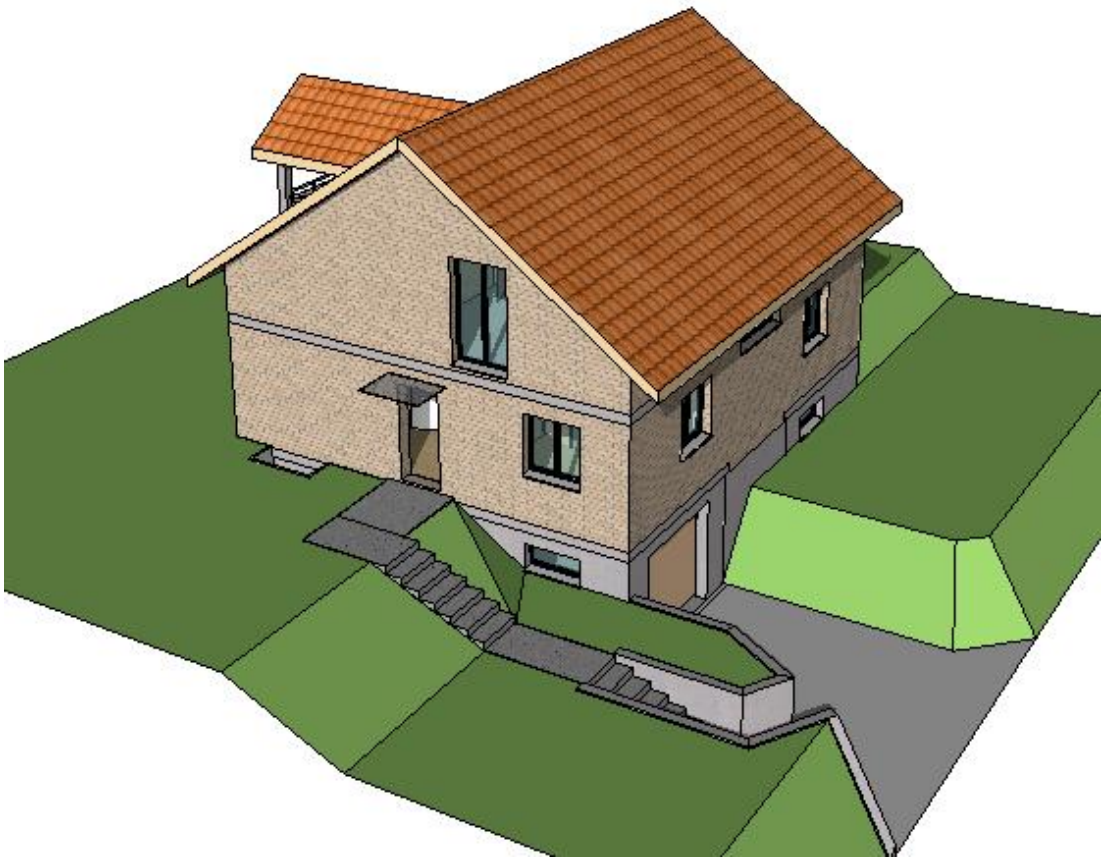


COURSE UNIT 4



Enhanced Construction Functions

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INTRODUCTION

How to use this course unit

This course unit is not a manual but a combination of theory and workshops with which to learn the programme on a 1-to-1 basis. Every mouse-click and every input is described in detail, providing you with a teaching resource that lets you learn the basics of the programme by yourself. Each chapter provides explanations, information, and a workshop to practise the functions. To enable the workshops to be completed smoothly, the explanations should be read through very carefully. The order of chapters should not be changed because each workshop builds on the previous one. The programme DVD contains examples stored as an ELITECAD file, enabling problematic places to be reviewed.

Conventions used in this course unit

The start and end of a workshop are marked as follows:

▼ ▼ ▼ ▼ **WORKSHOP**

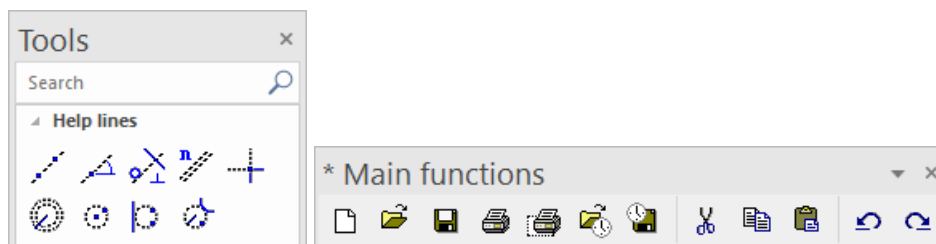
WORKSHOP END

Functions are written in block capitals. The corresponding icon also appears for new functions.

FUNCTIONS (BLOCK CAPITALS)



Functions can be accessed directly using icons (buttons). The functions are grouped together in tool bars or under tool management.



[Enter]

Function keys on the keyboard appear within square brackets.

Input values (bold)

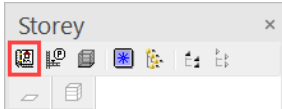
Input values must be entered using the keyboard. When the text is entered in the input line, it must be confirmed with the [Enter] key.

PREPARATION

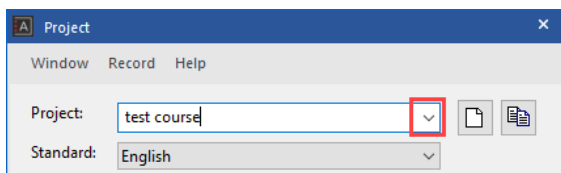
▼ ▼ ▼ ▼ WORKSHOP

In this course unit we start with the project status that you created in course unit 3 or you use our example supplied (CAD_Object3). First, load the project.

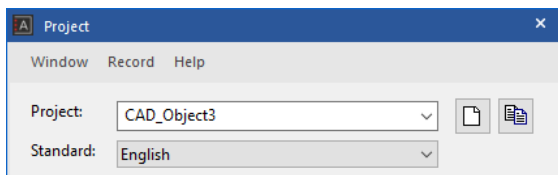
1. Open the project settings.



Existing model from course unit 3



Without model from course unit 3

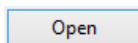


Select the relevant project and confirm with OK.

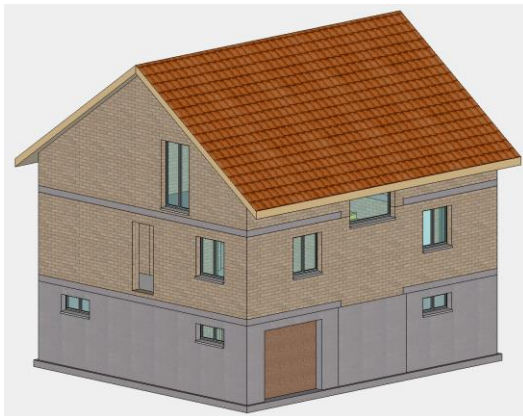
2. Load the corresponding model file with the menu FILE > OPEN.



Select the model and open it.



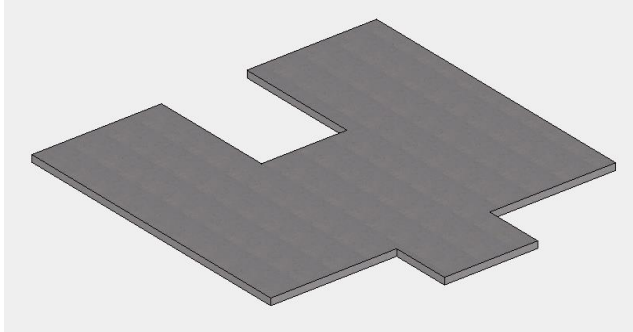
The opened model should have this status.



WORKSHOP END

MODIFY FLOOR CONTOUR

An existing floor plan perimeter line can be subsequently modified.

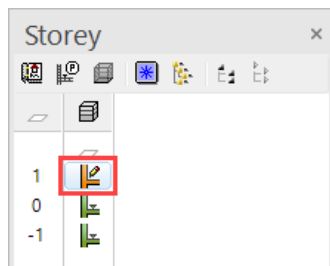


▼ ▼ ▼ ▼ WORKSHOP

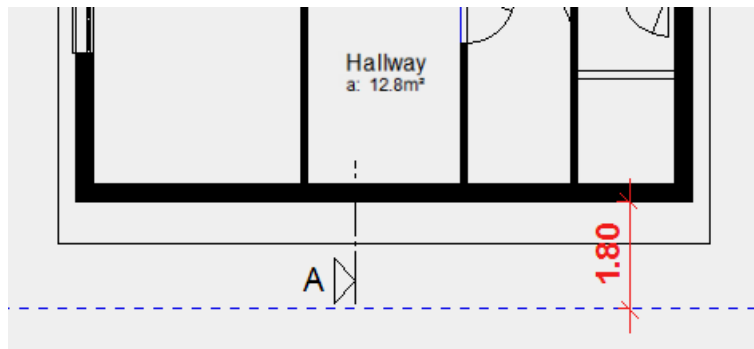
A balcony is to be created on the top floor in the corridor opposite the staircase. First, the floor is corrected.

1. All of the relevant data is located in the top floor; you only need to construct this floor.

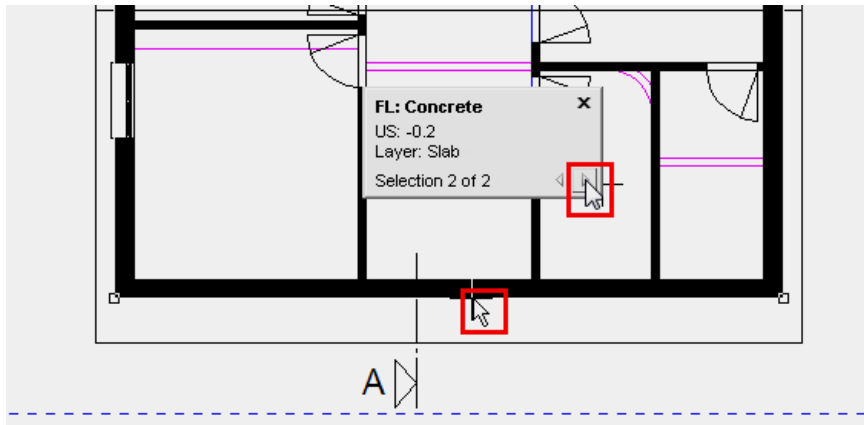
Storeys Manager > double-click on TF



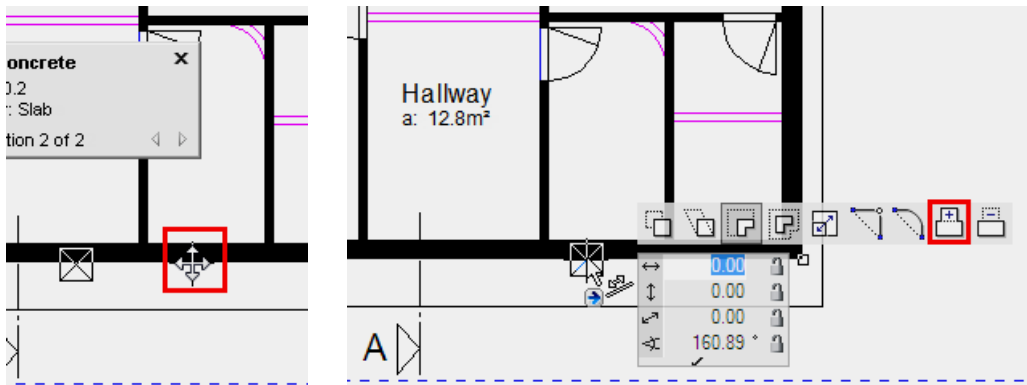
2. Create a parallel help line at a distance of **180** cm to the outer wall.



3. Click on the outside edge to select the floor. Since the edge of the outer wall and the floor are located above each other, the selection list appears. Select the slab.

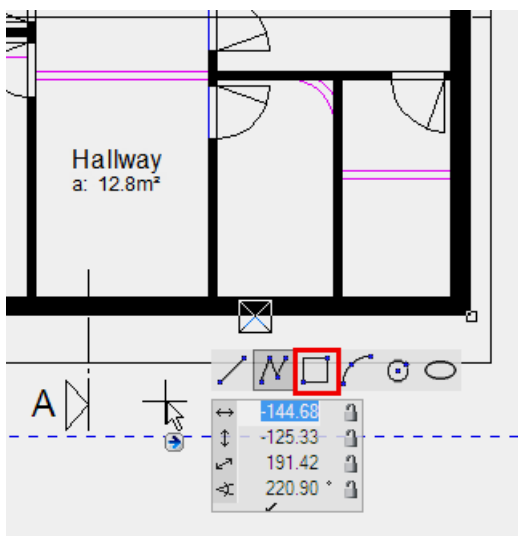


4. Click again on the contour. The cursor changes to a double arrow. This indicates that the cursor is located on a gripper.

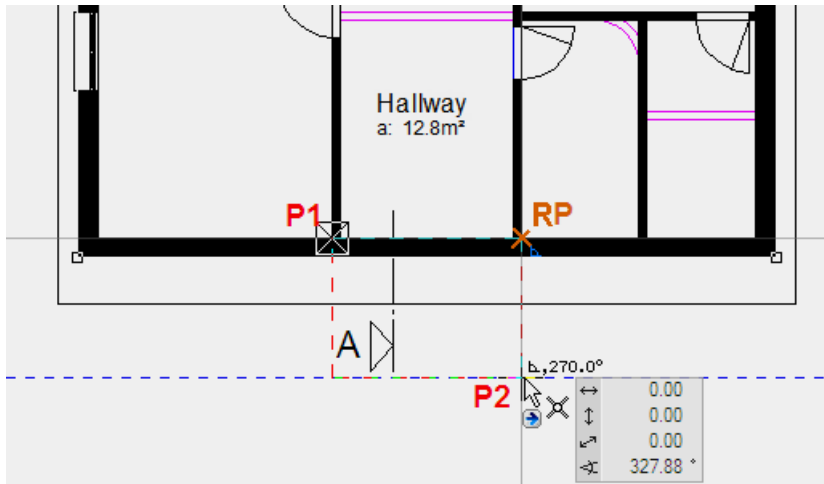


5. Select the function EXTEND POLYGON from the input assistant.

6. Enter the input assistant again and select the drawing function RECTANGLE.



7. Drag the rectangle from point **P1** to **P2**. For point **P2** you require the reference point **RP**.



8. Remove the help lines.



WORKSHOP END

DORMER

▼ ▼ ▼ ▼ WORKSHOP

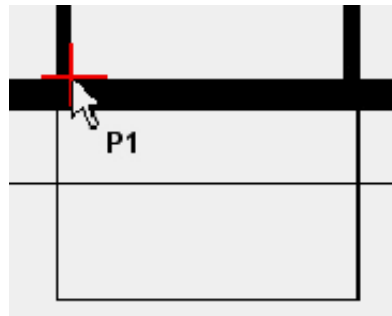
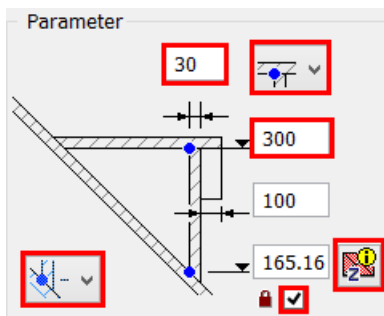
Create a dormer above the balcony.



1. Select the function CREATE DORMER.



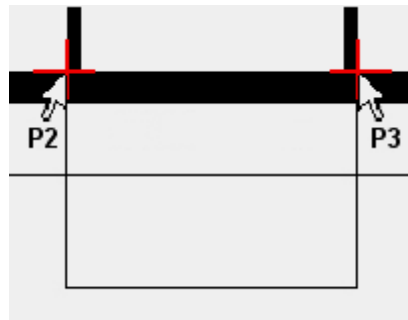
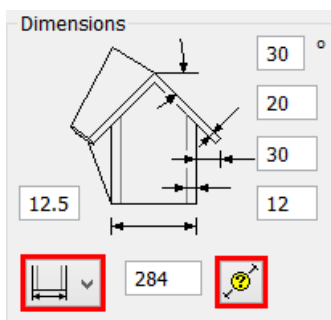
2. Start with the dedendum height of the dormer. This height can be taken directly from the plan. Click in the dedendum screen on the function DIGITALIZE DEDENDUM and then in the floor plan on point **P1**. The height is entered directly in the field (the height can differ from the value in the figure). Lock this value.



Enter the height of the ridge of the dormer (**300**) and the wall thickness (**30**).

3. For the dormer width you can obtain a value directly from the plan. Ensure that the setting of the width is set to "outside".

Click on the dimension function and then on the points **P2** and **P3**.



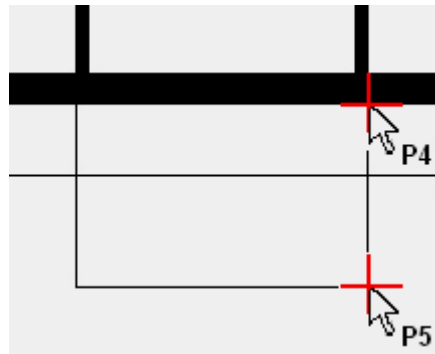
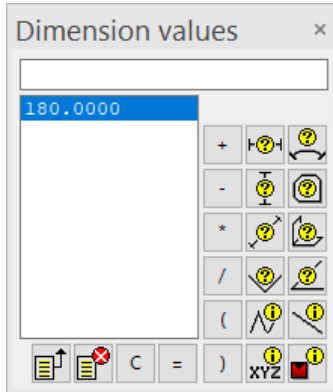
Enter values for the remaining dimensions on this screen.

