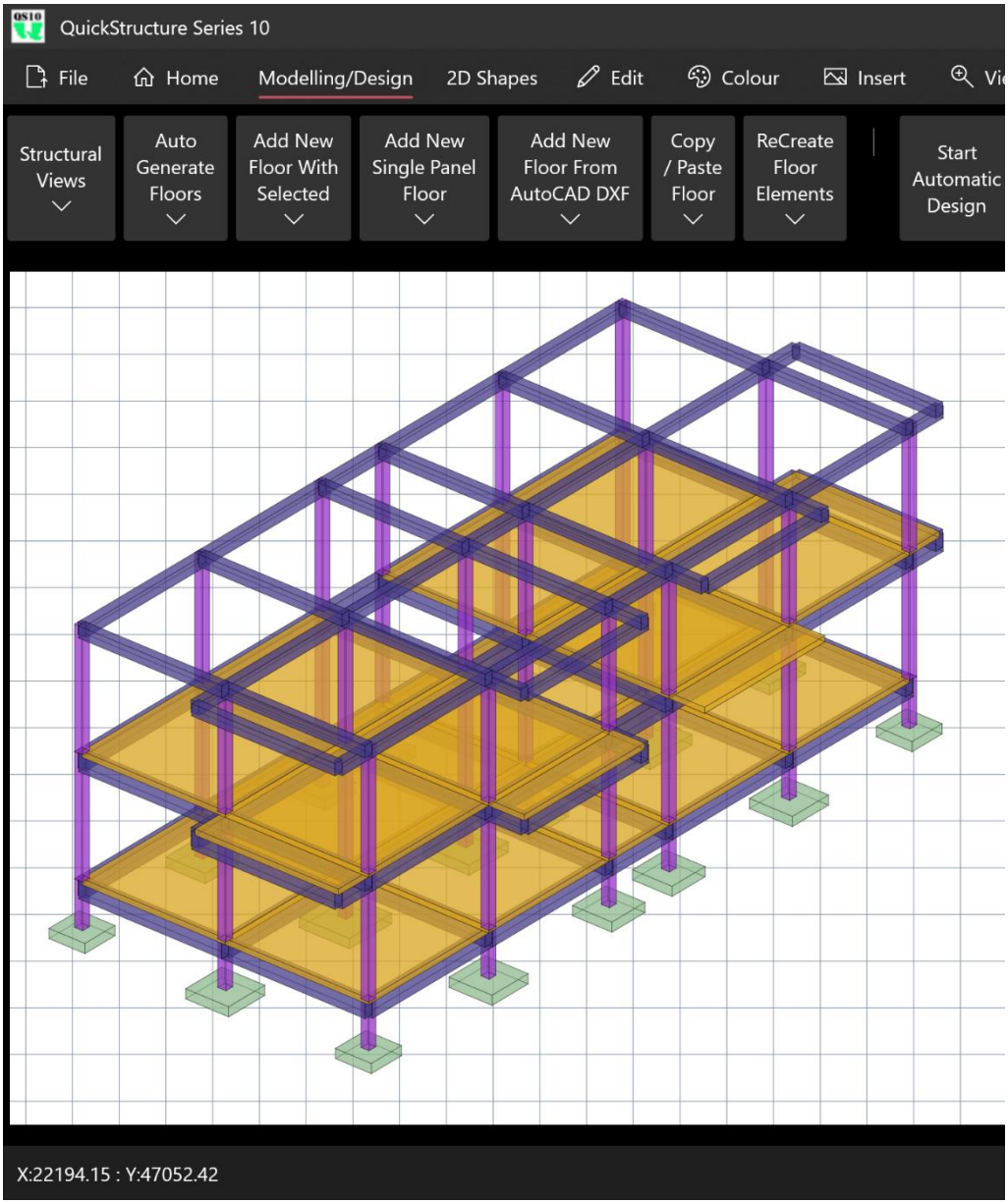
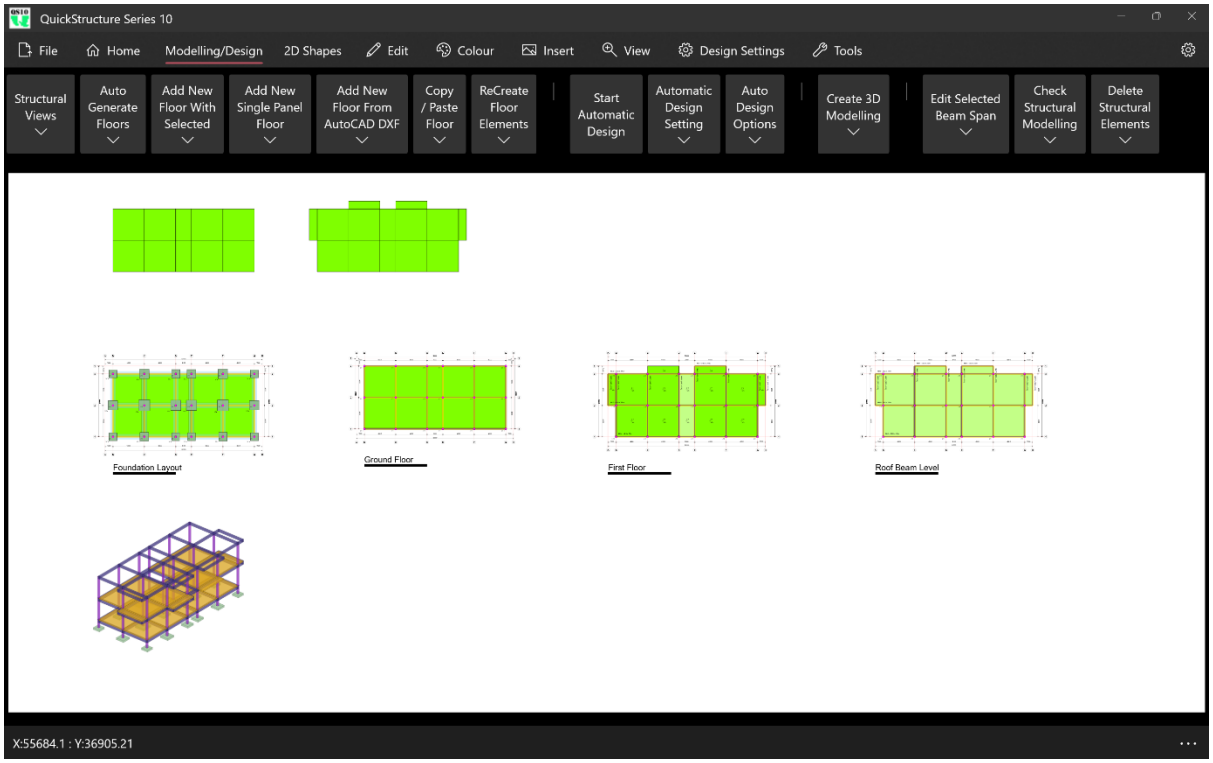
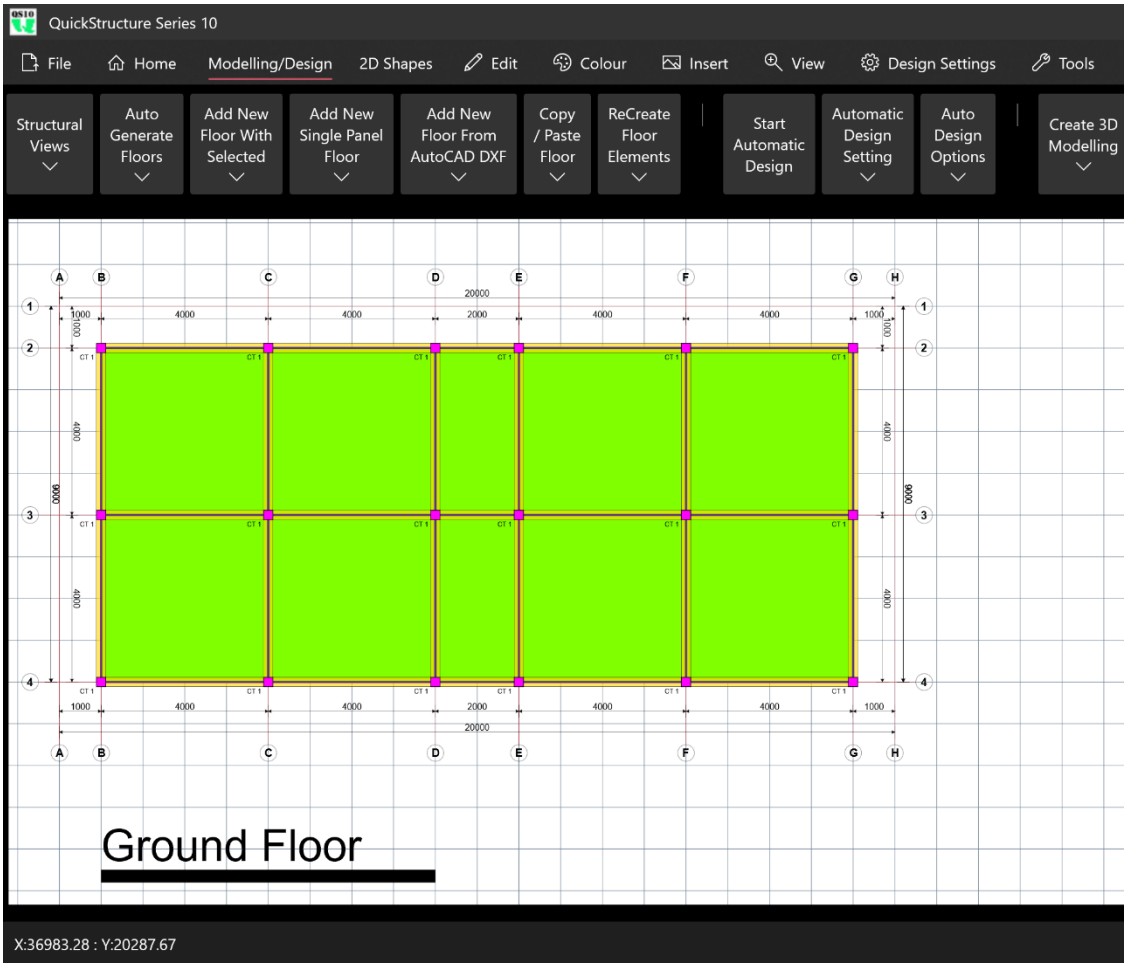
QUICKSTRUCTURE 10

TUTORIAL | PART 4

BLOCK OF FLAT MODELLING WITH COMPLEXITY




QuickStructure Series 10
File
Home
Modelling/Design
2D Shapes
Edit
Colour
Insert
View
Design Settings
Tools
Structural Views
Auto Generate Floors
Add New Floor With Selected
Add New Single Panel Floor
Add New Floor From AutoCAD DXF
Copy / Paste Floor
ReCreate Floor Elements
Start Automatic Design
Automatic Design Setting
Auto Design Options
Create 3D Modelling
Edit Selected Beam Span
Check Structural Modelling
Delete Structural Elements
Foundation Layout
Ground Floor
First Floor
Roof Beam Level
X:55684.1 : Y:36905.21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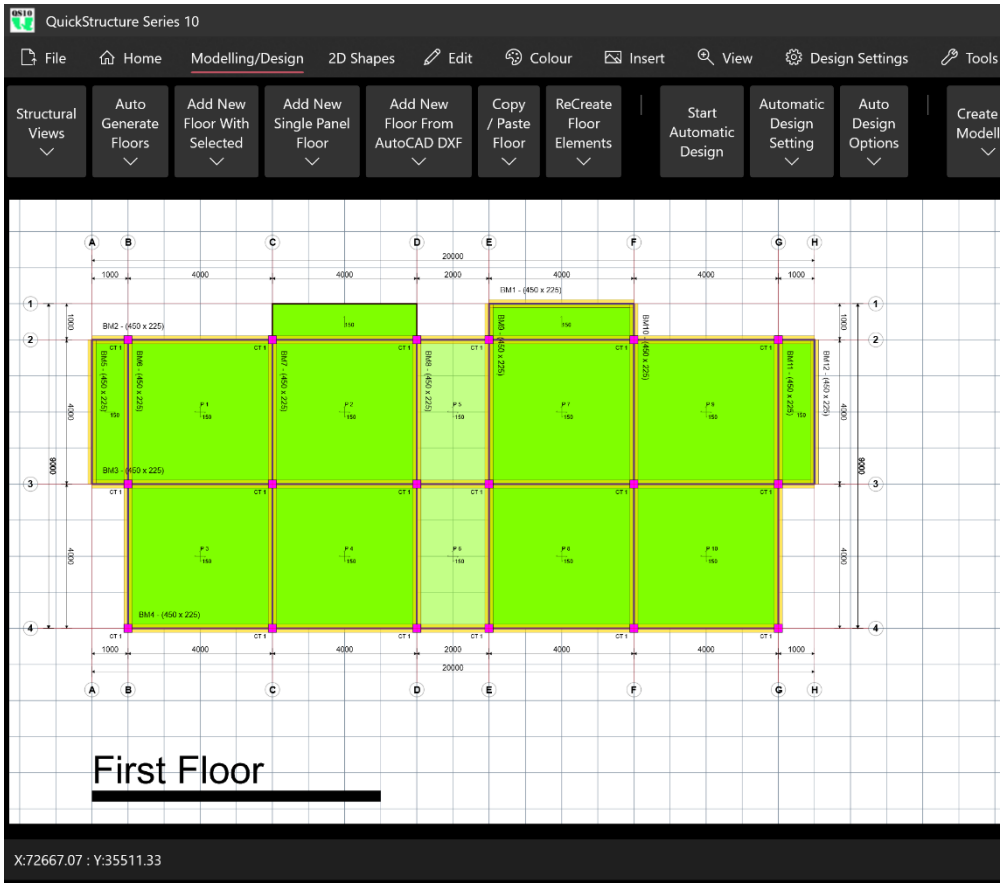
Add New Floor With Selected
Add New Single Panel Floor
Add New Floor From AutoCAD DXF
Copy / Paste Floor
ReCreate Floor Elements
Start Automatic Design
Automatic Design Setting
Auto Design Options
Create 3D Modelling
Ground Floor
X:36983.28 : Y:20287.67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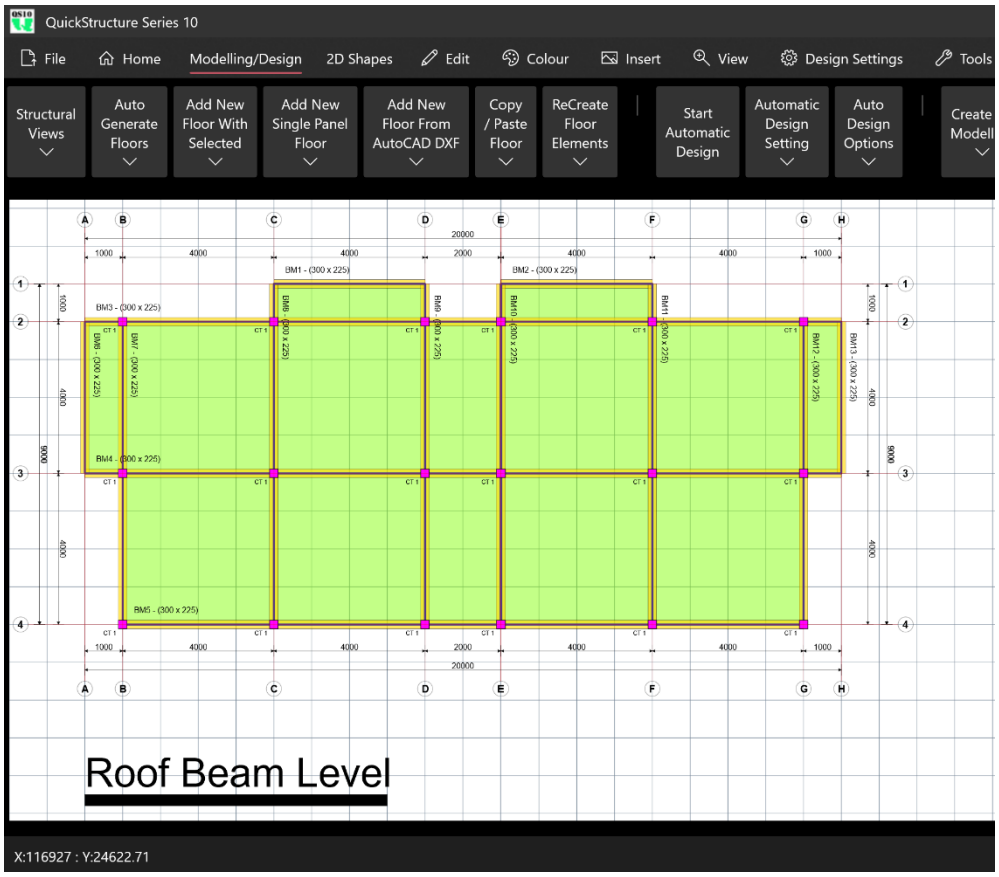
Tools
Structural Views
Auto Generate Floors
Add New Floor With Selected
Add New Single Panel Floor
Add New Floor From AutoCAD DXF
Copy / Paste Floor
ReCreate Floor Elements
Start Automatic Design
Automatic Design Setting
Auto Design Options
Create Modell
BM1 - (450 x 225)
BM2 - (450 x 225)
BM3 - (450 x 225)
BM4 - (450 x 225)
First Floor
X:72667.07 : Y:35511.33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Colour
Insert
View
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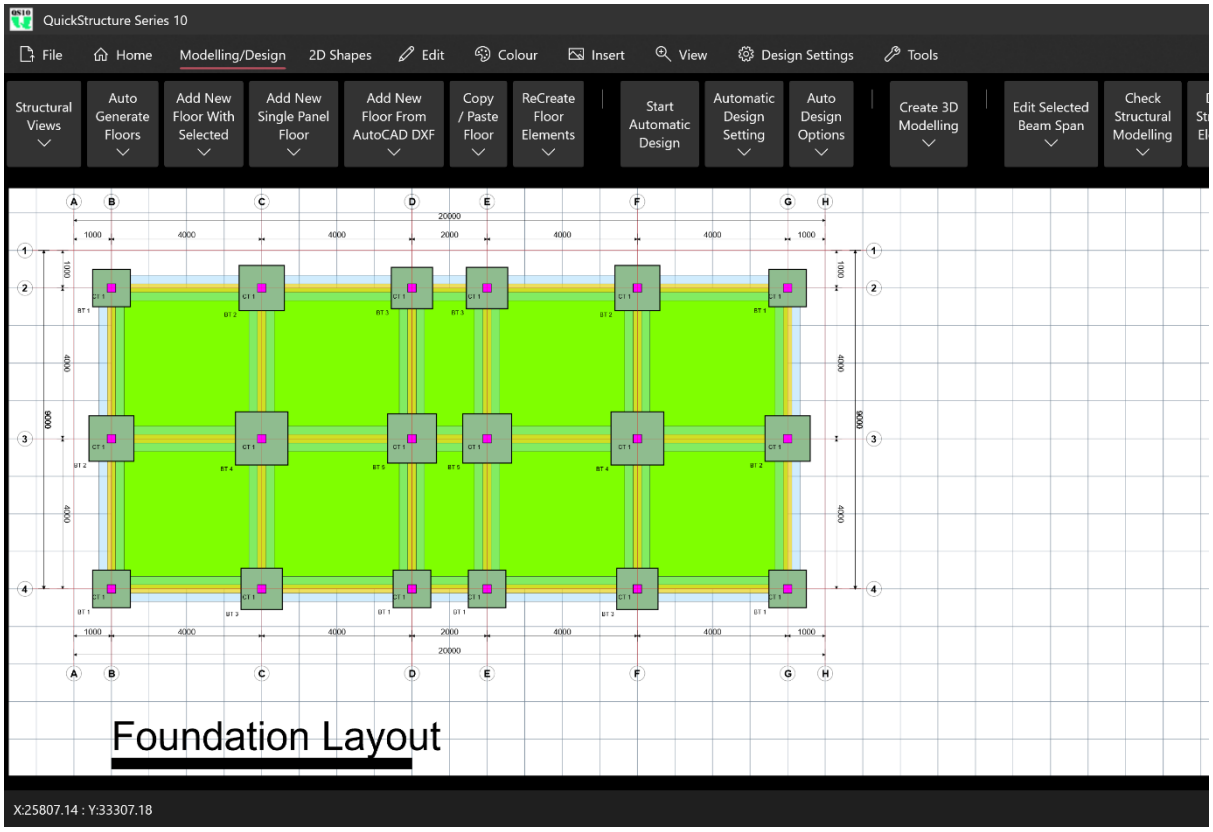
Tools
Structural Views
Auto Generate Floors
Add New Floor With Selected
Add New Single Panel Floor
Add New Floor From AutoCAD DXF
Copy / Paste Floor
ReCreate Floor Elements
Start Automatic Design
Automatic Design Setting
Auto Design Options
Create Modell
BM1 - (300 x 225)
BM2 - (300 x 225)
BM3 - (300 x 225)
BM4 - (300 x 225)
BM5 - (300 x 225)
Roof Beam Level
X:116927 : Y:24622.71



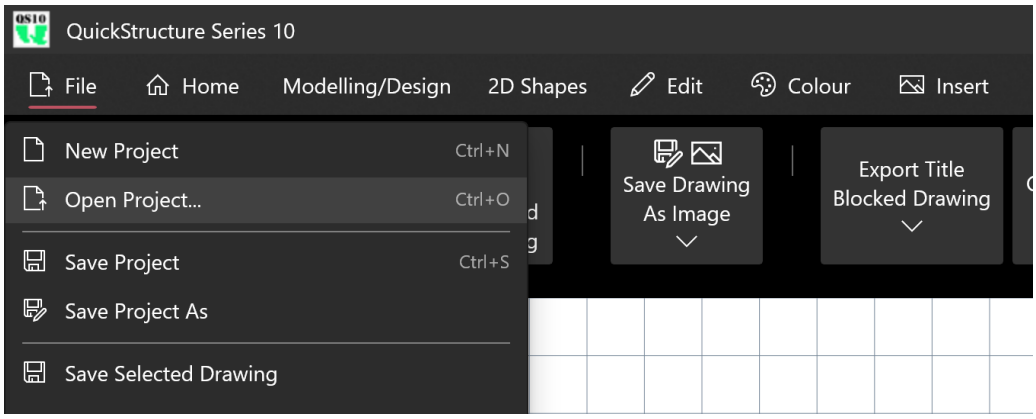
How to Create Block of Flats with some level of complexity using QS10.

In this example we will start introducing some level of complexity in our modelling.

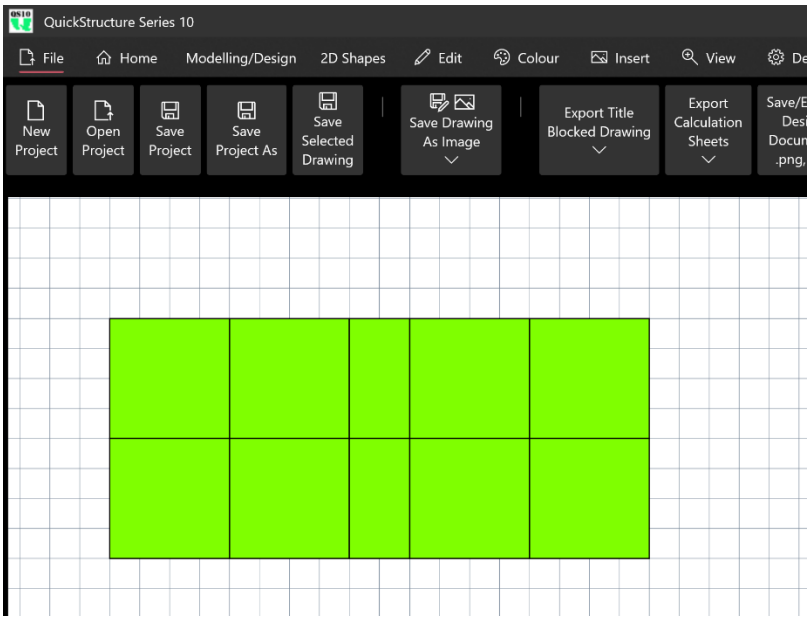
Please is important you go through part 1-3 of the QS10 tutorial to be able to follow this part 4.

1. Open QuickStructure 10 Software
   Note: It will always open with a new project by default. You don't need to create new project.

2. Open the geometry plain rectangle file we created in Part 3.
   - Click File and click Open Project



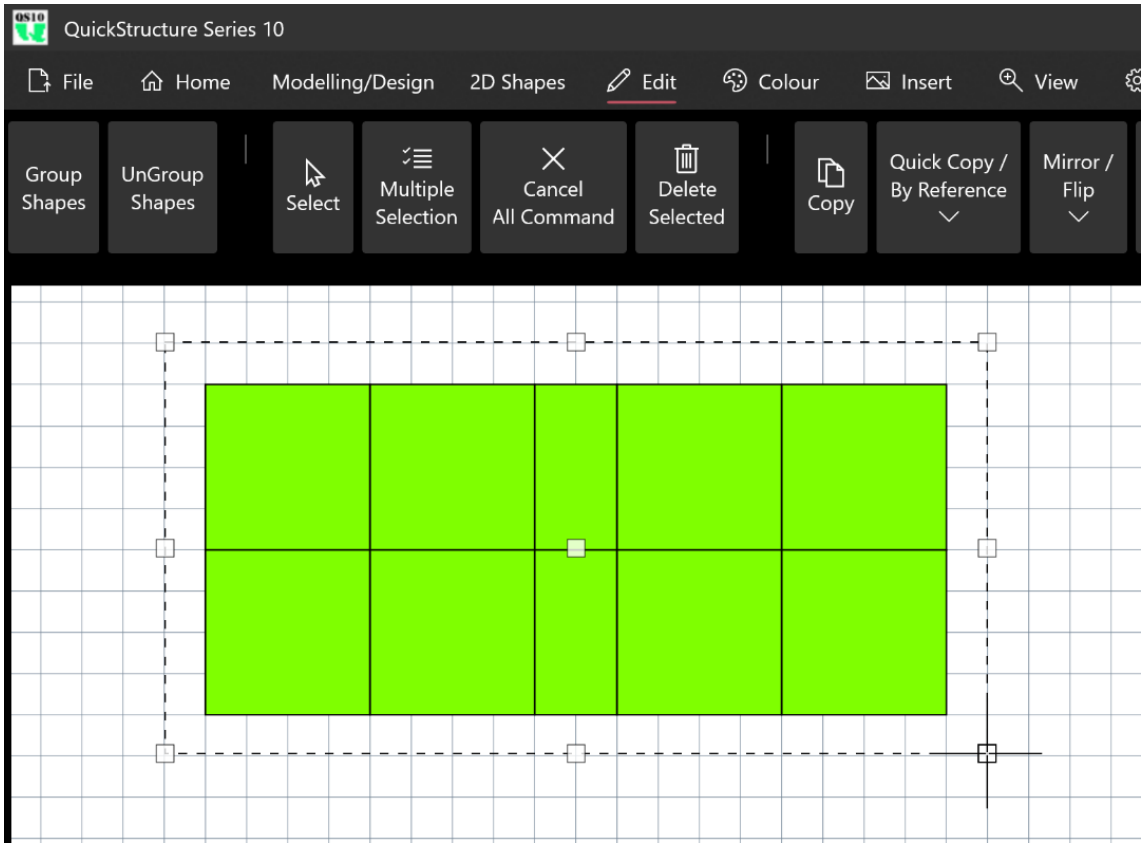
   - Open the file name: Project Design 3 Plain Geometry or any other name you saved the part 3 geometry file with.



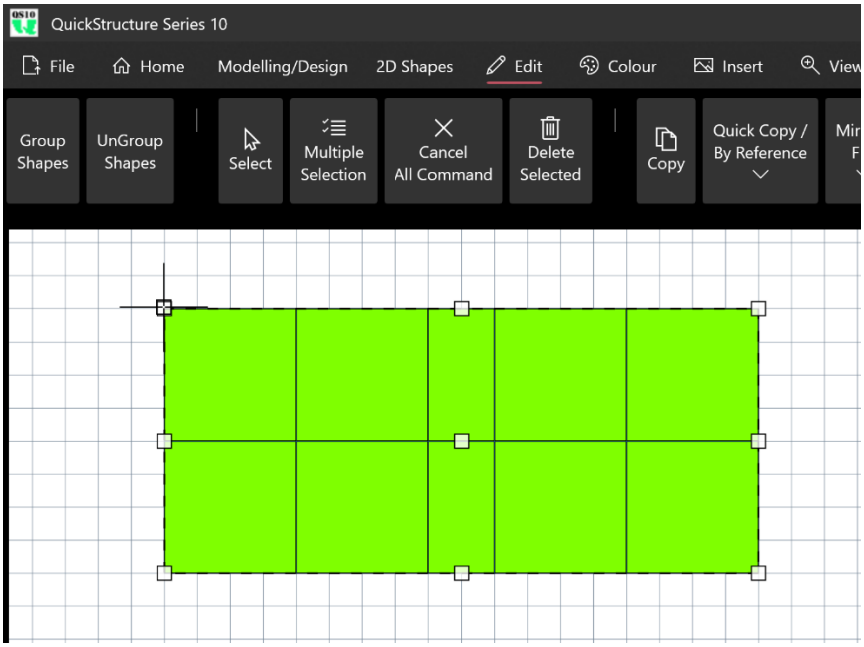
Note:

If you have not created the rectangles before you can easily create the above rectangle before you continue.

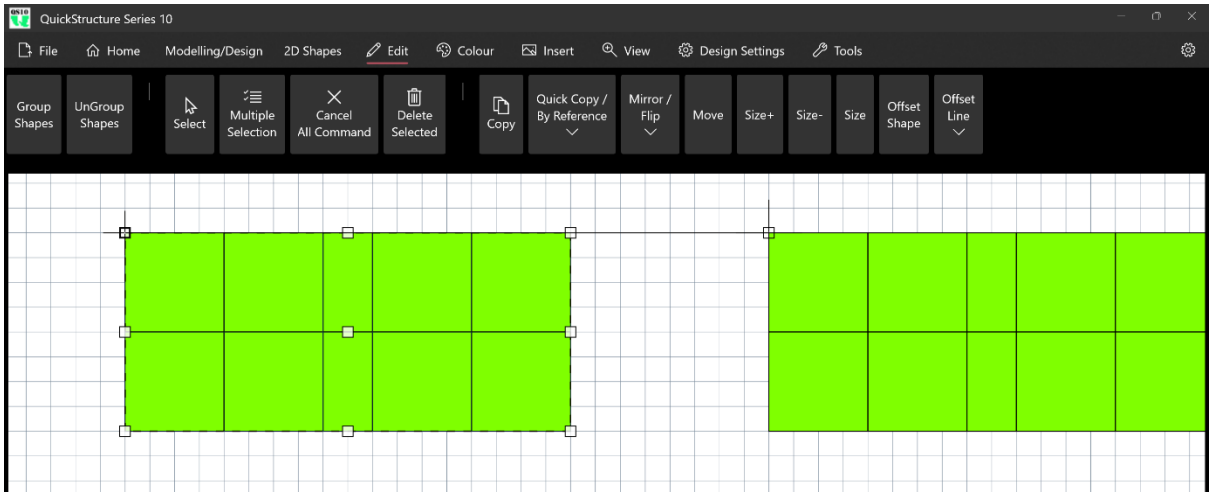
3. Copy first 10 rectangles.
   - Click Multiple Selection, select the first 10 rectangles

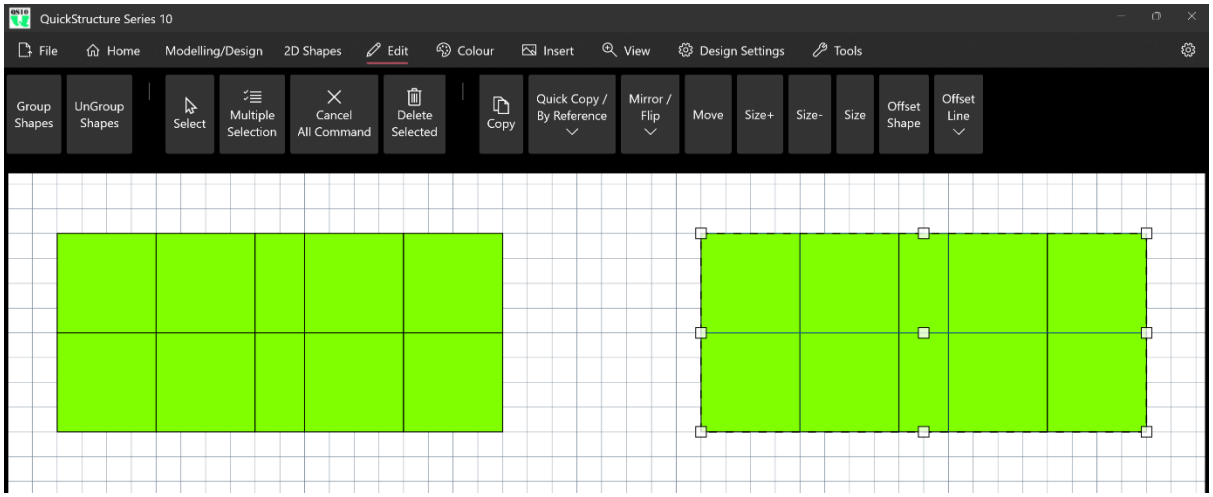


- Click Copy and click the top left corner of the selected rectangles as shown below.



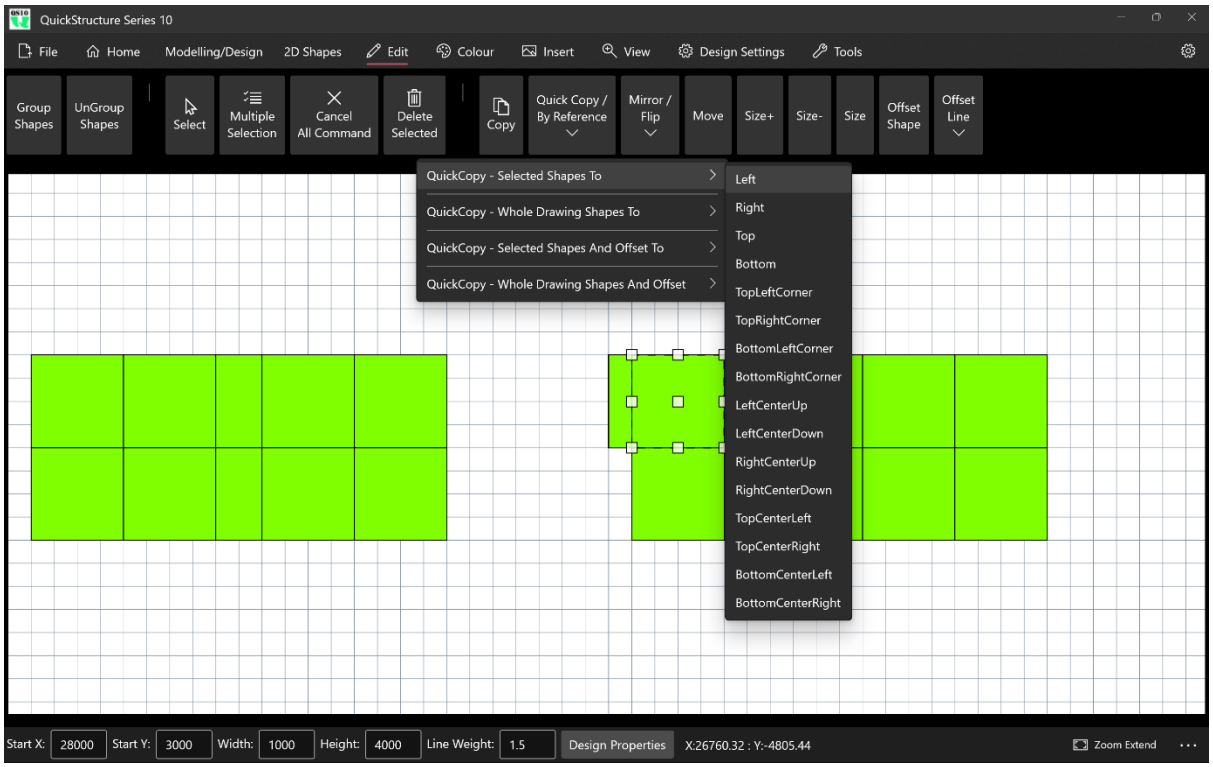
- Move the mouse at a distance and click to place the copied rectangles.





