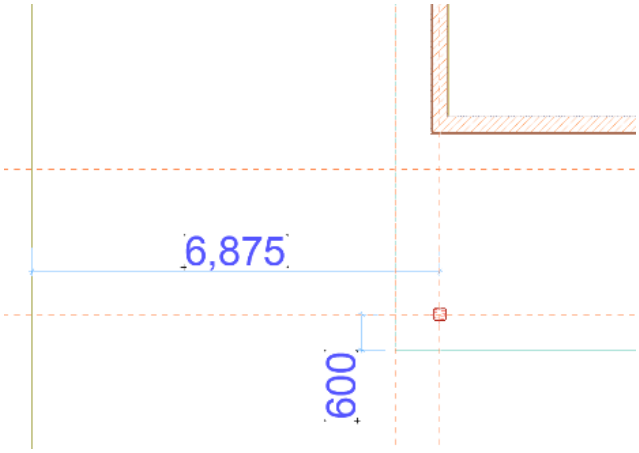
Video 12: Adjusting the internal floor slab

Column

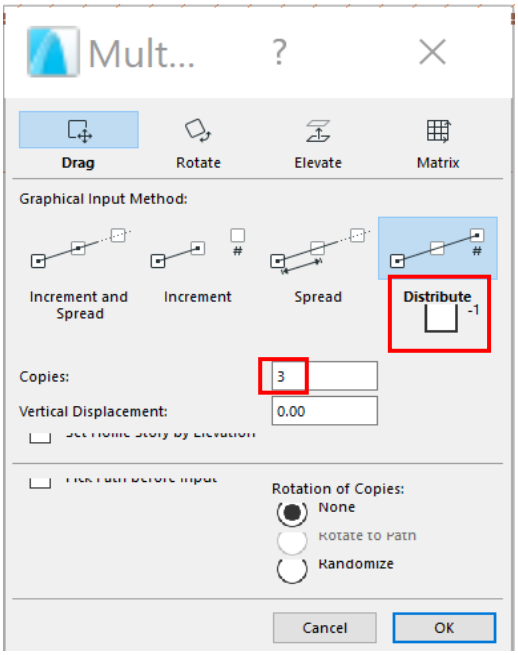
We will now add the columns to the extended pavement.

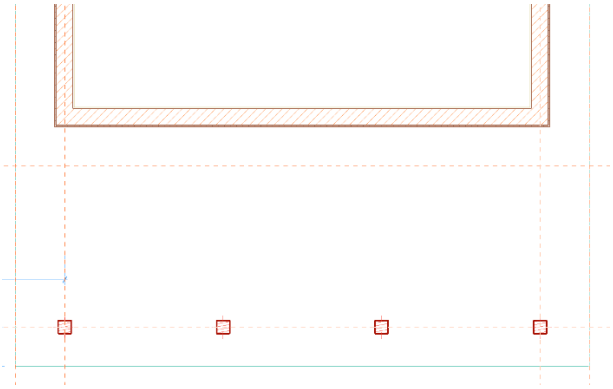


- Still on the **Ground Floor** (hit Esc or click outside the drawing to deactivate or deselect any active tool)
- Activate the **Column Tool** in the Toolbox**.**
- Open the settings dialog and set parameters as follows:
    - Column Top: **Not Linked**
    - Column Height: **3.15**
    - Bottom Elevation to Project Zero: **-0.05**
    - Structure: **Rectangular**
    - Size **0.20 x 0.20**
    - Building Material: **Timber - Structural**
    - Anchor Point of Core: **Middle**
    - Classification and Properties: **Load-Bearing Element**, **Exterior**
    - Layer: **Structural - Bearing**
- Hit **OK** to close the column settings
- Using guidelines, mark the intersection of **6.875m** from the site boundary AD and **0.6m** from the exterior pavement using the **guidelines** (see the image below)
- Place another guideline at **0.75m** from the other end of the exterior pavement
- Place a column on the first intersection point



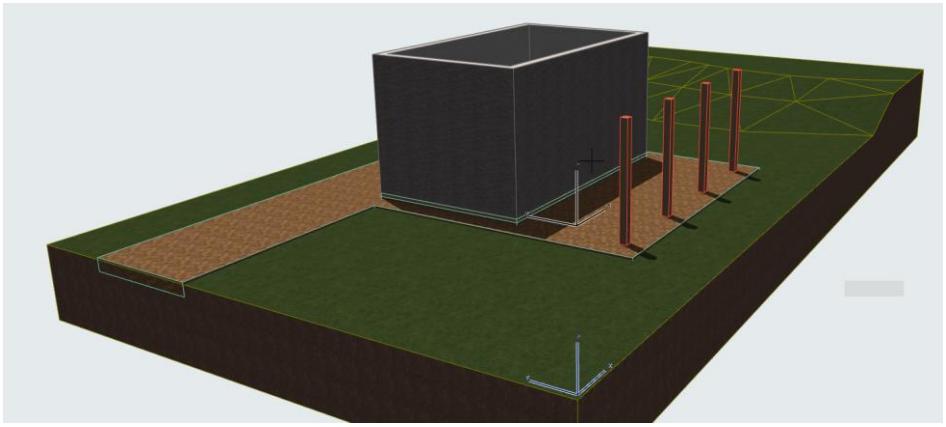
- Select the column and multiply it by activating the **Multiply** command from the context menu
- Right-click and choose the **Move > Multiply...** command. Alternatively, you can use the **Edit > Move > Multiply...** menu command (you can also use the shortcut **Ctrl + U** to activate this option).
- Choose **Drag** as the multiply action and enter **3** for the number of copies. Now select the **Distribute -1** multiply method.
- Click **OK**.
- Click on the **centre point** of the column to pick up the copies of the column
- Click on the intersection on the right to place the 3 new columns.



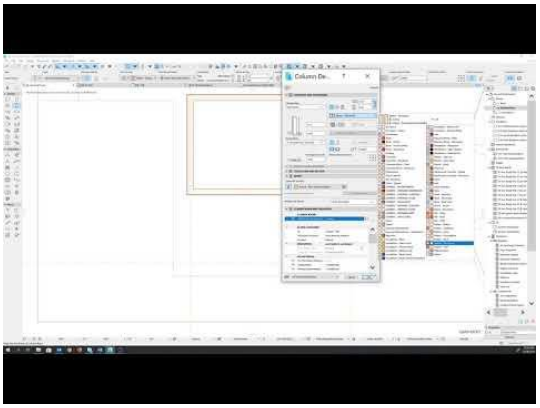


- Hit **Esc** to deselect the columns

Delete all dimensions and guidelines on the drawing screen and view your design in 3D.



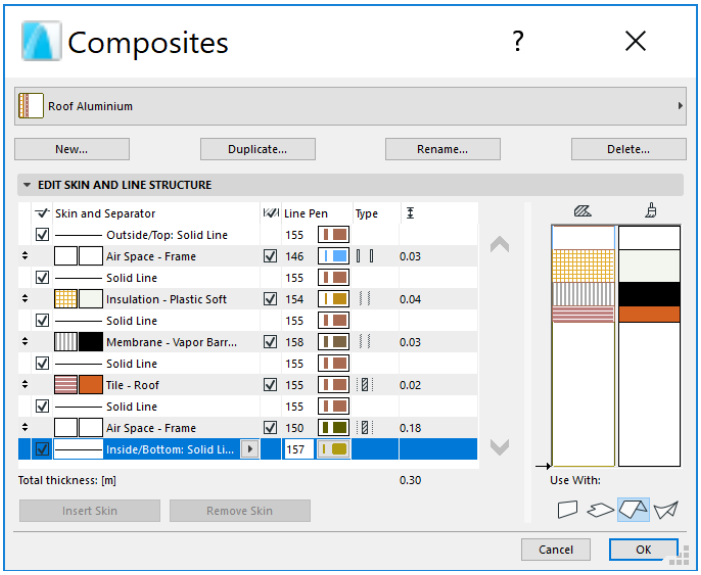
Please click on the video below to watch a demonstration



Video 13: Adding Columns

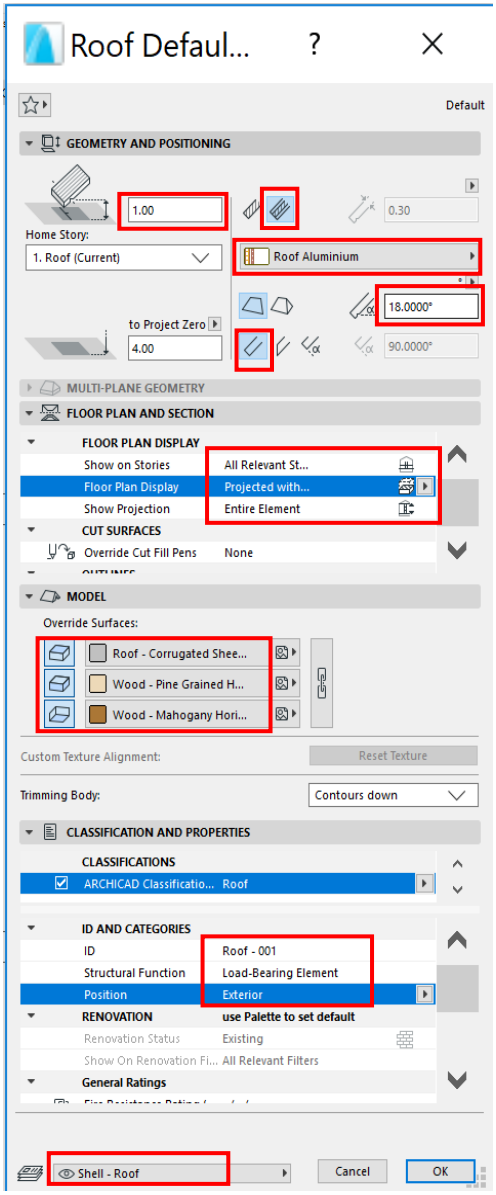
Roof

To design the roof for our building project, we have to create a composite - **Roof Aluminium** with the specifications as shown below:



- Ist Skin:
  - Material: Air Space- Frame;
  - Len Pen – 146;
  - Type – Finish;
  - Thickness – 0.03
- 2nd Skin:
  - Material: Insulation – Plastic Soft;
  - Len Pen – 154;
  - Type – other;
  - Thickness – 0.04
- 3rd Skin:
  - Material: Membrane – Vapor Barrier;
  - Len Pen – 158;
  - Type – Other;
  - Thickness – 0.03

- 4th Skin:
  - Material: Tile- Roof;
  - Len Pen – 150;
  - Type – Core;
  - Thickness - 0.02
- 5th Skin:
  - Material: Air Space - Frame;
  - Len Pen – 150;
  - Type – Core;
  - Thickness - 0.18
- Outside/Top: Solid Line; Len Pen 155
- Inside/Bottom: Solid Line; Len type 157



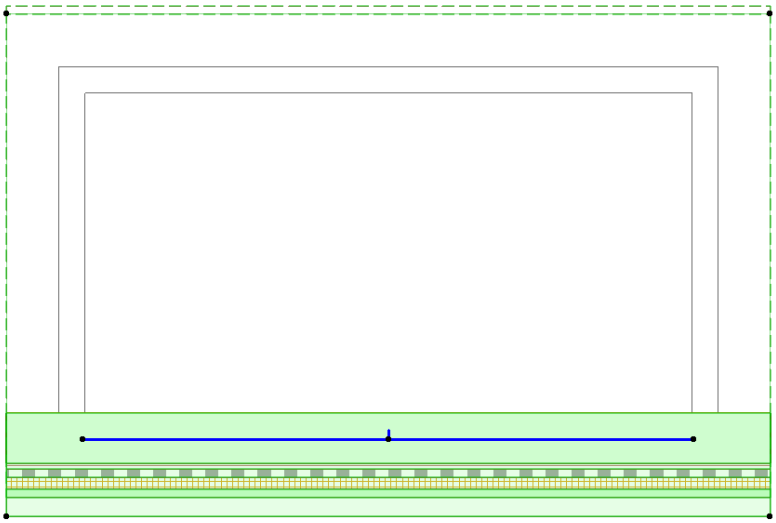
To design the roof:

- Switch to the **1. Roof** Story in the Navigator.
- Activate the **Roof Tool** and adjust its settings as shown in the image
  - Click on **OK** to close the roof settings
- To construct a pitched roof, first **define its pivot line by clicking on the lower internal corners** of the exterior wall.
- Define the direction of the slope by **clicking above** the defined pivot line with the **eye-shaped cursor**.

- **Draw the perimeter** of the roof (which is its projection to the horizontal plane) using the external corners of the exterior wall.
- Hit **Esc** to deactivate the roof tool

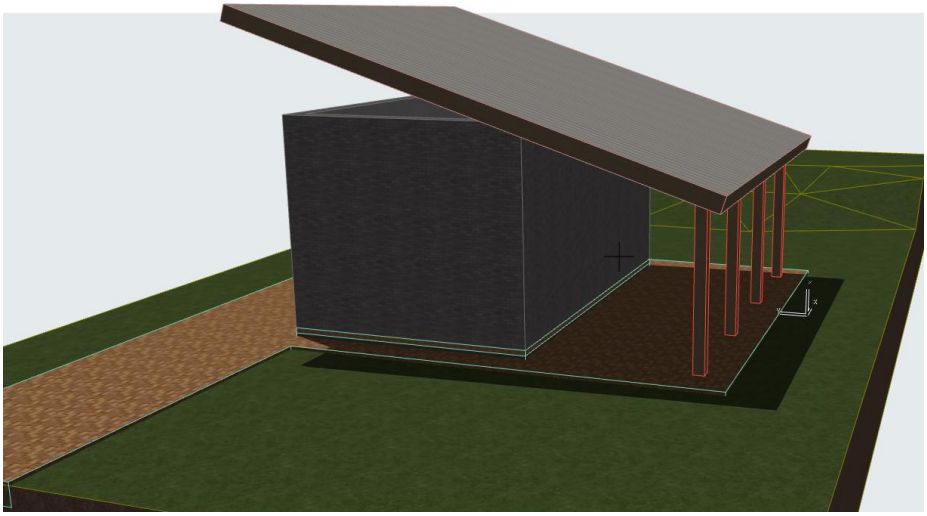
We now need to create roof eaves for the roof. To do this:

- Select **the Roof** created
- Click a corner hotspot of the selected roof and offset all edges by **0.6m**



We also need the roof to cover the pavement and the columns. To do this:

- Select **the Roof** and click **on the edge of the lower side** (preferably the middle line at the edge) of the roof.
- Choose the offset edge option in the pet palette
- Extend the roof for **3m** to cover the columns.
- View your building in **3D**

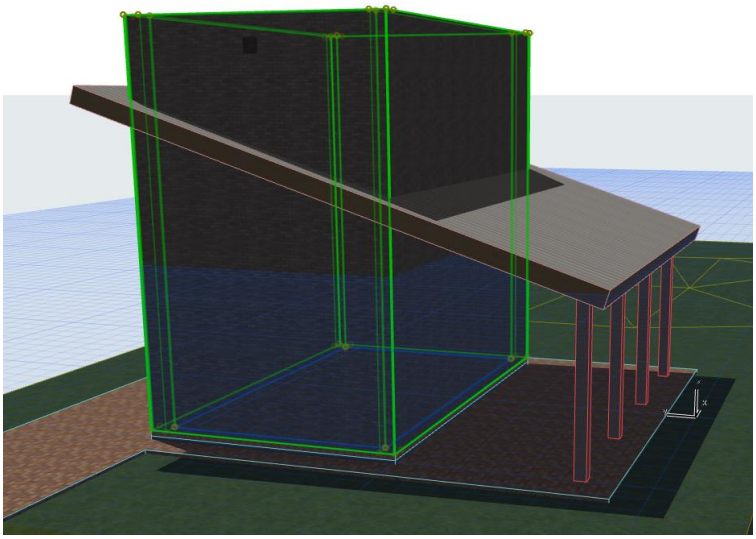


Trimming the Walls to the Roof

As you can see, the walls do not meet up with the roof because of the sloping angle of the roof. As such, we need to trim the walls with respect to the roof. To do this,

- Go to the **3D/All** view and select **all walls** (activate wall tool and click Ctrl+ A)
- Open the settings and change the Top offset to Top linked story from 1.00 to **4.00**
- Hit **OK** to close the settings

This will extend the walls above the roof



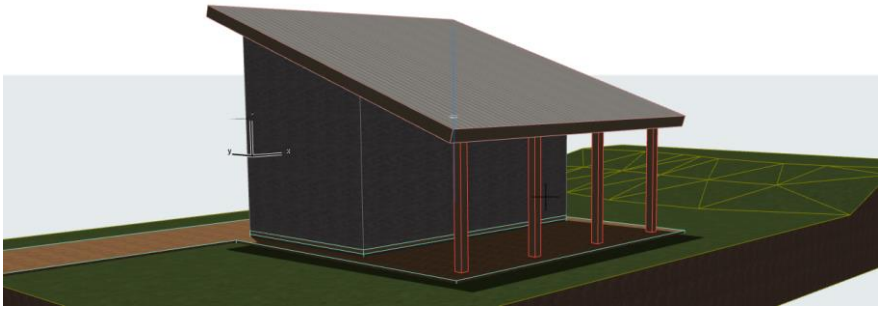
To trim off the part of the walls we do not need:

- Right-click and select **Connect**> **Trim Elements to Roof/Shell** or click on the icon  on the Toolbar
- Click anywhere on the roof. The empty roof icon turns **black** if the program finds a selectable element.
- Click on the side of the walls you want to keep (the walls below the roof)

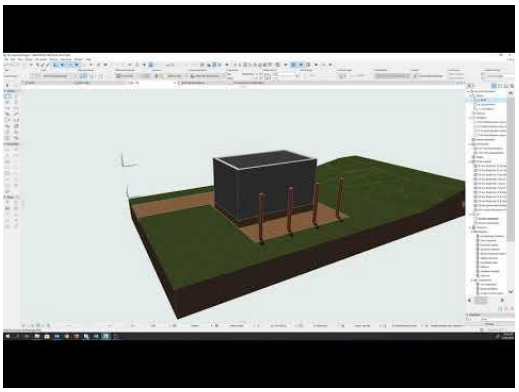
The parts above the roof will be trimmed off.

- Hit **Esc** to deselect the walls

The walls are now associatively trimmed to the roof. If you change the roof geometry or sloping angle, the walls will be updated automatically.



Please click on the video below to watch a demonstration



Video 14: Adding single plane roof

Exercise

1. Which of these is a major difference between 2D and 3D drawings?
    a. A 2D drawing is for buildings while a 3D drawing is for projects
    b. A 2D drawing represents the length and width of a building while a 3D represents the length, width and height of a building
    c. A 2D represents the length, width and height of a buildings while a 3D drawing represents the length and height of a building
    d. A 2D drawing smaller than a 3D drawing
2. What is the benefit of creating layers?
    a. It enables building components within the same layers to be modified collectively without affecting the other layers
    b. It enables building components across different layers to be deleted individually
    c. It ensures that building components within the same layers are visible
    d. It ensures building components across different layers are visible
3. What is the layer created for the exterior pavement?
    a. Structural- bearing
    b. Site & Landscaping – Terrain
    c. Shell – Roof
    d. Site Mesh - Proposed
4. What building material was created for the exterior wall?
    a. Brick – Finish (white)
    b. Brick – Finish
    c. Brick – White Natural
    d. Brick - Core
5. How many skins does the exterior wall have?
    a. 5
    b. 3
    c. 4
    d. 2
6. What is the pen colour for the cut fill of the building material: Brick – Finish(white)?
    a. 161
    b. 157
    c. 187
    d. 141
7. What is the thickness of the exterior wall?
    a. 0.30m
    b. 0.35m
    c. 0.20m
    d. 0.45m
8. What are the dimensions for the exterior wall?

a. 7m x 6m
b. 5m x 7m
c. 30m x 15m
d. 7m x 4m

9. How many skins does the internal floor slab have?
    a. 5
    b. 3
    c. 4
    d. 2
10. How did we get to the option for Building Materials?
    a. Options > Property Manager > Building Materials
    b. Teamwork > Property Manager > Building Materials
    c. Options > Layers > Building Materials
    d. Options > Element attributes > Building Materials
11. For the Internal Floor Slab, the top surface was overridden with what material?
    a. Pavement -Brick Moss
    b. Tiles – Light Brown 150x150
    c. Tiles – Dark Brown 300x300
    d. Tiles – Dark Brown 150x150
12. What geometry method was used to draw the exterior pavement?
    a. Polygonal
    b. Circular
    c. Rectangular
    d. Square
13. How long was the exterior pavement extended to accommodate the columns?
    a. 3.50m
    b. 3.05m
    c. 35m
    d. 350m
14. What is the size of the columns?
    a. 0.3x0.2m
    b. 0.3x0.3m
    c. 0.2x0.2m
    d. 0.6x0.6m
15. How many copies was entered in the “Multiply” dialogue box?
    a. 5
    b. 3
    c. 4
    d. 2
16. What is the composite structure for the roof?
    a. Roof – Shell
    b. Roof – Mohagamy
    c. Roof- Aluminum

   d. Roof - Mesh
17. What is the angle of the roof?
   a. 18^{o}
   b. 20^{o}
   c. 30^{o}
   d. 28^{o}
18. What is the length of the roof's eave?
   a. 0.6m
   b. 9m
   c. 0.9m
   d. 6m
19. What tool was used to make the walls flush with the roof?
   a. Stretch
   b. Drag
   c. Trim
   d. Flush
20. What is the thickness of the roof?
   a. 0.30m
   b. 0.35m
   c. 0.20m
   d. 0.45m

Module 3- Openings, Internal structures and Foundations

Module 3: Openings, Internal structures and Foundations

Learning Outcomes

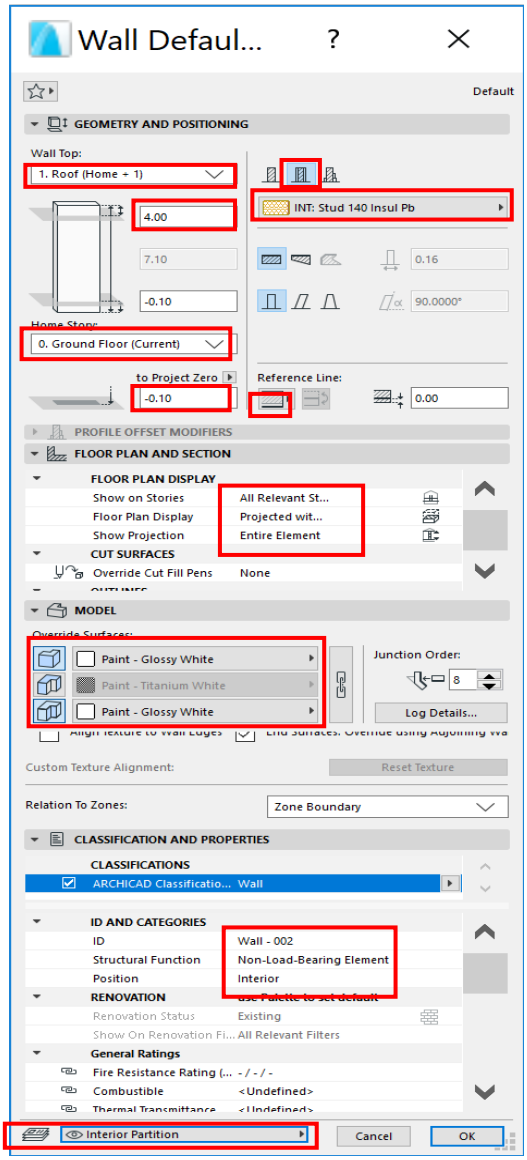
In this module, you will be creating the partition walls, openings (doors and windows) and foundations for our sample building. You will create the following elements:

- Partition walls
- Doors and Windows
- Foundation

Partition Walls

Partition walls are internal walls that separate the use of spaces in a building. They are usually non-load bearing walls. As this building is a simple one-bedroom with toilet and bathroom, we will need partition walls to separate the living room from bedroom and bathroom. To create the partition walls:

- Switch to **Ground Floor** on the Navigator (Project Map)
- Create a new layer: **Interior Partition** (Documents - Layers – Layer (Model Views) – New)
- Activate the Wall Tool and set the settings as follows:
    - Wall Top linked to **1. Roof (Home + 1)**
    - Top offset to Top Linked Story: **4.00**

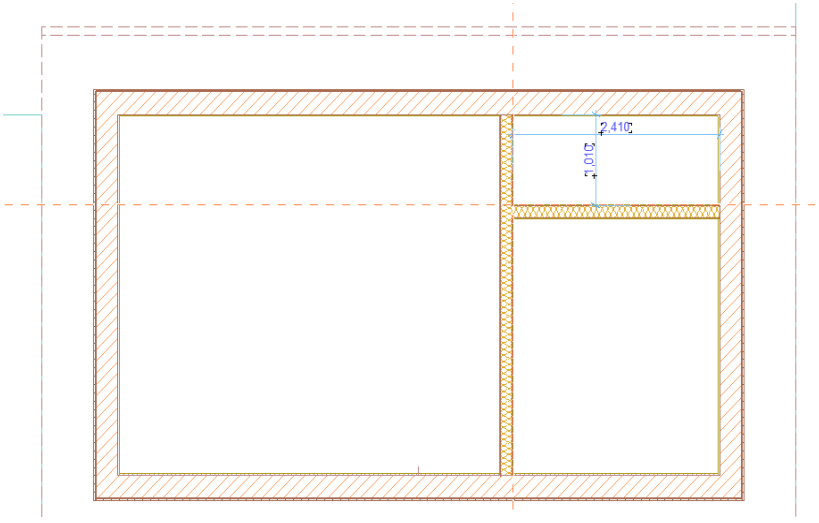


- Bottom Elevation (to Project Zero): **-0.1**
- Reference Line Offset: 0.00 (**inside face**)
- Home Story: Ground Floor
- Composite fill: **INT: Stud 140 Insul Pb** (we are using a composite created by default in ArchiCAD)
- Floor Plan and Section: **All Relevant Stories, Projected with Overhead, Entire Element**
- Override Outside and Inside Face Surfaces: **Paint - Glossy White**
- Classifications and Properties: **Wall- 002, Non-Load-Bearing, Interior**
- Layer: **Interior – Partition**

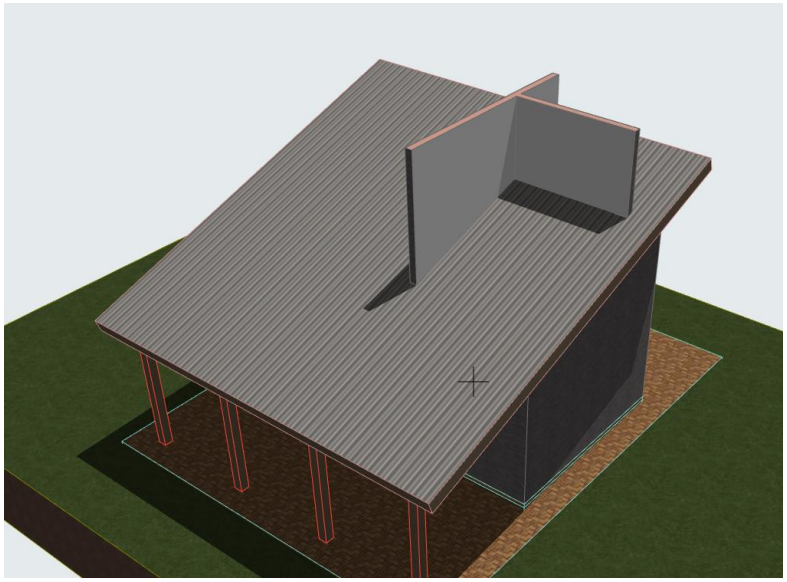
- Click on **OK** to close the wall settings
- Hit **Esc** to deactivate the Wall Tool
- On the Ground floor, place a guideline **1.0m downwards** from the interior core side of the **exterior wall on top** (remember how we carried out this step in Module 1)**.**
- Place another guideline 2.4m from the interior core side of the **exterior wall on the right-hand side**

You may need to zoom in on the drawing to get a clearer view of the core of the wall.

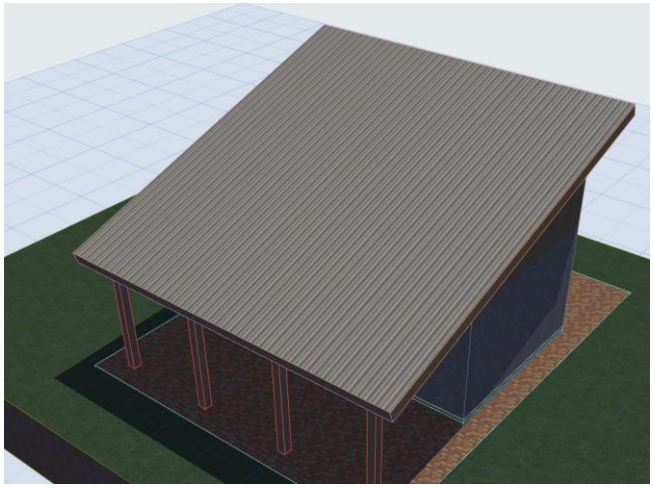
- Select the **Wall Tool** from the Toolbox
- Choose the **Straight Single Geometry Method** from the **Infobox**
- Draw on the guidelines as shown below



- Hit **Esc** to deactivate the Wall tool
- View the building in **3D**. You will notice that the partition walls protrude above the roof like in the image below.

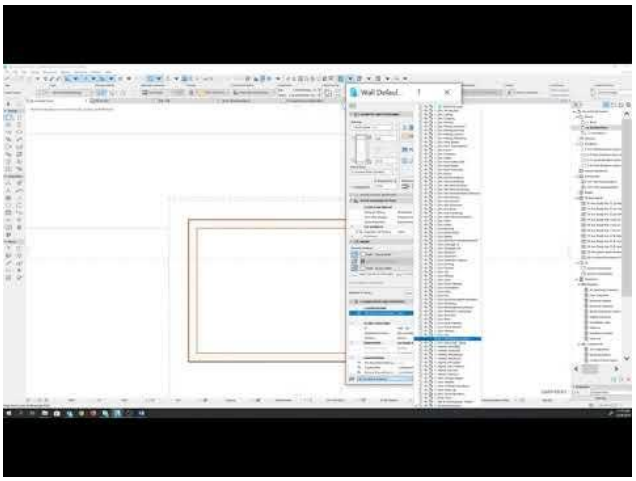


- Select the partition walls and **Trim** them to the roof.



- Hit **Esc** to deactivate the Wall tool

Please click on the video below to watch a demonstration



Video 15: Partition walls

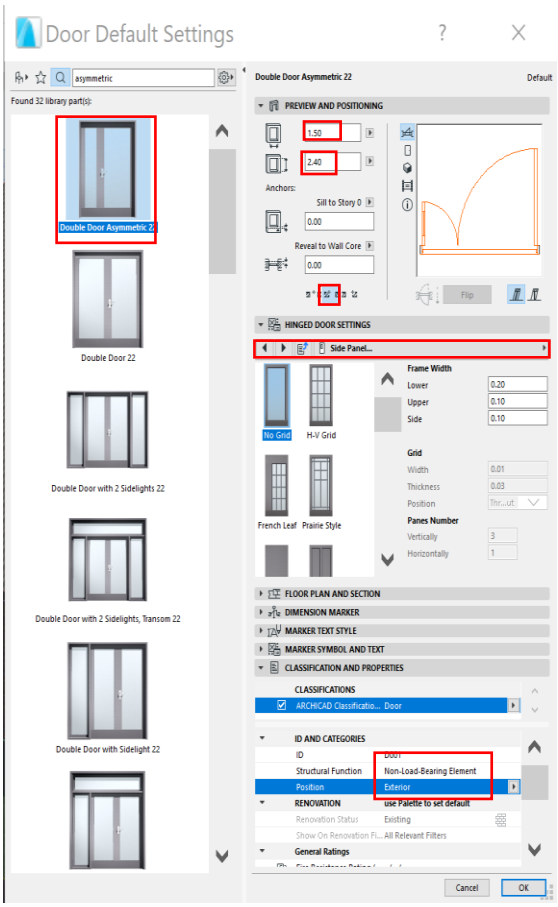
Entrance Door

The entrance door leads into the internal spaces in the building and will be placed on the exterior wall. To add the entrance door:

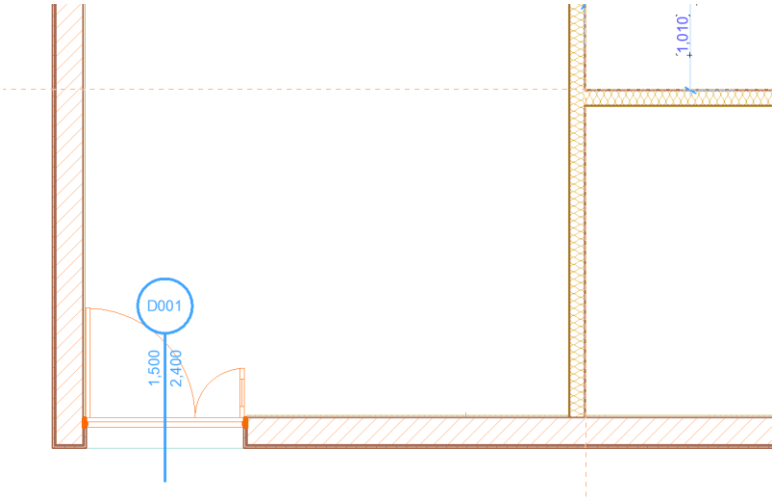
- Activate the **Door Tool** and open its Settings dialog by double-clicking on its icon on the Toolbox or Info box.
- Type **asymmetric** in the search field at the top left of the dialog, to find all available asymmetric doors.
- Select the **Double Door Asymmetric 22** door object from the result list.
- Set parameters as follows:
    - Preview and Positioning panel:
        - Width: 1.50
        - Height: 2.40
        - Anchor: Sill to Story 0 to 0.00 (if this isn't available, select Relink Anchor Story from the roll down list and select Ground Floor)
        - Reveal to Wall Core: 0.00 (To change from Wall Face click on the arrow button on the right)

        - Anchor Point: Side 1

    - On the **Hinged Door Settings**  (you can use the arrows to assess the various options)
        - On the **Shape** option: Set a value of **1.00**
        - On the **Door Leaf Type** option, select a **leaf (Style 20)**
        - On the **Fixtures and Fittings** page, uncheck **Casing Outside** and **Inside** and check **Normal threshold**.
        - Select **No Grid** on the **Side Panel** option**.**
    - **Classifications and Properties**: **D001** (ID), **Non-Load-Bearing Element** (Structural Function), **Exterior** (Position).
    - Click on **OK** to close the door settings



- Switch to **Ground Floor** on the Navigator (Project Map)
- Move the cursor over the lower exterior wall segment and place the door on the wall, as shown below. You may need to zoom into the section to see the junction where to place the door.
- Hit **Esc** to deactivate the Door tool

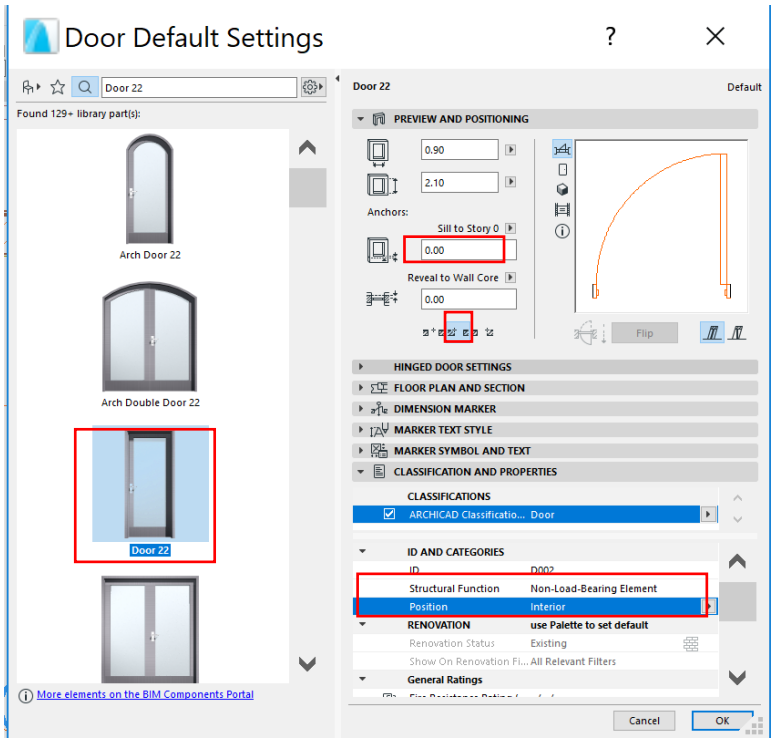


Internal Doors

The internal doors connect the spaces inside the building and allow for movement through the spaces. To place the internal doors, we need to ensure that they are placed on the appropriate wall thickness.

To have the right wall thickness for the door settings dialog, do this:

- Pick up the parameters of the partition wall with the **Pick-up Parameters Tool** (Alt+C).
- Activate the **Door Tool** and type **Door** in the search field — Select **Door 22** from the search results.
- Set the door settings as follows:



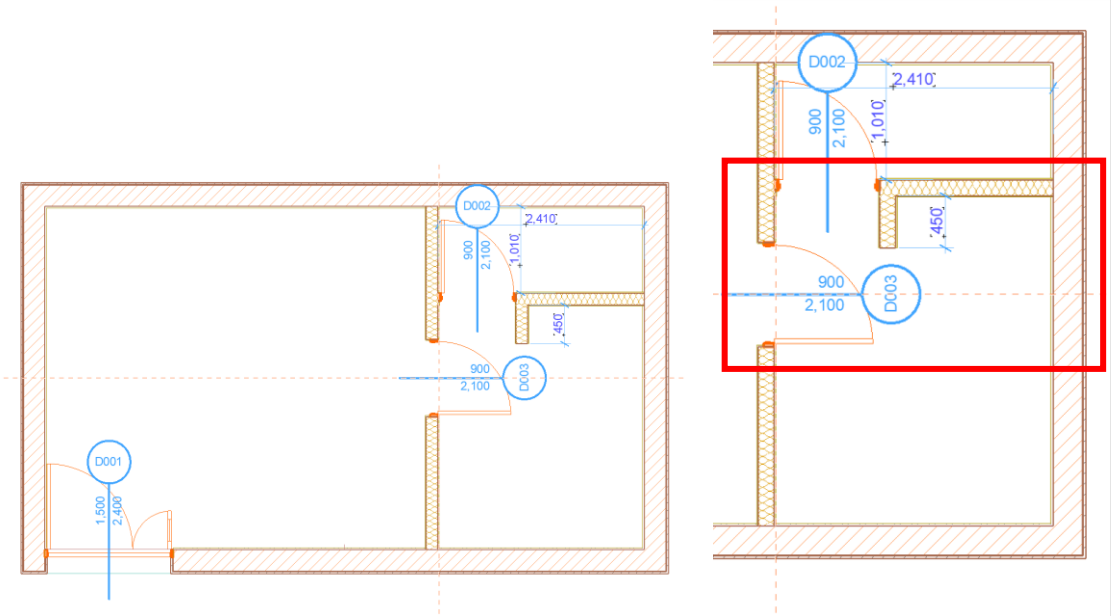
- Anchor Sill to Story 0: **0.00.**
- Anchor: **Side 1**
- Classifications and Properties: **Non-Load-Bearing Element, Interior.**
- Click on **OK.**

We will first place the bathroom door. To do this:

- Click on the **inner junction** between the vertical and horizontal partition walls to place a door in the horizontal partition, as shown in the image below.
- Click **above the horizontal partition** wall to make the door swing inwards.

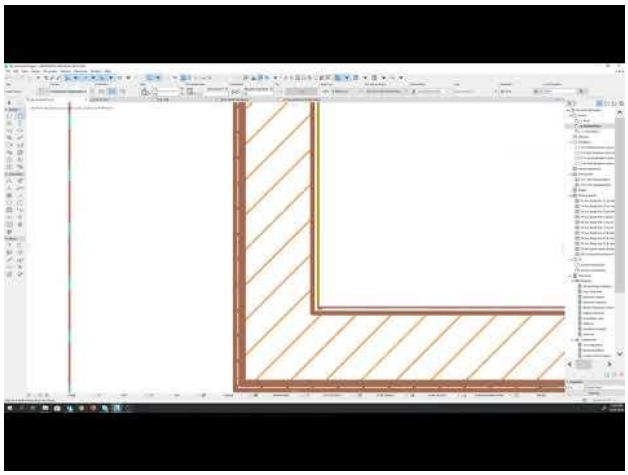
Let us place a door swinging into the bedroom. To do this:

- Place a guideline at the **mid-point** of the vertical partition wall.
- Change the Anchor Point for the wall to **Center** on the Toolbox.
- Place the second door in the vertical partition wall of the bedroom at **the mid-point of the wall**
- Click on the **right side** of the wall to make the door swing into the room.
- Hit **Esc** to deactivate the Door Tool
- A**dd a 0.45m (450mm) wall** next to the door on the horizontal partition wall (you will need to change the reference line location from inside Face to Core Outside).



- Hit **Esc** to deactivate the Wall Tool

Please click on the video below to watch a demonstration

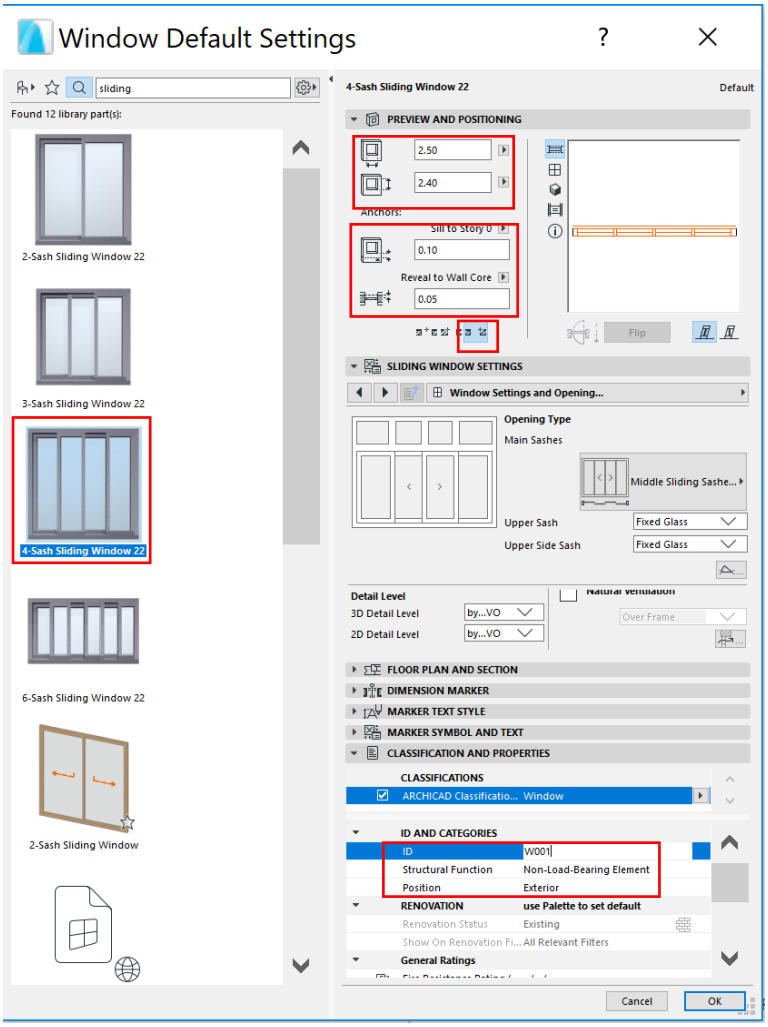


Video 16: Placing doors

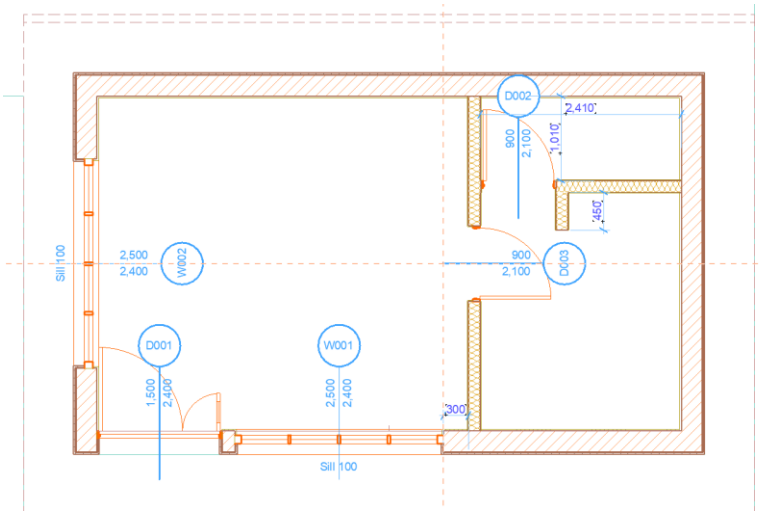
Living Room Windows

We will now place the windows in the living room. To do this:

- Activate **Window Tool** and open its settings;
- Type **Sliding** in the search field; choose **4-Sash Sliding Window 22** from the search results.
- Set the settings as follows:
    - Width: **2.50**
    - Height**: 2.40**
    - Sill to Story 0: **0.10**
    - Reveal to **Wall Core**: **0.05**
    - Anchor Point: **Side 2**
    - Classifications and Properties: **Non-Load-Bearing Element**, **Exterior**
- Click on **OK** to close the settings



- Place the living room windows **300mm** from the vertical partition wall (use a guideline to achieve this).
- Click **above the exterior wall** to make the window open inwards
- Place another window at the **midpoint of the left exterior wall**. You have to change the Anchor point to **Center** in the door settings.
- The opening direction is inwards the building

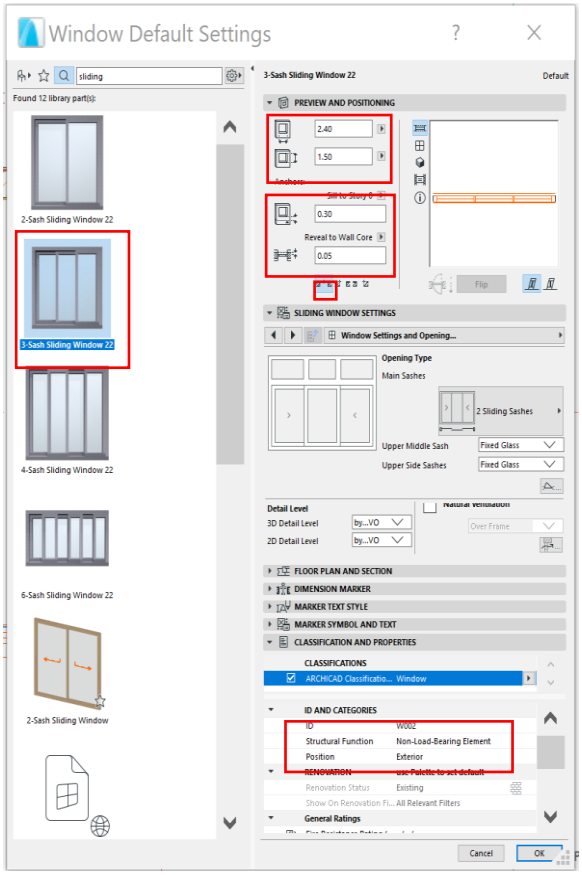


- Hit **Esc** to deactivate the Window Tool

Bedroom Windows

To place the bedroom windows:

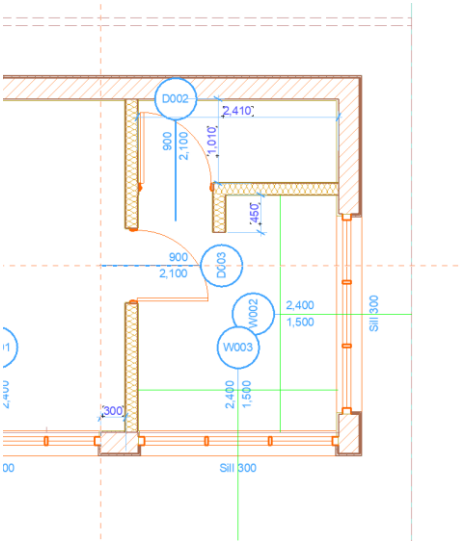
- Activate the **Window Tool** and open its settings;
- Type in **Sliding** in the search field; choose **3 Sash Sliding Window 22** from the search results
- Set the settings as follows:
    - Width: **2.40**
    - Height**: 1.50**
    - Sill to Story 0: **0.30**
    - Reveal to Wall Core: **0.05**
    - Anchor Point: **Center**



- Classification and Properties: **Non-Load-Bearing Element**, **Exterior**
- Click on **OK** to close the settings

To place the window, we need to figure out the midpoint of each wall. Use the **Line Tool** to achieve that (If you notice in the image below, I have used blue lines to figure out the midpoints of the bedroom walls. You can delete the lines once you are done).

- Place the **bedroom windows** at the midpoint of the lower wall and right side wall of the bedroom as shown below.
- The opening direction is inside the building.

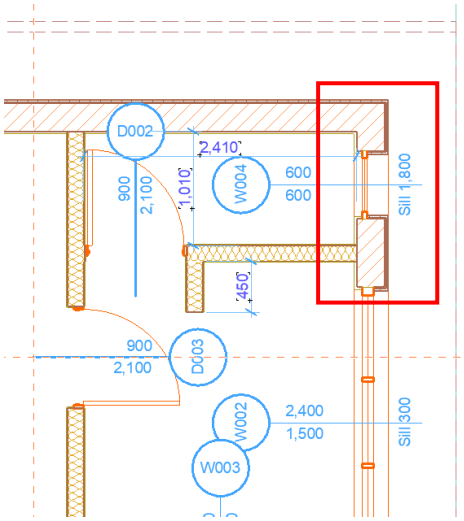


- Hit **Esc** to deactivate the Window Tool

Bathroom Window

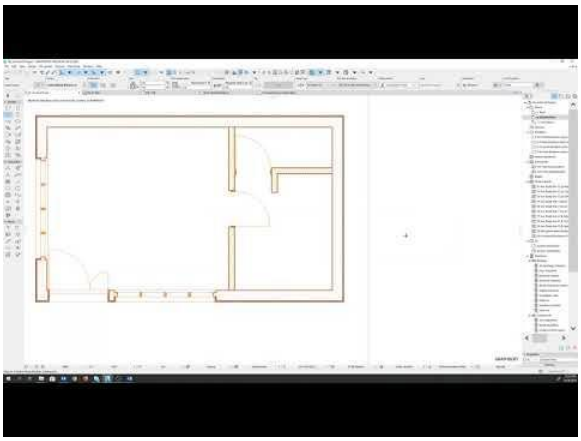
To place the bathroom windows:

- Still, on the Ground Floor, activate Window Tool and open its settings;
- Type **Window 22** in the search field and select it from the results.
- Set the settings as follows:
  - Width: **0.60**



  - Height**: 0.60**
  - Sill to Story 0: **1.80**
  - Reveal to Wall Core: **0.05**
  - Anchor Point: **Center**
  - Classification and Properties: **Non-Load-Bearing Element**, **Exterior**
  - Click on **OK**.
- Place the **Bathroom window** anywhere on the right side wall in the bathroom area.

Please click on the video below to watch a demonstration



Video 17: Placing windows

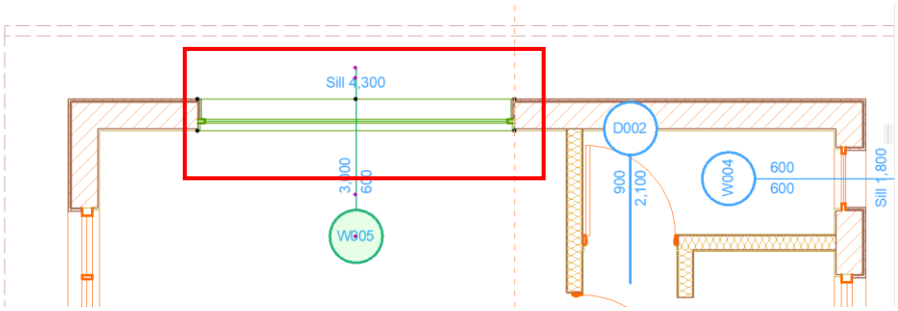
Roof level window

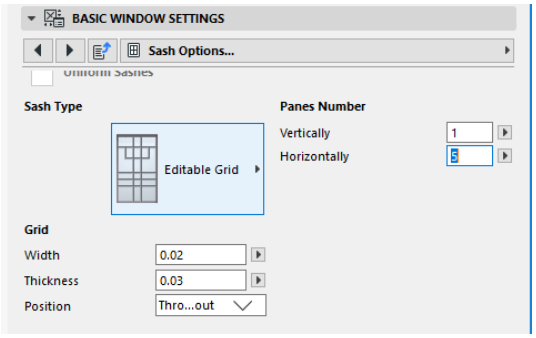
We will now place the roof level windows.

- While the window tool is still active, place a window on the top wall of the living room **500mm from the vertical partition wall**.
- Change the Anchor point to the **right**.
- Hit the **Esc** button to deactivate the tool
- Select the window, right-click on it, and open the **Window Selection Settings.**
- Set the Settings as below:
  - Width: **3.00**

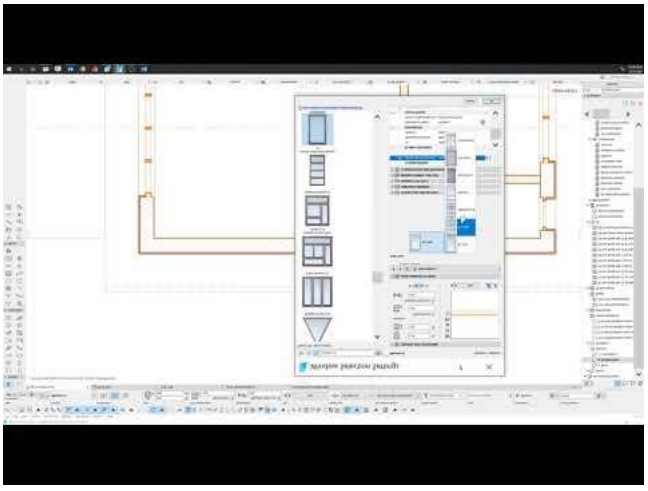
- Height**: 0.60**
- Sill to Story 0: **4.30**
- Anchor Point: **Side 1**
- Reveal to Wall Core: **0.05**
- In the Basic Window Setting, click on **Sash Options** tab, set as follows:
  - Sash type: **Editable grid**
  - Panes Number: **Vertically: 1; Horizontally: 10**.

- Click on **OK.** *(You will notice that the window disappears on the Ground Floor Story level. Go to Roof Story level, and you will see the window).*



- View the  window in 3D

Please click on the video below to watch a demonstration

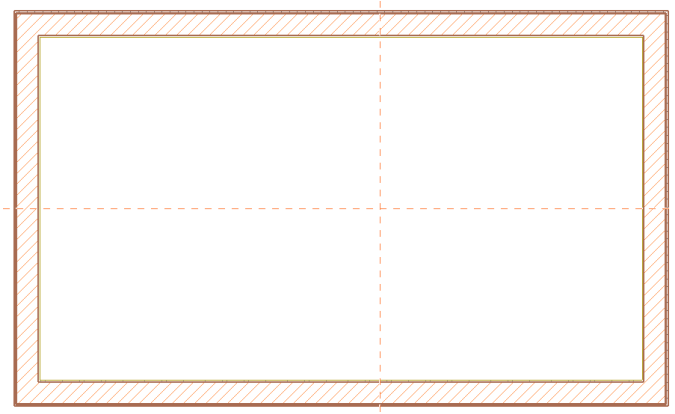


Video 18: Roof level windows

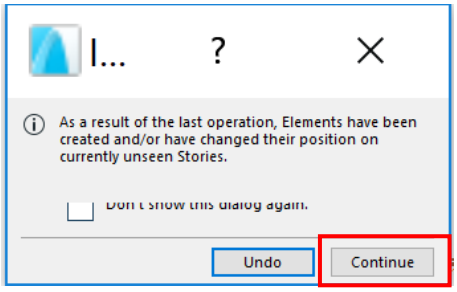
Foundations under the Walls

We are done with the windows and doors for the building. The next step is to create the foundation for the building. Remember that foundations are only required under load-bearing walls and columns to carry the point load from the building to the ground. To do this:

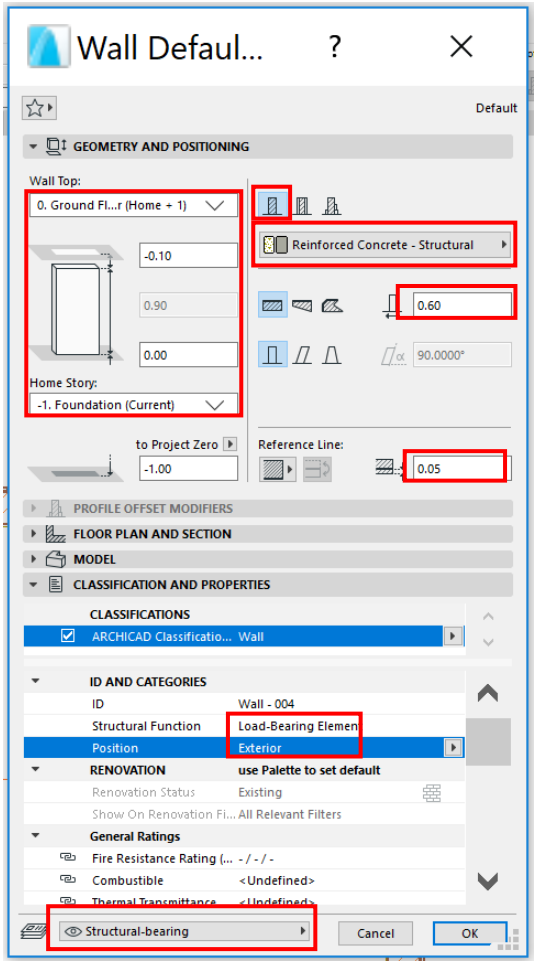
- Revert to the **0. Ground Floor** Story level and select **all exterior walls** *(click on the first wall, select other walls holding down on the shift-tab on your keyboard).*
- **Right Click** and click on **Wall settings**
- Set the Bottom offset to Home Story as **-0.10,** to make the walls start from the top of the foundation structure that we want to model.
- Click on **OK** to close the settings dialogue box
- Open the **-1. Foundation** Story Level (If the skins of wall composites are not visible, turn on Trace & Reference on the Toolbar to see them).
- Select **all partition walls** and set the Bottom offset to Home Story to **0.0** in the settings dialogue box to make the partition walls start from the top of the floor slab.



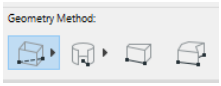
- An Information box appears. Click on **Continue** to acknowledge this function.



- Click on **OK**. The walls will disappear from the -1.Foundation story. *(Note: they are not load-bearing walls; so they do not need a connection with the foundation).*
- Activate the **Wall Tool** and set the settings as follows:
    - Wall Top: **Ground Floor** (Home + 1)
    - Top offset to Top Linked Story: **-0.10**
    - Bottom offset to Home Story: **0.0** (so that wall height is **0.90**)
    - Home Story: **-1. Foundation (Current)**
    - Structure: Basic
    - Building Material: **Reinforced Concrete – Structural**
    - Thickness: **0.60**
    - Reference Line: **Inside Face**
    - Reference Line Offset: **0.05**
    - Classification and Properties: **Load-Bearing Element, Exterior, Wall**
    - Layer: **Structural – Bearing**
    - Click on **OK** to close the settings



- Select the Straight **Rectangular Geometry Method** from the Infobox



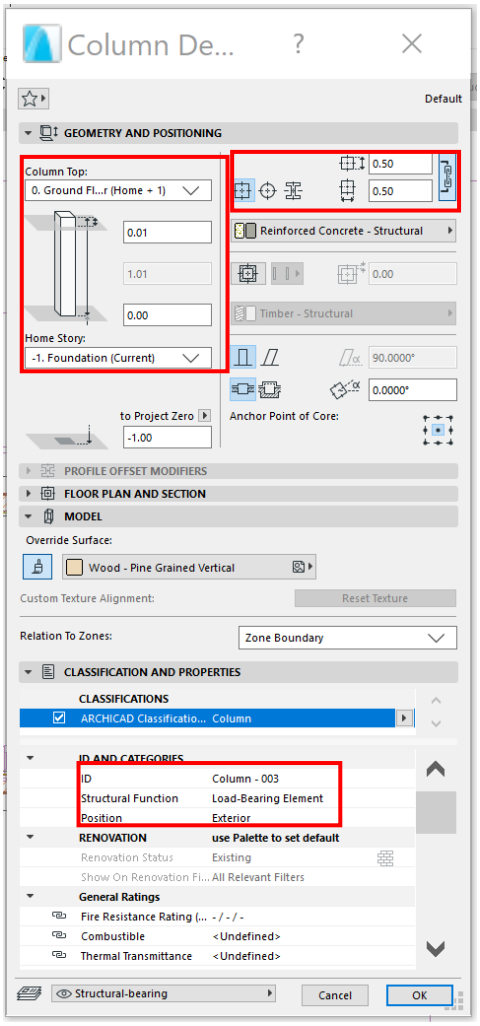
- Hold down on **Space Bar** on your keyboard (for a magic wand) and click on the **inside part of the exterior walls** to place the foundation

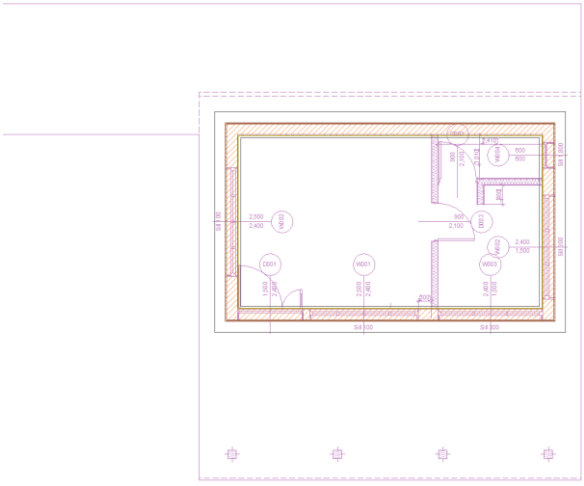
- Hit **Esc** to deactivate the Wall Tool

Foundations under the Columns

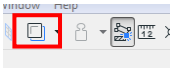
We will now place foundations under the columns.

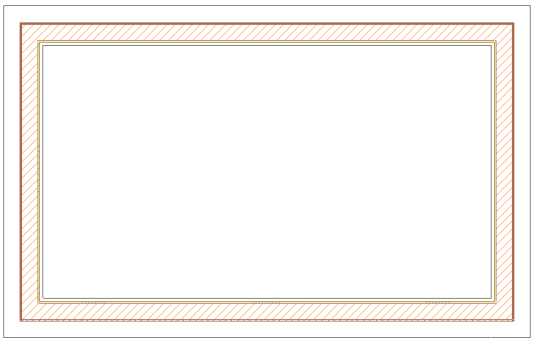
- Still on the **-1. Foundation** Story Level
- Right-click on the **Ground Floor** Story Level in the **Navigator** and choose **Show as Trace Reference** from the options (we want to see the columns). The outlines of the building on Ground level will show on your current drawing screen.



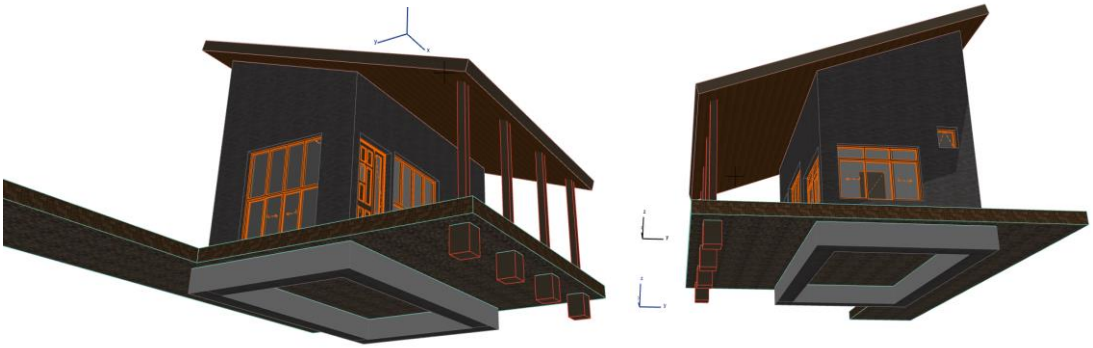


- Activate the **Column Tool** and use the following settings:
    - Column Top: **0. Ground Floor (Home + 1)**
    - Size: **0.50/0.50**
    - Top offset to Top Linked Story: **0.01**
    - Bottom Offset to Home Story: **0.00**
    - Building Material: **Reinforced Concrete – Structural**
    - Classification and Properties: **Load-Bearing Element, Exterior**
    - Click on **OK** to close the settings

- Click on the midpoints of the wooden columns to place the foundations.
- Untick the trace icon to remove the trace reference  so that you can see your drawing as shown below:

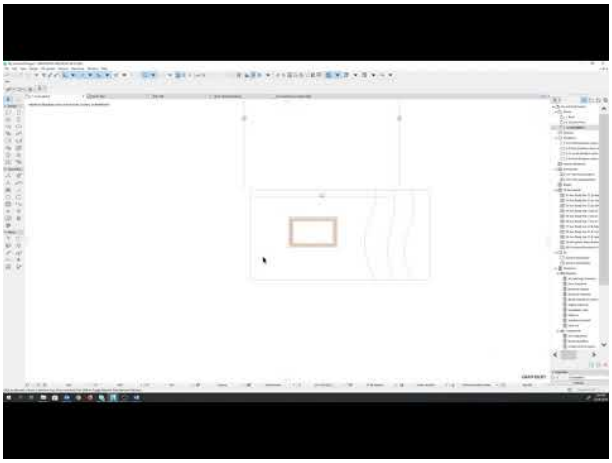


- View your work in **3D**. You are not able to see the Foundation because it is inside the Site Terrain.
- Select the **Site Terrain** and **Right Click> Layers> Hide Layer** to hide the Site.
- It should look like the images below:



- Go to **Documents> Layers> Show All Layers** to revert to the original view with the Site Terrain

Please click on the video below to watch a demonstration



Video 19: Placing foundations

Accessory Elements

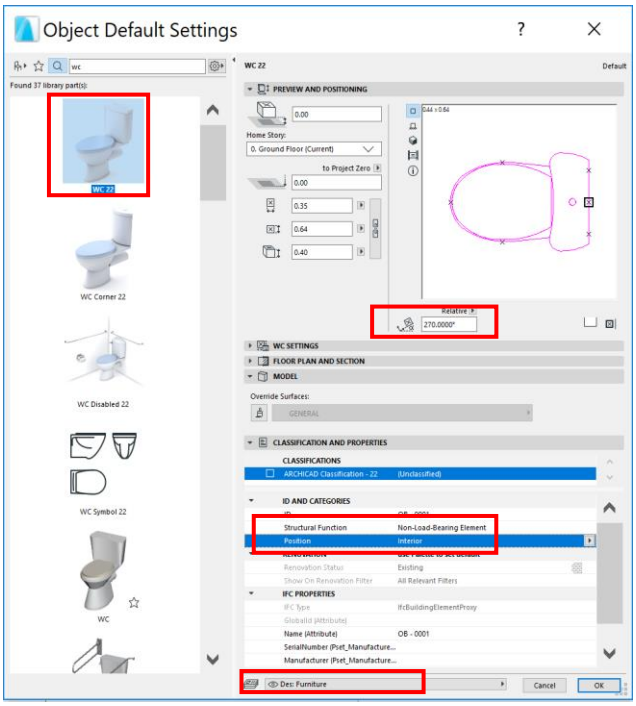
We need to furnish our building with accessories. The accessory elements are contained in the ArchiCAD Library 22. The library includes various furniture accessories like beds, tables and chairs; sanitary fixtures like toilets and washbasin; site elements like trees, cars and human figures; and special building structures like fireplace, ladders and shading

devices. There are various accessory elements (**Objects**) available for use. Check them out later on.