4. If you do not know a value, you can also work with the normal dimension functions. In this case the roof overhang of the dormer to the outer edge of the house must be measured.

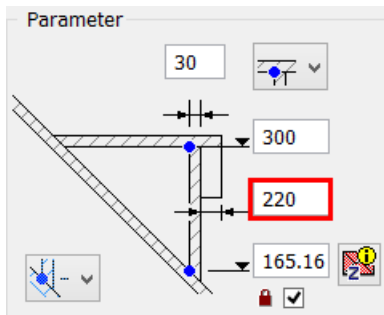
Right-click > select the function MEASURE



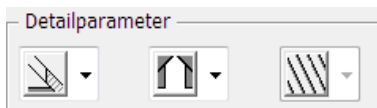
Click on the dimension values mask MEASURE VERTICAL and click on the points **P4** and **P5**. The result is entered in the mask. To this value is added **40** cm roof projection to the balcony slab.



Enter **220** in the mask.

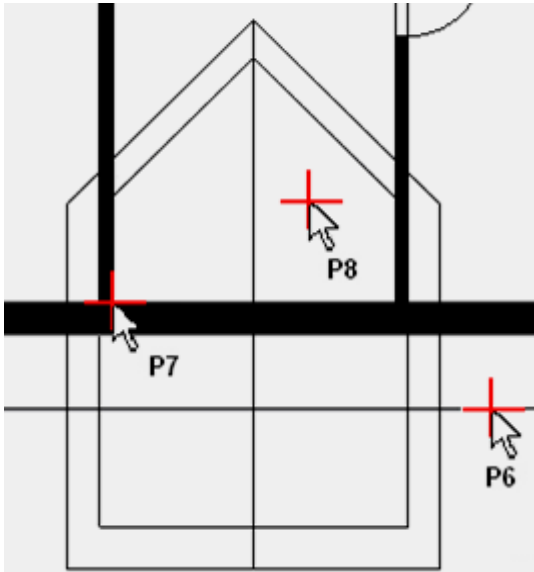


5. Ensure that the detail parameters are set correctly.



6. The values of the mask are now set correctly. Click APPLY.

7. The first prompt asks for the roof plane onto which the dormer is to be placed. Select the roof plane on point **P6**.



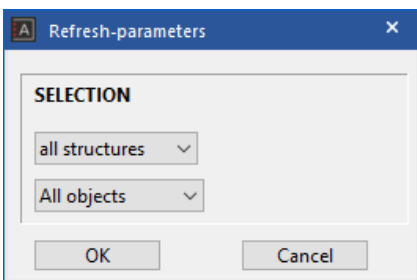
8. Select a placement point. This can be the middle of the dormer or one of the two inner corners (such as P7). It is easiest to set this dormer over a corner. Click on the point **P7**.

9. The end position of the dormer will now be determined. Move your cursor to the right > **P8**.

TIP

If the wall does not intersect immediately with the roof, the wall must be updated.

Menu **MODIFY > REFRESH AR-OBJECTS**



10. Cancel the function with [**Esc**].

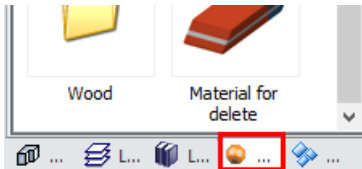
WORKSHOP END

APPLYING TEXTURES

The side walls of the dormer still have no texture.

▼ ▼ ▼ ▼ WORKSHOP

1. Open materials management. If materials management is not loaded, it can be loaded in the menu VIEW > WINDOW > MATERIAL.



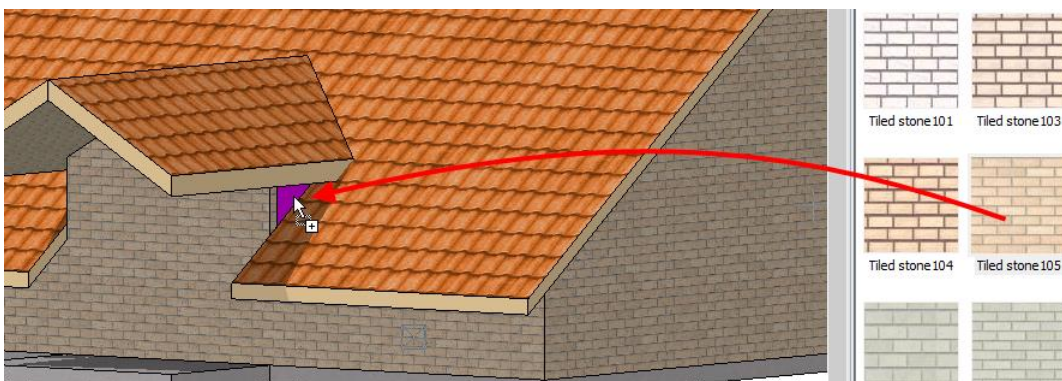
2. Right-click anywhere in materials management and select the function "Select material over surface".



3. Now left-click on the outer wall. The material is displayed in materials management.



4. Now use drag and drop to drag this material to one of the side walls and drop it there.



5. Use the centre mouse button to turn the model in such a way that the other dormer side wall is visible and apply the texture to this as well.

WORKSHOP END

COPYING/ROTATING

An element/object can be moved or manipulated using its handles. There are also individual manipulation functions (move, copy, rotate, mirror, scale). These functions have extended functionalities and can be combined with each other or a random reference point for the manipulation can be selected. For example, when you copy a window with handles, only the left or right side can be "packed", whereas with the manipulation function COPY SELECTION the wall corner can serve as a reference point. This means that the window can be copied to different corners at the same distance each time.



Function COPY SELECTION

First decide on a selection (one or more elements/objects), then start the function. As soon as the reference point of the selection to be copied is defined, the properties bar opens.



The functions can be combined in any way required. For example you can turn, scale and copy the selection.

EXAMPLE

Multiple copy:

Move which point? **P1**

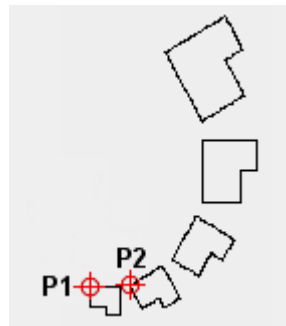


Enlargement factor? **1.25**



How often? **4**

Position where to? **P2**



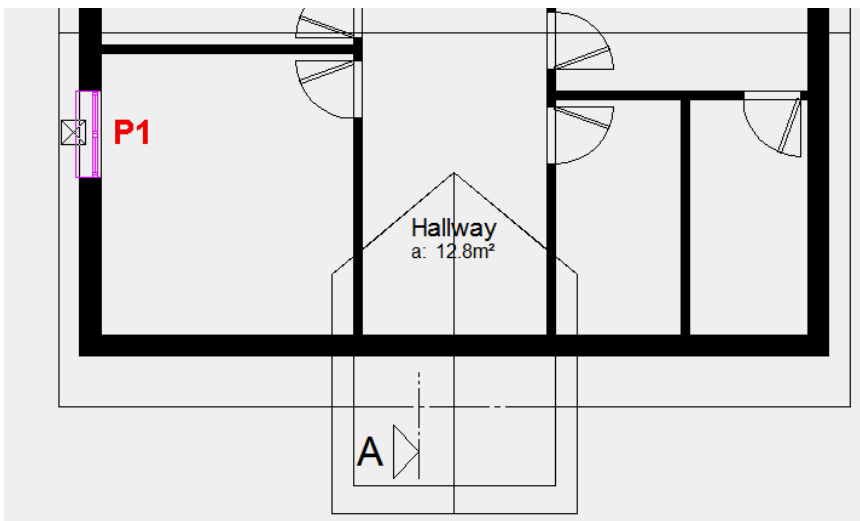
▼ ▼ ▼ ▼ **WORKSHOP**

You will now copy an existing window in the top floor, rotate it by 90° and set it into the new wall ahead of the balcony.

1. Switch to the wire model and back to the start position. So far, you should only have constructed the top floor.



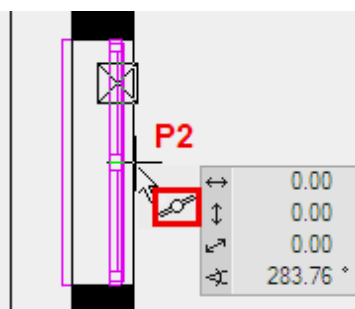
2. Select a window. > **P1**



3. Start the function COPY SELECTION.

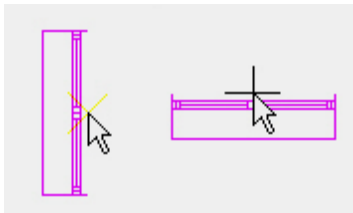


4. As a reference point for locating the copied window, select the centre on the inside of the window. > **P2**

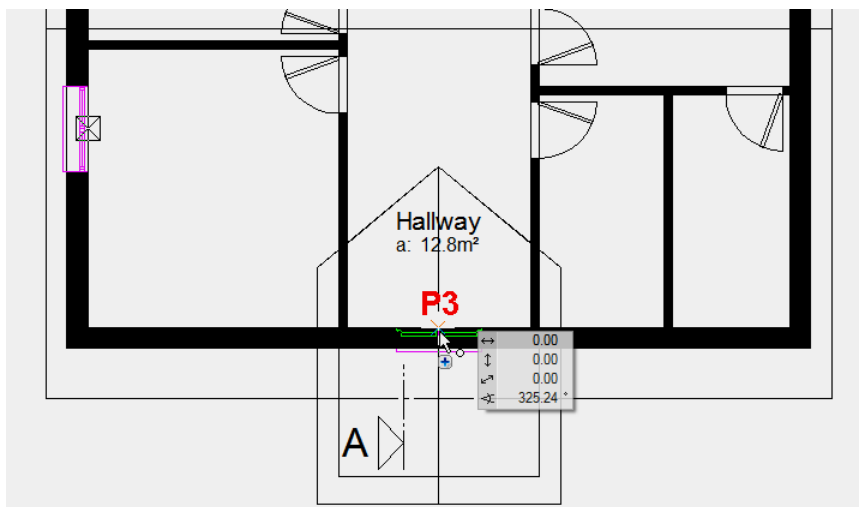


The window is now "attached" to the cursor.

5. Set the rotation angle in the properties bar to **90°** and rotate it anti-clockwise.



6. Set the window into the centre of the dormer. > **P3**



7. Cancel the function with [**Esc**].

WORKSHOP END

COLUMN

The CREATE COLUMN function is to be found under components, like the function CREATE WALL.



Properties bar

The most important data can be set in the properties bar for the column.



Height reference

As with walls, the height reference also applies for columns.

The definition "to underside of roof" causes the column in the roof storey to intersect with the roof planes.



▼ ▼ ▼ ▼ WORKSHOP

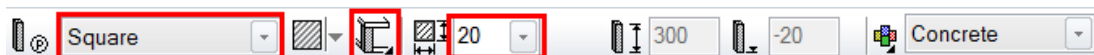
On the balcony, columns must be created that reach up to below the dormer roof.

1. Select the function CREATE COLUMN.



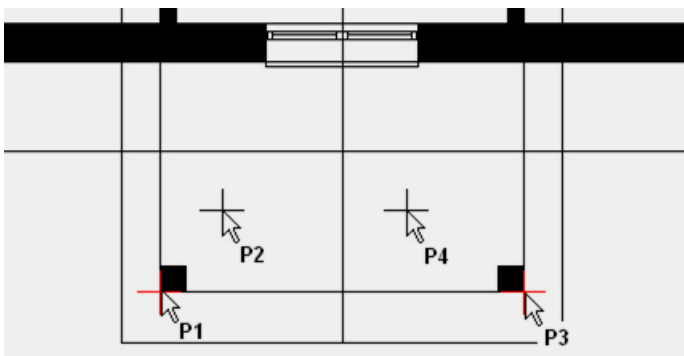
The properties bar of the column appears.

2. Select the parameter type "square" and add the remaining values.

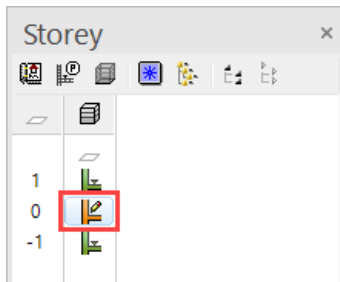


For a correct evaluation, the property "exterior column" must be activated in the column parameters.

3. For the position of the column, specify point **P1** and for the direction of the column, point **P2**.
4. For the position of the second column, specify point **P3** and for the direction of the column, point **P4**.



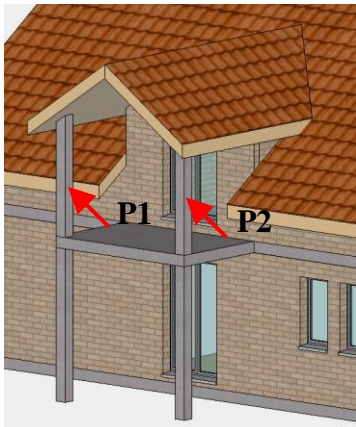
5. The function CREATE COLUMN is still active. Instead of cancelling the function, a new function can be selected directly. Specify the ground floor as *current*.



6. The columns must be copied to the ground floor. Use the function COPY TO CURRENT STOREY.



7. Click on both columns in the top floor. The copy is displayed immediately in the current storey (ground floor).



8. Cancel the function with [Esc].

WORKSHOP END

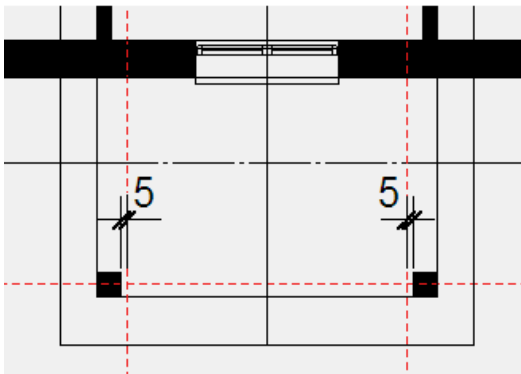
BANISTER

The BANISTER function can be used for a free-standing banister or for a banister on a staircase.

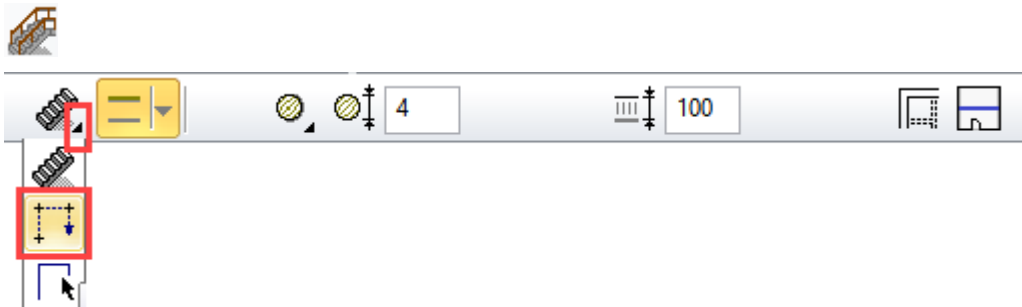
▼ ▼ ▼ ▼ WORKSHOP

Create a banister for the balcony. To do so you must first draw a line, from which the banister will then be created.

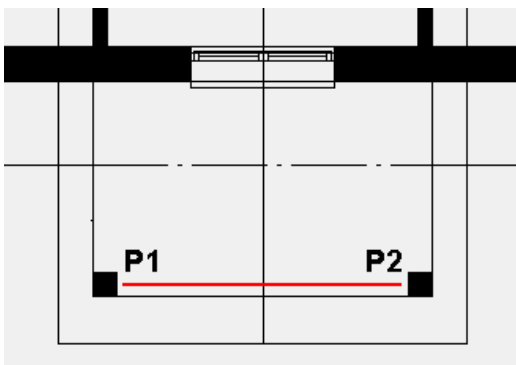
1. Top floor = current storey
2. Generate help lines in the middle of the column, each at a distance of 5 cm to the column.



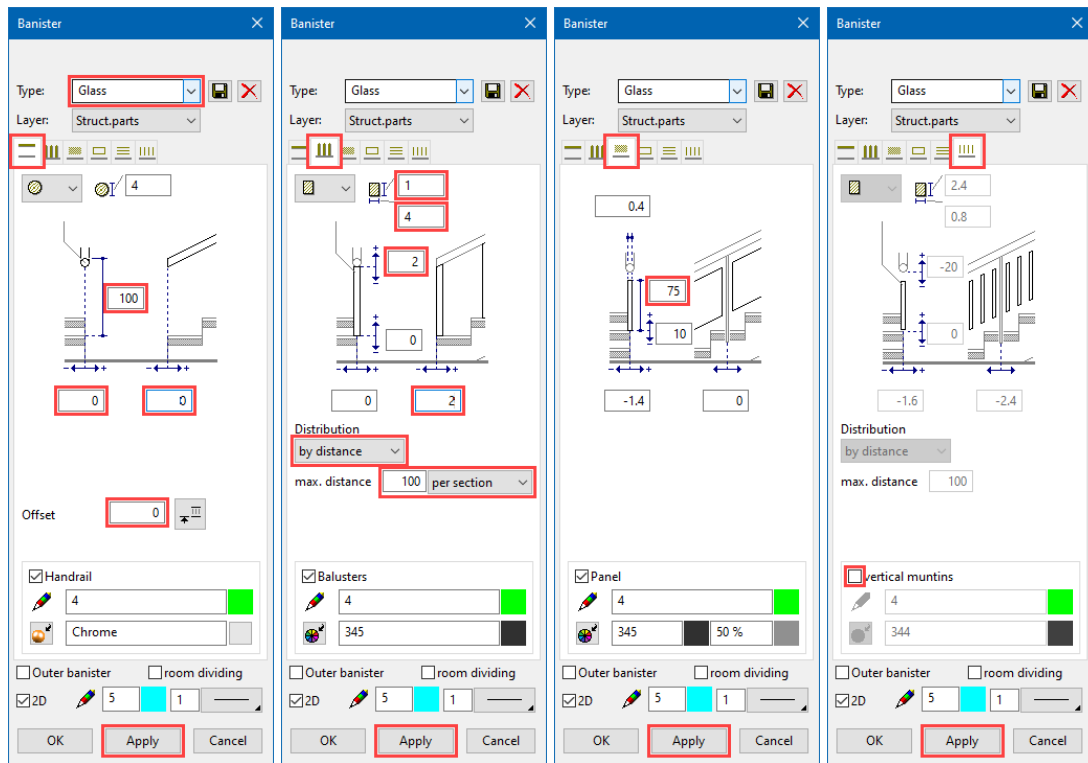
3. Select the BANISTER function, then the option "Draw contour manually" from the properties bar.