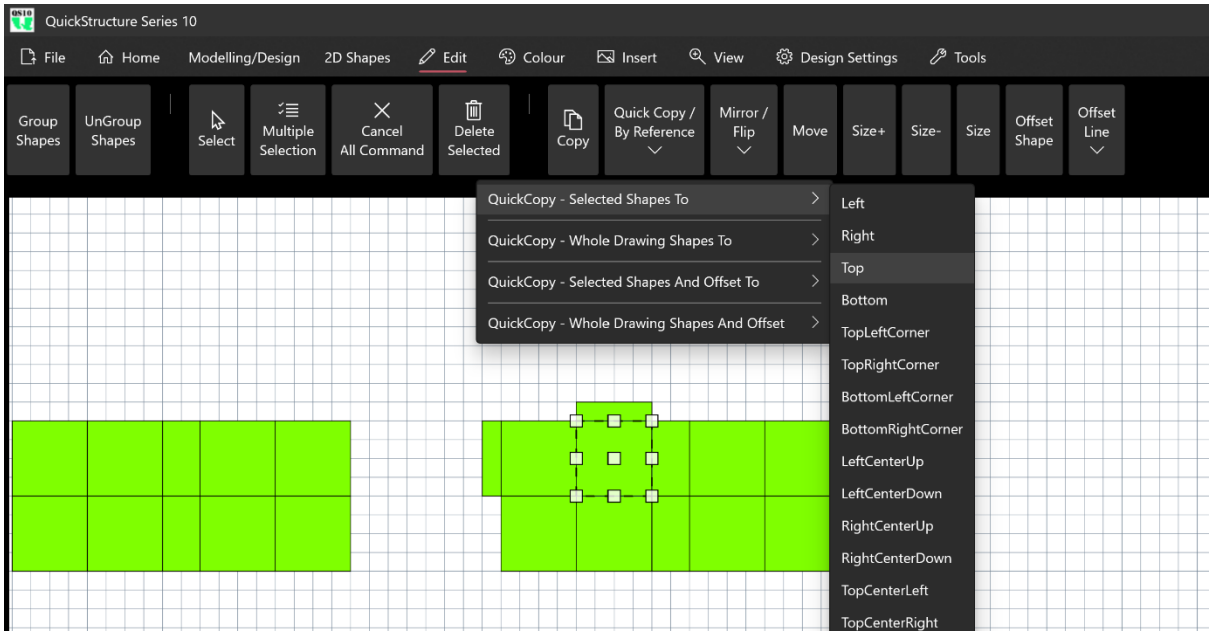
- Click Edit and Cancel All Command

4. Select the rectangle as shown below and Quick Copy to Left.

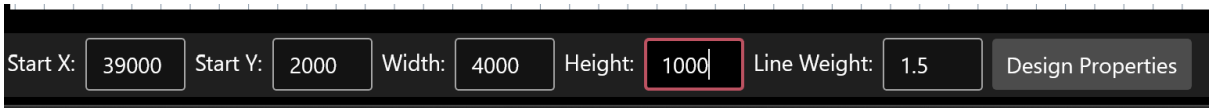


- Change the Width:1000 at the properties window bellow.

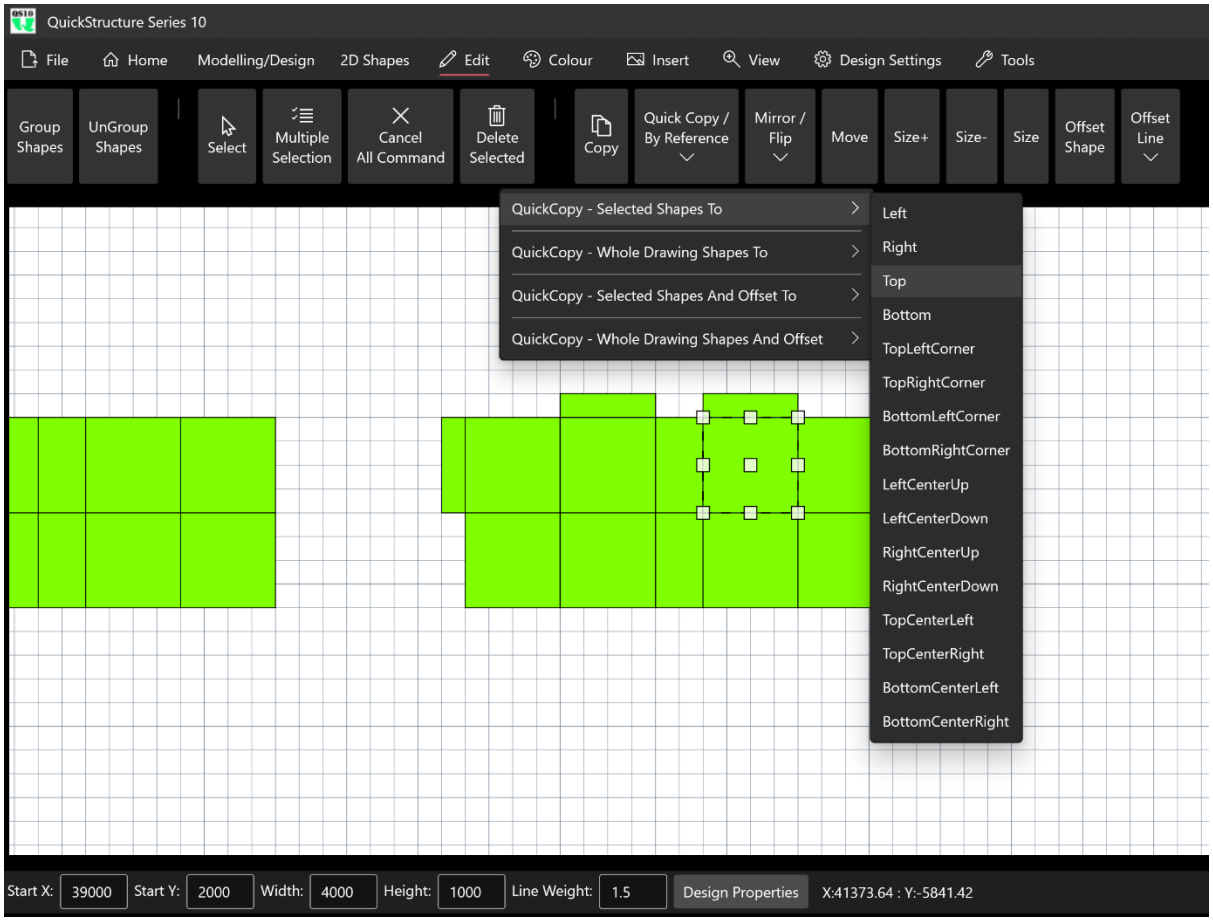
5. Select the rectangle shown below, Quick Copy to Top as shown below.



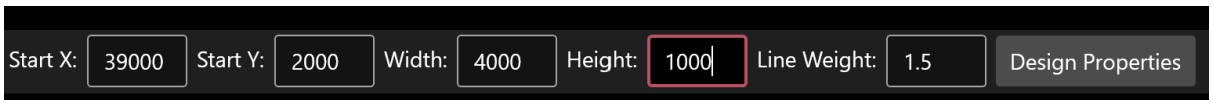
- Change the Height:1000 and press enter key as shown below.



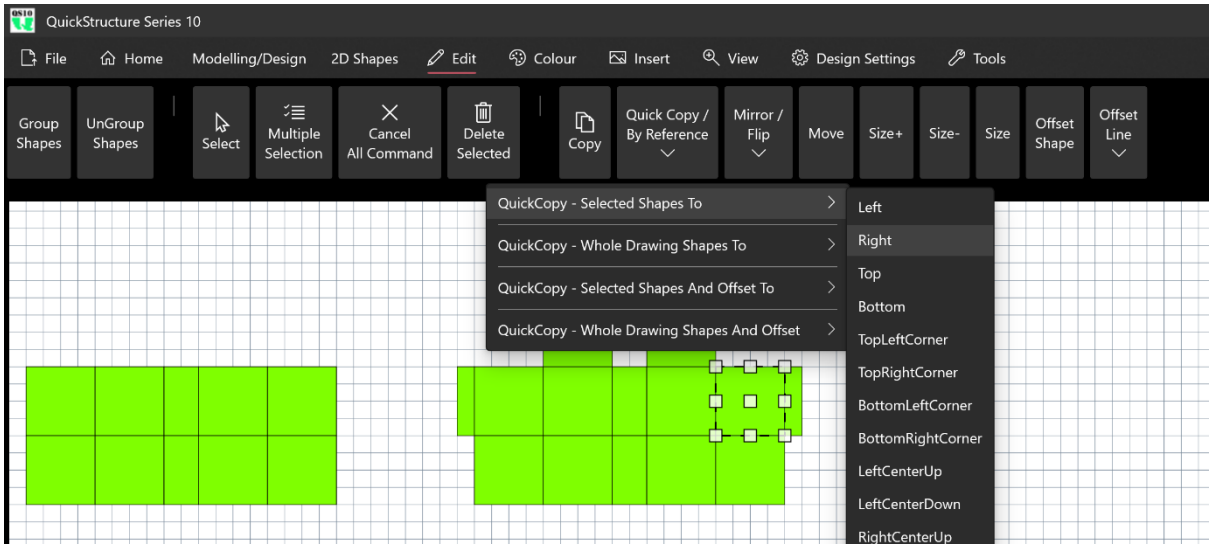
6. Select the rectangle shown below, Quick Copy to Top as shown below.



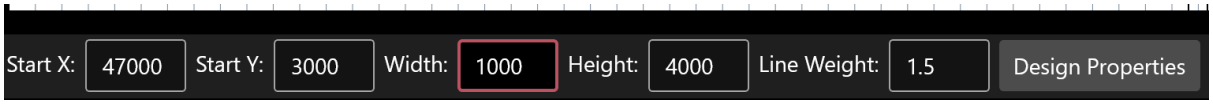
- Change the Height:1000 and press enter key as shown below.



7. Select the rectangle shown below, Quick Copy to Top as shown below.

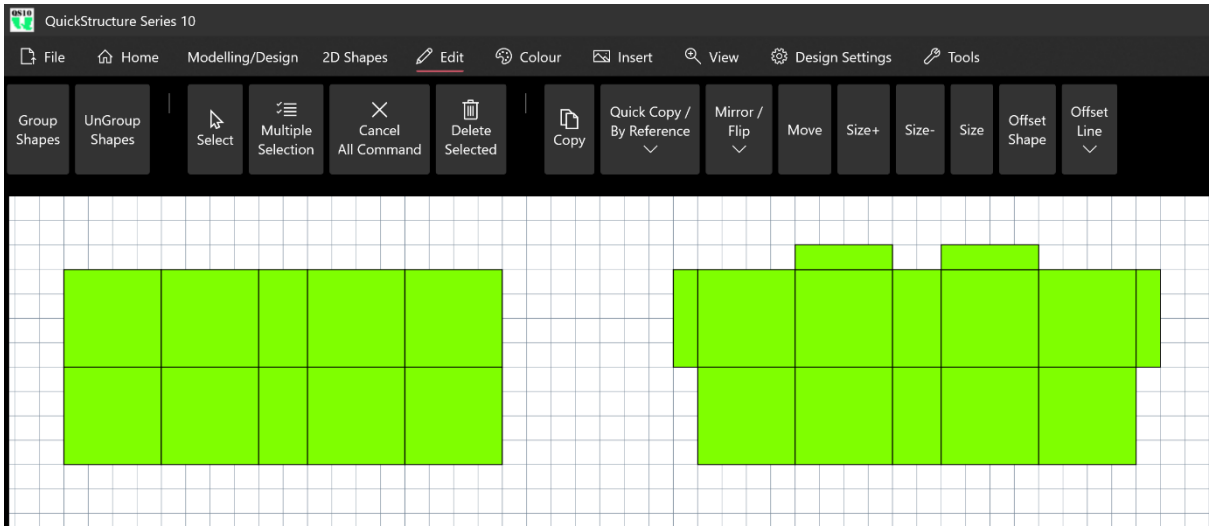


- Change the Width:1000 and press enter key as shown below.



8. Click Edit and click Cancel All Command.

Now we have the basic rectangle geometry we need to create the floors.



The first on the left will form our ground floor layout, and the second on the right will form our first floor and roof beam layout.

As you will see soon, the ground floor is used only for the foundation trench lines only, it doesn't play a part in the structural loading. The first floor columns will be the column of the ground floor and the foundation. So, if you want to remove a column that appears in the ground floor and foundation layout, you will have to remove it in the first floor. Don't worry about this for now, you will see it later in the structural modelling.

Now is a good time to save the plain geometry before we continue.

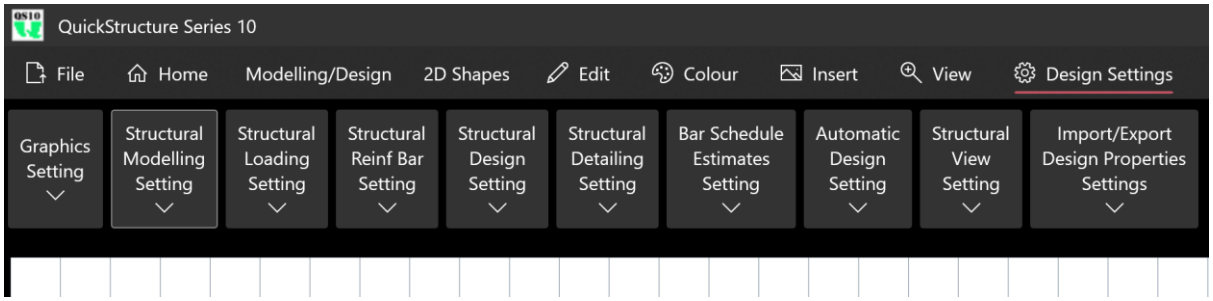
9. Save Project
    - Click File and click Save Project As
    - File name: Project Design 4 Plain Geometry

Note:

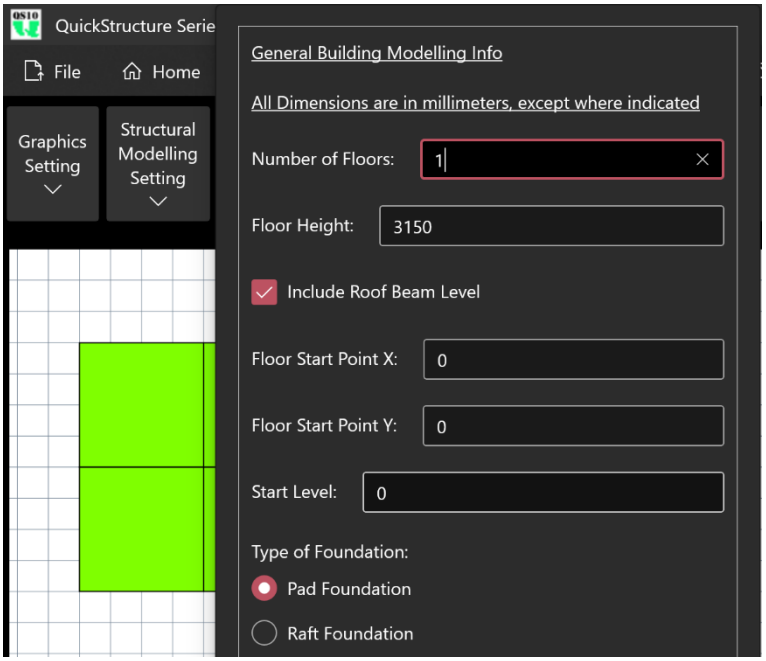
- Is a good practice to save the plain geometry in a separate file before the software generate the structural floors. This reason is that if anything good wrong with the modelling you can easily recreate it with this plain geometry file.

Create the structural floors

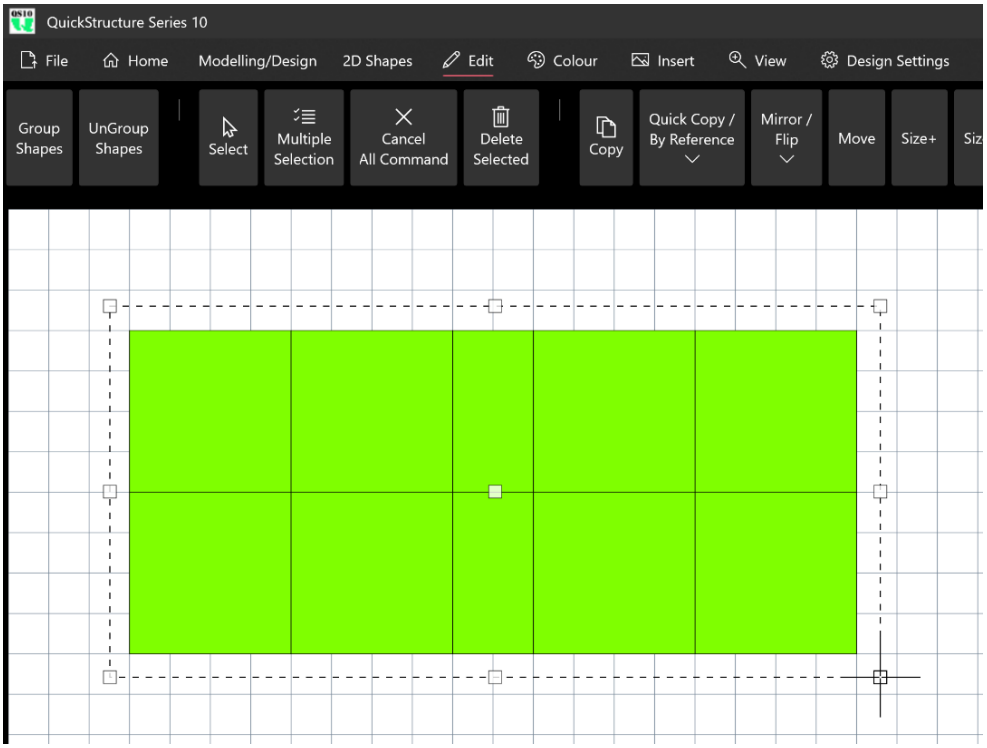
10. Set the Floor Settings
    - Click the Design Settings tab and click Structural Modelling Setting

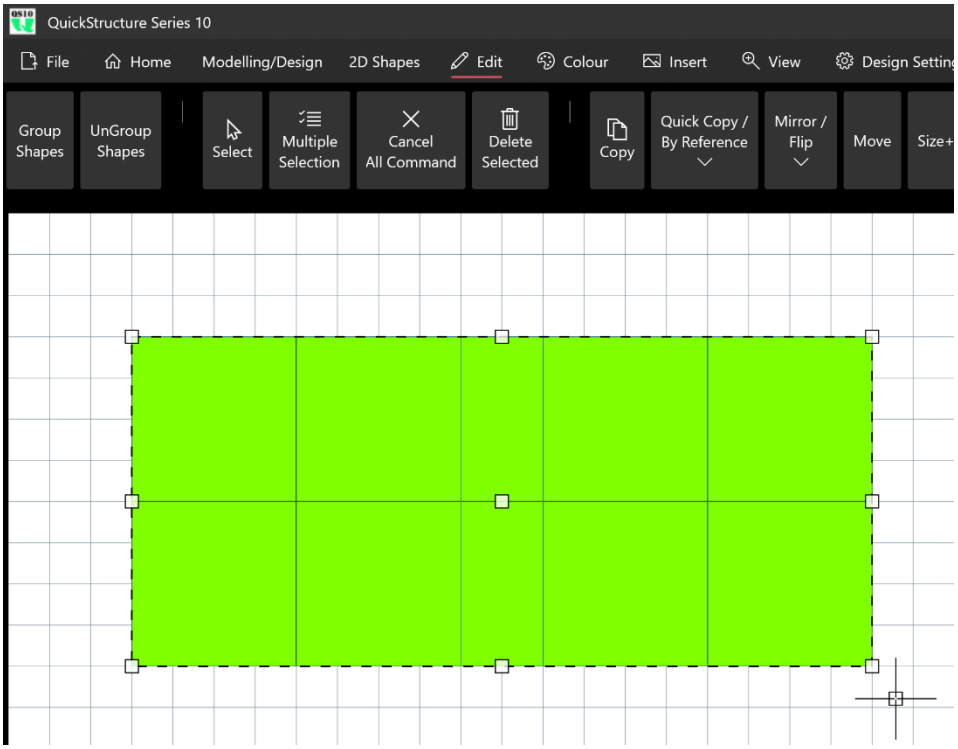


    - Number of Floors:1
    - Set Floor Height:3150
    - Set Floor Start Point X:0
    - Set Floor Start Point Y:0
    - Set Type of Foundation: Pad Foundation

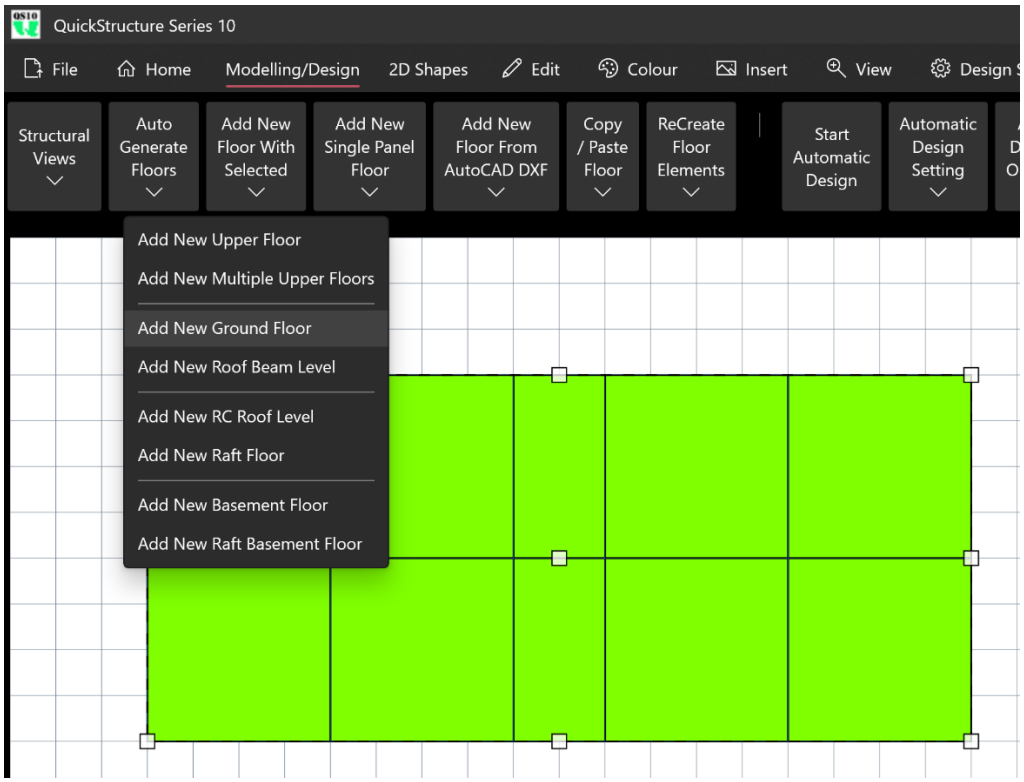


11. Click Edit, click Multiple Selection and select all the rectangles as shown below

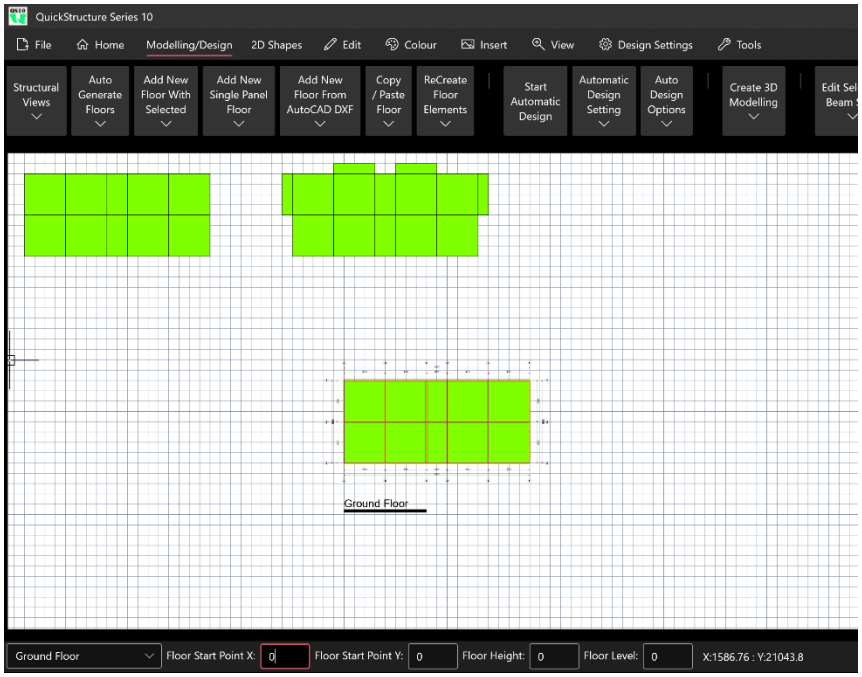




12. Add the Ground Floor
    - Click Modelling / Design tab, Click Add New Floor With Selected, and Click Add New Ground Floor (As shown below)

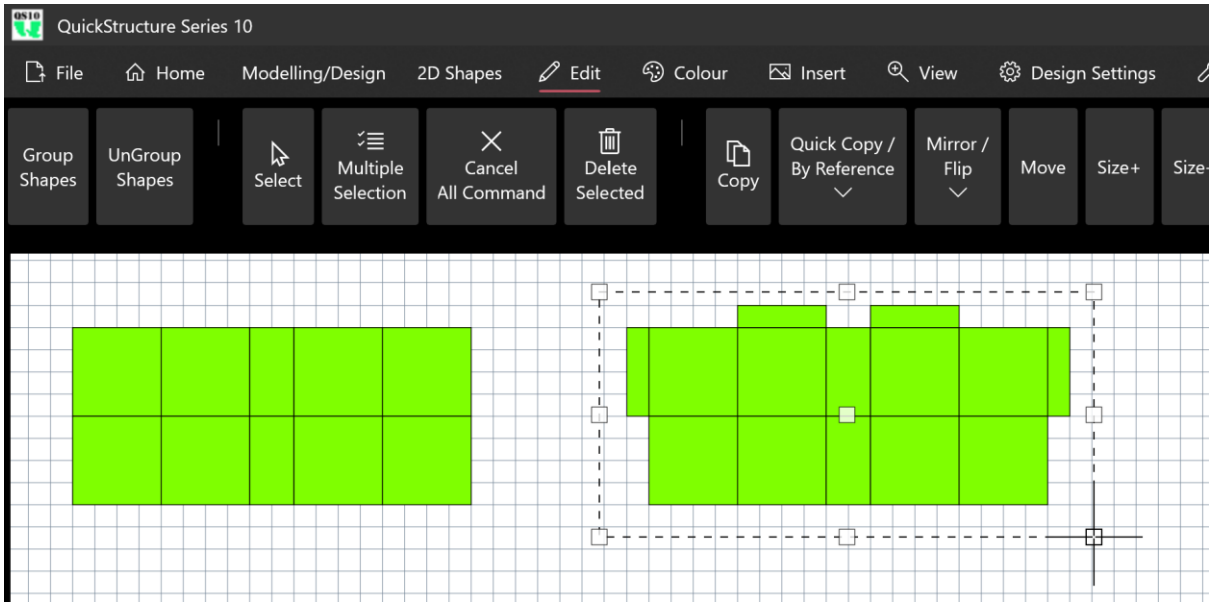


When you do the floor will be generated.

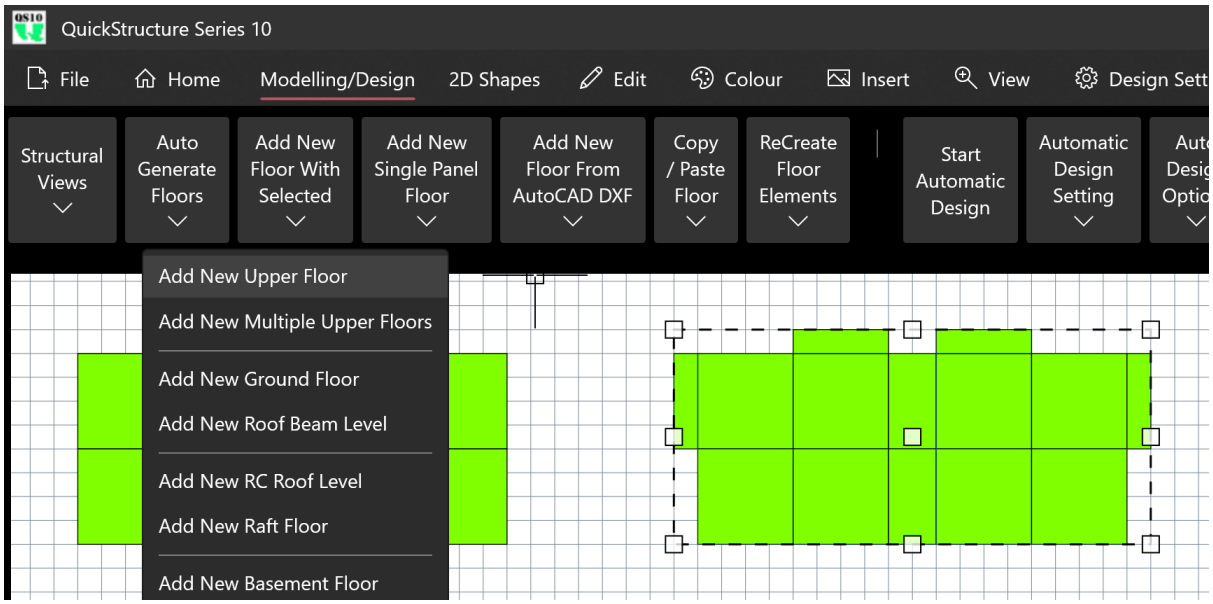


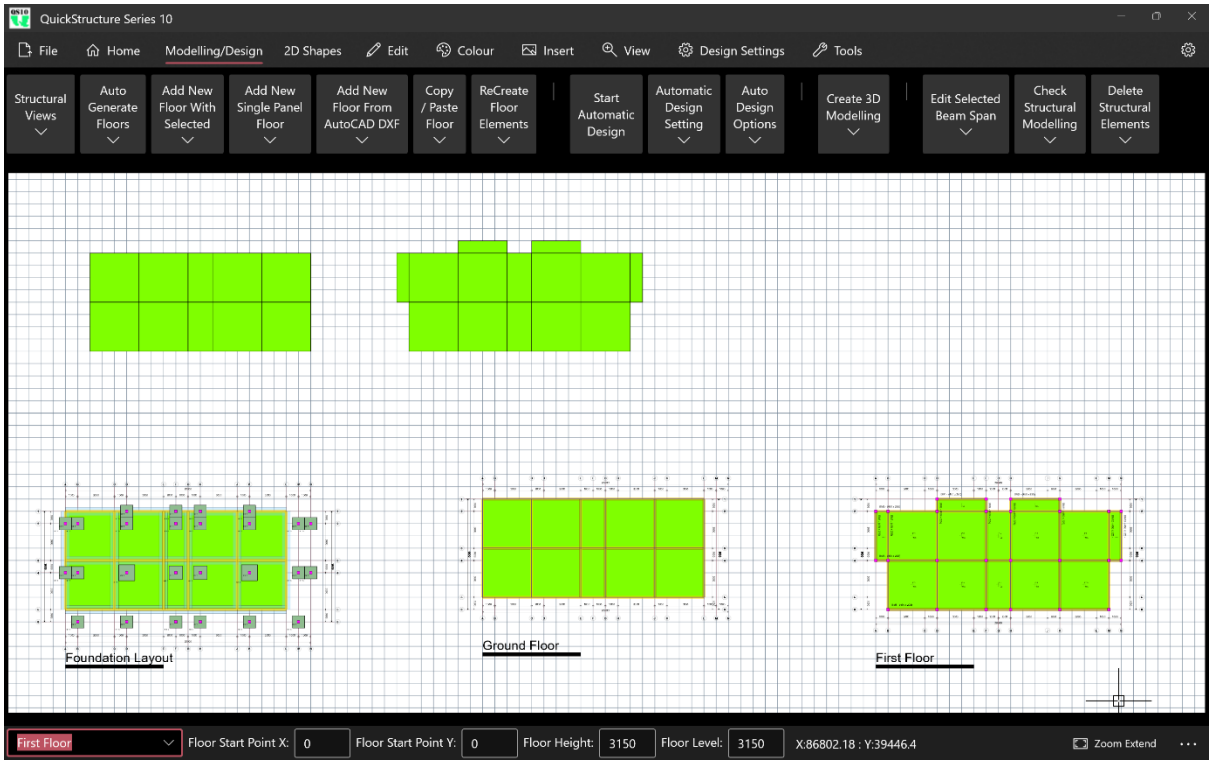
13. Add the First Floor

- Click Edit tab, click Multiple Selection and select the rectangles as shown below.



- Click Modelling / Design tab, Click Add New Floor With Selected, and Click Add New Upper Floor (As shown below)

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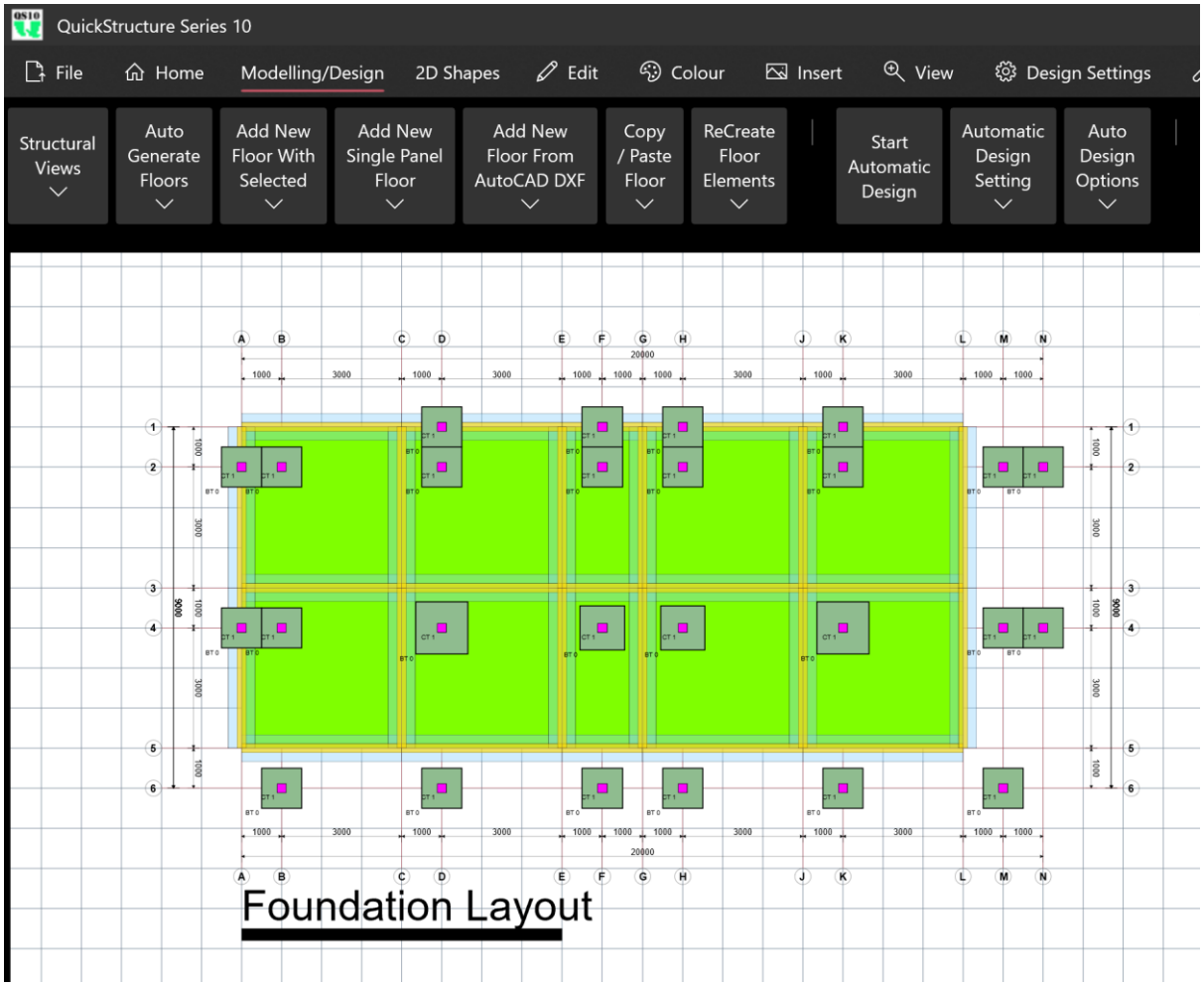
Edit Selected Beam Span
Check Structural Modelling
Delete Structural Elements
Foundation Layout
Ground Floor
First Floor
First Floor
Floor Start Point X: 0
Floor Start Point Y: 0
Floor Height: 3150
Floor Level: 3150
X:86802.18 : Y:39446.4
Zoom Extend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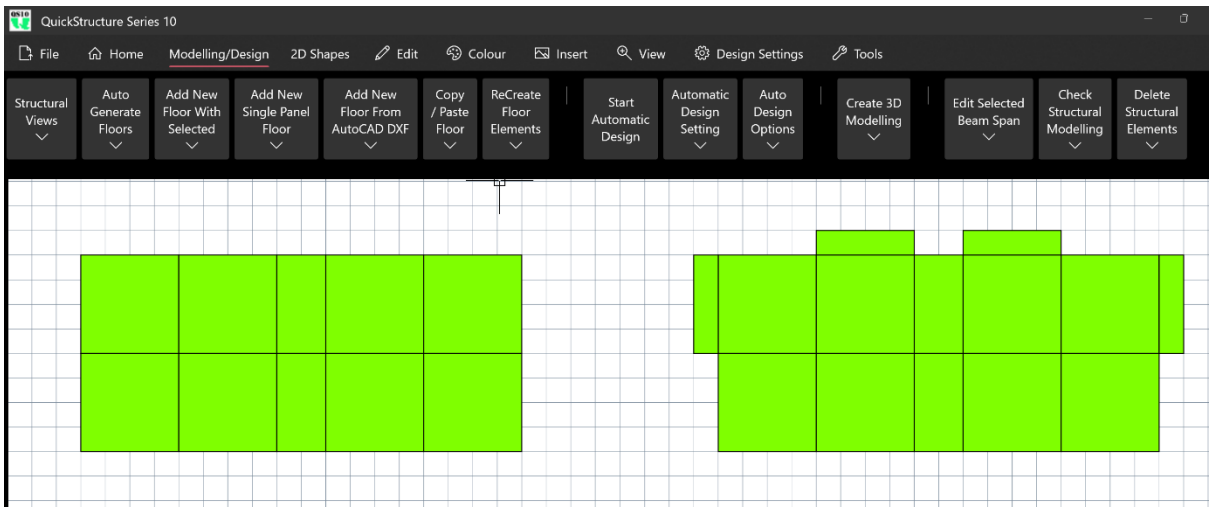
Auto Design Options
Foundation Layout

A look at the foundation layout above you will notice the foundation base and column are out of order.

