ALLPLAN 2020

Engineering Tutorial

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Welcome

Welcome to Allplan 2020, the high-performance CAD program for civil engineers.

In this tutorial workbook, you will learn about the most important tools in Allplan 2020.

You will find that within a short time you will be in a position to use Allplan 2020 effectively in your daily work.

This chapter covers the following:

- Contents of this tutorial
- Documentation for Allplan 2020
- Additional help on Allplan 2020
- Where to turn for training, coaching and project support

Introduction

The Engineering Tutorial expands on the Basics Tutorial. Based on six examples, the Basics Tutorial explains the principles of drafting and designing in 2D. In addition, you will learn how to get started in 3D modeling.

The aim of the Engineering Tutorial is to guide you with easy-to-follow steps from floor plan design to key plan generation to fully automatic creation and management of reinforcement drawings in 3D. The Engineering Tutorial consists of 9 exercises, which are divided into 5 units.

This tutorial will provide you with a sound introduction to Allplan 2020. As it only touches on the possibilities of some of the tools, please consult – especially later when you use Allplan 2020 – the **F1** Help as an important source of information.

You can download two project templates from Allplan Connect:

- A project template with the structures and settings (but not the design!) used in this tutorial.
- A project template with the data used in this tutorial so that you can compare your result with the data provided by us.

To find out how to install the project templates, see **Installing the project template** (on page 8) in unit 1. To find out how to download the project templates from the internet, see the section **Project templates on the internet** (on page 337) in the appendix.

This tutorial assumes that you have a working knowledge of Microsoft® Windows® programs. Basic CAD-knowledge is helpful; however, this tutorial will provide both the experienced CAD user and the newcomer to CAD with a solid foundation in the methods used by Allplan 2020.

Sources of information

Documentation for Allplan consists of the following parts:

- The Help is the main source of information for learning about and using Allplan.
  While Allplan is running, you can get Help on the current tool by selecting F1, or activate **What's This** in the **Help** drop-down list (right side of the title bar) and click the icon on which you need Help.
- The **Manual** consists of two parts. The first part shows how to install Allplan. The second part is designed to provide an overview of basic concepts and terms in Allplan and introduce approaches for entering data in Allplan.
- The **Basics Tutorial** guides you step by step through the most important tools for designing and modifying elements in Allplan.
- The **Architecture Tutorial** guides you step by step through the process of designing a building. In addition, you will learn how to analyze the building data in reports and to print the results.
- The **Engineering Tutorial** guides you step by step through the process of creating key plans, general arrangement drawings and reinforcement drawings and shows you how to print the results.
- **New Features in Allplan 2020** provide information on what's new in the latest version.
- Each volume in the **Step-by-Step** series deals with a specific concept or series of tools or modules in Allplan in detail. The areas covered include data exchange, system administration, geodesy, presentation, 3D modeling and so on. As a Serviceplus member, you can download these guides as PDF files from the Training - Documentation area of Allplan Connect (http://connect.allplan.com).
- You can also find numerous publications on social networks.

Additional help

Tips for efficient usage

The **Help** drop-down list (right side of the title bar) provides **Tips for Efficient Usage**. This topic provides practical tips and tricks showing you how to use Allplan efficiently and how to carry out everything with ease.

User forum (for Serviceplus customers)

Allplan forum in Allplan Connect: Users exchange information, valuable tips relating to everyday work and advice on specific tasks.
Register now at
connect.allplan.com

On the internet: solutions to frequently asked questions

You can find solutions to numerous questions answered by Technical Support in the comprehensive knowledge database at
connect.allplan.com/faq

Feedback on the Help

If you have suggestions or questions on the Help, or if you come across an error, send an email to:
dokumentation@allplan.com

Training, coaching and project support

The type of training you are given is a decisive factor in the amount of time you actually spend working on your own projects: A professional introduction to the programs and advanced seminars for advanced users can save you up to 35% of your editing time!

A tailor-made training strategy is essential. Our authorized seminar centers offer an extensive range of programs and are happy to work out a custom solution with you that will address your own needs and requirements:

- Our **sophisticated, comprehensive seminar program** is the quickest way for professional users to learn how to use the new system.
- **Special seminars** are designed for users who want to extend and optimize their knowledge.
- **One-on-one seminars** are best when it comes to addressing your own particular methods of working.
- One-day **crash courses**, designed for office heads, convey the essentials in a compact format.
- We are also happy to hold seminars on your premises: These include not only Allplan issues but also analyses, process optimization and project organization.

For more detailed information on the current training program, please consult our online seminar guide, which you can find on our home page (http://www.allplan.com/training).

Feedback on the documentation

We are always trying to improve the overall quality of our program documentation. Your comments and suggestions are important to us, and we welcome feedback.

Please do not hesitate to contact us to express criticism or praise concerning the documentation. Feel free to contact us as follows:

Documentation

ALLPLAN GmbH
Werinherstr. 79, Eingang 32 d
81541 Munich, Germany

Email: dokumentation@allplan.com

Unit 1: Basics

You will start this unit by installing the **Allplan 2020 Engineering Tutorial** project template. After this, you will start Allplan, create a new project and make a few basic settings.

The **Allplan 2020 Engineering Tutorial**, which you can download from **Allplan Connect**, comes with a **fileset structure** and assigned drawing files. The project template contains four print sets. With these print sets, you can control which layers are visible.

By creating the project based on the project template, you can start designing the building at once.

If you want to create the project along with the fileset structure and print sets yourself, you can find a detailed description of the necessary steps in the appendix (on page 291) to this tutorial. The appendix also provides information on various interesting topics, such as layers, ProjectPilot, Actionbar configuration and many more.

If you do not want to work through the entire tutorial step by step, you can download the **Allplan 2020 Engineering Tutorial (with model)** project template from **Allplan Connect**. This project template contains drawing files at different levels of completion so that you can get started wherever you want. For example, you can immediately start placing the reinforcement.

Look in the appendix for information on how to download project templates. Read the section "Project templates on the internet (on page 337)".

At the end of this unit, you will find a short troubleshooting section that you might find helpful.

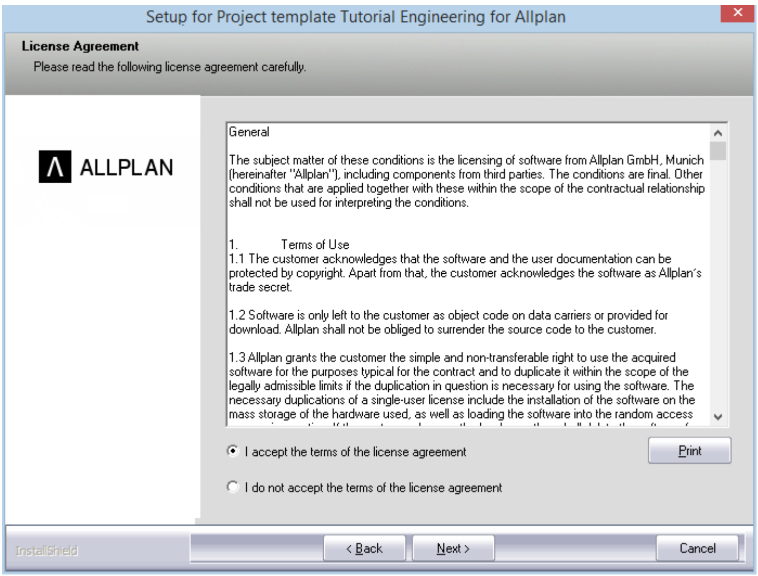
Installing the project template

After having installed and configured Allplan 2020, you can install the **Engineering Tutorial** project template (with or without the model).

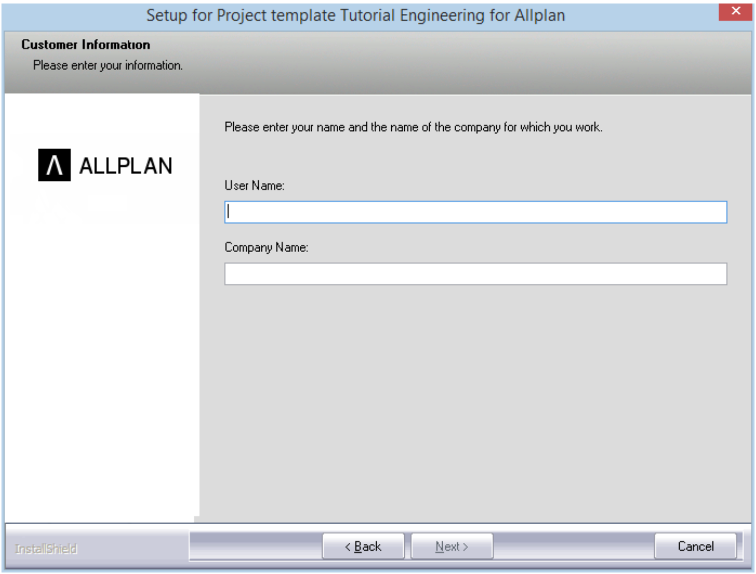
To install the project template

- ➲ Allplan 2020 must be installed, registered and configured correctly. After having installed Allplan, start Allplan to check whether it works properly.
- ➲ You downloaded the **Allplan 2020 Engineering Tutorial** project template from Allplan Connect (http://connect.allplan.com). You saved it to a folder of your choice and extracted it.

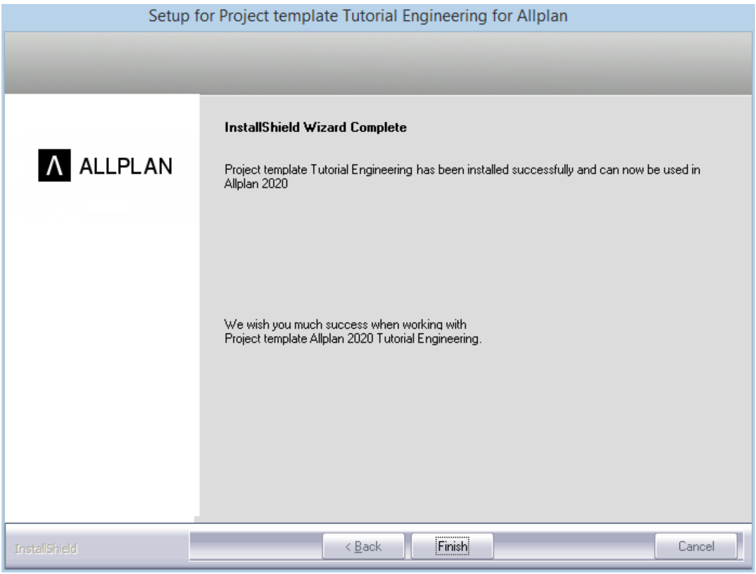
1. Close all running applications.
2. Double-click the extracted application and click **Run** in the dialog box.
3. Click **Next >** to confirm the Welcome screen.
4. Read the license terms carefully and accept them. Click **Next >**.



5 Enter your name and that of your company.
Click **Next >** to confirm.



6 Finally, click **Finish**.



Starting Allplan and creating the project

You have already installed Allplan 2020 and the **Engineering Tutorial** project template on your computer. Now you want to start working. To do this, start Allplan 2020 and create the project.

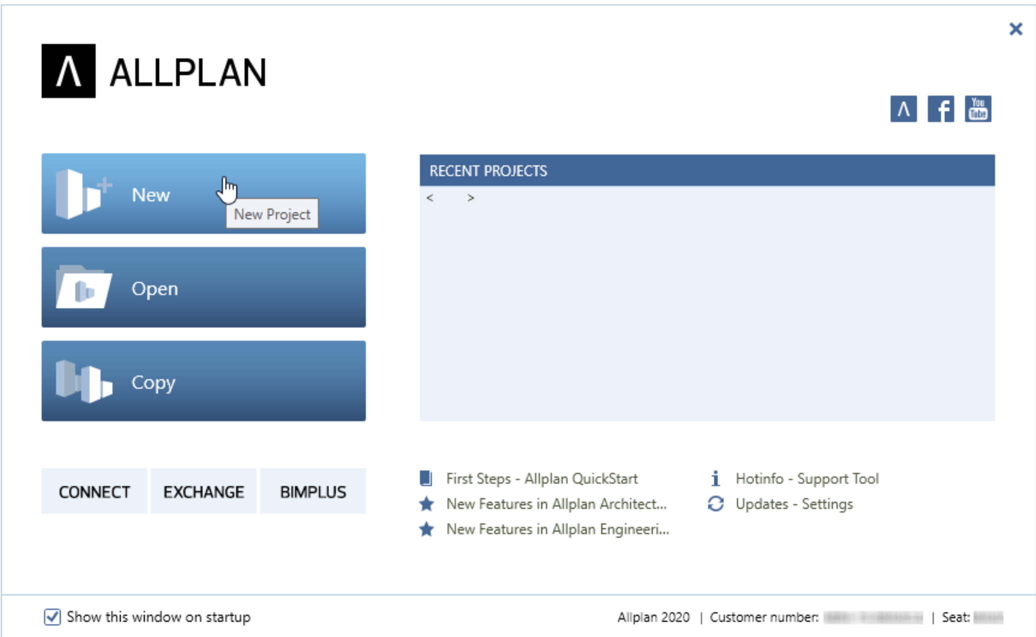
To start Allplan and use the project template

1 Go to the Windows Start menu, point to **Allplan** and click **Allplan 2020**.

Or

Double-click **Allplan 2020** on the desktop.

2 After having started Allplan 2020, you can create a project straight from the **welcome screen**. Click the corresponding tool.



If you have turned off the welcome screen, click **New Project, Open Project** on the Quick Access Toolbar. The **New Project, Open Project** dialog box opens. Click **New Project**.

3 Enter **Engineering Tutorial** for the project name. If you want, you can choose your country in **Country-specific templates**. Select the **Allplan 2020 Engineering Tutorial** project template and click **Finish**.

The project opens.

Default settings

Start by making the following settings:

Settings on the Actionbar

Tip: You can expand or collapse **all** task areas of the task currently selected by selecting and holding the Ctrl key while double-clicking within the name line of a task area. You can expand or collapse **all** areas **across tasks and roles** by selecting and holding Ctrl+Shift while double-clicking within the name line of a task area.
The width of the Allplan window defines how many task areas can be maximized. If the window is not wide enough, Allplan starts on the left side, expanding as many task areas as possible.

The Actionbar configuration is the default setting in Allplan 2020. This configuration shows the **Actionbar** above the workspace. In addition, you can see the **Properties**, **Wizards**, **Library**, **Objects**, **Planes**, **Task Board**, **Connect** and **Layers** palettes on the left side.

Note: You can find detailed information on the Actionbar configuration in the appendix (see "Actionbar configuration" on page 323) to this tutorial and in the Allplan 2020 Help.

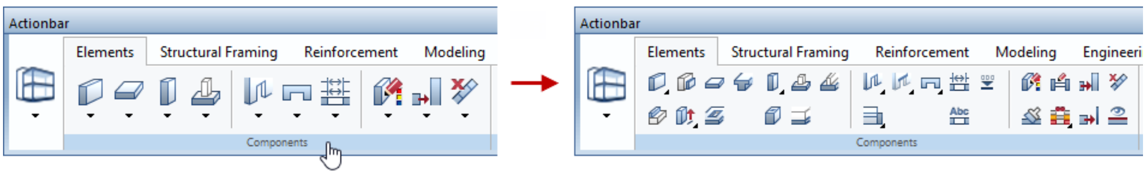
You will use the tools in the **Components** task area for the first exercise. Start by making settings on the **Actionbar**.

To make settings on the Actionbar for the exercise that follows

1 Select the **Engineering** role.

2 Open the tab of the **Elements** task.

3 The **2D Objects** task area has not been expanded yet. Expand this task area so that you can access its tools quickly.
To expand the task area, double-click within the name line of the task area.



Note: The **Actionbar** is docked to the top of the working area. If you want, you can drag the Actionbar to the bottom and dock it there. You can also make the **Actionbar** float anywhere on your screen. By double-clicking, you can dock it to the place where it was docked last.

Track tracing

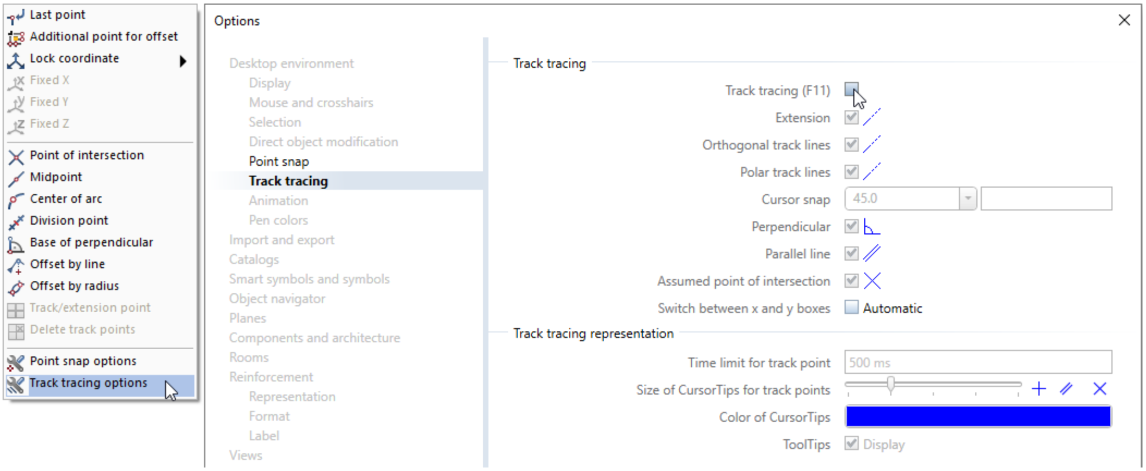
Track tracing helps you design intuitively. As you will not use this option in the following exercises, start by turning track tracing off (which is on by default).

To turn off track tracing

1 Go to the **Actionbar** and click **Line** (**Quick Access** task area).

2 Right-click in the workspace and select **Track tracing options** on the shortcut menu.

3 Turn **Track tracing** off.



Note: You can turn track tracing on and off at any time while entering points by selecting the **F11** key or clicking the **Track line** icon in the dialog line.

4 Click **OK** to confirm the settings and select ESC to close the **Line** tool.

Layer settings

For this project, the **Project** layer structure is selected. All the settings you make, therefore, will apply to this tutorial project only. The office standard is thus unaffected by any changes. You will probably use the office standard in your daily work. The office standard's settings are defined by the Allplan administrator and apply to the entire office.

Allplan 2020 provides a very extensive layer structure designed to meet a broad range of requirements.
You can also define your own layer categories, layer hierarchies and layers. For this guide, you will be using the layers in the main **ARCHITECTURE** and **ENGINEERING** categories.

You can specify whether the format properties (pen, line, and color) are based on your custom settings, whether these properties are proposed by the program in the **Properties** palette - **Format** area (you can change these settings at any time) or whether these attributes are always taken from the relevant layers (from the line style or the setting assigned to the layer).

For the exercises in this tutorial, you will configure Allplan to select the layer automatically with the tool. Furthermore, you will work independently of the predefined layer format properties and define these settings while drawing.

To check the basic settings for layers

Tip: As **Match** is selected on the **Format Definition** tab (this is the default setting), you can select the **From layer, line style** check boxes in the **Format properties from layer** area.

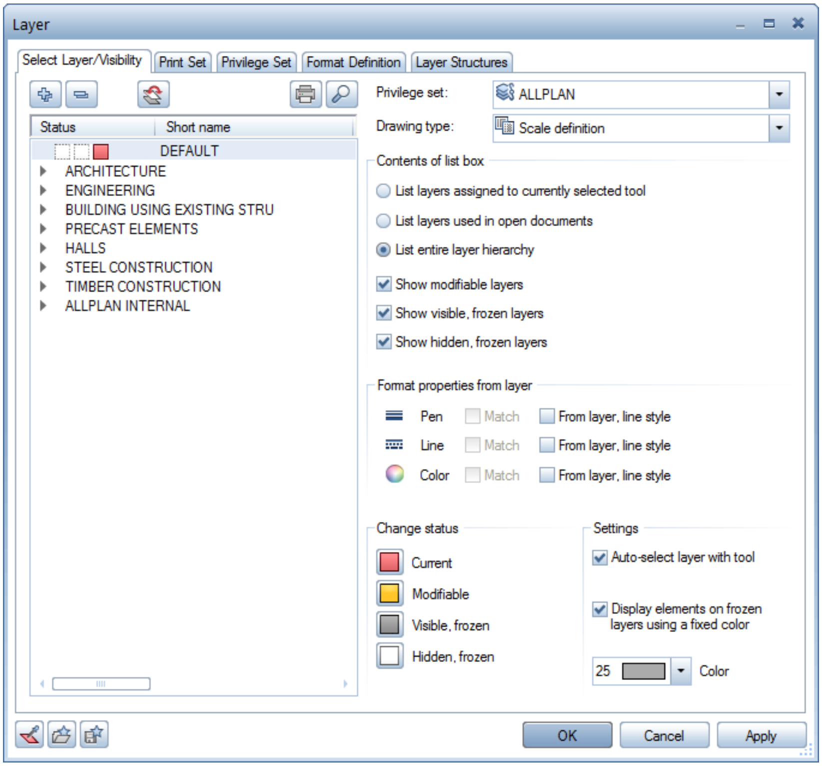
1 Click **Select, Set Layers** in the **View** drop-down list on the Quick Access Toolbar.

The **Select Layer/Visibility** tab is open.

2 Clear the check boxes in the **Format properties from layer** area.

3 Make sure that **Auto-select layer with tool** is selected in the **Settings** area.

4 In addition, make sure that **Display elements on frozen layers using a fixed color** and color **25** are selected.



Note: You can use the ,  and  buttons in the upper-left area to expand and collapse the tree structure of the layers and to find specific entries.

How to

Sometimes, things will not immediately work out as required. This list helps you succeed.

What if ...

- **... I have selected the wrong tool?**
  Select the ESC key and click the correct icon.
- **... I make a mistake as I go along?**
  Select the ESC key to cancel (you might have to do this several times).
  Click **Undo**.
- **... I have inadvertently deleted the wrong elements?**
  If **Delete** is still active, right-click twice.
  If no tool is active, Click **Undo**.
- **... I have unintentionally opened a dialog box or entered wrong values?**
  Click **Cancel**.

And what if ...

- **... the workspace is empty but you are sure the drawing file contains design data?**
  - Click **Zoom All** (viewport toolbar).
  - Click **Plan**.
- **... the workspace is suddenly divided into a series of different viewports?**
  Click **1 Viewport** (**Window** drop-down list on the Quick Access Toolbar).

Tip: Check whether the relevant layer is visible.

- **... specific kinds of elements such as text or hatching do not appear in the workspace?**
  Click **Show/Hide** (**View** drop-down list on the Quick Access Toolbar) and check that the relevant element type is selected.

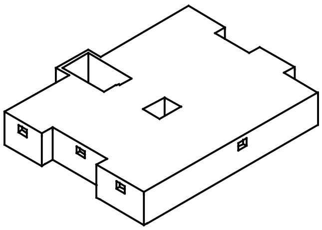
Unit 2: Floor Plan and General Arrangement Drawing

In this unit, you will learn how to create general arrangement drawings quickly and efficiently.

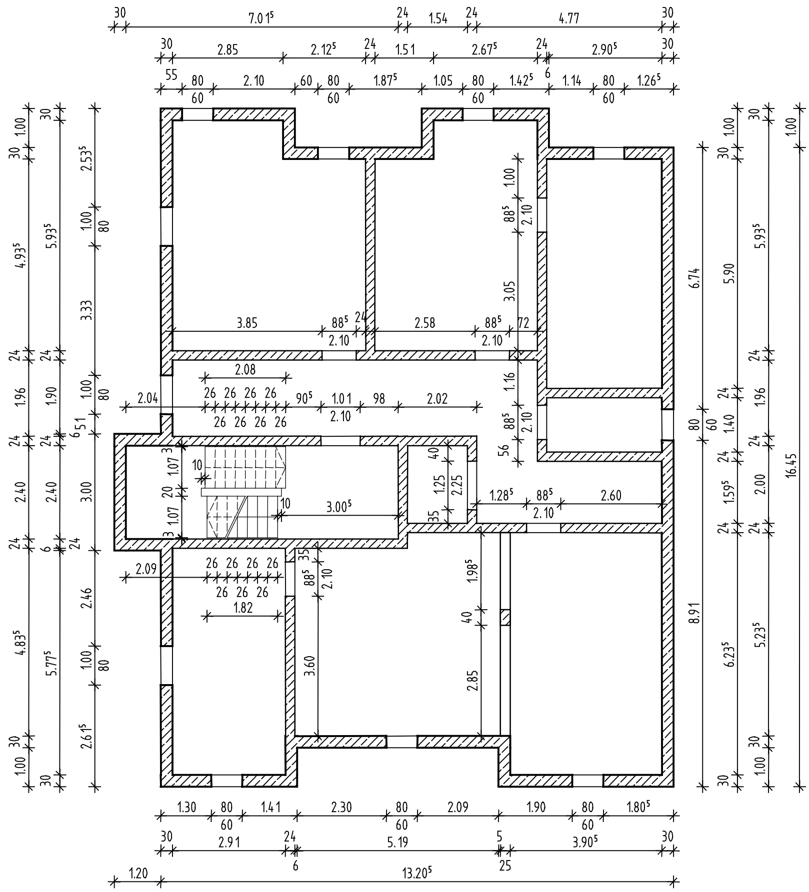
- You will use the tools in the **Components** task area to create a three-dimensional building model of a basement. You will also learn about viewports.
  As an alternative, you will create a two-dimensional floor plan of a basement with the tools in the **2D Objects** task area.
- With the tools in the **3D Objects** task area, you will create a three-dimensional general arrangement drawing of an elevator shaft.
  As an alternative, you will use the tools in the **Components** task area to create the same three-dimensional general arrangement drawing.

You should work your way through these exercises step by step These form the basis for subsequent exercises in units 3 and 4.

Overview of exercises

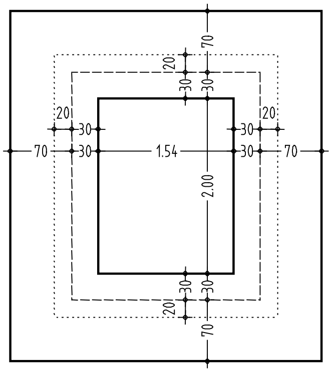


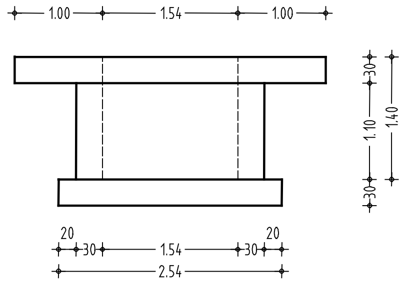
Exercise 1: floor plan of basement and viewports

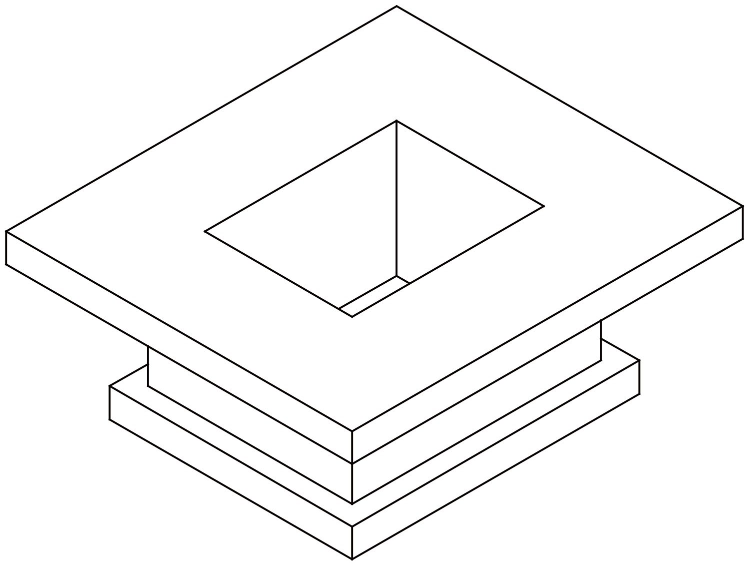


You will draw a basement in 3D with the tools in the **Components** task area and in 2D with the tools in the **2D Objects** task area.

Exercise 2: 3D elevator shaft







You will draw an elevator shaft for the basement created in exercise 1. To do this, you will use the tools in the **3D Objects** task area. As an alternative, you can also use the tools in the **Components** task area.

Exercise 1: floor plan of basement

Requirements:
Allplan 2020 Engineering comes in different packages.
Check whether the **Elements** task of the **Engineering** role contains the **Components** task area.

In this exercise, you will create a floor plan for a basement.

You will mainly use the tools in the **Components** task area. You can find these tools on the **Actionbar**.

You will also learn about viewports.

Finally, as an alternative, you will create the walls of the basement in 2D.

Start by selecting fileset **1** with the following drawing files:

Fileset	Drawing file number	Drawing file name
1	101	3D floor plan
	102	2D floor plan
	103	2D stair
	104	Dimensions and labels
	105	Hidden-line image
	110	Key plan
You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").		

Creating the 3D model with the tools in the Components task area

If you do not have the **Components** task area, create the floor plan in 2D (on page 76), dimension (see "Dimensions" on page 60) the floor plan and create the stair (on page 65).

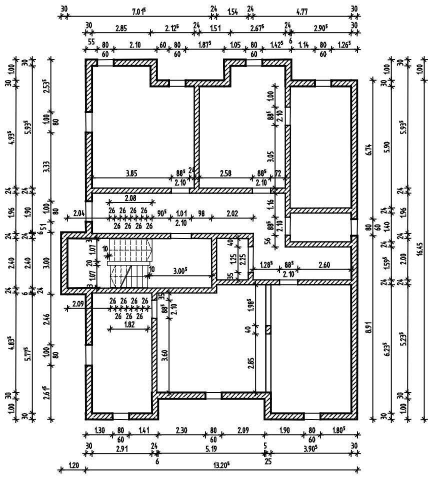
Tools

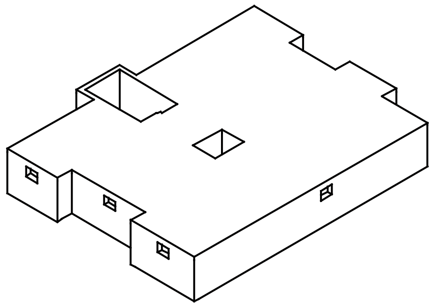
- Wall
- Join Linear Components
- Column
- Downstand Beam, Upstand Beam
- Door
- Window
- Hidden-Line Image, Wireframe
- Slab
- Recess, Opening in Slab

Viewports:

- 3 Viewports
- Hidden view type
- Save, Load View

Objective:





Settings

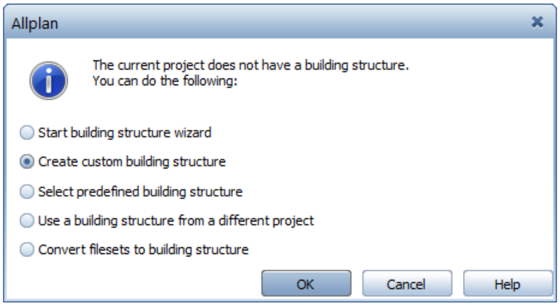
Start by defining the default settings.

To select a drawing file and to define options

➲ **Actionbar**: **Engineering** role – **Elements** task. The **Components** task area is expanded.

1 Click **Open on a Project-Specific Basis** (Quick Access Toolbar).

2 As you want to work with the fileset structure, click **Cancel** and select the **Fileset structure** tab.

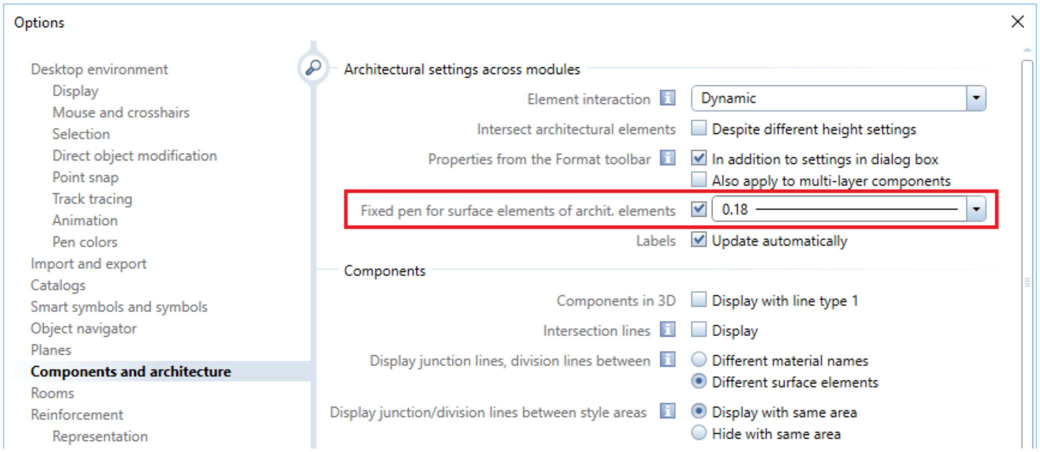


3 Open the drawing file tree for fileset **1** by clicking the triangle symbol beside the name of the fileset and double-click drawing file **101**.

4 Check the current **Scale** (**1:100**) and **Length** (**m**) on the status bar. If necessary, enter these values.

5 Open the **Default Settings** drop-down list on the Quick Access Toolbar and click **Options**. Select the **Components and architecture** page.

6 Check that the **Fixed pen for surface elements of archit. elements** check box is selected in the architectural settings across modules and click **OK** to confirm the dialog box.



7 Click **Show/Hide** (**View** drop-down list on the Quick Access Toolbar) and select the **Color stands for pen** option.

Walls

Note: When you use the architectural tools, you effectively work in three-dimensional space. To define the position of a component (wall, door, window and so on) in space, you need the height of the component's top and bottom levels. Here, you will use absolute values to define the height.

You will use the following settings for the basement in the building: The finished floor covering of the floor slab is at a height of **-2.70 m**. You work with unfinished dimensions; consequently, the unfinished floor is at a height of **-2.79 m**. The bottom of the floor slab is at **-0.31 m**.

Note: You define the position of a wall by entering its starting point and end point. In addition, you need to specify its offset direction relative to an imaginary line between the starting point and end point.

Enter a wall thickness to display the wall to scale. A hatching style, fill or style area can be applied to intersected walls.

You must enter the height so that Allplan 2020 can generate a three-dimensional model based on the floor plan. You can also define additional parameters such as a material and building trade.

This exercise involves creating the walls in the basement. Quantity takeoff is ignored. It is therefore enough if you just define the thickness and height of the wall and select a style area.

Start by defining wall parameters.

To define wall parameters

1 Click **Wall** (**Actionbar - Components** task area).

2 Go to the **Wall** Context toolbar and click **Properties**. The **Wall** dialog box opens.

3 Enter the following information:

- In the **Number of layers** area, select one layer.
- In the **Positioning axis** area, drag the component axis to an edge of the wall in the graphic.

Note: The position of the **component axis** controls the wall's offset direction. The component axis can be on a side of the wall or anywhere within the wall.