4. Draw the contour from the start point **P1** to the end point **P2** and confirm the end point by clicking again on **P2**.



5. Set the individual tabs as shown below and accept the settings by clicking APPLY.



6. The two side banisters can now be created. Since both banisters are identical, you can create one and then copy it.



WORKSHOP END

EXTERNAL STAIRCASE

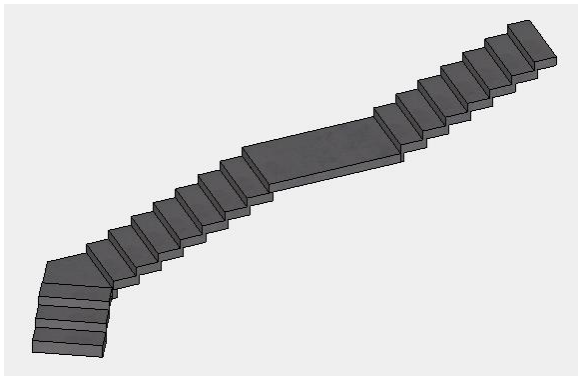
In the case of an external staircase that is not storey height, you must always enter the heights correctly first before specifying any additional values.

▼ ▼ ▼ ▼ WORKSHOP

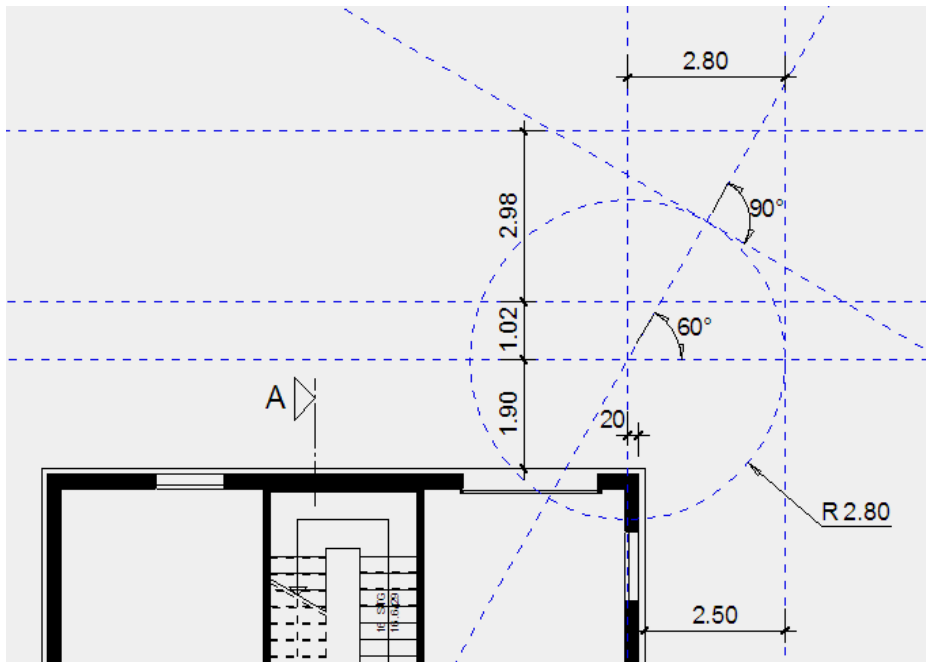
You will create the following staircase on the next pages:

The first flight with three steps is created as a separate "straight flight".

The second and third flight are combined into one staircase with a middle landing. Therefore only the landing (free slab) between the first and second flight needs to be added.



1. Switch the basement on the screen to visible *alone*.
2. Construct the following auxiliary drawing with help lines.



1. Function CREATE STAIR



2. Stair type "Straight flight"



Stair geometry

3. Modify height definition



4. Activate rise >
Enter new rise

44.1

5. Fix rise, >
Value has grey background

6. Set number of steps to **3**
The rise of step I should have the value 14.7

7. Set rise width to **34**
The stair length must not yet be fixed.
The stair length should now be 68.

Fix this value as well. >

8. Stair width value **100**

Step design

9. Select step design



10. Modify type



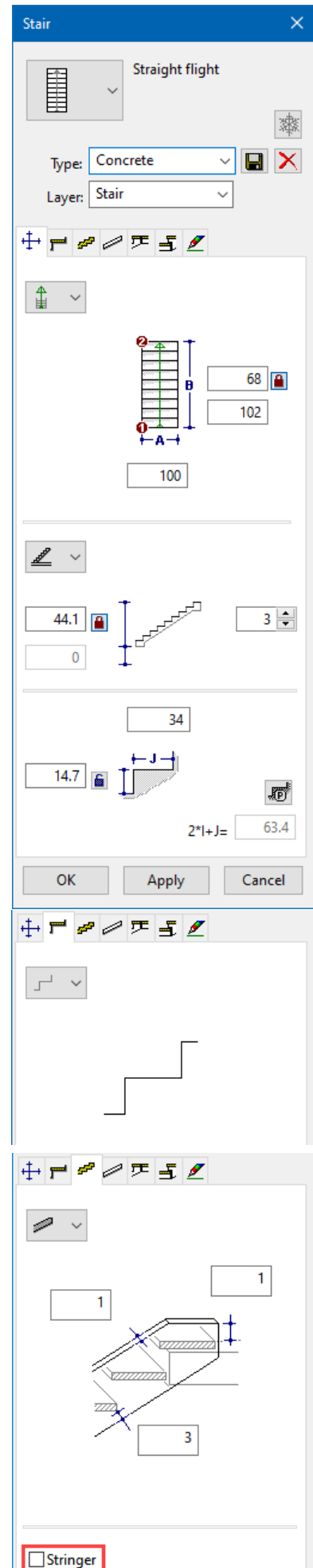
Stringer

11. Select stringer



12. Switch off stringer

Stringer

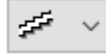


Load-bearing construction

13. Select load-bearing construction



14. Execution lower edge graduated



15. Enter values:
Overlap **5**, height **14.7**

16. Determine material and texture

Stair head

17. Select stair head



18. Select type



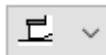
19. Specify construction height at exit **14.7**

Stair foot

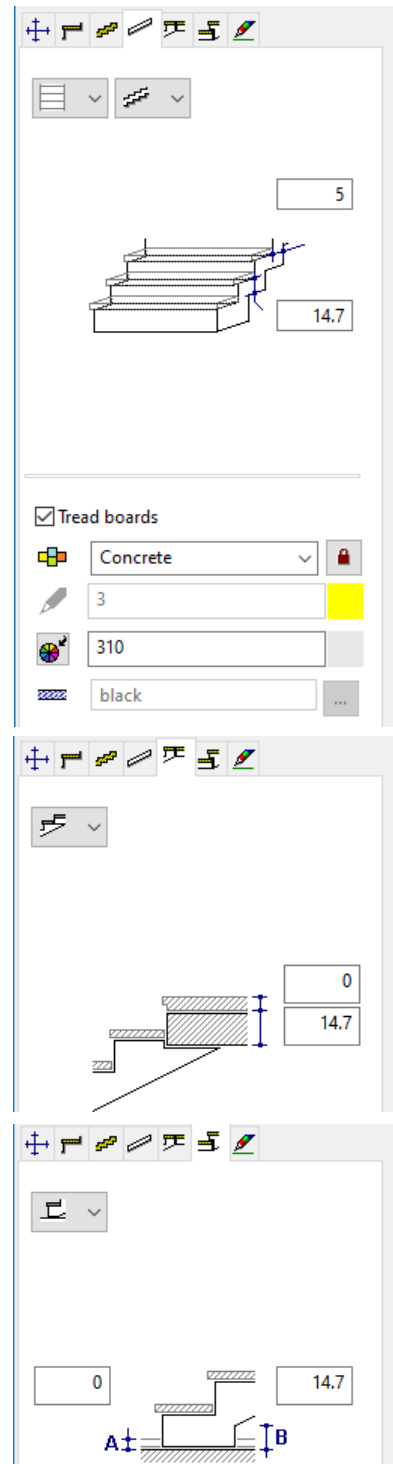
20. Select stair foot



21. Select type



22. Specify values for substructure **0**, **14.7**



Plan graphic

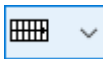
23. Select plan graphic



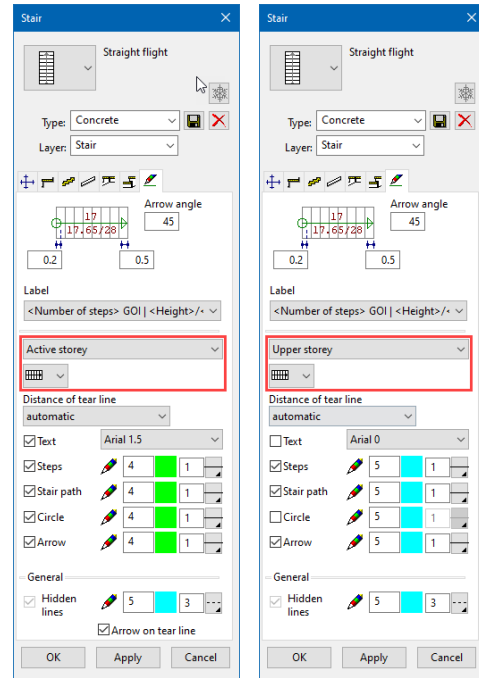
24. Display for the active floor



25. Display for the upper floor

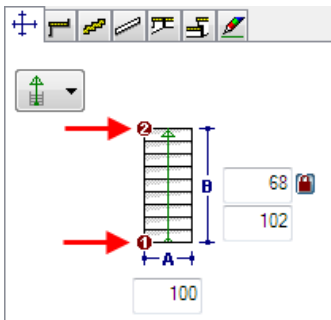


26. Check remaining settings



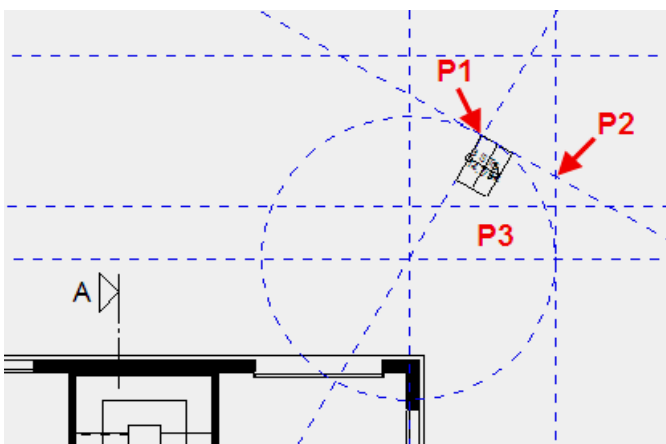
Set staircase

27. The geometry tab shows over which of the two points the staircase is to be placed.



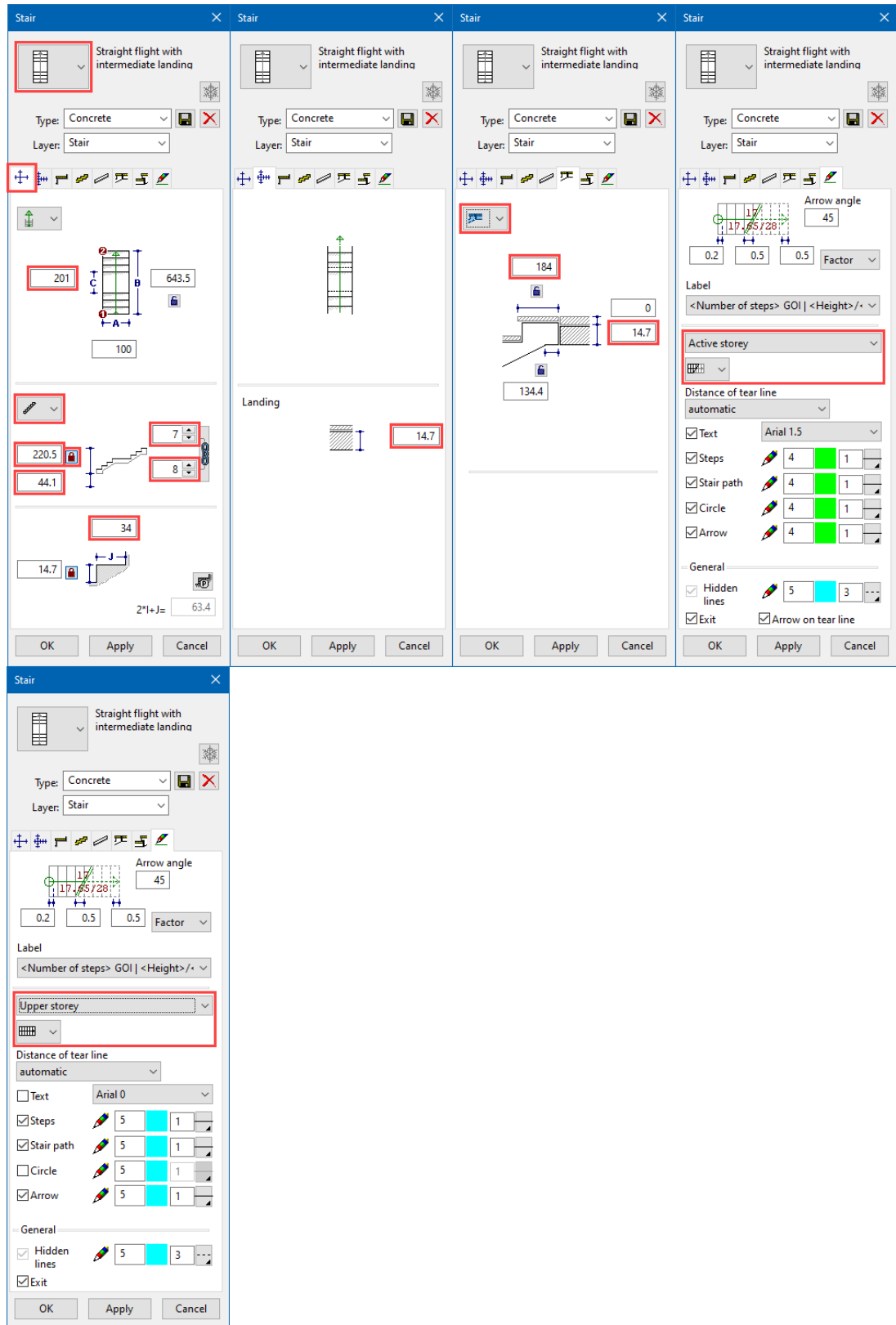
Specify the two points **P1** and **P2**.

28. The direction of the staircase is determined by the third point > **P3**.

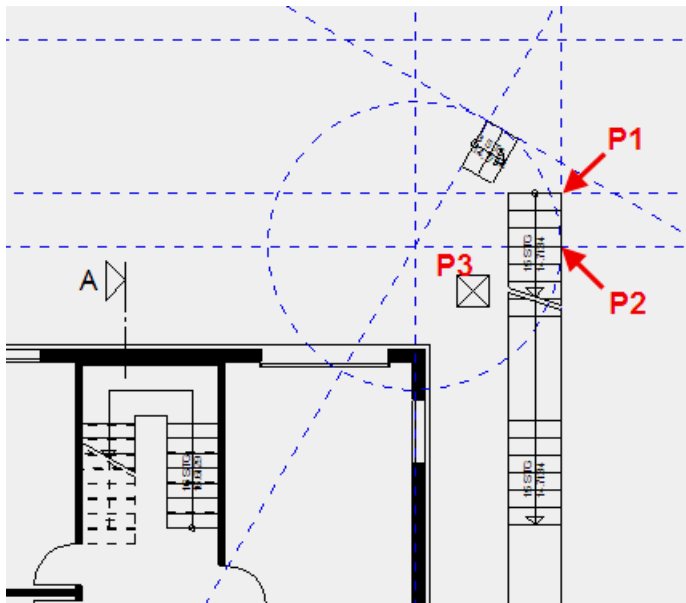


29. Click OK to close stair screen.

30. Create the second staircase in the same way as the staircase you just created with the following settings:



31. Locate the staircase with the points **P1**, **P2** specified below.



32. Specify the direction of the staircase > **P3**.

33. Close the staircase screen.

WORKSHOP END

INTERMEDIATE LANDING (FREE SLAB)

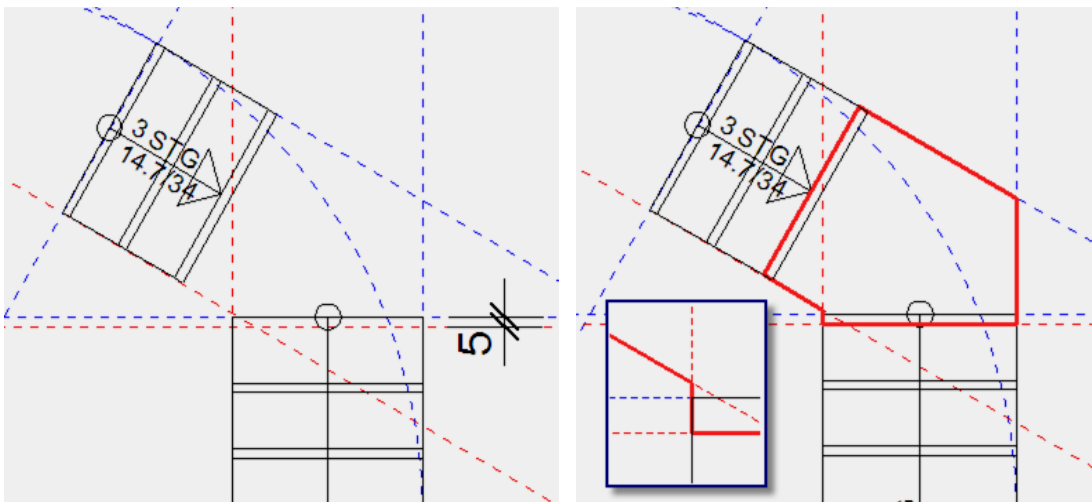
The intermediate landing between the first and second staircase must be created with a slab. This slab must not have any reference to the walls and must be located on a certain marker, independently of storeys. Use the free slab for this specification.