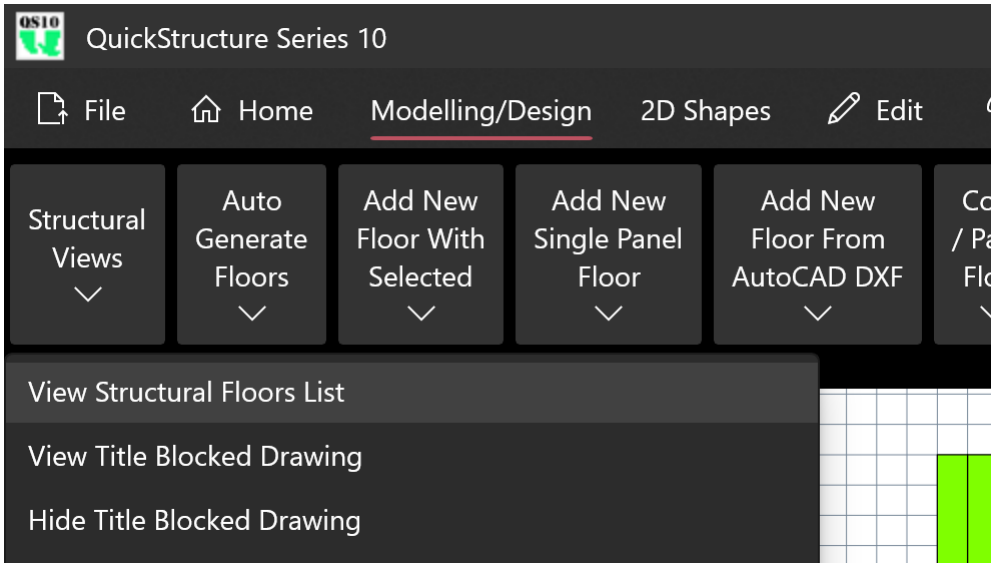
We will fix that.

The reason is that the first floor projected away from the ground floor in both X and Y axis.

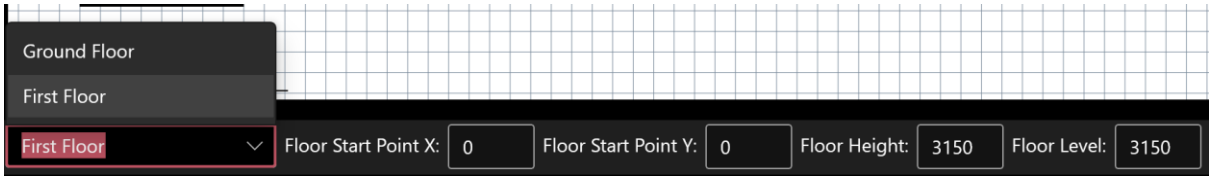


We will change the first floor start point X and Y to -1000

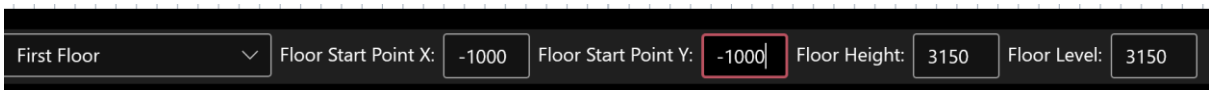
14. Change the first floor start points
    - Click Modelling / Design, click Structural Views and click View Structural Floors List



- Select First Floor from the Floor List

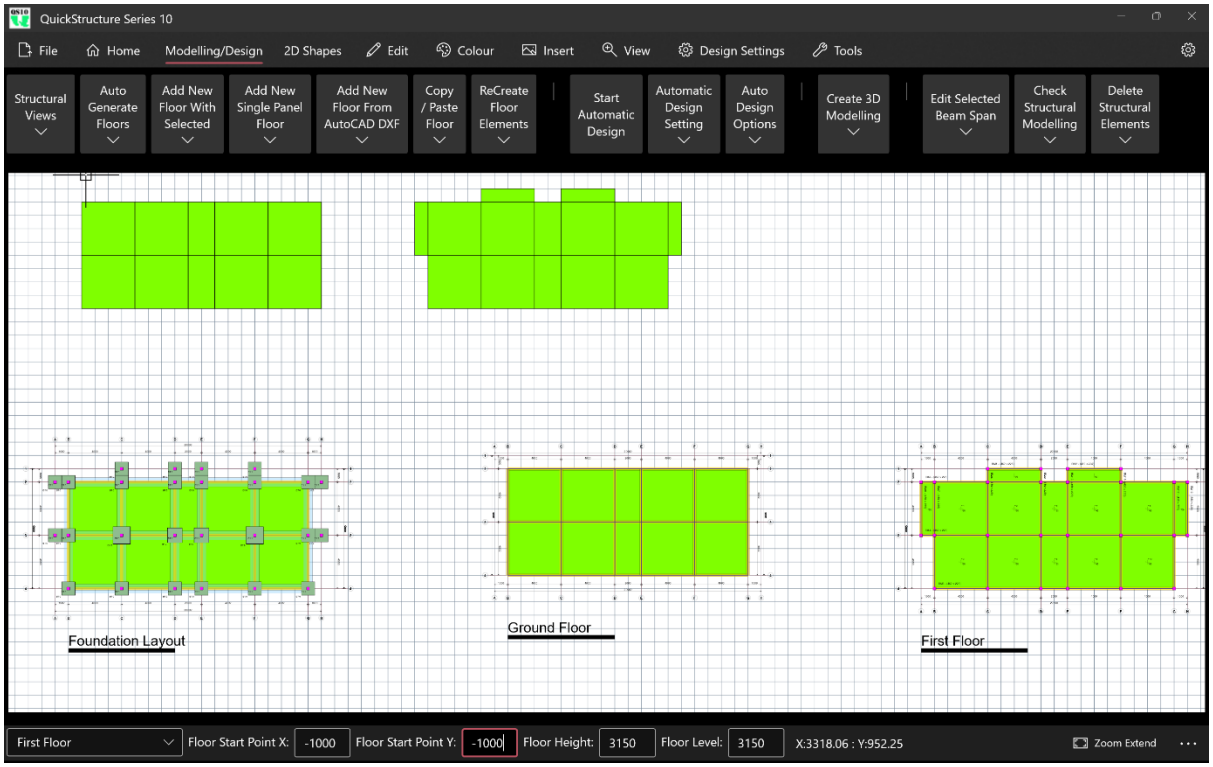


- Change Floor Start Point X: -1000 and Press Enter key
- Change Floor Start Point Y: -1000 and Press Enter key



When you change the floor start point and press enter, the foundation will be corrected.

When we add the roof beam level we will use a different method to achieve the goal.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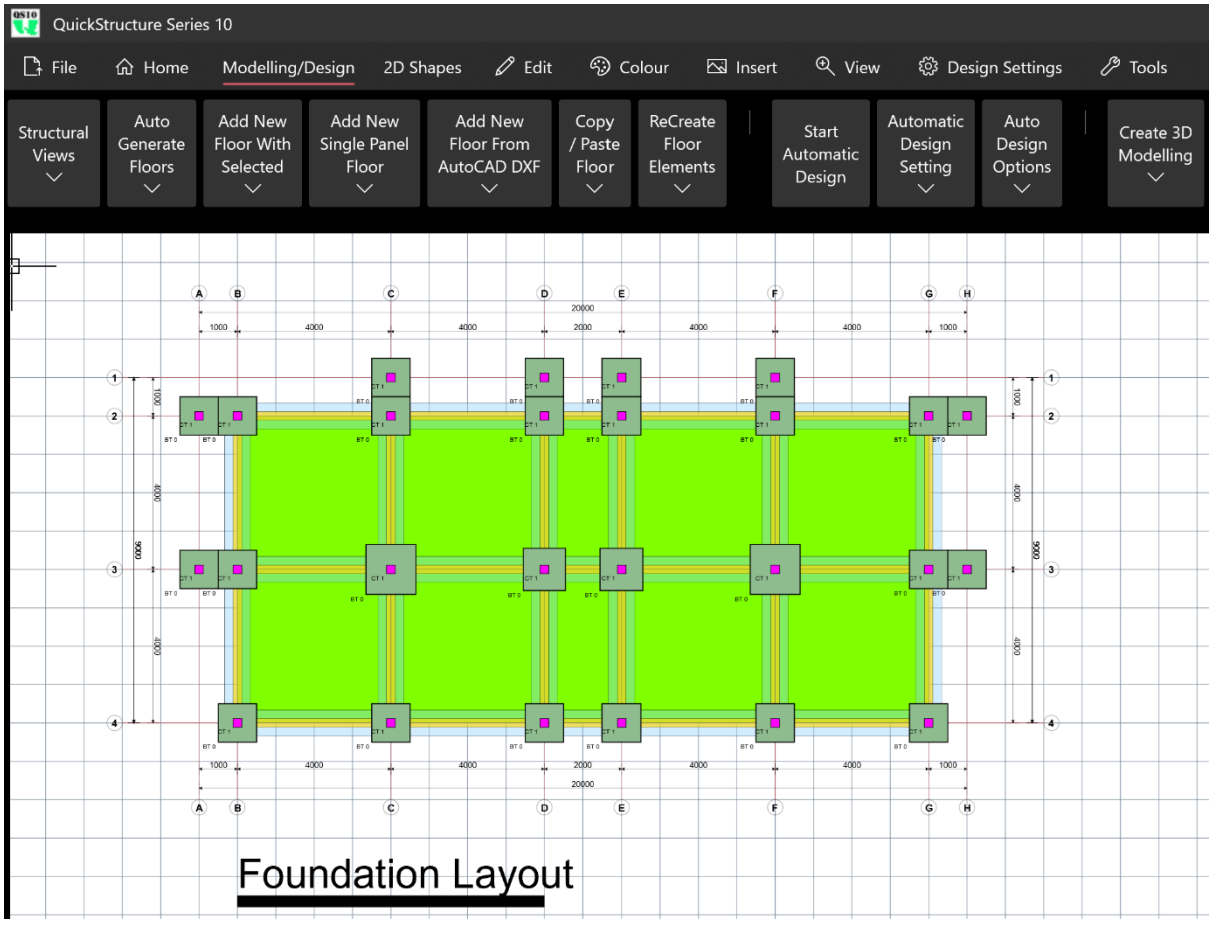
Edit Selected Beam Span
Check Structural Modelling
Delete Structural Elements
Foundation Layout
Ground Floor
First Floor
First Floor
Floor Start Point X:
-1000
Floor Start Point Y:
-1000
Floor Height:
3150
Floor Level:
3150
X:3318.06 : Y:952.25
Zoom Extend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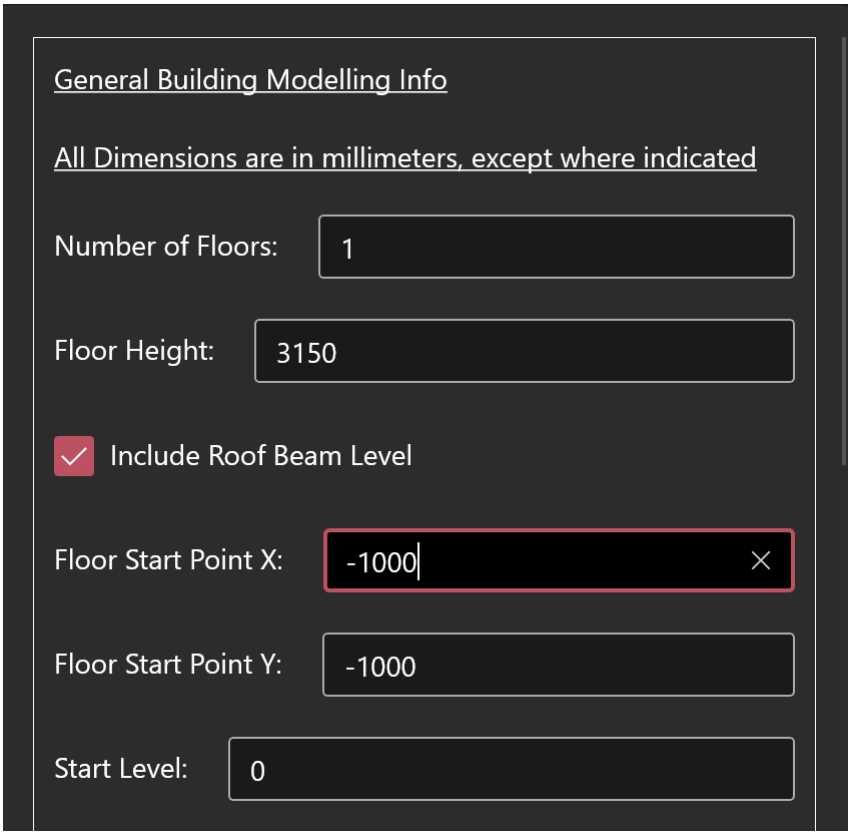
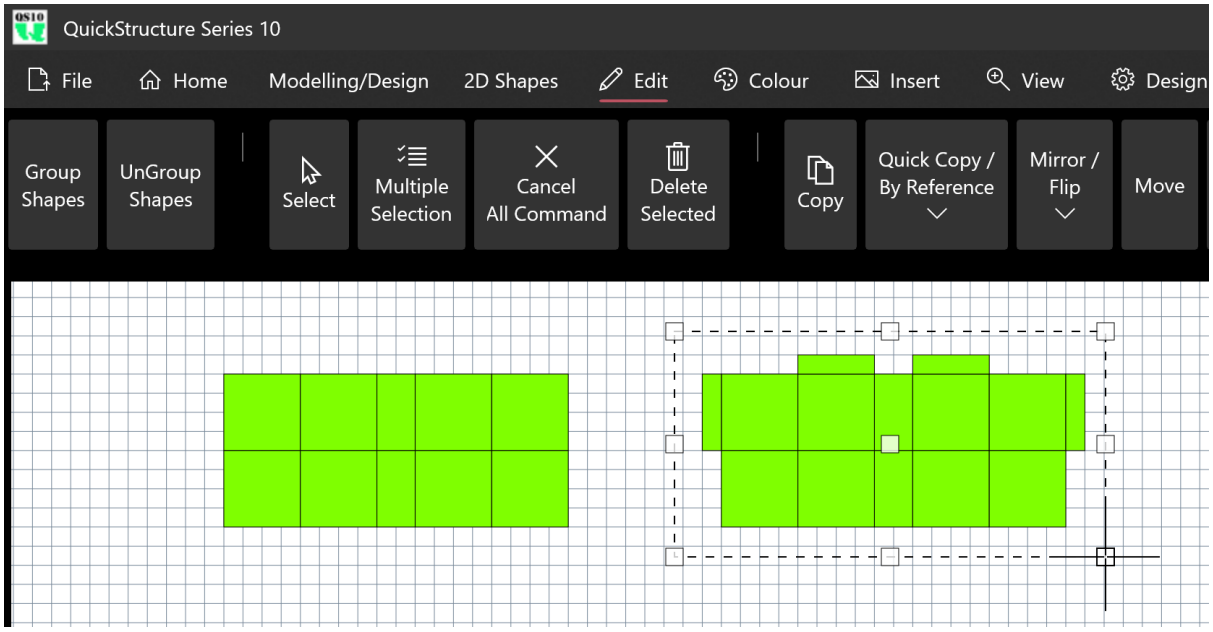
Add New Single Panel Floor
Add New Floor From AutoCAD DXF
Copy / Paste Floor
ReCreate Floor Elements
Start Automatic Design
Automatic Design Setting
Auto Design Options
Create 3D Modelling
Foundation Layout

15. Add the Roof Beam Layout
    - Click Design Settings and click Structural Modelling Settings.
    - Set Floor Start Point X: -1000
    - Set Floor Start Point Y: -1000

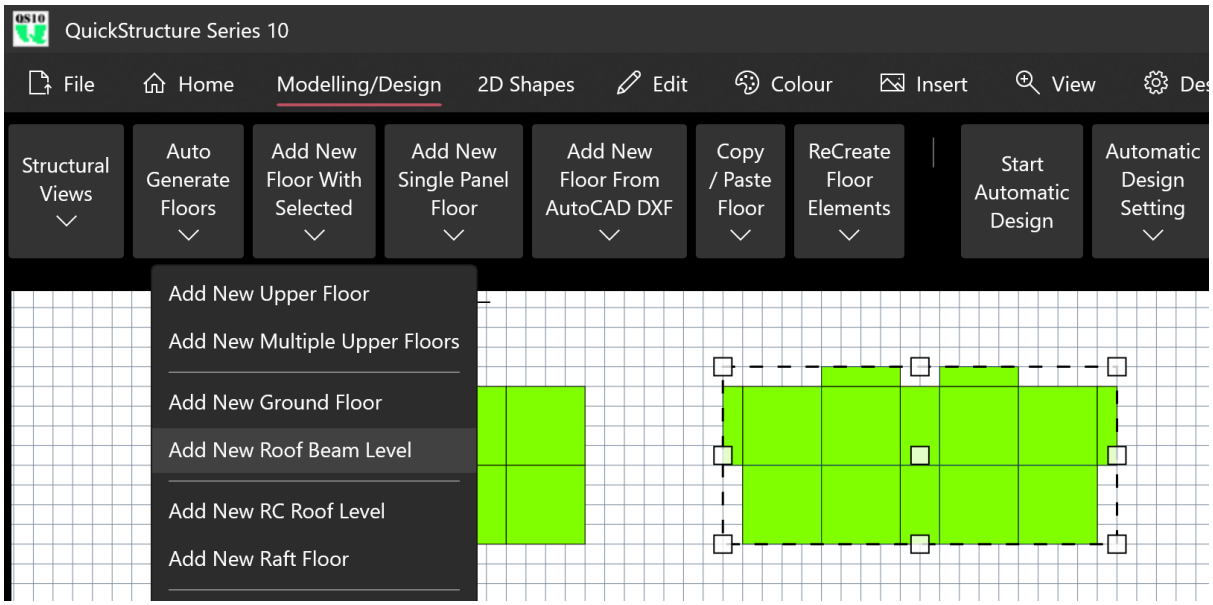


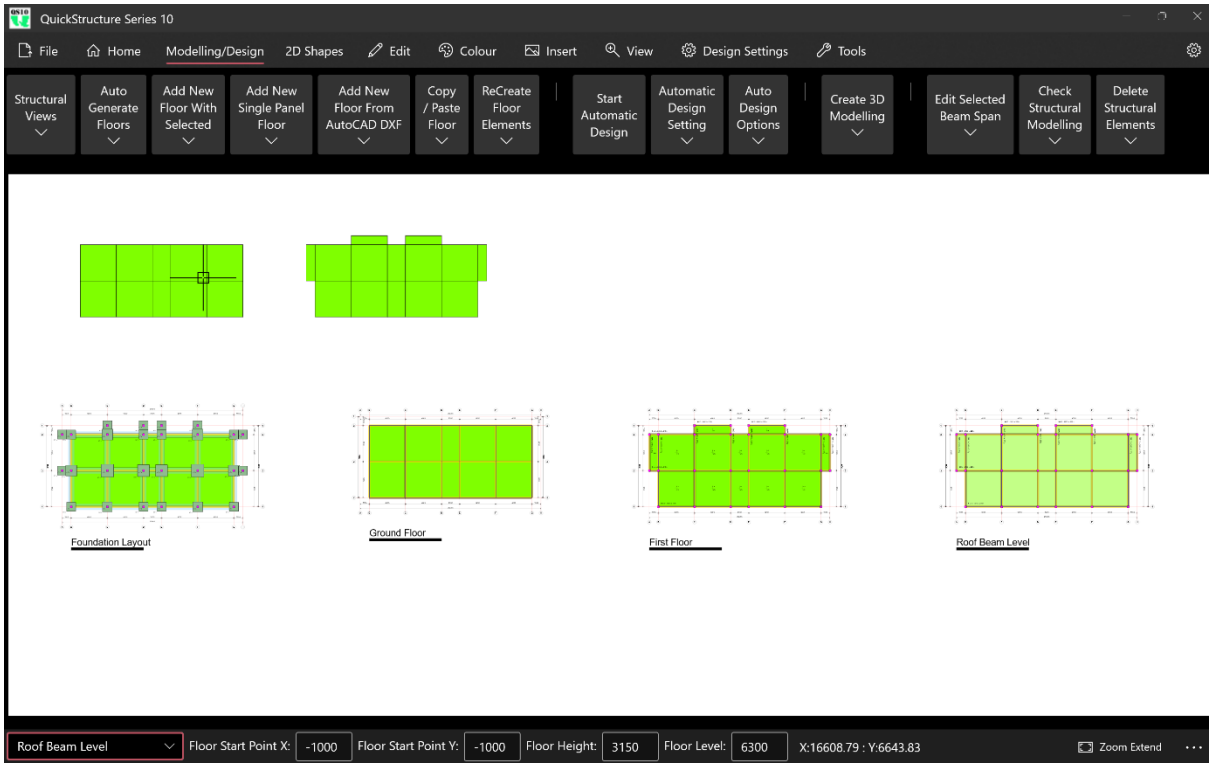
This setting will enable us to set the floor start point before we add the floor.

- Click Edit tab, click Multiple Selection and select the rectangles as shown below.

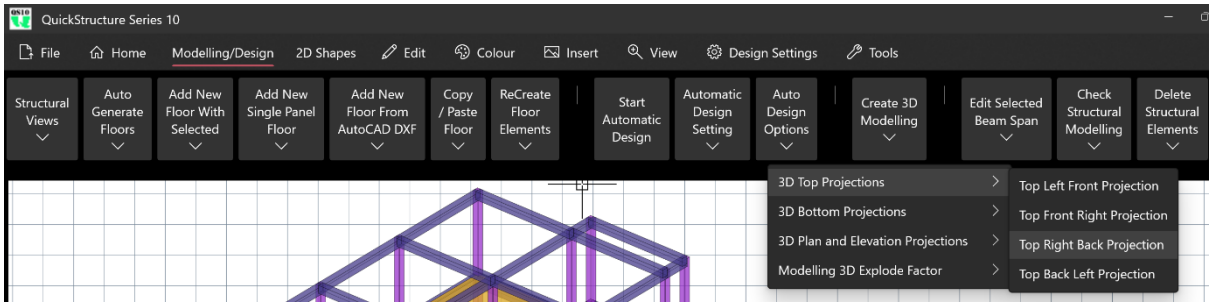


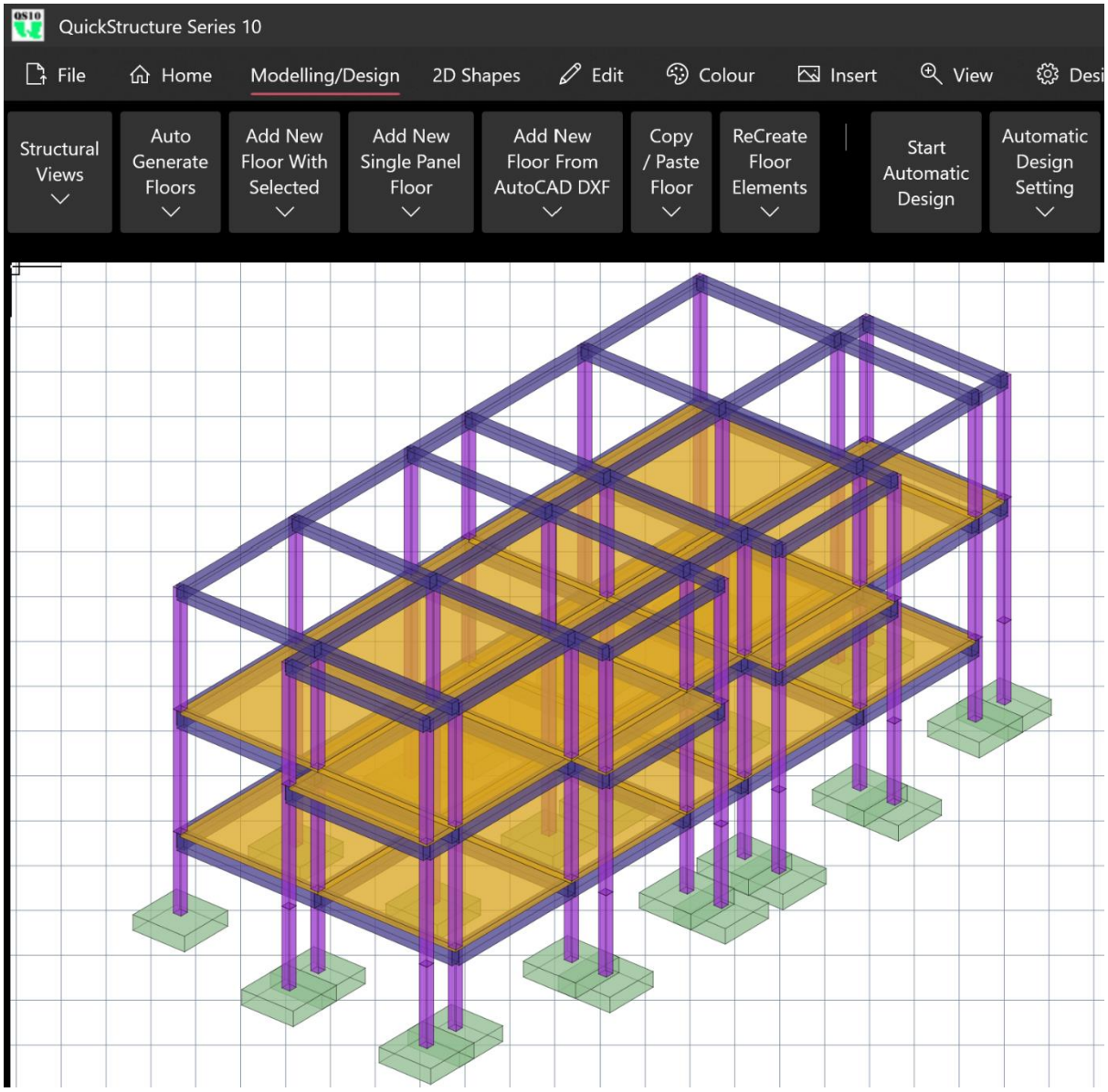
- Click Modelling / Design tab, Click Add New Floor With Selected, and Click Add New Add New Roof Beam Level (As shown below).





- Click Modelling/Design, click Create 3D Modelling, click 3D Top Projections and click Top Right Back Projection.



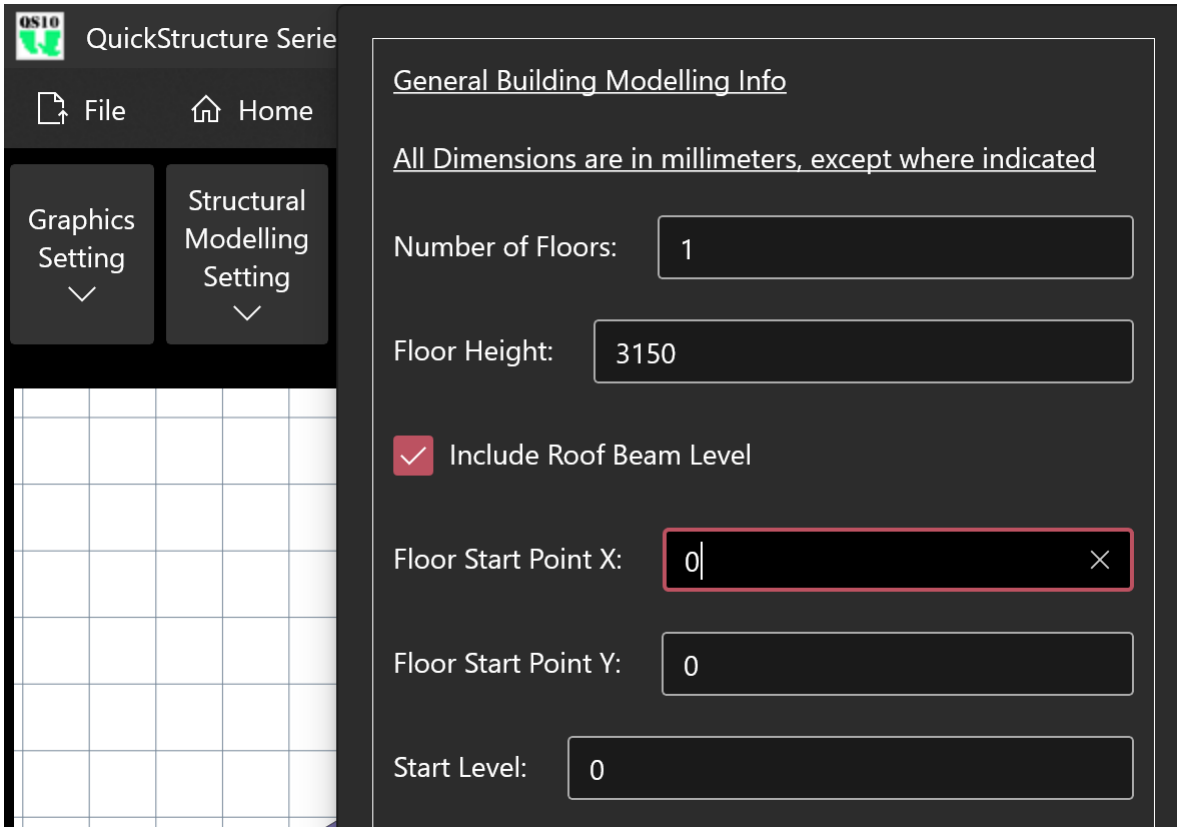


Note:

- From the above drawing, you can see that the roof beam level columns and the first floor columns are aligned very well. So, as you can see, you can set the floor start point before you add the floor or after you add the floor.

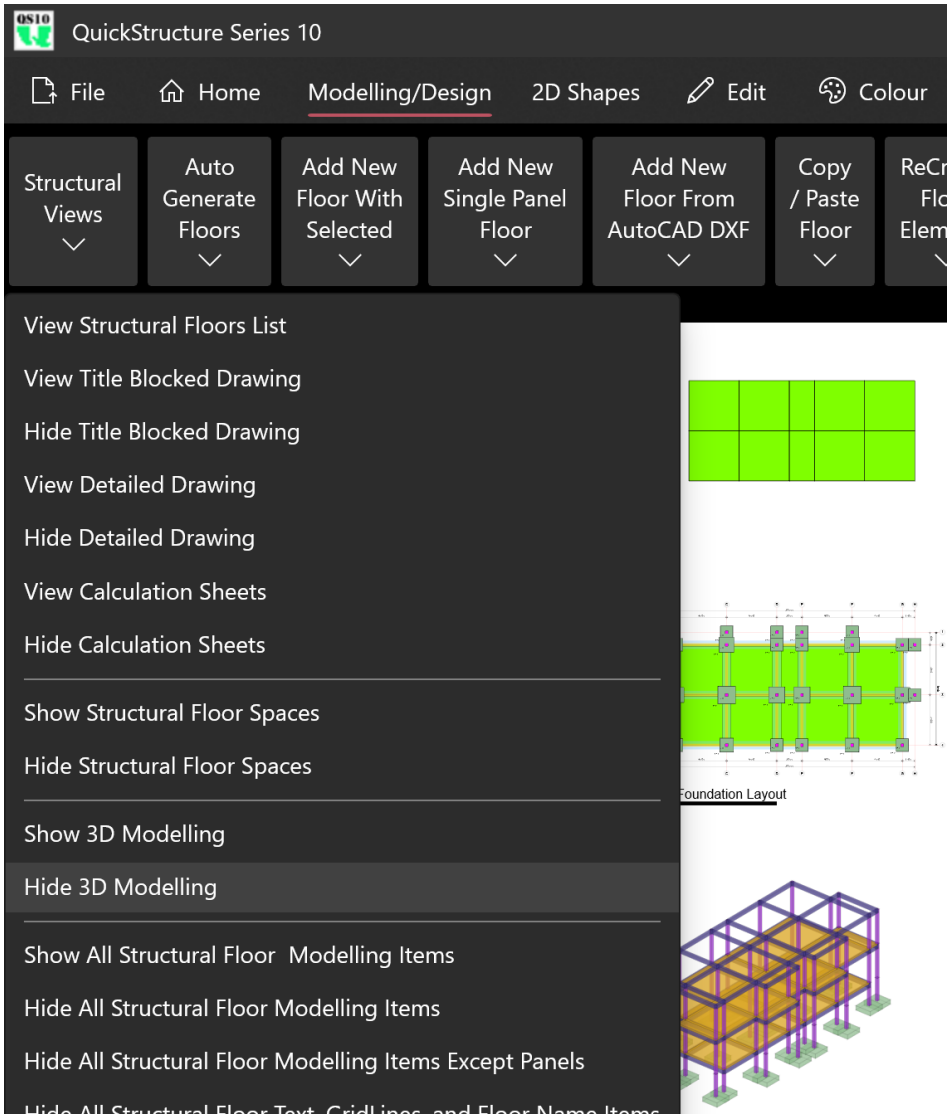
- Please always remember to set the design settings floor start point back to (0,0) after you finish adding the floor.

16. Click Design Settings, click Structural Modelling Setting and set the Floor Start Point X:0, Floor Start Point Y:0



- Is always a good practice to set floor start point X,Y to 0 after adding the floors. If you forget it could be used when next you add another floor.
- You can always project the 3D to see how the modelling is looking. You can always hide the 3D after viewing it.