4 Enter the following information for layer number 1 on the **Parameters, attributes** tab:

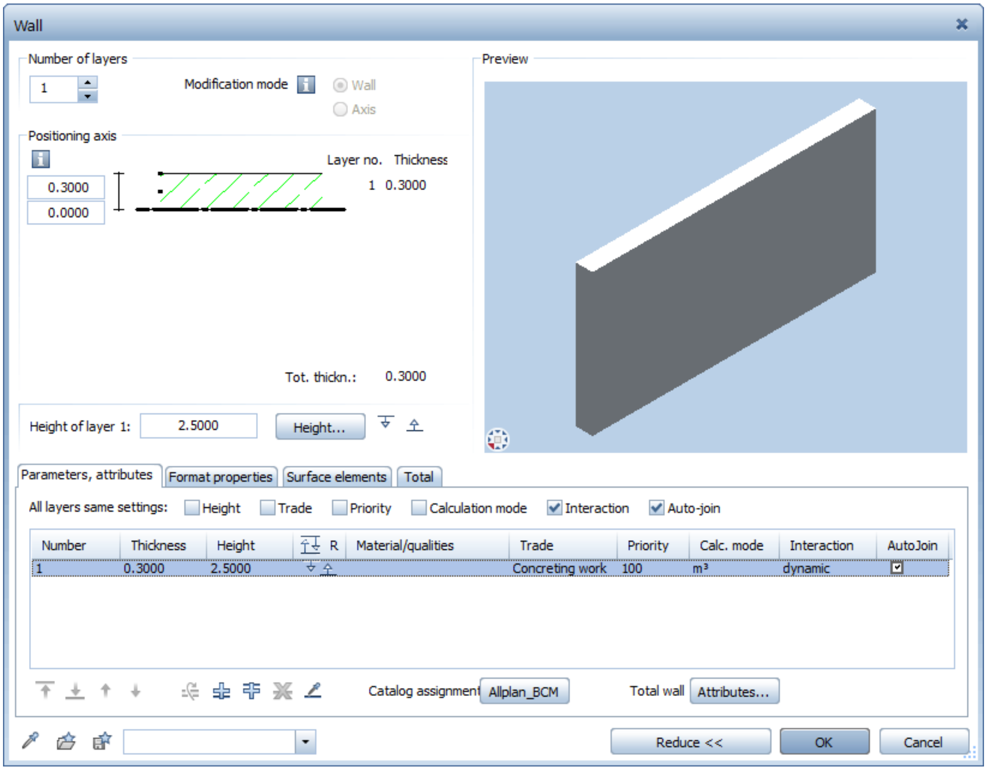
- Click the **Thickness** value, enter **0.300** and click **OK** to confirm. (This selects 0.30 and adds it to the list.)
- Change the **Priority** to **300**.

Tip: When defining the wall's **priority** rating:
Use the thickness of the wall in mm.

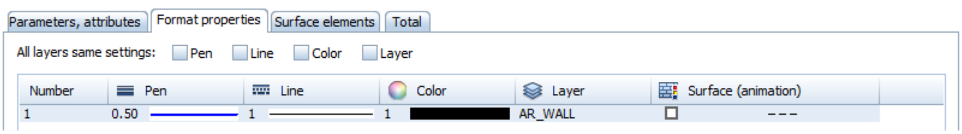
Note: The **Priority** rating controls the way components intersect. Components with a lower priority rating have a 'hole' cut in them where they are intersected by other components. This ensures that these areas are not counted twice in subsequent quantity takeoffs.

- For **Calculation mode**, select **m³**.
- For **Interaction**, select **dynamic**.
- Select the **Auto-join** check box.

The **Wall** dialog box now looks like this:



5 Select pen (3) **0.50** on the **Format properties** tab:

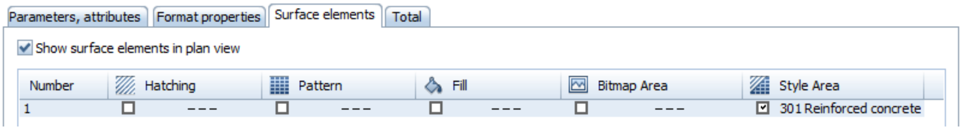


Note: The settings in the **Properties** palette – **Format** area have no effect on the format properties of walls.

6 Enter the following information on the **Surface elements** tab:

- Select the **Style Area** option.
  301 Reinforced concrete is selected. If it isn't, click the name of the style area and select number 301.

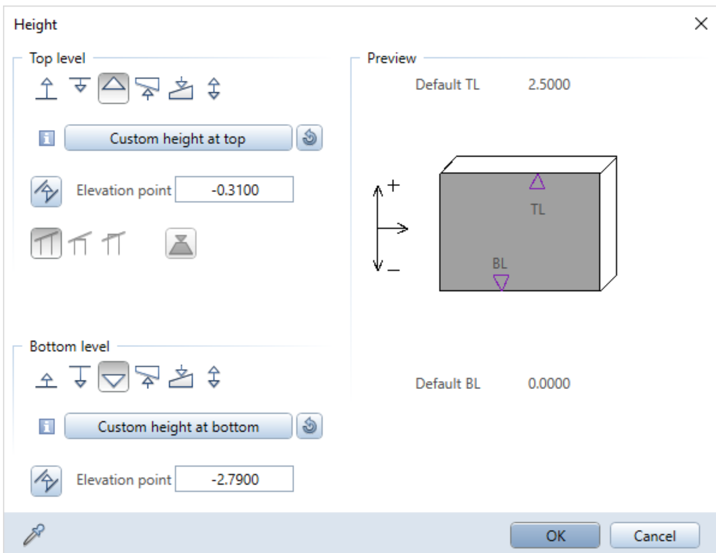
The **Surface elements** tab now looks like this:



Tip: The parameters you define in this dialog box are valid until you change them.

7 Now click the **Height...** button and enter the height. Enter the top and bottom levels of the wall as absolute values. Click the relevant elevation icon.

- Top level of wall (= bottom of slab): **-0.31**.
- Bottom level of wall (= top of floor slab): **-2.79**.



8 Click **OK** to confirm the **Height** and **Wall** dialog boxes.

Entering data in dialog boxes

Tip: For more information on the **Wall** tool, select

F1

This will display the relevant topic in the Allplan Help.

To **enter a value**, click in the box. Enter the value at the keyboard and select the Enter key.

To enter additional values in and to add them to custom list boxes, click  first.

To apply entries, click **OK**.

To discard entries, click **Cancel** or select ESC.

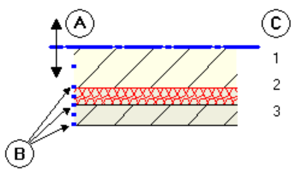
Component axis

Components are entered along their **component axis**. The wall's **offset direction** depends on the position of the component axis, the direction in which the wall is entered and the position of the first construction layer in the wall.
Click  **Reverse offset direction** (**Wall** Context toolbar) to change the wall's offset direction.

You can position the **component axis** as follows:

- Centered in or on the sides of the entire component (wall as a whole)
- Centered in or on the sides of each construction layer
- At a freely definable distance to a component edge (wall edge)

Small boxes in the preview indicate the positions you can select.



A Component axis
B Possible positions on the sides of or centered in the layer or entire wall
C Number of layers

You can place the component axis in several ways:

- **Intuitively**
  Use the mouse to move the axis: The cursor becomes a double arrow, and the component axis will snap to the positions marked by small black boxes. The values to the left side of the preview show the distances to the edges.

  The following positions are predefined:
  Left edge of component or layer
  Right edge of component or layer
  Center of component or layer

- **Freely by entering values**
  Click one of the boxes to the left of the preview. Enter any value defining the distance between the axis and edge of the wall. The program automatically calculates the value for the other side.

Offset direction of components, single-layer walls

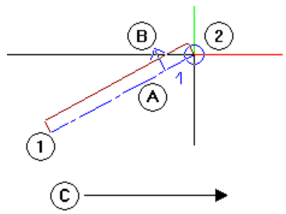
Components are entered along the component axis. Depending on the **axis' position within the component**, you can use the offset direction to specify on which side of the component axis (relative to the direction in which the component is entered) the component is drawn. With **Reverse offset direction**, you have the option to "tilt" the wall or to reverse the setup of the construction layers.

Tip: By means of the offset direction, you can quickly switch between inner and outer dimensions when entering walls.

The direction is indicated by an arrow and the position of the first construction layer. You can turn these symbols on and off by using the **Symbols when entering walls** option in the **Point snap options - Point snap representation** area.

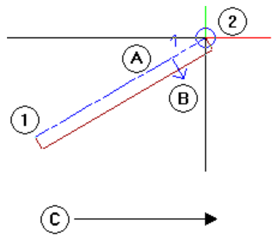
Depending on the position of the component axis, the following options are available:

- Single-layer wall, lateral component axis:



1 Starting point of component
2 End point of component
A Component axis
B Offset direction
C Direction in which you enter the component

After clicking  **Reverse offset direction**:



1 Starting point of component
2 End point of component
A Component axis
B Offset direction
C Direction in which you enter the component

- Single-layer wall, centered component axis:
  Clicking  **Reverse offset direction** does not make any difference.

When all the parameters have been set, you can draw the walls. In this exercise, the values are outside dimensions. Therefore, the wall's offset direction is toward the interior.

Tip: In the section that follows, you will use the keyboard to enter walls alternately in the x-direction and in the y-direction. So that you do not have to select the Tab key to switch between the boxes, you can select the **Switch between x and y boxes automatically** option on the **Desktop environment - Track tracing** page of the **Options**. However, this will only work if track tracing is off.

To draw exterior walls

1 Choose the wall type by clicking **Straight Component**.

2 *Set properties, place start point*
Click where you want the wall to start.

The wall is attached to the crosshairs. Check that track tracing is off. If it isn't, the starting point is marked with a cross. Turn track tracing off by selecting the **F11** key.

3 Check and define the wall's offset direction:

- You defined a lateral wall axis in the **Wall** dialog box. The axis of a straight wall is simply the line you enter.
- The values are outside dimensions (see illustration).
Start by drawing a horizontal wall on the lower-left side. As the starting point is on the outside, the wall's offset direction is upward (= toward the inside).
- Check the preview at the crosshairs. The small arrow points upward (= toward the inside).
- If the arrow does not point upward, change the wall's offset direction by clicking **Reverse offset direction** on the **Wall** Context toolbar.

Tip: While entering elements, you can quickly change the component axis by means of keyboard shortcuts or by clicking in the dialog line.

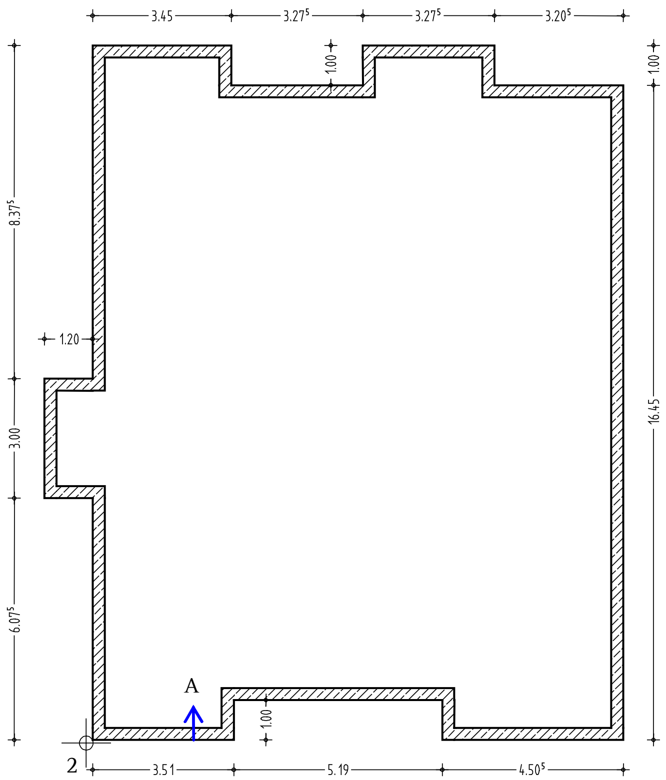
4 Enter **3.51** for the **x-coordinate** in the dialog line.

The other walls will join automatically when you create them in the same way as polylines by entering **dx** and **dy** values in the dialog line.

5 Enter the following values:

dy : 1.0	dx : 5.19
dy : –1.0	dx : 4.505
dy : 16.45	dx : –3.205
dy : 1.0	dx : –3.275
dy : –1.0	dx : –3.275
dy : 1.0	dx : –3.45
dy : –8.375	dx : –1.2
dy : –3.0	dx : 1.2
dy : –6.075	

Tip: If you cannot see the whole drawing, click **Zoom All** on the viewport toolbar.
If you want, you can place the toolbar for controlling the on-screen display at the top of the workspace. To do this, make sure that no tool is active. Use the ALT key to show the menu bar. Open the **View** menu, point to **Toolbars** and click **Viewport toolbar at the top**. You can also show the viewport toolbar all the time.



A Wall's offset direction

6 The wall polyline closes automatically.
Select ESC to close the **Wall** tool.

Draw the interior walls with a different thickness and priority rating. The wall height is the same as that of the exterior walls.

To draw interior walls

1 Use the right mouse button to double-click an exterior wall.

This selects the **Wall** tool and gets the wall's properties at the same time. So, you no longer need to define the height settings of the component.

2 Choose the wall type by clicking **Straight Component**.

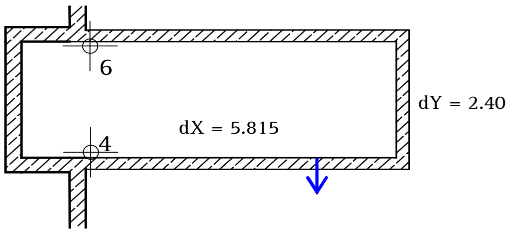
3 Change the **Properties** as shown.

- **Parameters, attributes** tab:
  Thickness (m) = **0.24**
  Priority = **240**
- **Format properties** tab:
  Pen thickness (2) = **0.35** mm

Then click **OK** to confirm.

4 *Set properties, place start point*
Draw the first horizontal interior wall by placing the starting point on the lower-left wall corner (see illustration) of the stairwell area. Check the wall's offset direction in the preview. If it is not correct, change it by clicking **Reverse offset direction**.

5 Enter **5.815** for the Δx **x-coordinate**. Then enter **2.40** for the Δy **y-coordinate**.

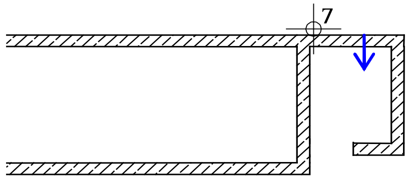


6 Close the wall outline by clicking the corner of the exterior wall at the top.

7 Click the upper-right point to place the first point for the elevator walls (see illustration).

8 Enter **1.78** for the **x-coordinate**.

9 Enter **-2.48** for the **y-coordinate** and then **-1.00** for the **x-coordinate**.



10 Select ESC twice to close the wall polyline and the **Wall** tool.

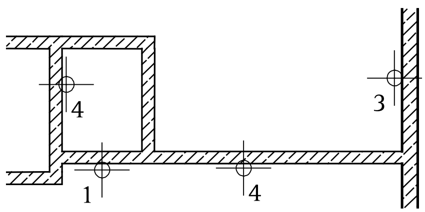
You will use the **Join Linear Components** tool to design the next wall. This tool can be used to extend a wall to the point where it intersects another wall.

To join walls

1 Right-click the elevator wall you want to lengthen.

2 Select **Join Linear Components** on the shortcut menu. Check that the joint width is **0.00**. If it isn't, enter this value in the dialog line.

3 Click the exterior wall through to which the elevator wall is to extend.



4 Lengthen the elevator wall by joining it with the wall of the stairwell; then, close the tool.

You will design more interior walls by using the reference point of existing walls and the 'enter at right angles' option, which creates elements at right angles to existing elements. After you have drawn the upper-left interior wall, which is described in this section, you can create the other walls yourself as shown in this illustration.

To draw more interior walls

1 Click **Wall** (**Actionbar - Components** task area).

2 Choose the wall type by clicking **Straight Component**.

3 Click the upper-right corner of the interior wall (see illustration) and define the offset direction toward the lower right.

4 Enter the length of the wall as follows: **x-coordinate** = **0** and **y-coordinate** = **-7.78**

5 Click **Enter at right angles** in the dialog line.

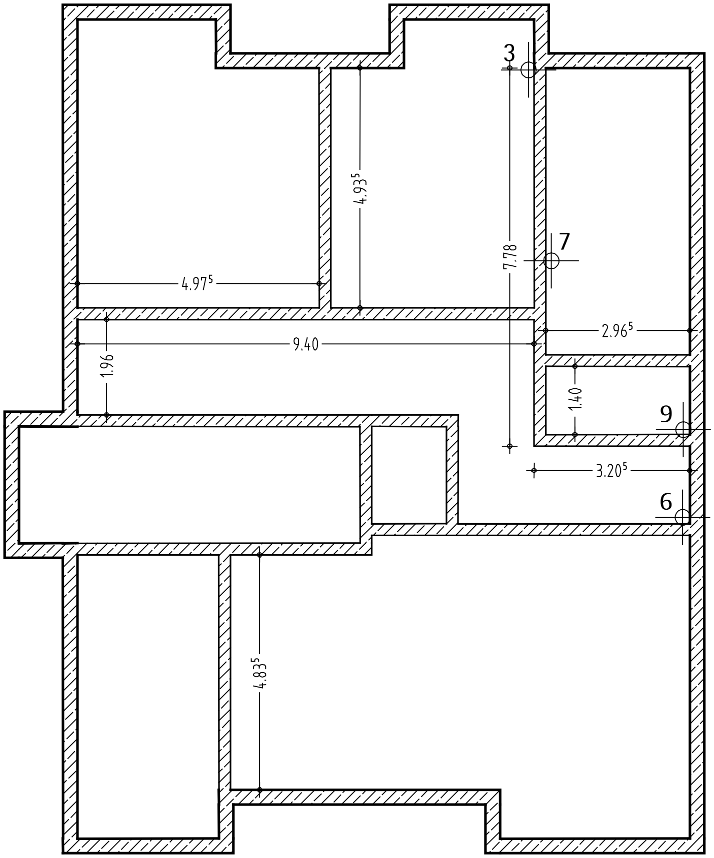
6 Confirm the value **dy = 0** so that you can enter a value in the x-direction and define the end point of the wall by clicking the point where the interior wall you just created and the exterior wall intersect.

7 To place the starting point of the horizontal wall at the top, click the line to the right of the vertical wall you just created. You can see the reference point.

8 If this is necessary, move the reference point onto the lower-left corner and enter the distance between the reference point and the wall: **1.40**.

9 **Enter at right angles** is still selected in the dialog line. Check that the offset direction is toward the top and click the lower-right wall corner.

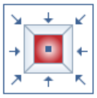
10 Now draw the other interior walls yourself.



11 The wall polylines close automatically. Select ESC to close the **Wall** tool.

A note on views and viewports

When working with walls and other components, you can get an impression of how the building looks in 3D space at the click of a mouse button. Each viewport has its own set of viewing tools in its viewport toolbar.

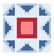


Tools for displaying the model

By using the tools on the viewport toolbar, you can not only move freely on the screen but also display any view. You can zoom in on any section or detail of your drawing as closely as you want. You can even use different view types to display the entire model or selected components.

Most of these tools are 'transparent' tools; in other words, you can use them while another tool (for example, **Line**) is active.

You cannot see the viewport toolbar until you point to the lower border of the viewport, guaranteeing as large a workspace as possible. When you use multiple viewports, each viewport has its own viewport toolbar.

Tool		Use
		Left area:
	View flyout menu	You can use this tool to choose between plan view and any of the predefined standard views.
	Zoom All	You can use this tool to select the display scale so that you can see all the elements in the visible files. **Note**: If you have loaded a view by using  **Save, Load View**, you can see this view only.
	Zoom Section	You can use this tool to zoom in on a section. To do this, enclose the elements you want to zoom in a selection rectangle.
	Navigation Mode	You can use this tool to turn navigation mode on or off in the active viewport. In this mode, you can use the mouse to view a 3D model. **Note**: You can move in sphere mode or in camera mode (while selecting and holding CTRL KEY).
	Previous View	You can use this tool to restore the previous view or display scale (if you had selected a different view or scale before you selected the current setting).
	Next View	You can use this tool to restore the next view or display scale (if you have already selected a subsequent view or scale).
	Save, Load View	You can use this tool to save the current view under a name of your choice or retrieve a view you saved beforehand.
	3D View	You can use this tool to display 3D models in three-dimensional space in a perspective view by entering an eye point (observer) and a target point. You can choose between parallel projection and central projection for the perspective view. You can also use this tool to create a view based on the building structure.
	Element Selection	You can use this tool to select the design entities you want to display in the active viewport. The program temporarily hides all the other design entities.
	Drawing File Selection	You can use this tool to temporarily hide drawing files that are currently visible in the active viewport.

Tool		Use
	Always on Top	You can use this tool to place the viewport so that it is always on top (that is, in front of) the other ones. You can only use this tool if you have *not selected* the **Connected** option and the viewport is *not maximized*.
or		
		Right area:
0.0	Exposure (only for the **Animation** and **RTRender** view types)	You can use this box to control the brightness in viewports of the **Animation** or **RTRender** view type. You can enter a value between -25 and 25. **Important!** This setting *only* changes the way elements look in the active viewport. It has *no* effect on rendering.
Off	Section Display	You can use this tool to display your design in an architectural section for which you have already defined the **Clipping Path**.
100,00	Display Scale	You can use this tool to select the scale for displaying the model on the screen. The display scale governs the ratio between the model on the screen and its real-life dimensions. The scale therefore changes automatically if you change the size of sections on the screen. You can see the current display scale on the viewport toolbar in the lower border of a viewport.
Wireframe	View Type	You can use this list box to select one of the predefined view types (**Wireframe**, **Hidden**, **Animation**, **Sketch** or **RTRender**) for the active viewport. Of course, you can also select a view type you defined yourself. Click to modify various settings of the view types. The settings apply to all the viewports that use this view type. Click **New view type** to define and save your own view types. When **Layout Editor** is open, you can switch between **Design view** and **Print view** (= preview of resulting printout).

Note: You can find more tools for controlling what's on your screen in the **View** and **Window** drop-down lists on the **Quick Access Toolbar** and on the shortcut menu (in navigation mode only).

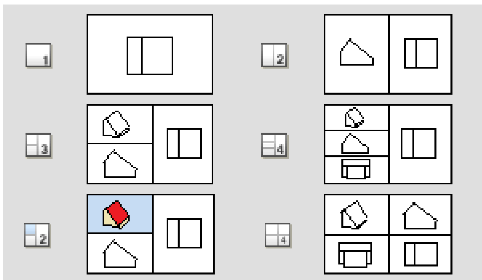
You edit your model in viewports. Here, you create or modify the required design entities. While doing so, you identify distinctive points and select the view type and view appropriate to the current status of your work.

Note: This tutorial uses the **Connected** option, which is selected by default (**Window** drop-down list on the Quick Access Toolbar). When you change the size of a viewport, all the other viewports adapt automatically. New viewports will be fitted into the arrangement.
If the **Connected** option is *not selected*, you can place and resize the viewports independently of each other within the Allplan window.

To maximize the workspace, you can float all viewports freely. If you have a second monitor, you can leave the Allplan window on one monitor, using it as a "toolbox", while editing your model in the independent viewports you place on the second monitor. You can find more information on floating toolbars in the Allplan Help - "Viewports".

By opening several viewports in parallel and arranging them as you need, you can display your model by using different views, scales and view types. You can display a different view in each viewport. For example, you can display a section, the entire design or an isometric view. Changes you make to the design in one viewport are immediately visible in all the others.

You can find the tools for using and arranging viewports in the **Window** drop-down list on the Quick Access Toolbar. You can also select one of the standard viewport arrangements and then modify this arrangement to suit your needs.



The following exercise will help you understand how the viewports work.

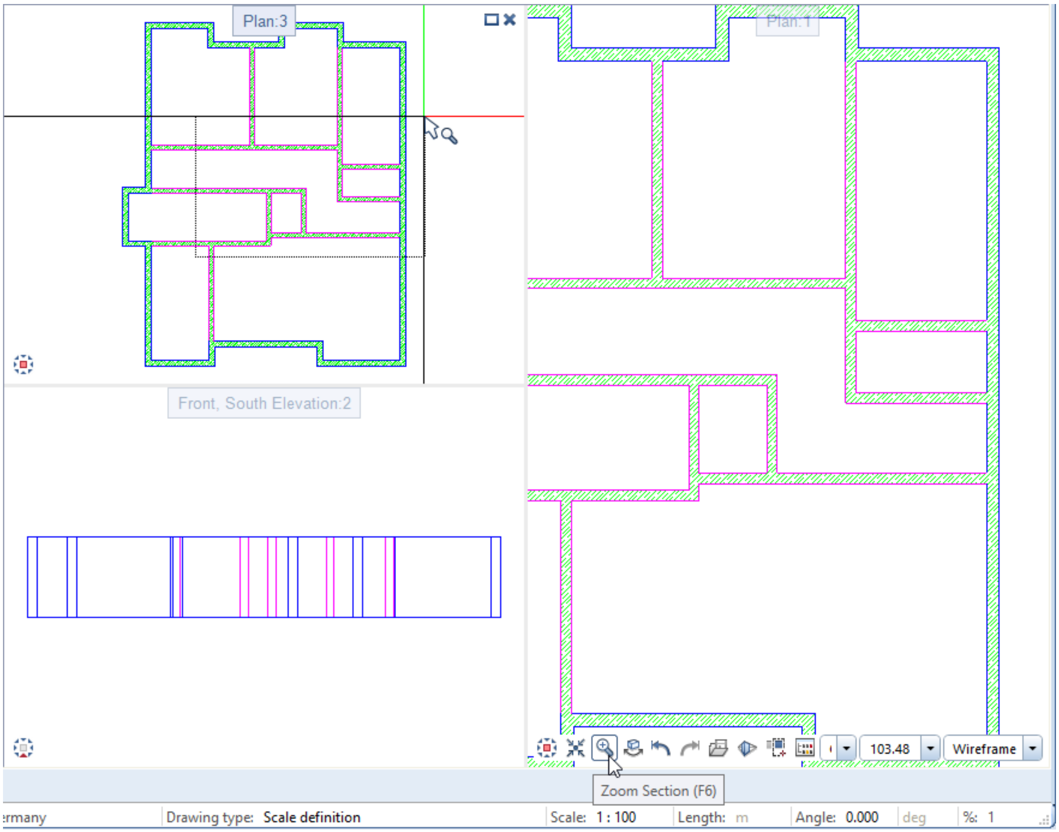
How to use viewports: detailed view and full view

1 Open the **Window** drop-down list on the Quick Access Toolbar and click **3 Viewports**.

2 Click **Plan** in the upper-left viewport.

3 Click **Zoom Section** on the viewport toolbar in the right viewport.

4 Zoom in on a section in the upper-left viewport.
You can see this section in the viewport where you clicked **Zoom Section** (here: in the right viewport).
Thus, you can work on details and still see your entire design in plan, perspective and elevation view.



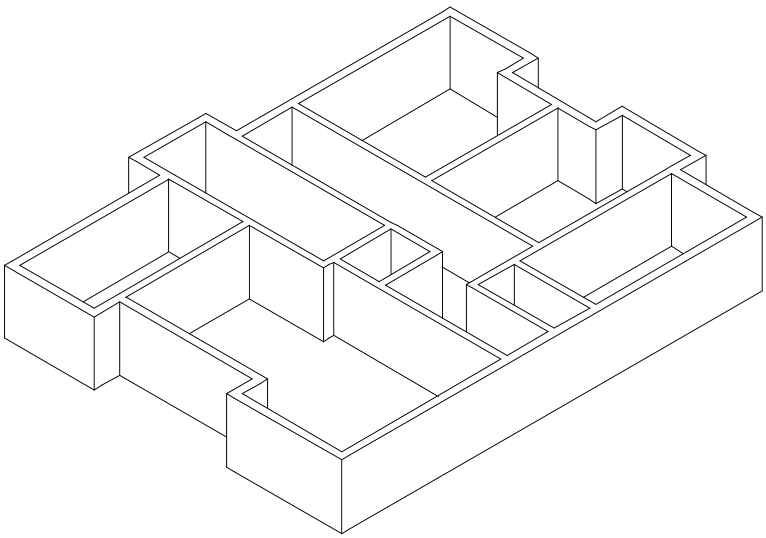
To create a hidden-line image

1 Click **3 Viewports**.

2 Go to the upper-left viewport, click Wireframe on the viewport toolbar and select the **Hidden** view type. This creates a hidden-line image.

Note: You can define the settings for the hidden-line image in a palette. Just click beside the view type.

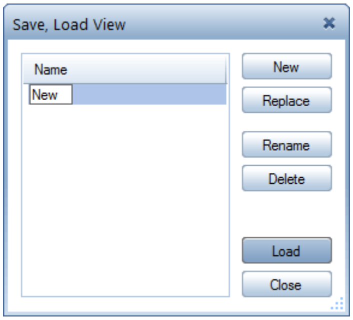
3 To hide the division lines between the exterior walls and interior walls of varying pen thickness, open **Show/Hide** (**View** drop-down list on the Quick Access Toolbar) and select the **Use color 1 for all elements** option.



To save a view

1 Use **Zoom Section** to choose a section displaying the design in plan (right viewport).

2 Click **Save, Load View**.



3 In the **Save, Load View** dialog box, click **New**, enter a name for the view and click **Load**.

Tip: You can use **Save, Load Arrangement** in the **Window** drop-down list (Quick Access Toolbar) to save the arrangement of all viewports and load it again with a single click.

The view is now selected (icon appears pressed in). This means that you can see this view when you click **Zoom All**.

4 Turn off **Save, Load View** (icon no longer appears pressed) and click **Zoom All**.

Instead of the saved view, the entire design is visible again.

5 Open the **Window** drop-down list on the Quick Access Toolbar and click **1 Viewport**. This also turns off the hidden-line image.

Columns

Now you will place a column in the basement.

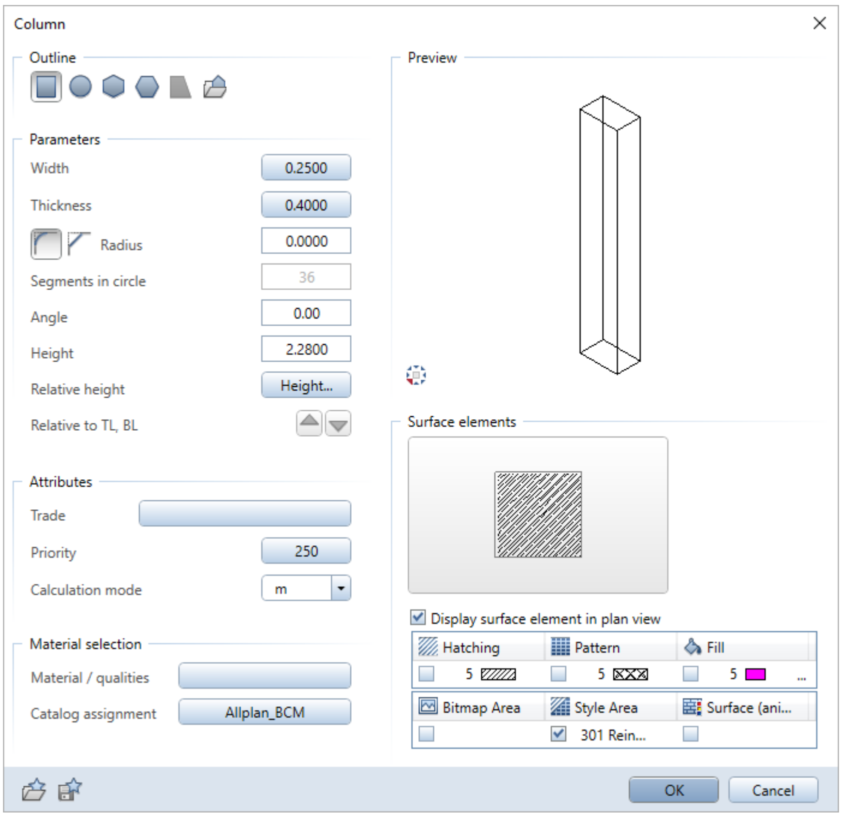
Tip: You can also use the **Column** tool to make any column-shaped element – for example, round and rectangular columns and small-sized flush piers.

To draw a column

➲ Drawing file **101** is current and plan view is selected. Line type **1** is selected.

1 Select pen thickness (3) **0.50** mm in the **Properties** palette – **Format** area and click **Column** (**Actionbar – Components** task area).
Check that the **AR_COL** layer is selected. If it isn't, select it in the **Properties** palette – **Format** area.

2 Go to the **Column** Context toolbar and click **Properties**.



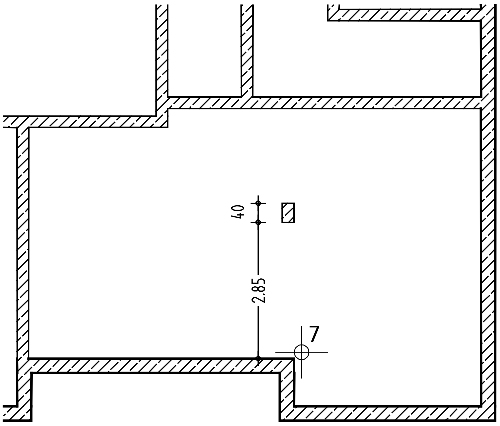
3 Define the parameters in the **Column** dialog box as shown:
Type: Rectangular column
Width: **0.25** m
Thickness: **0.40** m
Priority: **250**
Style area: **301 Reinforced concrete**

4 Click the button marked **Height...** and enter the height of the column as absolute values:

- Top level: **-0.51**.
- Bottom level: **-2.79**.

5 Confirm the two dialog boxes.

6 Go to the **Column** Context toolbar and change the column's anchor point to **lower right**.



7 Point to the inner corner of the wall (see illustration).

This point is the reference point for entering coordinates. Consequently, the boxes in the dialog line are highlighted in yellow.

8 Enter **0.00** for the **x-coordinate** and **2.85** for the **y-coordinate** in the dialog line and select the Enter key to confirm.

Allplan positions the column.

9 Select ESC to close the tool.

Assigning layers

You assign layers and other format properties (pen, line and color) to walls and upstands in the **Properties** dialog box.

Note: If you selected the layers as described in unit 1, the tool automatically selects the appropriate layer.
If it isn't or you want to use a different layer, do the following.

Tip: **How to select layers**

Always proceed as follows:

– First select a tool.

– Check the layer's short name in the **Properties** palette – **Format** area.

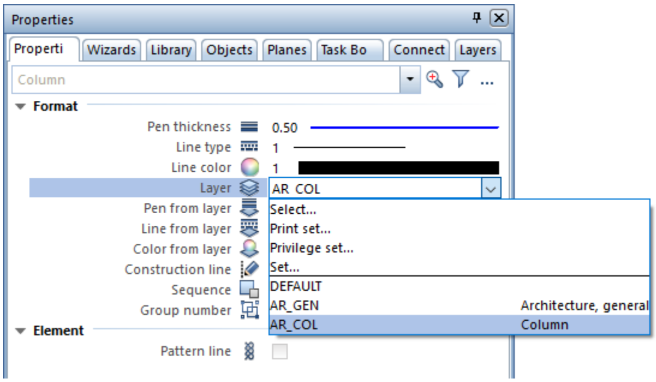
– Select a different layer.

Tip: To see which layers have already been assigned, open the **View** drop-down list, click **Select, Set Layers** and select the **List layers used in open documents** option in the **Contents of list box** area.
Alternatively, open the **Layers** palette and the shortcut menu and click **List layers used in open documents**.

To select the current layer

➲ The **Column** tool is selected.
The dialog box with the properties is closed.