Placing Objects

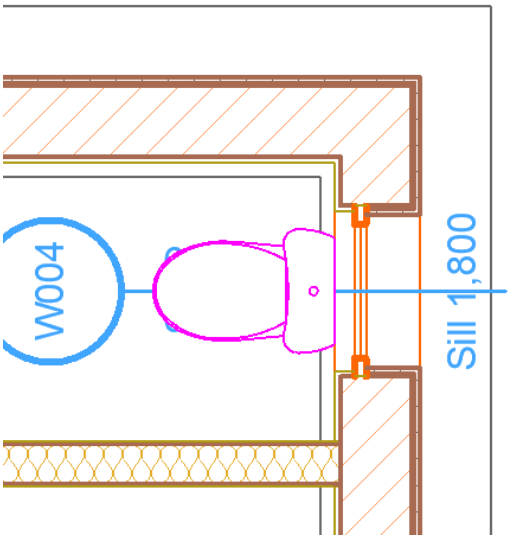
We can now start placing objects in the spaces within the building.

- Navigate to **0. Ground Floor**
- Double Click on **Object Tool**  in the toolbox to open the default settings
- Type **WC** in the search field and select **WC 22** from the search results
- Set the parameters as follows
    - Bottom Offset to Home Story: **0.0**
    - Home story: **0.Ground Floor (Current)**
    - Rotation angle: **270º**
    - Classifications and Properties: **Non-Load-Bearing Element; Interior**
    - Layer: **Des: Furniture**



- Click on **OK**.

Place the **WC 22** in the bathroom area so that it flushes with the internal line of the exterior wall, as shown below:



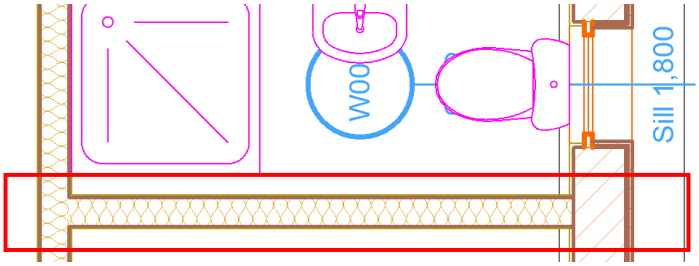
You may want to delete the dimension lines to de-cluster the bathroom

Using the same steps, place the element below in the bathroom:

- **Basin 22**
  - Dimension 1: **0.45**
  - Dimension 2: **0.30**
  - Bottom Offset to Home Story: **0.80**
  - Rotation angle: **0º**
- **Shower Tray 22**
  - Bottom Offset to Home Story: **0.10**
  - Rotation angle: **270º**

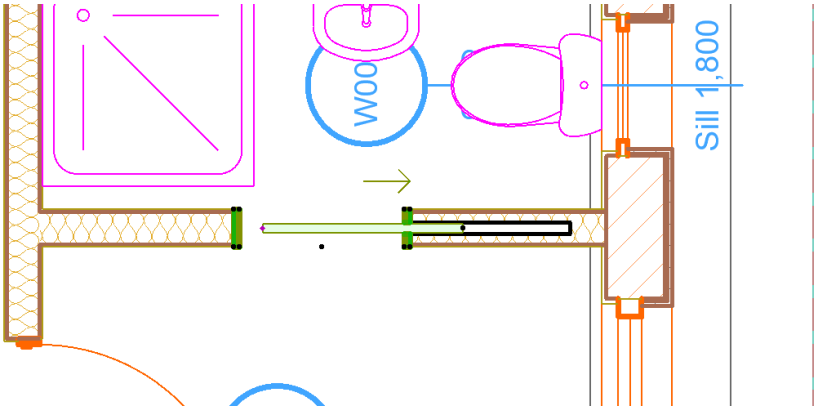
As you may have noticed, the shower tray clashes with the swing angle for the bathroom door. This means that if constructed, the bathroom door (Door 22) opens into the shower tray. To remedy this situation, we will change the type of door. To do this,

- Select the bathroom door and delete it
- Select the 450mm partition wall and delete it. The bathroom will look like this:



- Double click on the door tool to open its settings
- Search for Pocket and select **Pocket Door 22** from the search results
- Change the settings with the following:
    - Door width: **0.75**
    - Anchor point: **Center**
    - Dimension Marker: **No Marker**
- Click **OK**

Place the door on the midpoint of the horizontal wall. The swing position is Right.

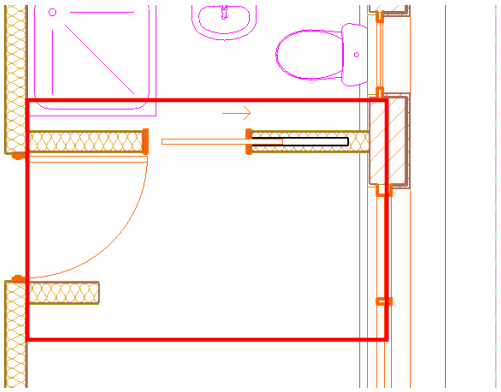


Now we will amend the bedroom door too. To do this:

- Select the Bedroom door and select **Mirror** from the palette
- Click on the **Center node** to mirror the door. This will change the swing of the door leaf towards the bathroom wall.
- Move the door, so that flushes with the bathroom wall

We need a wardrobe for the bedroom. To create one:

- Pick up the parameters of the bedroom wall and draw a new **0.5m** wall starting from the edge of the bedroom door

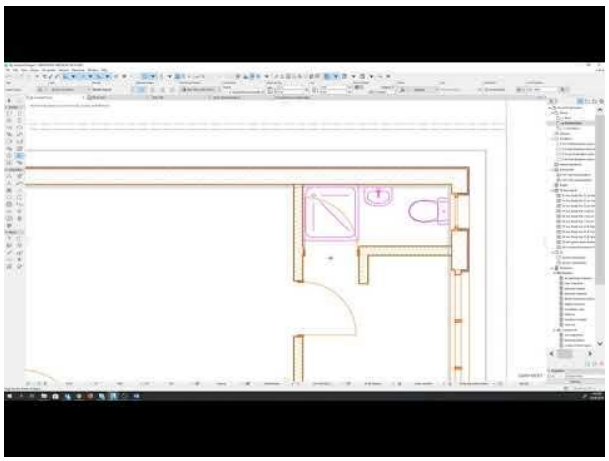


- Do not forget to trim the new wall to the roof in the 3D/All view

Next, we will clean up the drawing screen for the remaining accessories on the building plan. To do this:

- Select each window and door on the plan and change the dimension marker to **No marker** in the Infobox. Also, delete any dimensions on the plan. This will give us a cleaner drawing screen to work on.

Please click on the video below to watch a demonstration



Video 20: Bathroom accessories

Now, we can continue placing the accessories.

Place the following elements in the Bedroom:

- **Bed 22**
    - Bottom Offset to Home Story: **0.00**
    - Rotation angle: **180°**
    - In the preview window, change the anchor point to the **lower right side** of the bed
- **Wardrobe Variable 22**
    - Bottom Offset to Home Story: **0.00**
    - Dimension 1: **1.75**
    - Dimension 2: **0.50**
    - Rotation angle: **90°**
    - In the preview window, change the anchor point to the **lower left side** of the wardrobe
- **Stool 22**
    - Rotation angle: **0°**
    - In the preview window, leave the anchor point at the **center**
    - Place the stool next to the bed
- **Desk 22**
    - Bottom Offset to Home Story: **0.00**
    - Dimension 1: **0.75**
    - Dimension 2: **0.60**
    - Rotation angle: **90°**
    - In the preview window, change the anchor point to the **upper right side** of the desk

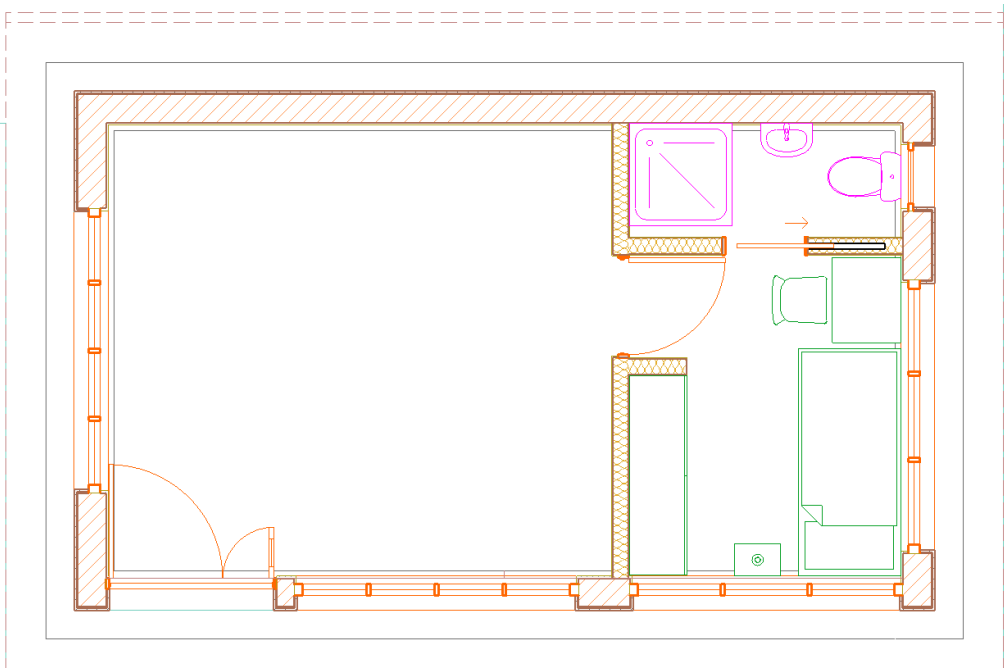
- **Chair 03 22**

    - Bottom Offset to Home Story: **0.00**
    - Rotation angle: **90°**

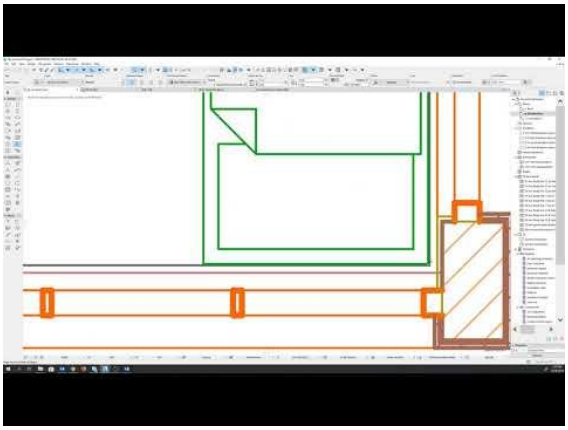
- In the preview window, leave the anchor point at the **lower middle point**

- **Vase 22**
  - Bottom Offset to Home Story: **0.45 (same as the height of the stool)**
  - Place it in the center of Stool 22

- Hit **Esc** to deactivate the Object Tool



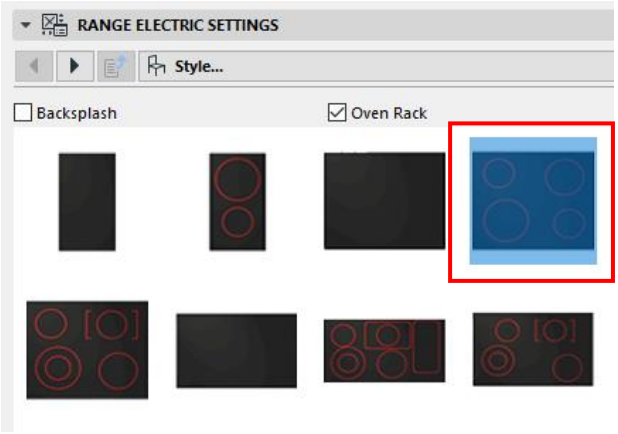
Please click on the video below to watch a demonstration



Video 21: Bedroom accessories

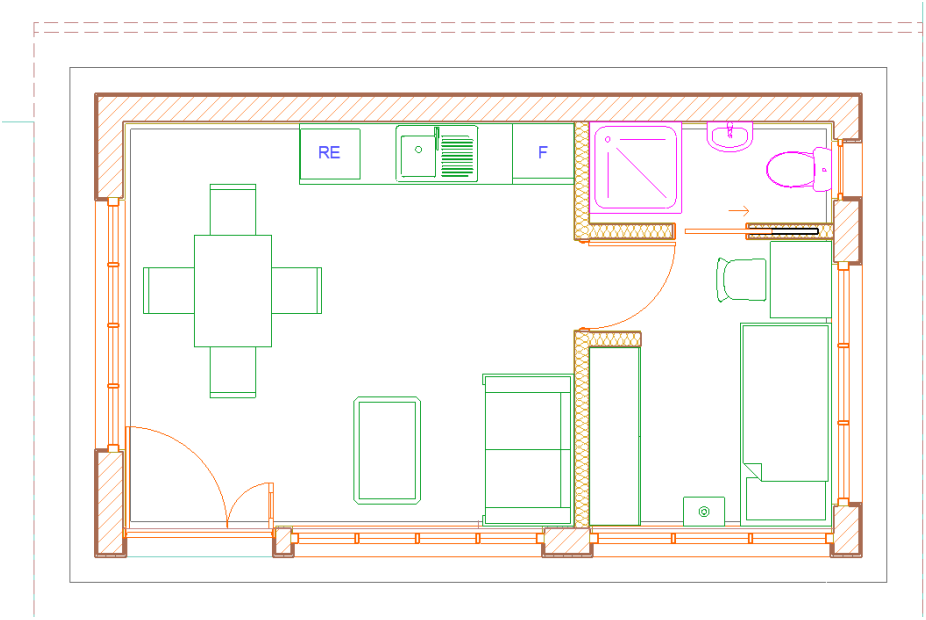
Let us place elements in the Living Area. To place kitchen cabinets, use the following objects:

- **Refrigerator 22**
  - Rotation angle: **0º**
  - Change the Anchor point from Top Center to **Top Right** side in the preview window
  - Click **OK**
  - Place Refrigerator 22 in the corner next to the partition wall and the exterior wall
- **Cabinet Base Triple Door 22.** In its settings, use:
  - Rotation angle: **0º**
  - Change the Anchor point from Top Left to **Top Right side** in the preview window
  - Click **OK**
  - Place the cabinet next to **Refrigerator 22**
- **Range Electric 22**. In its settings,
  - Select **Oven Rack** and Choose the four heating tops (as shown below)

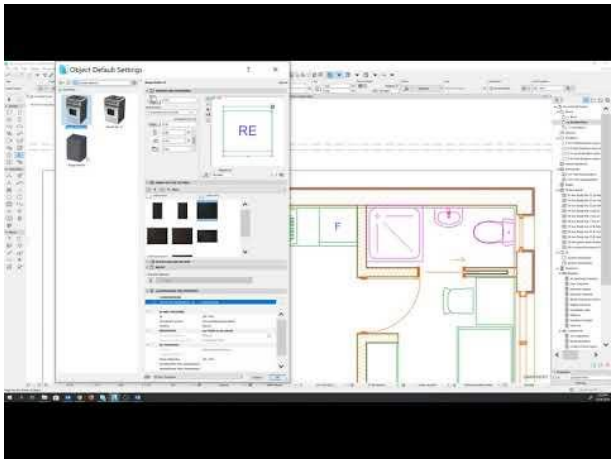


  - Rotation angle**: 180º**
  - Change the Anchor point from Top Center to **Top Right** side in the preview window
  - Click **OK**
  - Place Range Electric 22 next to Cabinet Base Triple 22

- **Dining Table 02 22**
    - Rotation angle: **270°**
    - Change the Anchor point from Top Left to **Center** in the preview window
    - Click **OK**
    - Place the dining in the Living Area as shown in the figure below
- **Chair 10 22**
    - Rotation angle: **0°**
    - Change the Anchor point from Top Left to **Center** in the preview window
    - Click **OK**
    - Place four chairs on each side of the Dining Table.
- **Designer Sofa 02 22**
    - Change the Anchor point from Bottom Left to **Bottom Right** side in the preview window
    - Rotation angle: **270°**
    - Click **OK**
    - Place the sofa in the corner next to the partition wall and the exterior wall as shown in the image below
- **Designer Table 03 22**
    - Rotation angle: **270°**
    - Click **OK**
    - Place the table next to the sofa
- Hit **Esc** to deactivate the Object Tool



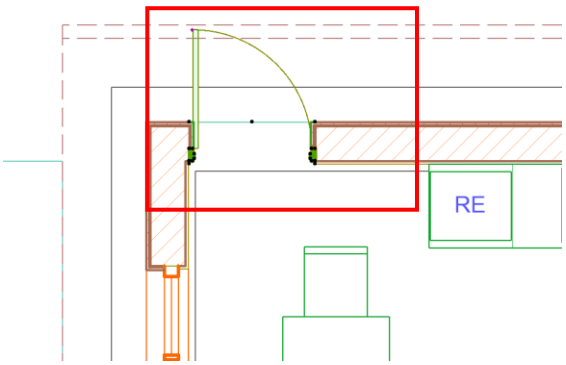
Please click on the video below to watch a demonstration



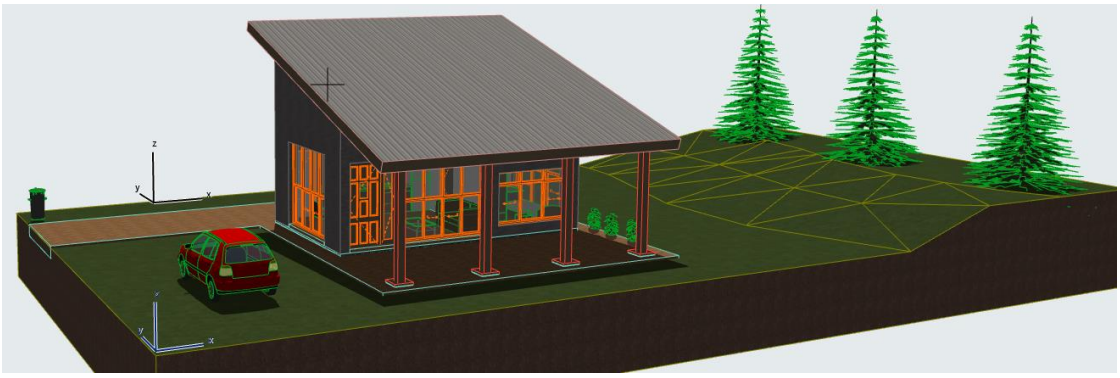
Video 22: Living area accessories

To complete our design, let us add an extra door to the kitchen area:

- Type: **Metal Door**
- Anchor point: **Side 2**
- Door swings outside to the left of the exterior wall

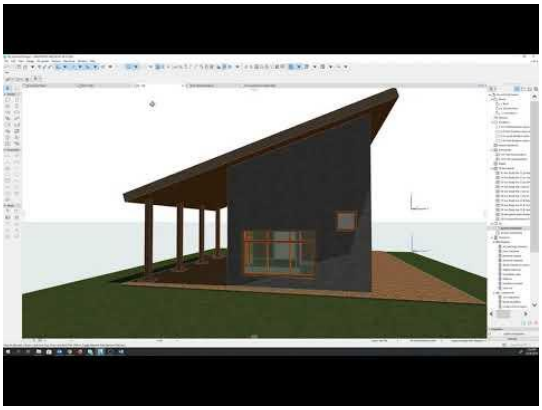


Have some fun adding other site improvement accessories such as cars, trees, people etc. Add at least two different items on the site. View your model from different angles. Use the Orbit icon to do so or press **O** on your keyboard to activate the **Orbit Tool**.



Now our building design is complete. Well done!!