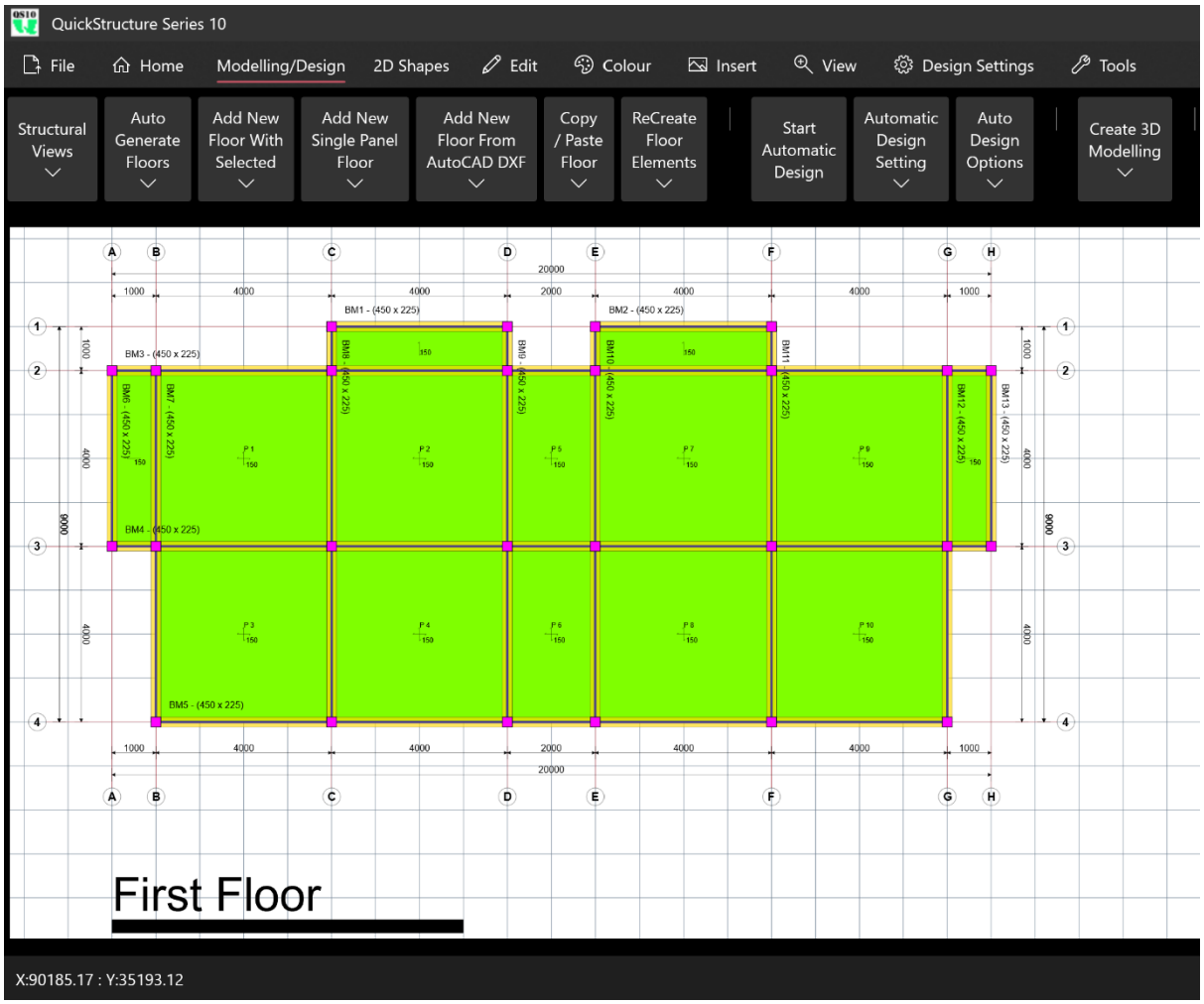
17. Hide the 3D model. Click Modelling/Design, Hide 3D Modelling.



- We don't need the 3D right now, we need to do more editing.

Before we do further editing this is a good place to save the structural modelling.

Editing the First Floor layout



- We need to remove the columns at the cantilever slabs, once we do that it will be removed at the foundation layout.
- We will edit the cantilever panels and also the cantilever beams.
- It could be a little bit complicated, but I will guide you through it all. Once you get use to it, you will see it is easy to do.
- Editing the floor layouts is the most difficult part of the modelling stage.

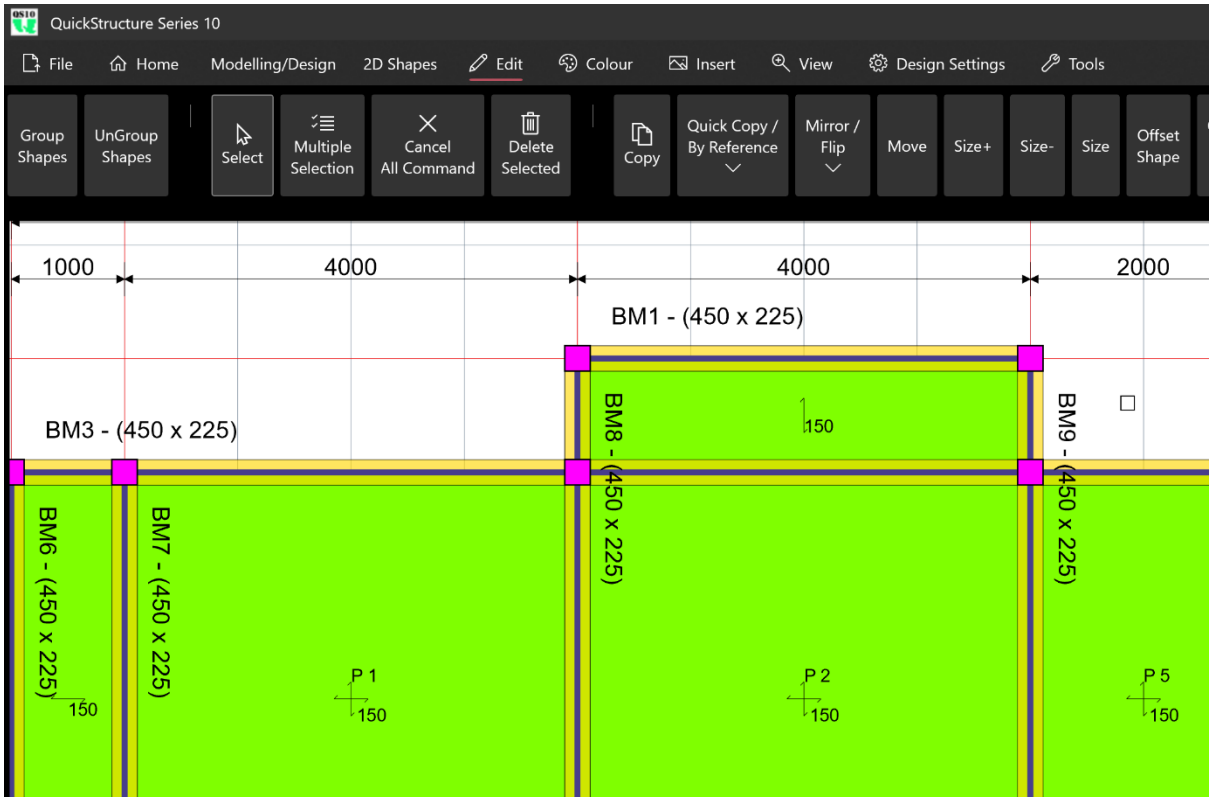
Note:

There is an order in editing the floor layout.

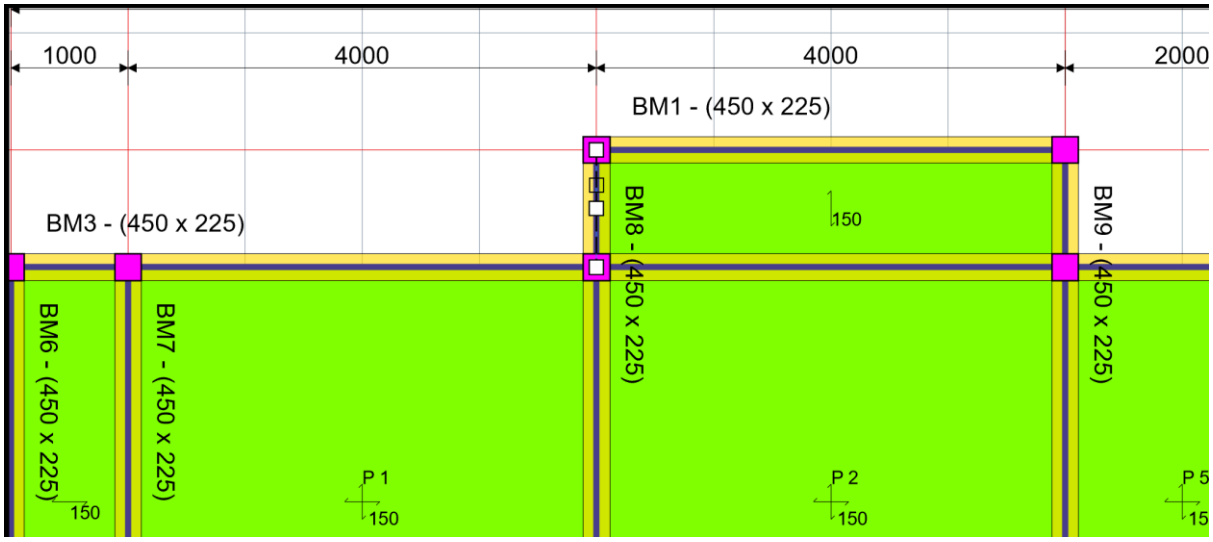
a. Remove Beam Span
b. Remove columns

This order is very important. You need to remove the beam spans before you remove the columns. The reason is that the software will try to recreate the columns each time you remove a beam span. The only exception to this is if you remove the beam span only. We will see these examples later.

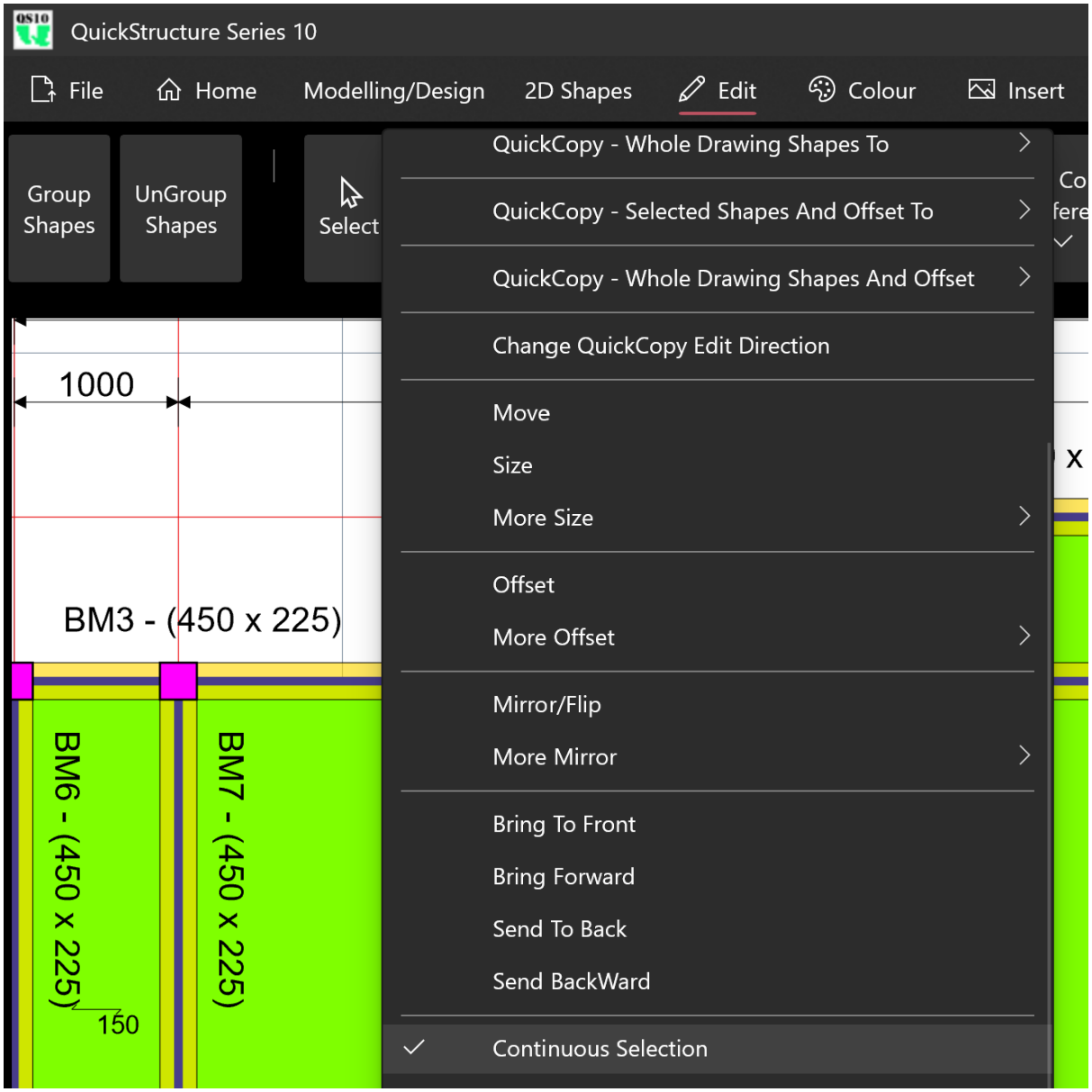
18. Zoom into the part of the first floor we are about to edit. It is better to use the mouse wheel.



- Click Edit and click Select and select the beam span shown below

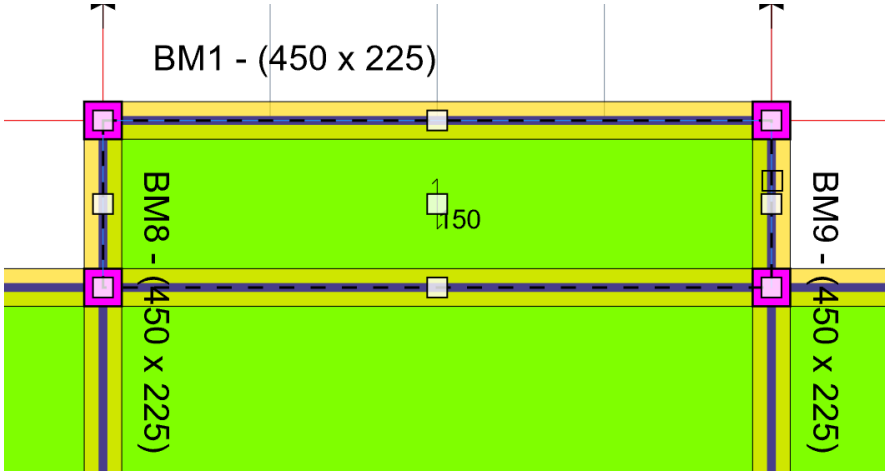


- Click Edit and click Continuous Selection from the menu.

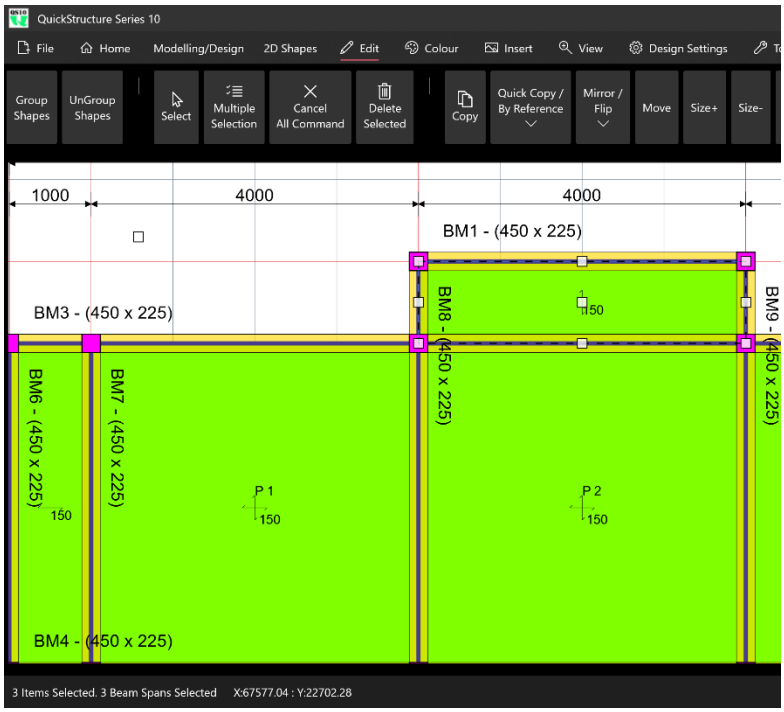


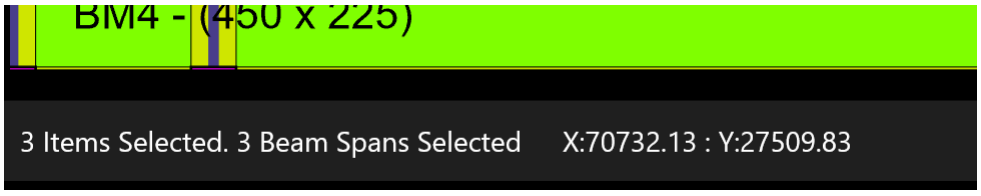
This will enable use to select many beam spans at a time.

- Select the order beam spans as shown below



When you select a beam span it will select and show you the number selected below the software window.

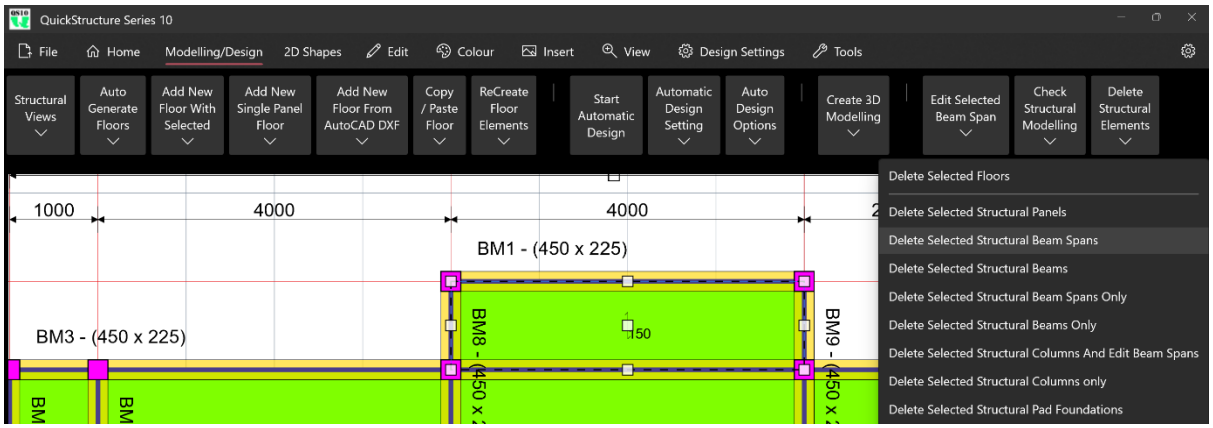




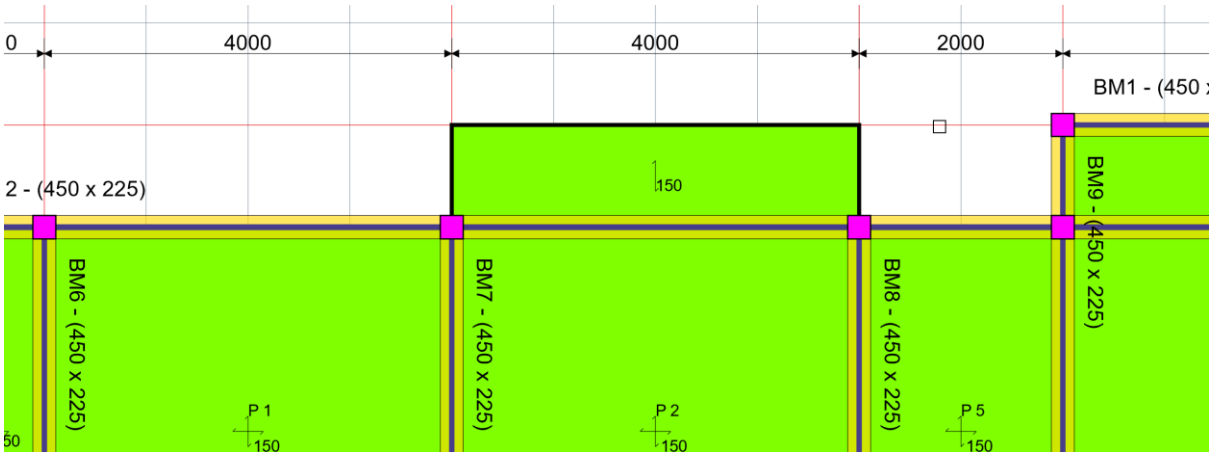
As you can see, it shows above, 3 Items Selected, 3 Beam Spans Selected.

This is very important it allows you to know how many beam spans you selected.

- Click Modelling/Design tab, click Delete Structural Elements and click Delete Selected Structural Beam Spans.

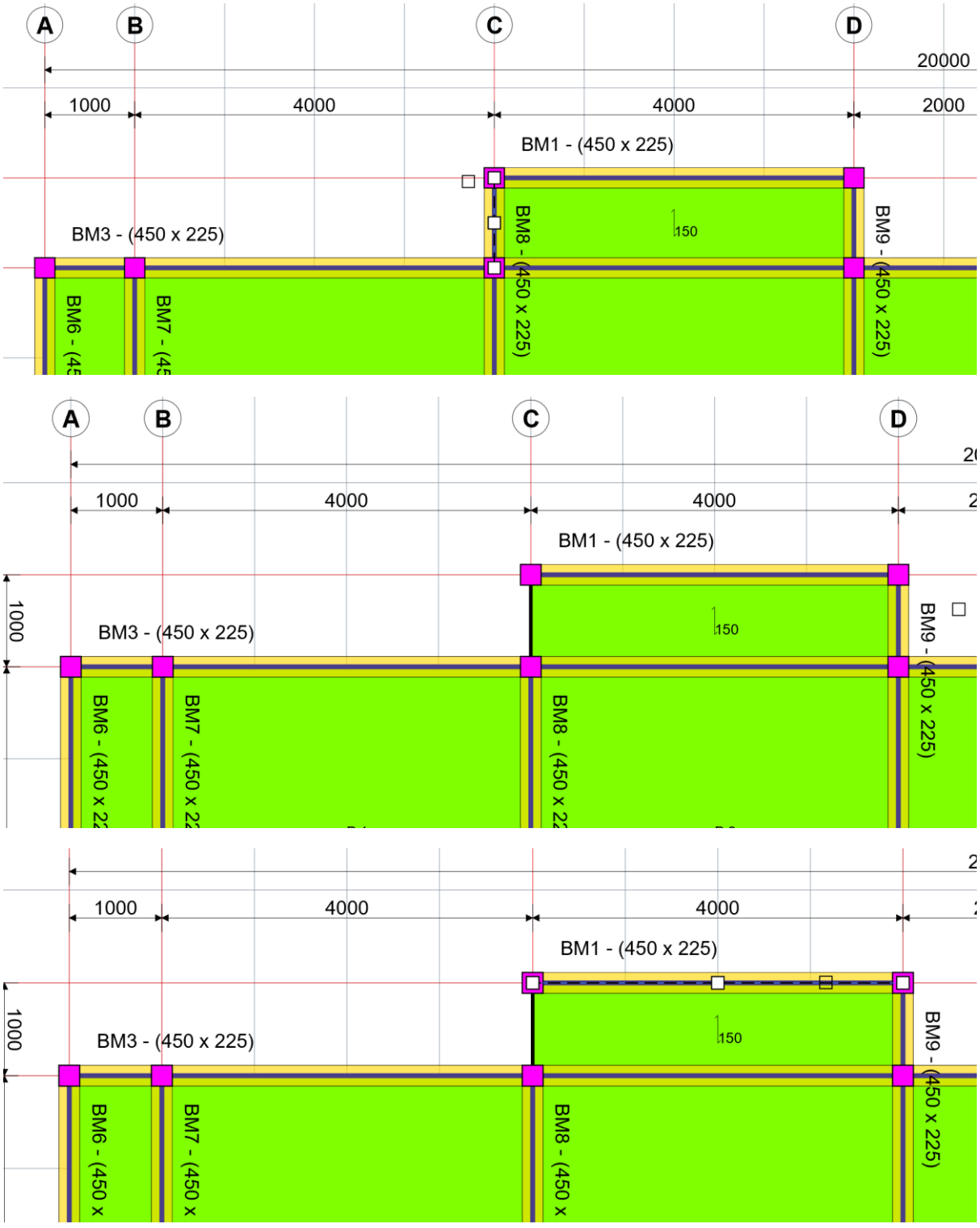


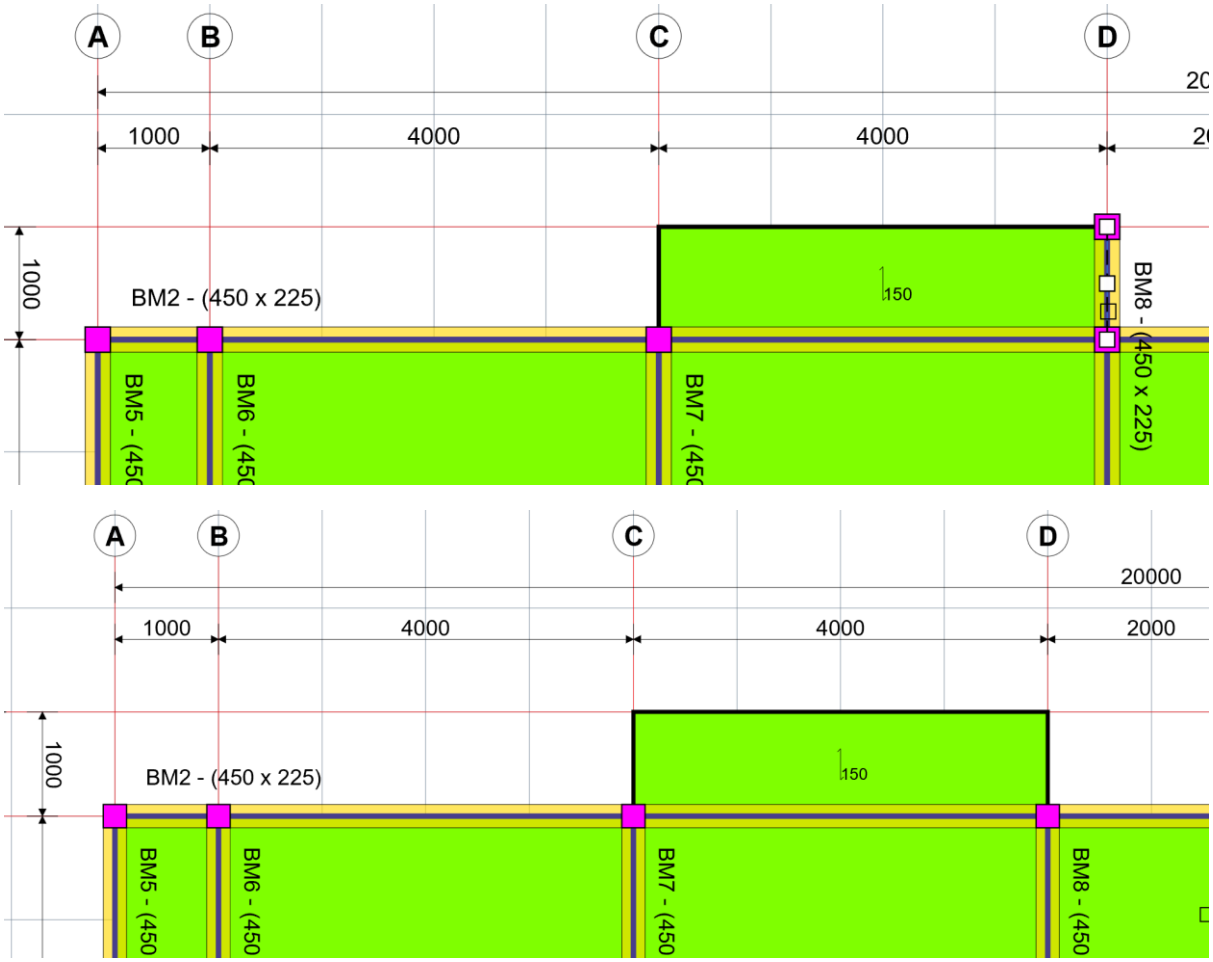
As you can see from the drawing below, the beam span and the column is gone.



Note:

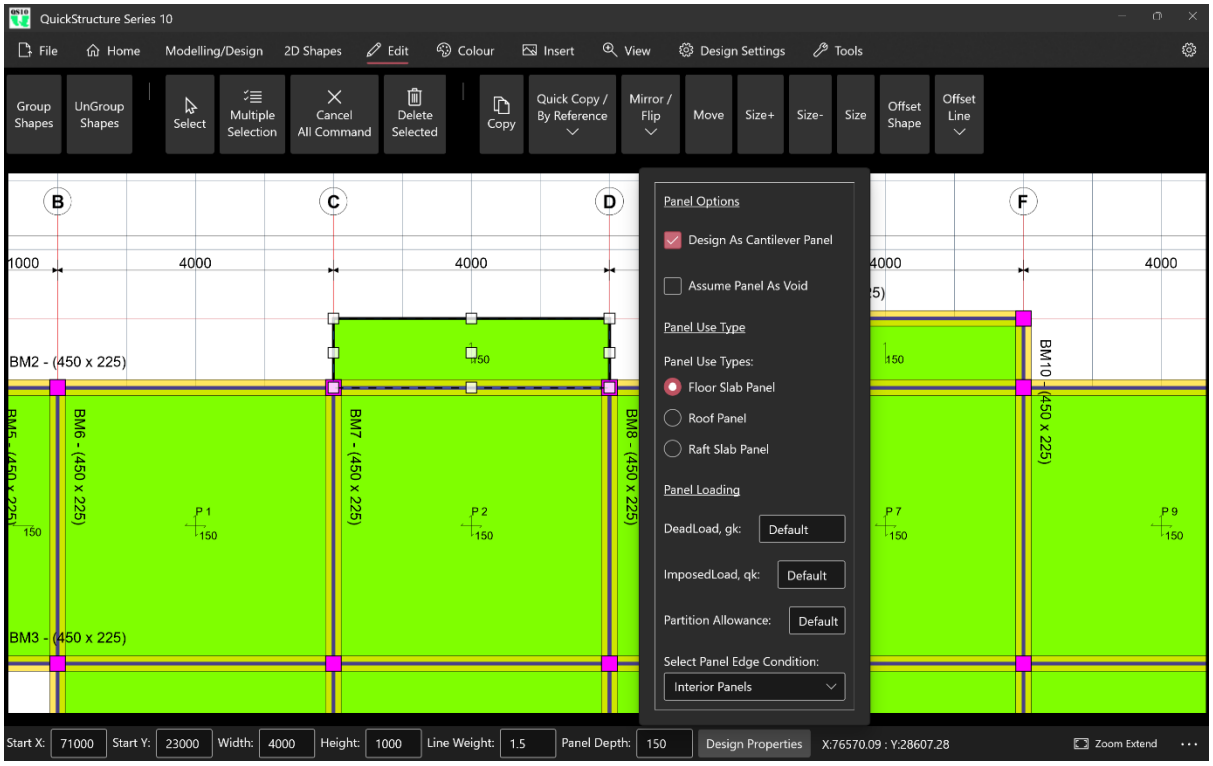
You can also delete the beam spans one after another as shown below.



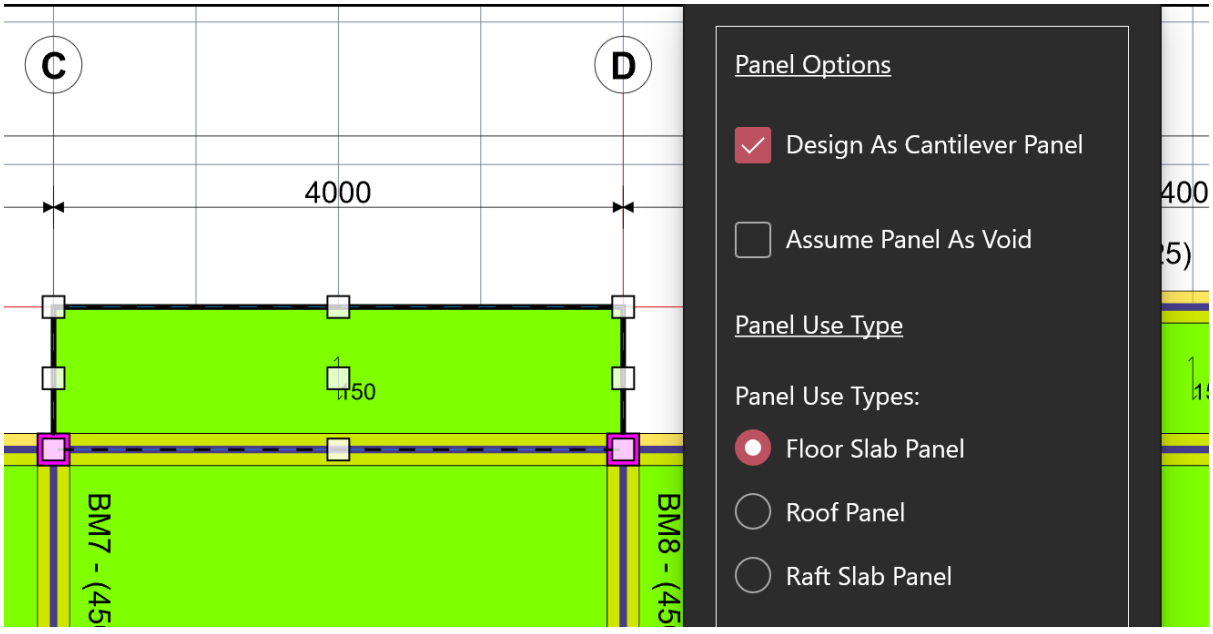


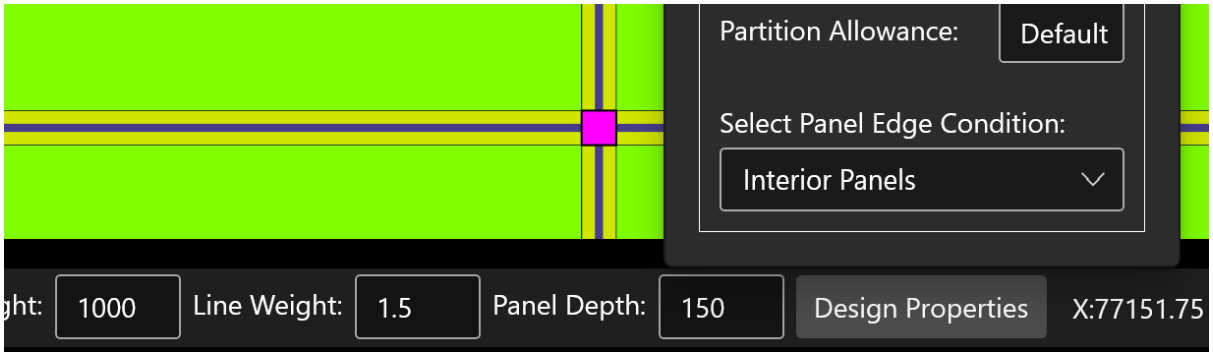
As you can see, you can select the span one by one and click Modelling/Design, click delete structural elements and click delete selected structural beam span. Sometimes is safer to do it this way so that you don't accidentally delete unintended beam span.

19. Set the cantilever slab as Cantilever
    - Select the cantilever panel as shown below.



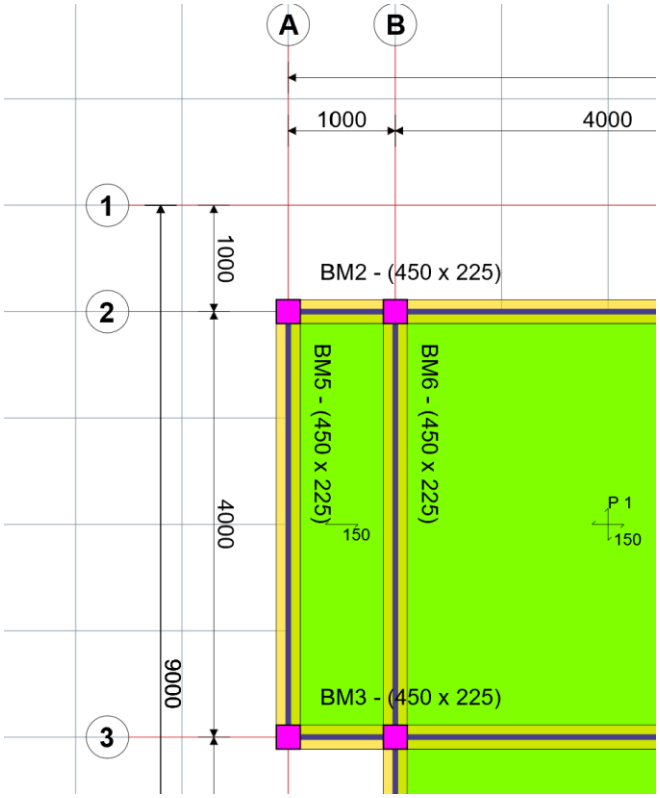
    - Click the Design Properties button, and check the Design As Cantilever Panel as shown above.