Height reference free slab



WORKSHOP

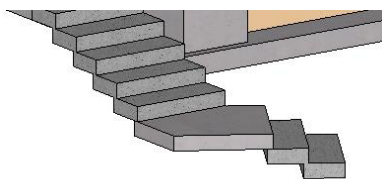
1. Add a parallel help line to the help lines at a distance of 5 cm for the overlap and one parallel help line at a distance of 0 cm to the outer sides of the staircase.



2. Select the function CREATE SLAB and add the values to the properties bar.



3. Draw the contour of the landing (see image above).



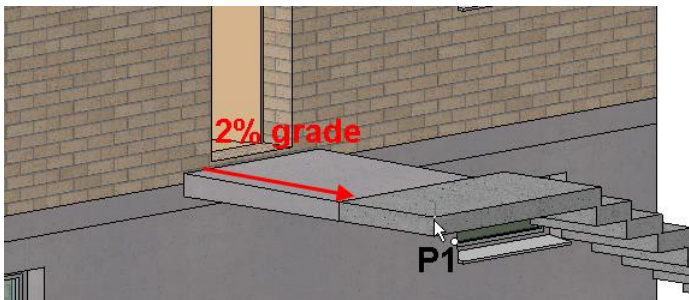
4. Cancel the function with [Esc].

WORKSHOP END

FORECOURT (GRADIENT SLAB)

The forecourt must be inclined. On the parameter screen of the slab you can switch between a level and a sloping slab. The gradient slab is determined by a percentage incline, the highest point of the upper edge of the slab and the direction of the incline. The level of the floor is measured from the current work plane. The work planes of the floors are located on the raw markers of the ceilings.

WORKSHOP



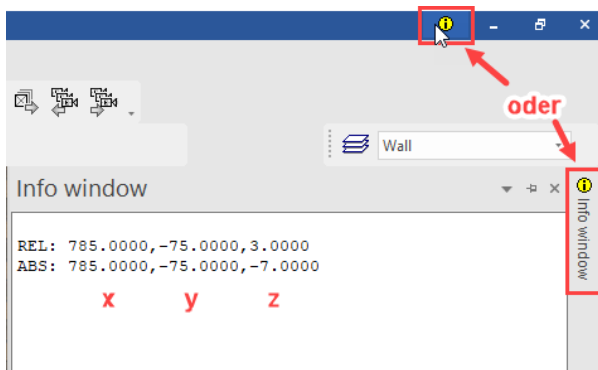
1. Make the ground floor the current one and set the basement to visible.
2. The height for the floor (measured as from the current work plane) can be calculated as follows:
 Marker basement: -270; marker ground floor: -10
 Stair heights: 44.1cm + 220.5cm = 264.6cm
 Floor height = **4.6**; marker +0.00 = -5.4

It is much easier to access the height directly from the model:
 Open the dimension functions from the context menu (right-click in the background).
 Start the function COORDINATES OF POINT.



Click on the upper edge **P1** (see image above) of the last step.

The info window is to the top right of the edge of the screen. The info window opens as soon as you move your cursor into the field.

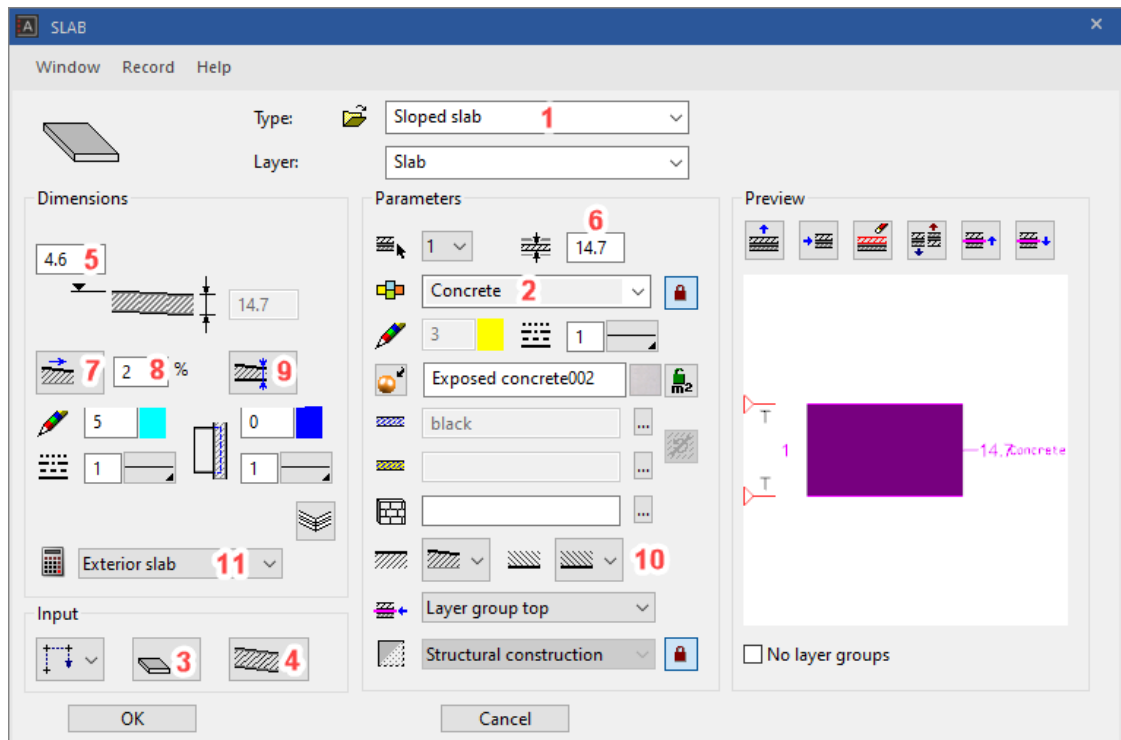


Two rows are displayed in the info window:
 REL = height to current work plane: X value, Y value, Z value
 ABS = height marker to +/- 0.00 of the structure: X value, Y value, Z value

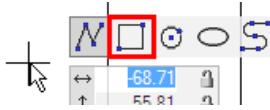
3. The basement is no longer required; switch the basement to invisible.
4. Select the function CREATE SLAB and open the PARAMETERMASK.



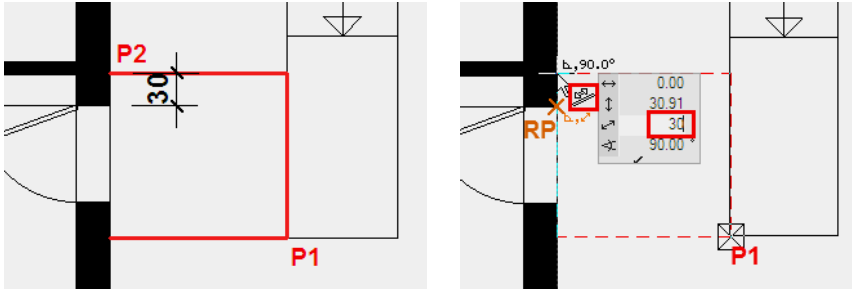
Set the parameter (1) correctly. The material (2) is concrete; the slab is of type free (3) and slanted (4). The upper side of the slab is set to 4.6 (5) and has a thickness (6) of 14.7 cm. The height is measured at the lowest point. There should be a gradient (7) of 2% (8) from this point. The gauge (6) is measured at the thinnest point (9). The lower edge of the slab must remain horizontal (10). The slab must be quantified as an "exterior foundation" (11).



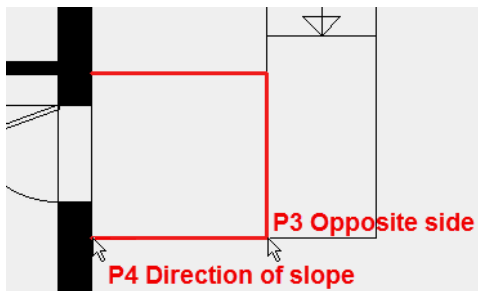
5. In the input assistant switch to the drawing function RECTANGLE.



6. Pull up the rectangle for the forecourt. Start at **P1**. The second point is located 30 cm above the door opening. Make use of a temporary reference point.



7. The two following prompts relate to the upper edge **P3** (point at which the height entered (5. image on previous page) should count) and the direction of slope **P4**.



8. Cancel the function with [Esc].

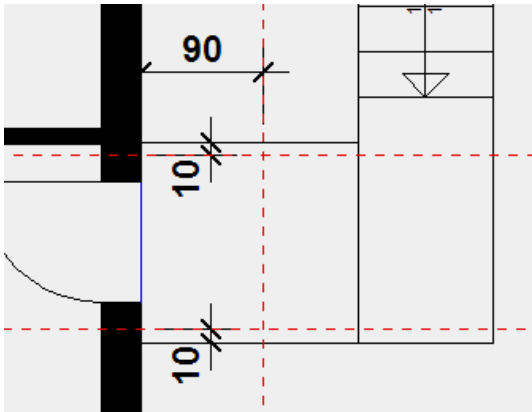
WORKSHOP END

PORCH

There will be a small glass porch over the entrance.

WORKSHOP

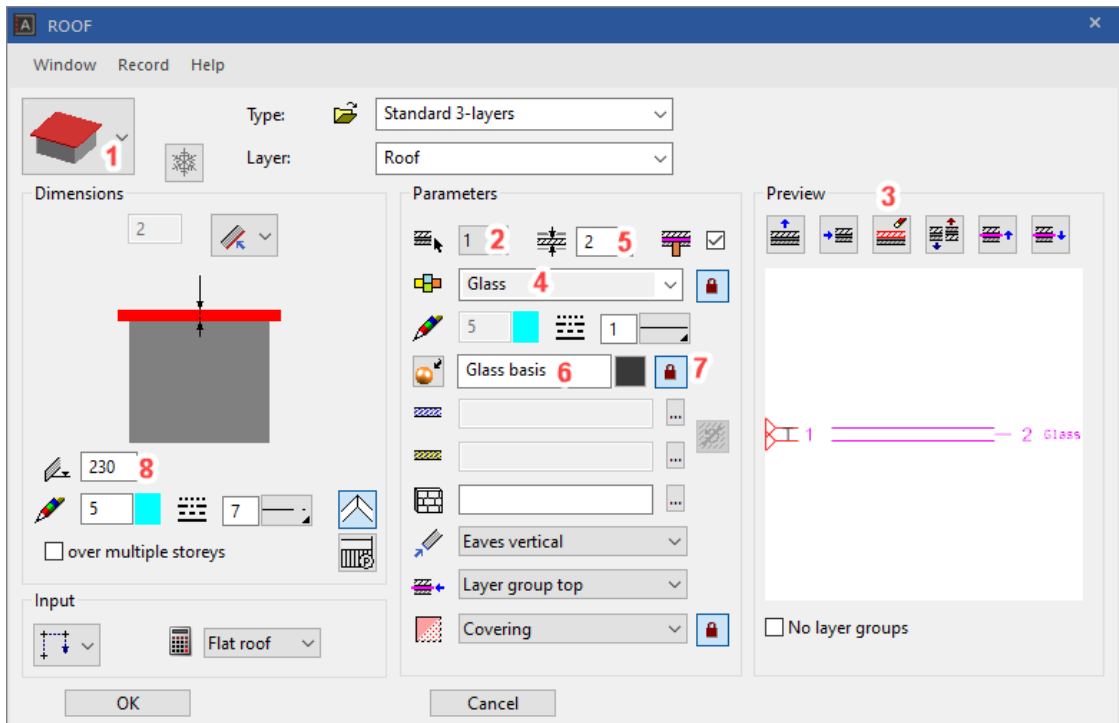
1. Create parallel help lines to draw the roof contour.



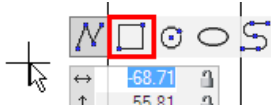
2. Select the function CREATE ROOF and open the parameter screen.



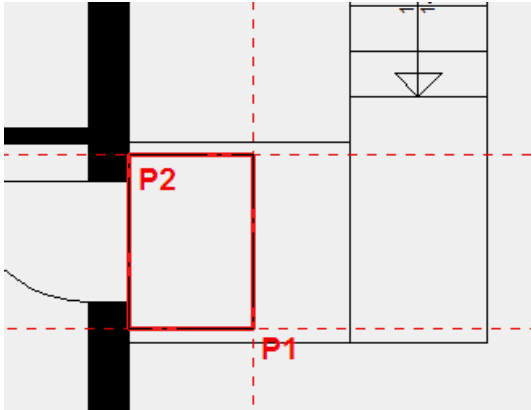
Change the roof form (1) to flat roof. Select a layer (2) and delete (3) it until only one layer is left. The gauge (5) of this layer is 2 cm and is made of the material (4) glass. Determine the texture (6) and activate the option (7) so that the texture is displayed on all sides. The height (8) of the roof is 230 cm.



3. In the input assistant switch to the drawing function RECTANGLE.



4. Extend the rectangle for the porch from point **P1** to point **P2**.



5. Cancel the function with [**Esc**].

WORKSHOP END

RETAINING WALL

▼ ▼ ▼ ▼ WORKSHOP

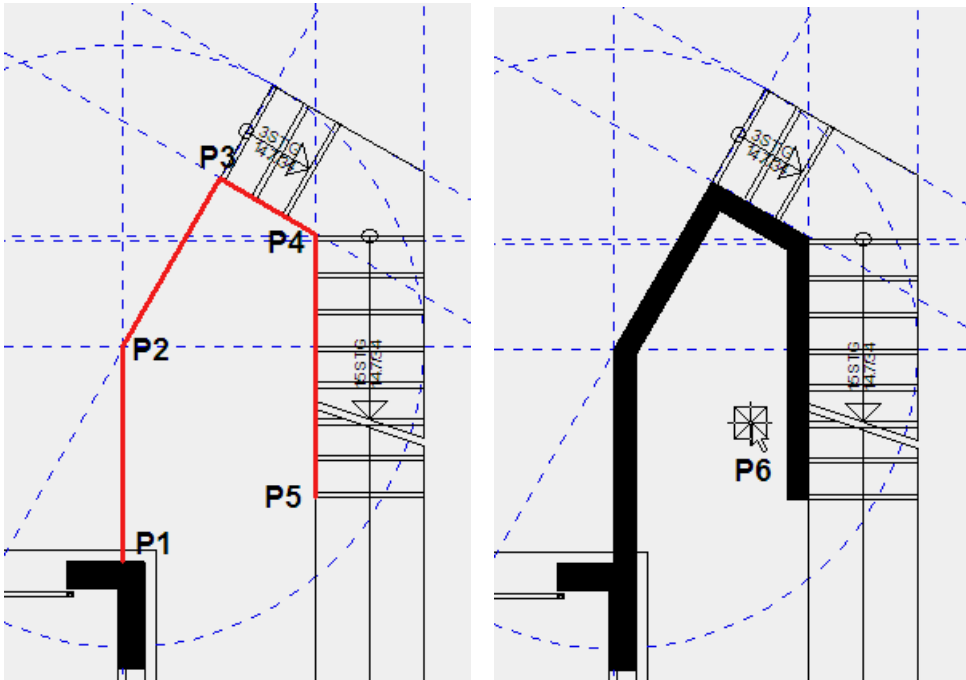
Retaining walls must be created along the garage entrance and staircase. The retaining walls extend 1 metre below basement level.

For the external staircase, you have created an auxiliary drawing with help lines. If you deleted the help lines, add the missing help lines in the same way as page 19.

1. Switch the basement to visible *alone* on the screen.
2. Select the function CREATE WALL. In the properties bar switch the parameter record to *Concrete* and change the rest of the values. The wall height is changed following modification. The bottom edge of the wall is set to **-100**.