Please click on the video below to watch a demonstration



Video 23: Site Improvement

Exercise 3

1. Are the partition walls load-bearing walls?
    a. Yes
    b. No
2. What type of door was used for the entrance door?
    a. Door 22
    b. Double Door 22
    c. Sliding Door 22
    d. Double Door Asymmetric 22
3. What door leaf type was used for the entrance door?
    a. Style 1
    b. Style 40
    c. Style 20
    d. Style 30
4. Where is the Anchor Point for the internal door to the bedroom?
    a. Side 1
    b. Side 2
    c. Center
    d. Bottom
5. What is the size of the internal doors?
    a. 0.90x1.80
    b. 2.40x1.80
    c. 0.90x2.10
    d. 2.10x2.40
6. What is the size of the living room windows?
    a. 2.50x2.40
    b. 1.80x2.40
    c. 1.50x1.80
    d. 2.50x1.80
7. Where is the Anchor Point for the living room windows?
    a. Side 1
    b. Side 2
    c. Center
    d. Bottom
8. Which tool was used to identify the midpoint of the bedroom exterior walls?
    a. Line Tool
    b. Spline Tool
    c. Guidelines
    d. Copy Tool
9. What are the pane numbers for the roof level windows?
    a. Vertically: 11; Horizontally: 10
    b. Vertically: 10; Horizontally: 1

c. Vertically: 10; Horizontally: 11
d. Vertically: 1; Horizontally: 10

10. What is the layer for the foundations?
    a. Structural- bearing
    b. Site & Landscaping – Terrain
    c. Shell – Roof
    d. Site Mesh - Proposed
11. On which story level was the roof level windows found?
    a. Ground floor
    b. Roof
    c. Foundation
    d. Datum
12. What is the size of the foundation columns?
    a. 0.50x0.50
    b. 0.20x0.20
    c. 0.30x0.30
    d. 0.45x0.45
13. How did we get to the option to hide layers on the drawing screen?
    a. Right click > Layers > Hide layers
    b. Left click > Layers > Hide layers
    c. Options > Building elements > Hide layers
    d. Options > Element attributes > Hide layers
14. What type of door replaced the bathroom door?
    a. Door 22
    b. Double Door 22
    c. Sliding Door 22
    d. Pocket Door 22
15. What is the rotation angle for the WC?
    a. 270^{o}
    b. 180^{o}
    c. 90^{o}
    d. 45^{o}
16. Where is the Anchor point for the Cabinet Base Triple Door 22?
    a. Top left
    b. Top right
    c. Center
    d. Bottom right
17. What type of door was used in the kitchen area?
    a. Timber door 22
    b. Door 22
    c. Metal door 22
    d. Double door 22
18. What tool is used to placed accessories in the building?

a. Object tool
b. Accessories tool
c. Furniture tool
d. Chair tool

19. What are the building material for the foundation walls?
    a. Brick
    b. Concrete -structural
    c. Structural bearing
    d. Reinforced concrete - structural
20. How many accessories were placed inside the building?
    a. 15
    b. 17
    c. 20
    d. 19

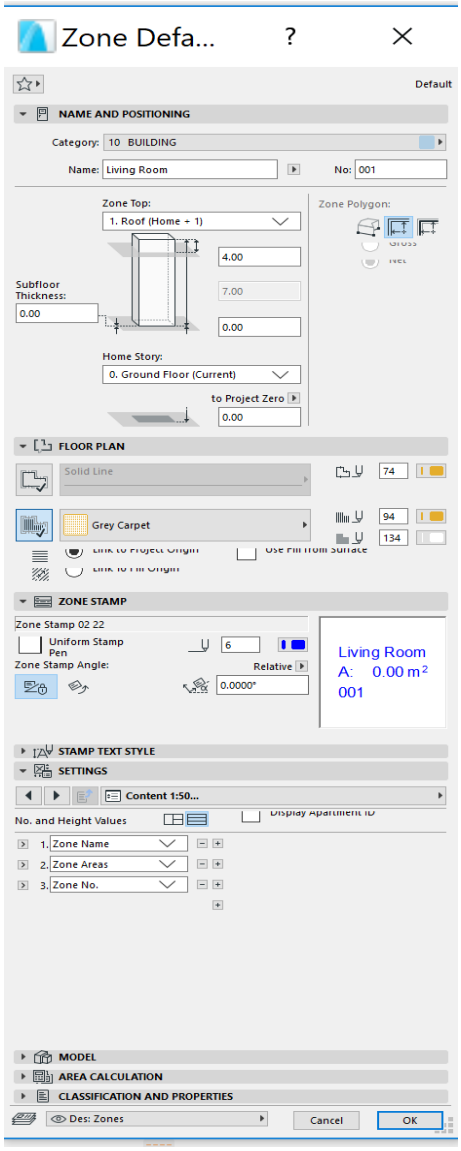
Module 4 - Documentation

Module 4 - Documentation

Learning Outcomes

In the last three modules, you have modelled a complete building. However, in order to present your design to stakeholders, you need to represent them in an orderly and sequential manner to convey the required information about the building. In this module, we will begin the documentation and the final part of a building design. You will learn how to do the following:

- Divide the building into zones
- Produce details of building components
- Take off Quantities/Schedules
- Dimension important elements
- Publish your design

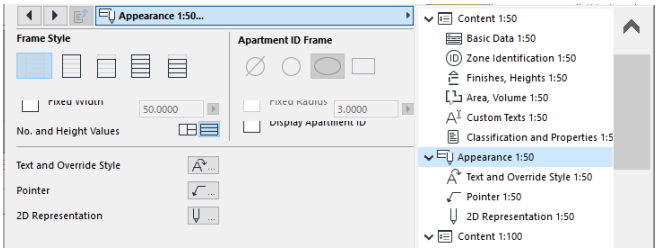


Zones

For easy identification, rooms in a building are often represented in ArchiCAD as Zones. The benefit of this is that we can assign common properties to multiple zones and edit them in bulk if required. Zones are 3D symbols of rooms and can be arranged and defined by Zone Categories.

You will be creating zones for the living room, bedroom and bathroom. To create Zones, do the following:

- Navigate to the **0. Ground Floor**
- Activate the **Zone Tool** and open its settings
- Set the parameters are follows:



- Zone Category: **BUILDING**
- Zone Name: **Living Room**
- Zone Top: **1. Roof (Home+1)**
- Top offset to Top Linked story: **4.00**
- Bottom Elevation to Project Zero: **0.00**
- Geometry Method: **Inner edge**
- Floor Plan
  - Activate **Add/Remove Cover Fill**
  - Select **Carpet** for the cover fill type
- Settings
  - In **Content 1: 50**, delete all options and leave only three (3) for:
    - **Zone Name**
    - **Zone Area**
    - **Zone No.**
  - In Appearance 1: 50, select the first Frame Style
- Layer: **Des: Zones**

- Click on **OK**

- Click anywhere in the living area to identify the zone.
- To place the text, click on the area you want it to be.

Repeat the steps to create zones for the bedroom and bathroom with the following information:

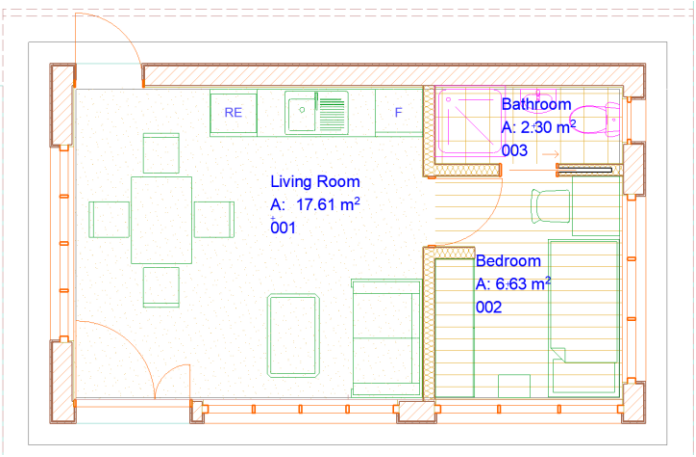
Bedroom:

- Zone Name: **Bedroom**
- Floor Plan:
  - Cover Fill Type: **Plank Floor**

Bathroom:

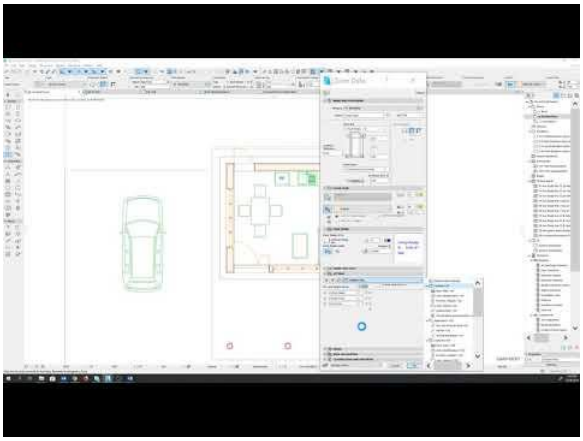
- Zone Name: **Bathroom**
- Floor Plan:
    - Cover Fill Type: **Grid 300x300**

The cover fills for the floor finishes of the zones are not showing. To remedy this, go to **Document> Graphics Overrides**. You will notice that by default, the **"Zones – no fills"** is active. Click on **"Drafting"** to change the settings. The cover fills for the floor finishes will appear.



- Hit **Esc** to deactivate any active Tool

Please click on the video below to watch a demonstration

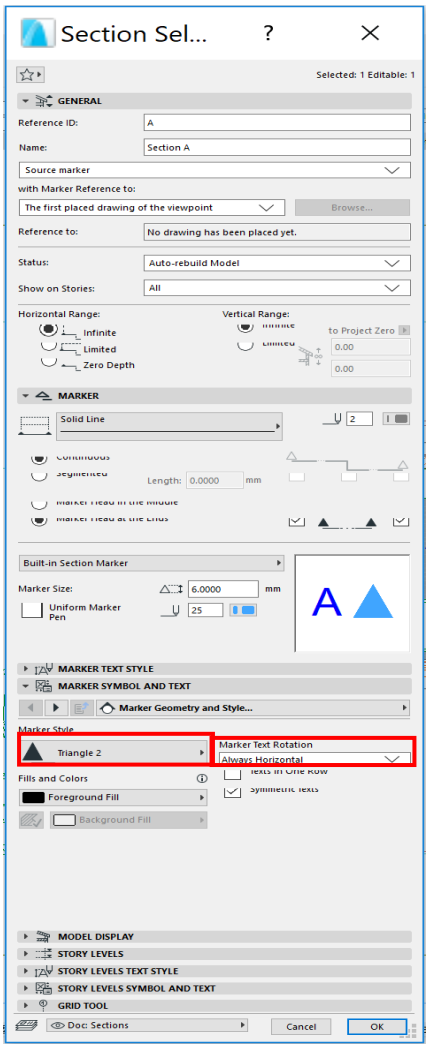


Video 24: Adding Zones

Sections

Sections show the internal view of the building when sliced into two. Depending on which part the designer wants to show, they can be cut horizontally and vertically. For this building, you will be cutting one vertical section. To do this:

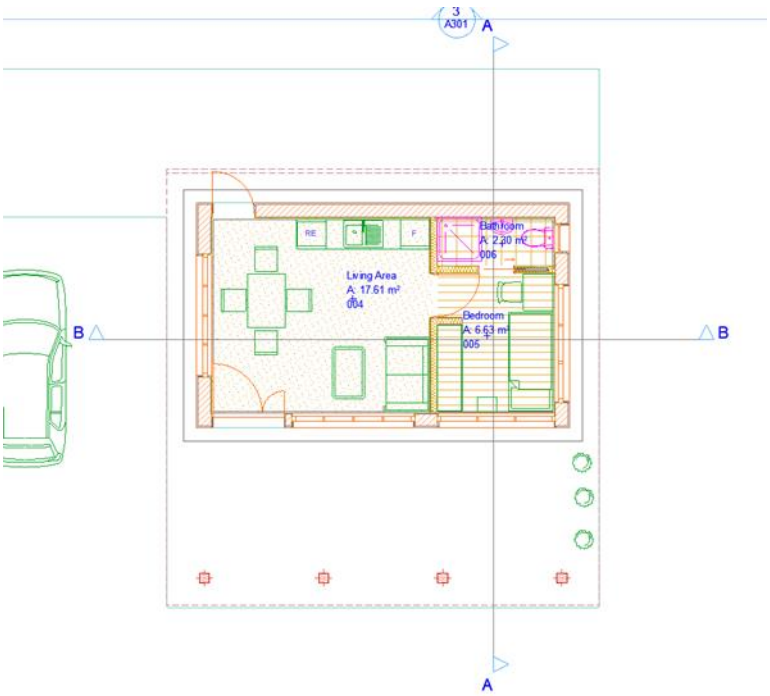
- Navigate to **0. Ground Floor**
- Activate the **Section Tool** on the Toolbox (in the Document section) 
- Place a vertical guideline in **the middle** of the bathroom
- Draw a section along the guideline across the building (an eye cursor appears)
- Click on the **right-hand side** to indicate the view of the building you want to represent.
- Select the section line and open its settings
    - In the Marker Text Style:
        - Change the Text Height to **5.0mm**
    - In the Marker Symbol and Text:
        - Choose **Triangle 2** as the Marker Style
        - Choose **Always Horizontal** as the Marker Text Rotation
    - Click on **OK**



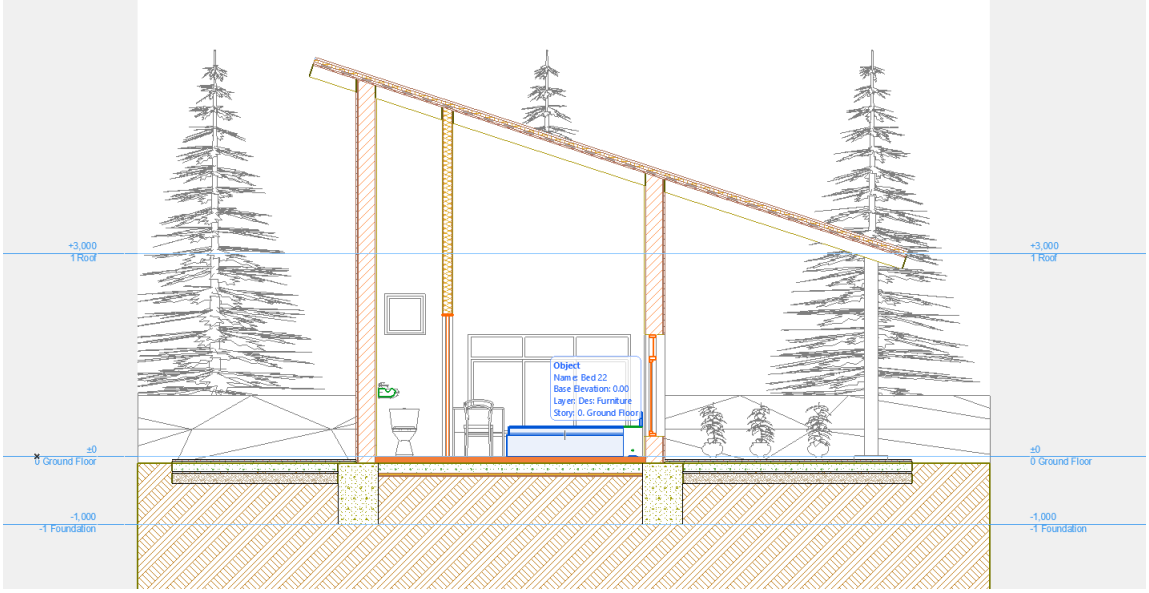
- Click on **Sections** (in the navigator map)

- Using the **Pick-Up parameters**, create a second section horizontally across the building.

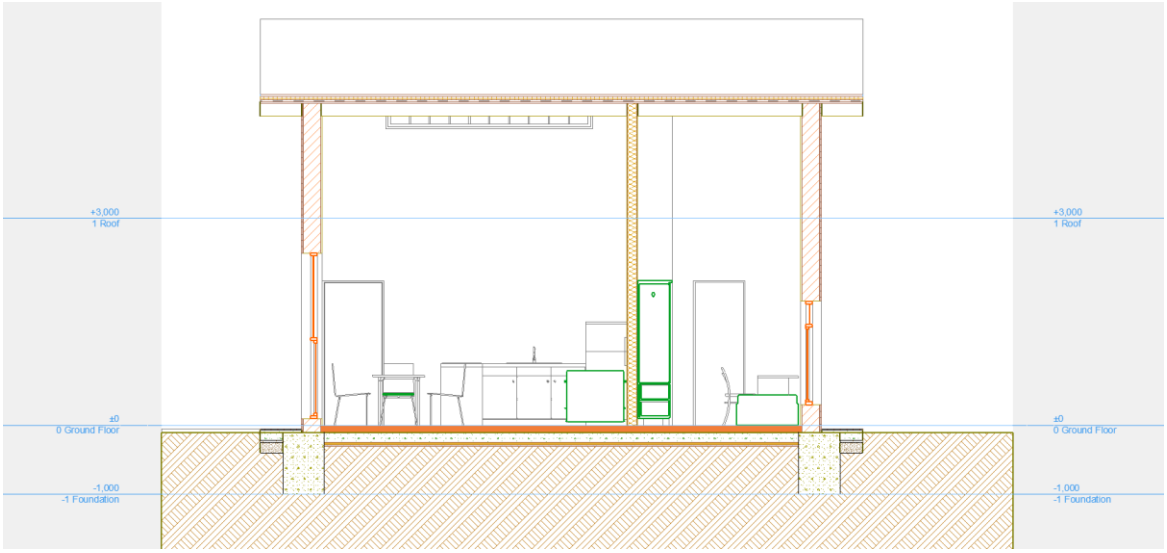
- Select the section line and change the ID and Name to **B Section B** (in the Infobox)



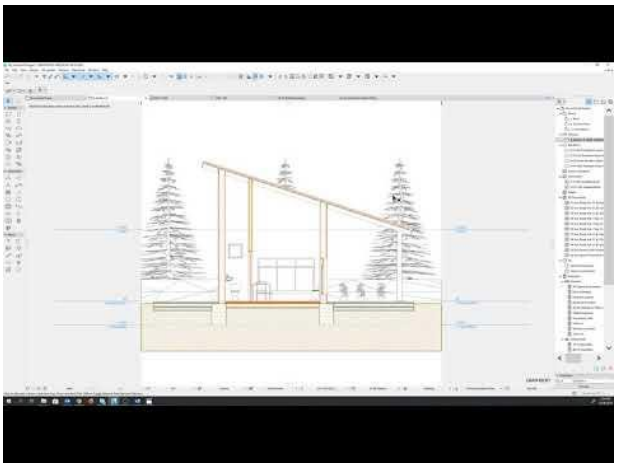
- Double click on A Section A to view the Section you just created



Double click on B Section B to view the Section you just created



Please click on the video below to watch a demonstration

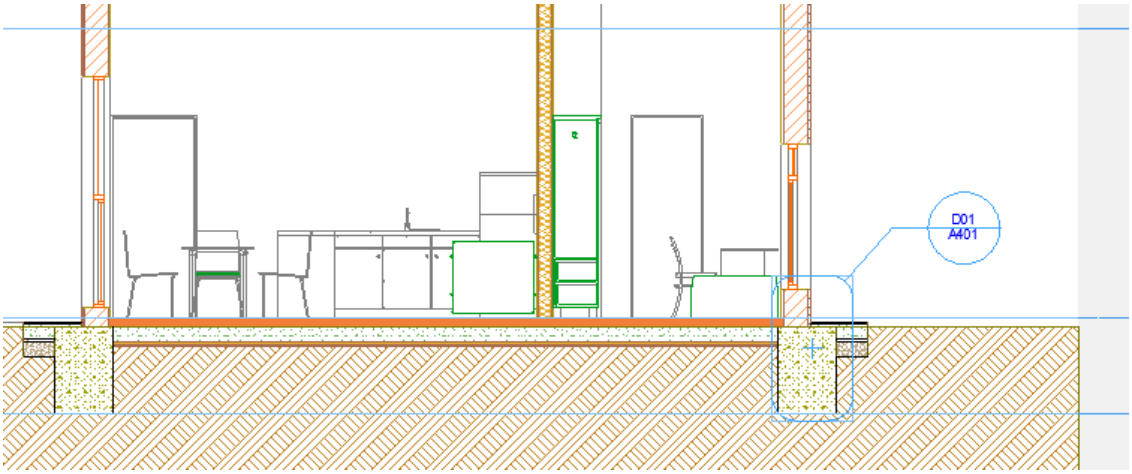


Video 25: Sections

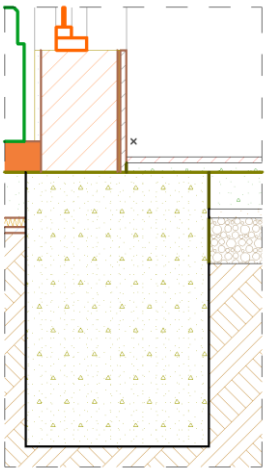
Details

Details are an important part of the documentation. They represent how building components work together in a particular section of the building. They are usually referred to when building are constructed. We will create the detail for a part of the building component.

- Still, on B Section B view, activate the **Detail Tool**  .
- Select the **Rectangular Geometry Method**
- Draw a rectangle around the foundation and wall connection, as shown below.

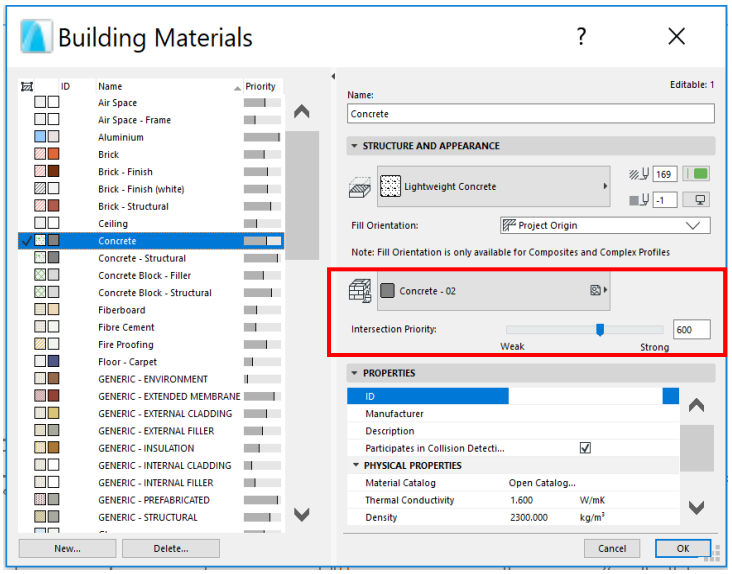


- Click above the top-left corner to place the marker
- Click on **Details** (on the Navigator Map)
- Double click on **D – 01 Detail (Drawing)** to view the detail you just created



If you notice that the connection between the exterior wall and the foundation wall is hidden by the interior floor slab, then we need to correct this. To do so:

- Go to B Section B view and select the **interior floor slab**
- Go to **Option**s > **Element Attributes** > **Building Materials**
- Change the Intersection Priority for **Concrete – 02** to **600**
- Click on **OK**



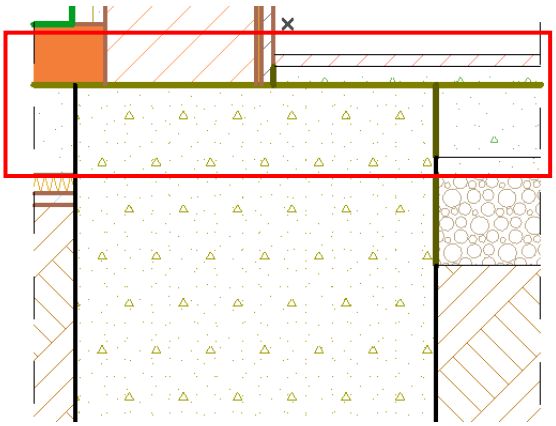
Repeat these steps on the **Exterior Pavement** and change the intersection priority for

Concrete – 02 building material to **600**

The connection between the exterior wall and the foundation wall becomes visible on the section

- Return to **D-01 Detail (Drawing)** view
- Right-click and choose **Rebuild from Source View** from the options

The connection between the exterior wall and the foundation wall becomes visible on the detail as shown below:



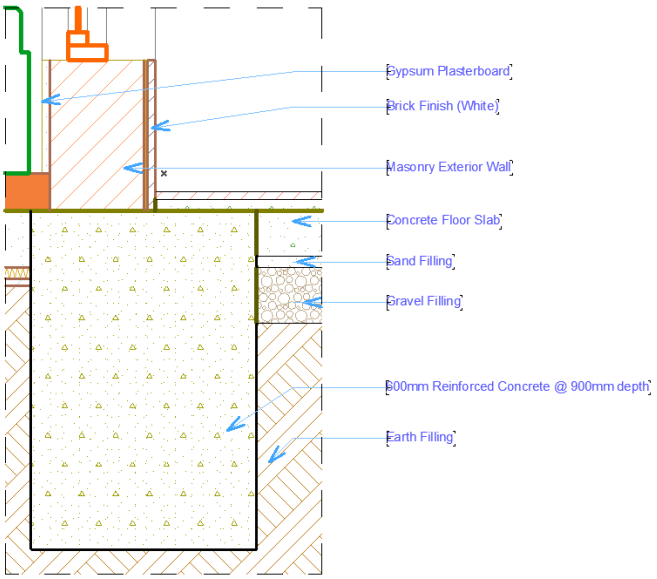
The detail you have produced is incomplete. You need to label the building elements shown. To do this:

- Activate the **Label Tool** on the Toolbox  and open its settings
- Change the Font Size to **1.0mm**
- Change the Arrowhead Size to **1.0mm**
- Change the Pointer Starting Angle to **0.0°**
- Click on **OK**

Now you can start labelling the elements on the detail

- Click on the element you want to label (a Text box appears)
- Type in the description of the element in the box
- Click to place the label

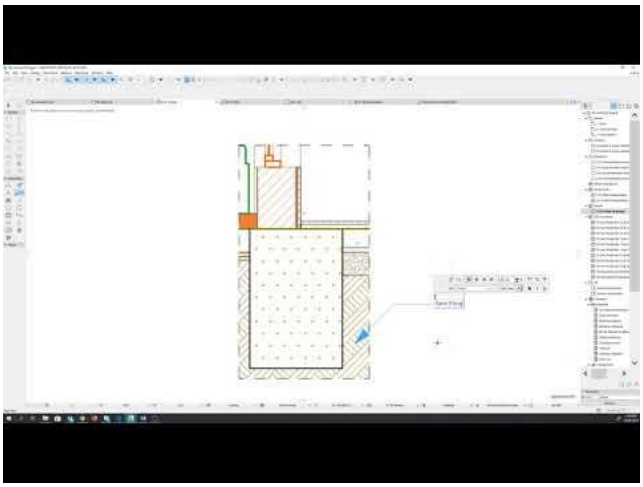
- Click on a node on the label and move it to align with the guideline
- Repeat these steps to label all the elements as shown in the diagram



You can adjust the labels as you wish using the guidelines (the guideline will enable you to place the labels on a straight line). Dispose of the guideline when you are done.