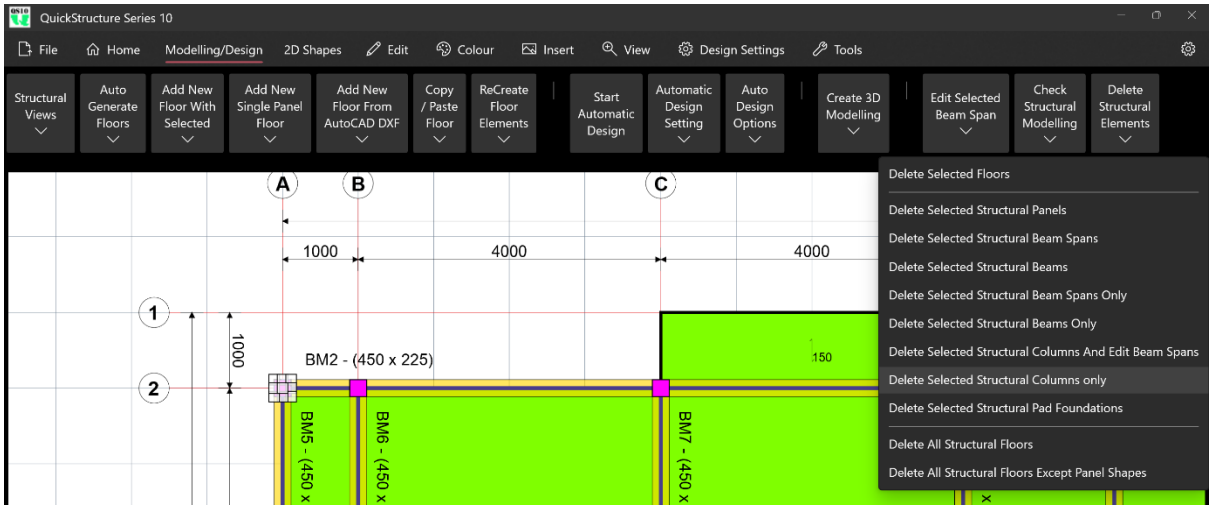
With that action we indicate that the panel is cantilever slab panel.

20. Remove the first floor columns at grid 2A and 3A in the cantilever shown below. This time the beam will be cantilevered.

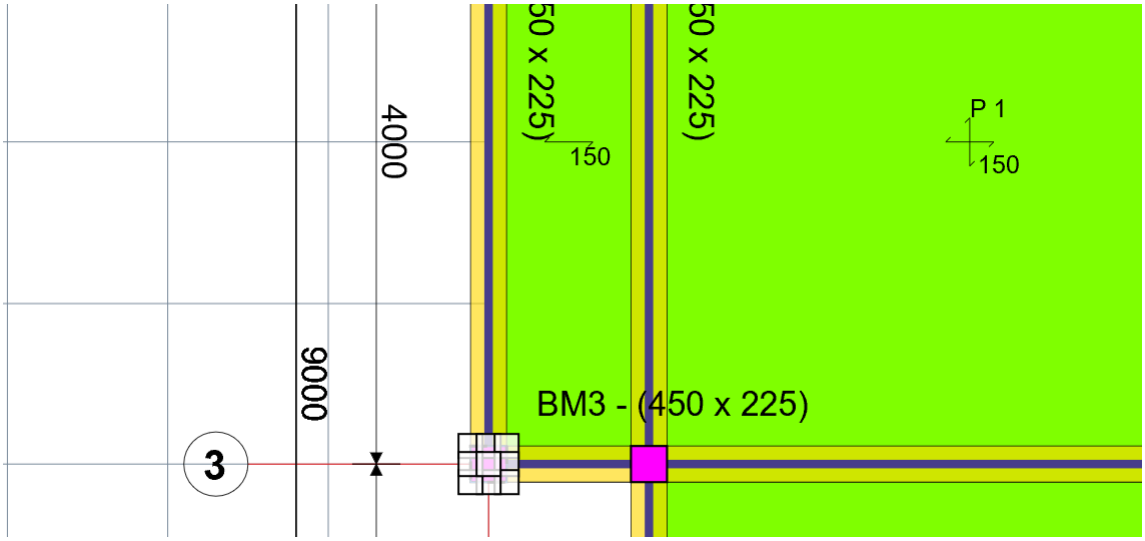


- Zoom into this area very well

- Select Column at grid 2A

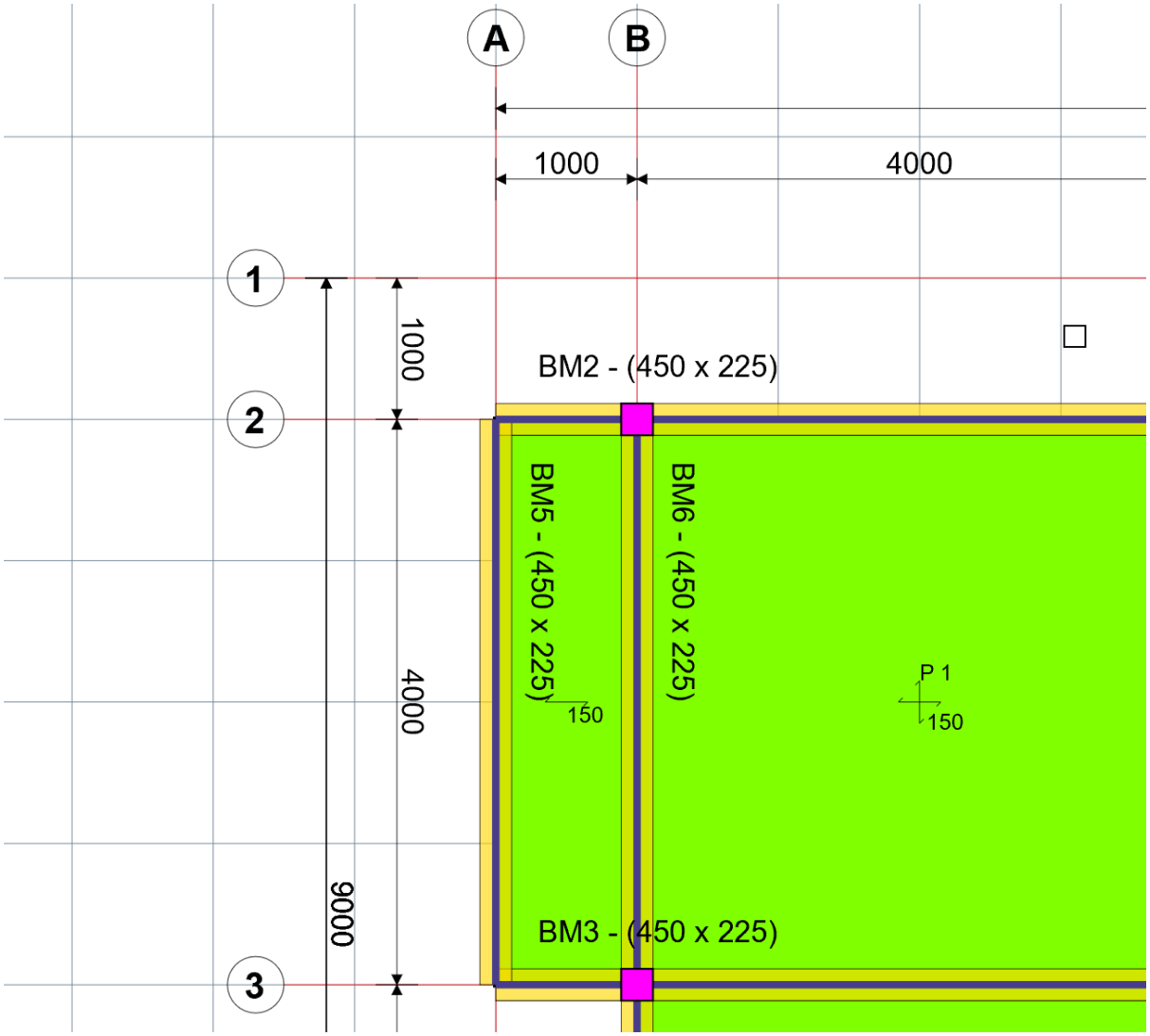


- Click Modelling/Design, click Delete Structural Elements and click Delete Selected Structural Columns Only.
- Select Column at grid 3A
- Click Modelling/Design, click Delete Structural Elements and click Delete Selected Structural Columns Only.

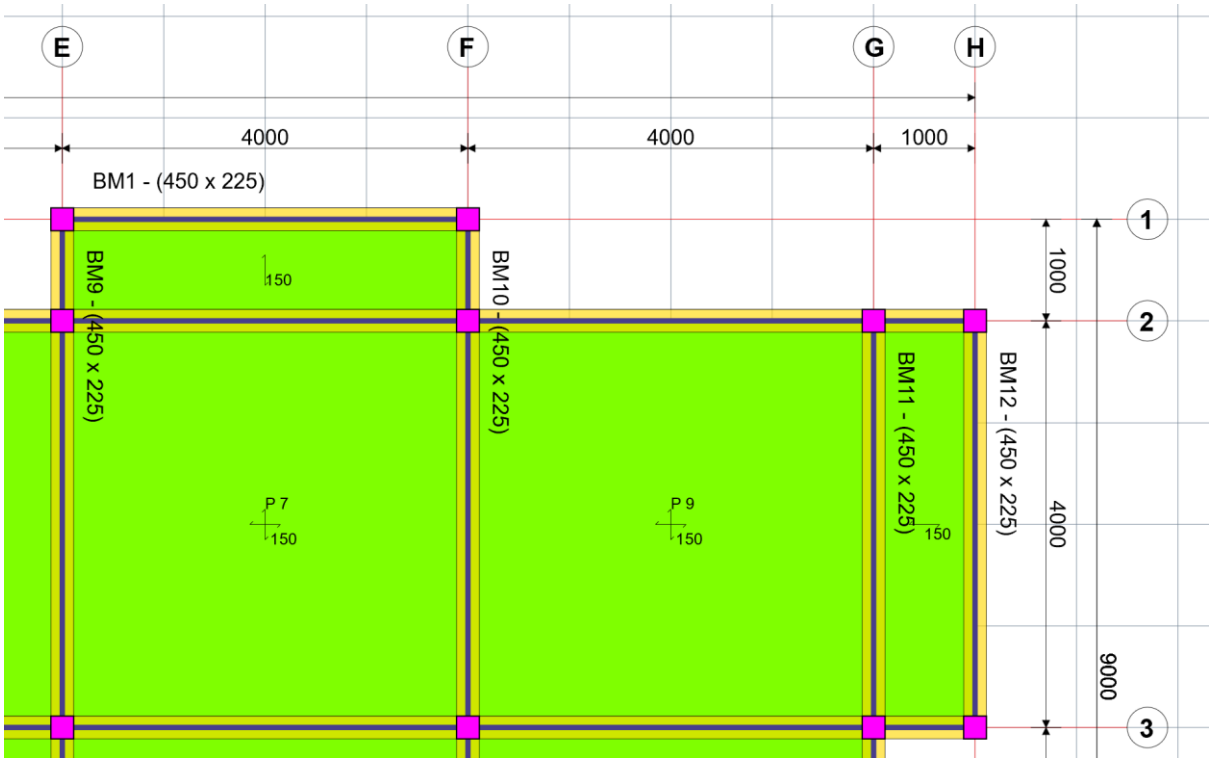


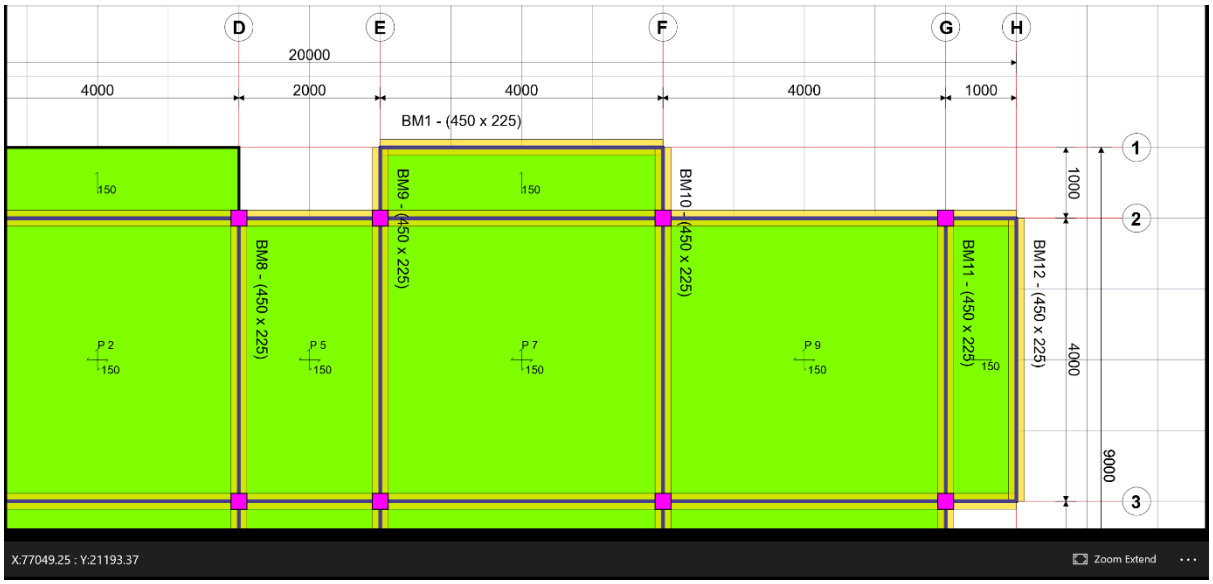
You can select both columns at the same time and delete it. You can only click Edit and click Continuous Selection to allow you to select many items at a time.

Also notice we didn't use Multiple Selection in the operation. We used Select because we want to make sure is the item we need that is selected.

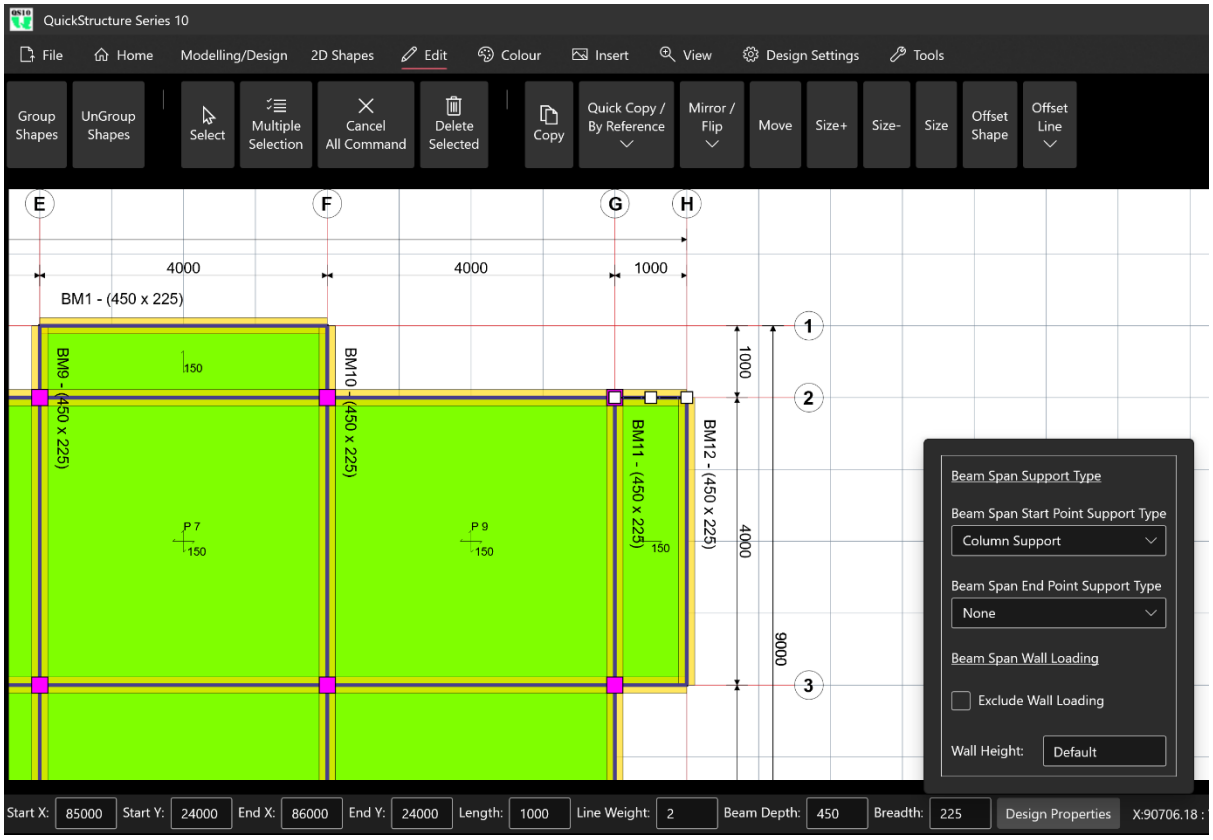


21. Next Delete the columns at grid 1E, 1F, 2H, 3H
    - Select those columns, click Modelling / Design, click Delete Structural Elements and click Delete Selected Structural Columns only

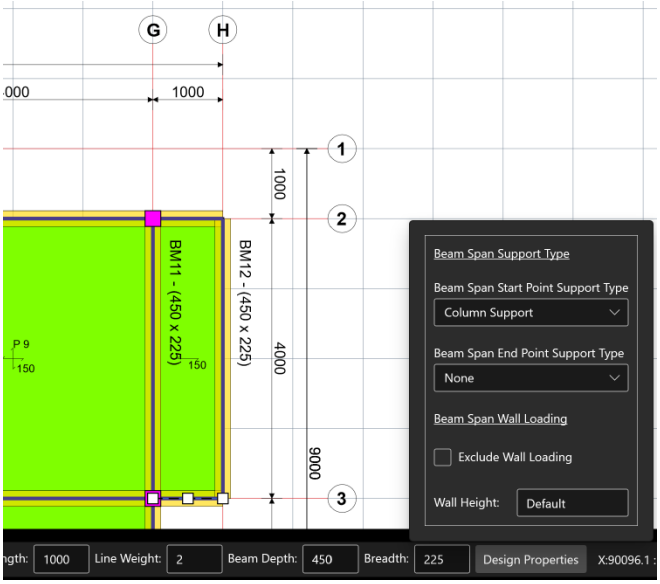




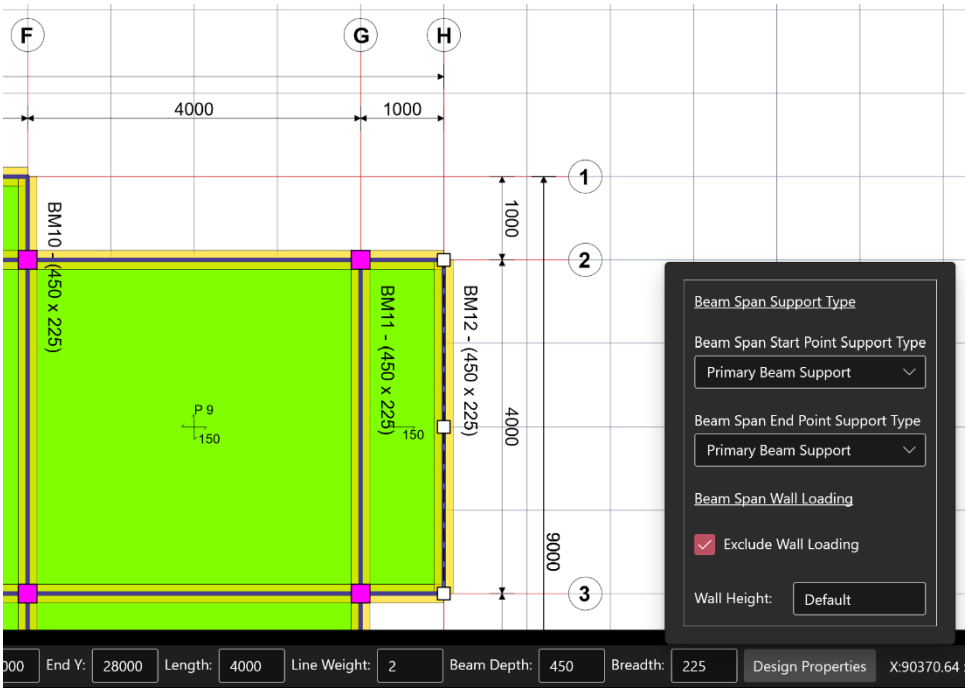
22. Select Beam Span grid 2G-2H as shown below, click Design Properties and change the Beam Span End Point Support Type to None.



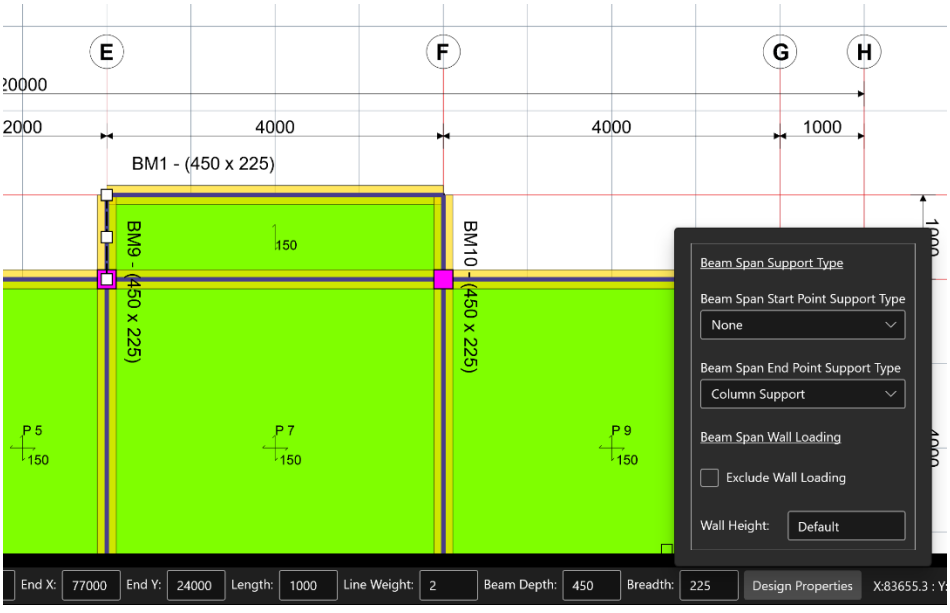
- Select Beam Span 3G-3H and change the end span support type to None.



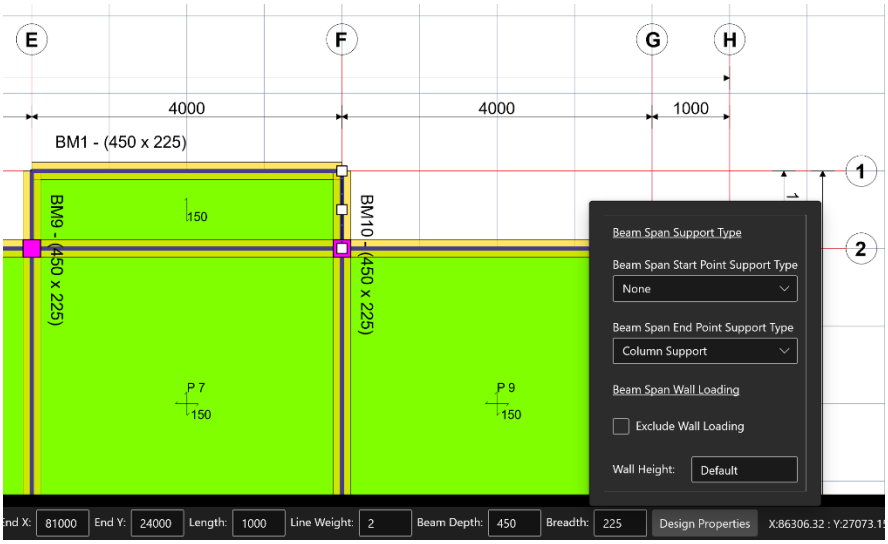
- Select Beam Span grid 2H-3H and change both the start point support type and end point support type to Primary Beam Support. Also check Exclude Wall Loading



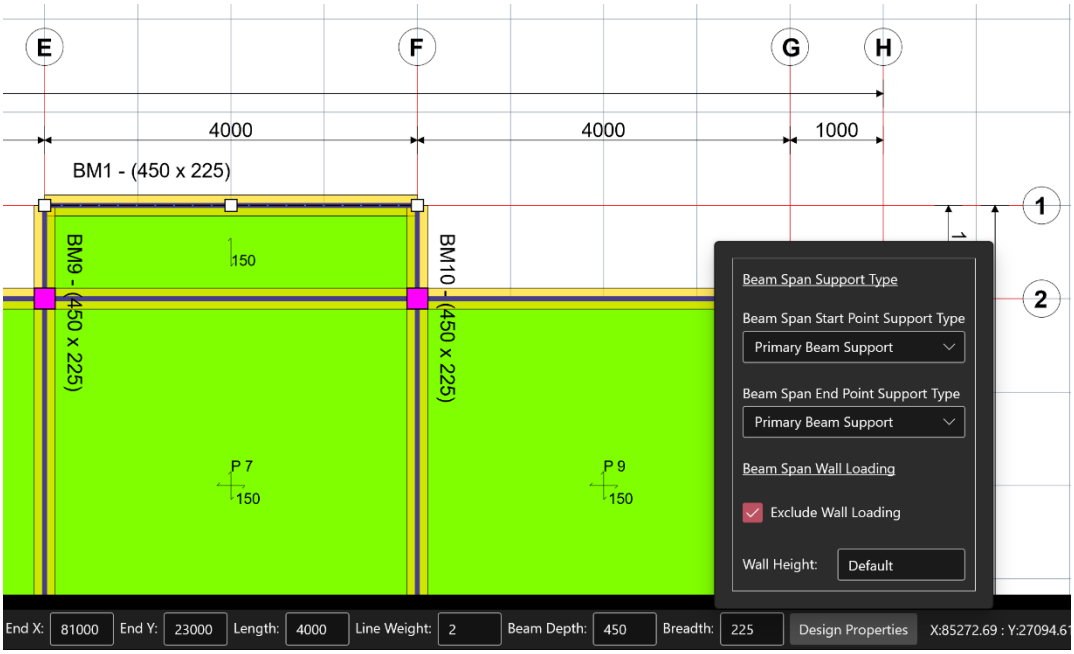
23. Select Beam Span grid 1E-2E as shown below, click Design Properties and change the Beam Span Start Point Support Type to None.



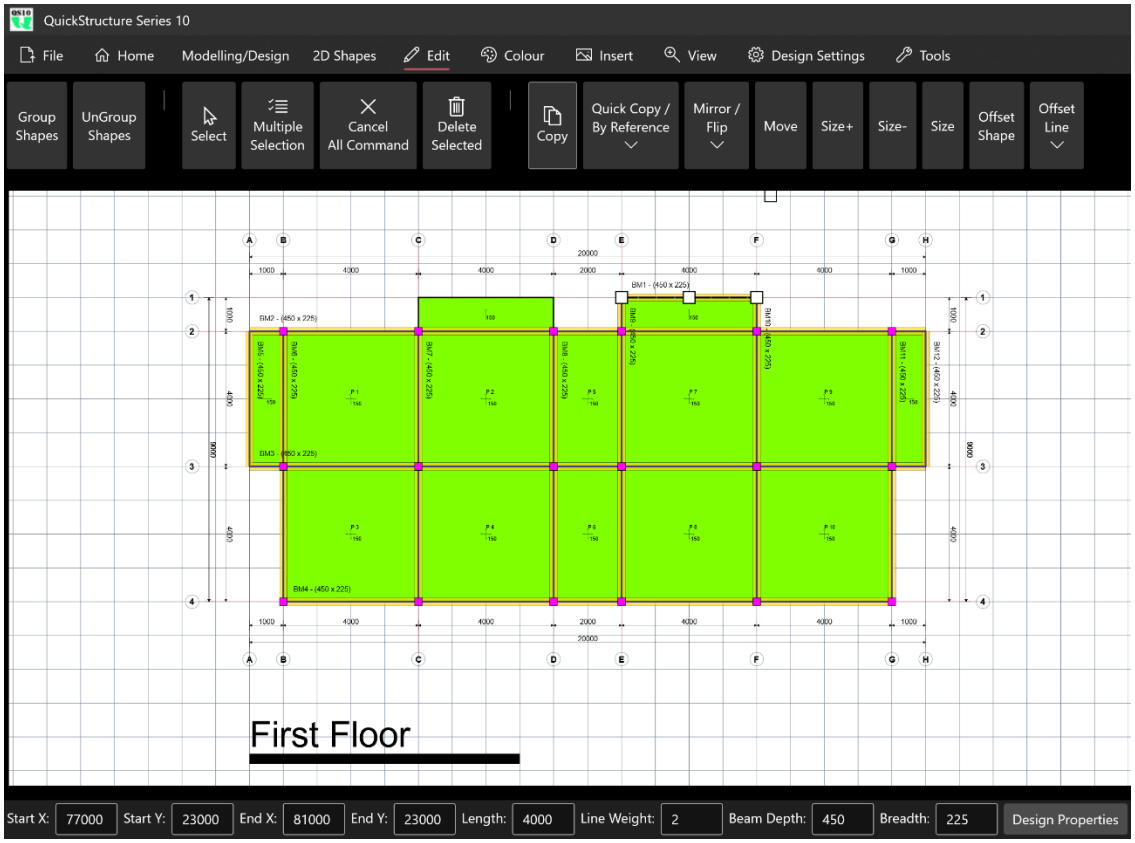
- Select Beam Span 1F-2F and change the start span support type to None.



- Select Beam Span grid 1E-1F and change both the start point support type and end point support type to Primary Beam Support. Also check Exclude Wall Loading



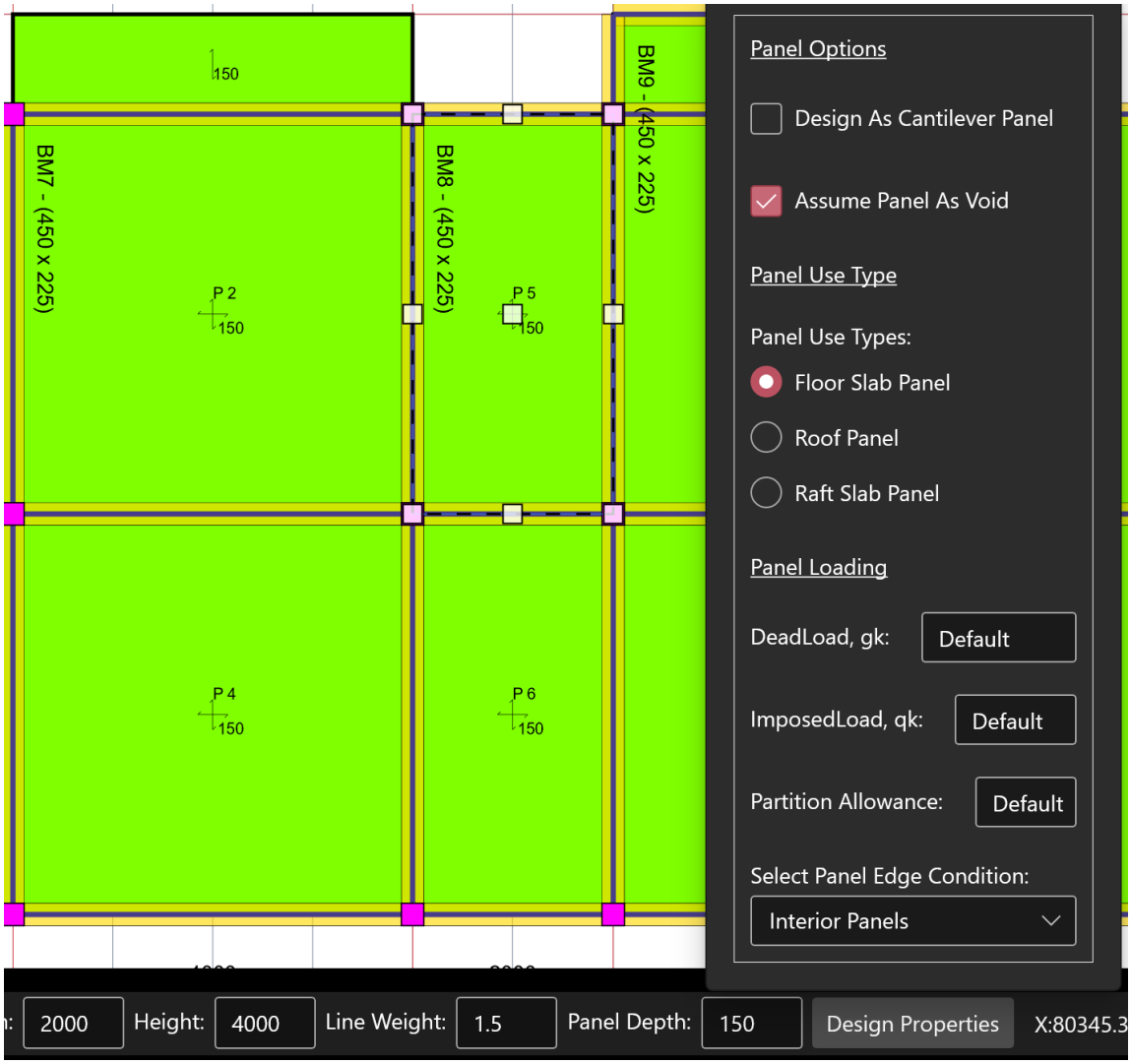
Now we have finished editing the columns and the beams of the first floor.