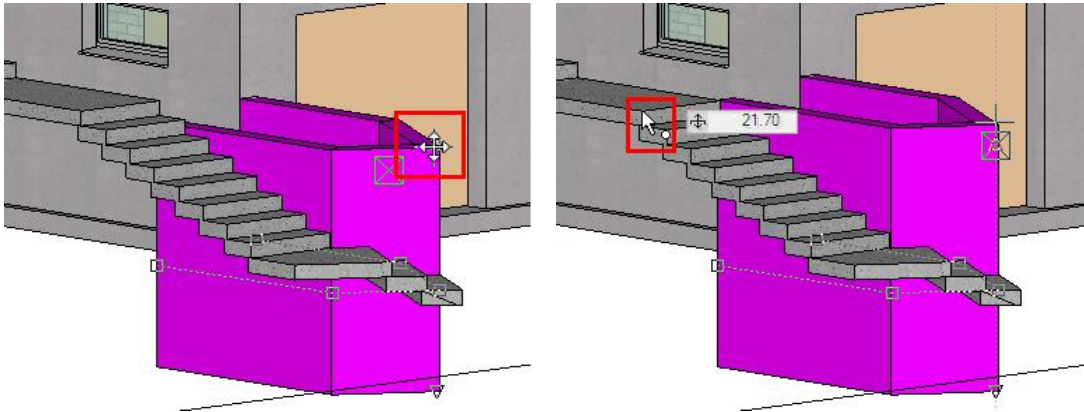


3. Start at point **P1** and move along the help lines and staircase to point **P5**. For point **P4** zoom in sufficiently so that you catch the corner of the podium and not the edge of the stair. Click again to confirm the end of the polygon **P5** and determine the direction of the wall **P6**.



4. Cancel the function with [**Esc**].

5. Rotate the model in 3D and switch to solid mode.
6. Select the retaining wall just created. A wall with a free height reference does not just have handles in the floor plan but also in the Z-direction. Move your cursor onto the upper height handle (triangle). The cursor switches to a double arrow. Click on the handle. The upper edge of the wall is now "attached" to the cursor. The wall must have the same height as the intermediate landing of the staircase. Point the cursor to the upper edge of the podium and confirm it as soon as point capture is displayed.

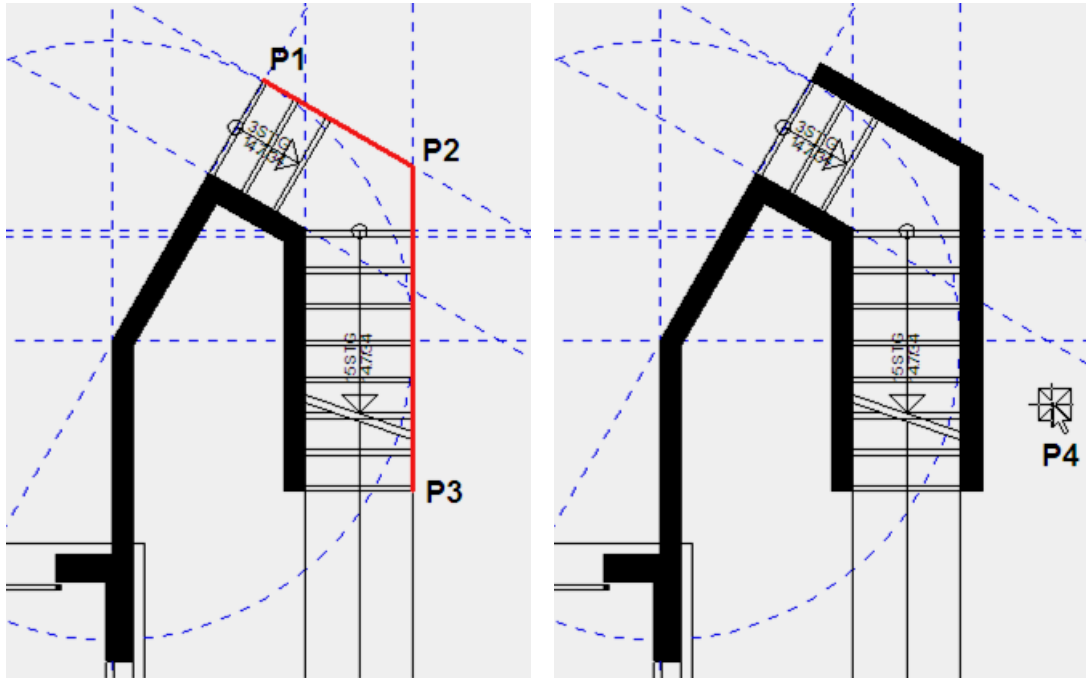


7. On the properties bar the new height is displayed as 261.7. The retaining wall should extend slightly beyond the podium. Change the height to **264**.



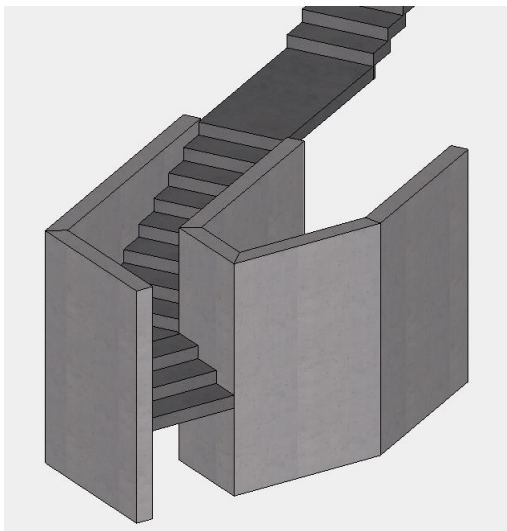
8. Cancel the function with [**Esc**].
Switch back to the wire model and to the starting position.

9. Restart the wall function. The settings are the same as those when exiting. You can draw the second retaining wall directly.



10. Cancel the function with [Esc].

The 3D model should now look as follows in the solid model.



WORKSHOP END

WALL WITH INCLINED UPPER EDGE

Definition of an inclined wall upper edge or wall lower edge

The angle of the edge can be entered in two different ways:

Over 3 points:

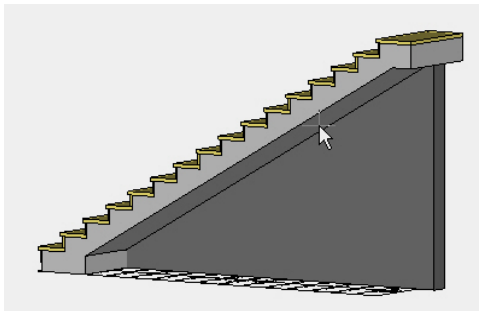
Specify 3 points with height.

Over planes:

If a surface already exists with the same slope, the surface can be selected directly in the model (solid model mode).

Example:

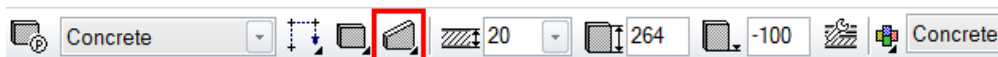
To define the upper edge of the wall, the bottom view of the staircase was selected.



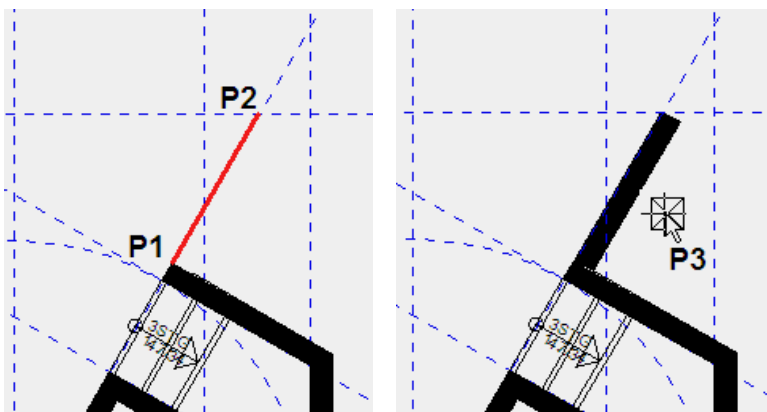
The wall can only have one slope. If there are multiple kinks, the wall must be interrupted.

▼ ▼ ▼ ▼ WORKSHOP

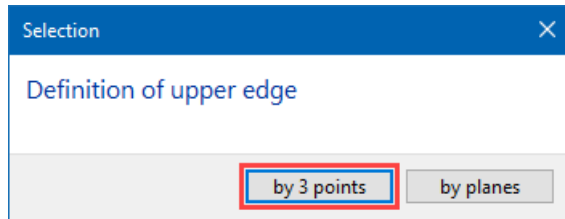
1. Select the function CREATE WALL. In the properties bar, change the wall upper edge to *Form – slanted above*.



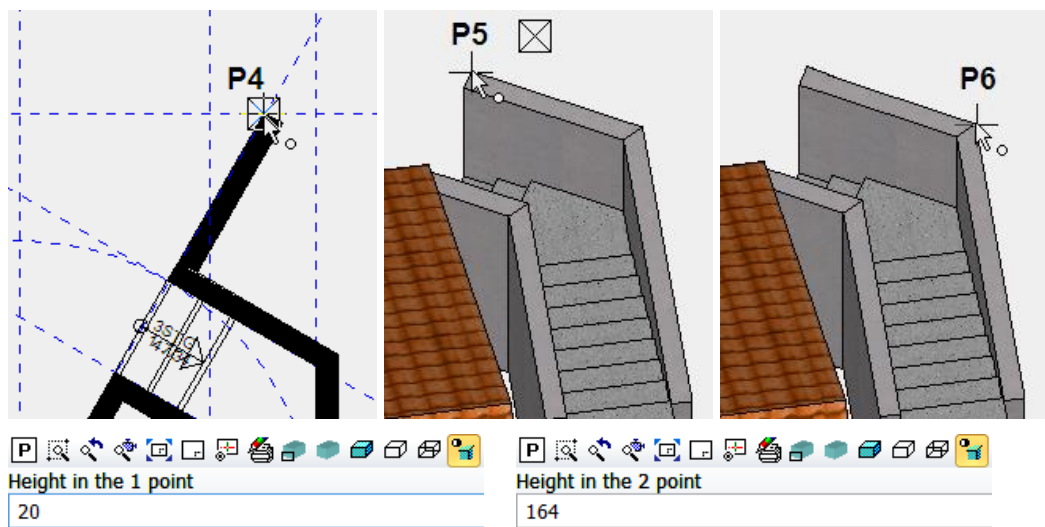
2. Start at point **P1** and end the wall by double-clicking at point **P2**. Specify the direction of the wall > **P3**.



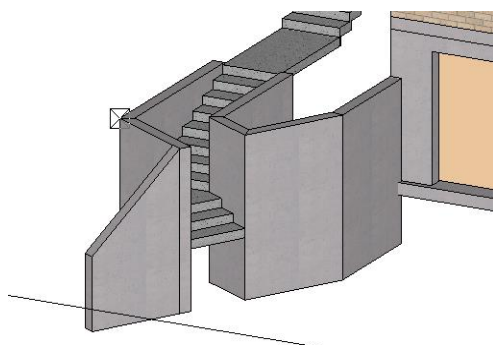
3. A prompt now appears asking how the upper edge is to be defined. In this case the upper edge is defined *over 3 points*.



4. The first of the 3 points is point **P4**. The height of the retaining wall at this point is 20 cm. Enter the value **20** into the input line and confirm the value.



5. The second and third height marker can be selected directly in the 3D model. Rotate in 3D and into the solid display. The second point of the retaining wall is point **P5**, height **164** is entered directly in the input line and must be confirmed. The third point of the retaining wall is point **P6** with height **164**.

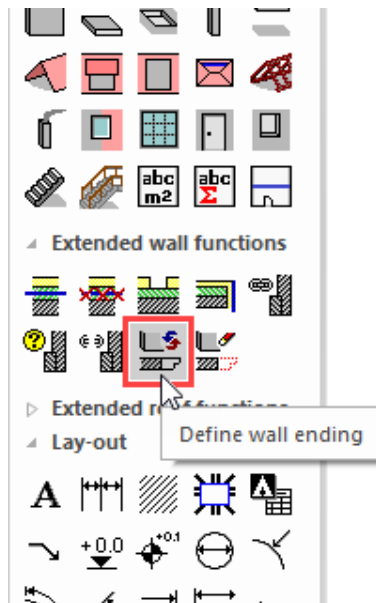
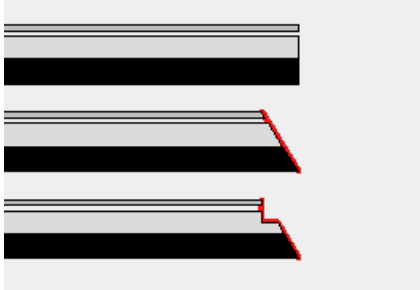


6. Cancel the function with **[Esc]**.

WORKSHOP END

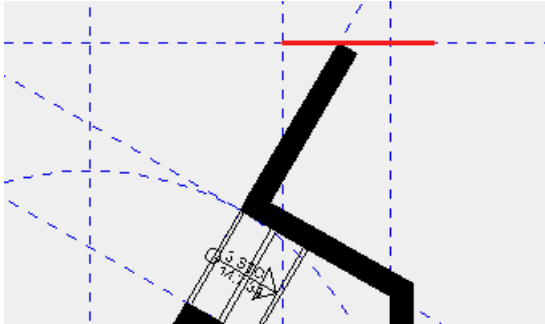
MODIFY WALL ENDING

A wall ending is perpendicular. The function DEFINE WALL ENDING can be used to define a sloping or a special ending. The ending is drawn as a polygon from one side of the wall to the other. The layers of a wall are not important.



▼ ▼ ▼ ▼ **WORKSHOP**

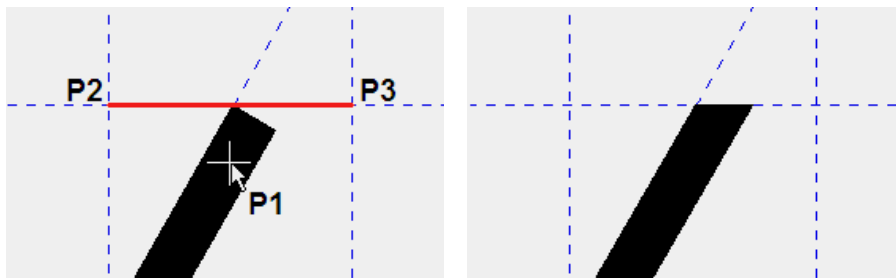
The upper wall ending of the inclined wall just created is to be horizontal and not perpendicular to the wall axis.



1. Bring the editor functions for the wall back onto the screen. Select any random wall and select the editor functions. The tool bar appears on the screen.



2. Start the function CHANGE WALL ENDING and select the wall to be changed > **P1**.



3. Draw the new wall end. The line does not have to start on the outer side of the wall but can overlap if necessary.

Start point **P2**

End point double-click **P3**

WORKSHOP END

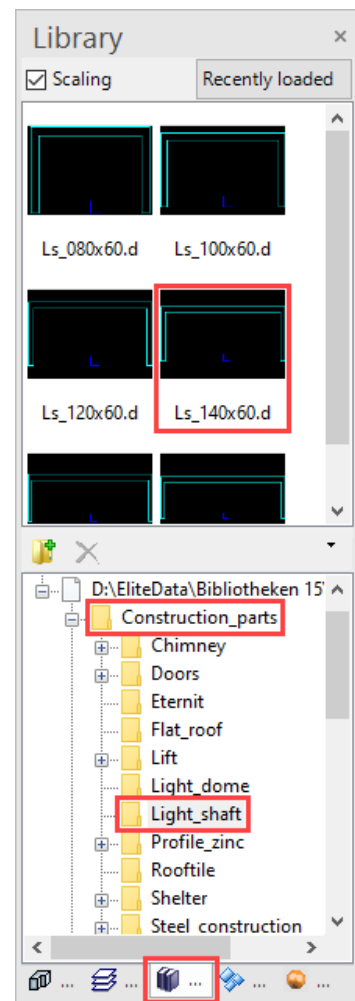
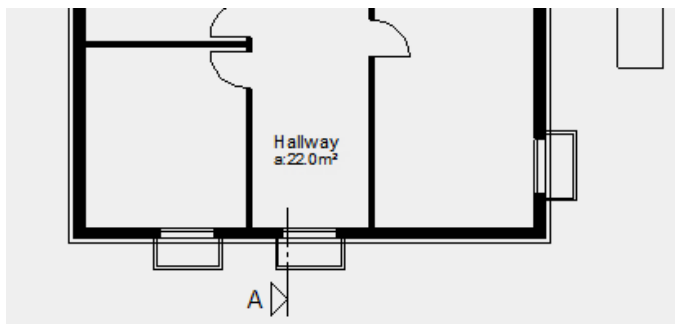
LIGHT SHAFT (LIBRARY PART)

There are a number of options for creating the light shafts.

- only as 2D floor plan in the plan
- set a library part
- as 3D object created from a library part or a polygon you drew yourself.

WORKSHOP

You must create 3 light shafts. The size of the light shafts is 60x140 cm and can be taken from the library.



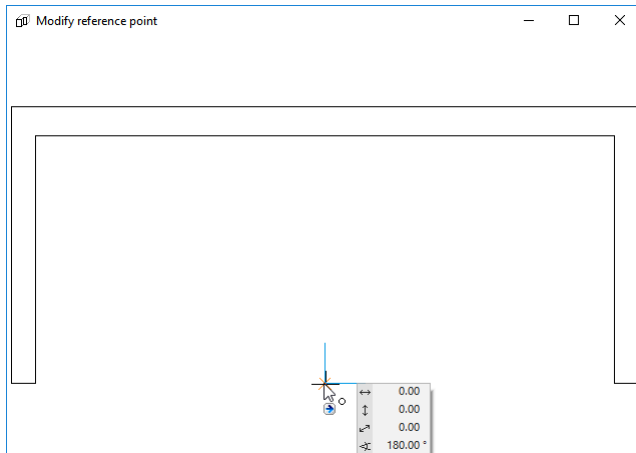
1. Switch the basement to visible *alone*.
2. Bring library management to the foreground. Switch to the path *components/light shaft*. Select the light shaft "**ls_140x60.d**".
3. You now have the light shaft attached to your cursor.