- Hit **Esc** to deactivate any active Tool

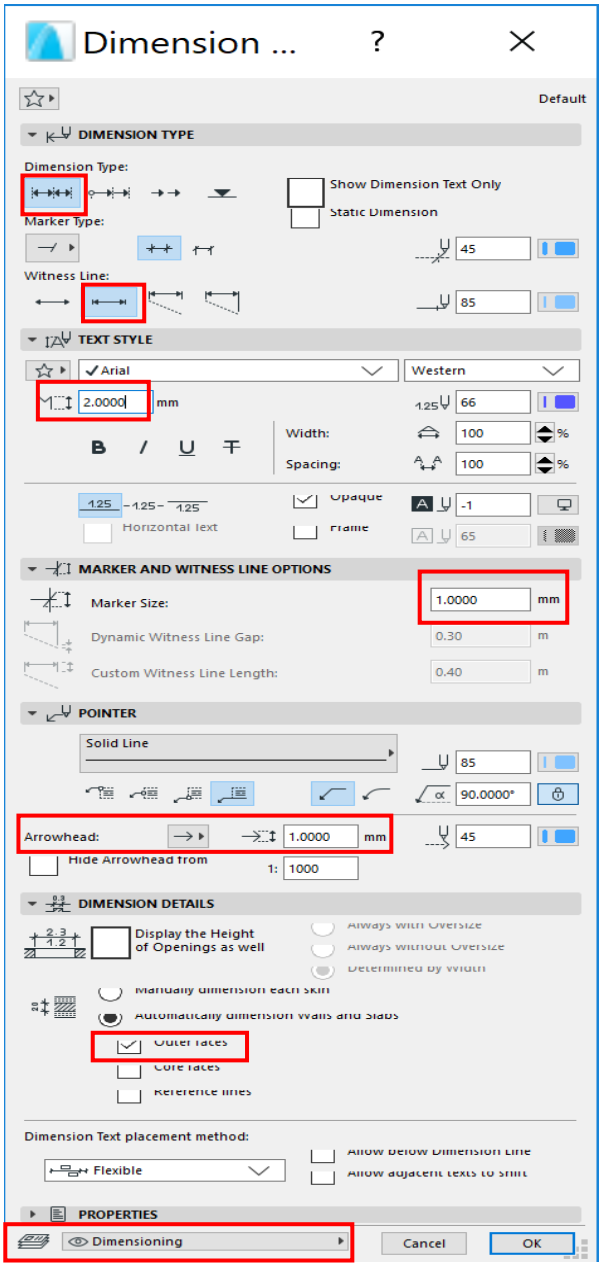
Please click on the video below to watch a demonstration



Video 26: Details and labels

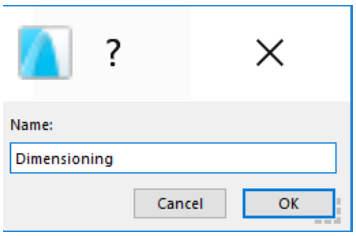
Dimensions

The next step is to put dimensions on the building. Dimensions are an important part of documentation. In ArchiCAD, dimensions can be linked to reference points and chains that will enable any changes made on the design to be updated automatically. This means that if you change the position or geometry of the dimensioned element, the dimension points and chain will update immediately. Dimensions can be created:



1. Automatically or
2. Manually

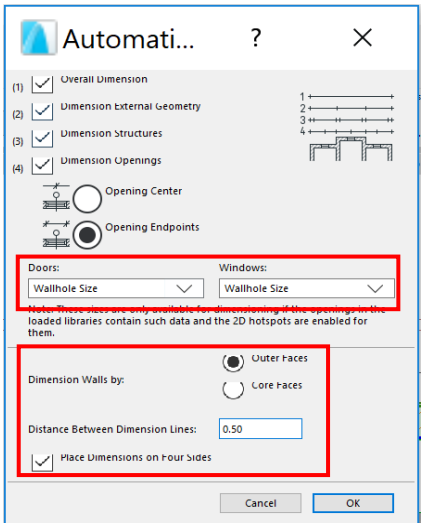
Let us create automatic dimensions for the Floor Plan:



- Create a new layer: **Dimensioning**
- Navigate to **0. Ground Floor**
- Activate the **Wall Tool** and Select all walls (use Ctrl/Cmd+A to do so)

- Hold down on **Shift** and **Click** on the **four foundation walls** around the **exterior walls** to deselect them (we do not want to include the foundation walls in the dimensioning).
- Activate the **Dimension Tool** and open its settings (you can double click on the tool to achieve this)
- Set the parameters as follows:
    - Dimension Type:
        - Dimension Type: **Linear Method**
        - Witness Line: **Sized Height**
        - Font Size: **2.00mm** (you can increase the font size if you wish to make the dimensions visible)
    - Marker and Witness Line
        - Marker Size: **1.00mm**
    - Pointer
        - Arrowhead size: **1.00mm**
    - Dimension Details
        - Under Automatically dimension walls and slabs, Check **Core Faces**
        - Layer: **Dimensioning**
- Click on **OK** to close the settings

Since this is automatic dimensioning, we will use the features provided by ArchiCAD.



- Go to **Document> Annotation> Automatic Dimensioning> Exterior Dimensioning** (If the layer notice comes up, click Show layer to continue)
- Take a look at the available dimensioning settings. Ensure the following options are checked:
    - **Opening Endpoints**

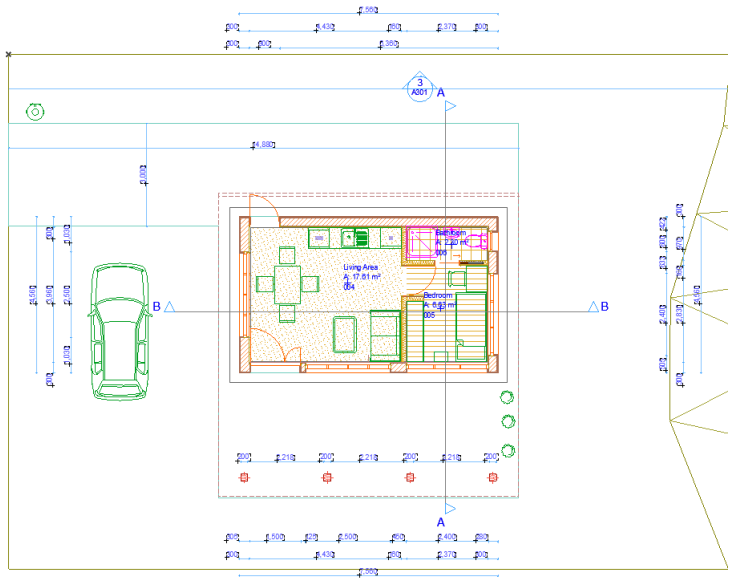
    - **Wallhole Size** for Doors and Windows
    - Dimension Walls by: **Outer Faces**
    - Distance Between Dimension Line: **0.50**
    - Check **Place Dimensions on Four Sides**
- Click on **OK** to close the dialogue box
- Click on the two edges of an exterior wall to define the direction for dimension lines. This can be horizontal or vertical. The cursor changes to a hammer icon.
- Click at a distance away from the building to place the first dimension line. The other two dimension lines will be placed automatically at an equidistance (**0.50m**) from the first.

The dimension lines will be placed on all 4 sides of the building automatically, based on the center of the selected building.

Delete the last row of dimension lines on each four sides (they are duplicates; so, we do not need them). Now we have only 3 rows of dimension lines.

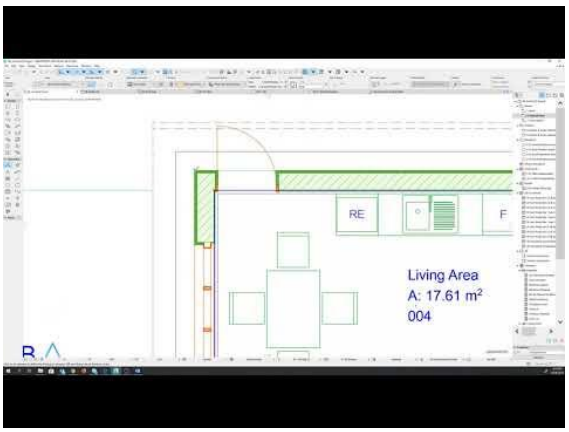
We will use Manual Dimensioning for the Columns and Exterior Slab. To do this:

- Activate the **Dimension Tool**
- Zoom into the drawing so that you can see the columns clearer
- Click on **both edges** of each column
- Double click to indicate placing the dimension lines
- Click on a space to place the dimension line above the columns
- Dimension the exterior pavement behind the building as shown below:



In case you click on a point you had not intended to accidentally and do not wish to include that point into the dimension chain, simply click on that same point again, the marker will disappear.

Please click on the video below to watch a demonstration



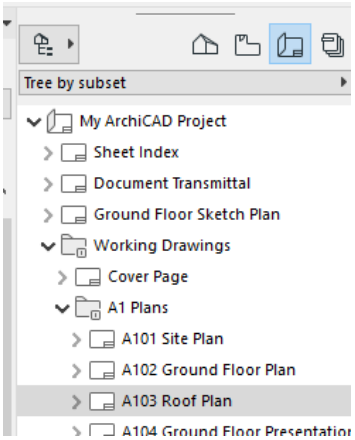
Video 27: Dimensioning

Schedules

Schedules provide the characteristics of the elements used to construct a building such as the dimensions, orientation and building materials. In ArchiCAD, schedules are predefined using the elements you have used to design the building. It provides intelligent, two-way communication medium between the schedules and the design project to ensure that even last-minute changes will be accurately and consistently reflected in the model and layouts.

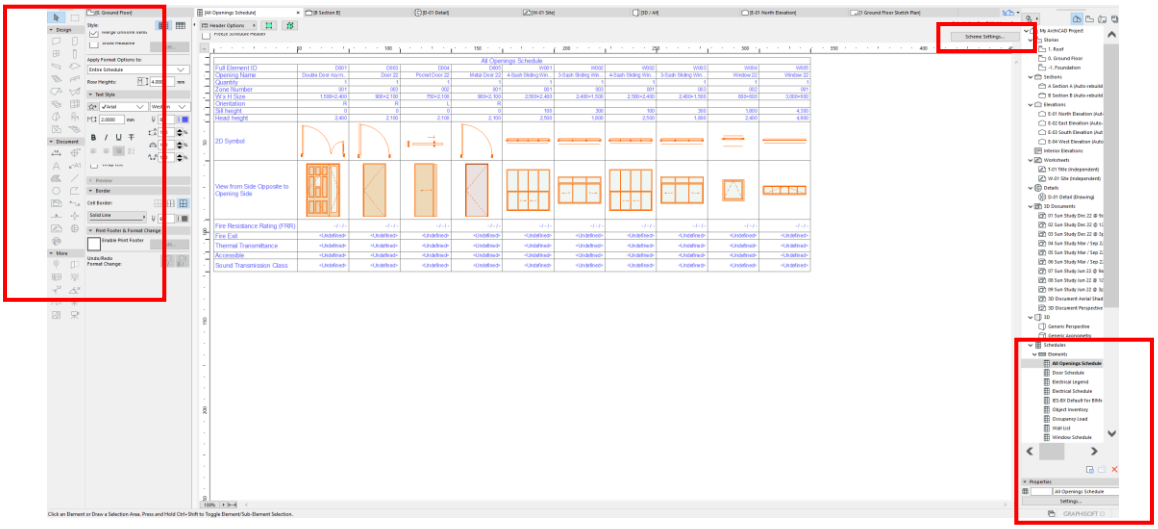
To view the schedules, predefine by ArchiCAD,

- Navigate to **0. Ground Floor**
- On the Project Map, go to **Schedules> Element> All Openings Schedule**
- Double Click to open the page. You will see all the windows and doors you have used on the building. Take a look at the features displayed (Full Element ID, Opening Name, Quantity, etc.) for each element.



This information is essential for the Quantity Surveyor and Construction Manager and is useful when elements are to be procured for construction work.

- On the left-hand side, formatting options are available to edit the arrangement of the fields to your preference.
- On the right-hand side, is the displayed Schedules



NB: You can customise the schedule to suit your preference using the Scheme settings. Any changes you make on the Schedule is automatically updated on the model and vice versa.

You can view the Schedule of other elements used for the building design. For instance, the Bill of Quantities provides the features for all the walls, slabs, roof and columns used for this building.

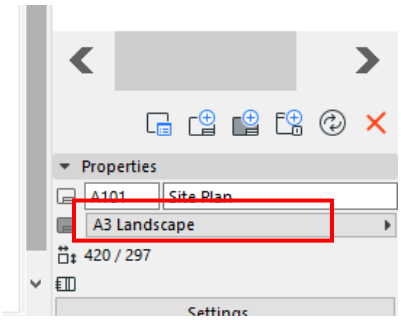
Placing Views on Layout

In the design process, you have to communicate your ideas with the other stakeholders in the project, like the owner, engineers and constructors. All of these usually need different formats that are suited to their applications. ARCHICAD provides users with efficient and fine-tuned publishing procedures.

We will start by creating the layout book where we will place the drawings we want to share. To do so;

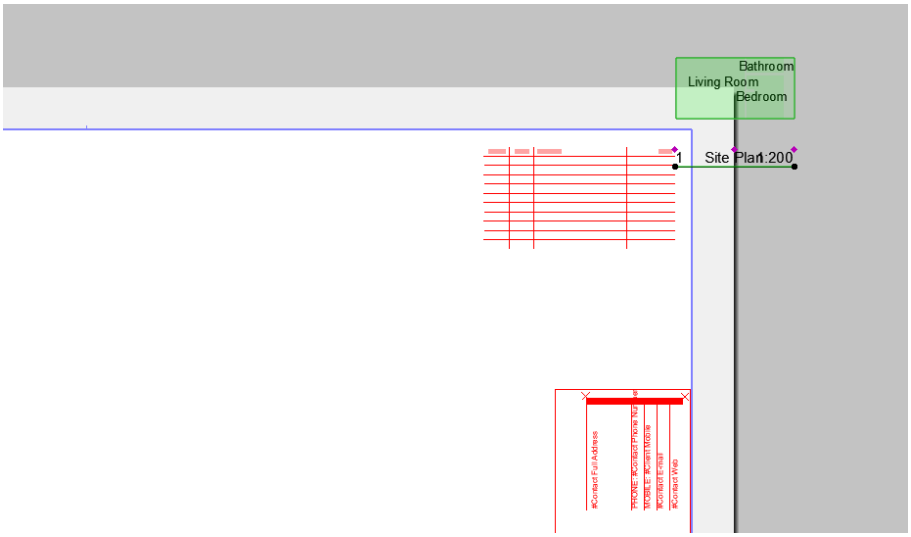
- Click on the **Layout Book** icon of the Navigator 

- Move the **Roof Plan** to the position under the Ground Floor Plan to make it A103 Roof Plan
- Click on **A101 Site Plan**
- Change the Master Layout from A1 Landscape to **A3 Landscape** in the Properties tab
- Click on **A102 Ground Floor Plan** and change the master layout to **A3 Landscape**



We will now start placing the drawings on the layouts we have prepared. We will start with the Site Plan.

- Double Click on **A101 Site Plan** Layout (you should see an empty layout waiting for a drawing to be placed on it)
- Delete the drawing (a box) that is shown on the layout

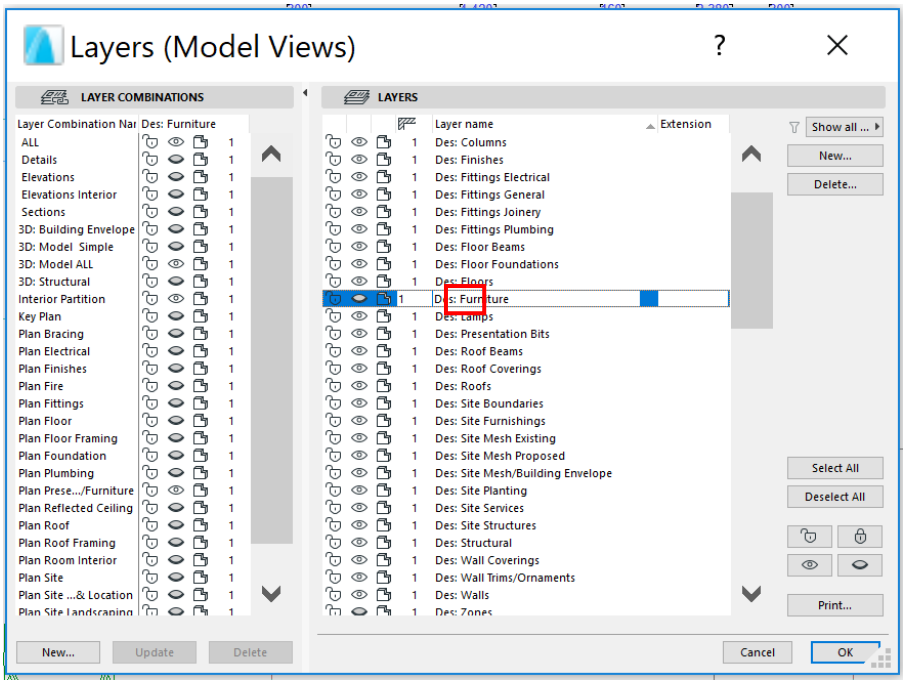


- Click on the **Project Map**
- Double Click on **0. Ground Floor** to show the building on the site

We do not want everything on the Ground Floor plan to be on the Site plan, so we will hide some of the objects. To do so:

- Go to **Documents> Layers> Layer (Model Views)** and hide the following layers:
    - Des: Furniture

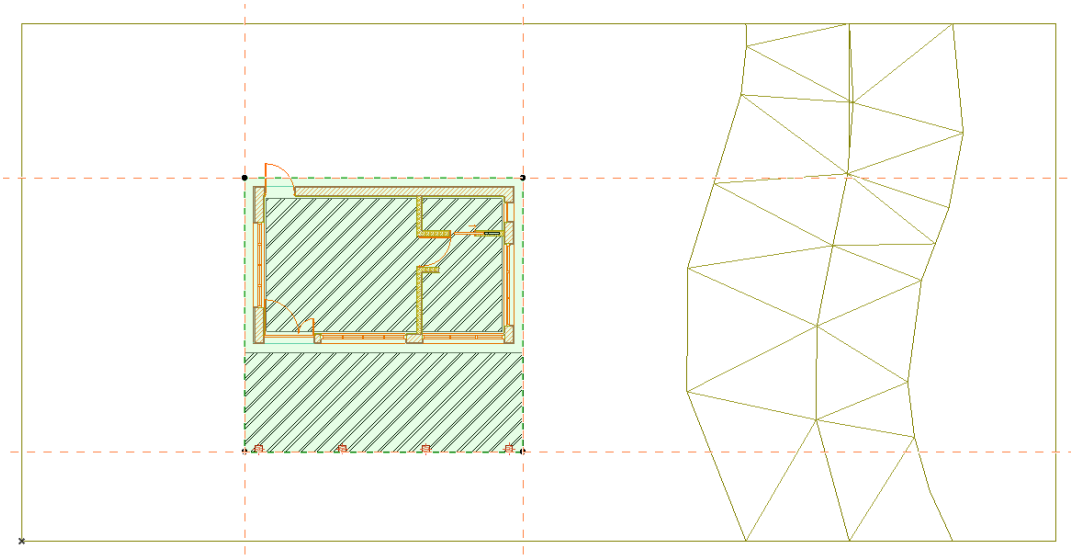
- Des: Zones
- Dimensioning
- Doc: Elevation
- Doc: Sections
- Shell- Roof
- Site & Landscape Terrain



- Click on **OK** to close the settings

All the layers disappear except the columns and walls

- Select the **Fill Tool**  from the Tool Box (Documents)
- Opening it's setting and Set the parameters as follows:
  - Fill Category: **Double 1:4**
  - Fill Foreground Pen: **1**
- Click on **OK** to close the settings
- Place **four guidelines** along the corners of the building and column to envelope them
- Draw a fill over the building and column as shown below