Next, we save project and later we set some panels as void (staircase)

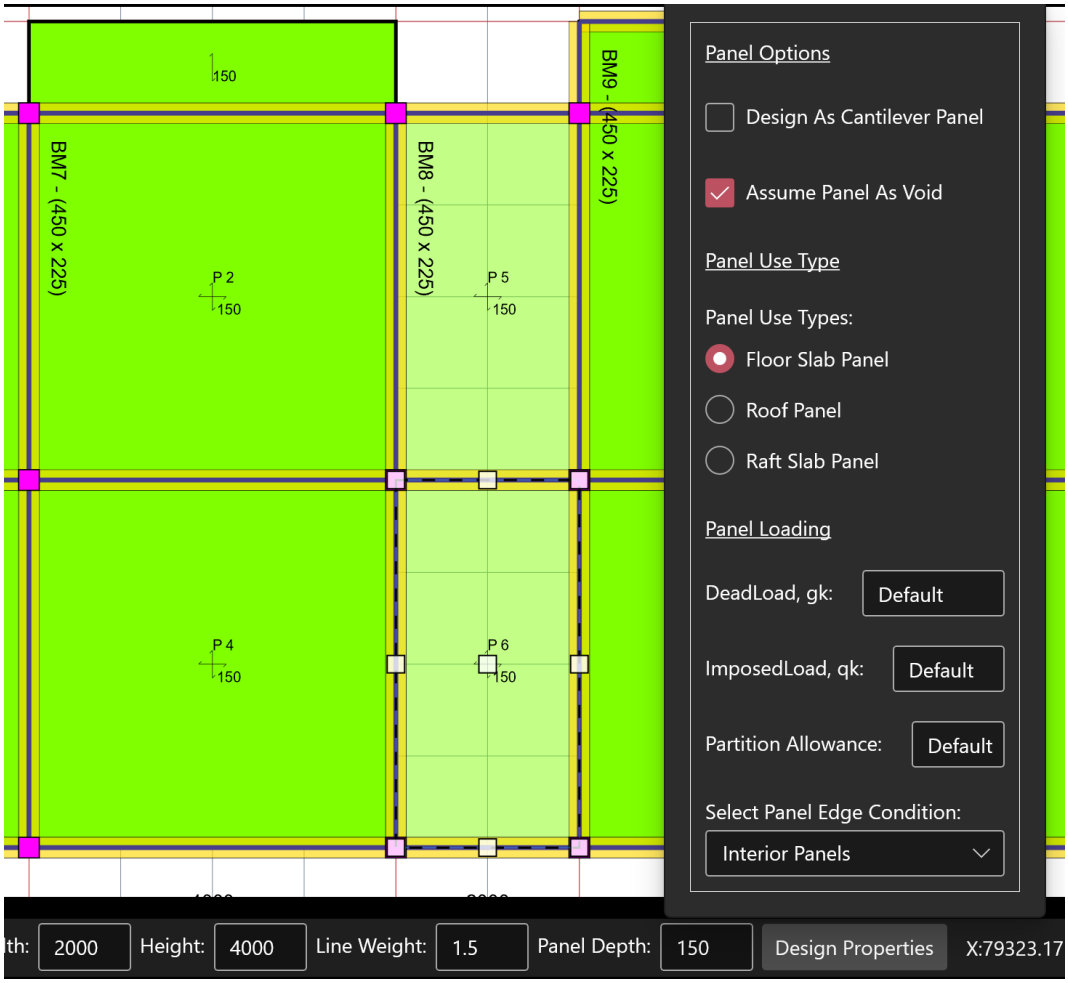
24. Click File and click Save Project

25. Select Panel 5, click Design Properties and check Assume Panel As Void.



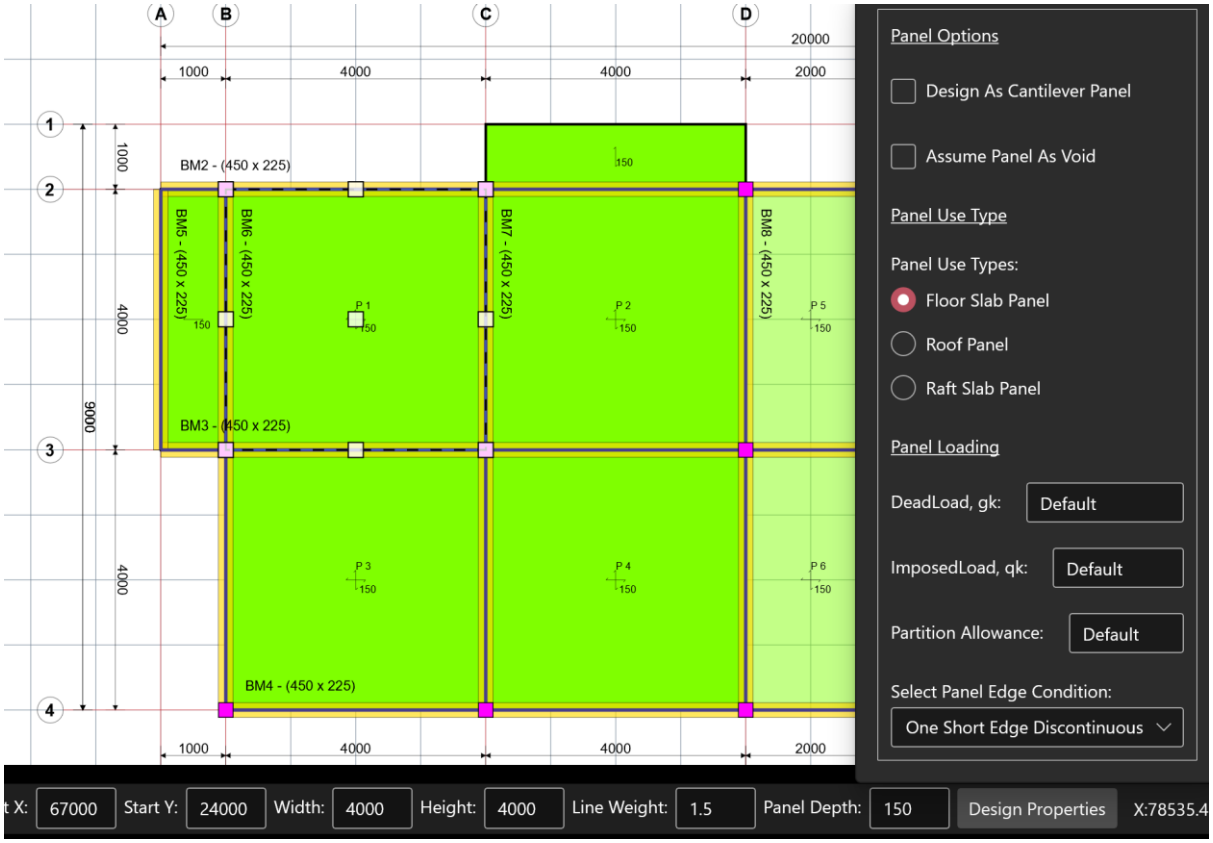
This will let the software know that the panel is void or staircase void.

26. Select Panel 6, click Design Properties and check Assume Panel As Void.



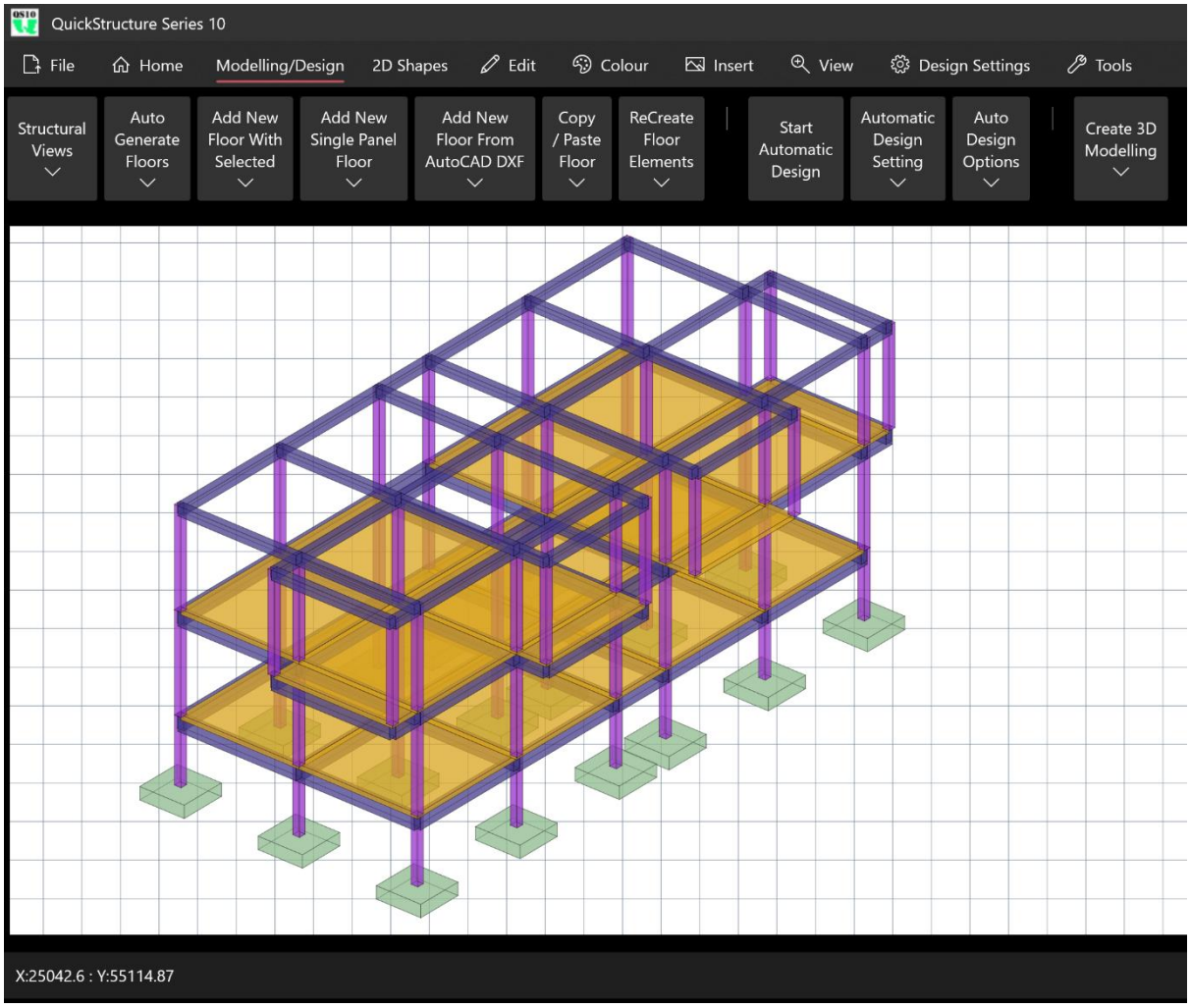
Next, we set the panel end conditions.

27. Select Panel 1, click Design Properties and change the Panel Edge Condition: One Short Edge Discontinuous.



You can select the rest of the first floor panels and set there panel edge conditions, but we will continue for now.

- We will create the 3D projection to see the model so far.

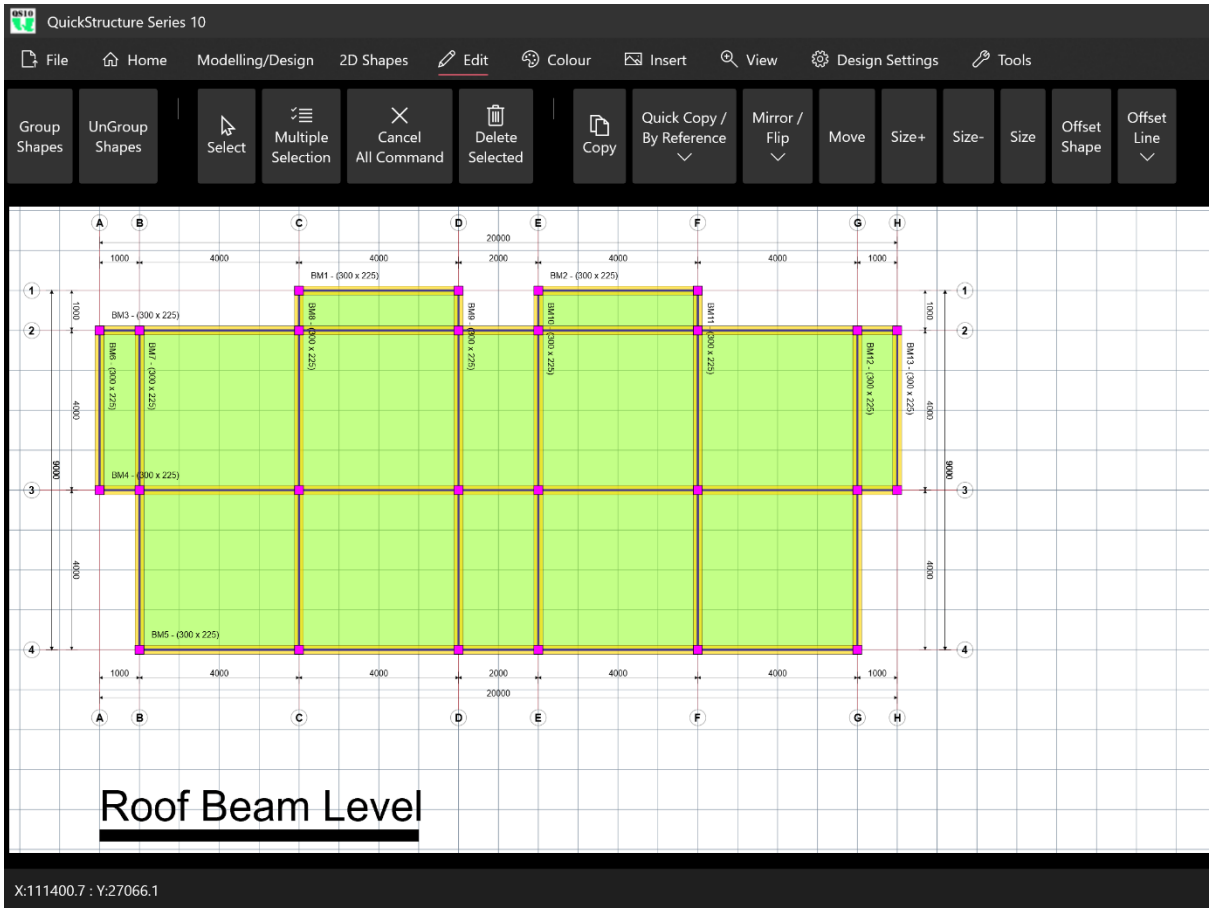


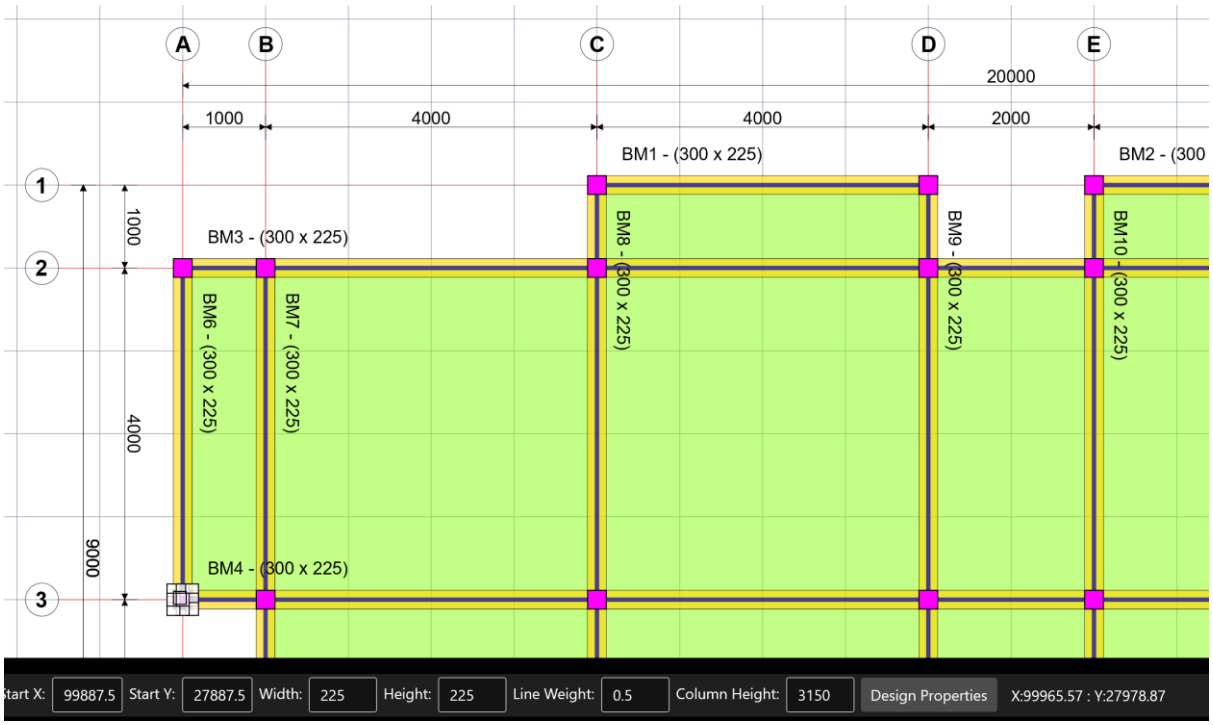
As can be seen we still have to remove some columns in the roof beam level.

Hide the 3D Modelling.

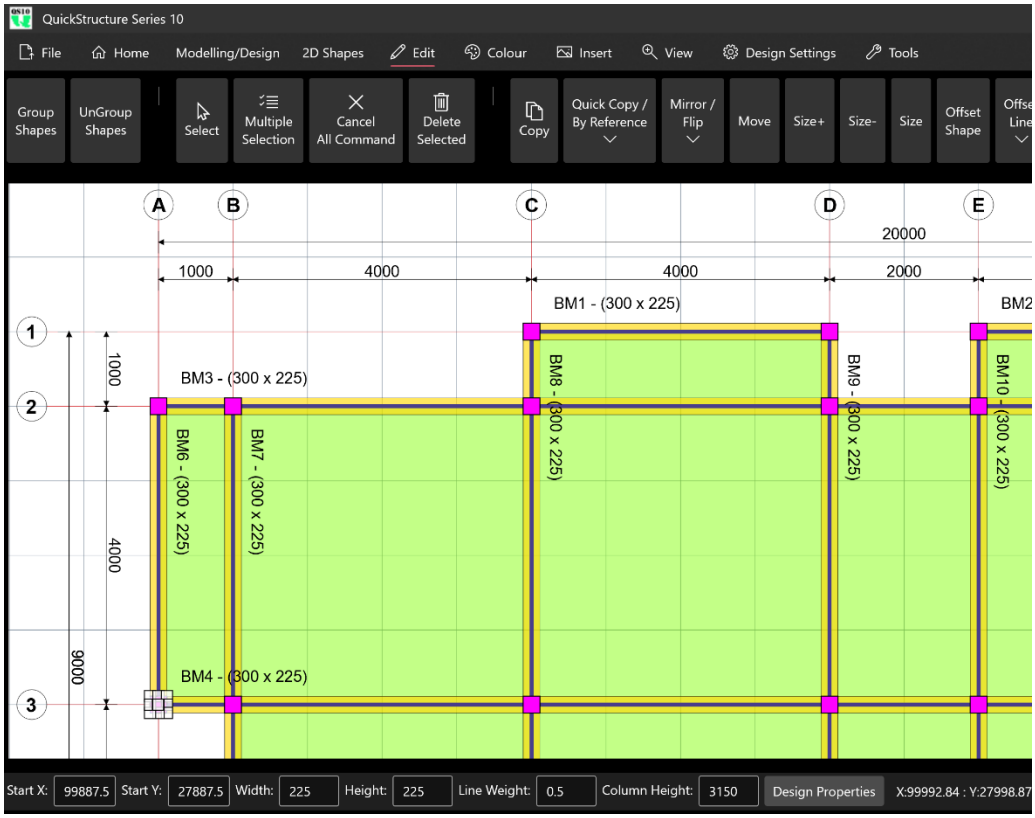
Editing the Roof Beam Layout

28. Zoom in into the roof beam level.

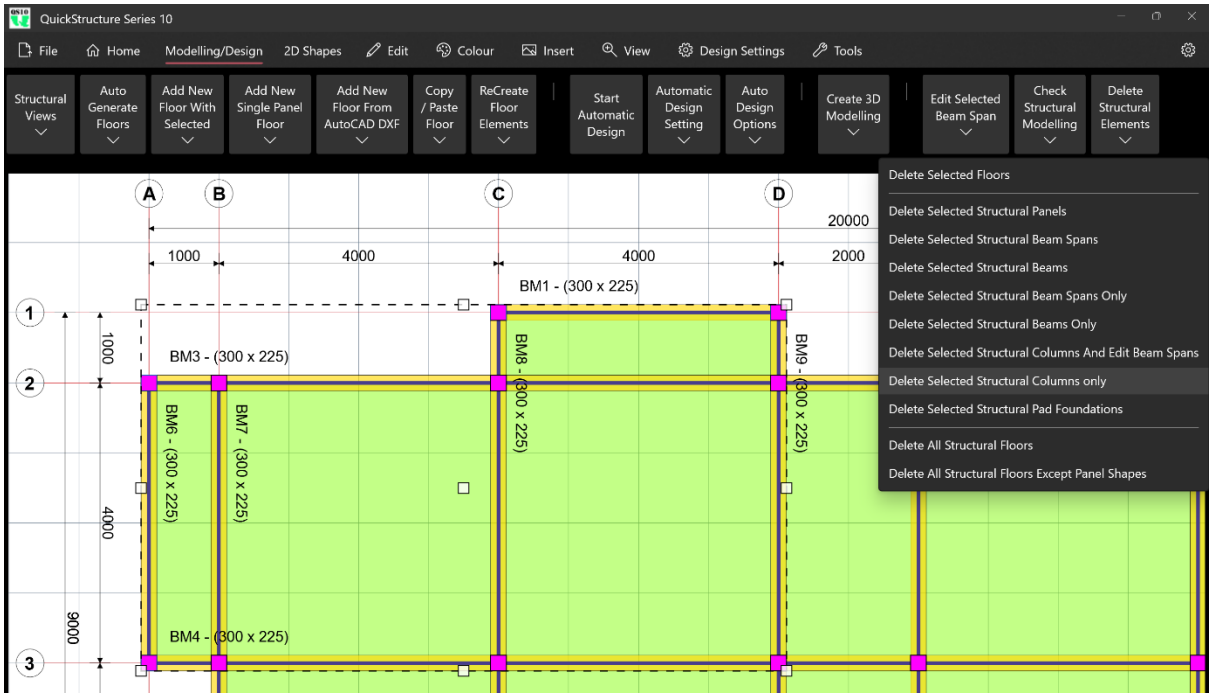


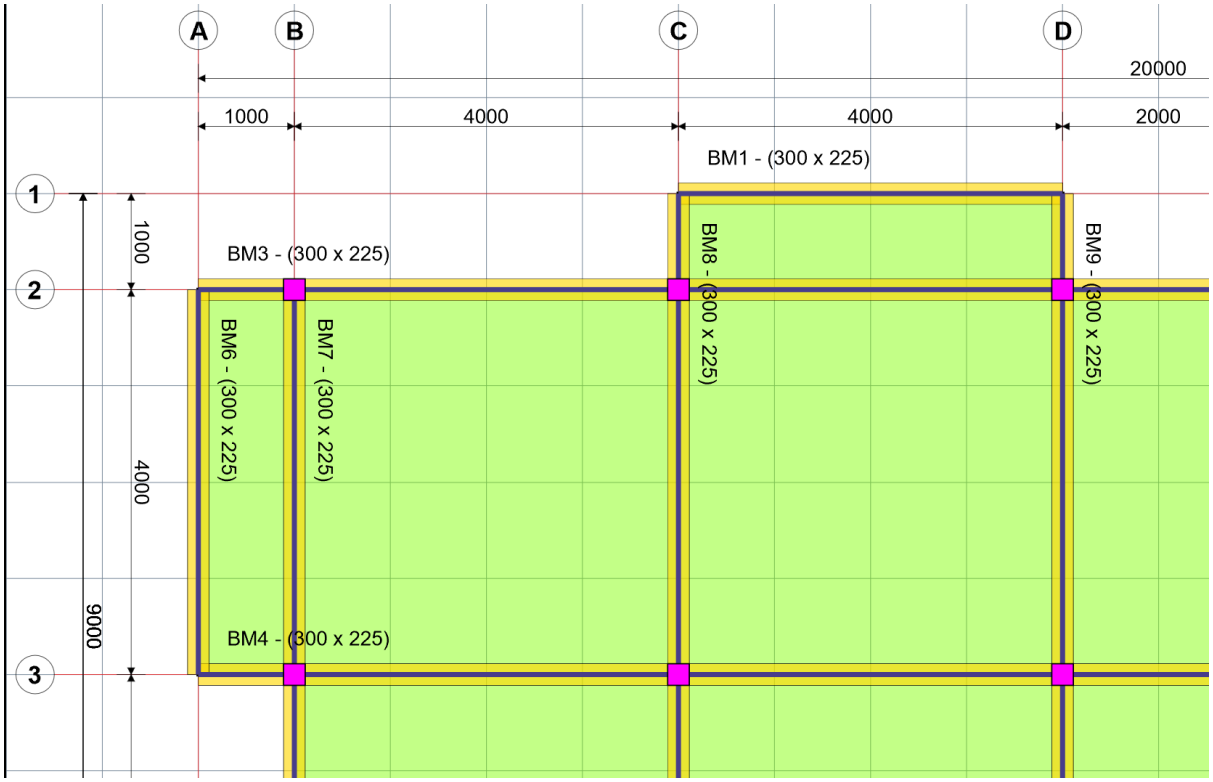


Zoom in to this part of the roof beam level

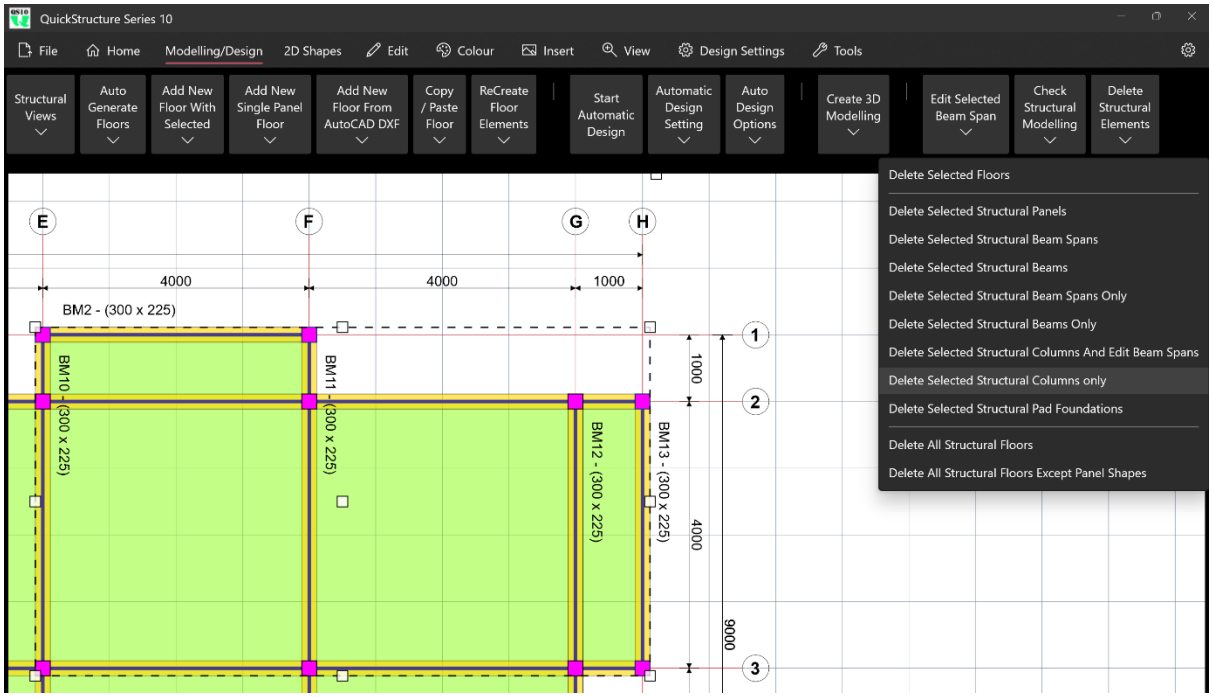


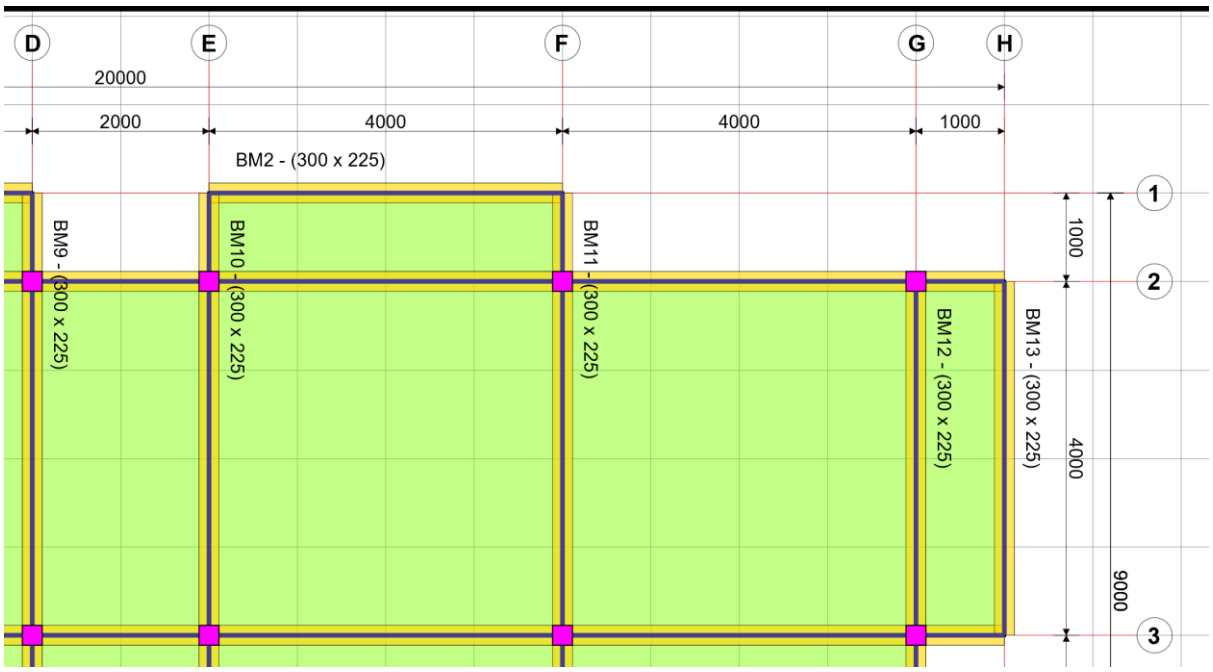
- Select columns 3A, 2A, 1C, and 1D and delete the columns.



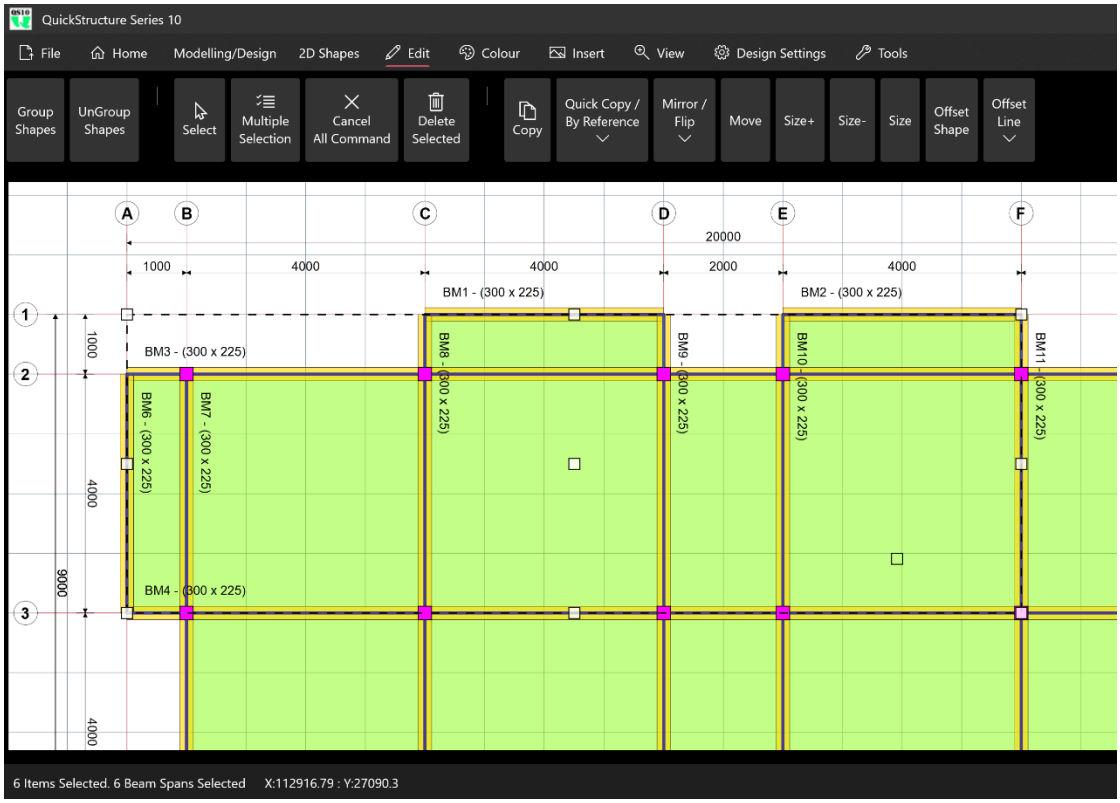


- Select columns 1E, 1F, 2H, 3H and delete the columns.

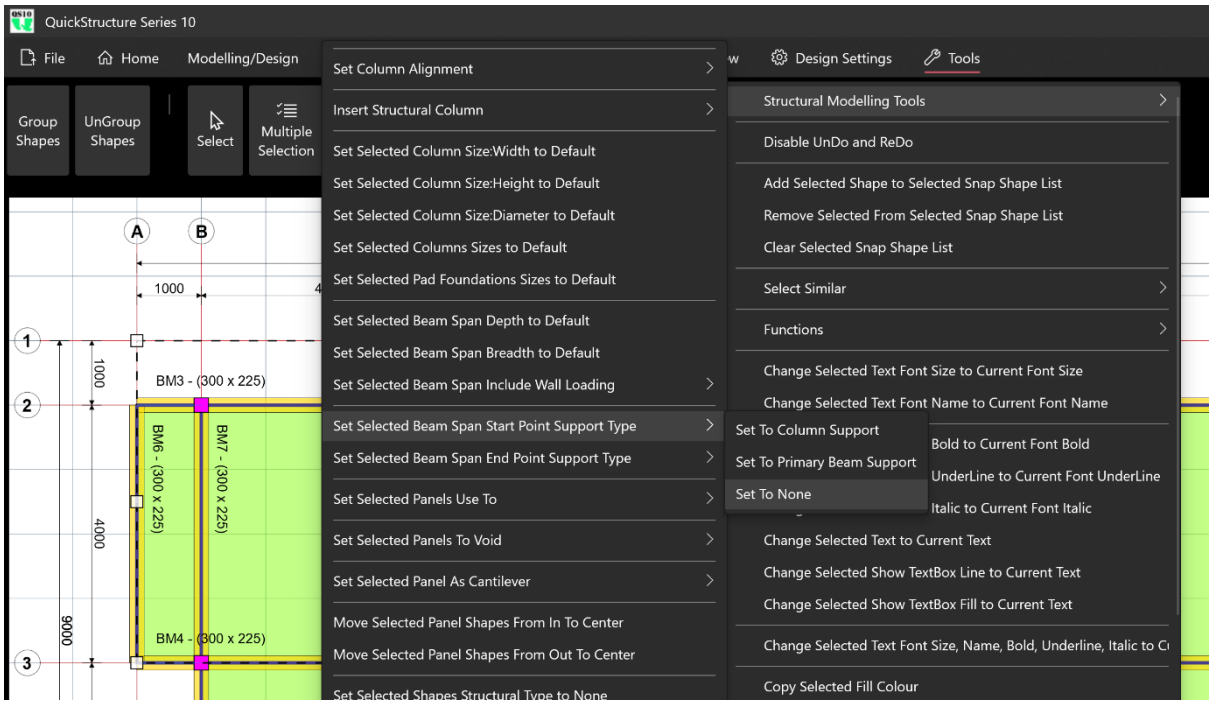




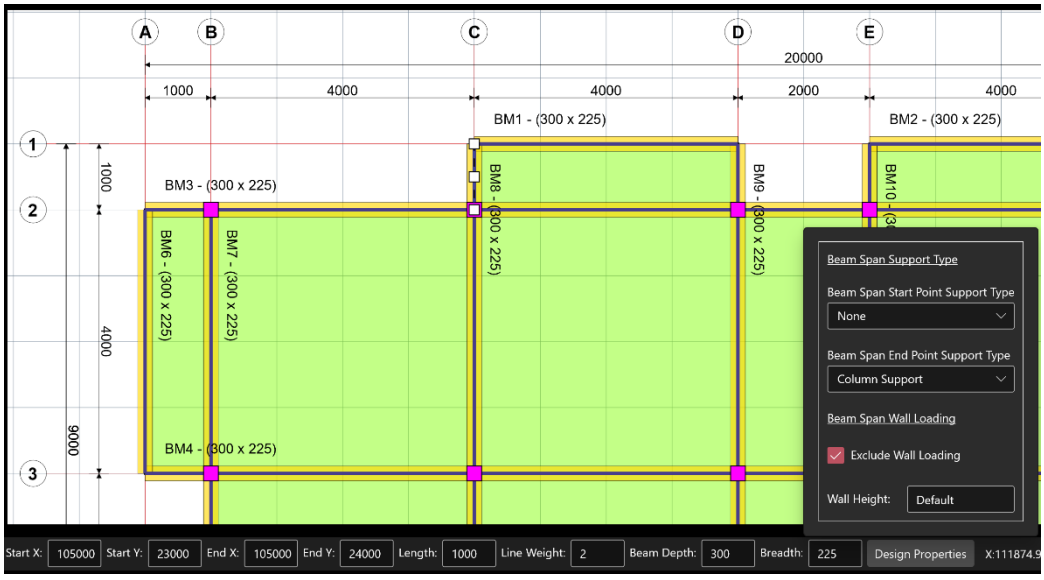
29. Set the beam span support type
    - Select beam spans on grid 3A-3B, 2A-2B, 1C-2C, 1D-2D, 1E-2E, 1F-2F



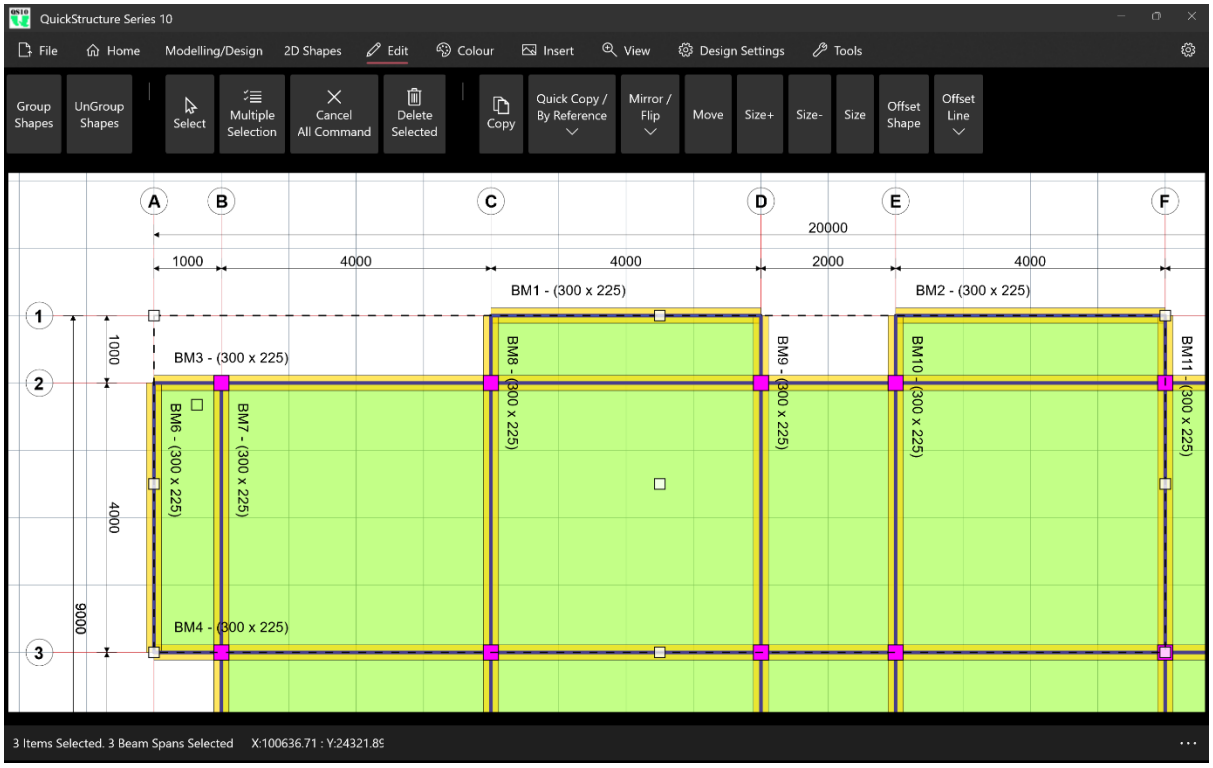
- Click Tools, click Structural Modelling Tools, click Set Selected Beam Span Start Point Support Type and click Set To None, as shown in drawing below.