1 Open the **Layer** drop-down list in the **Properties** palette – **Format** area.



2 If the layer **AR_COL** is available in the quick selection list, click this layer.

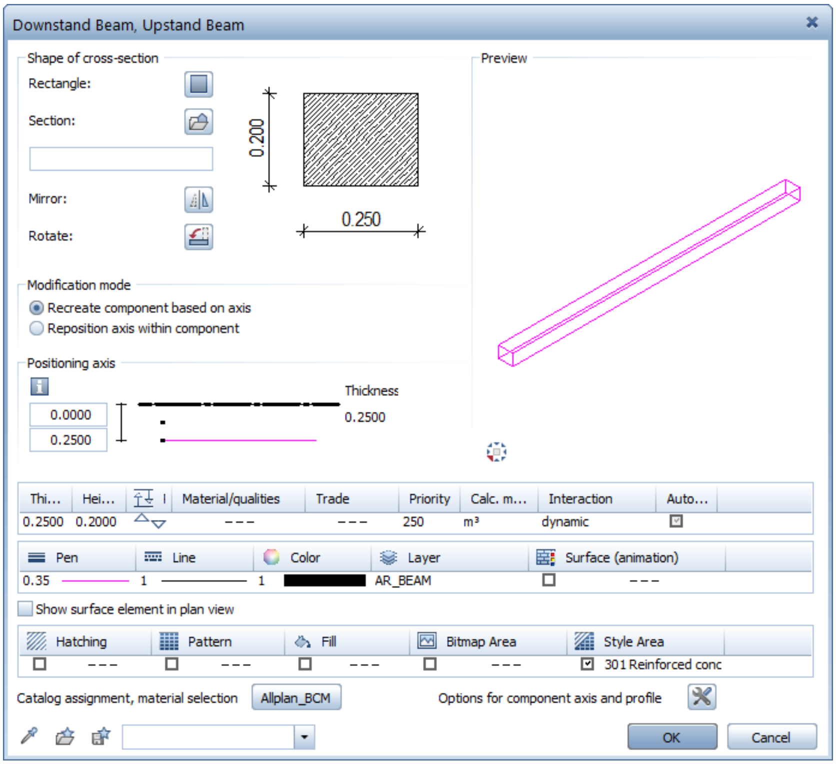
3 If it isn't available, click **Select...** and double-click the **AR_COL** layer in the **Single layer selection** dialog box.

Downstand beam

Next, you will create a beam over the column.

To draw a beam

1 Click **Downstand Beam, Upstand Beam** (**Actionbar – Components** task area). On the **Downstand Beam, Upstand Beam** Context toolbar, click **Properties**.



2 Define the parameters for the beam as shown in the illustration:
Thickness: **0.25** m
Priority: **250**
Pen thickness: (2) **0.35** mm
Style area: **301 Reinforced concrete**

3 Check that the layer **AR_BEAM** is selected. If it isn't, select it.

4 Click to define the absolute height of the beam:

- Top level: **-0.31**.
- Bottom level: **-0.51**.

5 Confirm the two dialog boxes.

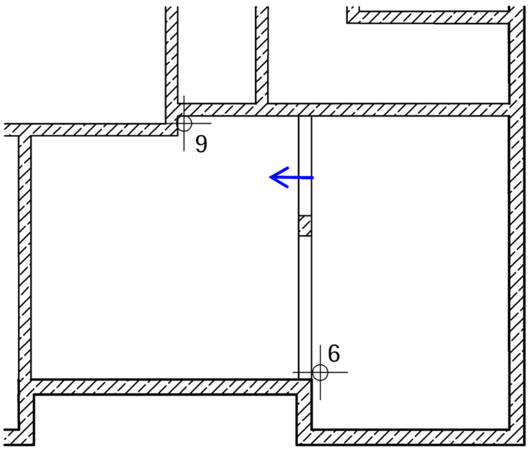
6 Click the starting point (see illustration).

7 Click **Enter at right angles** and enter **0** for **dx**.

8 Check the beam's offset direction in the preview. If it is not correct, change it by clicking **Reverse offset direction**.

9 To define the end point of the beam, click the horizontal wall. As you have selected 'Enter at right angles', you can also click a corner of the wall.

Allplan draws the beam.



10 Select ESC to finish entering the beam.

11 To check the beam's position, select a standard isometric view on the viewport toolbar or open multiple viewports.

Openings

Note: The procedure for creating an opening – be it a door, window, niche or recess – is always the same. The differences lie in the property settings you can make.
Like in the real world, walls and openings are linked in Allplan. When you move a wall, for example, its openings will move too.

All the doors in the basement are single doors of **0.885/2.10 m** (except for the doors to the stairwell and elevator). You will not use SmartParts or smart symbols. You will draw the door opening without a door swing. To display the door lintel, you will use the reveal option.
The procedure for creating door openings also applies to all other kinds of openings.

Entering openings

Tip: You can enter names for combinations of parameters and save them as favorites.
You can use to match the settings from an existing component.

- Click the first point of the opening.
- Enter properties and the height.
- Enter the width of the opening.

You must define the settings for the opening only once if you want to create a series of identical openings. The properties and height settings are stored by the system until you redefine them.

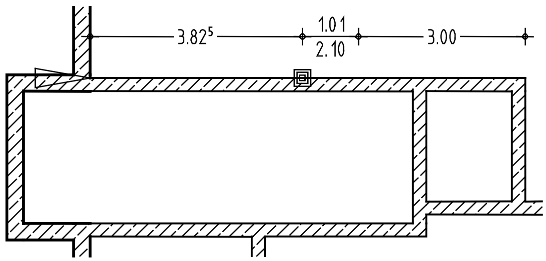
To create door openings

1 Click **Door** (**Actionbar** – **Components** task area).
The door opening is attached to the crosshairs.

The program suggests the **AR_SMSY** layer so that you can place a SmartPart or smart symbol in the opening while creating it.
Openings always have the same layer as the component into which they are inserted, regardless of which layer is the current one.
Here, the layer setting is irrelevant.

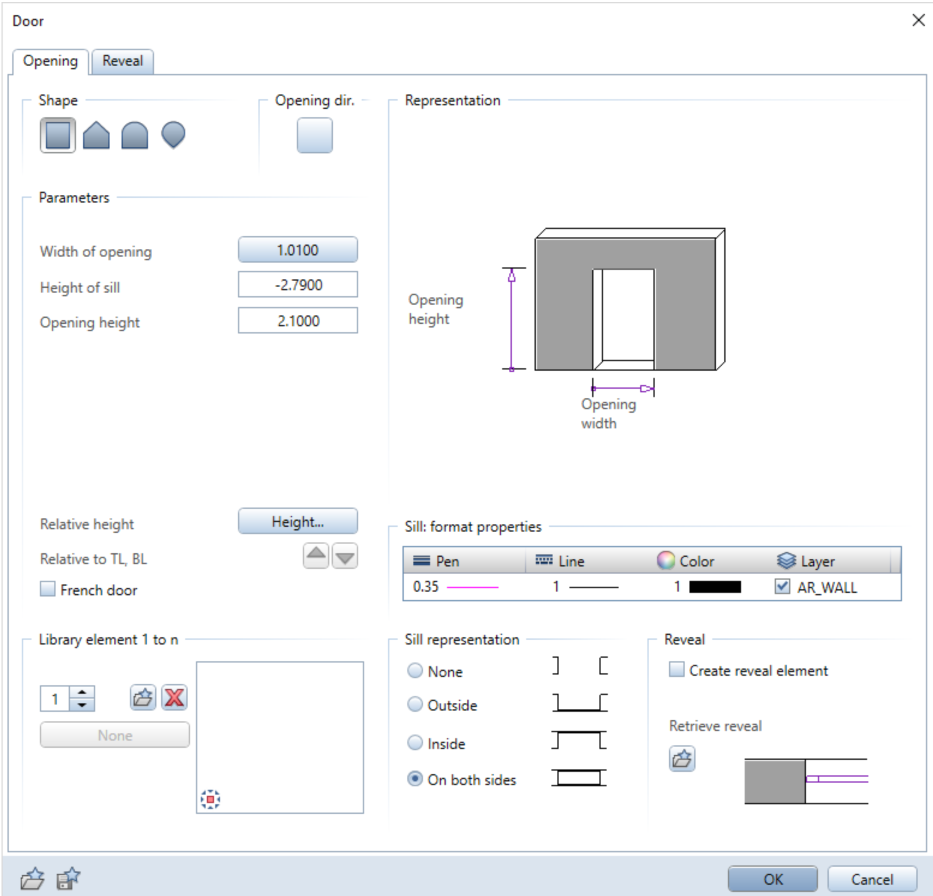
2 Switch the **Anchor point for preview** to the lower right on the **Door** Context toolbar and check that **Enter offset directly** is turned off in the dialog line. If it isn't, enter **0.00** for **Offset to reference point**. Now you can enter a reference point.

3 Click a point on the outside of the stairwell wall roughly where you want to insert the door (see the following illustration). Allplan displays an arrow on the reference point. When you look at the dialog line, you can see the distance between the reference point and the point clicked.



4 If the reference point is not on the upper-left inside corner, click this corner to move the reference point there and enter **3.825** m for the offset in the dialog line.

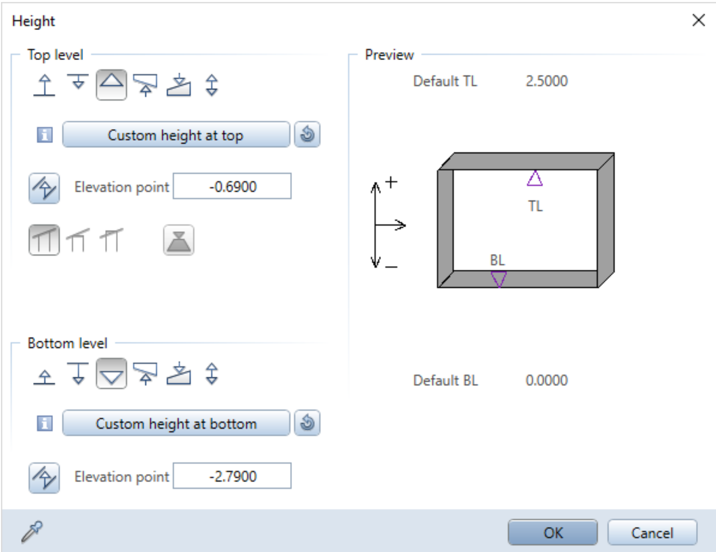
5 Click **Properties**.



6 Select the rectangular shape for the door.

7 As you do not want to display the door swing, click the icon below **Opening direction** and then click **Off**.

8 Click **Height...** and enter the height of the top and bottom levels of the door as absolute values. For the bottom level, enter **–2.79**. The top level is the door height plus the thickness of the floor (0.09 cm). Enter **–0.69**.



9 Click **OK** to confirm the dialog box.

10 For the sill representation, select **On both sides**. Select pen **0.35** mm for the sill; do not change the line or color. Select the **AR_WALL** layer.
Turn off the **Create reveal element** option.

11 Click **OK** to confirm the dialog box.

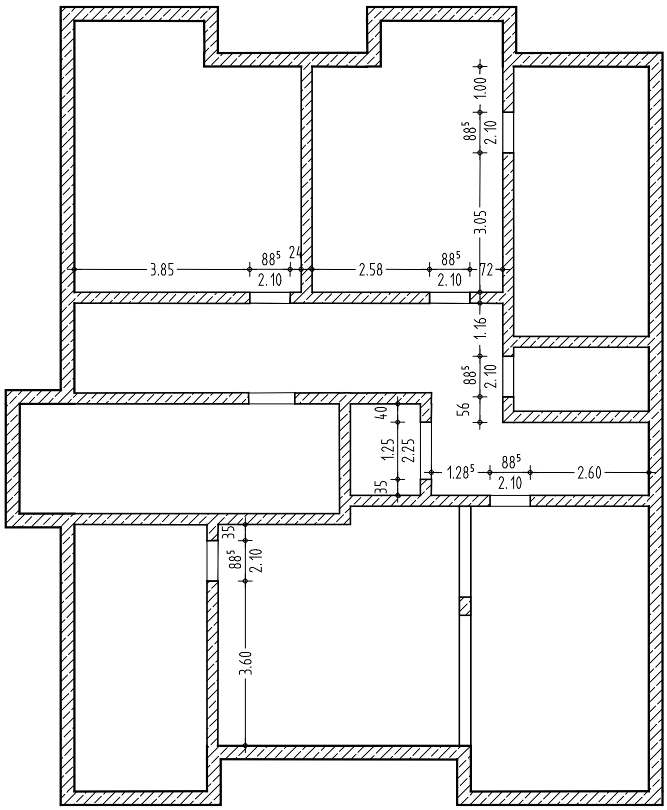
12 Enter **1.01** m for the width of the opening in the dialog line. Allplan draws the door opening.

Tip: You can change the anchor point (left, right or centered) on the **Door** Context toolbar.

You can also turn off the 'Prompt for opening width' to create several doors of the same width.

13 Now draw all the other door openings yourself. You only need to enter the width of the opening in the dialog line (except for the elevator door which is 2.25 m high). Make sure that the offsets are correct. Change the height of the elevator door in the dialog box:
bottom level = **–2.79**; top level = **–0.54**.

Tip: To check how your design looks in 3D, switch to a standard isometric view (viewport toolbar) and create a hidden-line image by using the **Hidden** view type.



14 Select ESC to close the tool.

The next step is to insert window openings in the walls. Some of the window openings will be wider and higher than others and the height of the sill in each opening is also different. Here, too, the windows get **sills**.

You are already familiar with the approach. Define the height, select the shape of the window and place the opening in plan.

To create window openings

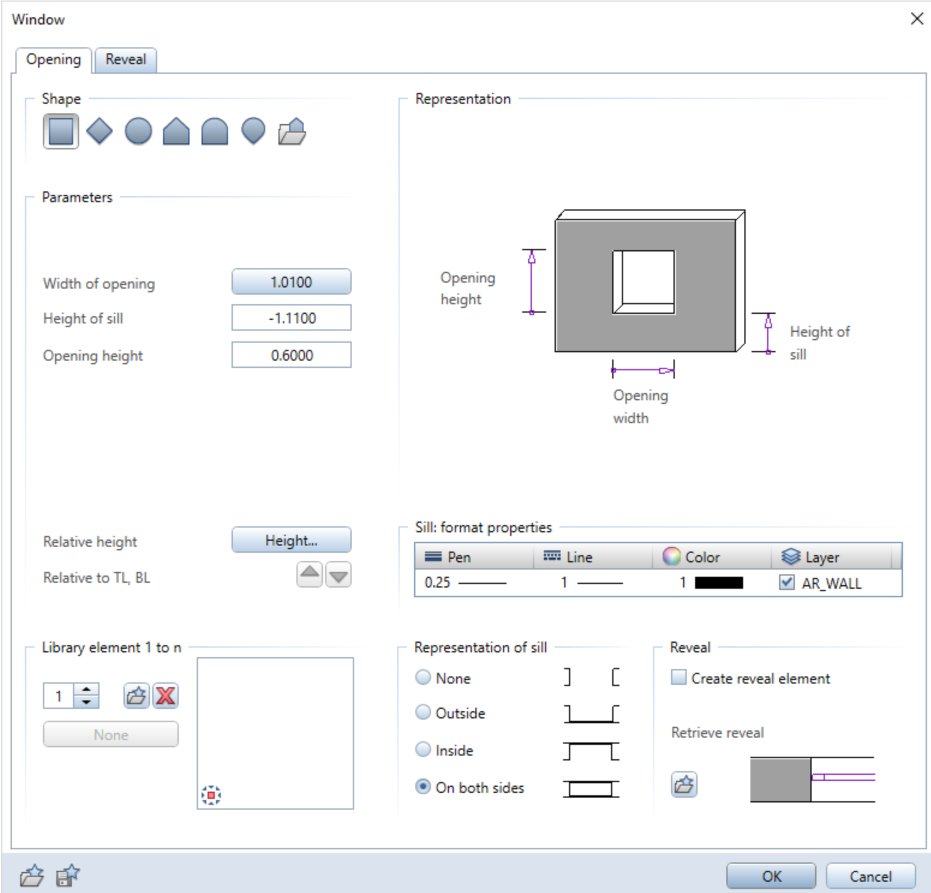
Tip: You can change the anchor point (**Window** Context toolbar) and the position of the reference point.

1 Click **Window** (**Actionbar** - **Components** task area - **Door** flyout menu).

2 Switch the **Anchor point for preview** to the lower-right point on the **Window** Context toolbar and check that **Enter offset directly** is turned off in the dialog line. If it isn't, enter **0.00** for **Offset to reference point**.

3 Click the line representing the upper-left exterior wall and enter the offset to the reference point in the dialog line.

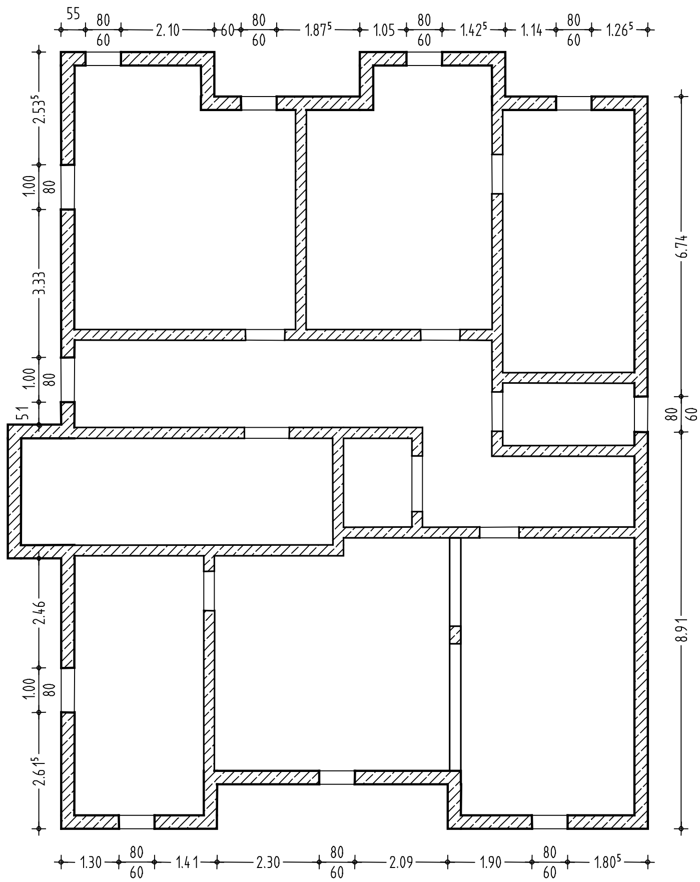
4 Click  **Properties**.



5 The dimensions of the window openings are 80 by 60 cm. When the lintel is 20 cm, the top level of the opening is at **-0.51** and the bottom level is at **-1.11**. Click **Height...** and enter the height as absolute values.

6 In the **Sill** area, select the **Both sides** option. Do not change the pen, line or color of the sill. Select the **AR_WALL** layer.
Turn off the **Create reveal element** option.

7 Click **OK** to confirm the dialog box.



8 Now draw the windows as shown. Do not forget to change the settings for the windows in the left exterior wall.

You can do this in two ways:

- Enter **–1.31** for the height of the sill and **0.80** for the height of the opening
- or click **Height...** and change the bottom level to **–1.31**.

9 Select ESC to close the tool.

Defining the reference point

To change the position of the small arrow representing the nearest significant reference point, you can

- click a new point on the wall line or
- click a point beyond the wall line. The reference point will move to the point on the wall line that is perpendicular to the point that you clicked.

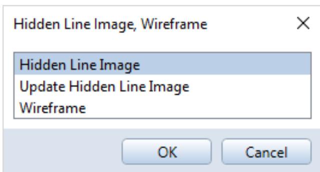
Checking the design

You can generate a hidden-line image to check the design. Thus, you can see whether the height settings of the window and door openings are correct. You can save the hidden-line image to a drawing file.

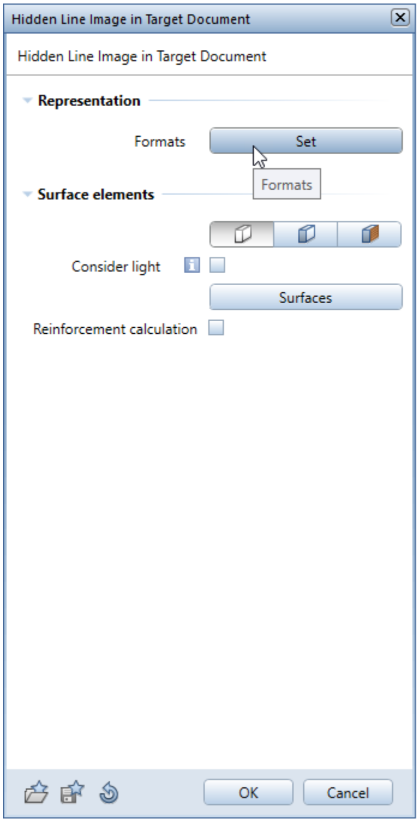
To copy the 3D view to a different drawing file

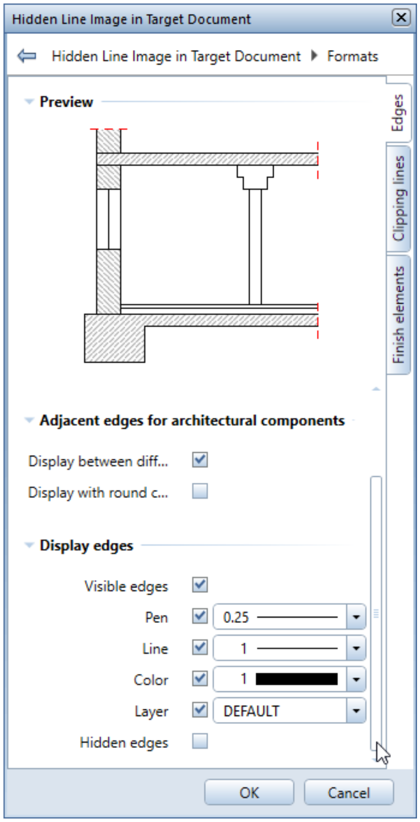
1 Click **Front Right, Southeast Isometric View** on the viewport toolbar.

2 Click **Hidden-Line Image, Wireframe ...** (**Window** drop-down list on the Quick Access Toolbar).



3 Click **Hidden-Line Image** in the **Hidden-Line Image, Wireframe** dialog box.





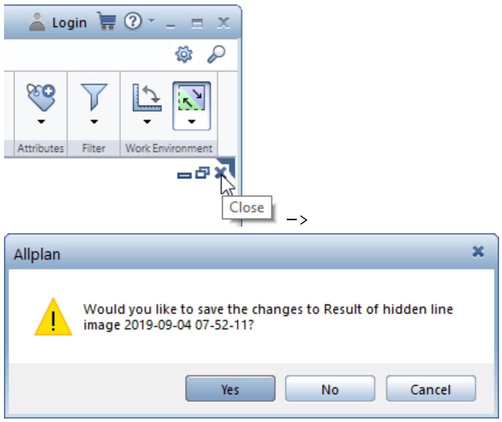
4 The **Hidden-Line Image in Destination Document** palette opens. Click the **Set** button in the **Representation** area. Another palette opens. Switch to the **Edges** tab and clear the **Hidden edges** option in the **Display** edges area.

5 Click **OK** to confirm the palettes and the note.

The hidden-line image appears in a separate window.

Tip: To save the resulting hidden-line image as an NDW file, open the drop-down list of the Allplan icon and click **Save Copy as...**.

6 Close this window by clicking the **X** in the upper-right corner. Confirm the prompt by clicking **Yes**.



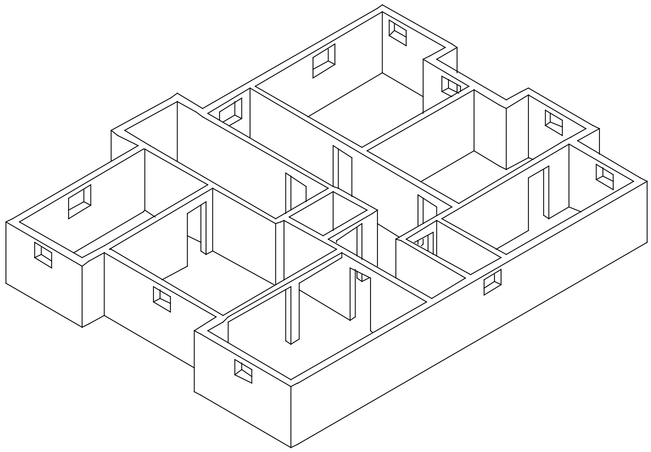
7 Select drawing file **105** in the **Select destination drawing file** dialog box.

8 Click **Open on a Project-Specific Basis** and double-click drawing file **105** to make it current.

As the isometric view is still active, you can see nothing in the workspace.

9 Click **Plan** on the viewport toolbar.

10 Your workspace now looks like this. You can also print the image by clicking **Print** in the drop-down list of the Allplan icon on the title bar.

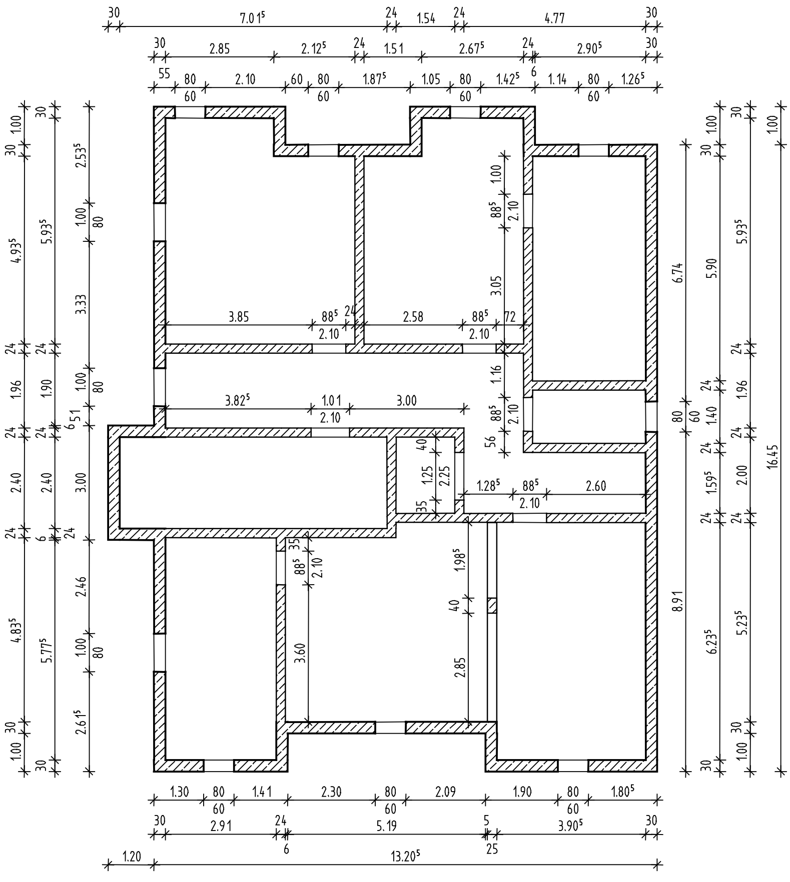


Note: When checking the design, you can also show or hide elements or element groups or zoom in on a particular element. To do this, use the **Objects** palette, which lists all components of your virtual building model in a compact and clear manner. You can use predefined sorting criteria to show and hide the required objects and elements.
You can find detailed descriptions of the options provided by the **Objects** palette in the Allplan Help.

Dimensions

Now you will dimension the floor plan by using the approach described in exercise 6 in the Basics Tutorial. To do this, go to the **Actionbar**, select the **Draft** role and the **Label** task and use the tools in the **Dimension** task area.

- Make drawing file **104** current; open drawing file **101** in edit mode and close all the other drawing files.
- Check the current **Scale** on the status bar and change it to **1:100**.
- Place the dimensions for the doors, windows and beam on the layer **DL_GEN** and the wall dimensions on the layer **DL_100**.



Turning layers on and off

To check the layers assigned to the dimensions, select the "visible, frozen" status for the **DL_GEN** layer with the dimensions of the openings.

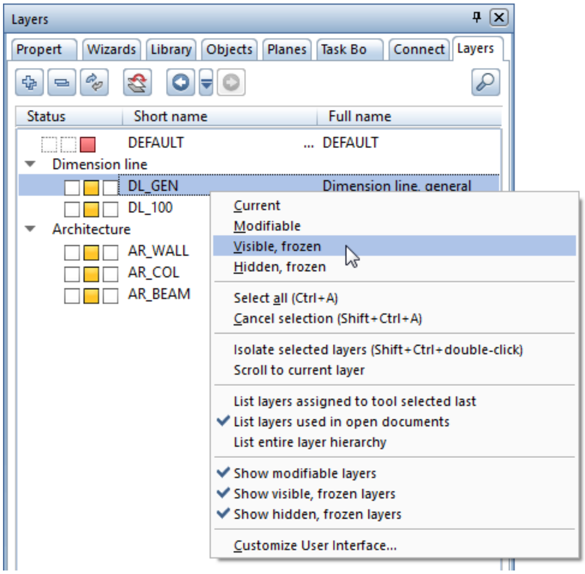
To turn layers on and off

1 Open the **Layers** palette.

2 Open the shortcut menu of the **Layers** palette and click **List layers used in open documents**.

3 Right-click the **DL_GEN Dimension line, general** layer and choose **Visible, frozen**.

Tip: If you change the status of the current layer, the **DEFAULT** layer becomes the current one.

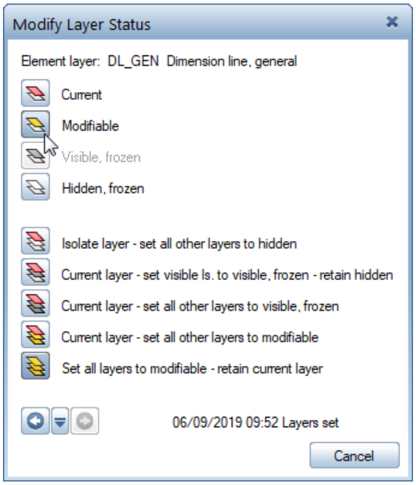


Tip: When no tool is active, you can also open the **Layer** dialog box by double-clicking the right mouse button in the workspace.

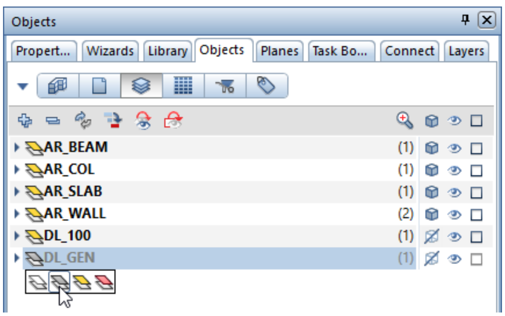
The dimensions on the **DL_GEN** layer are in color **25**, which you selected for frozen layers.

You can also show and hide layers by selecting the **Select, Set Layers** tool on the shortcut menu of a viewport. The shortcut menu of the **Select Layer/Visibility** tab provides the required options.

To make the frozen layer modifiable again, right-click any frozen dimension line, select **Modify Layer Status** on the shortcut menu and click **Modifiable**.



You can also use the **Objects** palette to change the layer status. Open the **Objects** palette and select **Sort by layer** in the list box at the top. This criterion lists all the layers assigned to the objects and elements in the currently open drawing files (**current** or **open in edit mode** or **open in reference mode**).
When you point to the icon indicating the layer status in the list, Allplan opens a flyout menu where you can change the status of the layer.



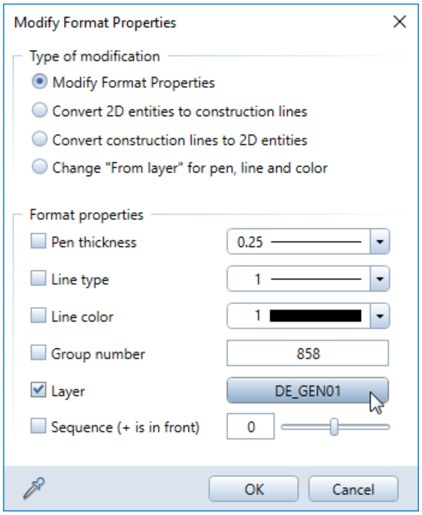
What to do when elements are no longer visible?

- Make all layers visible. To do this, use the **Layers** palette or the dialog box of the **Select, Set Layers** tool (open the shortcut menu in the workspace) or the **Objects** palette (**Sort by layer** criterion).
- If the elements are still not visible, the selected privilege set might not have the necessary privileges. Select the **Select Layer Privilege Set** tool at the bottom of the **Layers** palette and select an appropriate privilege set or ask your administrator for help.
  You can also select a privilege set in the **Layer** dialog box - **Select Layer/Visibility** tab - **Privilege set** list box.

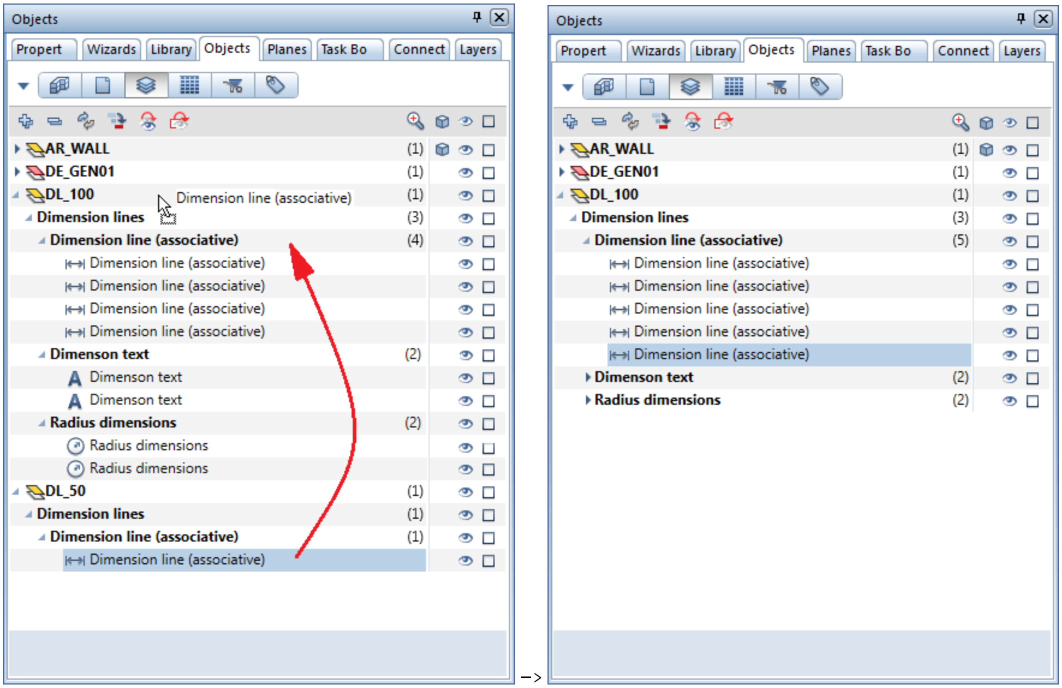
Which layer is the element on?

- When you point to an element (without clicking it), a box with **information on the element** opens. You can customize element info to your needs. Open the **Options** on the **Selection** page: **Element name** and **Layer** are turned on by default.
- You can find out which layers individual elements are on by turning each individual layer on in the **Layers** palette.
  You can also use the **Objects** palette. Select the **Sort by layer** criterion, which lists all the layers assigned to the objects and elements in the currently open drawing files (**current** or **open in edit mode** or **open in reference mode**). If you want to know the layer of a particular element, click this element in the workspace. As a result, this element gets the **Active** icon in the **Objects** palette and you can see the layer to which it belongs.
- You can find out which layer a single element is on by right-clicking the element and selecting **Format Properties**.
  You can see and change all the properties including the layer.
  You can also change the layer of the current element. The layers of linked components (for example, window openings in walls), however, do not change. We recommend that you use **Modify Format Properties**.

- You can change the layer assignments of one or several elements by using the **Modify Format Properties** tool (**Change** task area). This tool also modifies the layers of linked elements.



- To change the layer assignments of one or several elements, you can also use the **Objects** palette. Select the **Sort by layer** criterion. Open the tree structure of a layer down to its lowest level. There, select one or more elements. You can now drag the elements to another layer (the uppermost level in the hierarchy) in the list.



However, you can reassign the elements only to a layer that is in this list.

Stair outline

You can create stairs in two ways:

- You can model stairs in 3D with the tools in the **Stair** task area.
- You can draw stairs in 2D with the tools in the **2D Objects** task area.

As half-space landings and flights of stairs are usually produced as precast elements, you do not need to design or reinforce these components. Therefore, you will create the outline of the stair with the tools in the **2D Objects** task area. The following exercise is a "rough design guideline". Tools that you have already encountered are no longer explained in detail.

Tip: To select a tool you have already used beforehand, you can also open this tool by clicking it in the **Repeat** drop-down list (Quick Access Toolbar). You can choose from the 30 tools you have selected most recently.