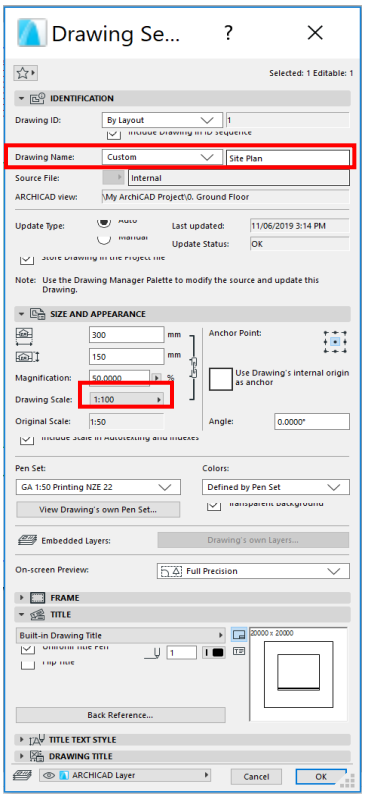
- Right-click on an empty space in view and select **Save View and Place on Layout** (make sure you can see the entire site)

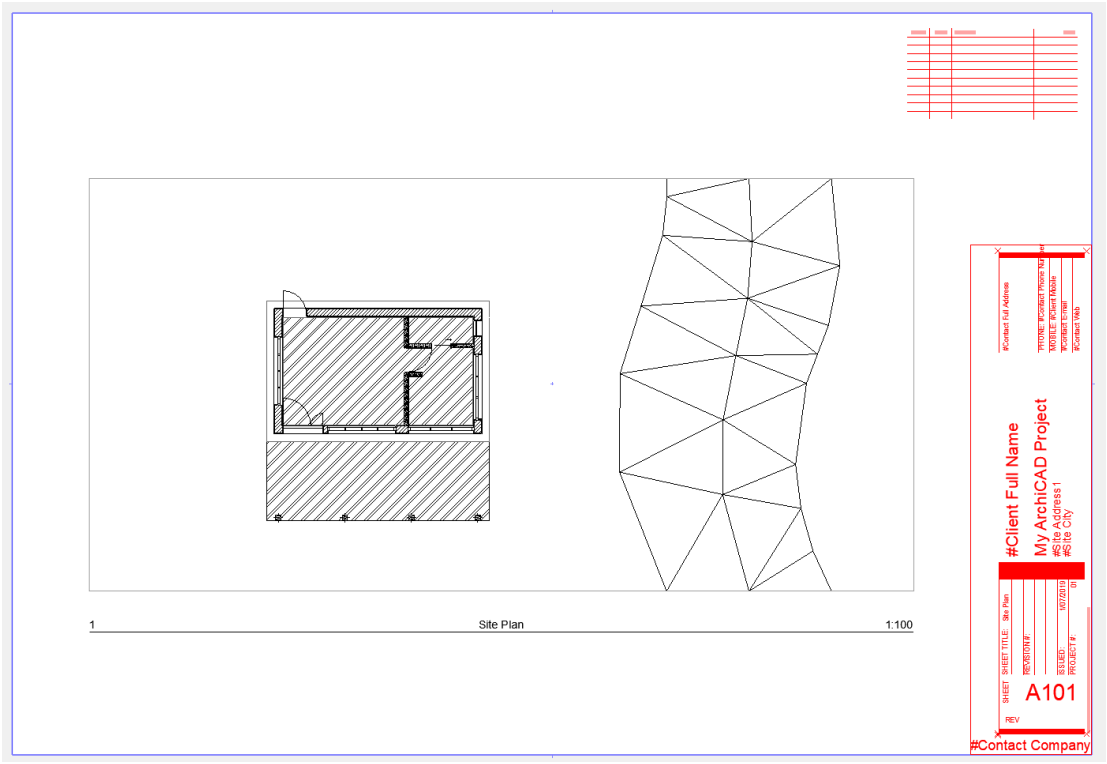
This takes us to the layout view A101 Site Plan

- Place the drawing on the **hotspot** at the center of the Site plan layout

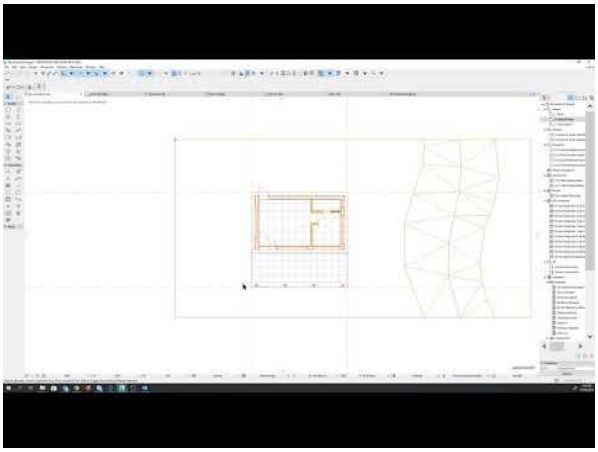
The drawing is too big. Let us adjust it to fir into the layout. To do this:

- Zoom out and select the drawing
- Open the setting of the Drawing and set the parameters as follows:
    - Drawing Name: **Custom: Site Plan**
    - Drawing Scale: **1:100 (under Size and Appearance)**
- Click on **OK**
- Move the drawing and place it correctly on the layout as shown below





Please click on the video below to watch a demonstration



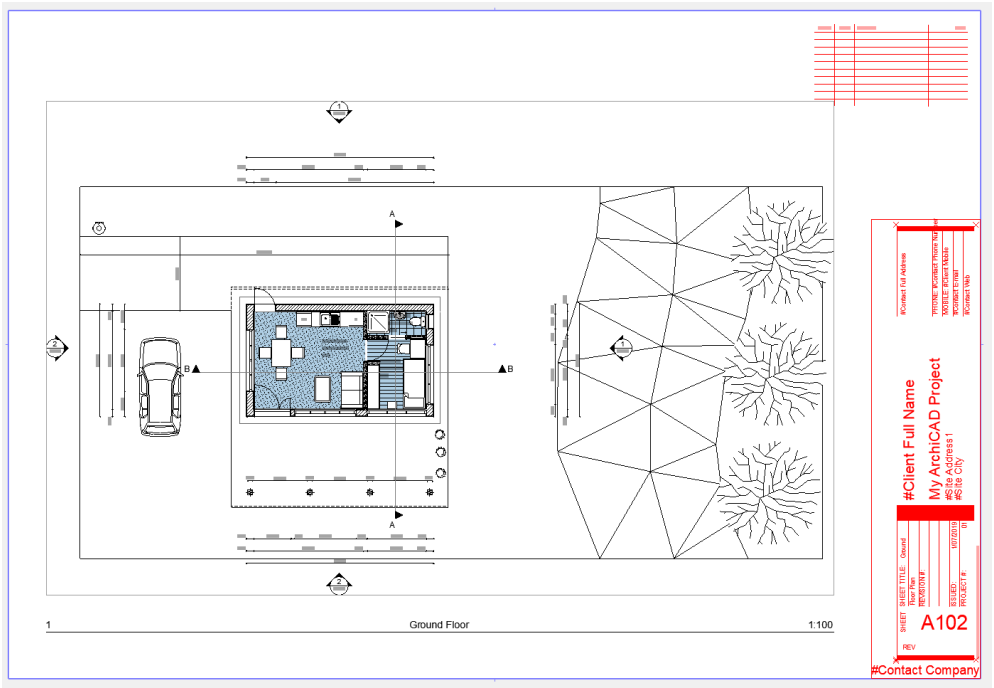
Video 28: Placing site plan on layout

The next is the **Ground Floor Plan**

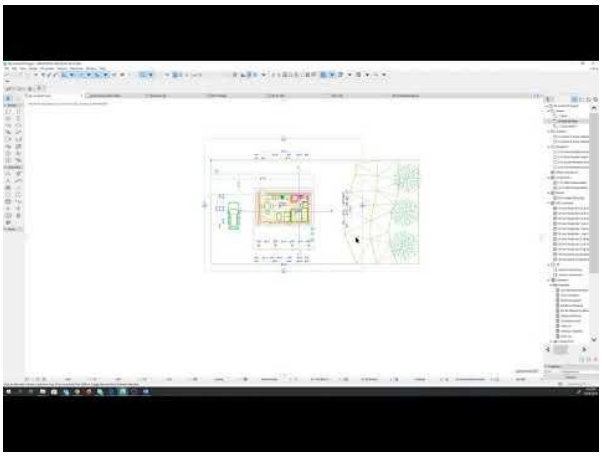
- Still on the **Layout Book** tab, Double Click on **A102 Ground Floor Plan** to show the layout
- Delete the drawing that is on the layout
- Navigate to **0. Ground Floor** on the **Project Map**
- Select and Hide the Fill on the Floor Plan, and dispose of the guidelines
- Go to **Documents> Layers> Show All layers** to show all the layers we hid
- Adjust the four **Elevation lines** so that they touch each other
- **Right-click** on an empty space in view and select Save View and Place on layout (make sure you can see the entire site)
- Place the drawing on the hotspot at the center of the Ground floor Plan layout

To modify the drawing:

- Zoom out and select the drawing
- Adjust the nodes so that the entire site is shown
- Open the setting of the Drawing and set the parameters as follows:
    - Drawing Name: **Custom: Floor Plan**
    - Drawing Scale: **1:100**
- Click on **OK**
- Click on any edge of the drawing to bring up the pet palette
- Select the **Offset Edge Tool** and adjust the drawing only show the floor plan
- Move the drawing and place it correctly on the layout as shown below



Please click on the video below to watch a demonstration

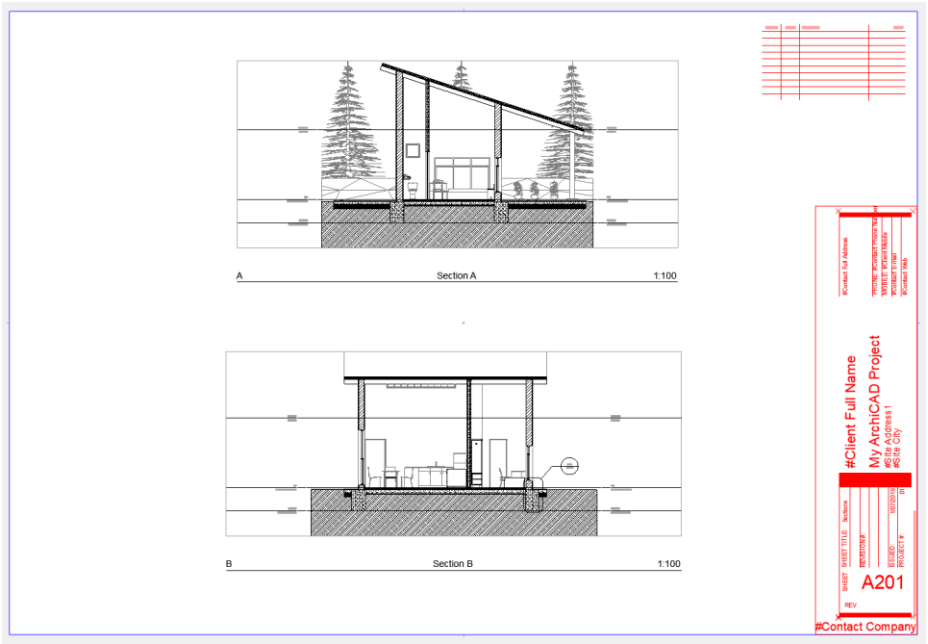


Video 29: Placing floor plan on layout

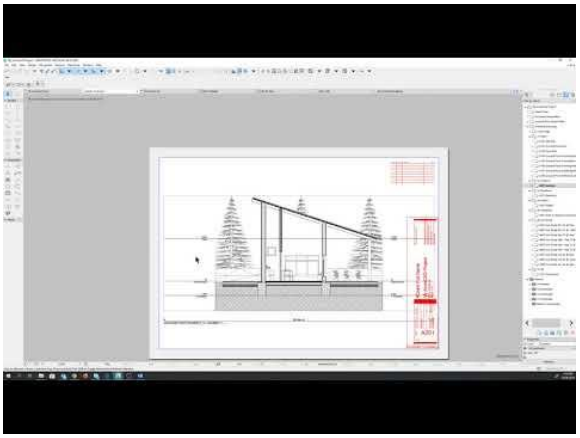
The next is the **Section**

- Still on the **Layout Book** tab, Double Click on **A201 Sections** to show the layout
- Delete the drawing that is on the layout (if any) and change the Layout size to **A3 Landscape**

- Navigate to **A Section A** on the **Project Map**
- Right-click on an empty space in view and select **Save View and Place on Layout** (make sure you can see the entire site)
- Place the drawing on the Section layout
- Repeat the same step and place **B Section B** on the Section layout
- Check that it looks like the image below



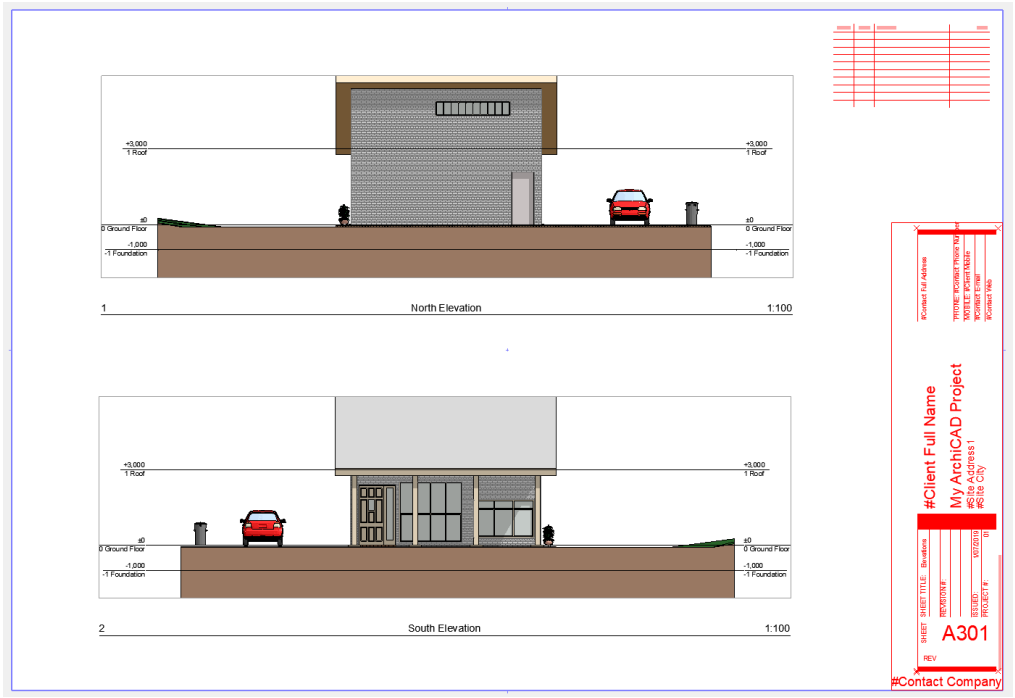
Please click on the video below to watch a demonstration



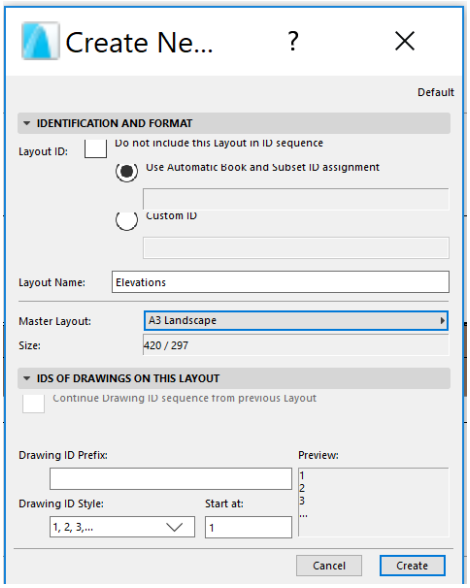
Video 30: Placing sections on layout

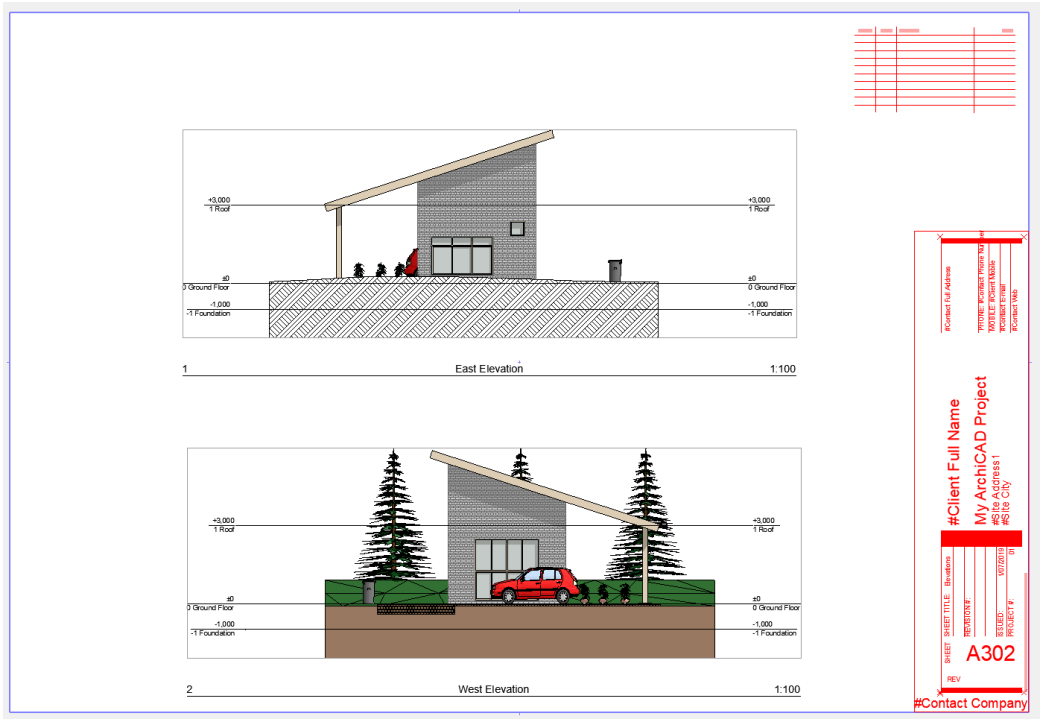
The next is the **Elevations**

- Still on the **Layout Book** tab, Double Click on **A301 Elevations** to show the layout
- Delete the four drawings that are on the layout
- Navigate to **E-01 North Elevation** on the **Project Map**
- Right-click on an empty space in view and select **Save View and Place on Layout** (make sure you can see the entire site)
- Place the drawing on the Elevation layout
- Change the scale to **1:50** (if it is in 1:100) on the Infobox
- Follow the same steps for **E-03 South Elevation**
- Check that it looks like the image below

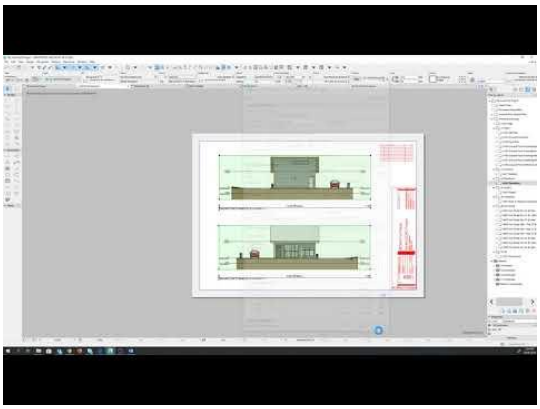


- Right-click on A3 Elevations Layout Subset and choose New layout
- Set the parameters as follows:
    - Layout Name: **Elevations**
    - Master Layout: **A3 Landscape**
- Click on **Create**
- Navigate to **E-02 East Elevation**
- Right-click on an empty space in view and select **Save View and Place on layout** (make sure you can see the entire site)
- Place the drawing on the Elevation layout
- Follow the same steps for **E-04 West Elevation**
- Check that it looks like the image below





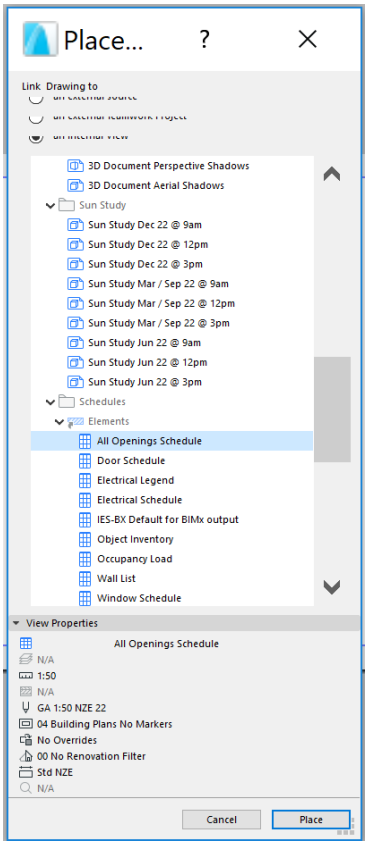
Please click on the video below to watch a demonstration