As soon as the library part is attached to the cursor, the properties bar appears. To enable the light shaft to be better placed, you must move the reference point.

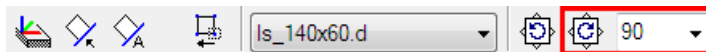
4. Select the function **MODIFY REFERENCE POINT** from the properties bar. A new window opens with the light shaft. Now select the new reference point in the centre of the light shaft.





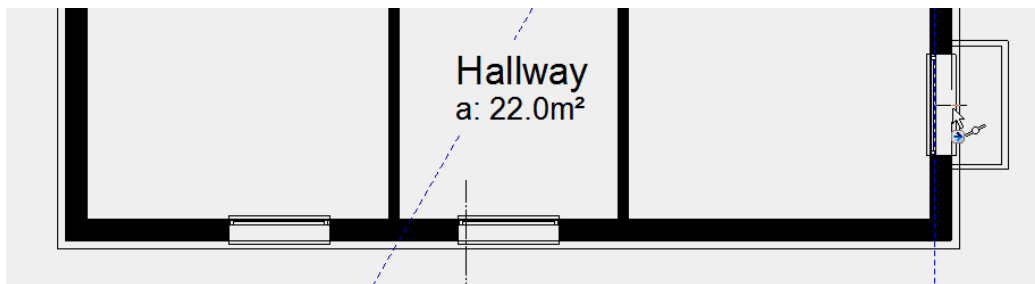
After clicking on the new reference point, the mask disappears again and you now have the light shaft in the centre of the cursor.

5. Turn the light shaft by 90° using the function ROTATE CLOCKWISE in the properties bar.

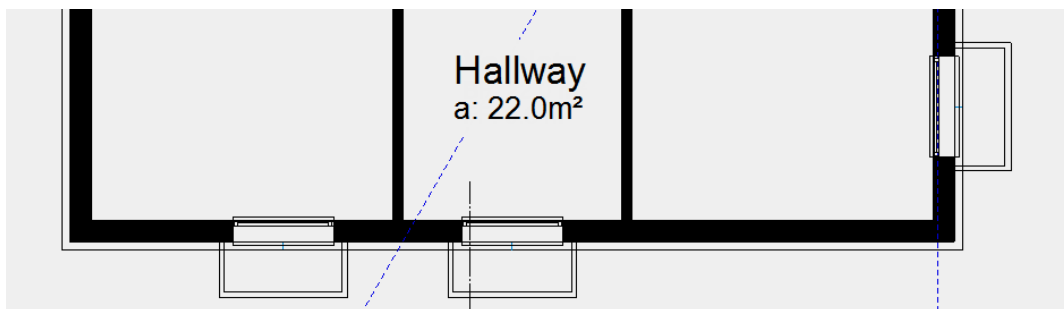


The light shaft is now perpendicular on the cursor.

6. Locate the light shaft in the middle of the basement window.



7. Rotate the light shaft by 90° again locate the two lower light shafts as well.



8. Cancel the function with [Esc].

WORKSHOP END

3D OBJECT FOR LIGHT SHAFT

▼ ▼ ▼ ▼ WORKSHOP

The light shafts are 2D library parts. A 3D object must be assigned to these floor plans.

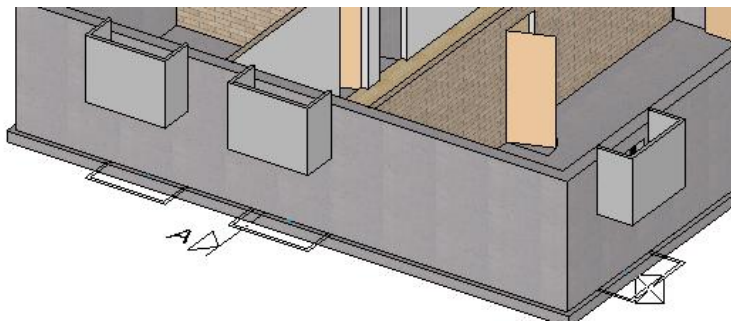
1. Select the function DEFINE BOX.



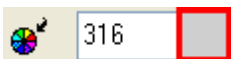
2. Determine the lower and upper height of the box (measured from the current work plane currently -2.70), and the creation type *Select contour*.



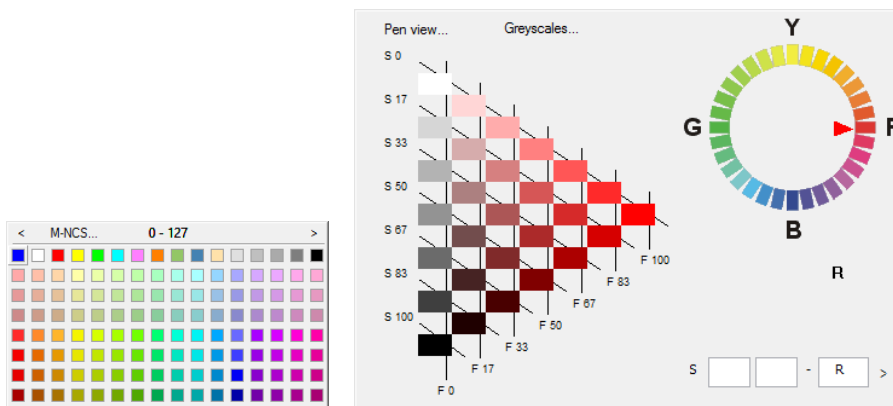
3. Click on every light shaft floor plan and end with [Esc]. The 3D object is immediately created.



TIP

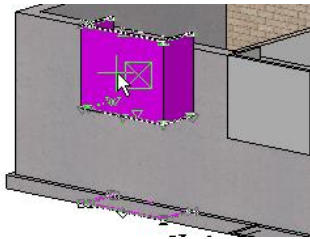


Click on colour preview to open the colour tables.

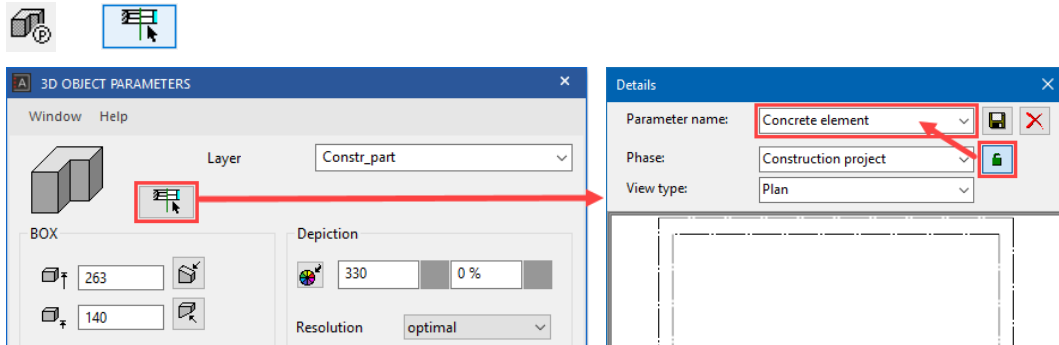


Use the arrows < > to navigate a table backwards and forwards. When you click on the M-NCS... button, you see a different view of the colour tables.

4. The 3D object first displays the standard settings. Select a light shaft for editing.

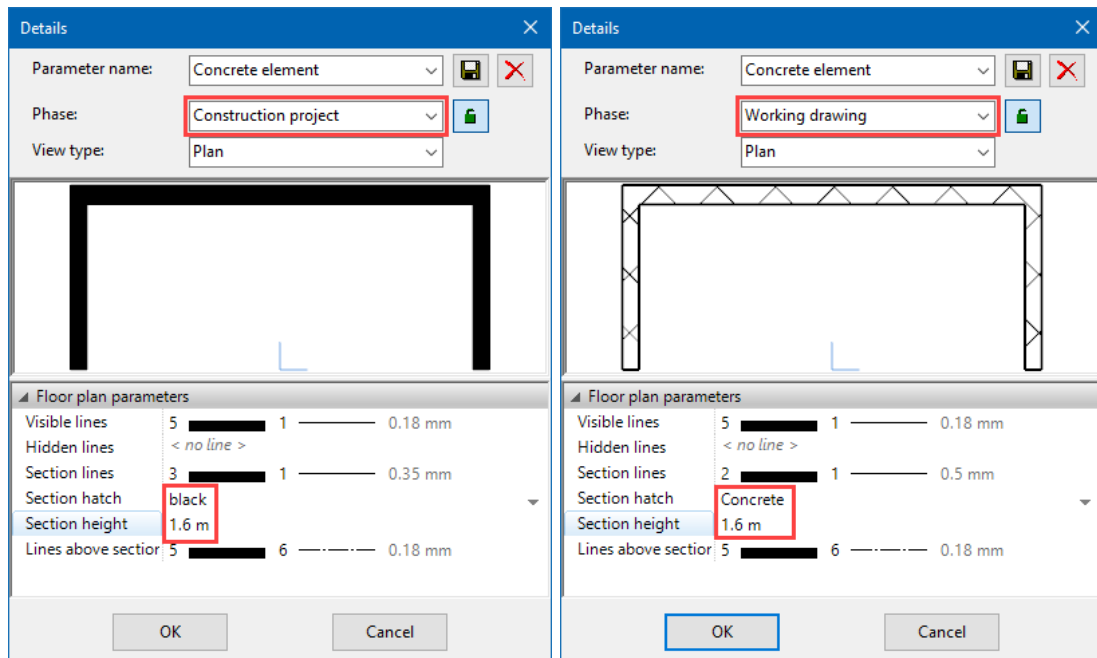


5. In the properties bar, open the parameter screen and select the detail settings.



Remove the link to the representation mode and select the parameter record *Concrete element*.

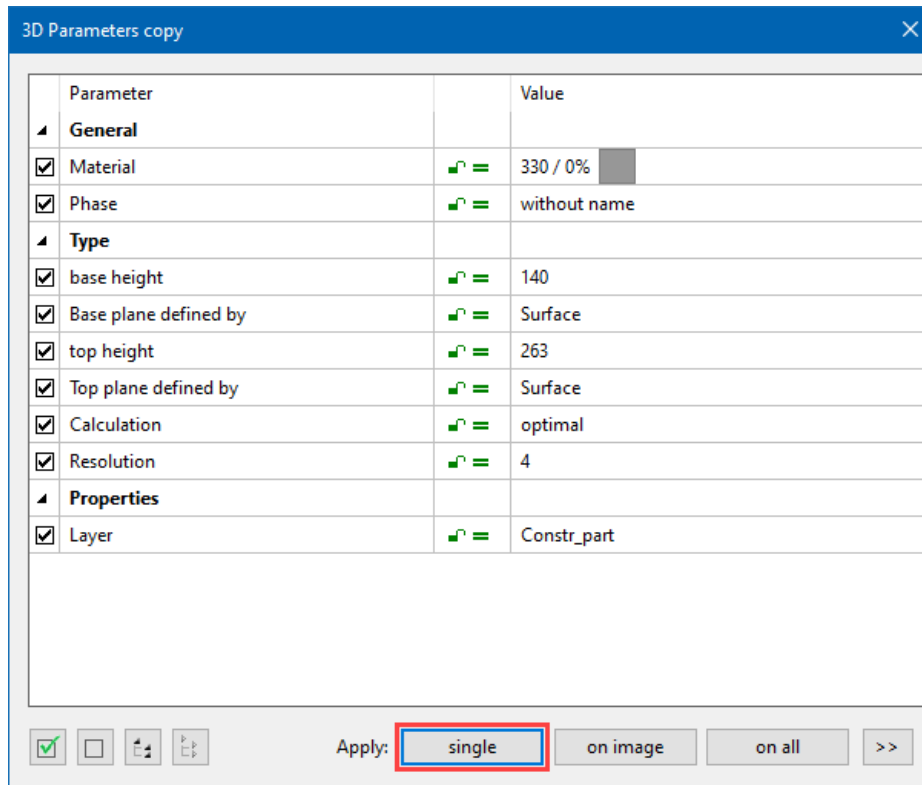
6. Change the section height to **1.60** metres and select the desired hatches for each representation mode.



7. The change to one light shaft must be transferred to the other two light shafts. Select the function COPY PARAMETERS and the light shaft you have just modified.



8. On the "Copy parameters" screen you can determine precisely which parameter values are to be transferred to the other objects. In this case, selecting the indicator for representation mode would be enough but it is also okay for all entries to be active since all light shafts have the same colour and height.



9. Select the transfer type *single* and click on the other two light shafts (click in the 3D model on the box). Cancel the function with [Esc].

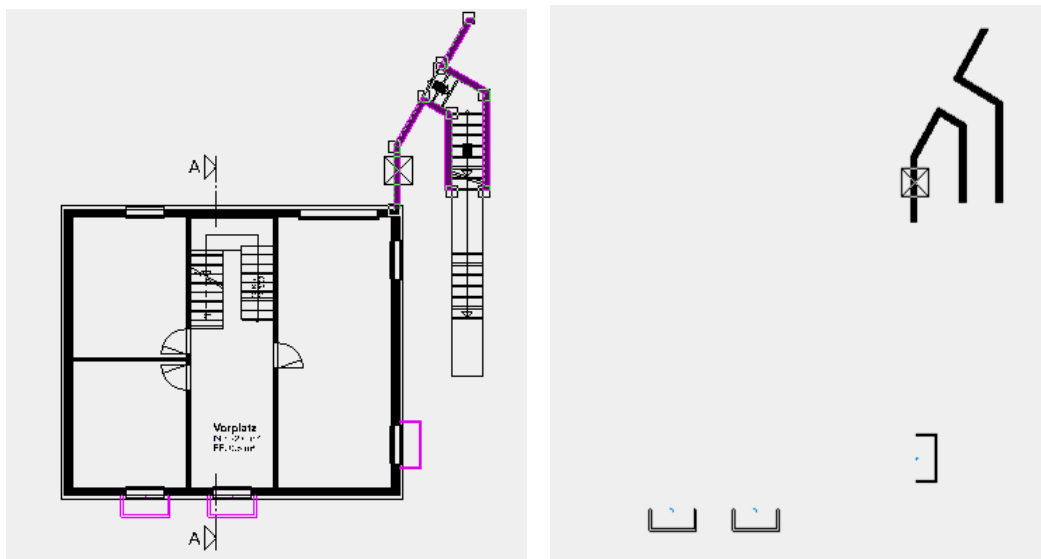
TOP VIEWS OF COMPONENTS

The components are only represented on the floor plan in the created storey. This is with the exception of stairs and windows that extend across separate storeys.

▼ ▼ ▼ ▼ WORKSHOP

The retaining walls and the light shafts must also be represented on the ground floor.

1. Switch the basement to visible *alone*.
2. Select all objects that are to receive a top view. Hold down the **[Shift]** key and select the 3 light shafts and the 3 retaining walls.

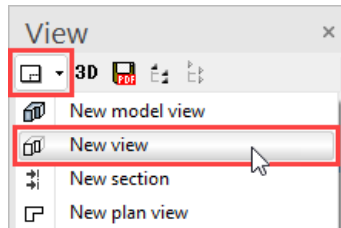


3. Select the SHOW function.

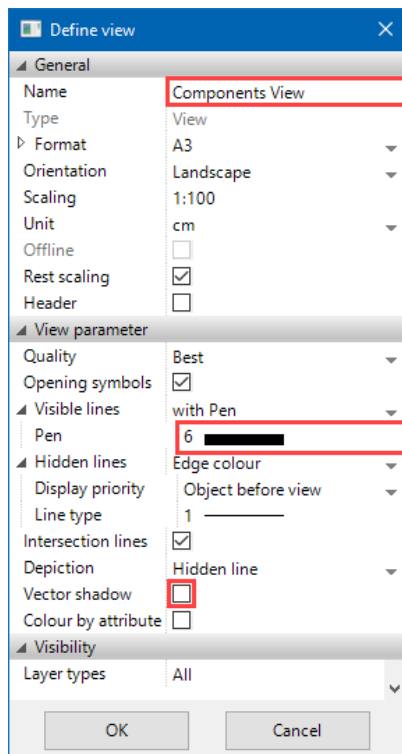


Only the selected parts are visible on the screen.

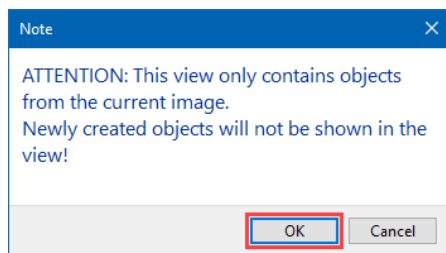
4. Create a view from the visible selection. Select the function NEW VIEW in view management.



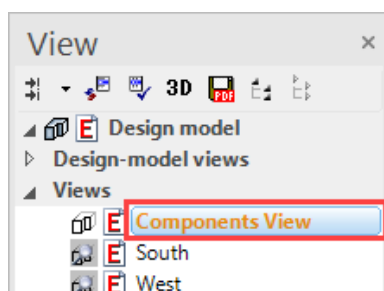
5. Enter the name *Components View* and make the settings.