To draw the stair outline

1 Make drawing file **103** current; open drawing file **101** in edit mode and close all the other drawing files. Open the **Properties** palette and select pen thickness **0.13** mm.

2 Select the **Design** task on the **Actionbar**.

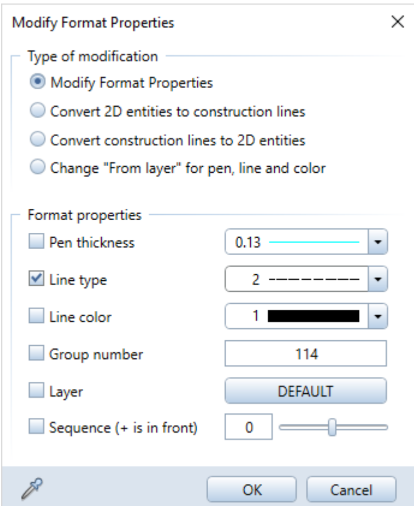
3 Use **Line**, **Rectangle** and **Parallel to Element** (**Actionbar – 2D Objects** task area) to draw the stringers and the steps.
Check that the **DE_GEN01** layer is selected. If it isn't, select it in the **Properties** palette – **Format** area.

4 Use **Line** and **Perpendic. Bisector** (**2D Objects** task area) to draw the line of travel.

5 Use **Line** to draw two section lines.

6 Use **Auto-Delete Segment** (shortcut menu of an element) to delete redundant line segments.

7 Click **Modify Format Properties** (**Actionbar – Change** task area).



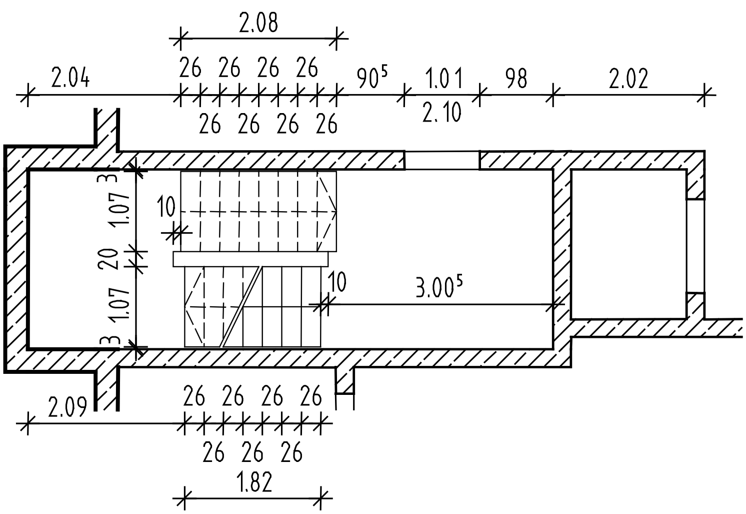
8 The **Modify Format Properties** dialog box opens. Select the **Line type** check box and choose line type **2**. Then click **OK** to confirm.

9 *Select elements to modify:* Click the elements to which you want to apply the new line type. Then select ESC to close the tool.

10 Make drawing file **104** current; open drawing files **101** and **103** in edit mode and close all the other drawing files.

11 Dimension the outline of the stair and modify the dimensioning of the door. Use the right mouse button to double-click a frozen opening dimension line.

This selects the **Dimension Line** tool and the **DL_GEN** layer.



Slab

The basement now needs a slab. You can create slabs with the **Slab** tool. As with walls, start by entering the properties and then draw the outline of the slab by means of the polyline entry tools.

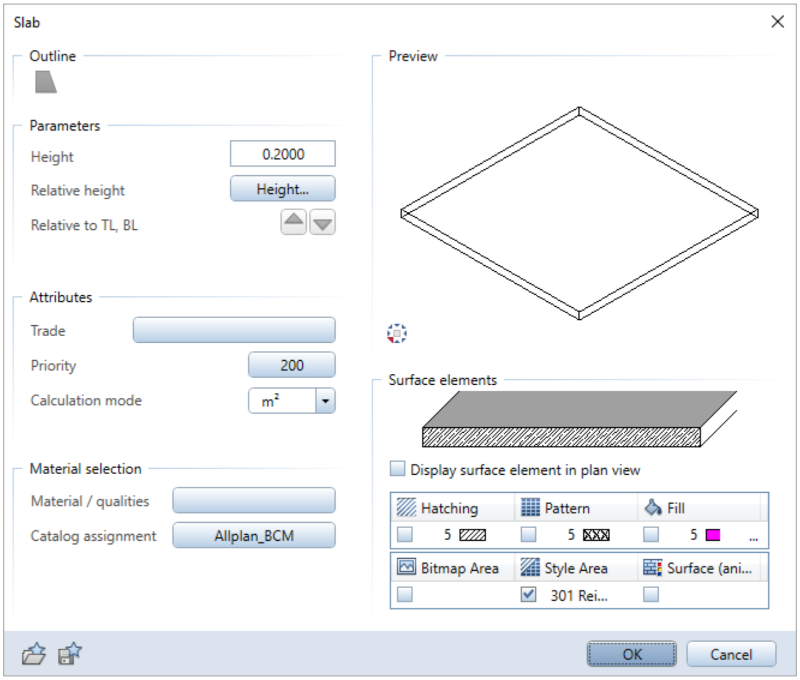
Tip: You can also use the **Slab** tool to create floor slabs.
Allplan provides separate tools for creating foundations.

To define the slab's properties

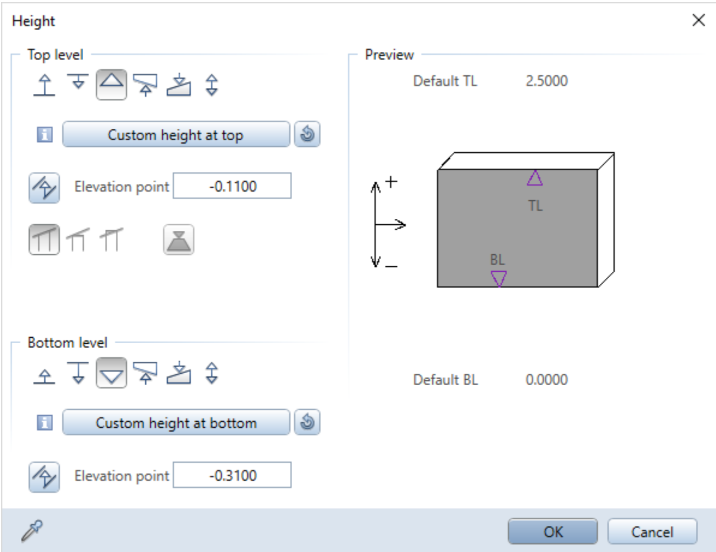
1 Make drawing file **101** current and open drawing file **103** in edit mode.

2 Go to the **Actionbar** and switch back to the **Engineering** role – **Elements** task. Then click **Slab** (**Components** task area) and select pen thickness **0.50** mm.
Check that the **AR_SLAB** layer is selected. If it isn't, select it in the **Properties** palette – **Format** area.

3 Go to the **Slab** Context toolbar and click **Properties**.



4 Click **Height...** and enter the height of the slab as absolute values. The unfinished floor of the ground floor = top level of the slab above the basement = **-0.11**. As the slab is 20 cm thick, the bottom level = **-0.31**.



5 Click **OK** to confirm the height settings, define the **priority** rating and select a **style area**. Do not close the **Slab** dialog box.

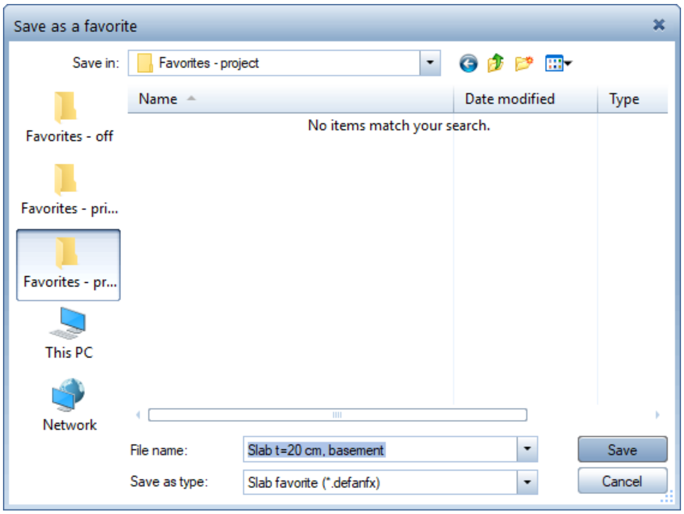
To avoid entering the same properties again and again, you can save them as favorite files. You can do this for any component.

To save component properties as favorite files

➲ The **Slab** tool is still selected; the dialog box is open. If this is not so, select this tool and click **Properties**.

1 Click **Save as a favorite** in the lower-left corner of the dialog box.

2 Select the **Favorites - project** folder, enter a name and click **Save** to confirm.



3 Click **OK** to confirm the **Slab** dialog box.

The next time you need a slab with these settings, click **Load favorite** and select the file.
The values in the dialog box will change automatically.

You will now define the position of the slab. To do this, you will use the polyline entry tools. By means of these tools, you can polygonize the outline in a single step. The only requirement is that you click an element in the polyline and do not snap a point.

Polyline entry tools

You can use these tools to enter any outline. To use the following options, select the **Polygonize elements** check box.

Polygonize entire element: This uses the starting point for the direction. You can specify the number of segments for circles and curves.

Define area of element to polygonize: This generates a polyline based on a portion of an element. Define the portion by clicking a 'from' and a 'to' point.

Enter reference point: This identifies a point on the element as the starting point for the new element. To define this point, click a point on the element and enter the offset between this point and the nearest significant point (indicated by an arrow).

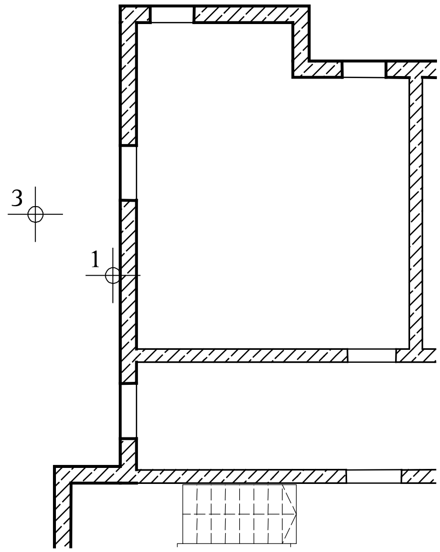
Area detection using additional point: This uses a point you click on a polyline to detect the entire boundary.

To create the slab by means of the polyline entry tools

1 *Set properties, place polygon point 1, element or offset*: Click a line representing the outside of a wall. Make sure that you do not click the line near a point.

2 Go to the input options, click **Area detection using additional point** and turn off **Island detection**.

3 Click a point (near to the first point) beyond the floor plan. The system automatically detects the outline of the entire floor plan.



4 Select ESC to close the tool.

You will now insert an opening in the slab in the area of the stair to provide access to the ground floor. You can use the **Recess, Opening in Slab** tool to pierce slabs in their entirety. Height settings are not required – all you need to do is define the shape of the opening. You can choose between rectangular, circular, polygon and freeform openings.

You will also insert a slab opening for the elevator shaft. To define the outline, you will use the **Area detection** tool. With this tool, you can detect a closed polyline simply by clicking within its boundaries.

To create a freeform slab opening

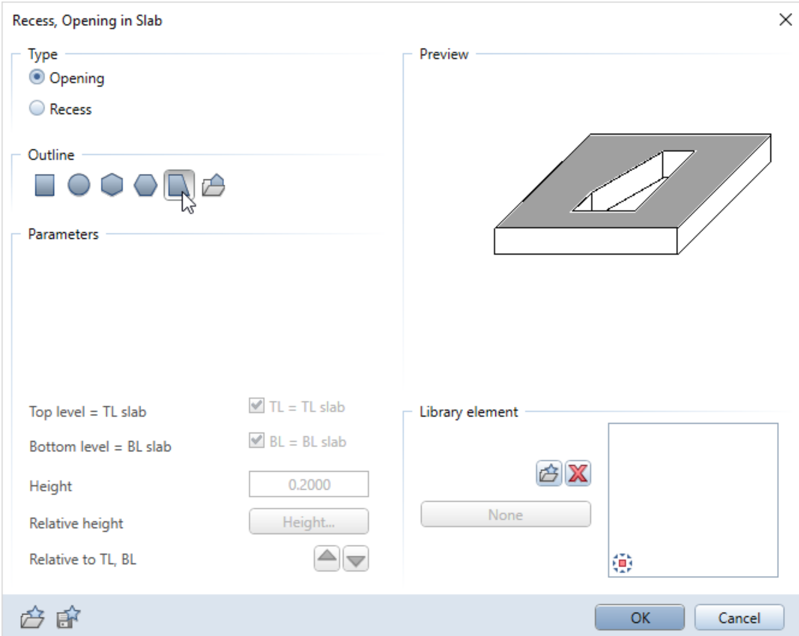
1 Click **Recess, Opening in Slab** (**Actionbar** – **Components** task area).

2 Click the basement slab.

3 Go to the **Recess, Opening in Slab** Context toolbar and click  **Properties**.

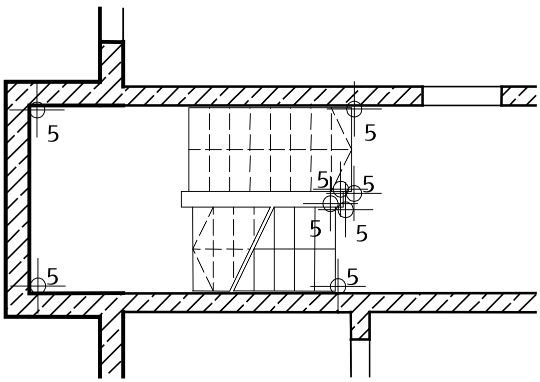
Tip: Slab openings are created in the same way as slab recesses. The parameters are also identical. The only difference is that height settings are required for recesses, as they do not pierce the slab in its entirety.

As with door and window openings, slab openings have the same layer as the component into which they are inserted, regardless of which layer is current.



4 Select the **Opening** type and the  **Freeform** outline.

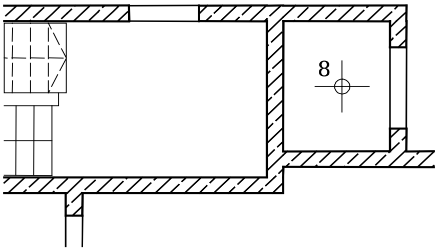
5 Click the corners of the stair outline one after the other.



6 To close the outline, click the first point again or select ESC after the last point.
This defines the slab opening for the stair. The next step is to define the slab opening for the elevator shaft.

7 Turn on **Area detection** in the input options (icon must be pressed in).

8 Click in the elevator shaft. The system automatically detects the area.

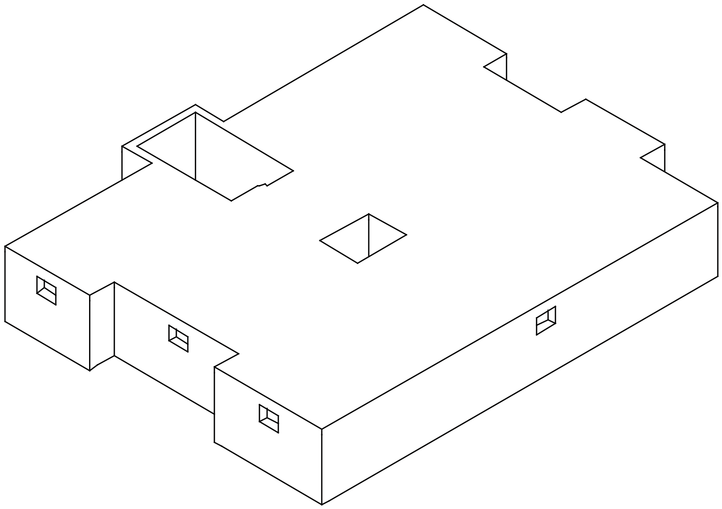


9 Select ESC to close the tool.

10 Click **Front Right, Southeast Isometric View** on the viewport toolbar.

11 Select the **Hidden** view type on the viewport toolbar, open **Show/Hide** and temporarily select the **Use color 1 for all elements** option again.

The result should look like this:



Printing layouts is covered in exercise 9.

Creating the walls in the basement in 2D with the tools in the 2D Objects task area

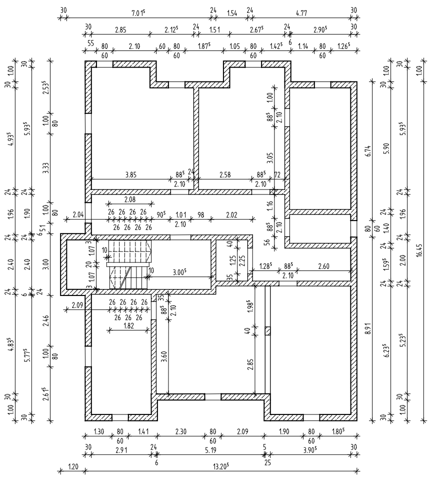
As an alternative to the tools in the **Components** task area, you will now create the walls in the basement in 2D.

You will use the tools in the **2D Objects** task area. You can find these tools on the **Actionbar**.

Tools:

Offset Polyline
Rectangle
Delete Double Lines
Line
Parallel to Element
Auto-Delete Segment
Move

Objective:



Start by defining the default settings.

To select a drawing file and to define options

1. Go to the **Actionbar**, select the **Draft** role and open the **Design** task. Expand the **2D Objects** task area.
2. Click **Open on a Project-Specific Basis** (Quick Access Toolbar) and double-click drawing file **102**.
3. Check the current scale (**1:100**) and unit of length (**m**) on the status bar.
4. Select pen thickness **0.50** mm and line type **1** in the **Properties** palette - **Format** area.

Now draw the exterior walls.

Approaches

You can enter a floor plan in 2D in various ways:

- Create the walls with the **Line** and **Parallel to Element** tools. You are already familiar with this approach; you used it to draw the title block in the Basics Tutorial.
- Create the walls with the **Rectangle** tool. By snapping to points and entering offset values, you can take openings into account. You will draw the interior walls in this way.
- Create the walls with the **Offset Polyline** tool.

In addition to these 2D tools, you can also use the tools in the **Components** task area to create the floor plan without defining the height (top level = bottom level = 0.00). This approach is equivalent to the one described earlier.

To draw exterior walls as offset polylines

➲ Plan view is selected and the **Hidden** view type is turned off. If this is not so, click **1 Viewport** in the **Window** drop-down list on the Quick Access Toolbar.

1 Click **Offset Polyline** (**Actionbar - 2D Objects** task area).

2 Select the layer **DE_GEN02**. Consequently, you can use the 2D floor plan for the key plan and the slab reinforcement.

Tip: When you enter a negative offset, Allplan creates the offset polyline on the side opposite the one you clicked. The direction in which the offset polyline is entered, however, does not change.

3 *Number of parallel lines:* Enter **2**.

4 Enter the offset for the parallel lines in the dialog line: *Offset 1* = **0**; *offset 2* = **0.30**

5 Click in the workspace to place the first point. Click anywhere in the lower-left area.

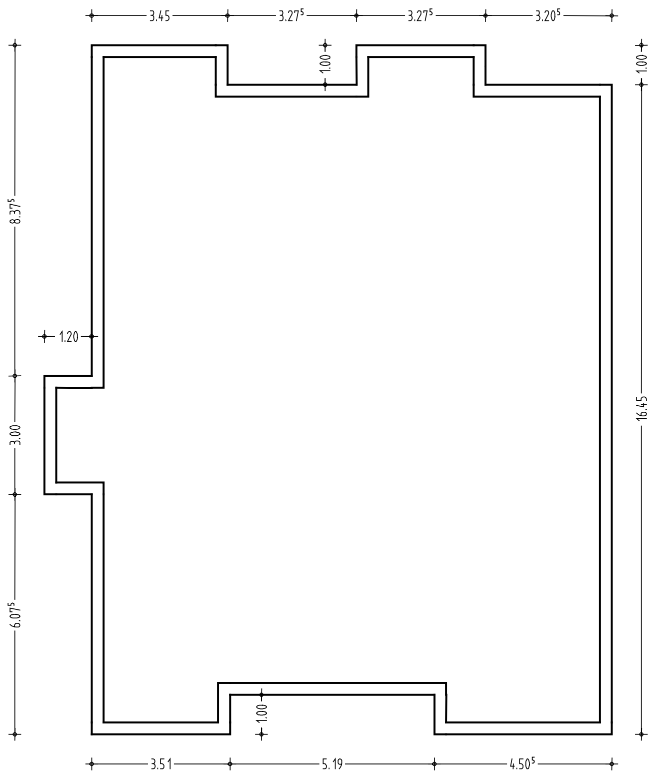
6 Click **left** in the input options to define the offset direction. Use **x-coordinate** and **y-coordinate** in the dialog line to enter the values in the x-direction and y-direction as shown in the illustration. Then select ESC to close the tool.

Select the Tab key to switch between the boxes.

dx = 3.51	dy = 1.00
dx = 5.19	dy = –1.00
dx = 4.505	dy = 16.45
dx = –3.205	dy = 1.00
dx = –3.275	dy = –1.00
dx = –3.275	dy = 1.00
dx = –3.45	dy = –8.375
dx = –1.20	dy = –3.00
dx = 1.20	dy = –6.075

Tip: If you have entered an incorrect value or made an error, select ESC and **Delete** (**Actionbar** – **Edit** task area) the error. You can then resume your work.

Tip: If you want to create a floor plan of varying wall thickness, you can enter the offset values each time you place a point or you can use the **Modify Offset** tool to correct the wall thickness after you have entered the floor plan.

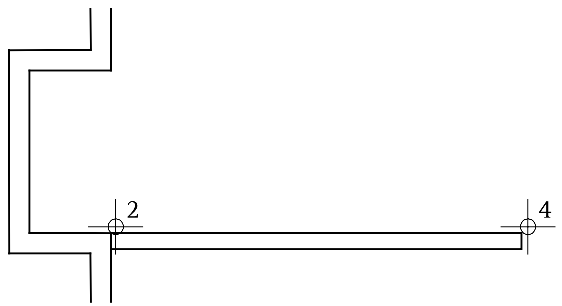


Draw the interior walls with the **Rectangle** tool. In doing so, you can take the door openings into account. Start with the horizontal walls near the stairwell.

To draw the interior walls as rectangles

1 Click **Rectangle** (**Actionbar - 2D Objects** task area).

2 *Starting point:* Click the reentrant corner of the left exterior wall (see illustration).

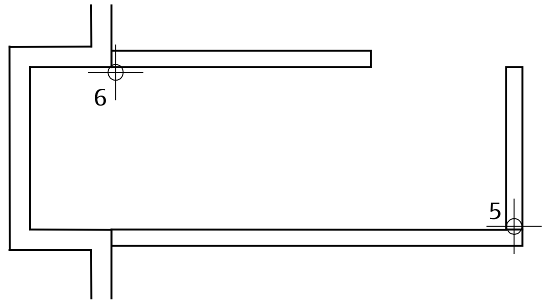


3 *Diagonal point:* Enter **6.055** (= length of wall) for the Δx **x-coordinate** and **-0.24** (= thickness of wall) for the Δy **y-coordinate**. Then select the Enter key to confirm.

4 To create the vertical wall, click the upper-right corner of the wall you just created and enter Δx **x-coordinate** = **-0.24** for the length and Δy **y-coordinate** = **2.40** for the width.

5 To delete the two superimposed lines in the corner, which result from the two rectangles, right-click the duplicate lines and select **Delete Double Lines** on the shortcut menu.

6 Click **Rectangle** and draw the exterior wall at the top of the stairwell. The starting point is the interior edge of the corner (see illustration); length = **3.825**, width = **0.24**.



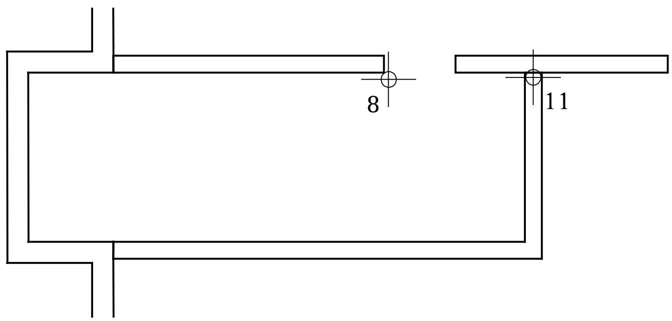
7 The **Rectangle** tool is still open. To define the starting point of the next rectangle, you will snap to a point and enter the offset value.

8 Point to the lower-right corner of the wall you have just drawn (see illustration). The boxes are highlighted in yellow in the dialog line

Tip: Bear in mind that you can select a wide range of tools simply by right-clicking the element in question (when no tool is active).

9 Enter **1.01** for the **x-coordinate** in the dialog line and select the Enter key to confirm.

10 Enter **3.00** for the length and **0.24** for the width.

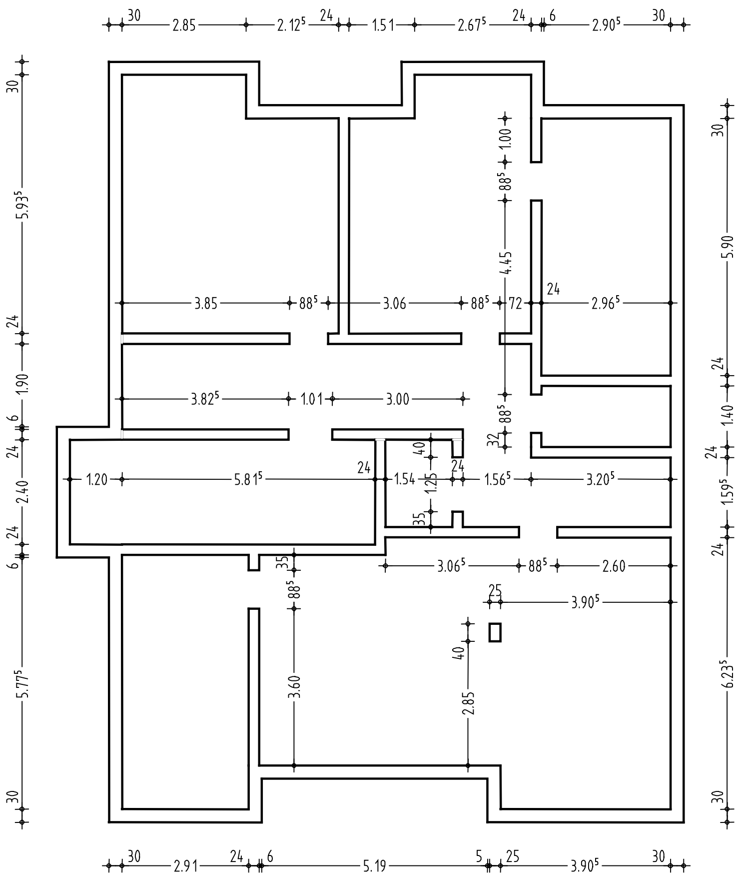


Moreover, you can open tools you have already used by clicking the tool in question in the **Repeat** drop-down list on the Quick Access Toolbar.

11 You can delete the superimposed line at the point where the horizontal and vertical walls intersect by using the **Delete Double Lines** tool (shortcut menu of the element).

Draw the other interior walls by snapping to points and entering offset values. Experiment with the **Parallel to Element** tool.

When you have drawn all the walls, delete the redundant lines in the areas where the walls intersect. You can also delete the lines in the region where the interior walls and the exterior walls meet, as the same material is used for all walls.

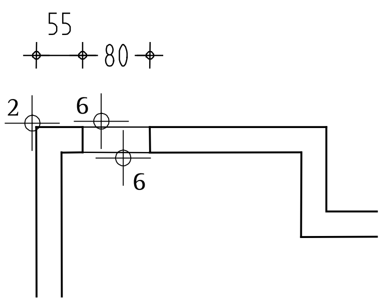


Use the **Line** tool to complete the door lintels and the beam near the column. To do this, select pen thickness **0.25** mm.

The window openings in the exterior walls are still missing.

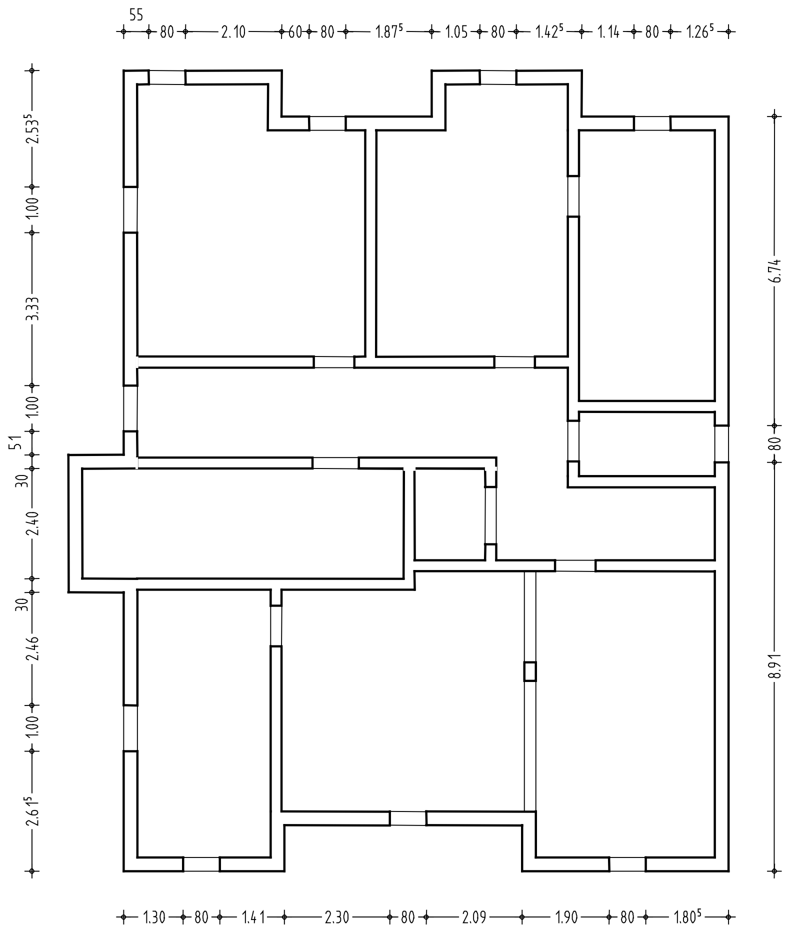
To draw window openings

1. Select pen thickness **0.50** mm and click **Line** (**Actionbar - 2D Objects** task area).
2. Point to the upper-left corner of the exterior wall. The boxes are highlighted in yellow in the dialog line.
3. Enter **0.55** for the **x-coordinate** in the dialog line and select the Enter key to confirm.
4. Enter **-0.30** for the **y-coordinate**.
5. Click **Parallel to Element** (**Actionbar - 2D Objects** task area) and draw a line to the right of the existing line. Enter an offset of **0.80**.
6. Use **Auto-Delete Segment** (shortcut menu of the element) to delete the lines representing the lintels. Finally, complete the lintels for the windows with a pen thickness of **0.25** mm.



Use the same approach to draw all the other window openings yourself (see illustration).

Experiment with the numerous tools. For example, you can use **Copy** and **Copy and Resize** (**Actionbar - Edit** task area).



Tip: Use **Area detection** when you create the style area.

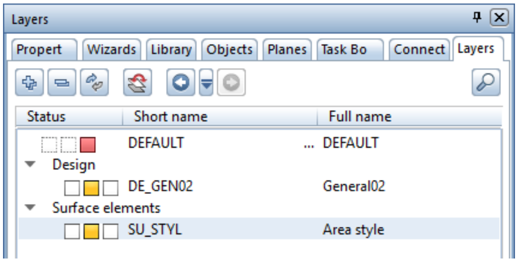
Use the **Style Area** tool (**Actionbar - 2D Areas** task area) to apply hatching to the walls of the floor plan as described in exercise 6 in the Basics Tutorial. Select pen thickness **0.18** mm and style area **301 Reinforced concrete**. Check that the **SU_STYL** layer is selected while you are creating the style area.

To finish, you will check the layers used, move the 2D floor plan in such a way that the 2D and 3D floor plans are congruent, add the opening for the stair and check the entire design by means of the **Key plan** and **General arrangement drawing** print sets.

To check the layer settings

1 Open the **Layers** palette.

As the **List layers used in open documents** option is selected, you can see the layers **DE_GEN02** and **SU_STYL** only.



Tip: You can also use the **Objects** palette.

2 Right-click the **SU_STYL** layer and choose **Visible, frozen**.

The style area appears in color **25**, which you selected for frozen layers.

3 Correct the layer assignment and change the status of the **SU_STYL** layer to **Modifiable** again.

To move the drawing in the workspace

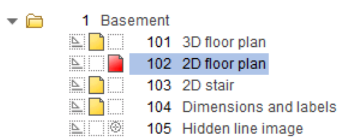
1 Drawing file **101** is current. In addition, open drawing file **102** in reference mode.

2 Click **Move** (**Actionbar** – **Edit** task area).

3 Select the entire 2D floor plan and place it so that the 2D floor plan and the 3D floor plan are congruent.

4 Finally, use **Line** to draw the edge of the slab in the stairwell.

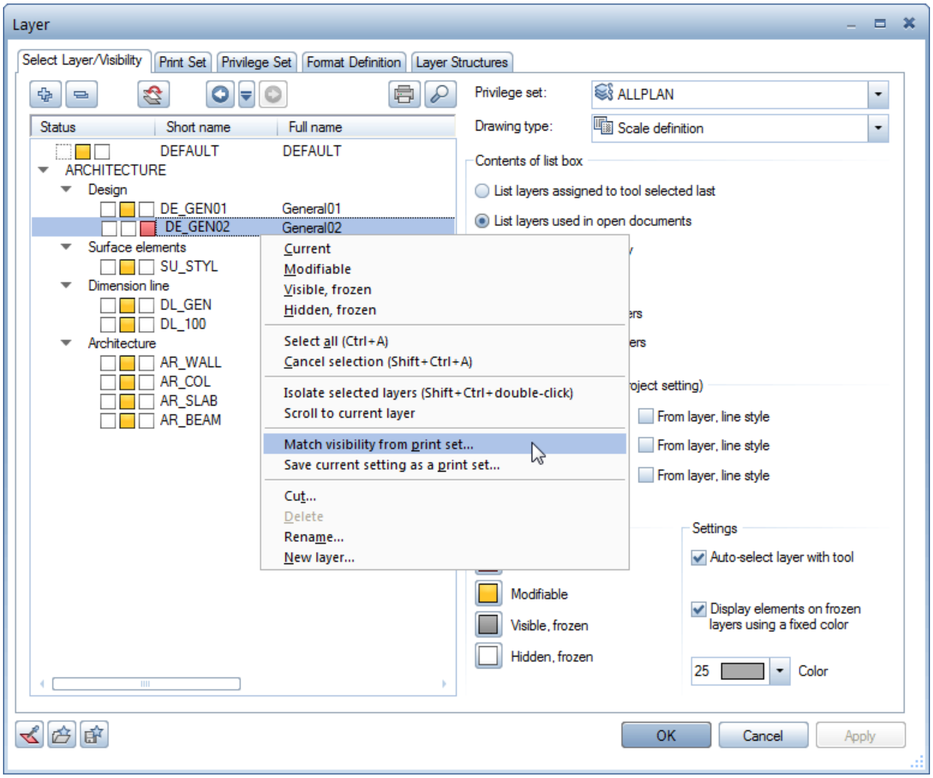
To check the design by means of print sets



1 Open drawing file **101** in edit mode. In addition, open drawing files **103** and **104** in edit mode.

2 Click **Expand** at the bottom of the **Layers** palette and select the **List layers used in open documents** option.

3 Right-click in the layer structure and select **Match visibility from print set...**.



Tip: The design exists twice when you select the **General arrangement drawing** print set.
If you want to display only one floor plan, you can define visibility settings for layers or open and close the relevant drawing files.