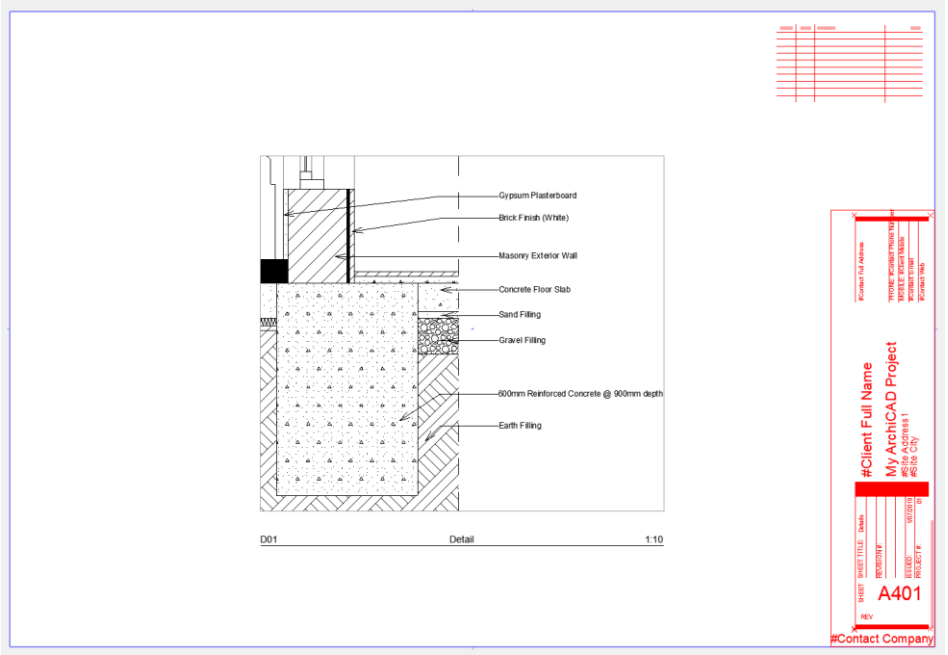


Video 31: Placing elevations on layout

The next is the **Detail**

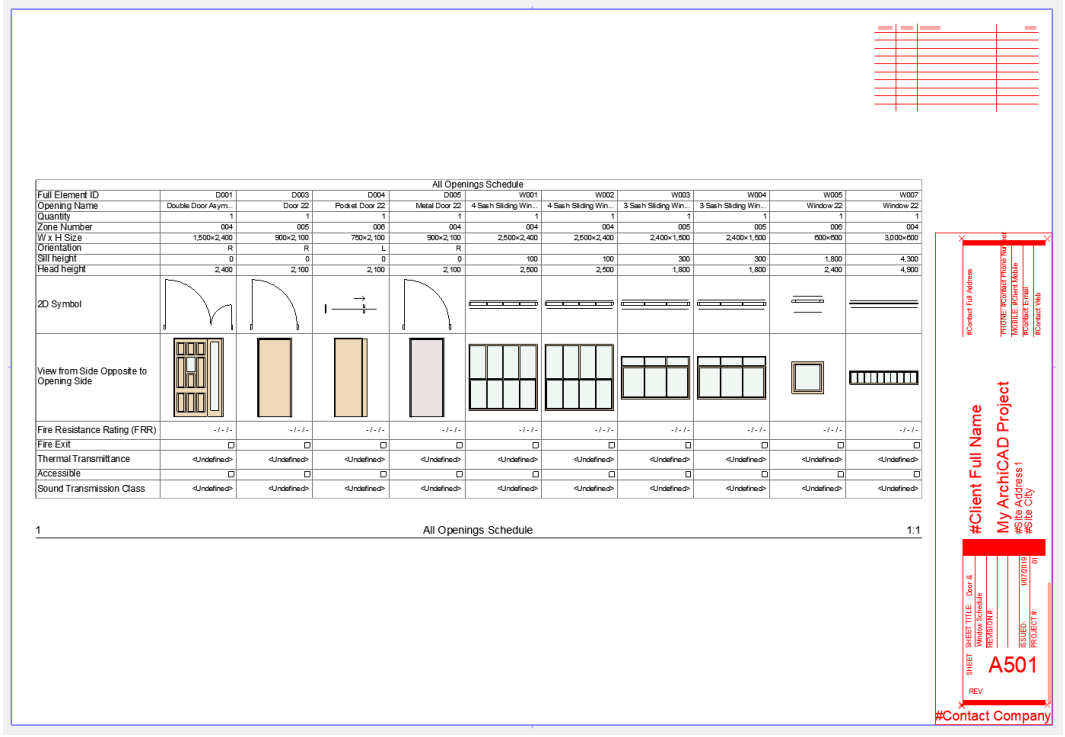
- Still, on the **Layout Book** tab, Double-click on **A401 Detail** to show the layout
- Delete the drawing that is on the layout (if any)
- Navigate to **Detail Drawing** on the **Project Map**
- Right-click on an empty space in view and select **Save View and Place on Layout** (make sure you can see the entire site)
- Place the drawing on the hotspot at the center of the Section layout
- Select the drawing and change the settings as follows in the Infobox:
    - Drawing Scale: **1:10**
- Click on **OK** to close the settings



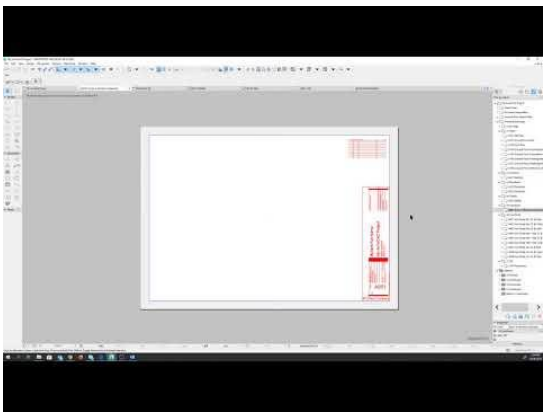


The next is the **Schedule**

- Right-click on A**5 Schedules** Layout Subset and choose **New layout**
- Set the parameters as follows:
    - Layout Name: **Schedules**
    - Master Layout: **A3 Landscape**
- Click on **Create**
- Right-click on the new layout -**A501 Schedules** and select **Place Drawing**
- Scroll down and select All Openings Schedule and click on Place
- Move the drawing to place it appropriately on the layout



Please click on the video below to watch a demonstration

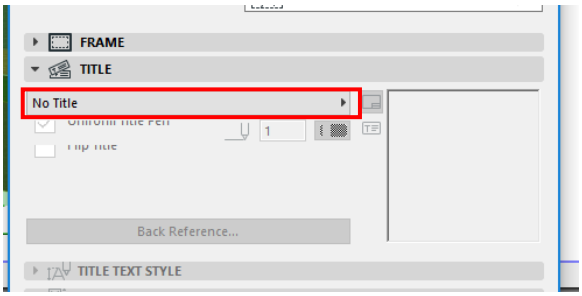


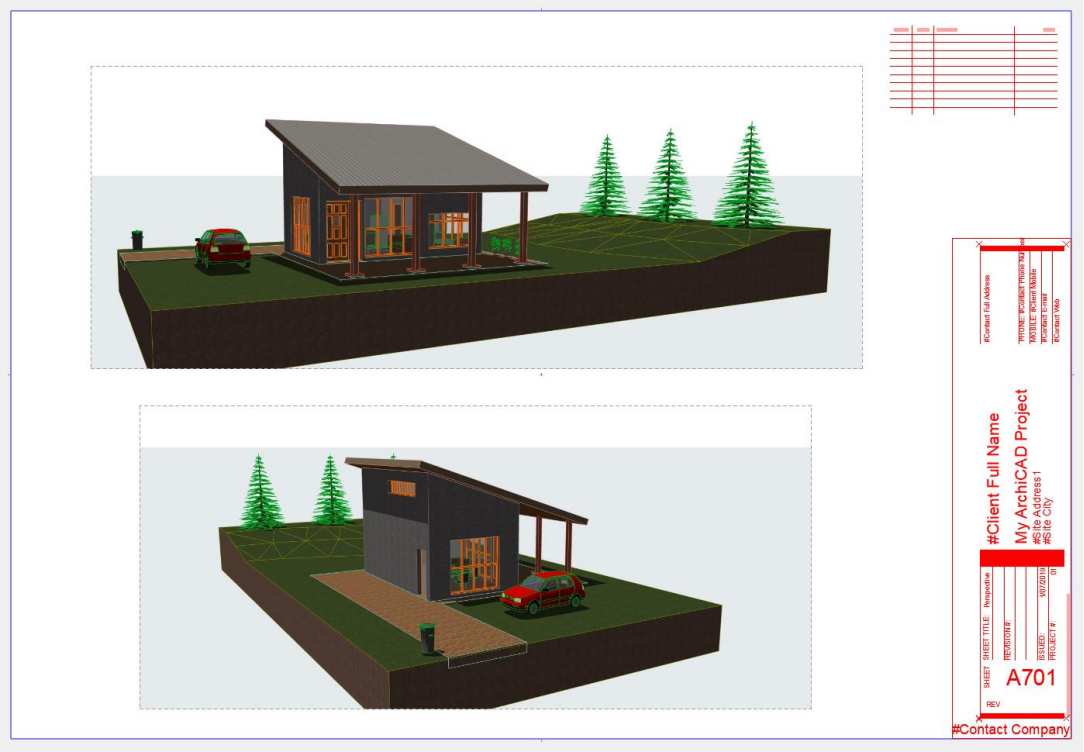
Video 32: Placing details and schedules on layout

The next is a **3D Perspective** of the building

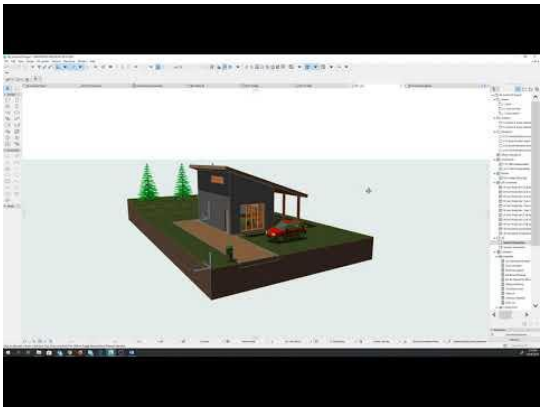
- Still on the **Layout Book** tab, Double Click on **A701 Perspective** to show the layout

- Delete the drawing that is on the layout (if any) and change the master layout to **A3 Landscape**
- Navigate to **Generic Perspective** on the **Project Map**
- Using the **Orbit Tool**, orbit the building to a desired view
- Right-click on an empty space in view and select **Save View and Place on Layout** (make sure you can see the entire site)
- Place the drawing on the hotspot at the center of the Section layout
- Click on an edge of the drawing to bring up the pet palette
- Select the **Offset Edge Tool** and adjust the drawing so that it fits on the drawing space
- Move the drawing and place it correctly on the layout
- Place a **second perspective** of the building's back view on the layout
- Select both drawings and **open the settings**
    - Under the Title Tab, choose **No Title**
- Click on **OK**





Please click on the video below to watch a demonstration



Video 33: Placing perspective views on layout

Master Layout settings

As you may have noticed, the master layout we have been using is A3 Landscape. By default, there are pre-set titles on the Layout, but we can change or create new ones as required.

To do so;

- Still on the **Layout Book** tab, Double Click on **A3 Landscape** in the **Masters** subset

In the A3 Landscape Masters view, we have access to its content. We can paste any 2D content here including text, fills, lines, images etc. We can also copy and paste these elements from one Master Layout to another.

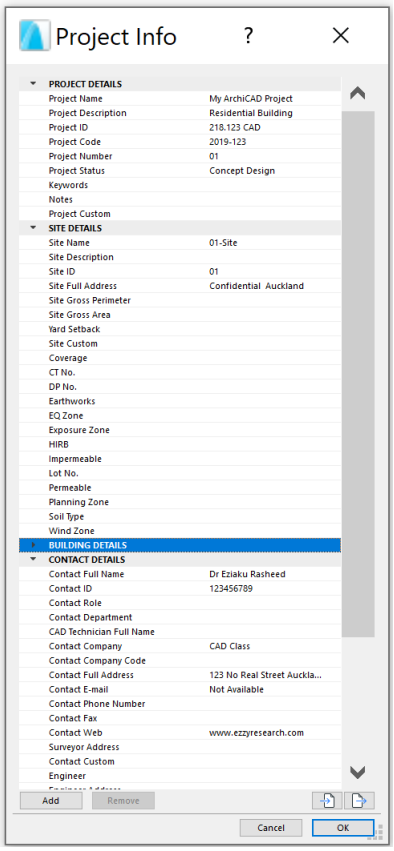
Texts with # icon at the beginning are called 'Autotext' elements. The benefit of using these is to retrieve information from the Project Info instead of typing the text manually.

To edit the Title Block;

- Select the **Title Block**, Right-click and select **Open Source View**

This opens a 2D worksheet where we can edit the Title Block

- Go to **File** > **Info** > **Project Info**
- Fill in the following information into the appropriate columns
    - Project ID: **218.123 CAD**
    - Site Full Address: **Confidential**
    - Contact Company: **CAD Class**
    - Change the Contact Full Name to **Your Name** *(Eziaku O. Rasheed)*
    - Contact ID: **Your student ID** *(123456789)*
    - Contact Email: **Not Available**

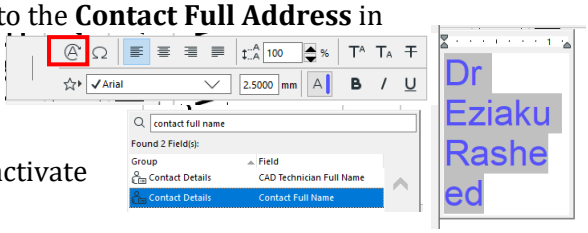


- Contact Web: www.ezzyresearch.com
- Contact Full Address: **123 No Real Street, Auckland, New Zealand**
- Client Full Name**: Mr & Mrs John Smith**

- Click on **OK** to close the project info dialogue box

You will notice that the Address stretches outside the text space in the 3rd block. Adjust the text box by dragging the nodes.

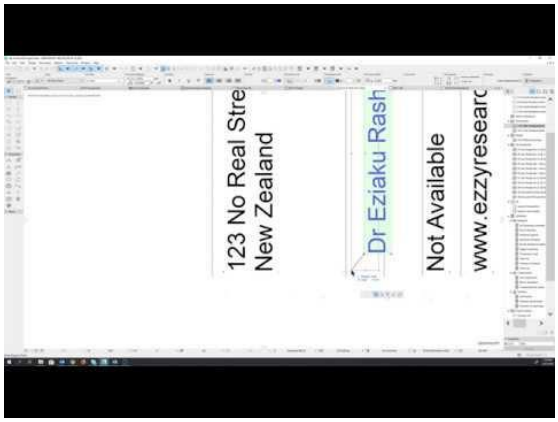
- Delete Contact Phone and Mobile Number
- Select the **Text Tool** from the Toolbox  and open the settings.
  - Change the font size to **2.50mm**
  - Click **on OK**
- Double-click on the space next to the **Contact Full Address** in the 3rd block. The Text Palette shows up



- Click on the **AutoText icon** to activate it
- Select **Contact Full Name**
- Click on **Add** to include this in the title block
- Click on a space outside the text to place it.
- Hit **Esc** to deactivate the **Text Tool**
- Select the **Text, Rotate** and place appropriately in the space
- Repeat **the last 8 steps** to place **Contact ID** in the space next to Contact Full Name.
- Select both Texts and change their **Text Pen** colour from **86** to **1**

If you check on all the Layouts we have produced, you will notice that the title blocks have been updated to reflect the latest information we added.

Please click on the video below to watch a demonstration



Video 34: Master layout

Publishing

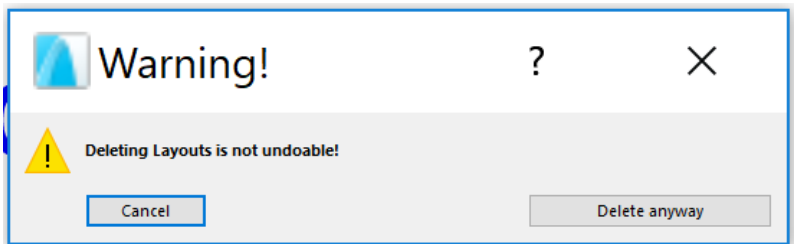
Now we need to publish our work for presentation to other stakeholders. Before going forward, **please save a copy of your drawings in a safe location**. By doing this, we are sure that we can always access a complete version of our drawings for further use. To do

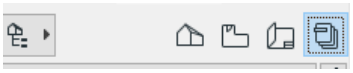
this, we only need the layouts with the required information about our building design namely:

- Sheet Index
- Document transmittal
- Site Plan
- Ground Floor Plan
- Sections
- Elevations
- Details
- Schedule
- Perspective

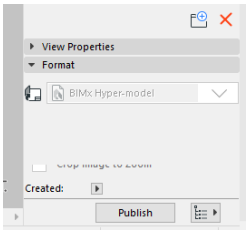
- Double click on **Cover page** to open it and delete the drawing on it.
- Place a drawing of your choice to represent your work
- Delete the other Layouts on the Layout Book. We should have **11 sheets** to publish.

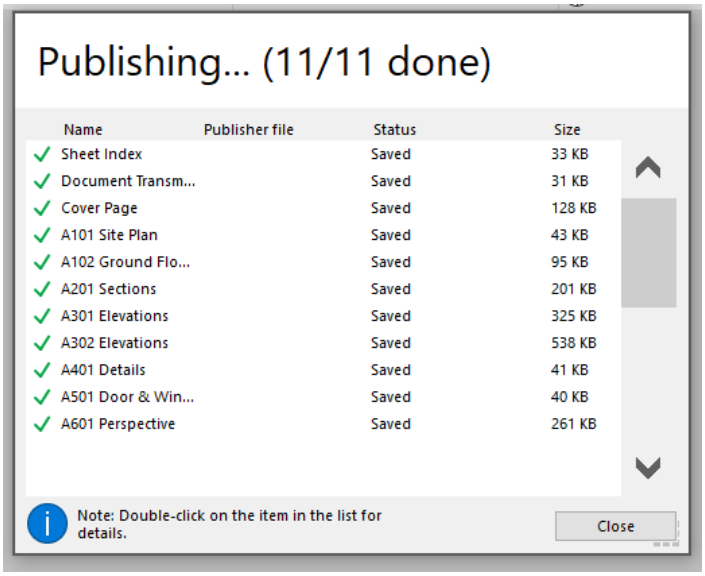
*Select **Delete anyway** when the Warning! Tab pops up. If you notice, the A701 Perspective changes to **A601 Perspective**.*



- Select the Publisher set **"My ArchiCAD Project"** 
- Right-click on **My ArchiCAD Project** and select **Publisher Properties** from the options
- Set the options as follows:
  - Select **Create Single File**
  - Path: browse to save on **Desktop (or any safe location). DO NOT** save in a flash drive
  - Format: **PDF**
- Click on **OK**

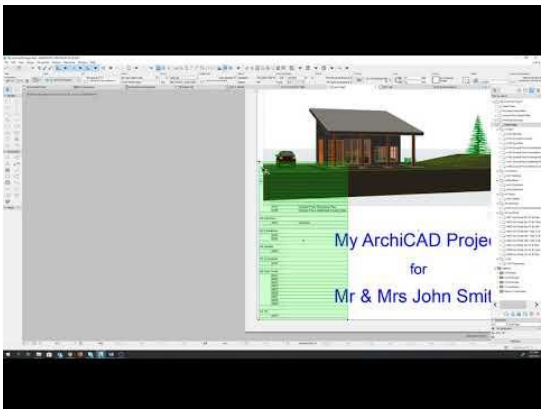
- Double-click on **Publish** at the bottom of the Navigator and wait until the entire documents have been published.





- Close the **Publishing palette** when it is done.
- Find the **PDF file** you have created and view your work.

Please click on the video below to watch a demonstration



Video 35: Publishing in ArchiCAD

Well Done! You have successfully designed a complete building!

Exercise 4

1. What is the zone category for the living room?
    a. Building
    b. Residential
    c. Concept design
    d. Commercial
2. What are the three options chosen in the content 1:50 section of the zone settings?
    a. Zone Name; Zone Area, Zone ID
    b. Zone Category; Zone Material; Zone ID
    c. Zone Name, Zone ID; Zone Material
    d. Zone Material; Zone Category; Zone ID
3. What is the cover fill used for the bedroom?
    a. Plank Floor
    b. Grid 300x300
    c. Carpet
    d. Gravel
4. What is the area calculated for the bathroom?
    a. 2.30m^2
    b. 17.61m^2
    c. 6.63m^2
    d. 7.54m^2
5. What is the Zone ID for the bedroom?
    a. 005
    b. 003
    c. 004
    d. 002
6. What is the marker style chosen for the section marker?
    a. No Marker
    b. Triangle 2
    c. Rectangular 2
    d. Square 2
7. What is the text height chosen for the section text?
    a. 5.0m
    b. 3.0m
    c. 4.0m
    d. 2.0m
8. How many sections were created?
    a. 5
    b. 3
    c. 4
    d. 2
9. What number was the intersection priority for concrete changed to in the Building materials' dialogue box?

a. 500
b. 300
c. 600
d. 400

10. What type of dimensioning style was using to add dimensions to the columns?
    a. Automatic
    b. Manual
    c. Conventional
    d. Virtual
11. What was the distance set between the dimension lines?
    a. 0.2m
    b. 0.5m
    c. 0.4m
    d. 0.1m
12. How did we view the Schedules for the doors and windows?
    a. Project Map > Ground Floor > Schedules
    b. Layout Book > A102 Schedules > Schedules
    c. Project Map > Element > All Openings Schedule
    d. Schedules > Element > All Openings Schedule
13. What is the size of the Master Layout used for the documentation?
    a. A1 landscape
    b. A4 Landscape
    c. A3 landscape
    d. A2 landscape
14. What is the drawing scale for the Detail published?
    a. 1:100
    b. 1:50
    c. 1:20
    d. 1:10
15. What is the name of the client for the sample building?
    a. Mr & Mrs Jane Smooth
    b. Mr & Mrs John Smith
    c. Mr & Mrs Josh Snet
    d. Mr & Mrs Steve Smith
16. How many layouts were published?
    a. 10
    b. 9
    c. 11
    d. 8
17. What tool was used to cover the floor plan on A 101 Site Plan?
    a. Line Tool
    b. Spline Tool
    c. Text Tool

d. Fill Tool

18. What is the drawing scale used for the 3D Perspective?
    a. 1:100
    b. No Scale
    c. 1:50
    d. 1:200
19. What is the Site Full Address used in the Tile Block?
    a. Confidential
    b. 123 No Real Street Auckland
    c. Not Available
    d. 123456788
20. What file format was the layouts published in?
    a. .doc
    b. .pln
    c. .pdn
    d. .pdf

Notes

Answers to the Chapters

Exercise

Exercise 1

1. D
2. B
3. B
4. C
5. A
6. A
7. D
8. A
9. A
10. A
11. A
12. C
13. A
14. B
15. C
16. A
17. B
18. A
19. C
20. d

Exercise 2

1. B
2. A
3. B
4. A
5. C
6. A
7. A
8. D
9. C
10. D
11. B
12. A
13. B
14. C
15. B
16. C
17. A
18. A
19. C
20. A

Exercise 3

1. B
2. D
3. C
4. A
5. C
6. A
7. C
8. A
9. D
10. A
11. B
12. A
13. A
14. D
15. A
16. B
17. C
18. A
19. B
20. D

Exercise 4

1. A
2. A
3. A
4. A
5. D
6. B
7. A
8. D
9. C
10. B
11. B
12. D
13. C
14. D
15. B
16. C
17. D
18. B
19. A
20. D

EASY STEPS TO ARCHICAD

About the Author

Dr Eziaku Onyeizu Rasheed is a lecturer and researcher in the field of Building Technology and Evaluation. She is currently affiliated with the School of Built Environment (SBE), Massey University. Amongst the courses she teaches are Architectural Design, Plan Reading and Building Information Modelling (BIM).

This manual is designed for students in construction-related programmes who want an easier means of learning how to draft designs using ArchiCAD software. This teaching manual helps you learn to use various tools in ArchiCAD while designing a simple residential building. The focus is on providing a good understanding of major steps required to design a building in ArchiCAD. It illustrates basic information in ArchiCAD commonly used to design buildings. This manual simulates a real architectural project, in detail, and offers explained steps to the use of ArchiCAD for building designs.

- Ideal for students in architecture, engineering and construction-related courses at university and high school levels
- Presented in plain language and clear visuals
- YouTube videos are added at significant milestones for demonstration
- Exercises are included at the end of each module

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