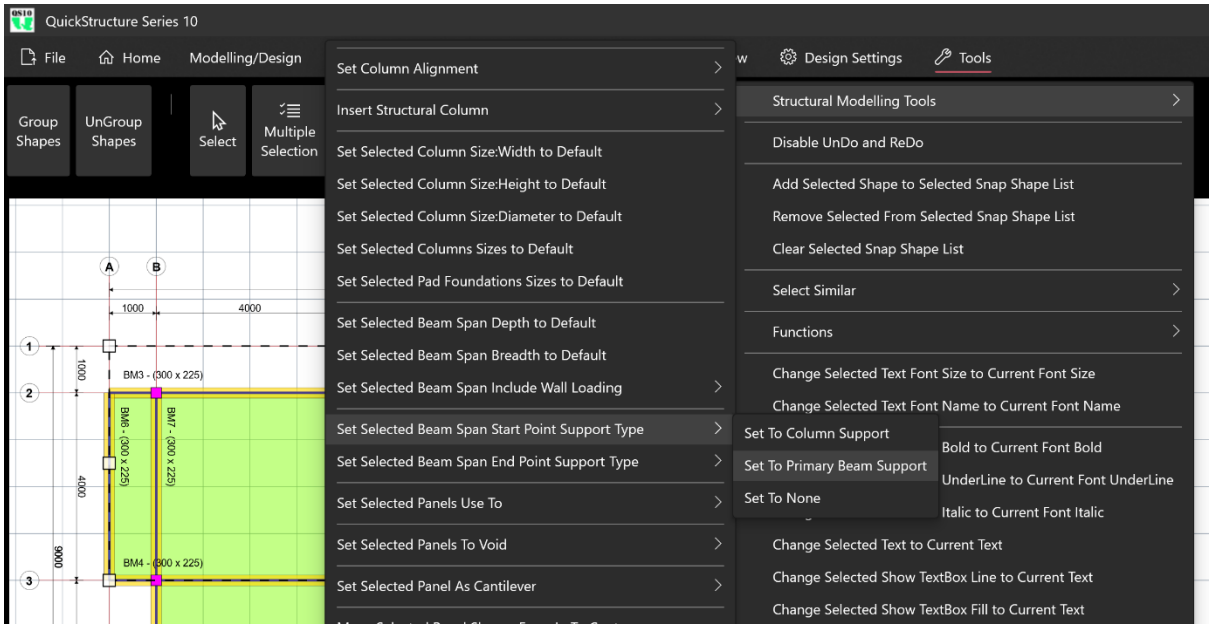
If you click the beam span as shown below and click Design Properties, you will see that the software has set the start point support type to none.



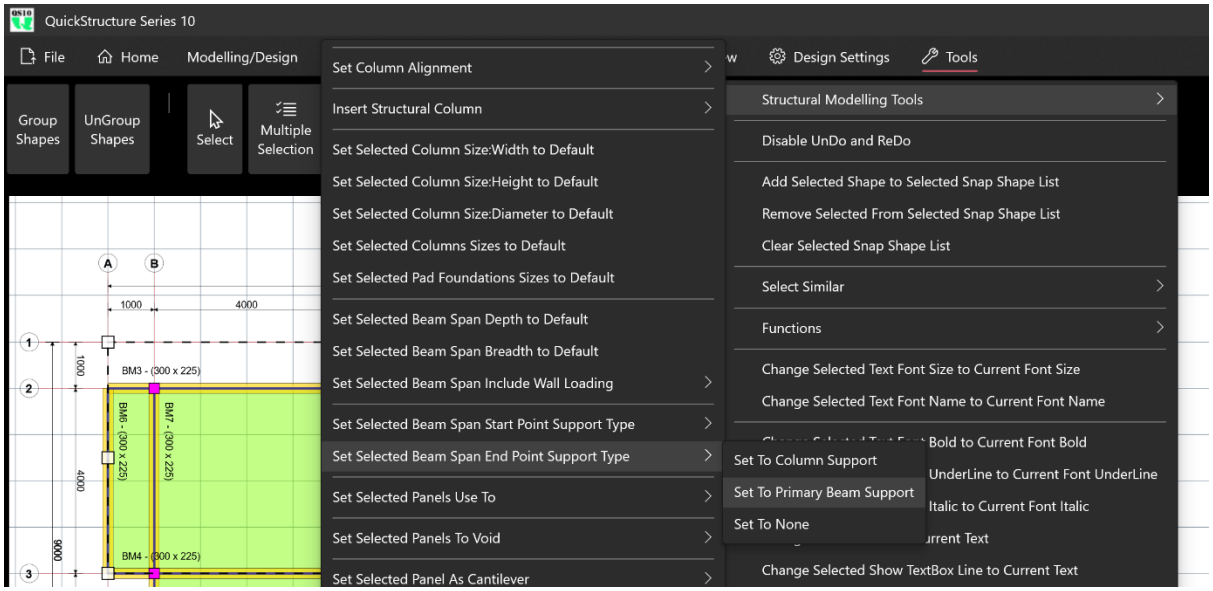
- Click Edit and click Cancel All Command
- Select Beam Spans on grid 2A-3A, 1C-1D, 1E-1F



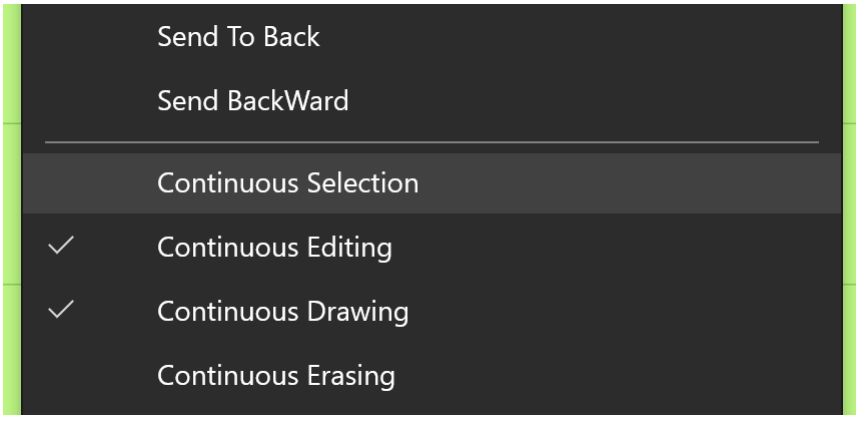
- Change the selected Beam Span Start Point Support Type to Primary Beam Support.



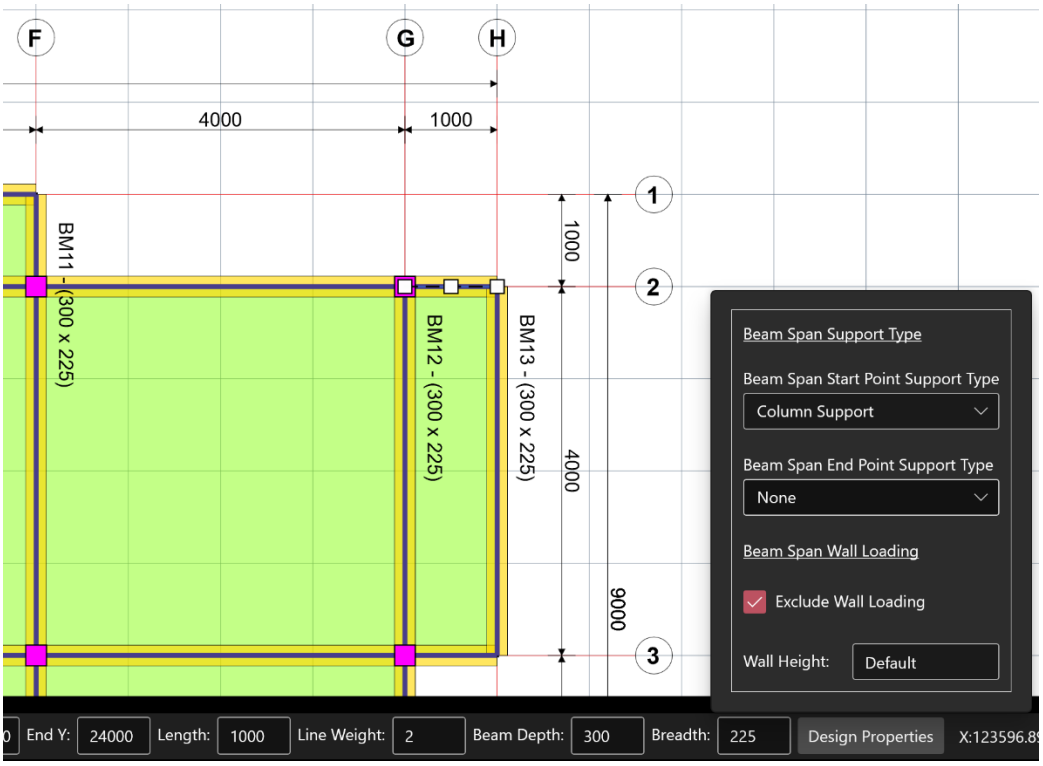
- Change the selected Beam Span End Point Support Type to Primary Beam Support.



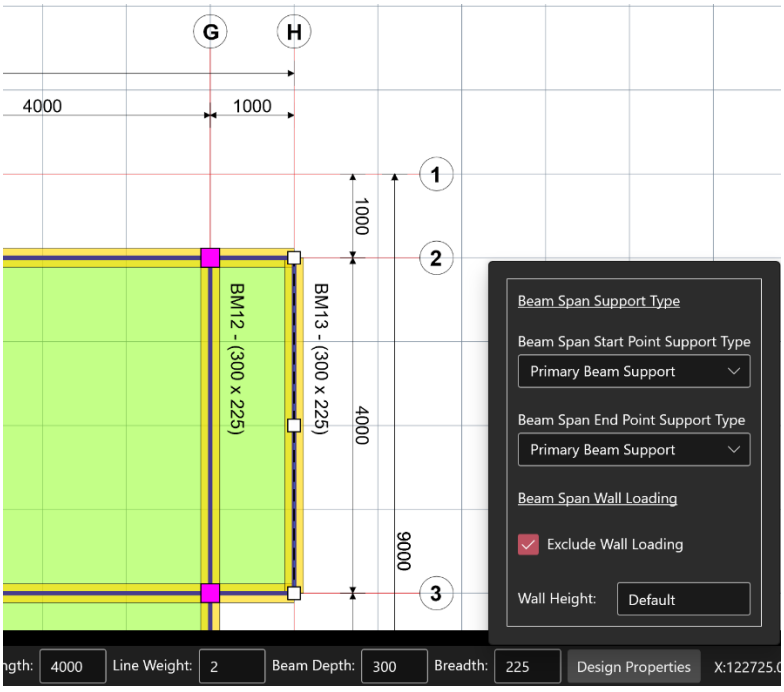
30. Click File and Save Project.
31. Click Edit and uncheck Continuous Selection



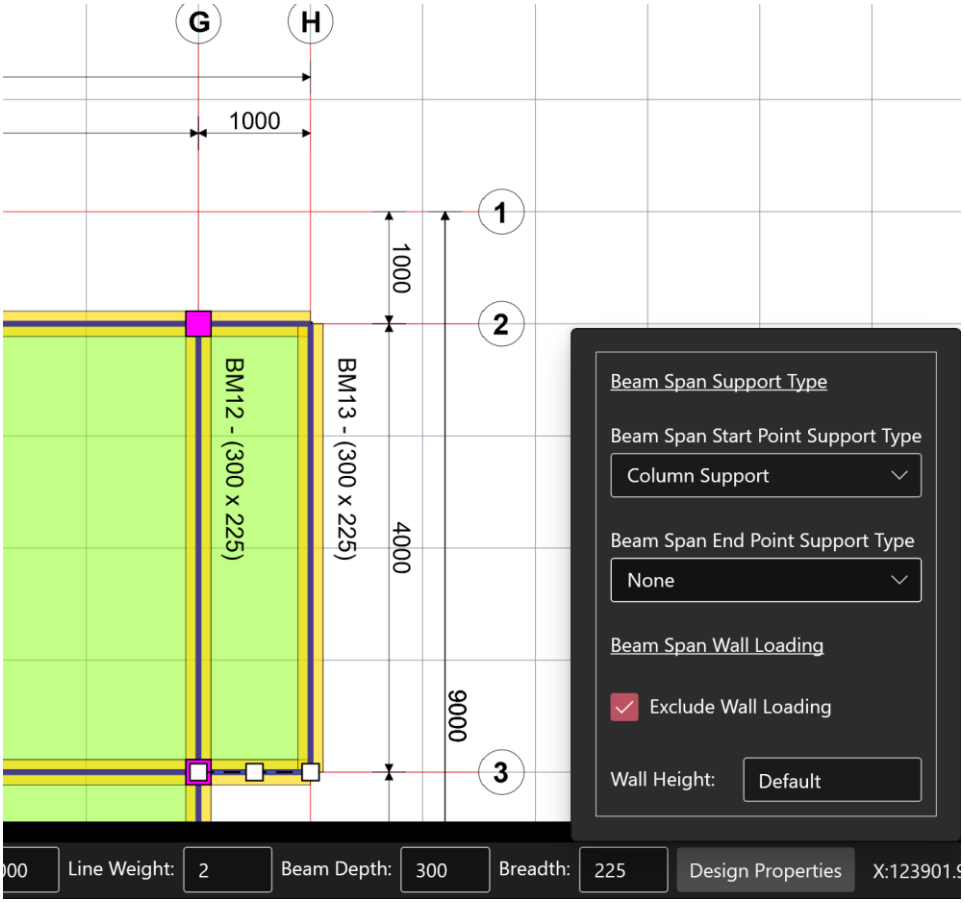
32. Select Beam Span 2G-2H and change the Beam Span End Point Support Type to None



33. Select Beam Span 2H-3H and change the Beam Span Start and End Point Support Type to Primary Beam Support.



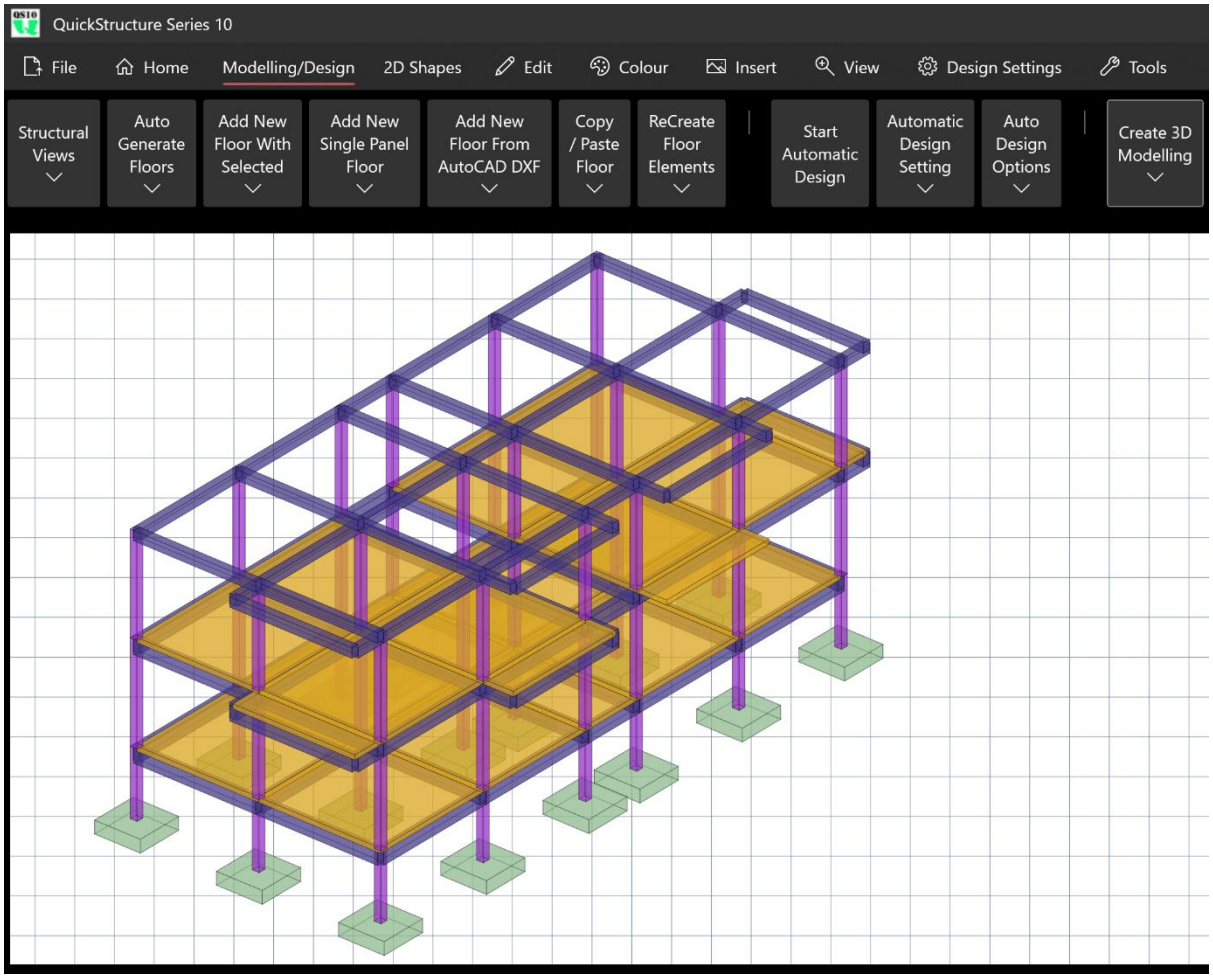
34. Select Beam Span 3G-3H and change the Beam Span End Point Support Type to None.



35. Cancel All Command
36. Click File and click Save Project

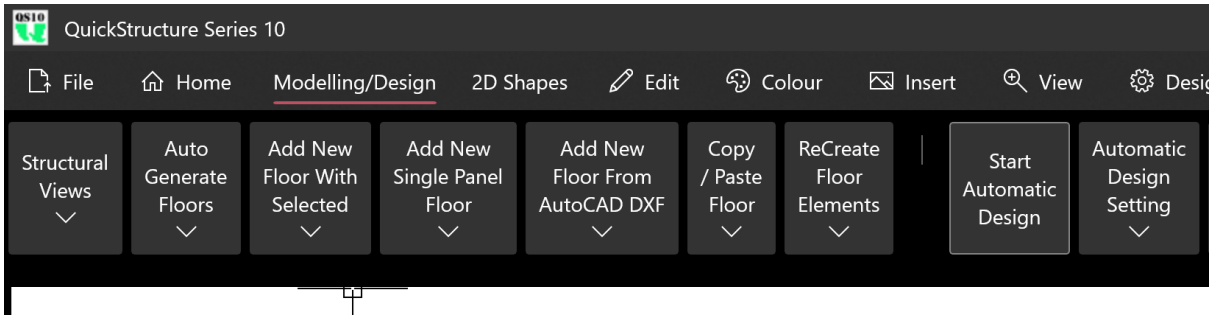
Now we have edited the first floor and roof beam layouts.

37. You can project the 3D Model again.

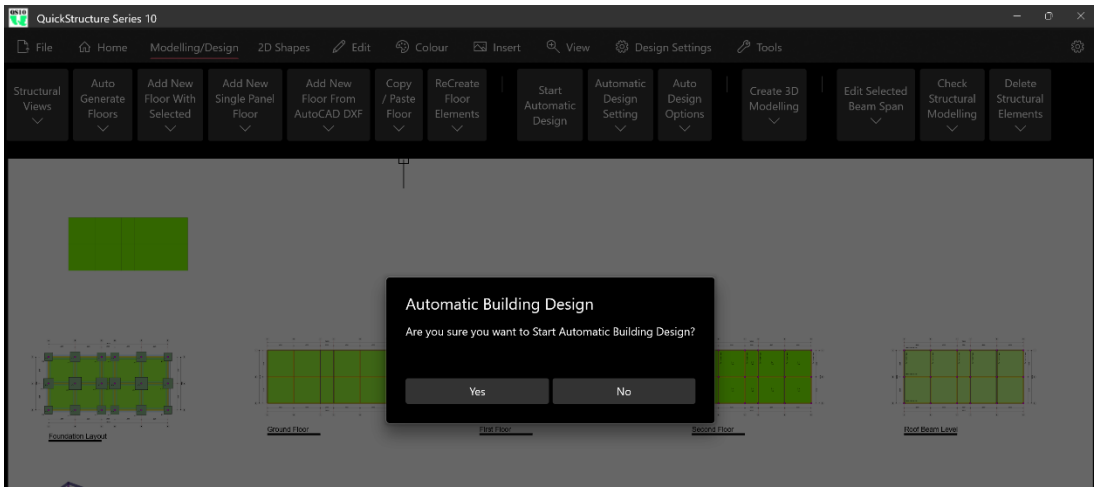


- Hide the 3D after viewing it.

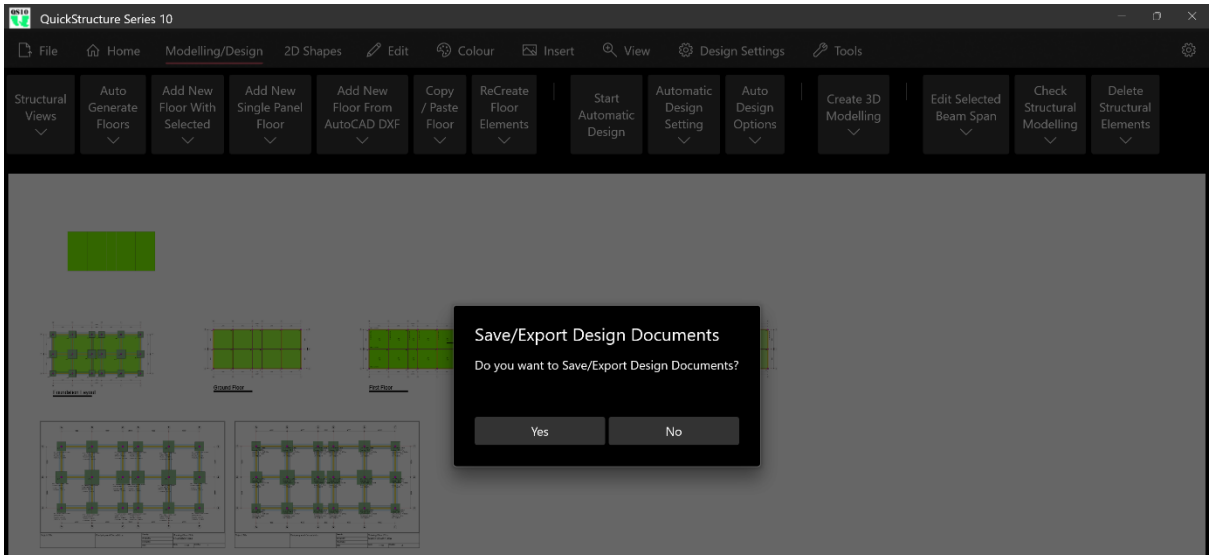
38. Click Modelling / Design and click Start Automatic Design



39. Click Yes to start automatic design



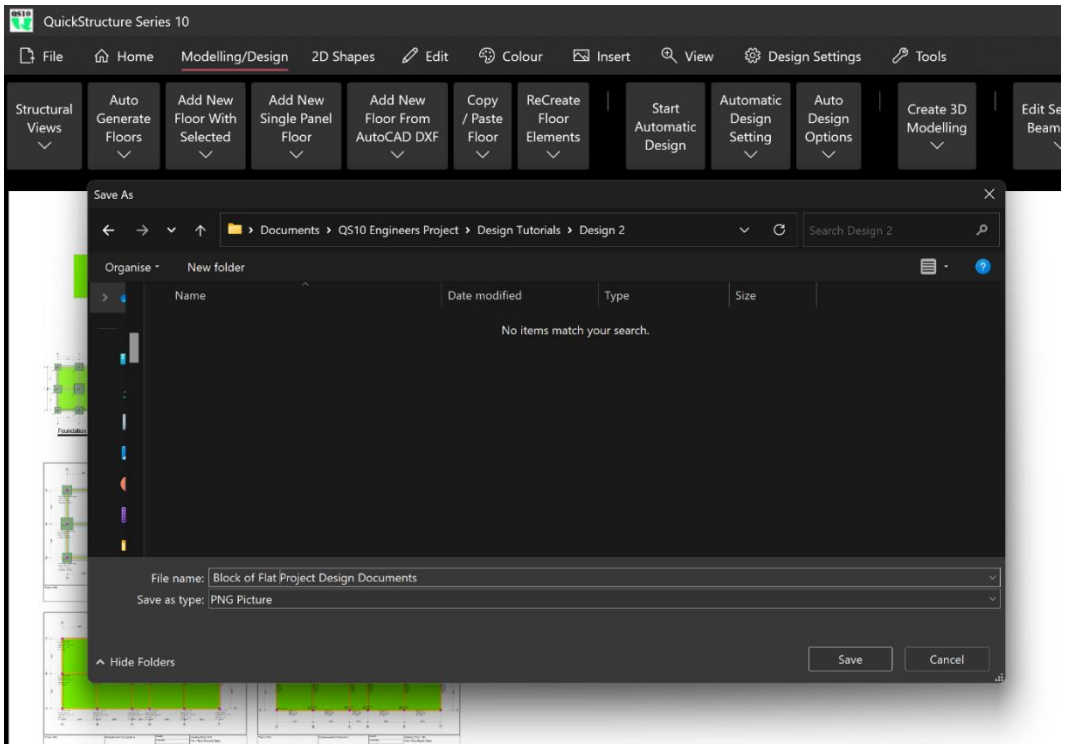
40. Click Yes to Save/Export Design Documents

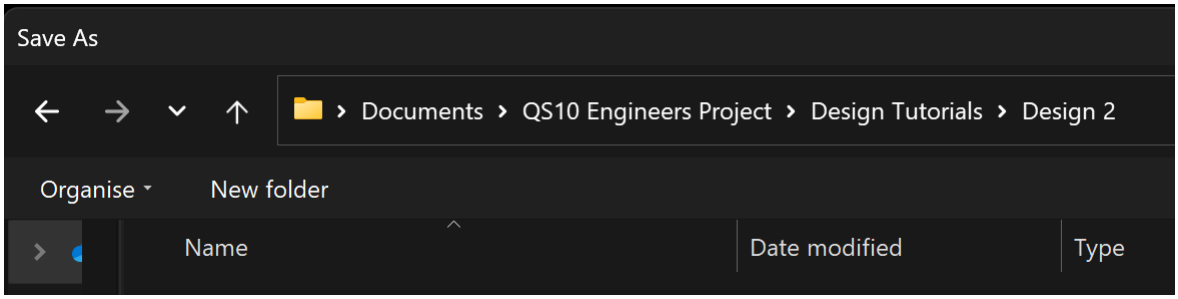


You can also choose to click No and explore the design before you save the documents. Normally you don't save the documents at first. You look at the design and if you are satisfied with it, then you can than save the design documents.

41. Navigate to my Documents and create a new folder:Design 3, open the folder.
    Is very important you save in a new folder. The software will create some files, so is important they are together.

42. Enter the File Name: Block of Flat Project Design Documents and click Save





Please reference part 2 of QS10 manual for details on automatic design, automatic design settings and saving the design documents.

Note:

- Editing the floor layouts is very important in the software.
- Even though we have improved the graphics greatly, modelling is still a serious business. Is important to go through the modelling carefully.
- Where you have beam spans that form cantilever ends, take care to set and check carefully.
- When selecting the structural elements make sure you select the element you want, you can always zoom in very well with the mouse wheel before you select.

- When went through so many floors editing so that you will get us to it, because editing the floor is very important in the software. Not all floor modelling is this complicated but, in most cases, there will be some level of editing.

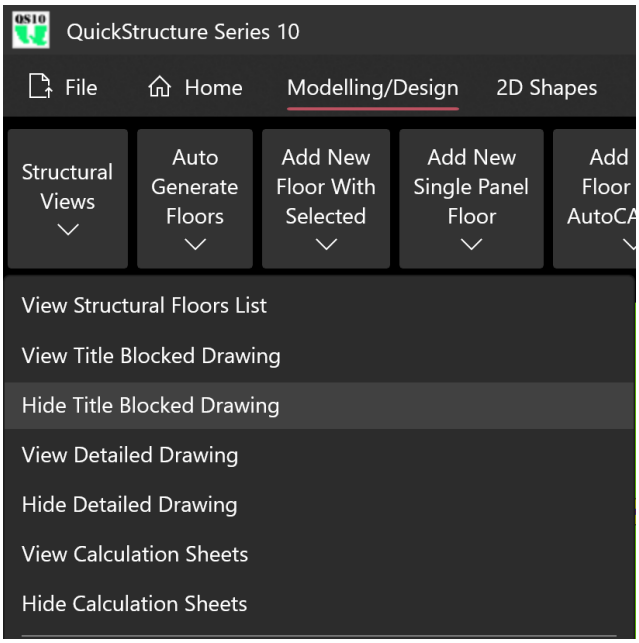
43. Save the project

Before you save the project after running automatic design, is important to hide some part of the project that are not necessarily.

Automatic design will create a lot of details in the software, we don’t need to save those details because we can easily recreate them. Is better to save as little information as possible so that the file size will be small.

In QS10 we really worked hard to make the project file very small. So, before you save, hide any other details that is part of the floor modelling.

- Click Design/Modelling, click Structural View and click Hide Title Blocked Drawing

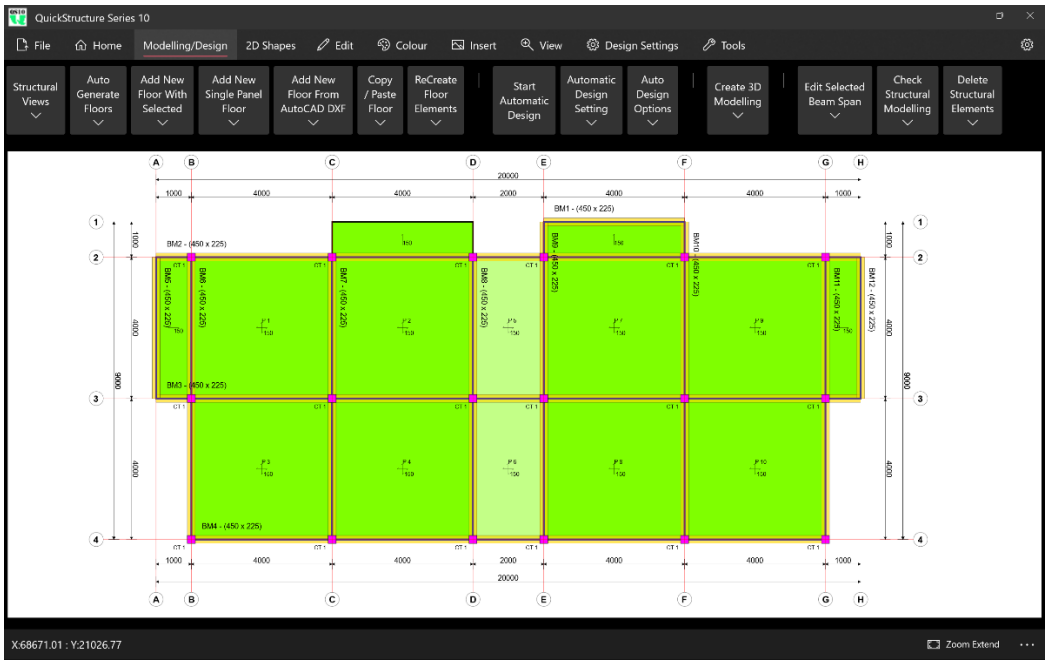


You can hide most things in the drawing windows from this menu. We do this because anything on the drawing windows will be saved.

- Click File and click Save Project

Note:

- Is important to make sure that you don't have overlapping grids. As you can see we didn't have the an overlapping grids in the example below.



- The modelling might not work if you have overlapping grids. If you run automatic design, it might not work. If there is overlapping grids, the foundation layout might not be created.
- It is important to note that this is structural modelling drawing, not an artwork drawing. So is important to do the modelling carefully.

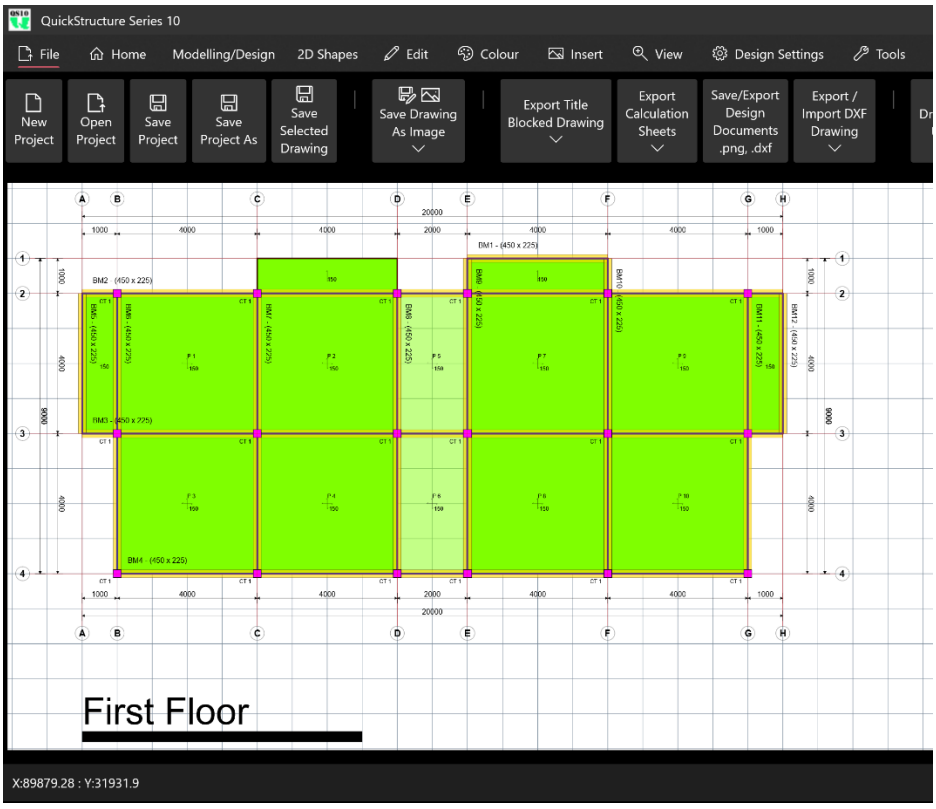
Part 4 example ends here.