4 Select the **Key plan** print set and click **OK** twice to confirm.

All you can now see is the 2D floor plan with the main dimension lines but without style areas.

5 Repeat steps 2 through 4 for the **General arrangement drawing** print set. Select the **Set all layers visible in print set to modifiable** option when you select the print set.

Exercise 2: elevator shaft

Requirements:

Allplan 2020 Engineering comes in different packages.

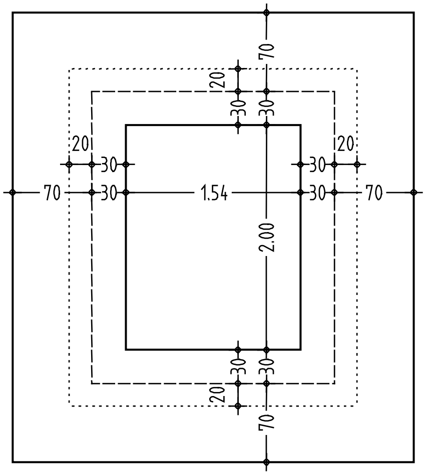
Check whether the **Modeling** task of the **Engineering** role contains the **3D Objects** task area.

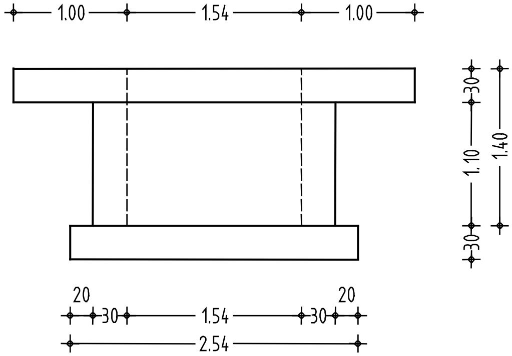
This exercise involves designing an elevator shaft for the basement you created in exercise 1.

You will use the tools in the **3D Objects** task area. You can find these tools on the **Actionbar**.

Start by selecting fileset **2** with the following drawing files:

Fileset	Drawing file number	Drawing file name
2	101	3D floor plan
	201	General arrangement – 3D objects
	202	Concrete component
	203	General arrangement – components
	204	Sections and reinforcement with the model
You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").		





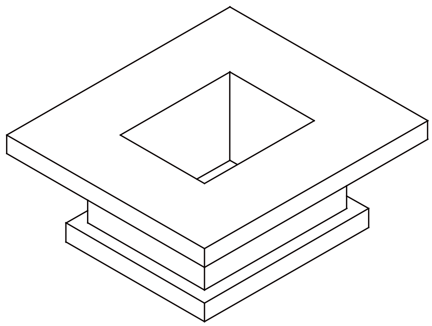
Creating the 3D model with the tools in the 3D Objects task area

If you do not have the **3D Objects** task area, you can also use the tools in the **Components** task area to design (on page 102) the elevator shaft.

Tools

- Box
- 3D Surface
- 3D Line
- Extrude Along Path
- Convert Elements
- Change Archit. Properties
- Move

Objective:



Start by defining the default settings.

To select a drawing file and to define options

1 Go to the **Actionbar**, switch to the **Engineering** role and open the **Modeling** task.

2 Click **Open on a Project-Specific Basis** (Quick Access Toolbar), open the drawing file tree for fileset **2** by clicking the triangle symbol beside the name of the fileset and double-click drawing file **201**.

3 Check the current scale (**1:100**) and unit of length (**m**) on the status bar.

4 Select pen thickness **0.50** mm and line type **1** in the **Properties** palette - **Format** area.

5 Open the **Window** drop-down list on the Quick Access Toolbar and click **3 Viewports**.
So, you can always see the design in plan, isometric and elevation view.

Start by designing the floor slab with the **Box** tool.

To draw a cube

Note: The tools in the **3D Objects** task area use the **AR_GEN** layer by default. Here, the layer setting is irrelevant, because you will create sections with their own layers later by using the tools in the **Sections** task area.

1 Click **Box** (**Actionbar** - **3D Objects** task area).

2 In plan view (right viewport), click a point in the workspace. The *starting point* is to be the lower-left point of the box.

3 Enter the following values in the dialog line:
Diagonal point: Enter **2.54** for the **x-coordinate** and **3.00** for the **y-coordinate**. Then select the Enter key to confirm.
Click point on parallel surface or enter height = **0.30**

4 Open the **Window** drop-down list and click **3 Viewports** to restore the view in all three viewports.

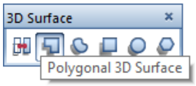
Next, you will create a volume solid consisting of vertical walls which will be joined with the floor slab in the basement. To achieve this, you will extrude a closed profile along a path. This involves three basic steps:

- Create the outline as a planar polygonal surface.
- Create the path as 3D lines.
- Create the volume solid.

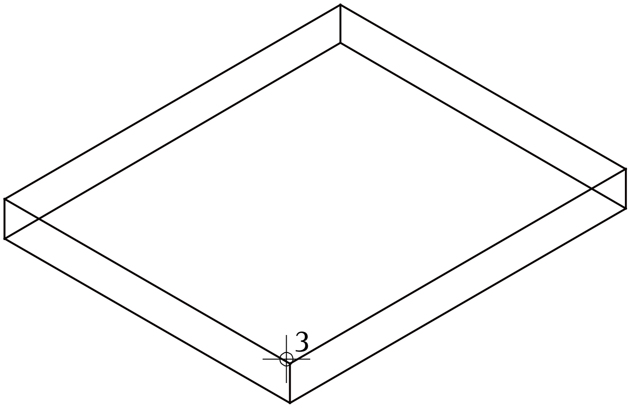
To create the outline as a planar polygonal surface

1 Click **3D Surface** (**Actionbar - 3D Objects** task area).

2 Check that **Polygonal 3D Surface** is selected on the **3D Surface** Context toolbar.



3 In isometric view (upper-left viewport), point to the upper front corner of the box, so that the boxes are highlighted in yellow in the dialog line.

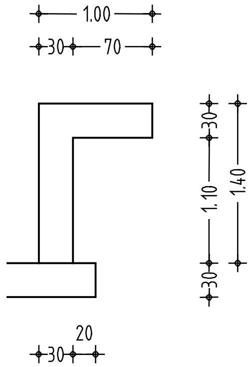


4 Enter **x-coordinate** = **-0.20** and **y-coordinate** = **0.50** and select the Enter key to confirm.

The starting point is attached to the crosshairs.

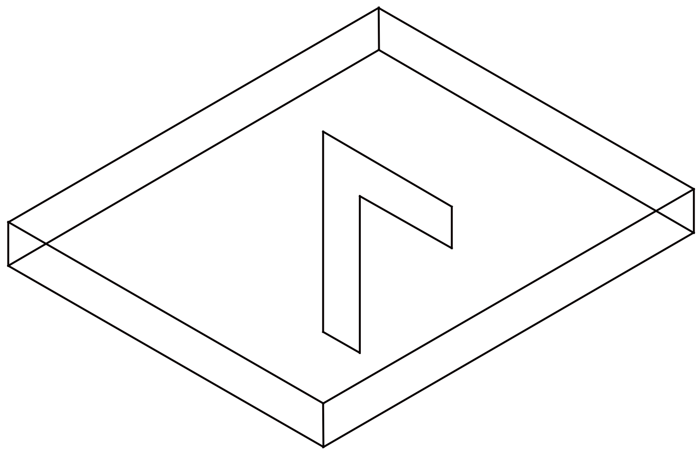
5 Enter values in the Δz **z-coordinate** and Δx **x-coordinate** boxes as shown in the table.

Select the Tab key to switch between the boxes.



Δz dz = 1.10
Δx dx = 0.70
Δz dz = 0.30
Δx dx = –1.00
Δz dz = –1.40
Δx dx = 0.30

The design should now look like this in isometric view:



The next step involves drawing the path for the volume solid as a 3D line.

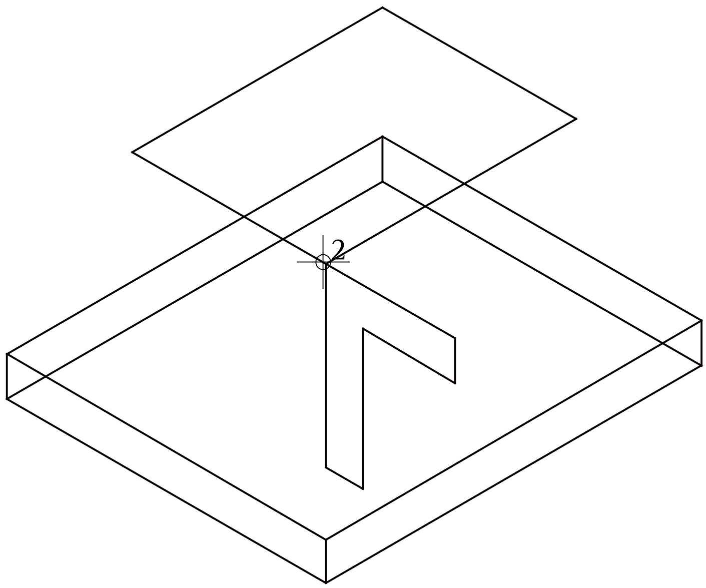
To draw the path for a volume solid as a 3D line

1 Click **3D Line** (**Actionbar - 3D Objects** task area).

Polyline is selected in the input options.

2 In isometric view, click the upper-left point of the outline (see illustration).

3 Use the **y-coordinate** and **x-coordinate** boxes in the dialog line to enter the dimensions of the shaft:
dy = 2.00
dx = -1.54
dy = -2.00
dx = 1.54



4 Select ESC twice to close the tool.

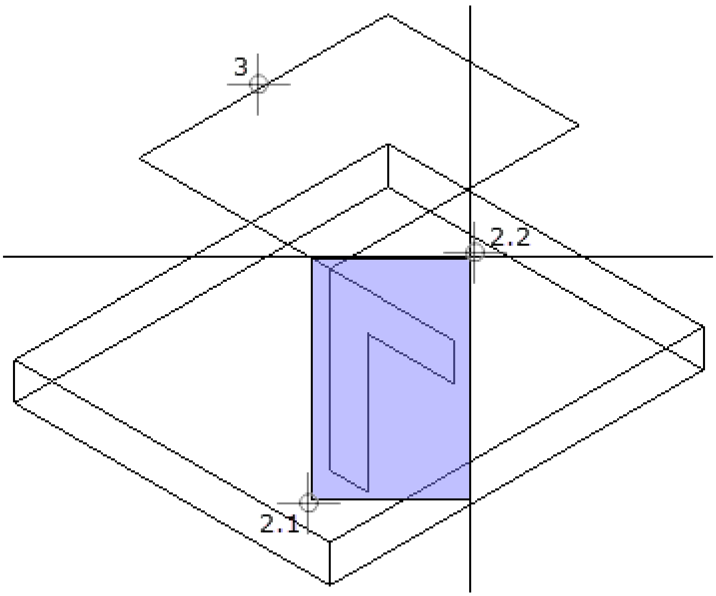
Next, you will create the volume solid. The 3D line will serve as the path; in other words, the polygonal surface will be moved along this line.

To create the volume solid and convert it to a 3D solid

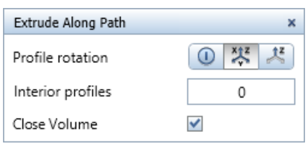
1 Click **Extrude Along Path** (**Actionbar** – **3D Objects** task area – **Extrude** flyout menu).

2 *Select profile to extrude*: Click to the left of the polygonal surface and enclose it in a selection rectangle.

3 *Select path:* Click the 3D polyline.



Allplan displays a preview of the solid and opens the input options.



4 Select ESC to confirm without changing the settings in the input options

Allplan creates the volume solid without deleting either the profile or the path.

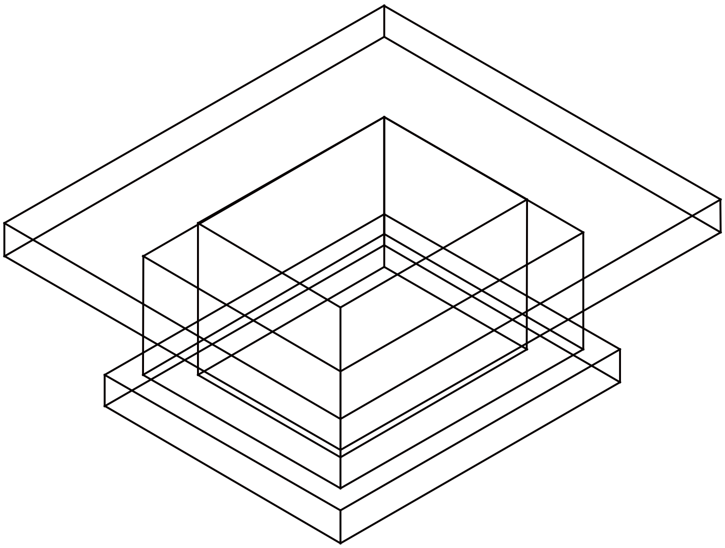
5 Delete the planar polygonal surface you used for the profile and the 3D polyline you used for the path.

Tip: To get to this tool quickly, click **Find** in the upper-right corner of the **Actionbar**.

6 Click **Convert Elements** (**Actionbar - Change** task area).

7 Choose **General 3D element to 3D solid, 3D surface** for the conversion mode. Then select the volume solid you just created and select ESC twice to confirm the settings in the input options and to close the tool.

Your screen now looks like this:

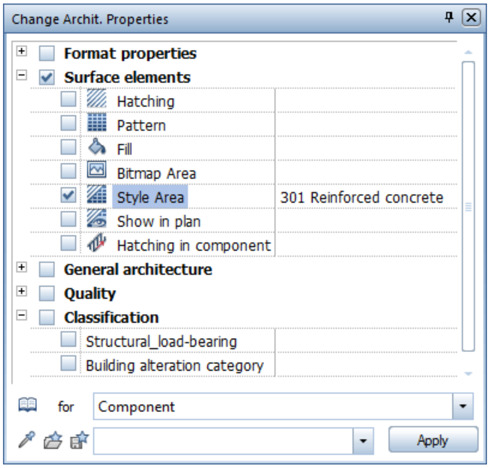


To finish, you will assign a surface element to the volume model. You will use this surface element later when you create associative sections. After this, you will move the volume model so that this model and the 3D floor plan created in exercise 1 are congruent. In addition, you will check that the top of the elevator shaft and the bottom of the basement walls are flush.

To assign a surface element

1 Click **Change Archit. Properties** (**Actionbar** – **Change** task area – **Modify Format Properties** flyout menu).

2 Go to the **Surface elements** area and select style area **301 Reinforced concrete**.



3 Select the entire volume model and click **Apply** in the **Change Archit, Properties** dialog box.

4 Select ESC to close the tool.

To move the volume model

1 Make drawing file **201** current and open drawing file **101** in reference mode.

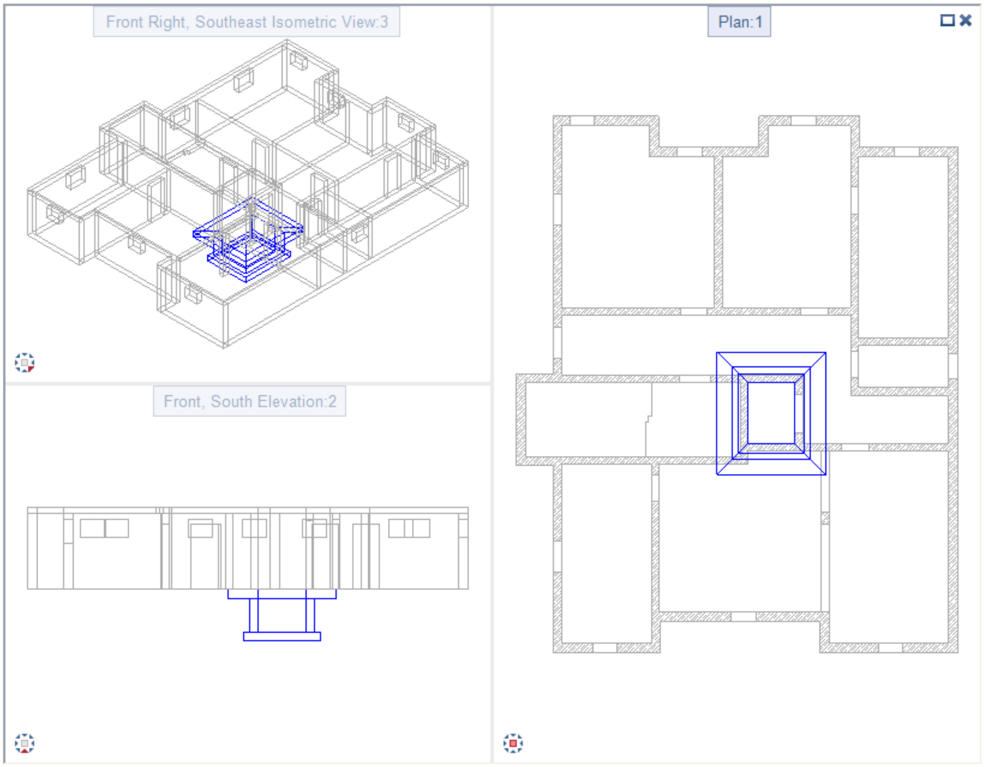
2 **3 Viewports** are still open. Click **Move** (**Actionbar - Edit** task area).

3 In plan view (right viewport), select the entire volume model.

4 Open the **Window** drop-down list and click **3 Viewports** to restore the view in all three viewports.

5 Place the volume model in the 3D floor plan in such a way that they are congruent. Make sure that the shaft dimensions match.

6 The **Move** tool is still open.
Select the volume model again by right-clicking twice and move the volume model by
dz = **-4.49**.
This value results from the absolute height of the basement walls (= -2.79) and the overall height of the elevator shaft including the floor slab (= 1.70).



This elevator shaft and the floor plan of the basement will serve as the basis for exercise 4. In this exercise, you will learn how to create sections with the tools in the **Sections** task area and apply reinforcement with the tools in the **Bar Reinforcement** task area.

Printing layouts is covered in exercise 9.

A note on concrete components

To create three-dimensional components of structural engineering, you can use **PythonParts**, which you can find in the **Library** palette.

The PythonParts library contains predefined components. You can adjust the dimensions on component-specific tabs. All entries you make are immediately visible in the preview and on the screen.

Allplan 2020 provides various tools helping you place these components.

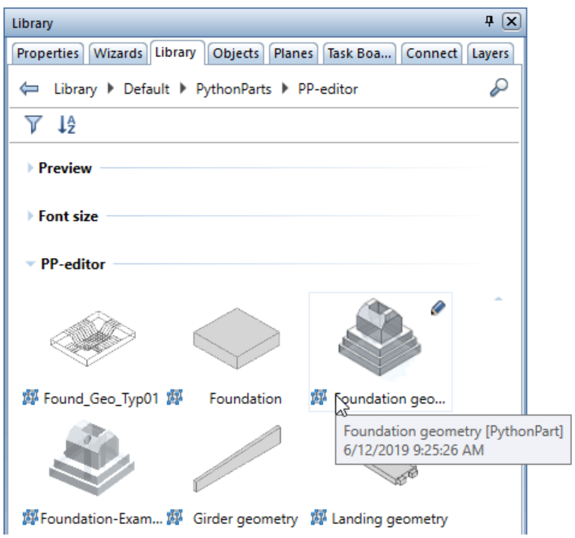
Next, you will create the floor slab and the walls of the elevator shaft by means of a **PythonPart**.

To create the floor slab and the elevator shaft as concrete components

1 Click **Open on a Project-Specific Basis** (Quick Access Toolbar), close drawing file **201** and open drawing file **202**.

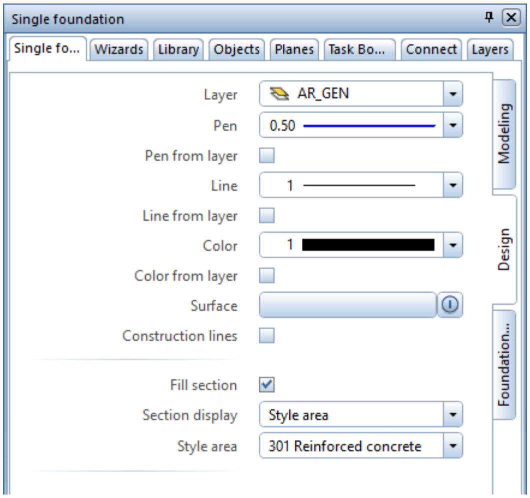
2 Open the **Library** palette and the **Default - PythonParts - PP-Editor** folders.

3 Double-click the **Foundation geometry** PythonPart.

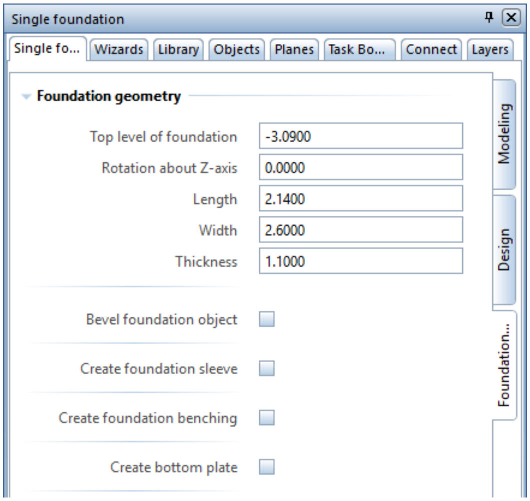


4 Do not change the settings on the **Modeling** tab and select the **Design** tab.

5 Select a layer and select the **Fill section** option. For **Section display**, select the style area and choose **301 Reinforced concrete**.

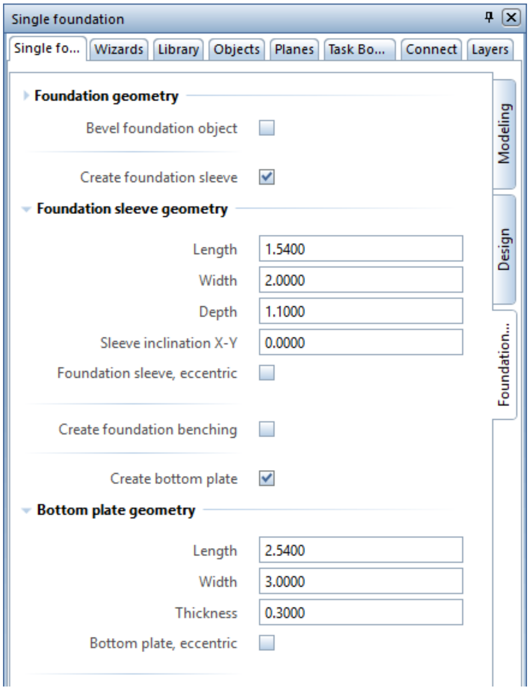


6 Select the **Foundation geometry** tab and define the height settings and dimensions of the foundation:
Top level of foundation: –3.09
Length: 2.14
Width: 2.60
Thickness: 1.10



7 Select the **Create foundation sleeve** option and enter the dimensions:
Length: 1.54
Width: 2.00
Depth: 1.10
Sleeve inclination xy 0.00

8 Select the **Create bottom plate** option and enter the dimensions:
Length: 2.54
Width: 3.00
Depth: 0.30

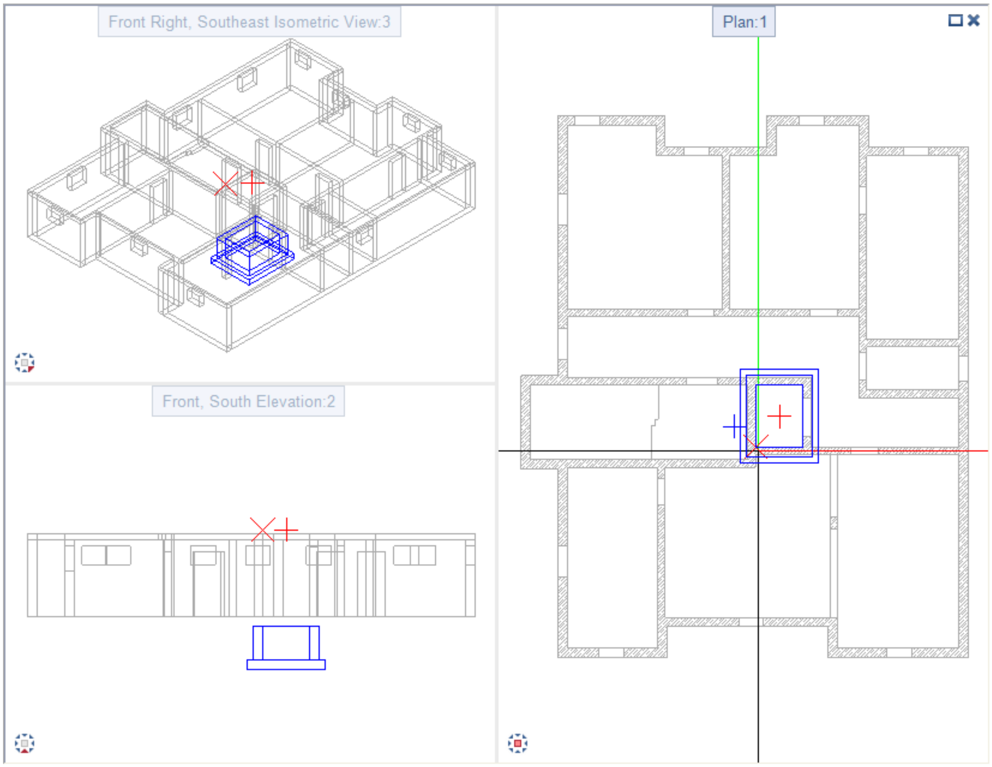


A preview of the modeled component is attached to the crosshairs. Use the lower-left corner of the elevator shaft as the drop-in point. The upper center of the foundation plate serves as the component's reference point.

9 Enter half the opening lengths in the dialog line:

-  x-coordinate = **0.77**
-  y-coordinate = **1.00**

10 Point to the lower-left corner of the elevator shaft and click to place the component.



11 Check the height settings and adjust the parameters in the palette.

12 **Close** the palette.

Creating the 3D model with the tools in the Components task area

As an alternative to the tools in the **3D Objects** task area, you can also create the elevator shaft with the tools in the **Components** task area.

You can find these tools in the **Components** task area on the **Actionbar**. As these tools were covered in exercise 1, they are no longer explained in detail.

Tools:

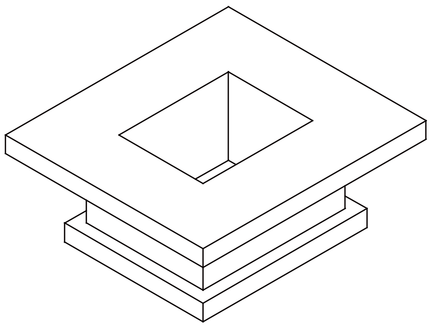
Wall

Slab

Recess, Opening in Slab

Move

Objective:



Start by defining the default settings.

To select a drawing file and to define options

1 Go to the **Actionbar** and switch to the **Elements** task.

2 Click **Open on a Project-Specific Basis** (Quick Access Toolbar) and double-click drawing file **203**.

3 Check the current scale (**1:100**) and unit of length (**m**) on the status bar.

4 Select pen thickness **0.50** mm and line type **1** in the **Properties** palette - **Format** area.

Create the walls of the elevator shaft.

To create walls

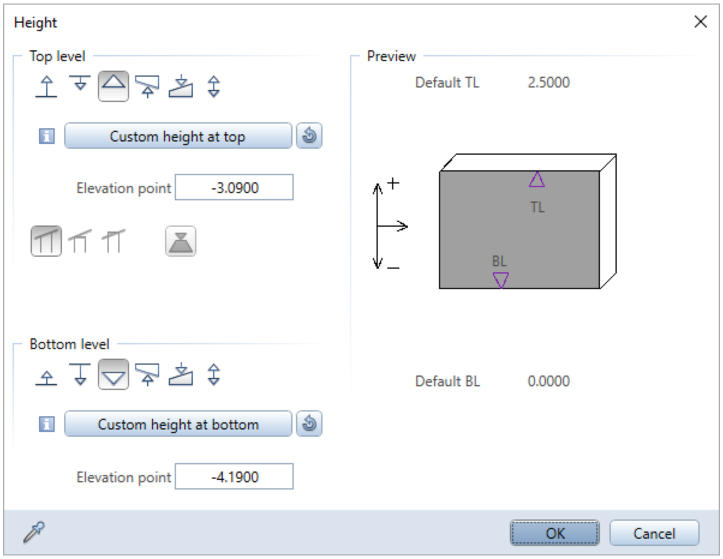
1 Click **Wall** (**Repeat** drop-down list on the Quick Access Toolbar).

2 Click **Properties**.

3 The **Wall** dialog box opens. Select wall thickness **0.300**, priority rating **300**, pen thickness **0.50** mm and area style **301**. Then click **Height...**.

4 Enter the height as absolute values:

- Top level of wall: **-3.09**.
- Bottom level of wall: **-4.19**.



5 Click **OK** to confirm the settings.

6 Click **Rectangular Component**.

7 *Starting point:* In plan view (right viewport), click a point in the workspace.

8 Turn off **Enter at right angles** and check that the wall's offset direction is toward the outside! If it is not correct, change it by clicking **Reverse offset direction**.

9 *Diagonal point:* Enter **1.54** for the **x-coordinate** and **2.00** for the **y-coordinate**. Select the Enter key to confirm.

Now you will create the slab and the floor slab for the elevator shaft.

To create the slab and the floor slab

1 Click **Slab** (**Repeat** drop-down list).

2 Click **Properties**.

3 The **Slab** dialog box opens. Switch the priority rating to **300**, select style area **301** and click **Height...**.

4 Enter the height as absolute values:

- Top level of slab: **-2.79**
- Bottom level of slab: **-3.09**

5 Click **OK** twice.

6 *From point, element or offset*: Enter **0.70** for the offset in the dialog line.

7 In plan view, click the lower-left corner of the wall you have just created.

8 *To point, element or offset*: In plan view, click the upper-right corner of the wall you have just created and select ESC.

9 Repeat steps 2 through 8 to enter the floor slab. The floor slab projects from the wall by **0.20** m. Use the following absolute values to define its height:

- Top level of slab: **-4.19**
- Bottom level of slab: **-4.49**

10 Select ESC to close the tool.

Tip: You can also use the **Slab Foundation** tool to create the floor slab.
In doing so, you can define the top level of the foundation by matching the bottom level of an existing component.

The slab now needs an opening.

To create a slab opening

1 Click **Recess, Opening in Slab** (**Repeat** drop-down list).

2 Click the upper slab.

Tip: You can also select the slab in elevation or isometric view.

3 Go to the **Recess, Opening in Slab** Context toolbar and click **Properties**.

4 Select the **Opening** type and the **Freeform** outline. Then click **OK** to confirm.

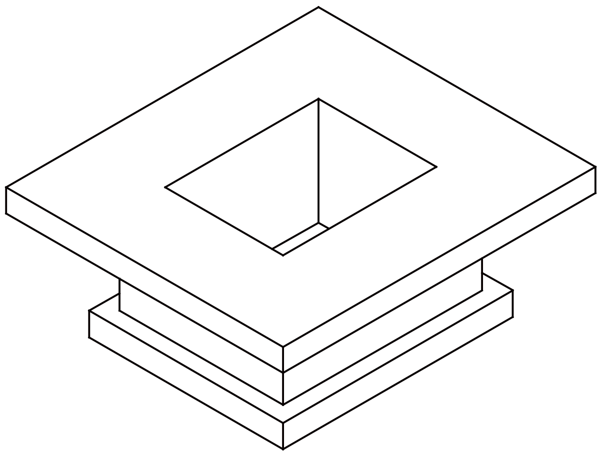
5 Turn on **Area detection** in the input options (icon must be pressed in).

6 Change the offset to **0.00** in the dialog line and click within the walls of the shaft. The system automatically detects the area.

7 Select ESC to close the tool.

8 Open the **Window** drop-down list and click **3 Viewports** to restore the view in all three viewports.

9 In isometric view (upper-left viewport), select the **Hidden** view type on the viewport toolbar.



To finish, move the elevator shaft underneath the elevator shaft of the basement you created in exercise 1.

To move the elevator shaft

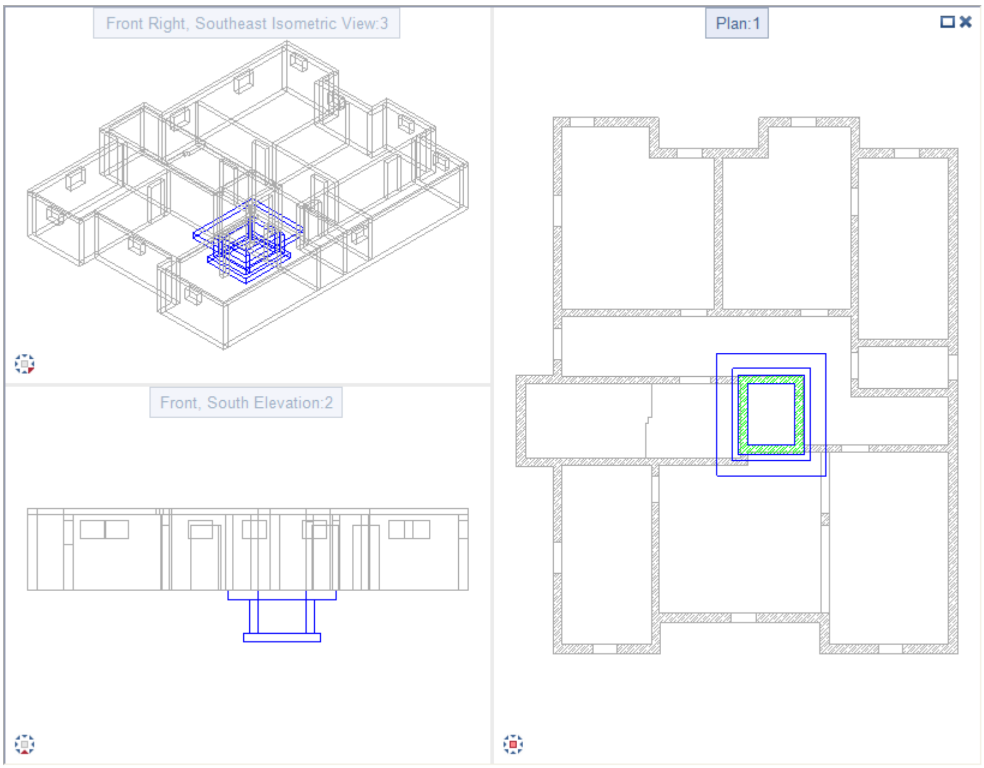
1 Make drawing file **203** current and open drawing file **101** in reference mode.

2 **3 Viewports** are still open. Click **Move** (**Actionbar – Edit** task area).

3 In plan view (right viewport), select the entire elevator shaft.

4 Open the **Window** drop-down list and click **3 Viewports** to restore the view in all three viewports.

5 Place the elevator shaft in the 3D floor plan in such a way that they are congruent. Make sure that the shaft dimensions match.



Unit 3: Key Plan

In this unit you will learn how to create key plans quickly and easily.

Exercise 3: key plan for basement

Requirements:

Allplan 2020 Engineering comes in different packages.

Check whether the **Structural Analysis** task of the **Engineering** role contains the **Key Plan** task area.

In this exercise, you will create a key plan for the basement. This exercise requires exercise 1.

You will mainly use the tools in the **Key Plan** task area. You can find these tools on the **Actionbar**.

Start by selecting fileset **1** with the following drawing files:

Fileset	Drawing file number	Drawing file name
1	101	3D floor plan
	102	2D floor plan
	103	2D stair
	104	Dimensions and labels
	105	Hidden-line image
	110	Key plan
You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").		