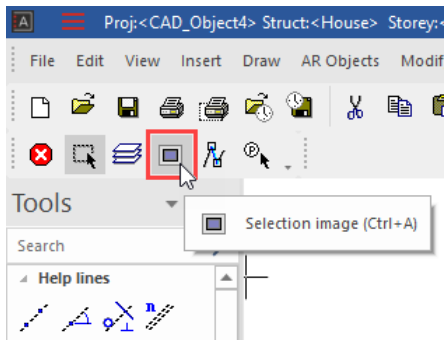
6. A message appears that newly generated objects in this view are not displayed.



7. You can access the view in views management.



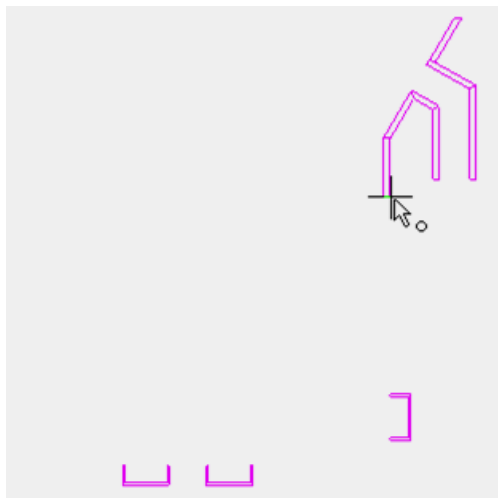
8. The top views of components must be copied from the view to the ground floor. Use the SELECTION IMAGE function or the key combination [Ctrl]+[A], to select all objects in the view.



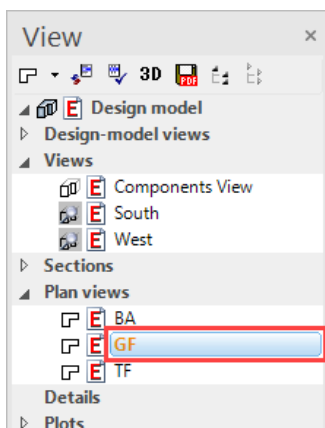
9. Copy the selected objects to the clipboard.
(or key combination [Ctrl]+[C])



10. To enable the objects to be set exactly, a reference point must be specified. Select the corner of the retaining wall that corresponds to the corner of the building and which can therefore be easily placed in the ground floor.



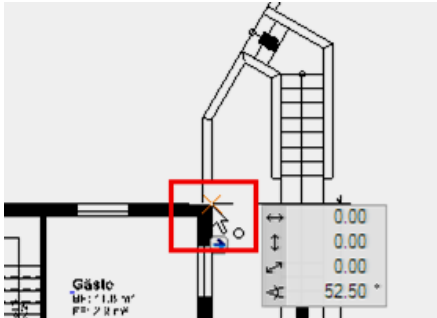
11. Switch to the plan view *GF*.



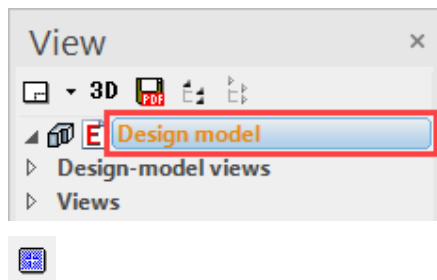
12. Paste the copied selection from the clipboard into the plan.
(or key combination [Ctrl]+[V])



13. The objects are "attached" to the selected reference point on the cursor. Position the selection in the plan.



14. Switch back to the model and reconstruct the whole drawing.



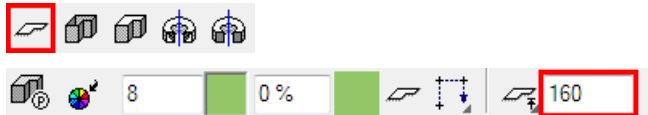
WORKSHOP END

SURROUNDING AREA (HORIZONTAL OVER VALUE)

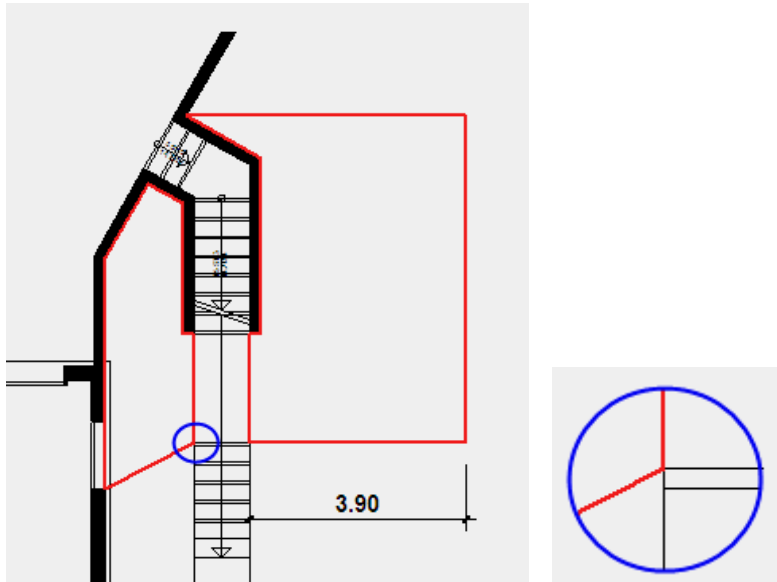
▼ ▼ ▼ ▼ WORKSHOP

Start with the horizontal surrounding areas in the basement.

1. Switch the basement to visible *alone* on the screen.
2. Start the function DEFINE PLANE and add the values in the properties bar. The height of the plan is **160** cm, measured starting from the current work plane.



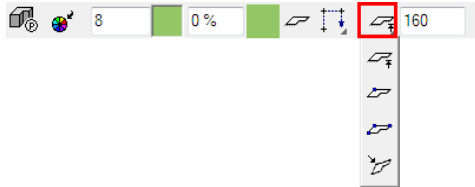
3. Draw the two outlines of the horizontal planes.



WORKSHOP END

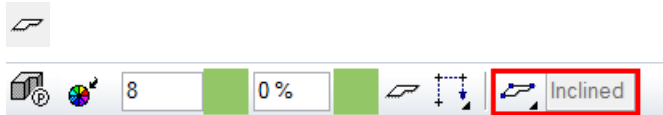
SURROUNDING AREA (INCLINED OVER 3 POINTS)

In addition to height information, the type of entry can be made using one point, using 3 points for inclined planes, or using an existing plane. You can select the options in the properties bar.

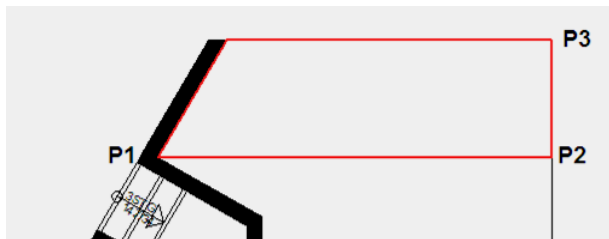


WORKSHOP

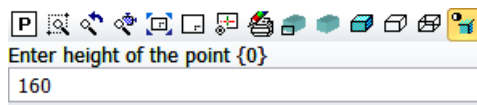
1. Start the function DEFINE PLANE and in the properties bar change the type of entry to *3 points*.



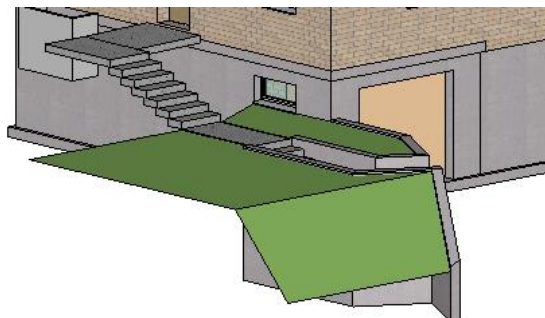
2. Draw the outline of the plane.



3. You must now specify a height for 3 points of the plane. Click on the corner at **P1**, in the input line enter the height **160** and confirm the value.



- Click on the second point **P2** and enter the height **160**. For the third point **P3** enter the height **0**.



WORKSHOP END

SURROUNDING AREA (DEFINITION POINTS IN 3D)

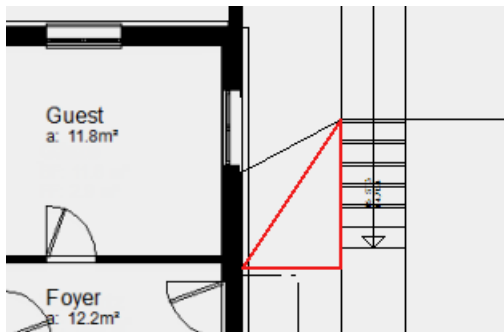
The definition points of the plane can be selected directly in the model. This make it easy to continue the surrounding areas in a seamless way.

▼ ▼ ▼ ▼ WORKSHOP

1. Switch the ground floor to *visible* but not *current*.
2. The *Plane* function is still active.

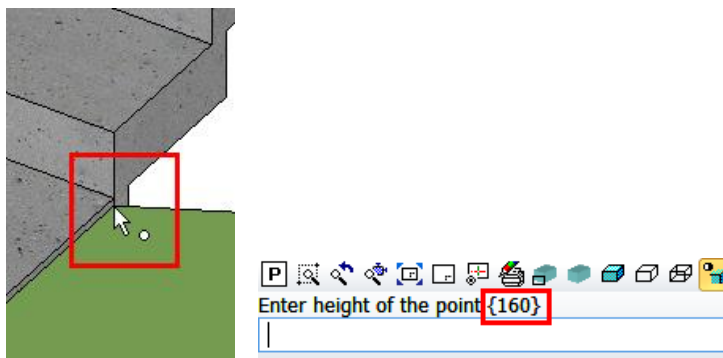


3. Draw the outline of the plane.



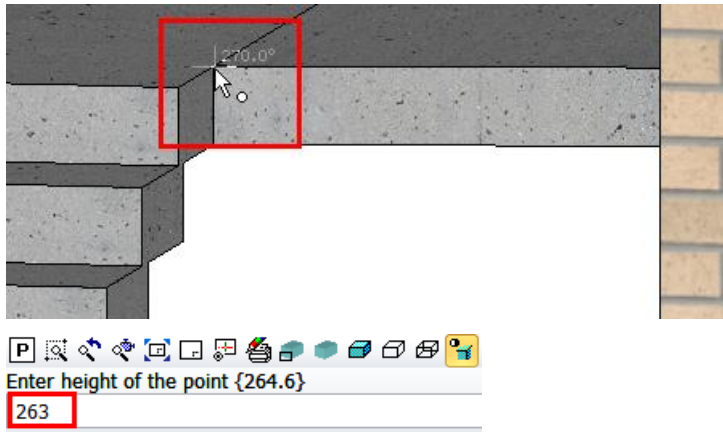
4. Switch to the solid design model [Ctrl]+[D] and show the edges [Ctrl]+[K]. Rotate the model continuously so that you can always hit the point to be selected in the optimum way.

Point 1: Lower corner



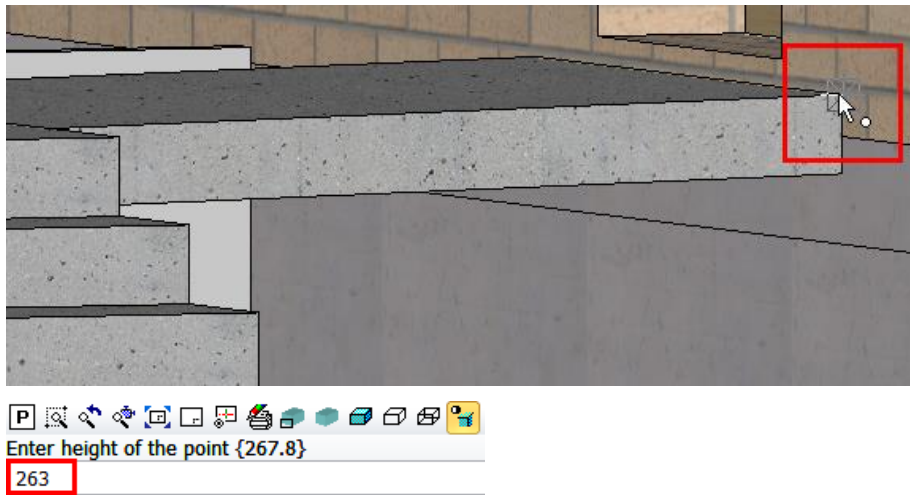
The "transferred" height is written in the input line. In this case this height is directly the desired value. Confirm the value without writing anything into the input line.

Point 2: Corner of the forecourt for the staircase



The surrounding area must not reach to exactly the same height as the forecourt. Use the "transferred" value of 264.6 as information and enter the value **263**.

Point 3: Corner of the forecourt at the entrance doors



The forecourt has an angle, the surrounding area must not take on this angle. Enter the same value as for point 2 > **263**.

WORKSHOP END

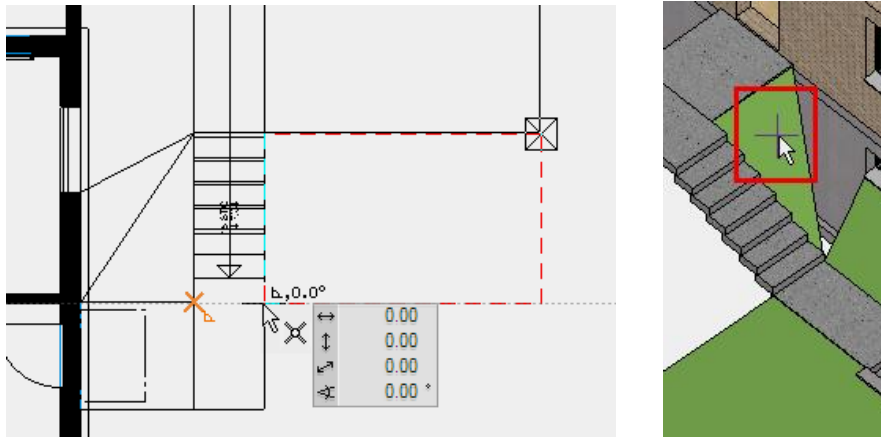
SURROUNDING AREA (SLOPE AS FOR EXISTING AREA)

WORKSHOP

1. The plane function is still active; in the properties bar change the type of entry to *Plane*.



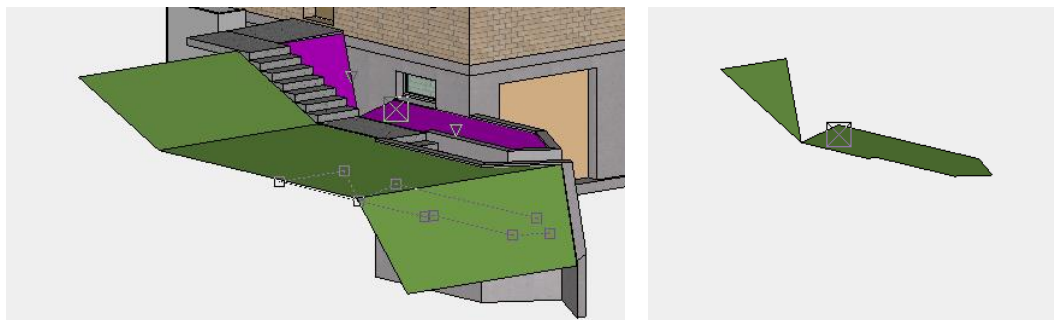
2. Draw the outline of the plane. From the input assistant select the drawing function **RECTANGLE**.



3. You now need to specify a reference plane. To do so, switch to the solid and click on the triangular plane just created.

4. Cancel the function with [**Esc**].

5. Select the two surrounding areas in order to add the missing area.
Multiple selection: hold down the [**Shift**] key

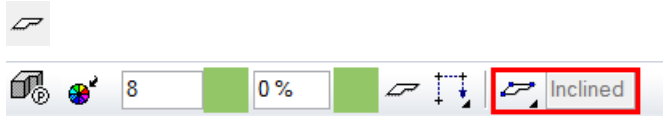


6. Select the function **SHOW**.

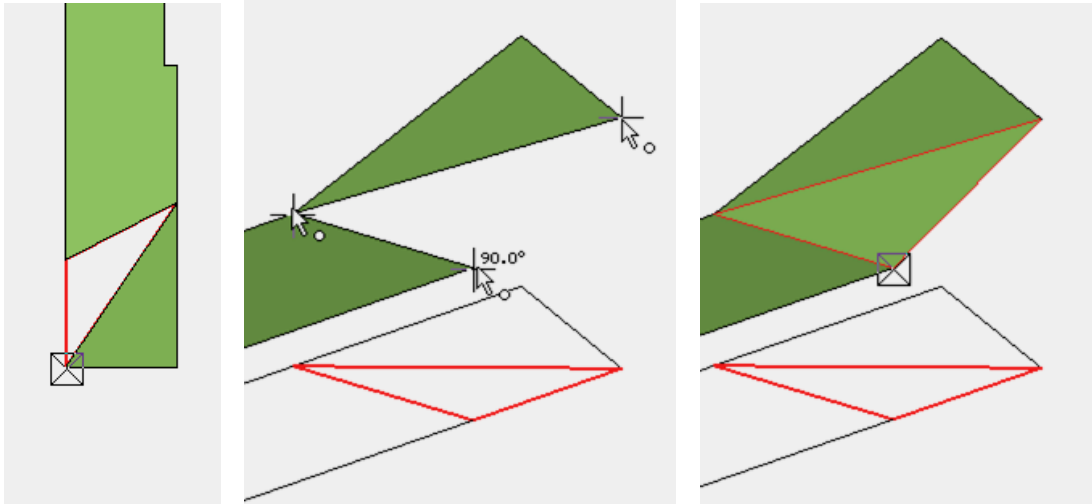


The less data is present on the screen, the more accurately and easily the points can be caught.