Merge Beam Span

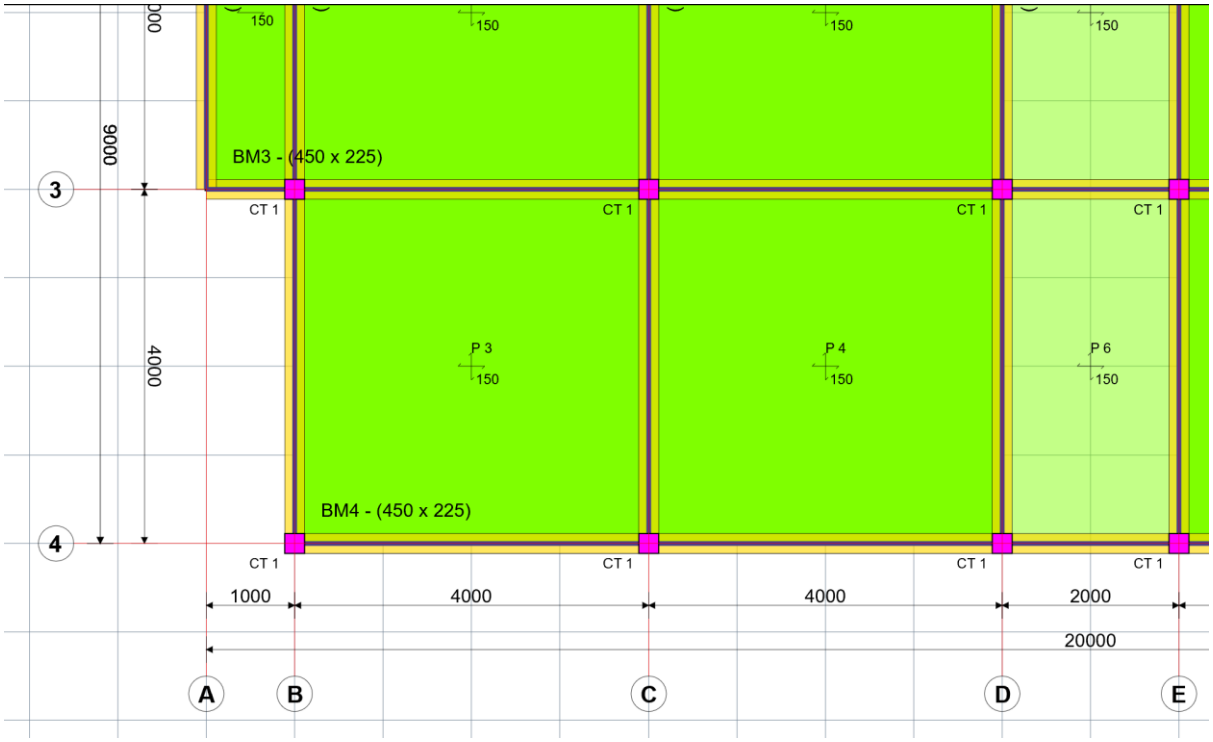
One area of floor editing we didn't do in the above worked example in part 4 is beam span merging. Merging the beam spans in very important sometimes in the software.

I will do an example of this below. But first you need to open the software again, open the last project we saved.

1. Open QuickStructure 10 Software.
2. Click file, click open project and select the last project in part 4: Project Design 4 Structural Model



3. Zoom into this part of the first floor as shown below

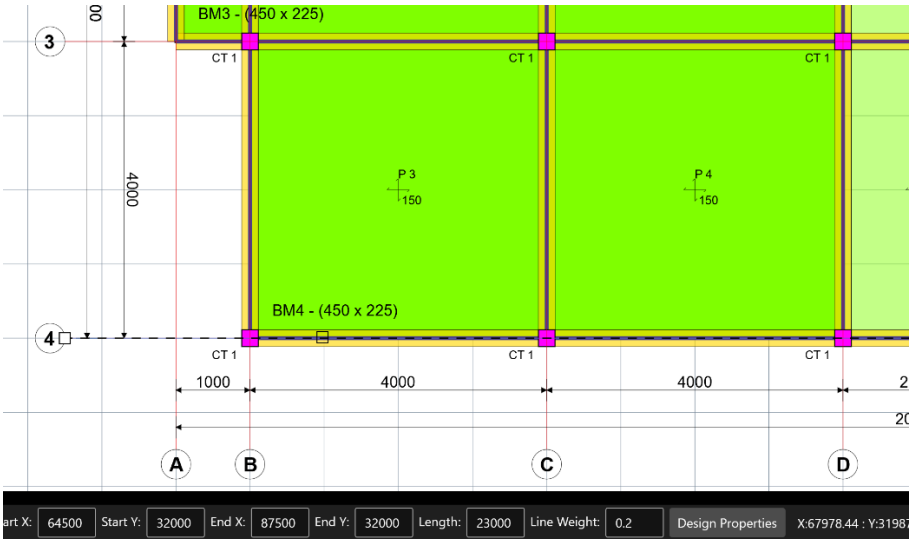


Our aim is to remove the column at grid 4C, and join or merge beam span 4B-4C, and beam span 4C-4D.

4. Click Edit and click Select

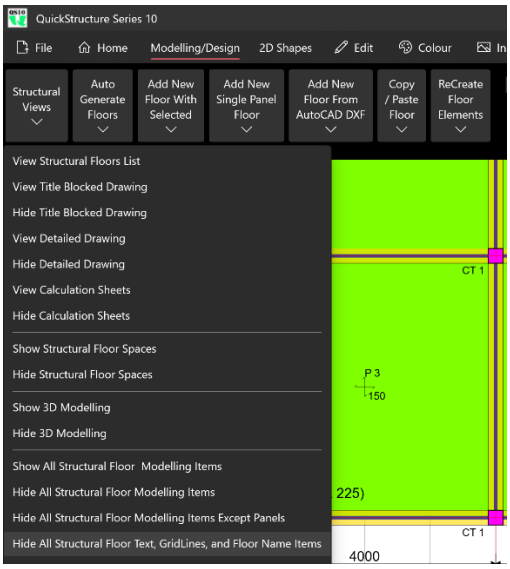
5. Select beam span 4B-4C, and beam span 4C-4D.

As you can see below, the grid is getting on the way



Let us fix that.

- Click Edit and click cancel all command
- Click Modelling/Design, click Structural Views, and click Hide All Structural Floor Text, GridLines, and Floor Name Items

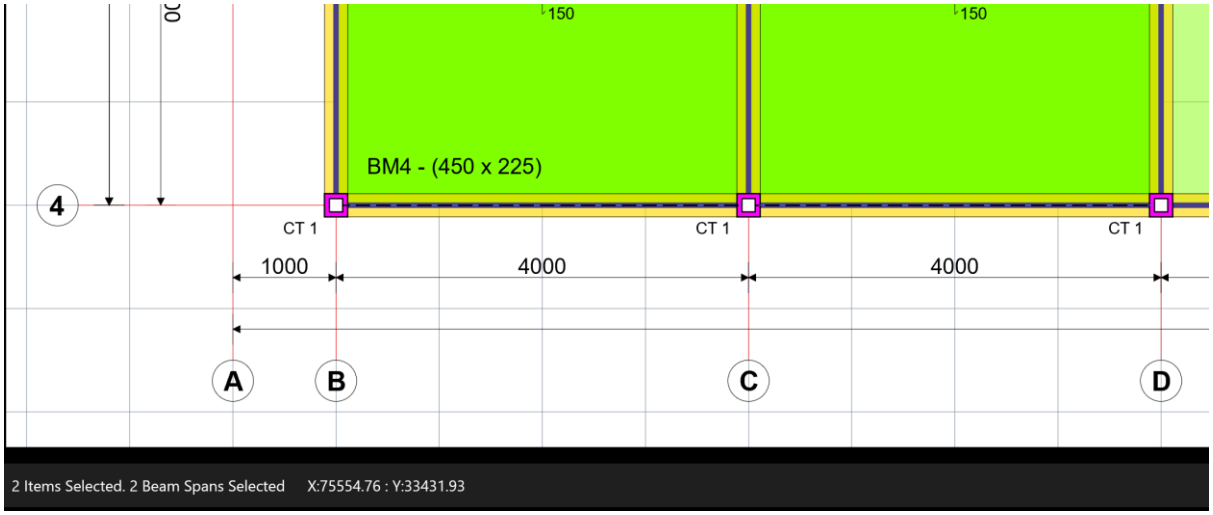


- Click Show All Structural Floor Modelling Items.

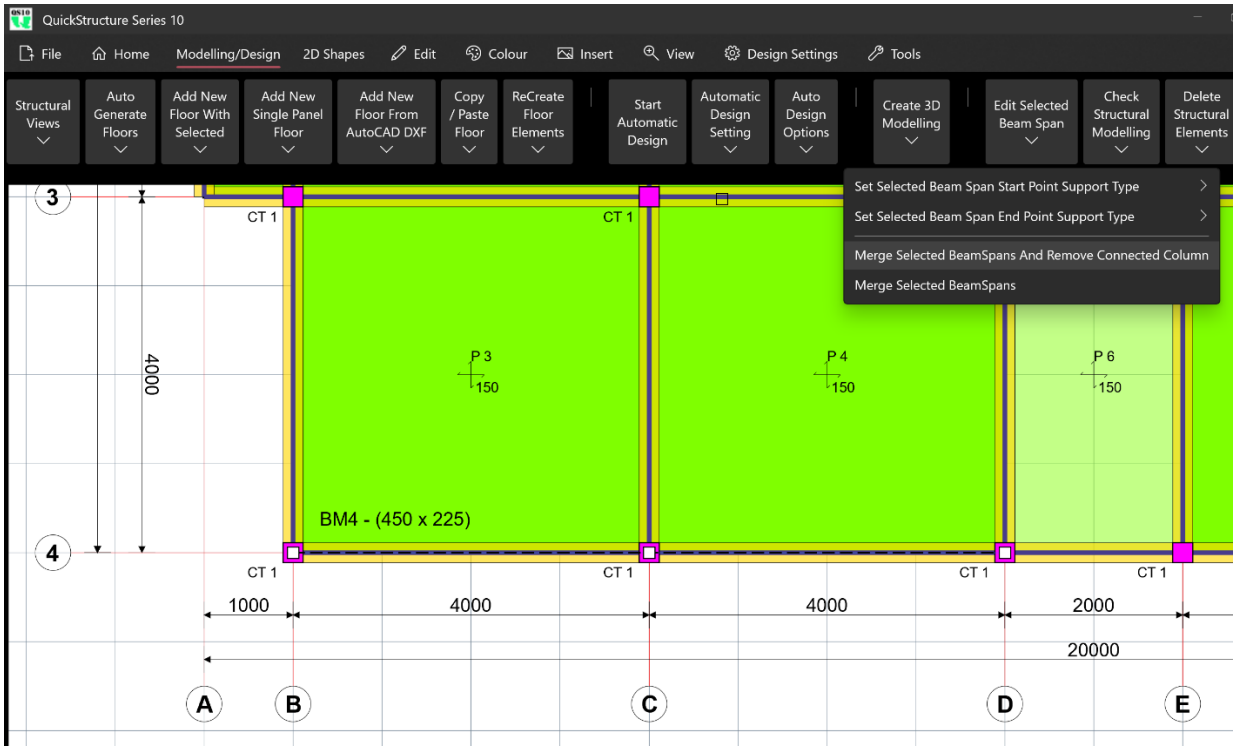
The hide will hide the grid and the show will show all items again but this time the grid line will be behind the beam span line.

Now we can now select the Beam Spans.

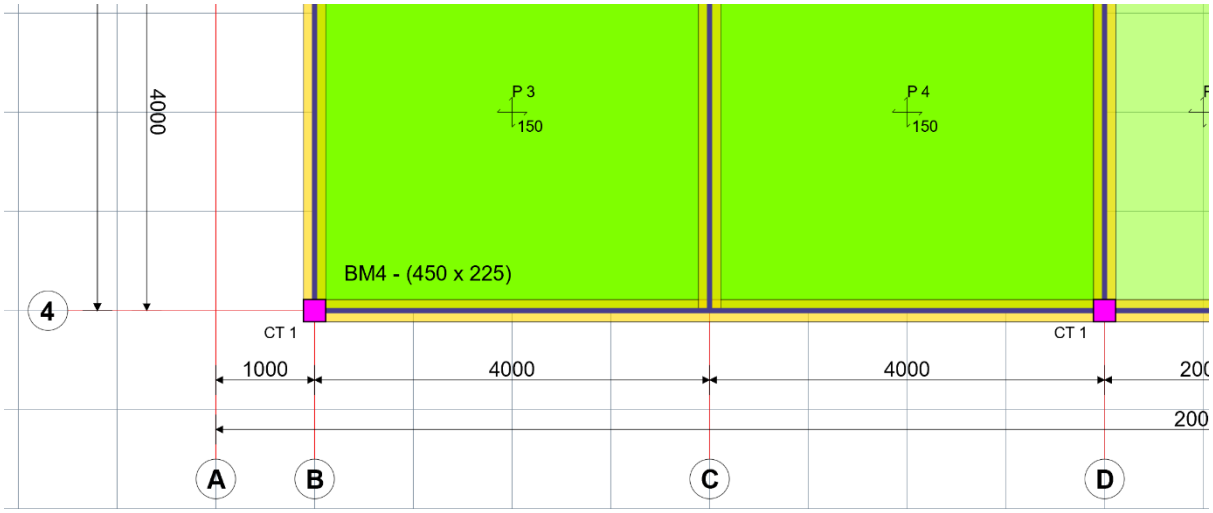
- Select beam span 4B-4C, and beam span 4C-4D.



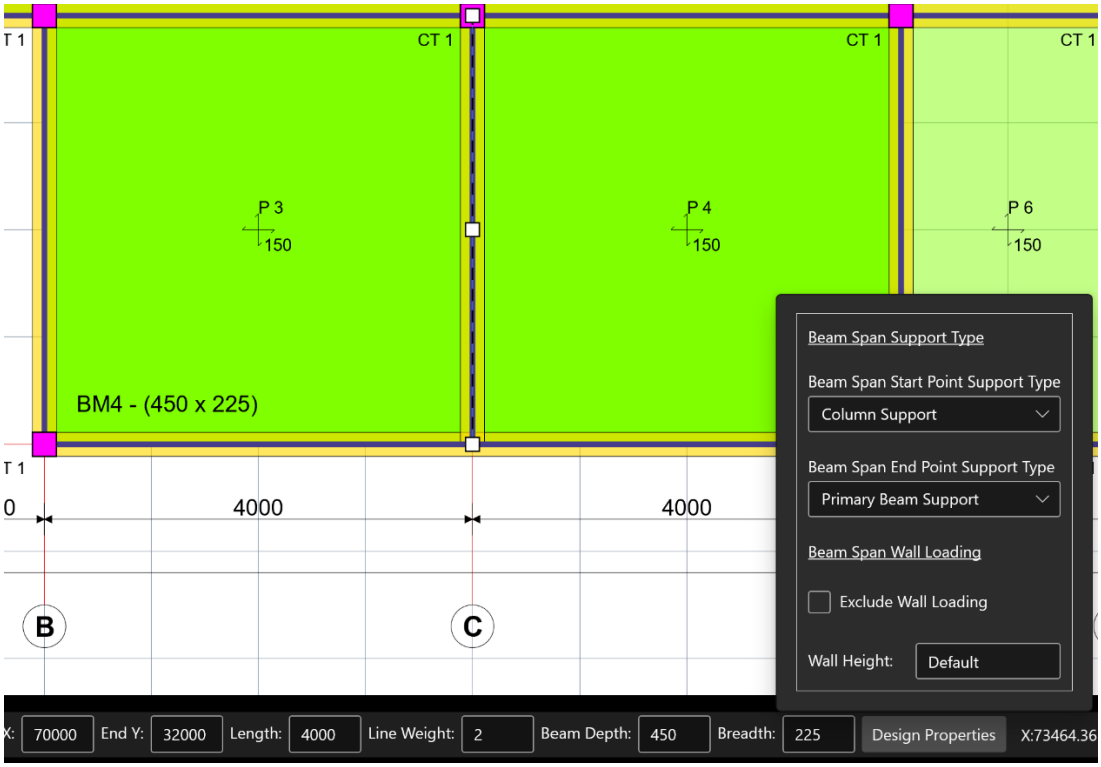
6. Click Modelling/Design, click Edit Selected Beam Span and click Merge Selected Beam Spans And Remove Connected Column



This will merge/join the beam spans and remove the column.



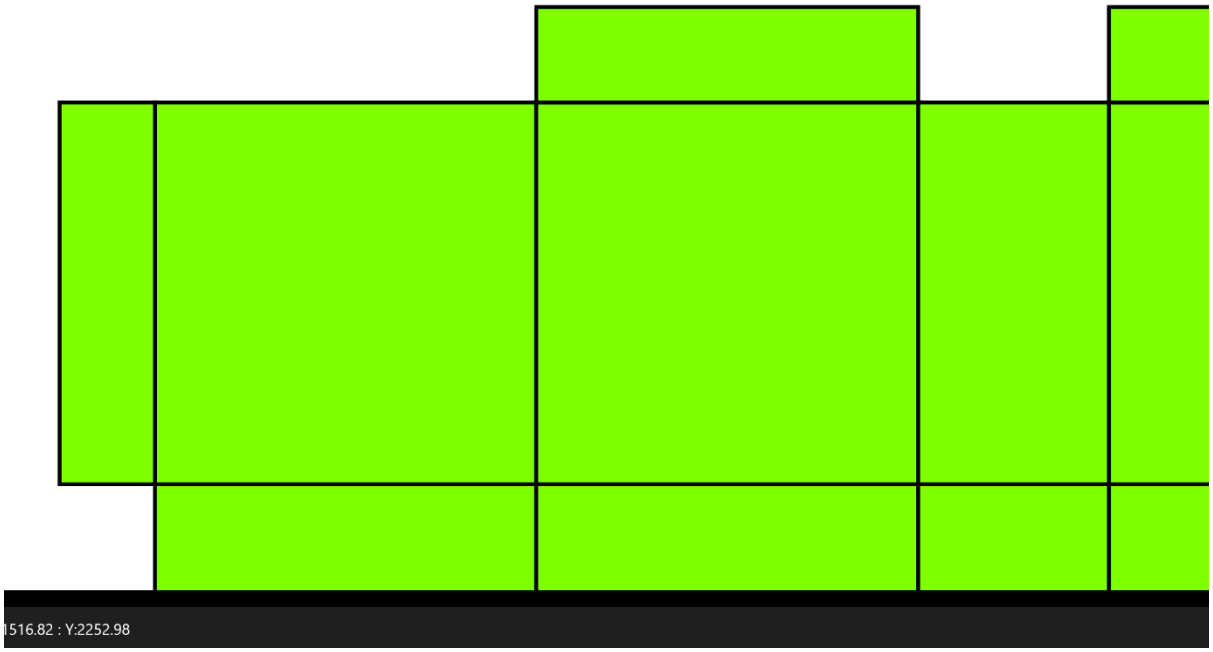
This is the best practice on how to remove a column and join the beam span. The reason why we used merge beam span is that the software will also detect the connected beam span and change the support type to primary beam support. See the drawing below.



Common Modelling Mistakes

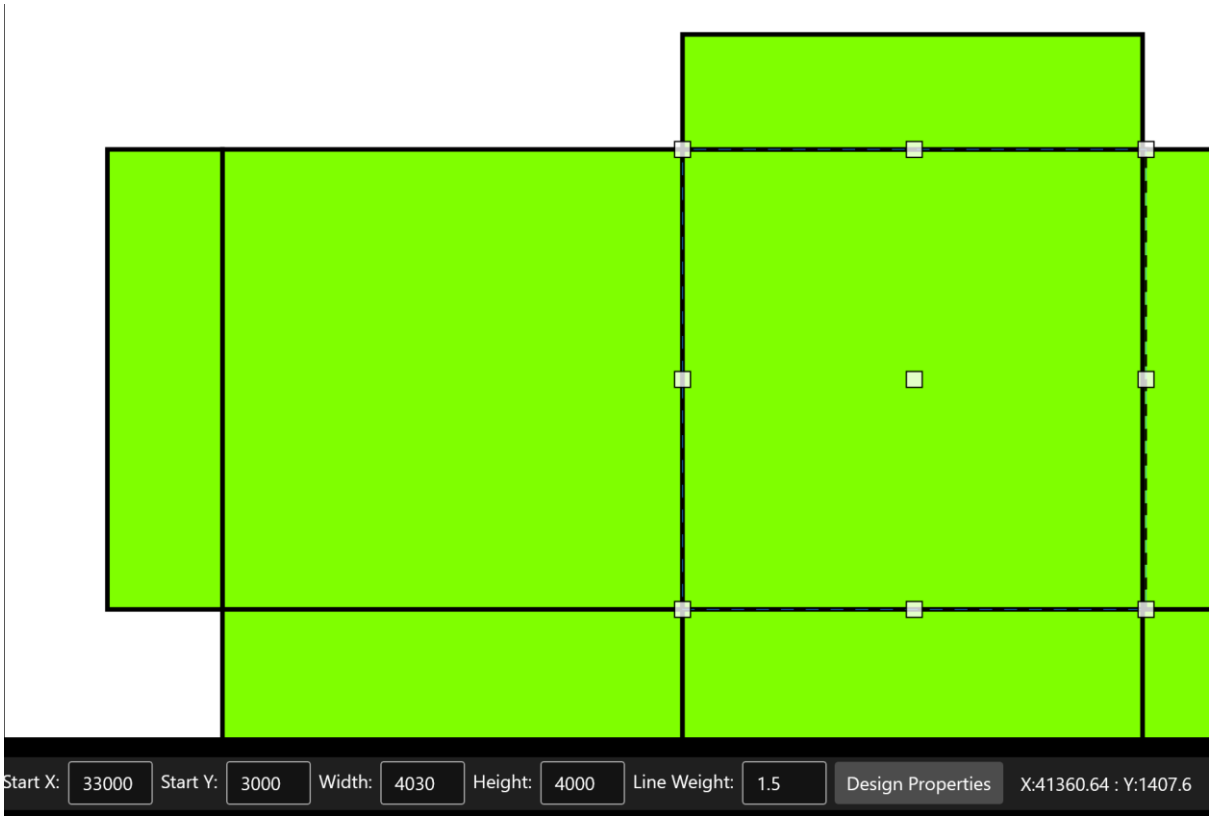
These are some of the common modelling mistakes people make.

1. Overlapping slab panel rectangles.



A look at the drawing above, it looks like everything is fine and the rectangles didn't overlap.

But if you select one of them as shown below, you will see there is an overlap.



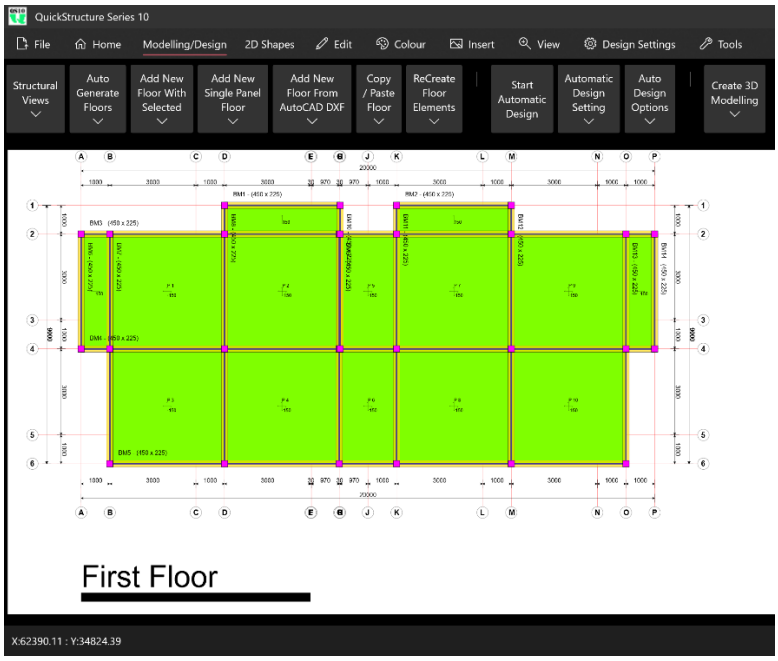
- You can see that the selected rectangle is 4030 x 4000. The difference of 30 is so small you might not see it but is there.
- This error will create a double or overlapping grids and the foundation layout might not be created.
- Is important to avoid this kind of mistakes.

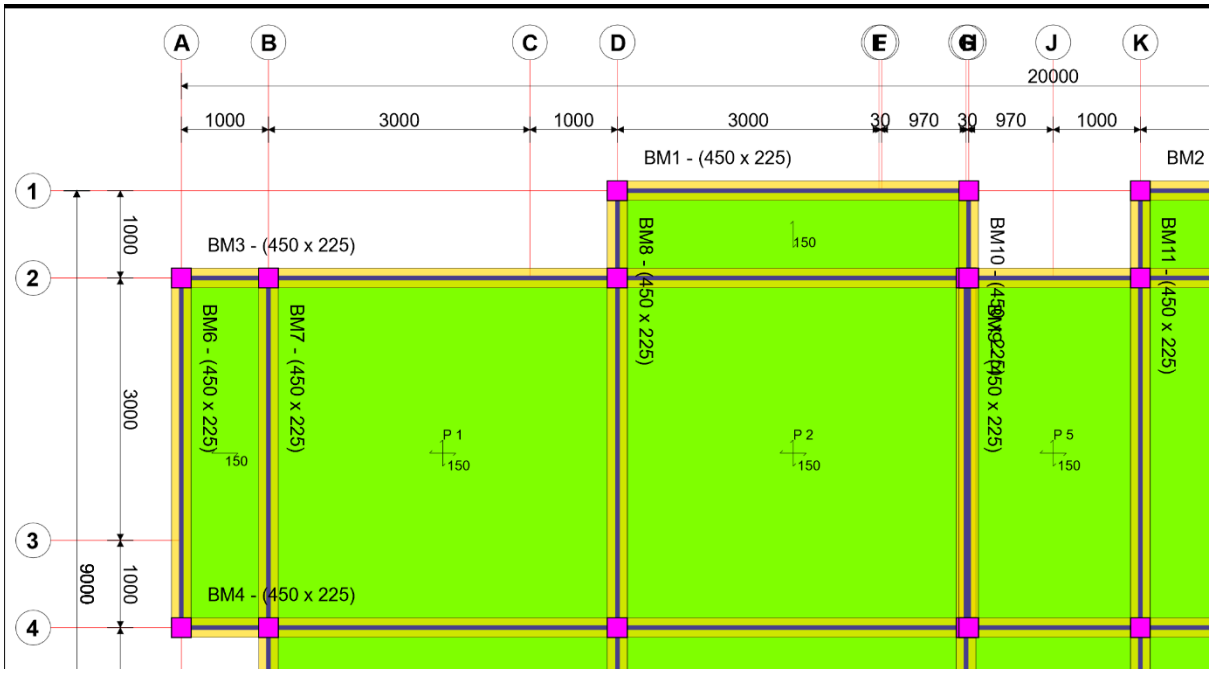
How to avoid this mistake:

- Is better to use QuickCopy / By Reference to copy rectangle panels as we did in the examples. QuickCopy / By Reference is built to copy panels next to each other.
- When importing from AutoCAD DXF, please take care in the modelling. Check the

rectangles imported to make sure everything is ok.
If possible, model direct in QS10, is now very easy and fast to model in our software.

2. Overlapping grids or very close grids.

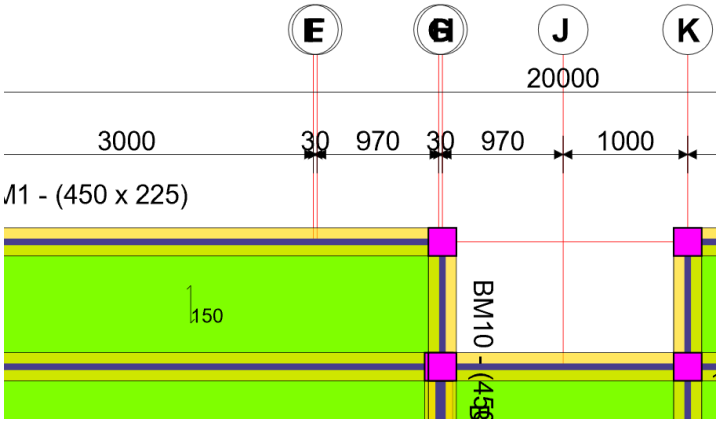




- As you can see from drawing above, grids E,F overlaps and grid G,H overlaps.
- Most overlapping grids are usually produced by overlapping rectangles.

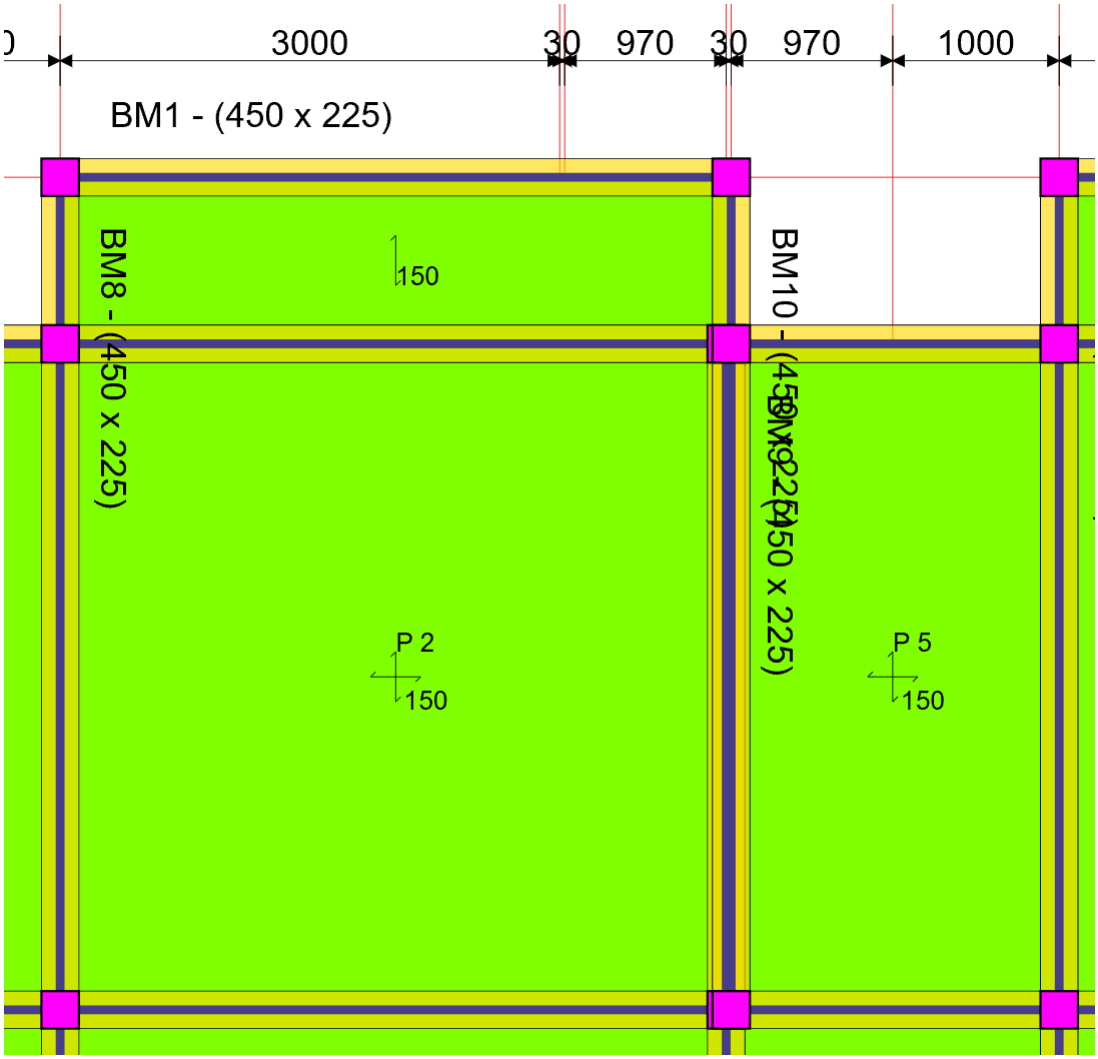
How to avoid this mistake:

- Visually look through the modelling and see if you can see overlapping grids. In QS10 because we have the grids text as part of the modelling, you can easily see where there is an overlapping grid.



- To correct overlapping grid, you will need to correct the slab panel that produced it.

3. Overlapping beam span and columns

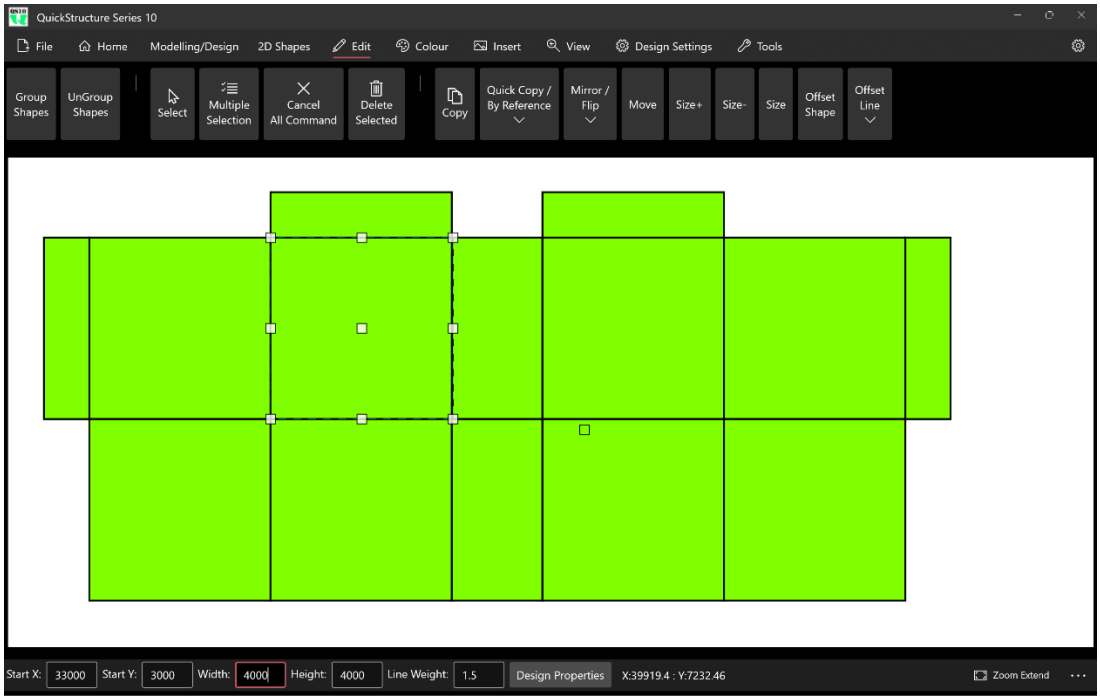


Beam 9 and Beam 10 overlaps. The column close to beam 10 overlapped also.

How to avoid this mistake:

- Visually check the model for overlapping beams and columns. In structural modelling, beams cannot be on top another beam and columns cannot be on top another column on this same floor.
- This mistake can be corrected once you correct the rectangle panels.

- It is better to correct the rectangles at the plain geometry level before you add the floors as shown below.



Please do not correct them at the floor model level as shown below. Correcting the mistake at the floor model level is a waste of time and might not resolve the problem.