Tools:

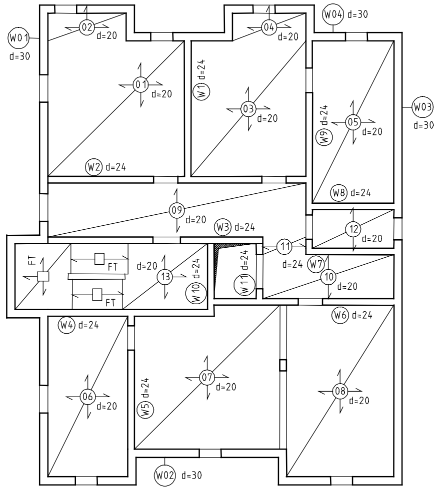
Horizontal Mark

Slab Mark

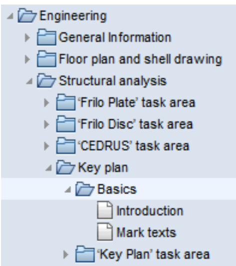
Move

Modify Lines

Objective:



Tip: Look in the Allplan Help for basic information on the **Key Plan** task area:

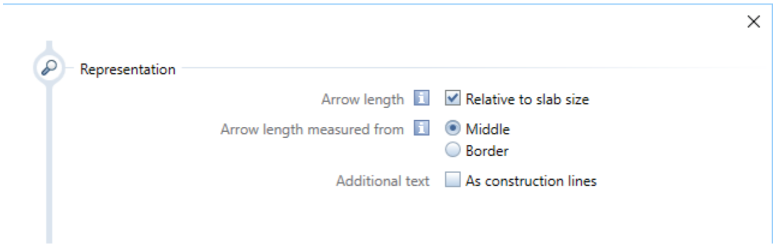


Start by defining the default settings.

To select drawing files and to define options

1. Go to the **Actionbar**, select the **Structural Analysis** task and expand the **Key Plan** task area.
2. Click **Open on a Project-Specific Basis** (Quick Access Toolbar), open the drawing file tree for fileset **1**, select drawing file **110**, open drawing files **102** and **103** in edit mode and close all the others.
3. Open the **Window** drop-down list on the Quick Access Toolbar and click **1 Viewport**.
4. Check the current scale (**1:100**) and unit of length (**m**) on the status bar.
5. Select pen thickness **0.25** mm and line type **1** in the **Properties** palette - **Format** area.

6 Open the **Default Settings** drop-down list on the Quick Access Toolbar and click **Options**. Select the **Key plan** page.



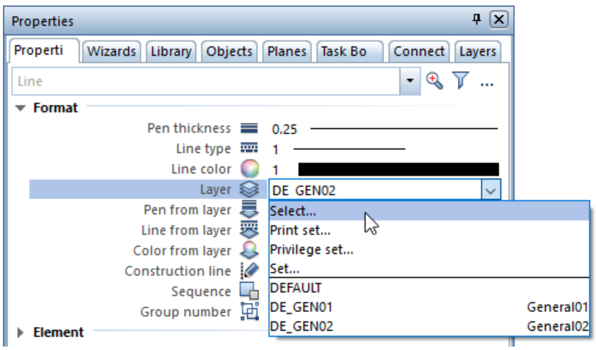
7 Make settings as shown in the illustration and click **OK** to confirm.

As the half-space landing and the flights of the stair will be created as precast elements, you will draw the boundaries of these components only. After this, you will use print sets to define which design entities are visible.

To control which design entities are visible

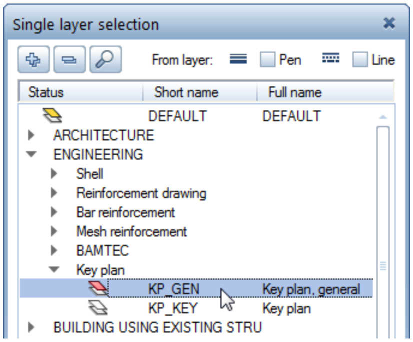
1 Click **Line** in the **Repeat** drop-down list on the Quick Access Toolbar.

2 Go to the **Properties** palette - **Format** area, open the **Layer** drop-down list and click **Select...**.



3 The **Single layer selection** dialog box opens. To close the tree structure, click in the upper-left area.

4 Open the **Key plan** layers in the **ENGINEERING** layer structure by clicking the corresponding triangle symbol. Click the **KP_GEN** layer and click **OK** to confirm the dialog box.



5 Complete the design by drawing the stairwell and the other missing stair components. Then select ESC to close the tool.

6 Open the **Layer** drop-down list again and click **Set...**.

7 Right-click in the layer structure and select **Match visibility from print set...**.

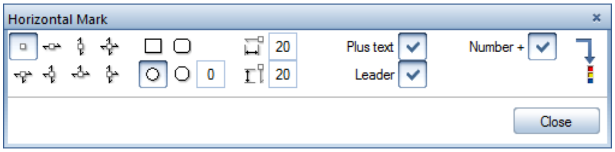
8 Select the **Key plan** print set and click **OK** twice to confirm.

All you can now see is the floor plan with the lines you have just drawn; the style areas are not visible.

First, you will apply marks to the exterior walls. After this, you will assign a mark to the slab.

To create horizontal marks

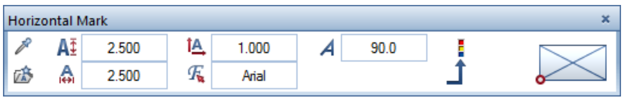
1 Click **Horizontal Mark** (**Actionbar** – **Key Plan** task area).
Check that the **KP_KEY** layer is selected. If it isn't, select it in the **Properties** palette – **Format** area.



2 Go to the **Horizontal Mark** Context toolbar, click **Without span direction** and select **Bubble**.

3 Select **Plus Text**, **Leader** and **Number +**. This defines how the mark looks.

4 Click to make settings for the mark text.



5 Define the following parameters:

- **Text height** = **text width**: **2.50**
- **Aspect**: **1.00**
- **Font**: **Arial**
- **Font angle in degrees**: **90**

6 Enter **W01** in the dialog line and select the Enter key to confirm.

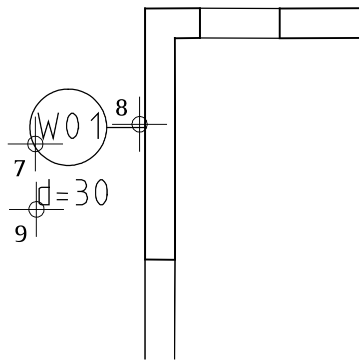
7 Place the mark, which is attached to the crosshairs, outside the left exterior wall (see illustration).

Tip: You can define the leader type on the context toolbar.

8 *Reference to point:* Select the **Straight** setting and click the exterior wall. This creates the leader, which connects the mark with the component. Select ESC to finish.

9 *Starting point for text, match text or enter additional text:* Define the text parameters and click where the additional text is to appear.

10 Enter **d=30** for the additional text and select the Enter key to confirm.



11 Select ESC. The next mark number is already attached to the crosshairs. You can modify it in the dialog line.

12 Enter **W02** for the exterior wall at the bottom.

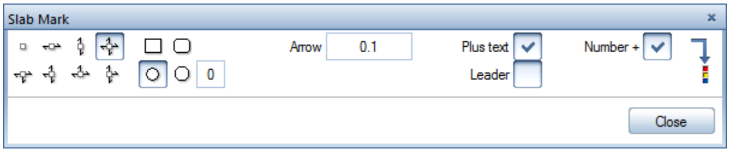
13 Use the same approach to assign mark numbers **W03** and **W04** to the other exterior walls.

14 Select ESC twice to close the tool.

You have two options to display slab marks: A mark can be horizontal or at an angle that reflects the angle of the slab diagonal. In this exercise, you will create horizontal marks.

To create slab marks

1 Click **Slab Mark** (**Actionbar** – **Key Plan** task area).



2 Click **Span direction on all sides** and enter **0.10** for the arrow length, which is relative to the slab size. In addition, turn off the **Leader** option.

3 Enter **01** in the dialog line and select the Enter key to confirm.

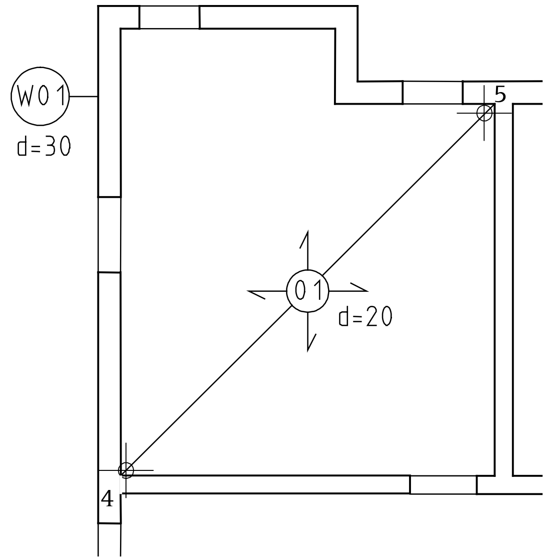
4 *Start point, match text or enter mark text*: Click the lower-left corner of the slab.

5 *Diagonal point, match text or enter mark text*: Click the upper-right corner. You can see the mark.

6 Click where the additional text is to appear.

7 Enter the additional text in the dialog line and select the Enter key to confirm.

8 Select ESC twice to finish.



Allplan provides several methods for modifying key plans:

You can use this tool to modify marks (span direction, mark symbol shape and additional text).

You can use this tool to modify the mark text and a single line of additional text.

You can use this tool to modify lines and their reference.

You can use this tool to edit additional text. Mark text cannot be changed with this tool.

You can use this tool to change the parameters of all text items in a mark.

You can use this tool to replace text in marks.

The next step is to move the slab mark.

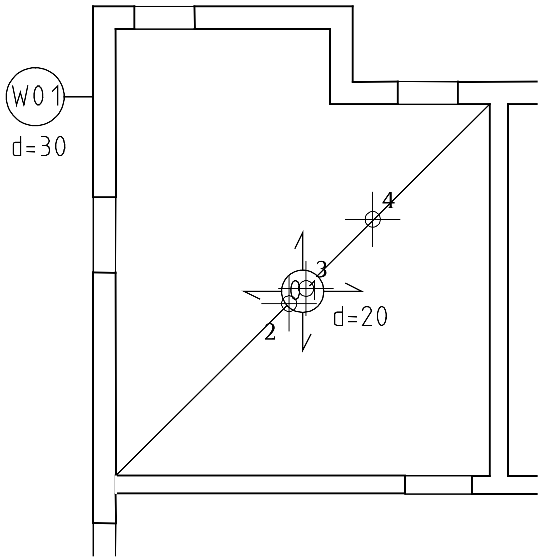
To modify marks

1 Click **Move** (**Actionbar – Edit** task area).

2 *Select elements you want to move:* Click the mark.
Allplan selects the mark including additional text, leaders and slab diagonals.

3 *From point*: Click the center of the circle.

4 *To point*: Drag the circle on the diagonal upward to the right.

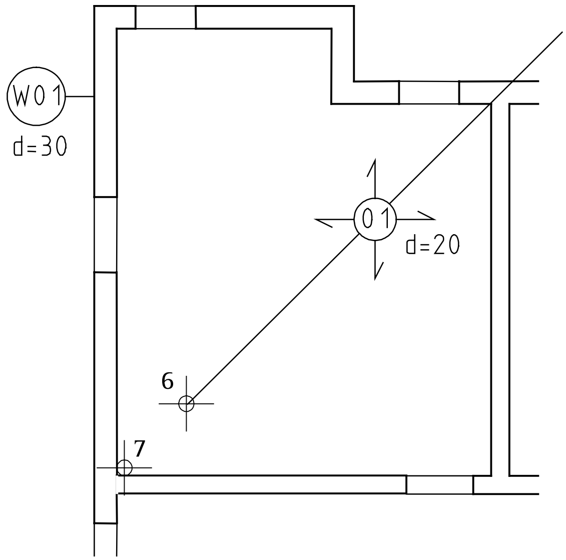


The slab diagonals have also moved.

5 Click **Modify Lines** (**Actionbar – Key Plan** task area).

6 *Select the line to modify:* Click the end of the lower diagonal.

7 *To point or line:* Click the lower-left corner.



8 Use the same approach to modify the line at the top.

9 Select ESC to close the tool.

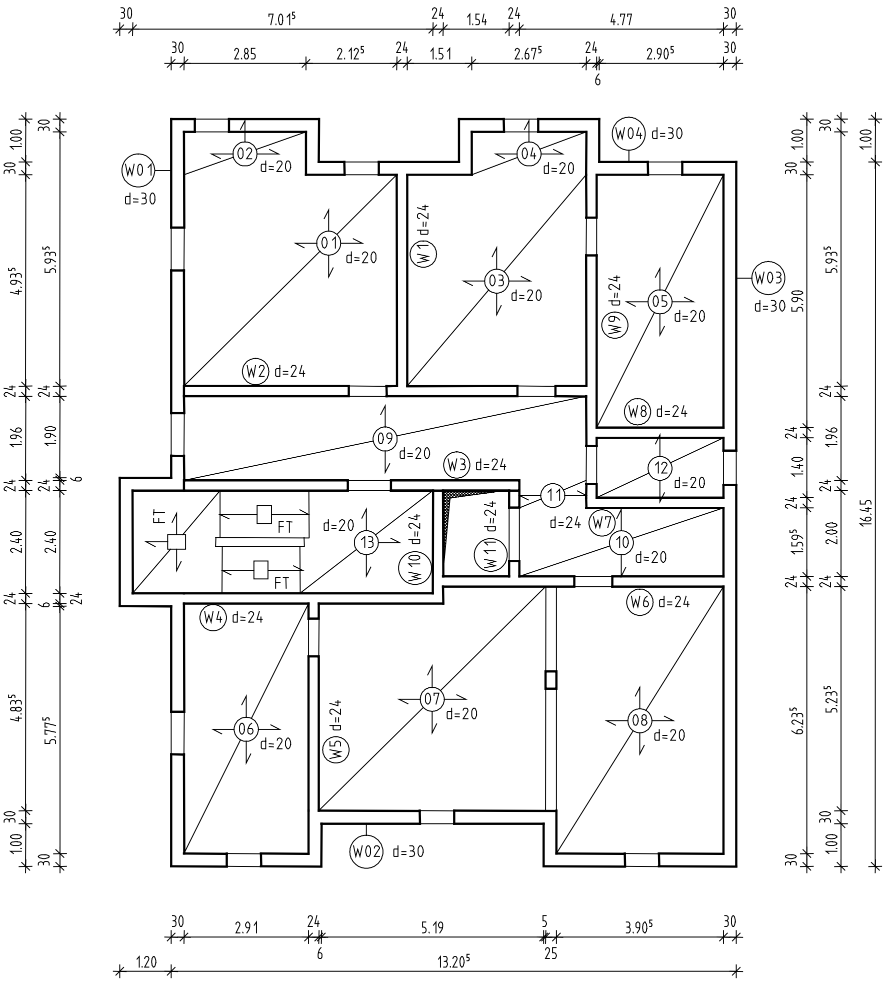
Note: You can also modify the marks by means of **direct object modification**, which is covered in the Basics Tutorial.

Reports

You can assign detailed additional text to marks. To avoid confusion, you can select the **Additional text as construction lines** setting in the options. You can then include the marks and the additional text in a report. To do this, use the **Report** tool (Actionbar - **Key Plan** task area).

Complete the key plan as shown in the illustration. Do not assign marks to the half-space landing and the flights of the stair, as these components are precast elements.

Finally, open drawing file **104** in edit mode. As you have selected the **Key plan** print set, only the main dimension lines are visible.



Printing layouts is covered in exercise 9.

Unit 4: Reinforcement Drawing

This unit consists of four exercises showing you how to create reinforcement drawings quickly and efficiently.

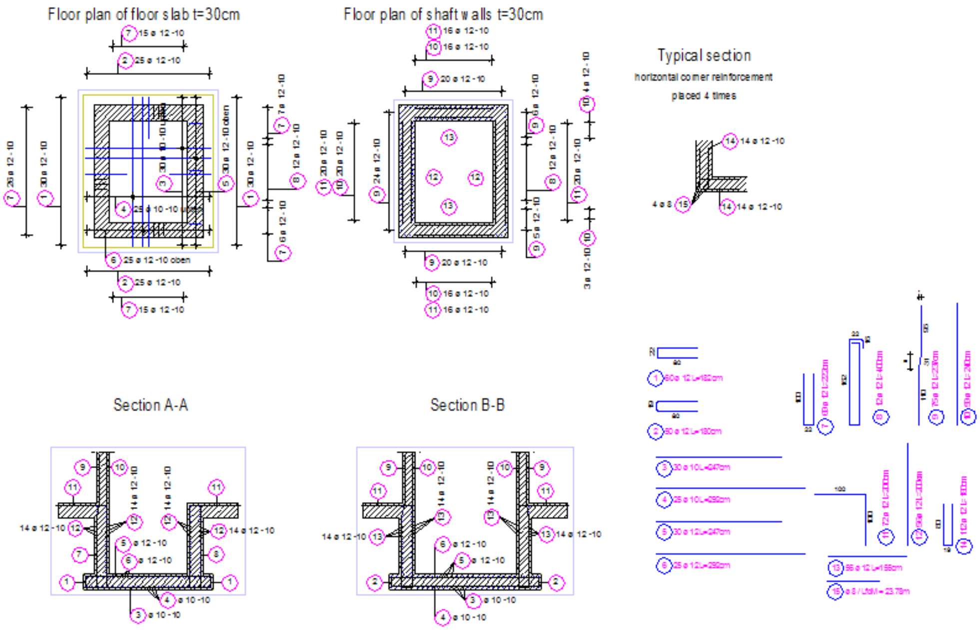
- You will use the tools in the **Sections** and **Bar Reinforcement** task areas to reinforce a 3D elevator shaft and create a 3D model from the reinforcement at the same time (method 1). Finally, you will create a reinforcement schedule and a bending schedule.
- You will use the tools in the **Bar Reinforcement** task area to reinforce a basic 2D door lintel and create a 3D model from the reinforcement by entering an auxiliary 3D solid (method 2). Finally, you will save the reinforcement as a symbol.
- You will use the tools in the **Bar Reinforcement** and **Meshes** task areas to reinforce a basic 2D slab without creating a 3D model from the reinforcement (method 3).
- You will use the tools in the **BAMTEC** task area to reinforce a section of a slab.

To finish, you will learn how to manage **cross-section catalogs**.

Overview of exercises

Exercise 4: 3D elevator shaft with a 3D model (method 1)

You will reinforce the elevator shaft (from exercise 2) and create a 3D model from the reinforcement at the same time. To do this, you will use the tools in the **Sections** and **Bar Reinforcement** task areas.

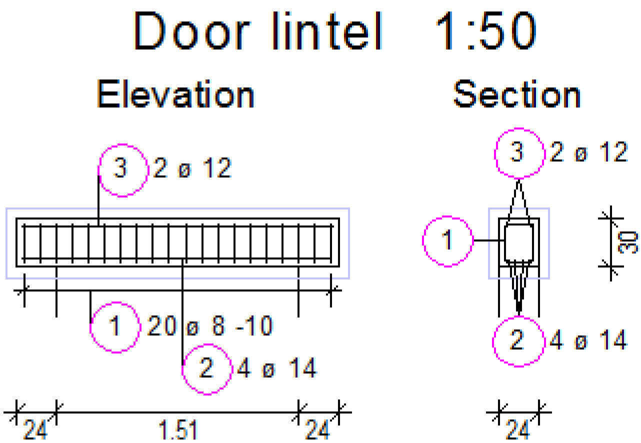


Bar schedule - bending shapes

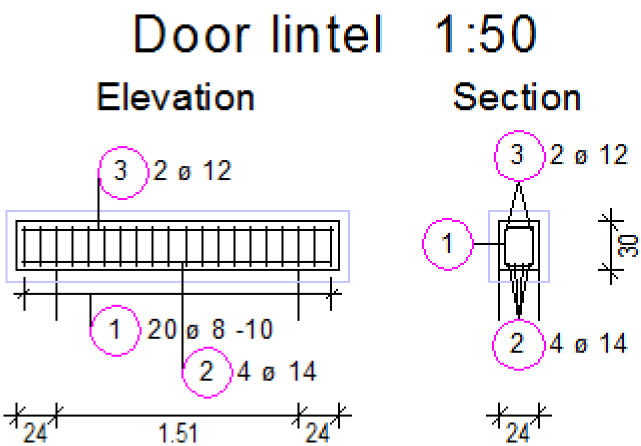
Mark	Pcs	ø [mm]	Single length [m]	Dimensioned bending shape (not to scale)	Total length [m]	Mass [kg]
1	60	12	1.82	220 / 800	109.20	96.97
2	50	12	1.79	180 / 800	89.50	79.48
3	30	10	2.48	2460	73.80	45.53
4	25	10	2.93	2920	73.00	45.04
5	30	12	2.48	2460	73.80	65.53
6	25	12	2.93	2920	73.00	64.82
7	69	12	2.22	1000 / 220	153.20	136.02
8	12	12	3.99	155 / 220 / 1620	47.90	42.52

Exercise 5: 2D door lintel with a 3D model (method 2)

You will draw a door lintel with the tools in the **Design** task area. Then, you will create an auxiliary 3D solid. With the tools in the **Bar Reinforcement** task area, you will reinforce the door lintel and create a 3D model from the reinforcement at the same time.

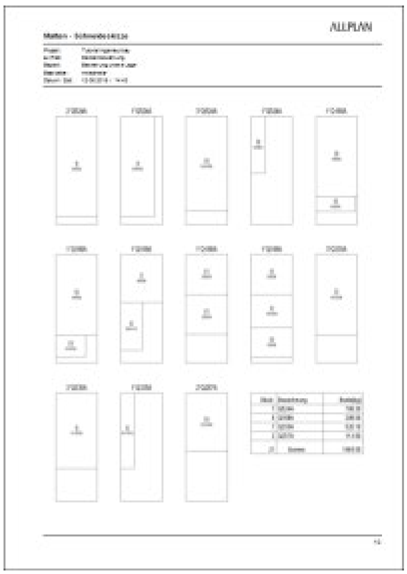


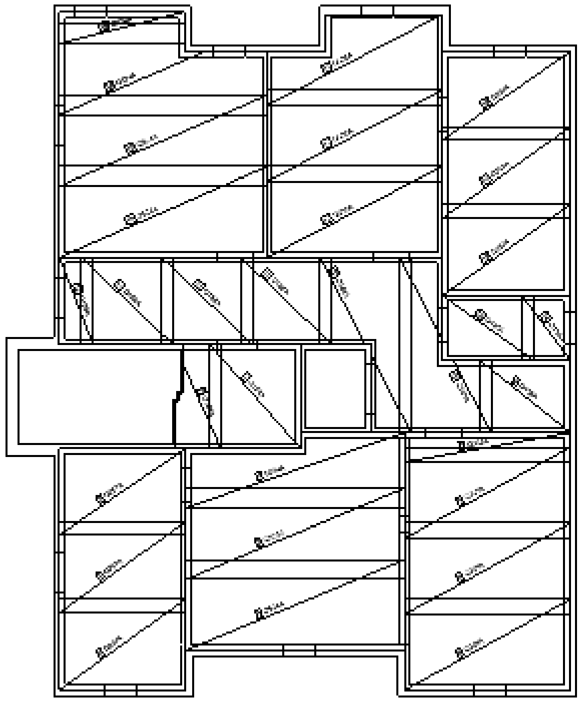
You will delete the auxiliary 3D solid and save the door lintel as a symbol to the library. You will then retrieve and modify the door lintel.

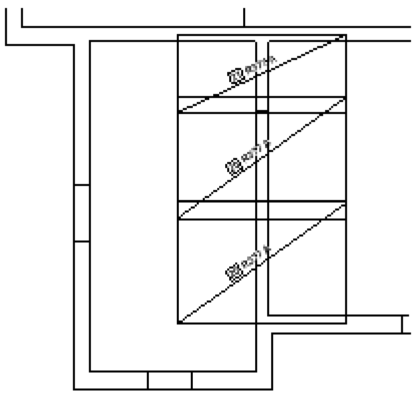


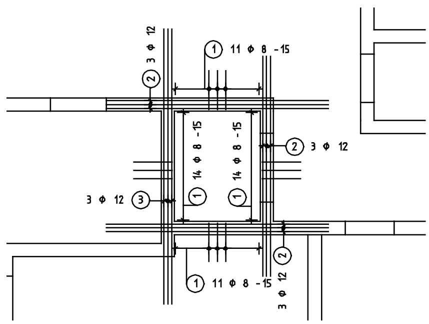
Exercise 6: 2D slab without a 3D model (method 3)

You will use the tools in the **Meshes** and **Bar Reinforcement** task areas to reinforce sections of the slab you created in exercise 1. This time, you will not create a 3D model from the reinforcement.



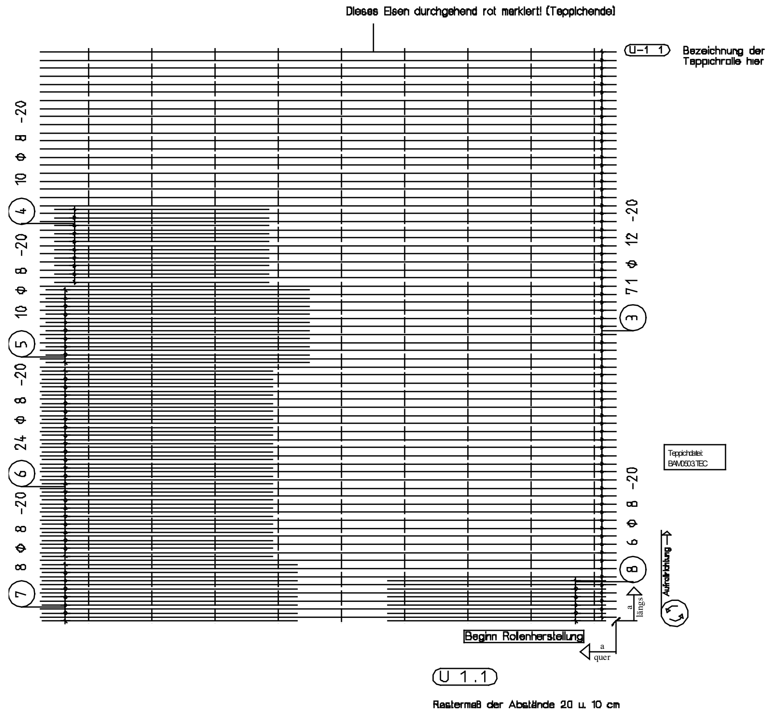






Exercise 7: BAMTEC® reinforcement

You will use the tools in the **BAMTEC** task area to reinforce a section of a slab without a 3D model.

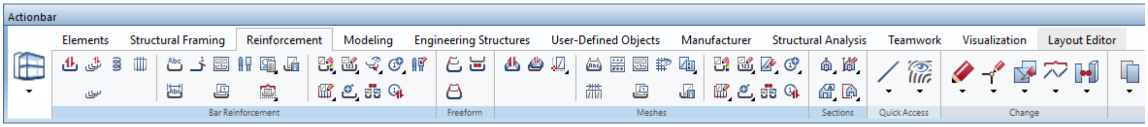


Default settings

So far you have used the tasks for creating a building model. You can find these tasks in the **Engineering** and **Draft** roles on the **Actionbar**.

To reinforce the components in the following exercises, just select the tab of the required task:

- Open the tab of the **Reinforcement** task and expand the **Bar Reinforcement**, **Meshes** and **Sections** task areas.



Exercise 4: 3D elevator shaft with a 3D model (method 1)

Requirements:

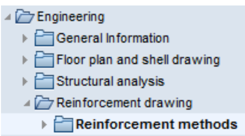
Allplan 2020 Engineering comes in different packages.

Check whether the **Reinforcement** task of the **Engineering** role contains the **Bar Reinforcement** and **Sections** task areas.

Check the **Actionbar** to see whether the program contains the following tools:

Bar Shape

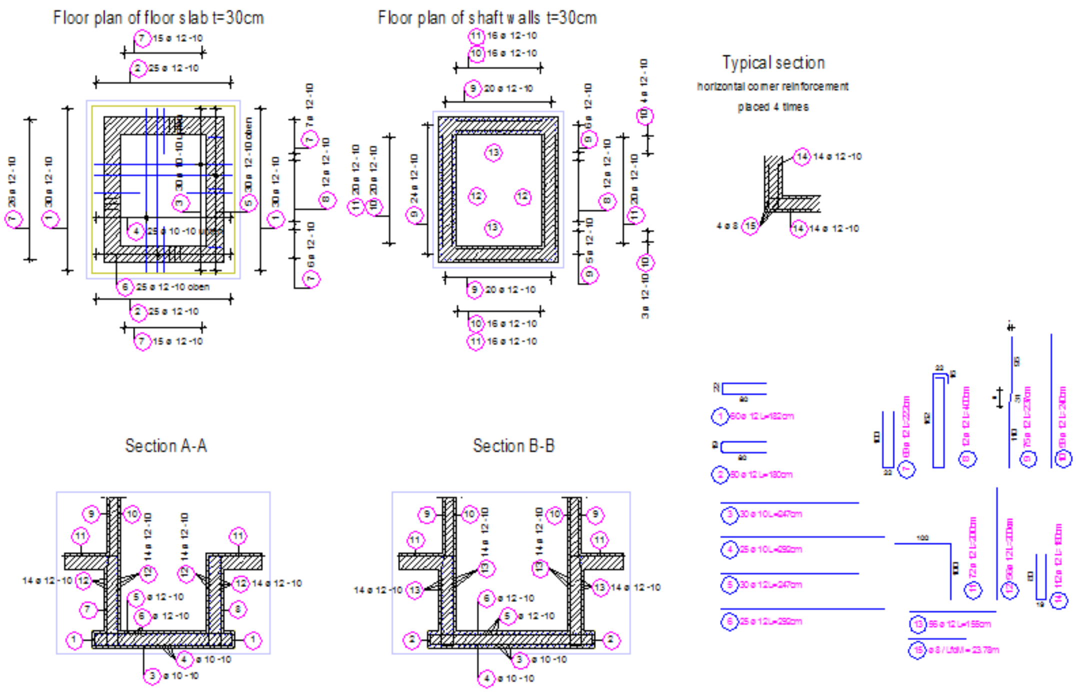
Tip: Look in the Allplan Help for basic information on the reinforcement methods:



In this exercise, you will reinforce the 3D elevator shaft you designed in exercise 2. First, you will generate auto-updating sections. After this, you will create the reinforcement with a 3D model (method 1). This exercise requires exercises 1 and 2.

Start by selecting fileset **2** with the following drawing files:

Fileset	Drawing file number	Drawing file name
2	101	3D floor plan
	201	General arrangement – 3D objects
	202	Concrete component
	203	General arrangement – components
	204	Sections and reinforcement with the model
You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").		

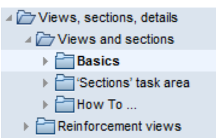


Task 1: creating associative sections

In the first part of this exercise, you will use the architectural floor plan and the 3D elevator shaft to create auto-updating sections. These sections will form the basis for placing reinforcement later (see Tip).

You will use the tools in the **Sections** task area. You can find these tools on the **Actionbar**.

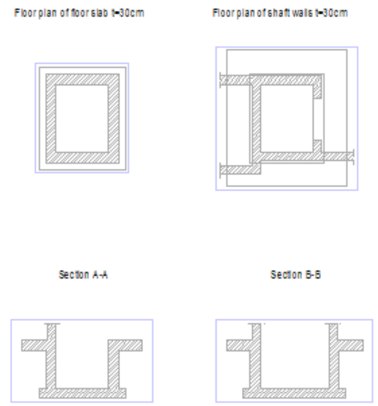
Tip: Look in the Allplan Help for basic information on the **Sections** task area:



Tools:

- Create Section
- Copy
- Modify Clipping Path
- Modify Section
- Show Clipping Path

Objective:



You can use the tools in the **Sections** task area to create clipping paths and views. These form the basis for the reinforcement drawing you will create later.

At first glance, auto-updating views and section would appear to be no different from 2D data. However, they are derived from a three-dimensional model and are therefore inherently linked with this model.
The program updates the component automatically to reflect any changes you make to the 3D component or to a view or section. If, for example, you move an opening in the front elevation or add an opening to the floor plan, the 3D component and all automatically updating views and sections of the general arrangement drawing will adapt automatically. You can also make modifications in isometric views.

Placing reinforcement has an immediate and direct effect on the three-dimensional model and consequently on all the other views and sections.

To create reinforcement, you need at least two orthogonal views or sections. You can create any number of additional sections by deriving them from the three-dimensional model. The program displays the reinforcement automatically and you can label it immediately.

Sections are different to views in that they can have a spatially delimited height and depth. This delimitation is defined by the clipping path.

Start by defining the default settings.

To select drawing files and to define options

➲ Check the **Actionbar** to see whether the **Engineering** role and the **Reinforcement** task are selected. In addition, make sure that the **Bar Reinforcement**, **Meshes** and **Sections** task areas are expanded.

1 Click **Open on a Project-Specific Basis** (Quick Access Toolbar), open the drawing file tree for fileset **2**, select drawing file **204**, open drawing files **101** and **201** (or **203**) in edit mode and close all the others.

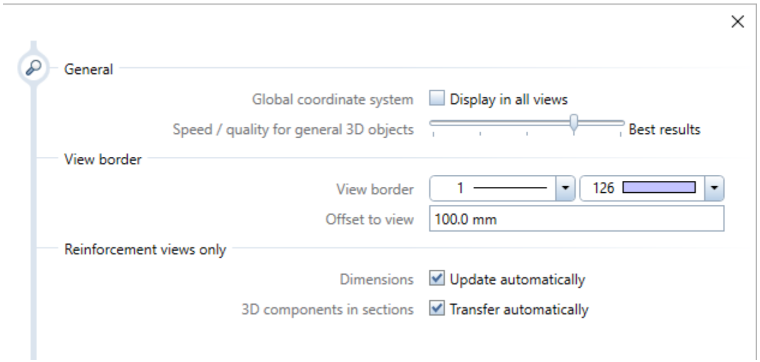
2 If three viewports are still open, click **1 Viewport** in the **Window** drop-down list on the Quick Access Toolbar.

3 Click the current **scale** on the status bar and select **1:50**. Make sure the unit of length is **m**.

4 Open the **Default Settings** drop-down list on the Quick Access Toolbar and click **Options**. Select the **Views** page.

5 Check the settings.

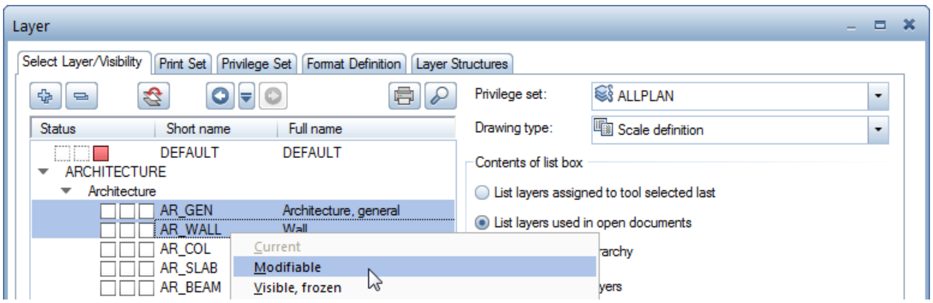
Note: Regardless of the setting of the **Automatically transfer 3D components to sections** option, Allplan always transfers new 3D components to views and sections created with the tools in the **Sections** task area.



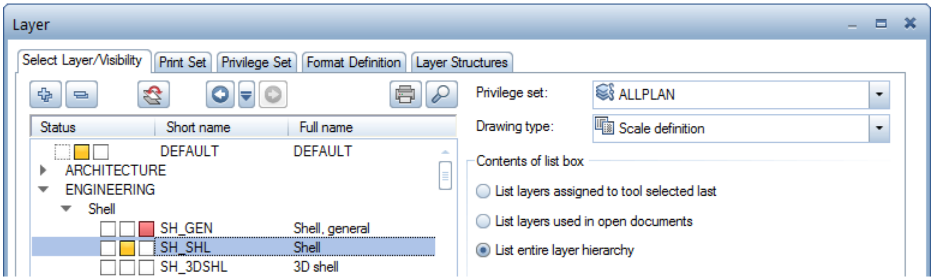
6 Open the **View** drop-down list on the Quick Access Toolbar, click **Select, Set Layers**, select the **List layers used in open documents** option, click the **ARCHITECTURE** layer structure and then the button in the upper-left area to expand the tree structure.