7. Start the function DEFINE PLANE and in the properties bar change the type of entry to *3 points*.



8. Draw the outline of the plane and select the 3 corners of the existing planes. End the function at the end.



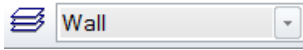
9. Select the SHOW function to display the rest.



WORKSHOP END

ASSIGN LAYERS

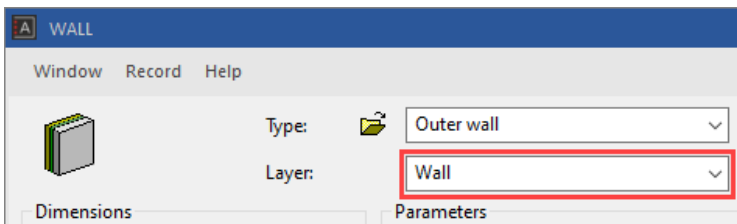
List of layers



The active layer is displayed in this field. The object created at this moment is assigned to this layer.

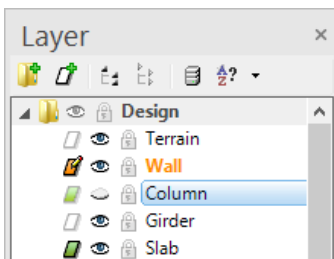
On the component screens, the layer is stored directly in the parameter record. If you access the parameter record wall xyz, the wall will be automatically assigned to the correct layer.

Example of wall:



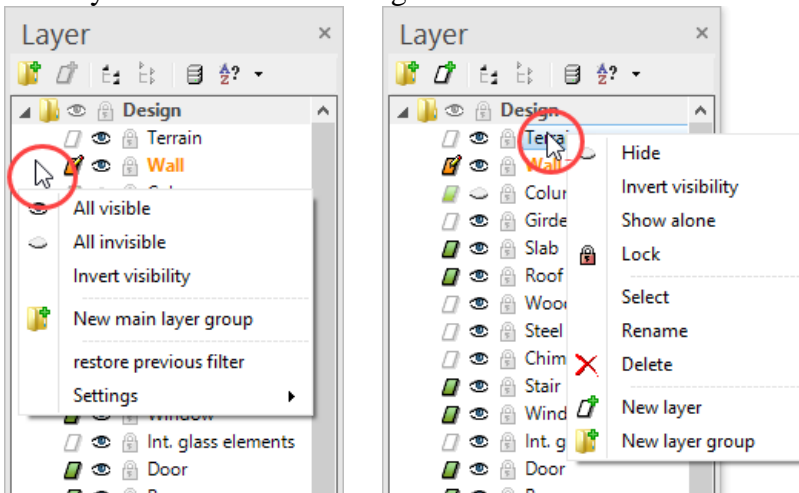
Layer management

Layer management is opened via the LAYER function or from the menu by selecting VIEW > WINDOW > LAYER.



- Layer main group
- Layer with data
- Active layer
- Layer without data
- Layer visible
- Layer invisible

Right-click to perform various manipulations. There is a difference between clicking on a layer name or in the background.



MODIFY LAYER

There are two options for changing a layer.

Selection/layer list:

Select one or more objects, then select the desired layer from the layer list.

Layer management/drag&drop:

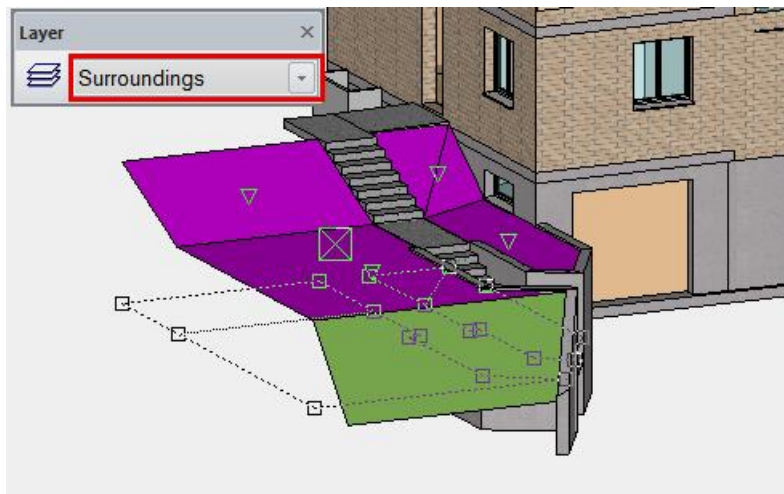
Drag the desired layer name from layer management and drop it on the desired object.

▼ ▼ ▼ ▼ WORKSHOP

Assign the created surrounding planes to the "Surroundings" layer.

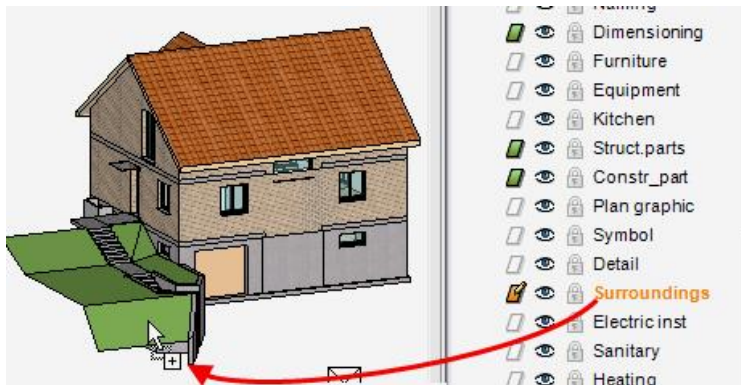
1. Method 1:

Using multiple selection [Shift] to select the surrounding areas (as far as the front sloping area) and in the list of layers select the "Surroundings" layer.



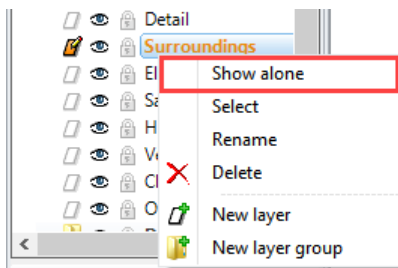
2. Method 2:

Drag the "Surroundings" layer from layer management to the ambient plane not yet assigned and release the mouse button.

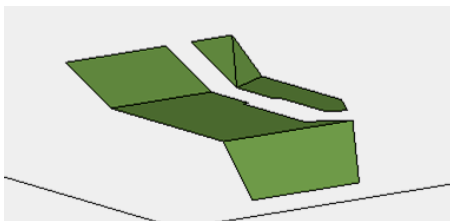


3. Check that the assignments have worked.

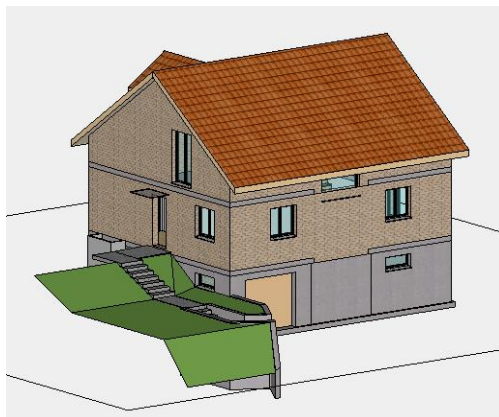
On the "Surroundings" layer open the context menu and select the function SHOW ALONE.



If you made the assignments correctly, only the surroundings areas should show on the screen.



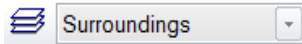
4. To show all objects again, select the SHOW function.



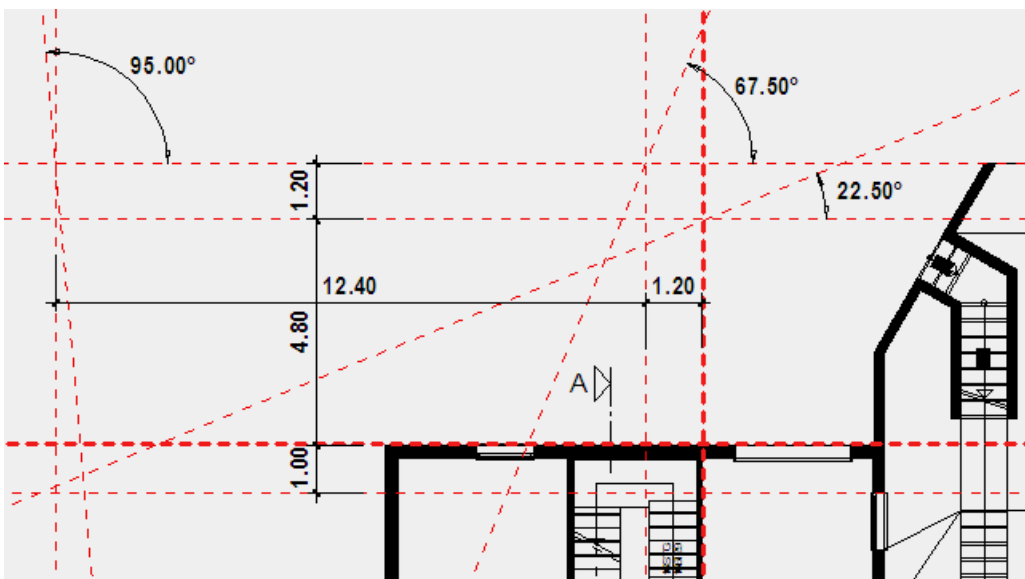
SURROUNDING AREAS

WORKSHOP

1. Switch the basement to visible alone and make the "Surroundings" layer active.



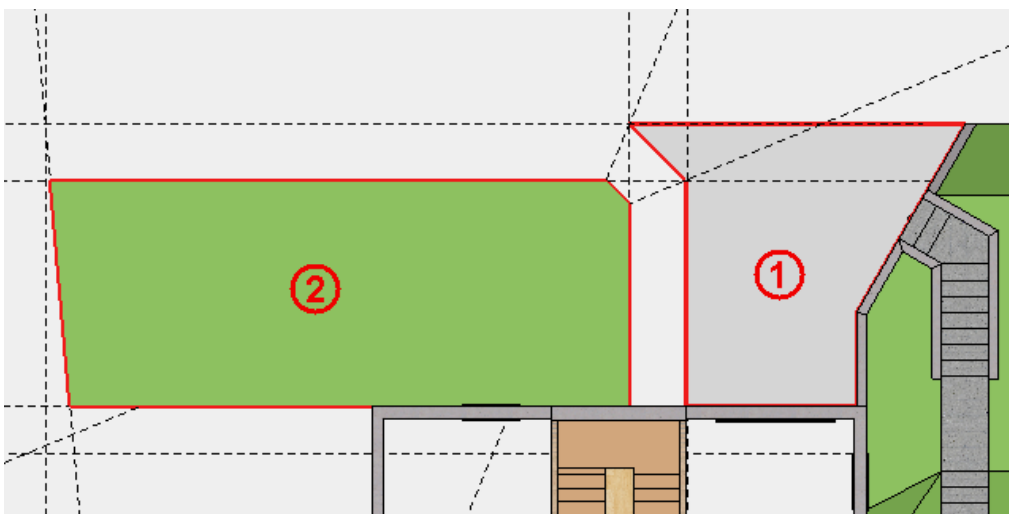
2. Draw a help lines construction to create the rest of the surrounding areas of the basement. To ensure that the slab with its projection does not get in the way, it is hidden straight away.



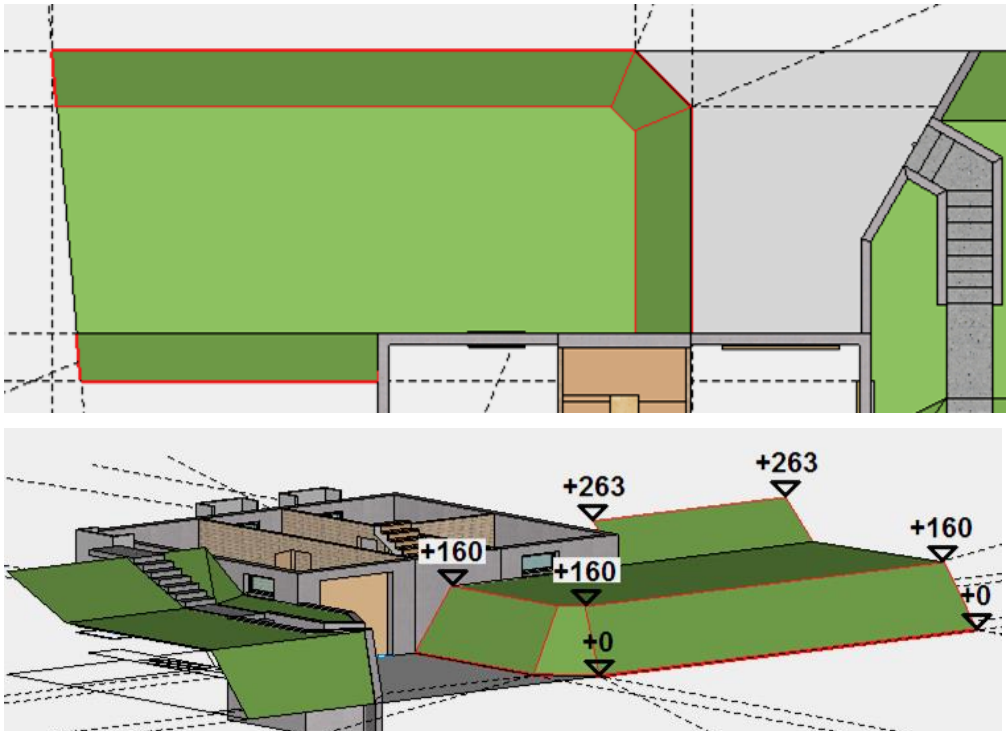
3. Start with the two horizontal planes.

Plane 1: Height 0 Colour 313

Plane 2: Height 160 Colour 8

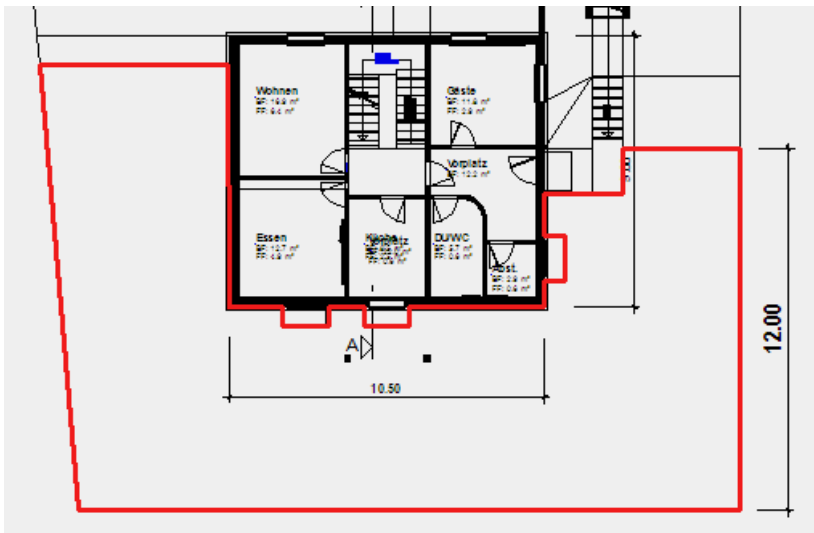


4. Generate the inclined planes in accordance with the predefined heights.



5. The remaining planes must be assigned to the ground floor. Specify the ground floor as *current*.

6. The height of the last plane is 3 (is calculated starting from the current ground floor work plane). Draw the outline and assign a plane.



7. Delete the help lines.



WORKSHOP END

SAVE

▼ ▼ ▼ ▼ WORKSHOP

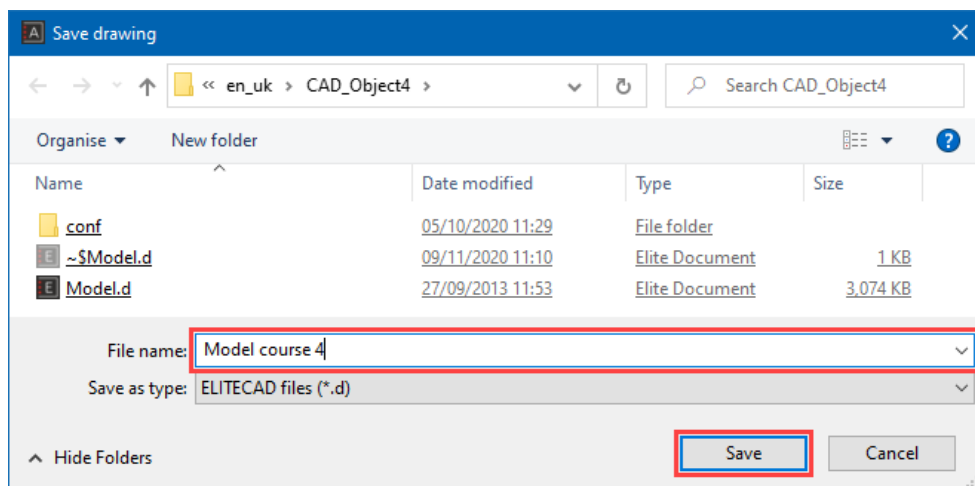
Save the model.

1. Show all objects using the SHOW function.



2. Save the file under the name **Model course4.d**.

Menu FILE > SAVE AS



WORKSHOP END

You can now continue directly to course unit 5.