7 Select the layers **AR_GEN** and **AR_WALL**, right-click the selection and, on the shortcut menu, choose **Modifiable**.

Note: If you use drawing file **203** instead of drawing file **201**, layer **AR_GEN** is not available. In this case, make the **AR_SLAB** layer modifiable.



8 Select the **List entire layer hierarchy** option and expand the **ENGINEERING** layer structure. Open the **Shell** layers and make **SH_GEN** **Current** and **SH_SHL** **Modifiable**.



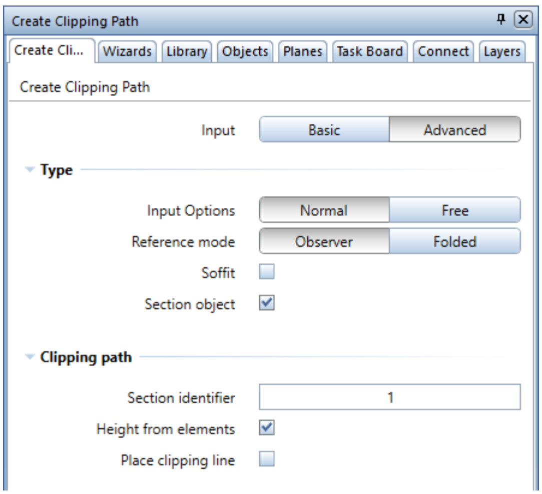
You will begin by creating a plan view based on the 3D general arrangement drawing. The height will not be delimited.

To create a plan view

1 Click **Create Section** (**Actionbar – Sections** task area).

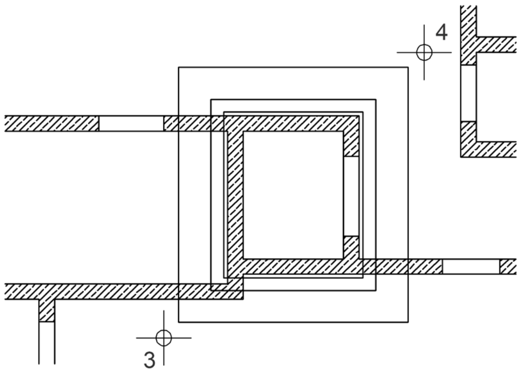
The **Create Clipping Path** palette opens so that you can define the clipping path.

2 Select the **Advanced** method for **Input** and clear the **Place clipping line** option in the **Clipping path** area.



3 *Select view or section or enter first point:* Click to the left of and below the lower-left corner of the upper floor slab (see illustration).

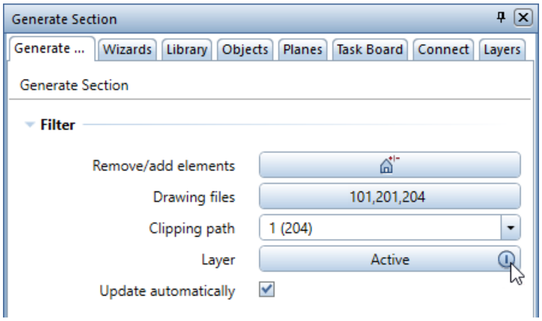
4 *To point:* Click a point above the upper-right corner of the upper floor slab (see illustration). Then select the Esc key to finish.



5 *Select viewing direction:* Click in the circle. This has the effect that Allplan views the object from the top when calculating the section.

The **Generate Section** palette opens; the section is attached to the crosshairs. Allplan uses the layer in the **Properties** palette - **Format** area for the section object and the label. The view border is always on the DEFAULT layer, regardless of this setting. Allplan takes the layers for the elements of the section from the 3D components, or you can specify the layers when you define the formats for edges, clipping lines and finish elements.

6 In the **Generate Section** palette, turn **Off** the **Layer** in the **Filter** area.



The text on the button changes from **Active** to **Set**. This indicates that Allplan creates the section based on the current layer setting.

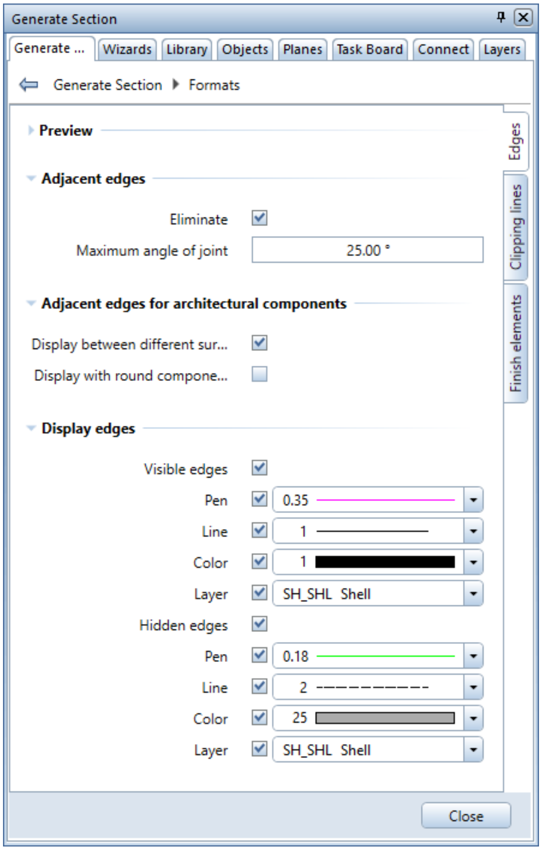
7 Do not change the other settings. In the **Representation** area, click the **Set** button to the right of **Formats**.

The **Formats** palette opens. You can see the **Edges** tab.

8 Check the **Display edges** area to see whether the **Visible edges** and **Hidden edges** options are selected. Define the following format properties.

Visible edges:
Pen **0.35** mm; do not change the line or color; select the **SH_SHL** layer.

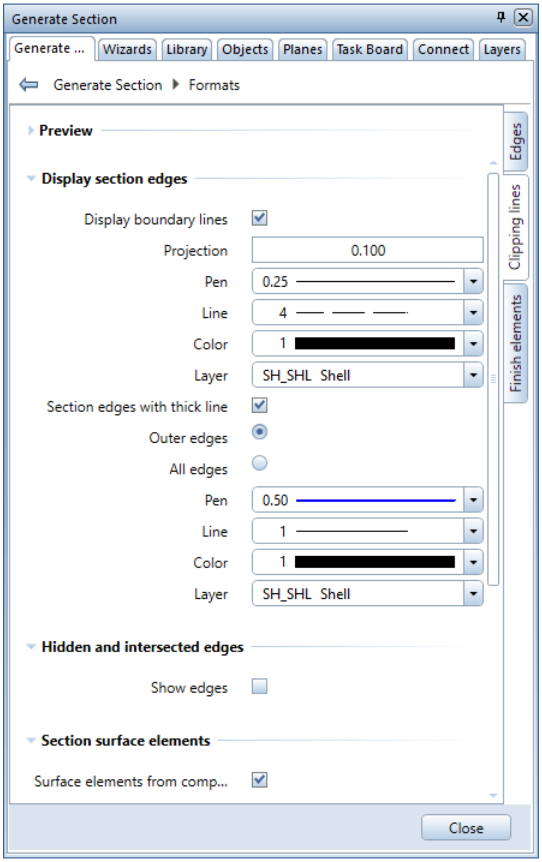
Hidden edges:
Do not change the pen, line or color; select the **SH_SHL** layer.



9 Switch to the **Clipping lines** tab.

10 Go to the **Display section edges** area, select the **Display section edges with a thick line** and **Outer edges** options. In addition, select the **SH_SHL** layer for the boundary lines and section edges.

Do not change the other settings.

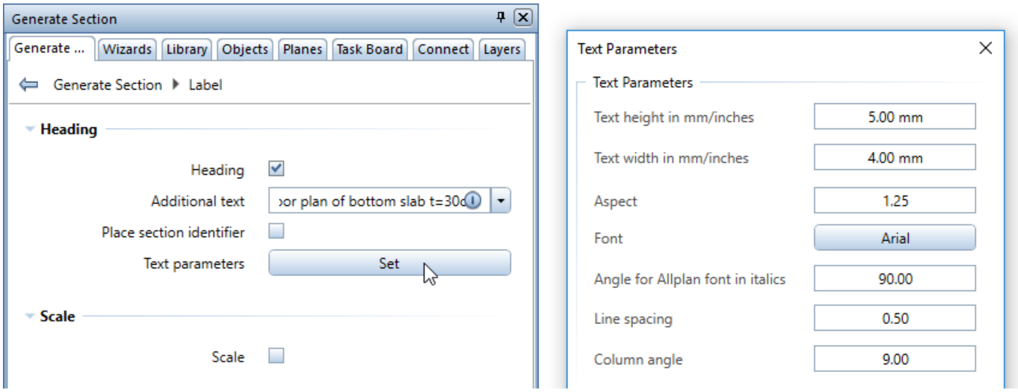


11 **Close** the **Formats** palette to save the settings and to return to the **Generate Section** palette.

12 Check the **Representation** area to see whether the **Show clipping path** option is selected. Then, click the **Set** button to the right of **Label**.

13 In the **Label** palette, enter the label for the plan view in the **Additional text** box:
Floor plan of floor slab, t = 30 cm
Clear the **Place section identifier** option.

14 Click the **Set** button to the right of **Text parameters**, define the parameters for the label (text height of 5mm / text height of 4mm) and click **OK** to confirm the dialog box.



Tip: Track tracing helps you place points in exact alignment with existing points. You can select the **F11** key or click **Track line** in the dialog line to turn track tracing on and off.

15 *To point or angle of rotation:* Place the section so that it is to the right of and aligned with the architectural floor plan.

You will now create a longitudinal section and a transverse section based on the plan view you generated beforehand.

To create sections

➲ The **Create Clipping Path** palette is still open. If it isn't, open this palette by selecting the **Create Section** tool again.

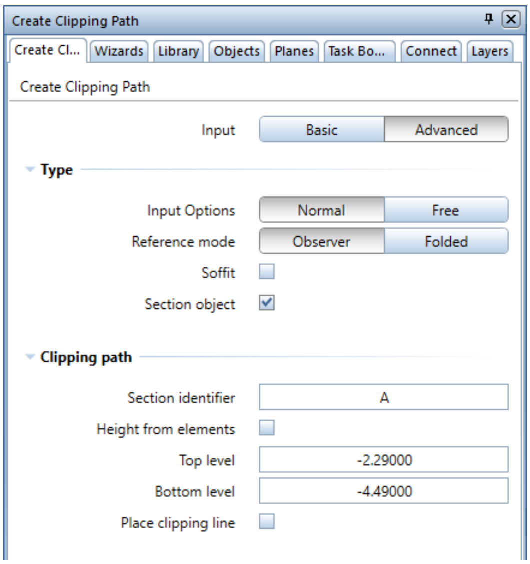
Tip: In **Observer** mode, the bottom edge is placed so that it is always horizontal; in other words, horizontal edges are always horizontal, regardless of the viewing direction.
When you select **Folded**, however, Allplan simply folds the section.

1 In the **Type** area, you can switch between the **Observer** and **Folded** reference modes. **Observer** is selected; do not change this setting.

2 *Select view or section or enter first point:* Click the view border of the plan view that you just created to define the clipping path within the plan view.

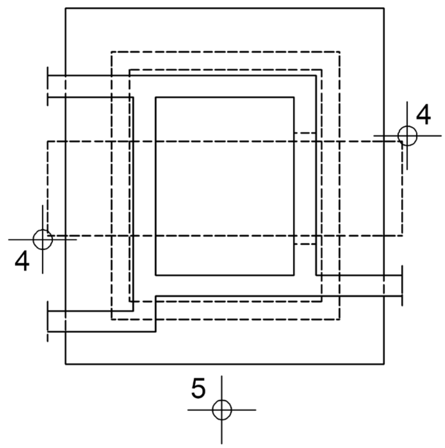
The **Height from elements** option disappears; instead, you can see the top level and bottom level of the plan view.

3 Change the **Section identifier** to **A** and the **Top level** to **–2.29**.



4 Define the clipping area by clicking the lower-left corner and the upper-right corner in the area of the door opening (see illustration). Then select ESC to finish.

5 *Select viewing direction:* Click below the circle. The effect of this is that Allplan views the object from the front when calculating the section.



6 You are back in the **Generate Section** palette. In the **Representation**, click the **Set** button to the right of **Label**.

7 Select **Section** in the **Additional text** list box and select the **Place section identifier** option.

8 *To point or angle of rotation:* Place the section so that it is below and aligned with the floor plan.

The **Create Clipping Path** palette opens again. Allplan creates any other clipping paths within the selected plan view until you finish creating sections within a view or section by selecting ESC.

9 Use the same approach to create the longitudinal section B-B. Define the viewing direction from the right. Place this section to the right of section A-A.

10 Select ESC twice to close the tool.

Finally, you will copy the plan view and its clipping path. You will then modify the height settings to display the floor slab and shaft walls separately.

To copy the plan view and to adjust the height

1 Click **Copy** (**Actionbar** – **Edit** task area).

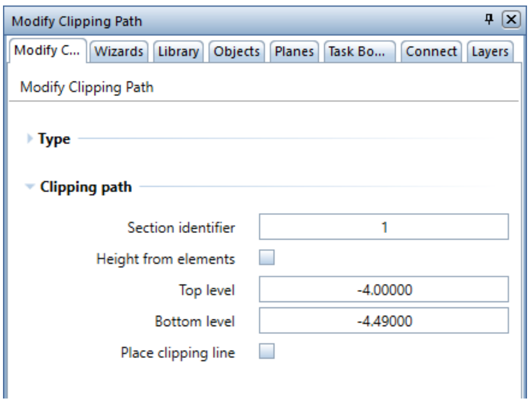
2 Select the entire plan view by enclosing it in a selection rectangle or by clicking the view border. Place the copy so that it is to the right of and aligned with the plan view.

3 In addition, copy the clipping path of the plan view in the model data to itself by clicking the same point for *From point, dx* and *To point or enter number of copies*.

Tip: If no tool is active, you can also open the modification tool by double-clicking the clipping path.

4 Right-click the clipping path in the original plan view and select **Modify Clipping Path** on the shortcut menu.

5 The **Modify Clipping Path** palette opens. Clear the **Height from elements** option. For the top level, enter **-4.00**. Do not change the bottom level, which is **-4.49**.



6 **Close** the palette to apply the changes.

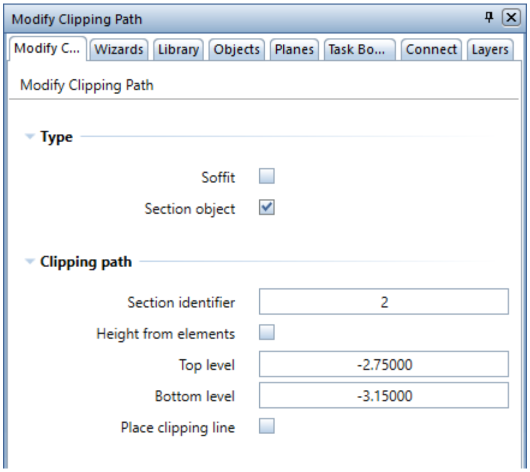
7 Click **Repeat** on the Quick Access Toolbar.

The **Modify Clipping Path** tool opens.

8 Select any standard view on the viewport toolbar, click the unchanged clipping path you copied and switch back to **Plan** view.

9 Go to the **Modify Clipping Path** palette, clear the **Height from elements** option and change the top level and bottom level to the following values:

- Top level **-2.75**
- Bottom level **-3.15**

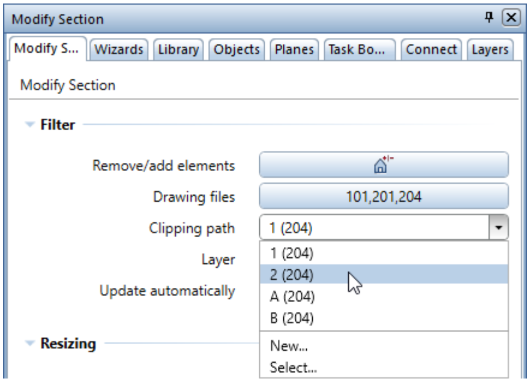


Note: By copying the data, Allplan automatically changed the **section identifier** to **2**.

10 **Close** the palette to apply the changes.

11 Right-click the view border in the plan view you copied and select **Modify Section** on the shortcut menu.

12 The **Modify Section** palette opens. Go to the **Filter** area, open the **Clipping path** list box and select the entry **2 (204)**.



13 In the **Representation** area, clear the **Show clipping path** option and change the **Additional text** of the label to
Floor plan of shaft walls, t = 30 cm
To apply the changes, click **Apply**. Then, click **Close** twice.

14 Then, go to the plan view on the left side. Here, too, hide the clipping path by using the  **Modify Section** tool.

The clipping paths of sections A-A and B-B are still visible in the two plan views.

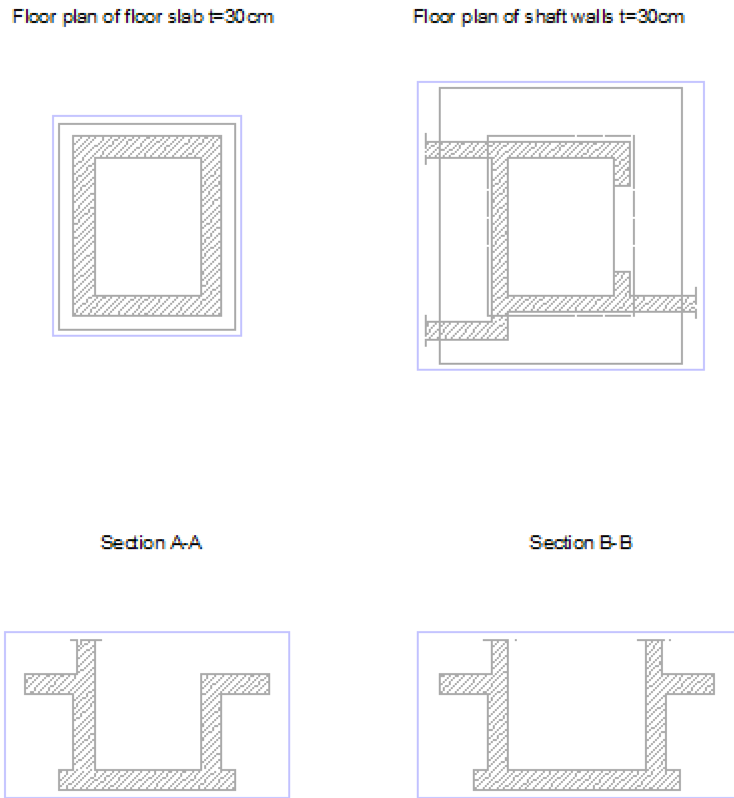
15 Right-click one of these clipping paths and select  **Show Clipping Path** on the shortcut menu.

16 *Select view:* Click the plan view on the left side.

17 Click the second clipping path and, again, the plan view on the left side.

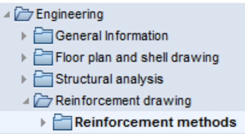
18 Repeat this for the plan view on the right side and select ESC to close the tool.

19 **Move** the labels of the sections to make space for the reinforcement labels that you will create later.



Task 2: edge reinforcement of floor slab

Tip: Look in the Allplan Help for information on the reinforcement methods and the 3D reinforcement model:



Next, you will place bar reinforcement and create a three-dimensional model from the reinforcement at the same time (method 1; see Tip).

You will mainly use the tools in the **Bar Reinforcement** task area. You can find these tools on the **Actionbar** and on the shortcut menu.

First, you will create the edge reinforcement of the floor slab. To do this, you will use the **Bar Shape** tool.

- For the longitudinal direction, you will create the bending shape as a freeform bar by defining individual points.
- For the transverse direction, you will use a predefined bending shape that expands to adapt to the existing outline.

Tools:

Options

Bar Shape: Freeform

Place Bar Shape Along placing line

Copy and Mirror

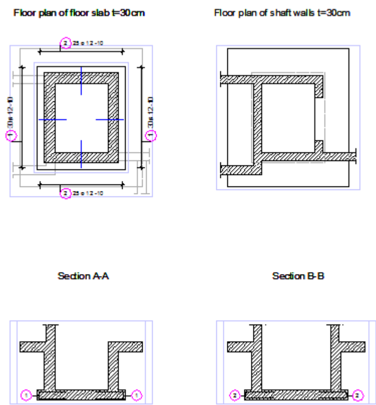
Label

Dimension Line, Label

Bar Shape: Open stirrup

Modify Placement Display Mode

Objective:



Start by defining the default settings.

To select drawing files and to define options

1 Click **Open on a Project-Specific Basis** on the Quick Access Toolbar or double-click in the workspace.

2 Double-click drawing file **204**.

3 Check the current reference scale (**1:50**) and unit of length (**m**) on the status bar.

4 Switch to the **Properties** palette - **Format** area and define the **DEFAULT** layer as the current one.

5 Use the **Modify Section** tool to hide the clipping paths from the two sections.

6 Select **Reinforcement drawing** for the drawing type on the status bar.

The hatching in the sections changes to fills.

Tip: You can define how **bar reinforcement** looks in the **Options**. You can find more information in the Allplan Help.

Before you start, you must decide whether you want to create a 3D reinforcement model (see Tip on page 142).

In this exercise, you will work with the reinforcement model (method 1). This means that the reinforcement placed will be managed internally by the system and displayed in all the views and sections you create with the tools in the **Sections** task area.

For the reinforcement of the floor slab, which is 30 cm thick, you will create two-way bar reinforcement of Ø12/10 cm in the top layer and Ø10/10 cm in the bottom layer. The concrete cover is 4 cm.

The **BR_GEN** layer is proposed for bar reinforcement. You can use this layer, as it is not necessary to differentiate between the upper and lower reinforcement layers.

You will place the reinforcement on several layers when you create the slab reinforcement in exercise 6.

Start by creating the freeform bending shape of the open stirrup in the longitudinal direction.

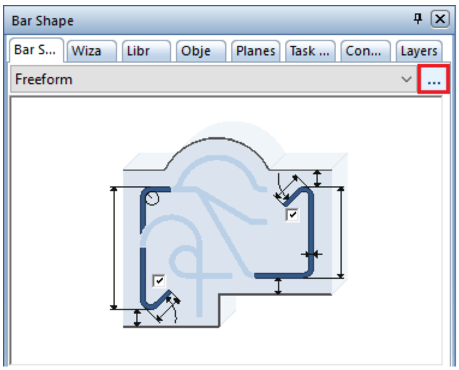
To enter the open stirrup as a freeform bending shape

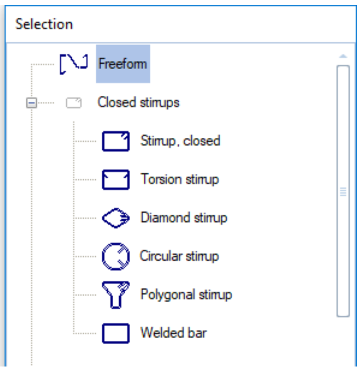
1 Open the **Default Settings** drop-down list on the Quick Access Toolbar and click **Options**. Select the **Reinforcement** page and check that the **Reinforce with 3D model** option is selected in the **General** area. Open the **Format** page and select line type **1** for the **Leaders**.

2 Click **Bar Shape** (**Actionbar - Bar Reinforcement** task area). Check the **Layers** palette to see whether the **BR_GEN** layer is selected. If it isn't, select it now.

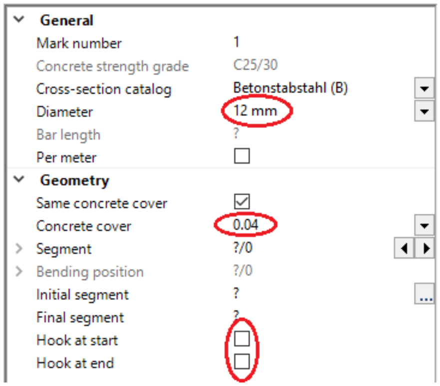
Tip: Allplan also provides a predefined bending shape for creating open stirrups. You will use it later when you enter open stirrups in the transverse direction.

The **Bar Shape** palette opens; the **Freeform** bending shape is selected by default. You can use it to create any bending shape. To use a different bending shape, click the button above the graphic and select one of the predefined shapes.
Click to open a dialog box that displays all the bending shapes graphically in groups.

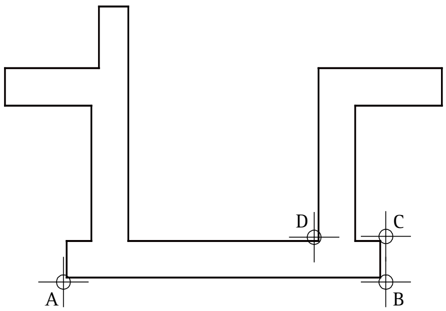




3 Go to the parameter area of the palette, select a diameter of **12 mm**, enter **0.04** for the concrete cover and clear the **Hook at start** and **Hook at end** check boxes.



4 To enter the open stirrup, click the points in section A-A as shown in the illustration. The next step is to define the segment length.



A 1st point

B 2nd point

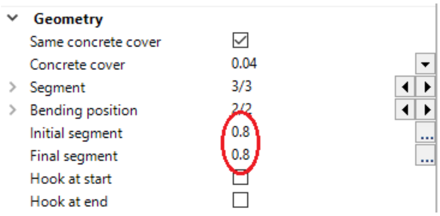
C 3rd point

D 4th point

5 Select ESC to finish entering the open stirrup.

6 Go to the parameter area of the palette and enter **0.80** for the length of the **Initial segment** and the **Final segment**.

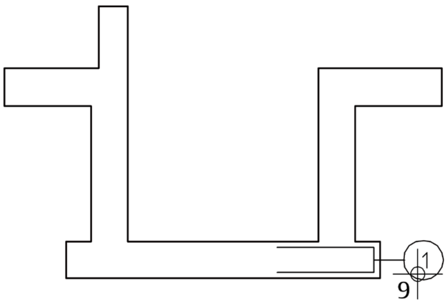
Note: You can still change almost all the parameters. The changes are immediately visible in the preview.



7 Select ESC to finish entering the bending shape. As the **Label** option was selected in the input options when you created the bar shape, the **Label** tool starts automatically.
To finish entering the bending shape and to label the bar, right-click in the workspace and select the **Label** tool on the shortcut menu.

8 Make settings for the mark text in the palette.
Select the **Options for text** parameter and click , enter **1.00** for the aspect and click **OK** to confirm.

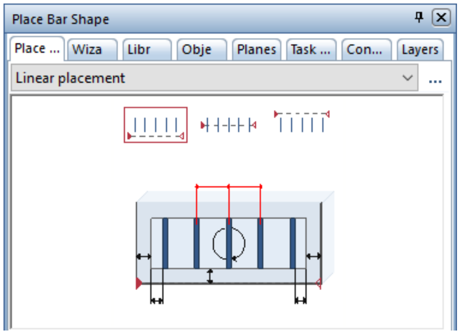
9 Place the mark.



10 This defines the bending shape. If you want, you can continue and immediately place the open stirrup you just created. However, you can also select ESC and place the mark later by using the **Place Bar Shape** or **Special Placements** tool.
In this exercise, you will place the mark now.

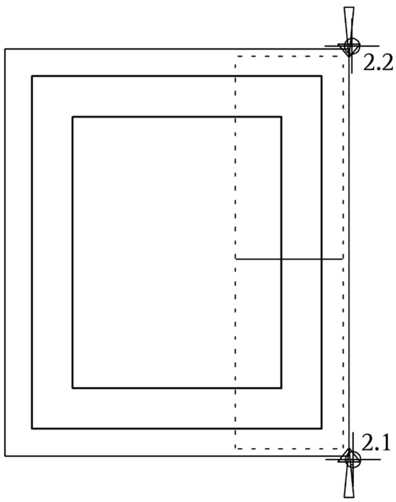
To place the open stirrup in edge-based mode

1 The palette of the **Place Bar Shape** tool is open and **Linear placement** is selected.
If this is not so, right-click the open stirrup you want to place and select **Place Bar Shape** on the shortcut menu.



2 Click the edges of the outline to define the placing area.
Placing line from point: Click the lower-right corner in plan view.
Placing line to point: Click the upper-right corner (see illustration).

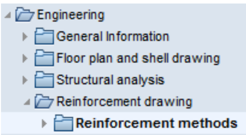
Tip: The entries you make are immediately visible in the preview. So, you can check the effects of your settings at any time.



Symbols indicate the placing region.

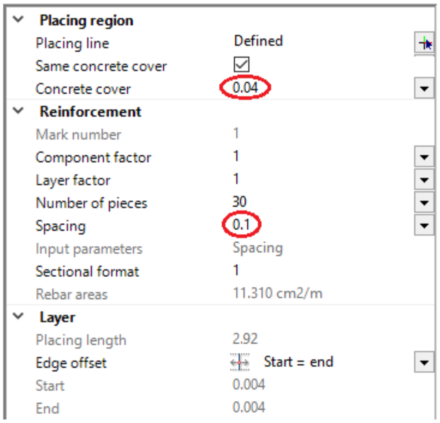
In the input options, you can define the position of the placed bar, specify how the placement looks and select automatic labeling.

Tip: Look in the Allplan Help for information on the reinforcement methods and the align, move, and rotate options for the placing mode:



3 Select the **Align** option and select the **Show middle bar only** placement display mode.
Align uses the spatial orientation and position of the identified mark to place the reinforcement in alignment (see Tip).

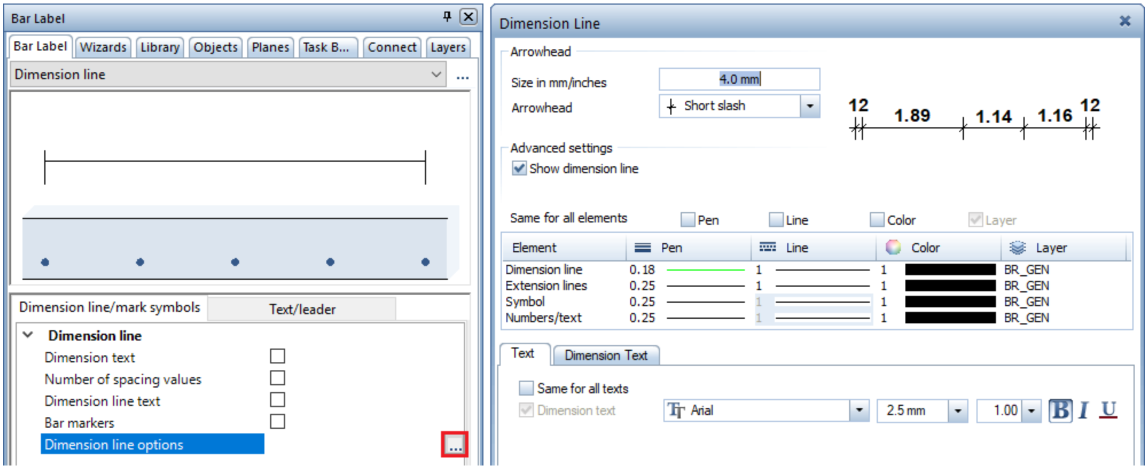
4 Go to the parameter area of the **Place Bar Shape** palette and enter **0.04** for the concrete cover and **0.10** for the spacing. You can leave the other settings as they are.



5 Click **Dimension Line, Label** on the shortcut menu.
As an alternative, select ESC twice to close the tool and to start the **Dimension Line, Label** tool.

6 Make settings for the dimension lines in the palette.

7 Select the **Dimension line options** line and click .... The **Dimension Line** dialog box opens. Check that the layer **BR_GEN** is selected. Change the aspect to **1.00**.

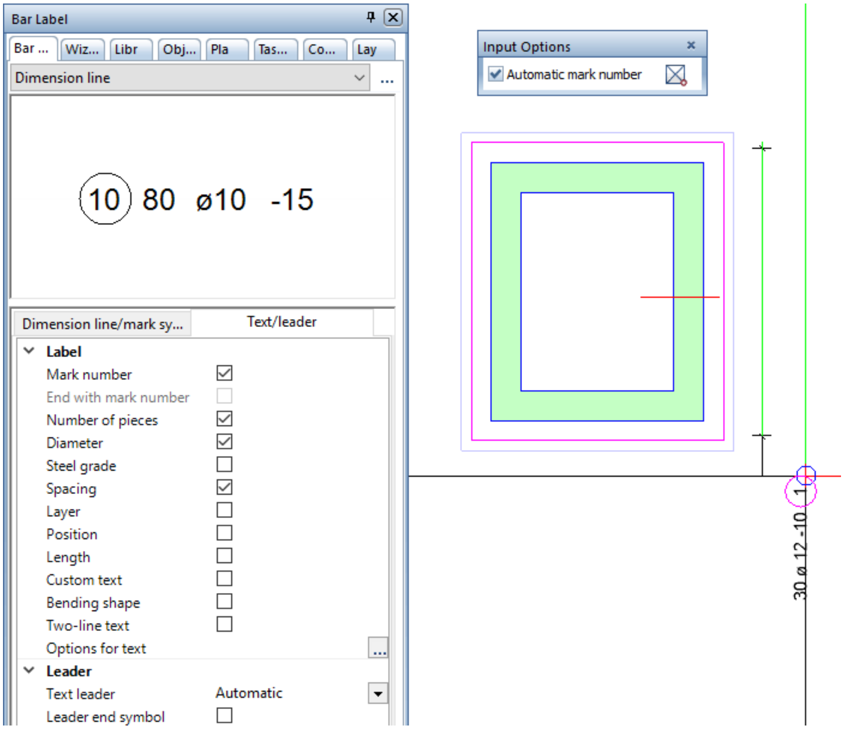


8 Click **OK** to confirm the **Dimension Line** dialog box and click a point through which the dimension line is to pass.

The palette switches to the **Text/leader** tab, where you can define the label for the placement.

9 Specify the parameters as shown, select the **Options for text** line and click ..., enter **1.00** for the aspect and click **OK** to confirm.

Note: If **Automatic mark number** is selected in the input options, the program creates the mark number at the beginning or end of the label, depending on the drop-in point specified. Check this by selecting this option and moving the crosshairs over the workspace.



10 Place the label and select ESC to close the tool.

Note: When you click **Zoom All**, you can see that Allplan has created the reinforcement in the sections plus a reinforcement model of the 3D elevator shaft.

To hide the model data, use to define a section and click to save this section.
This was described in unit 2 when you created the architectural floor plan.

Displaying and labeling placements

When placing reinforcement, you can specify the placement display mode in the input options or in the dialog box:

Shows all the bars.

Shows only the bar in the middle.

You can select the bars you want to display.

Shows a single bar as folded. This helps you define the exact position of the bar, which is required for placing the bar on the building site. You can select the folding direction you want to use.

You can use the **Modify Placement Display Mode** tool to change the display mode later.

Labels can be placed at any time. The **Bar Reinforcement** task area provides the following tools for creating labels at a later stage:

Label
Dimension Line, Label

Reinforcement placed is visible in all the views and sections. During creation, however, reinforcement can be labeled in the placing view only. You must place labels in all the other views and sections later.

Instead of placing the bar again on the opposite side, it is easier to mirror mark 1. You can then label the reinforcement.

To copy and mirror the placed reinforcement

Tip: To select general edit tools, you can also right-click in the workspace and select a tool on the shortcut menu.

1 Click **Copy and Mirror** (**Actionbar** - **Edit** task area - flyout menu of the **Mirror without Copy** tool).

2 Click the bar in the section.

3 Define the mirror axis:
Click point 1 of mirror axis: Right-click a horizontal line of the floor slab in the transverse section and click **Midpoint** on the shortcut menu. Make sure that you do not click the midpoint of the line or any other existing point.

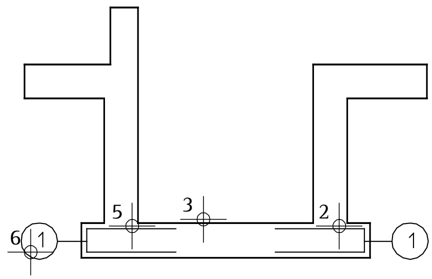
Tip: Track tracing helps you define the 2nd point of the mirror axis. You can select the **F11** key or click the **Track line** icon in the dialog line to turn track tracing on and off.

2nd point of mirror axis: Go to the dialog line, enter a value that is not zero for the **Δy y-coordinate** and select the Enter key to confirm.

4 Select ESC to close the tool.

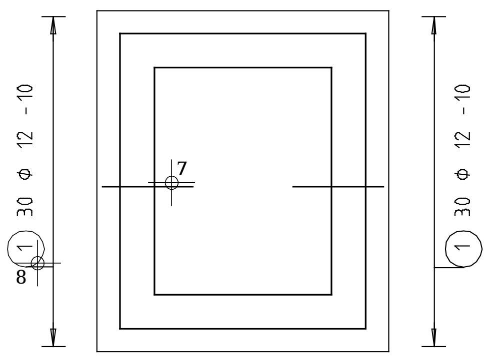
5 Right-click the bar in the section and select **Label** on the shortcut menu.

6 Define the text parameters so that only the **Mark number** is visible. Place the mark number in the workspace and select ESC to close the tool.



7 As the sections are linked, the mirrored placement is also visible in the floor plan. To label the placement, right-click the bar in the floor plan and select **Dimension Line, Label** on the shortcut menu.

8 Place the dimension line and the label to the left of the floor plan and select ESC to close the tool.

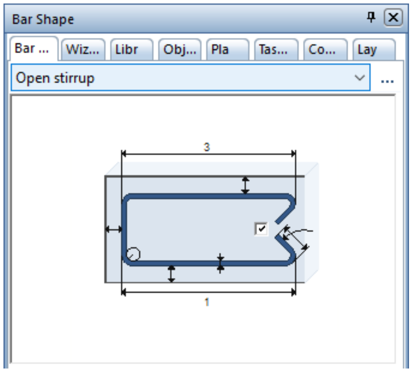


As an alternative, you will now use a predefined, expanding bending shape to create the edge reinforcement in the transverse direction. Finally, you will place the bending shape automatically.

To create an expanding open stirrup and place it automatically

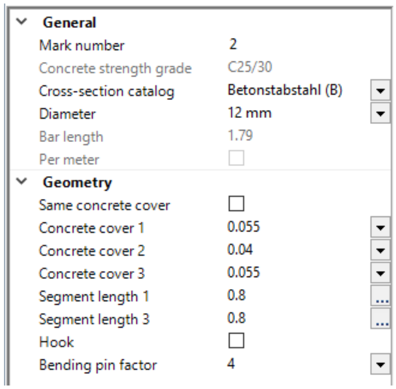
1 Click **Bar Shape** again (**Actionbar** – **Bar Reinforcement** task area).

2 Select the **Open stirrup** bending shape in the list box at the top of the **Bar Shape** palette.

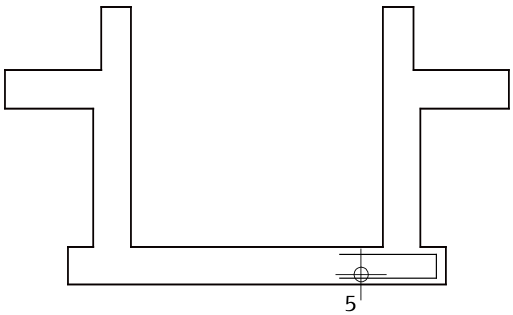


3 Go to the parameter area of the palette, select a diameter of **12 mm** and clear the **Same concrete covers** check box, because these bars are in the second layer. Change the values for **Concrete cover 1** and **Concrete cover 3** to **0.055** each and the value for **Concrete cover 2** to **0.04**.

4 Enter **0.80** for **Segment length 1** and **Segment length 3** and clear the **Hook** check box.

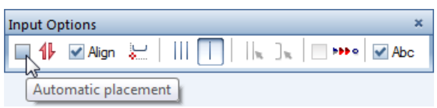


5 In section B-B, point to the lower-right edge of the floor slab until the open stirrup expands correctly, then click.



6 Select ESC and place the label for the bar in the section.

7 Select the **Place automatically** option in the input options.



By using automatic depth placement, Allplan immediately places the bar in the floor plan of the floor slab.

Note: **Automatic depth placement** is only possible when you create the bending shape in a 3D outline and place it immediately afterward.

In this case, you cannot define the placement display mode: all the bars are always visible.

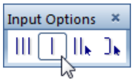
8 Click **Dimension Line, Label** in the **Repeat** drop-down list on the Quick Access Toolbar, click a bar in the placement you just created and place the dimension line and the label.

9 To copy these bars to the lower part of the floor plan, click **Copy and Mirror** (**Repeat** drop--down list) and select the placement as an entity group in plan.

10 *Click point 1 of mirror axis*: Right-click a vertical line of the floor slab in plan and select **Midpoint** on the shortcut menu.

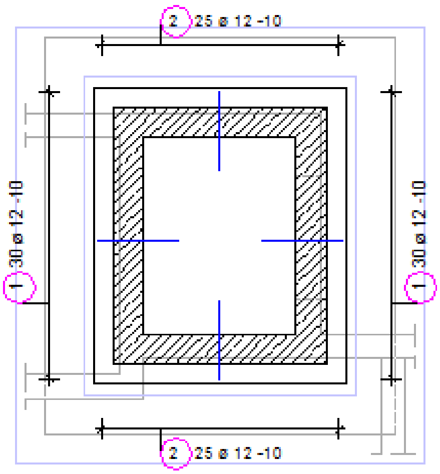
11 *2nd point of mirror axis:* Go to the dialog line, enter a value that is not zero for the **x-coordinate** and select the Enter key to confirm. Select ESC.

12 Right-click one of the placements in plan, select **Modify Placement Display Mode** on the shortcut menu and select **Show middle bar only** for both placements.

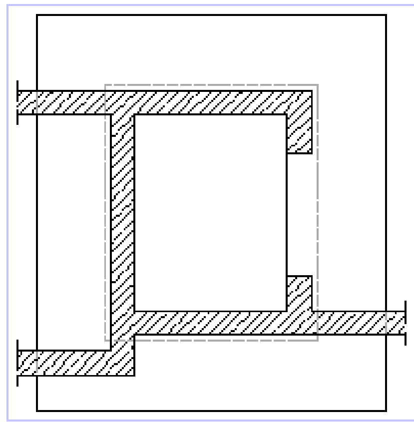


13 Use the shortcut menu and the **Label** and **Dimension Line, Label** tools to create labels for the bottom placement in the section and in plan.

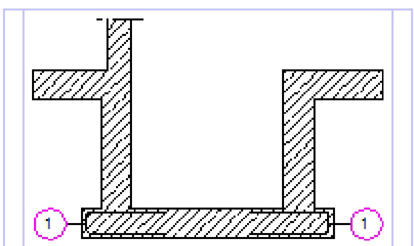
Floor plan of floor slab t=30cm



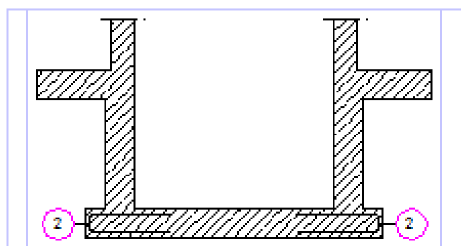
Floor plan of shaft walls t=30cm



Section A-A



Section B-B



Task 3: area reinforcement of the floor slab

The edge reinforcement of the floor slab has been placed. The following part of the exercise involves creating area reinforcement.

Tools:

Enter Area Reinforcement

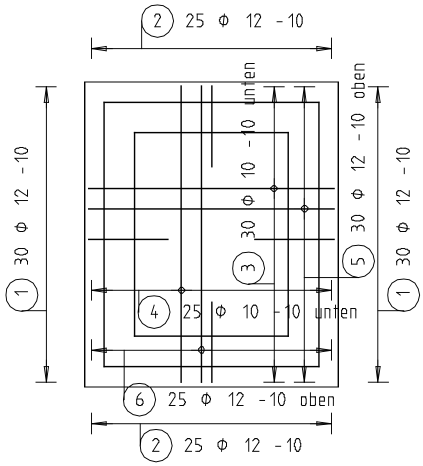
Span Reinforcement

New Mark Number

Modify Mark

Modify Placement Display Mode

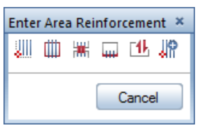
Objective:



You will start by creating two-way bar reinforcement.

To create span reinforcement for the bottom layer

1 Click **Enter Area Reinforcement** (**Actionbar - Bar Reinforcement** task area) and check the **Properties** palette - **Format** area to see whether the **BR_GEN** layer is selected. If it isn't, select it now.

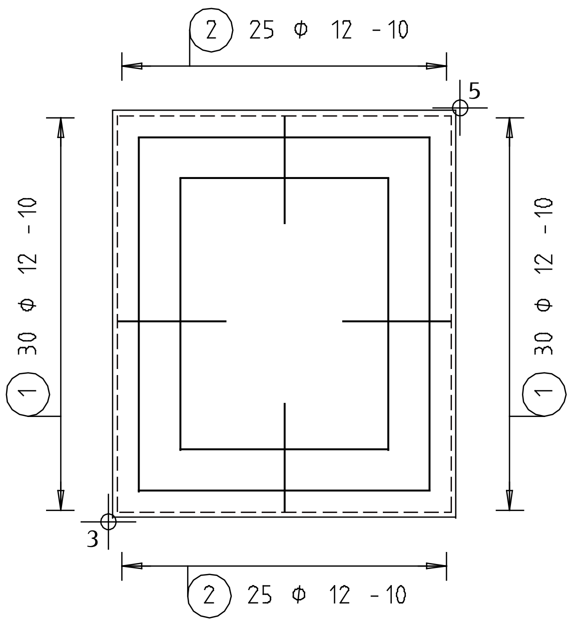


2 Click **Span Reinforcement** on the **Enter Area Reinforcement** Context toolbar.

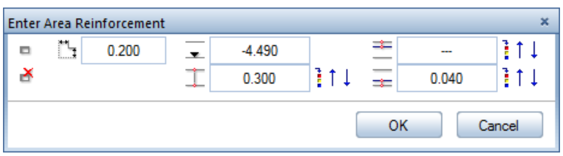
3 *From point, element or offset:* Click the lower-left corner in the floor plan.

4 *To point, element or offset:* Enter **-0.04** for the support depth in the dialog line.
Entering a negative value moves the placing polygon toward the inside.

5 Click the upper-right corner of the floor plan.

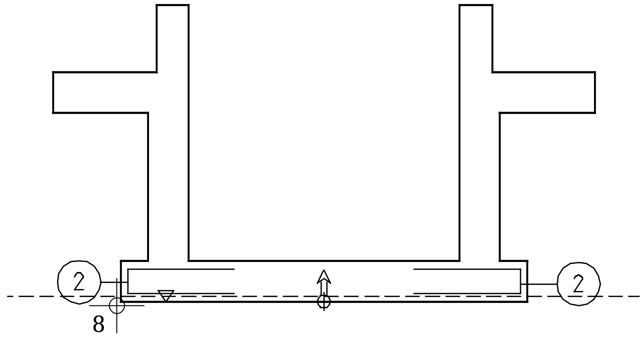


6 Select ESC to finish. This selects the area.



7 Define the layer depth: Change the **Component thickness** to **0.30** and click in the box to the right of **Layer depth**.

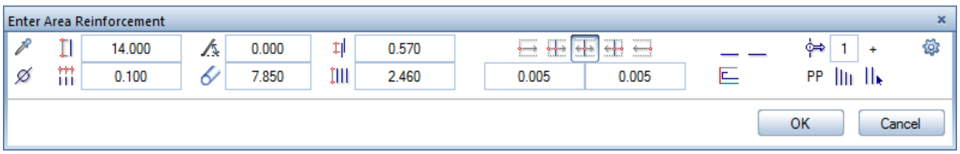
8 *Layer in reference view or layer depth:* Click the lower-left point in section B-B.



The dashed line indicates the current layer depth of the reinforcement. The concrete cover is taken into account. The elevation symbol shows the layer depth of the definition point entered. The direction of the positive bar segments and the placing direction of the bar are indicated by the arrow.

9 Click **Concrete Cover (Bottom)** and enter **0.04**. When you look at section B-B, you can see how the dashed line moves.

10 Click **OK** to confirm the entries.

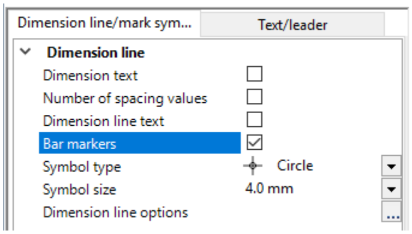


11 Define placing parameters:
Diameter 10 mm
Spacing 0.10
Angle 0.00
Equal offsets to edge
Select **PP** (= place in polygon) in the lower-right area.
The bars and the edge reinforcement are congruent in the floor plan. Therefore, select **Show selected bars** for the placement display mode to ensure that the bars do not hide the edge reinforcement.

12 Click **OK** to confirm.

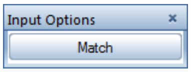
13 *Select the bar you want to display:* The preview displays all bars in the selection color. Click a bar in the upper part and select ESC.

14 Select the **Bar markers** option, specify the symbol type and place the dimension line.



15 Select the **Custom text** parameter, type in **bottom** in the line for defining text and place the label.

16 Next, you will place the transverse reinforcement. You do not need to enter the placing polygon again. You can copy the one you used for the longitudinal reinforcement. Click **Match** in the input options.



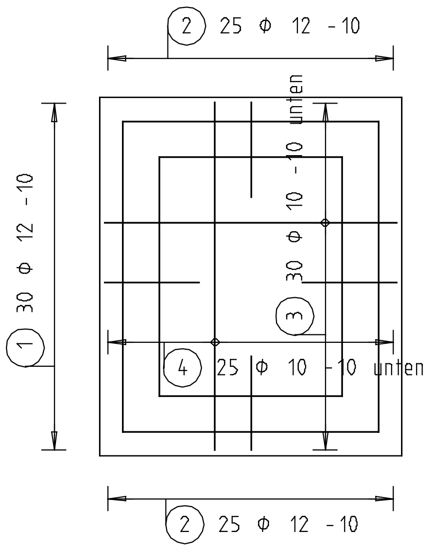
17 *Select the polygon you want to match:* Click the existing polygon.

18 The system will automatically propose 0.050 for the concrete cover at bottom. Increase this value to **0.055** (this is to take the bar ribs into account) and click **OK** to confirm.

19 The system will automatically propose **90** degrees for the **placing angle**. Check the settings and click **OK** to confirm.

20 Select a bar and place the dimension line and the label to which you have added custom text.

The bottom layer now looks like this:



Now that you have completed the bottom layer, you can create the bars for the top layer yourself. The following section briefly describes how to do this.

To create span reinforcement for the top layer

1 The **Span Reinforcement** tool is still open. If it isn't, select it again.

2 Match the existing placing polygon.

3 To define the **Layer depth**, click the upper-left point of the floor slab in section B-B and enter **0.00** for the **Component thickness**.

4 Click **Concrete Cover (Top)** and enter **0.04**.

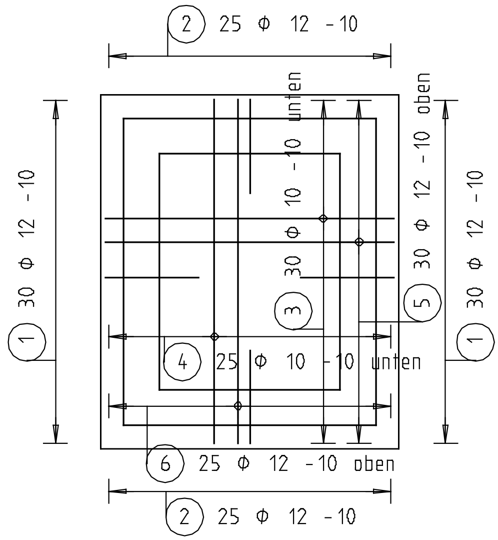
5 Confirm the settings and enter a **placing angle** of **0.00** degrees.

6 Change the diameter to **12 mm** in the dialog line. Then confirm.

7 Select a bar and place the dimension line and the label to which you have added custom text (here: "top").

8 Use the same approach to create the second reinforcement layer at the top. Bear in mind that you must associate the **layer depth** with the top level and click **Concrete Cover (Top)** after you have copied the placing polygon. Here, too, change the diameter to **12 mm**.

The floor slab now looks like this:



Instead of creating the top layer from scratch, you can copy and mirror the bottom reinforcement.

As the diameter of the top bars is 12 mm, you must assign new mark numbers to the bars of the mirrored reinforcement. To do this, use the **New Mark Number** tool (**Actionbar – Bar Reinforcement** task area).

You can then change the diameter by using the **Modify Mark** tool, select the bars you want to display by using the **Modify Placement Display Mode** tool and label the placements.

Task 4: starter bars

The reinforcement for the floor slab is complete. However, the wall reinforcement is still missing. This part of the exercise involves placing the starter bars.

Tools:

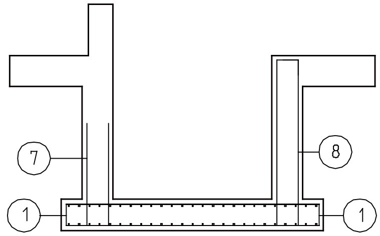
Bar Shape:
Open stirrup
Stirrup, closed

Modify Placement
Display Mode

Place Bar Shape
Along placing line

Dimension Line, Label

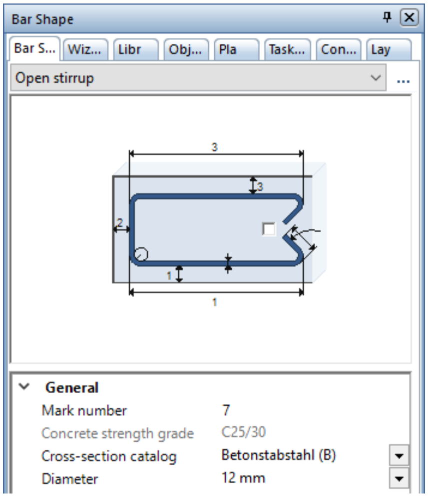
Objective:



To enter and place starter bars

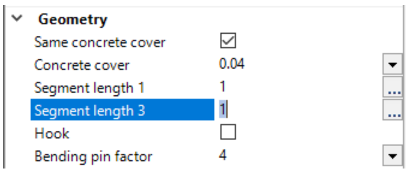
1 Use the right mouse button to double-click the open stirrups of the floor slab.

This selects the **Bar Shape** tool with the **Open stirrup** bending shape. The diameter is **12 mm**.

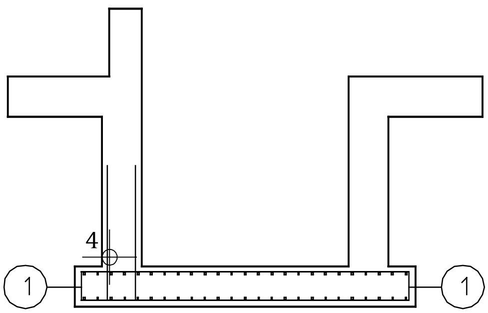


2 Check the **Layers** palette to see whether the **BR_GEN** layer is selected. If it isn't, select it now.

3 Go to the parameter area of the palette, select the **Same concrete covers** check box, enter **0.04** for **Concrete cover** and **1.00** for **Segment length 1** and **Segment length 3**.



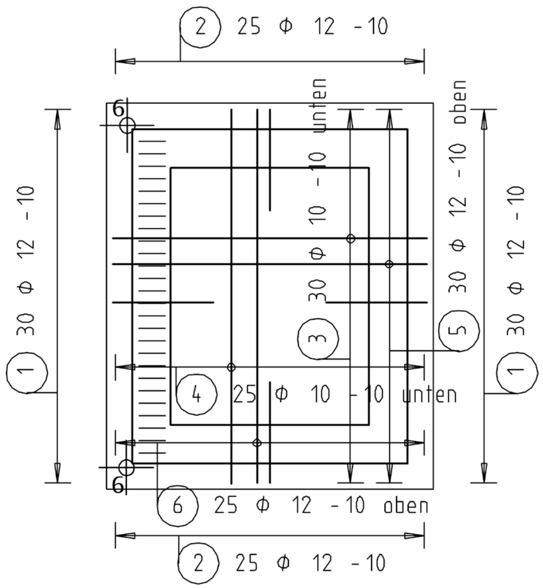
4 In section A-A, point to the left outer edge of the wall until the open stirrup expands correctly; then click.



5 Select ESC to label the bar.

6 Place the bar label in the section.

Place automatically is still selected in the input options. As you can see, the open stirrups are placed across the entire shaft wall on the left side in the floor plan.
If they aren't, click **New placing line** in the parameter area of the palette and define the **placing line** accordingly.



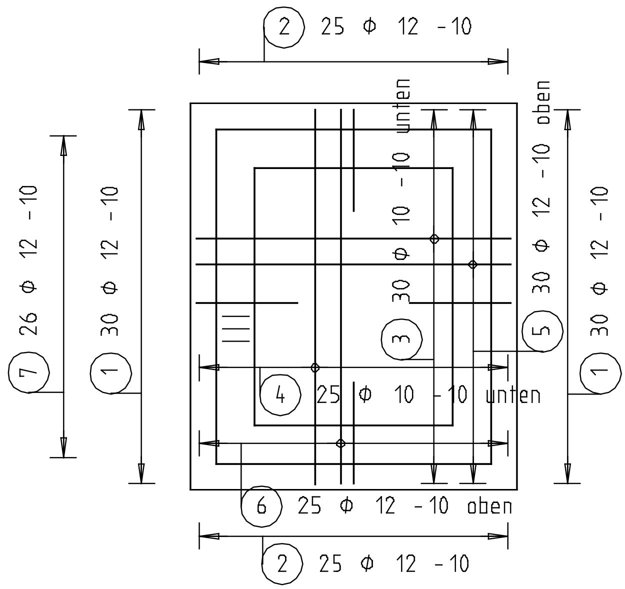
7 Select **Dimension Line, Label** in the **Repeat** drop-down list, click a bar in the placement you just created in plan, turn off the **Bar markers** option and place the dimension line.

8 Turn off the **Custom text** option and place the label.

9 Select ESC to close the tool, right-click the placement in plan. On the shortcut menu, choose **Modify Placement Display Mode**.

10 Choose **Show selected bars**, click the three bars just below the middle (see following illustration) and select ESC twice.

The floor plan of the floor slab should now look like this:



Next, you will place mark 7 in more walls.

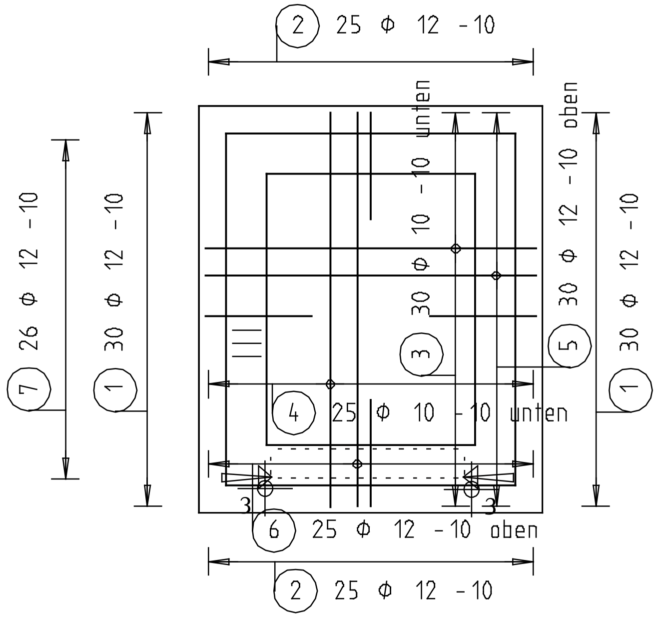
Remember: You inserted a door opening in the right wall when you created the floor plan of the basement. In this region, you will not place mark 7 but use closed stirrups instead. You will define the placing region for mark 7 in the floor plan of the shaft walls. The placed bars, however, will be visible only in the floor plan of the floor slab, as the starter bars are not within in the clipping area of the shaft walls.

To place and rotate starter bars

1 Click **Place Bar Shape** (**Actionbar – Bar Reinforcement** task area) and confirm the mark in the dialog line: mark 7.

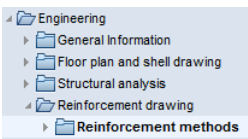
2 Turn off the **Align** option in the input options.

3 Place mark 7 in the lower transverse wall (from left to right). To define the end points of the placing line, click the points where the inside edges of the longitudinal walls and the outer edge of the bottom wall intersect (use **Point of Intersection** on the shortcut menu).

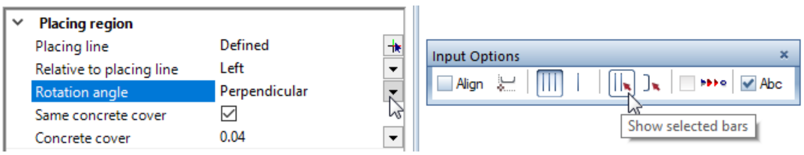


Tip: The sequence in which you enter the points of the placing line is irrelevant for an **aligned** placement. But when you create a **moved** or **rotated** placement, the sequence in which you enter the points defines the direction of the placing region.

Look in the Allplan Help for information on the reinforcement methods and the align, move, and rotate options for the placing mode:



4 Go to the parameter area of the palette and select **Perpendicular** for the **Rotation angle**. The preview of the bending shape changes accordingly.



5 In the input options, click **Show selected bars**, select the bars you want to display and select ESC.

6 Right-click in the workspace and choose **Dimension Line, Label**. Place the dimension line and the label in the floor plan and select ESC to close the tool.

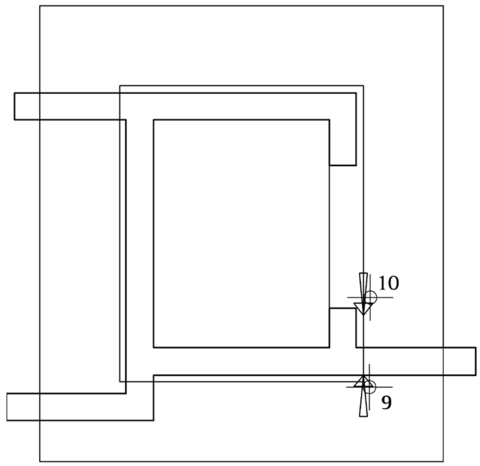
7 Use the **Copy and Mirror** tool to copy the reinforcement and its label to the transverse wall at the top. (Alternative: Use the same **Rotation angle** and place the bars in the transverse wall at the top.)

8 Click **Place Bar Shape** again and confirm the mark in the dialog line: mark 7.

The **Align** option is not selected; **Perpendicular** is selected for the rotation angle.

9 *Placing line from point:* Click the lower-right outer corner of the 30-cm shaft wall in the floor plan of the shaft walls.

10 *Placing line to point:* Click the point where the lower reveal and the 30-cm shaft wall intersect.



Allplan highlights the placing region in the floor plan of the shaft walls and displays the placement in the floor plan of the floor slab. As the starter bars for the wall are not within the clipping area of the shaft walls, all the bars are visible, regardless of the selected display mode.

11 Select ESC to finish.

12 Use the same approach to place the starter bars above the door opening. To define the first point of the placing line, click the point where the upper reveal and the 30-cm shaft wall intersect. To define the second point of the placing line, click the upper-right outer corner of the 30-cm shaft wall.

13 Select **Dimension Line, Label** in the **Repeat** drop-down list, click a bar in the placement you just created in the floor plan of the floor slab and place the dimension line and the label.

14 Create the dimension line and the label for the second placement and select ESC to close the tool.

15 Right-click one of the placements in the floor plan of the floor slab, click **Modify Placement Display Mode** on the shortcut menu and select **Show middle bar only**.

16 Allplan changes the look of the placement clicked. Click the second placement too. Then select ESC to close the tool.

You will now create and place a closed stirrup in the wall near the door opening.

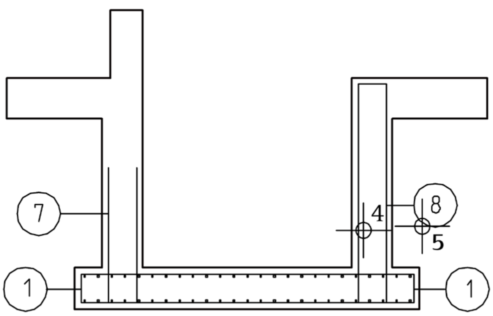
To create and place a closed stirrup in the door area

1 Open the **Repeat** drop-down list and click **Bar Shape**. Check the **Layers** palette to see whether the **BR_GEN** layer is selected. If it isn't, select it now.

2 Select the **Stirrup, closed** bending shape in the list box at the top of the **Bar Shape** palette.

3 Go to the parameter area of the palette, select a diameter of **12 mm** and enter **0.04** for the concrete cover.

4 Go to section A-A and hover over the left outer edge of the right wall until the open stirrup expands correctly; then click.



5 Select ESC and place the label for the bar in the section.

6 Here, automatic depth placement is not useful, as you will place the stirrups only around the door opening. Therefore, turn off the **Place automatically** option in the input options. The **Align** option is selected.

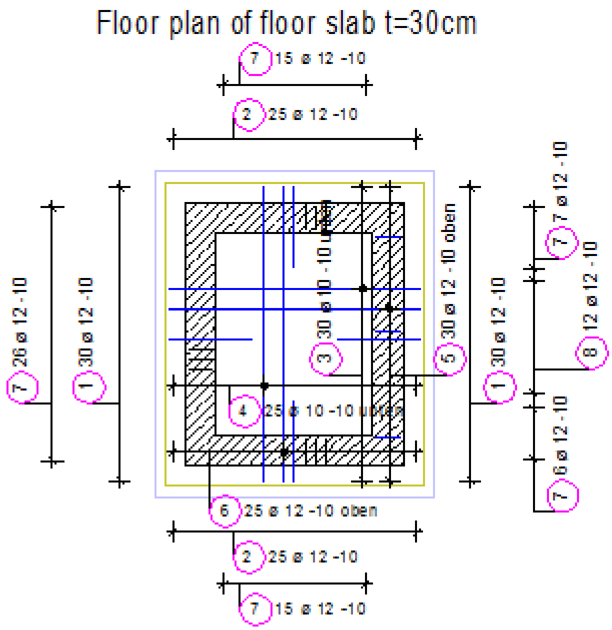
7 Define the placing line by clicking a corner of the upper reveal in the floor plan of the shaft walls and then the corresponding corner of the lower reveal.

8 Click **Dimension Line, Label** in the **Repeat** drop-down list and create dimension lines and labels for the placements in the floor plans.

9 Click **Modify Placement Display Mode** in the **Repeat** drop-down list, select **Show middle bar only** and click the placement in the floor plan of the floor slab.

10 Select ESC to close the tool.

This completes the starter bars for the walls.



Task 5: bar reinforcement for the walls

In the following part of the exercise, you will reinforce the walls as far as the top level of the floor slab (TL = -2.79). You will enter the reinforcement in the floor plan of the shaft walls.

Tools:

Bar Shape:
Freeform
Straight bar
L-shaped bar

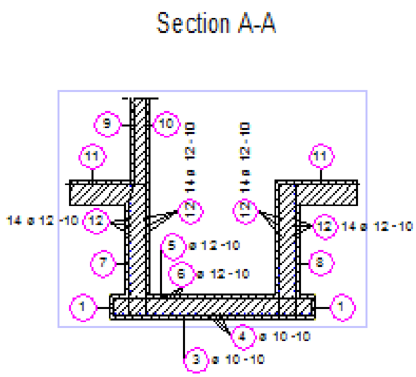
Place Bar Shape
Along placing line

Modify Clipping Path

Extrude Bars Along Path

Reinforcement Tools

Objective:



Tip: If you want to generate complex bending shapes (for example, bent-up bars for silos, towers or barrel roofs), you can convert a bending shape that was created with the tools in the **2D Objects** task area to a bar. To do this, use the **Convert, Match Elements** tool.
When converting, Allplan interprets the design entities as the center line of the bar. Bear this in mind when you create the design entities.

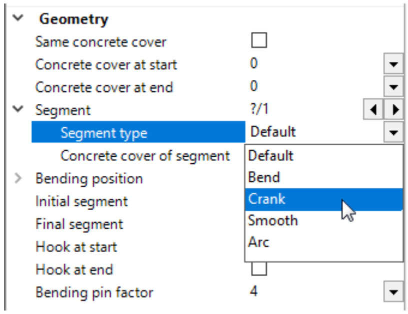
Due to the wall offset, you must create a cranked bar for the exterior wall reinforcement. You will create this bar manually with the **Freeform** bending shape of the **Bar Shape** tool.

To manually enter and place cranked bars

1. Select the **Bar Shape** tool again and select **Freeform**. Check the **Layers** palette to see whether the **BR_GEN** layer is selected. If it isn't, select it now.
2. Clear the **Same concrete covers** check box and enter **0.00** for **Concrete cover at start** and **Concrete cover at end**.
3. Click the arrow to the left of the **Segment** parameter and enter **0.04** for **Concrete cover of segment**.
4. Click the two outside corners of the upper-left wall in section B-B. Start at the top.

Tip: You can also define the segment type in the graphic.

5 Go to the parameter area of the palette, change the **Segment type** to **Crank** and click the point where the shaft wall and the upper floor slab intersect.

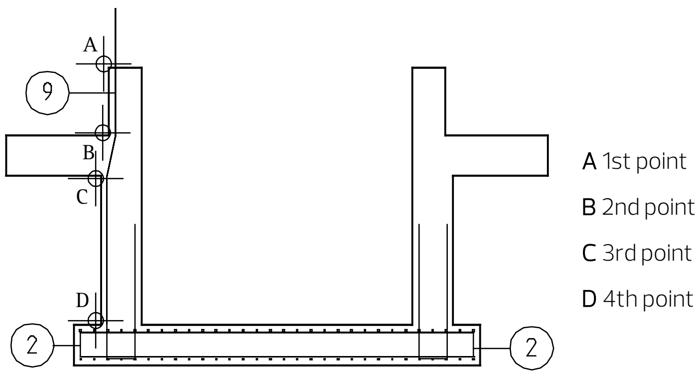


6 The segment type automatically switches back to **Default**. To define the last point, click the point where the shaft wall and the lower floor slab intersect.
Make sure that the preview of the segment is within the wall. To achieve this, you must approach the point from the outside.

7 Select ESC to finish entering the bending shape. Enter **0.95** for the length of the **Initial segment** and **1.10** for the length of the **Final segment**.

Note: To check or change the crank, select the **Segment** parameter, click to select the segment 2/3 and then click beside **Crank value**.

8 Select ESC and place the label for the bar in the section.



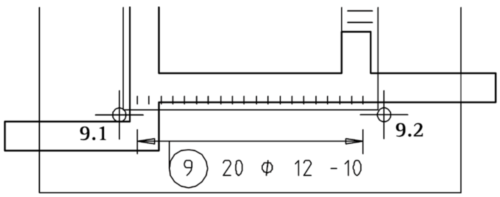
9 In this example, **automatic depth placement** would not be created where you need it. Therefore, do not change the setting of the **Place automatically** option in the input options (it is not selected!) and define the placing line in the floor plan of the shaft walls:

- *Placing line from point*: Click the lower-left outside corner of the 30-cm shaft wall.
- *Placing line to point*: Click the lower-right outside corner of the 30-cm shaft wall.

10 Clear the **Same concrete covers** check box in the parameter area of the palette. Taking the wall offset of 6 cm into account, enter **0.10** for **Concrete cover at start** and **Concrete cover at end**.

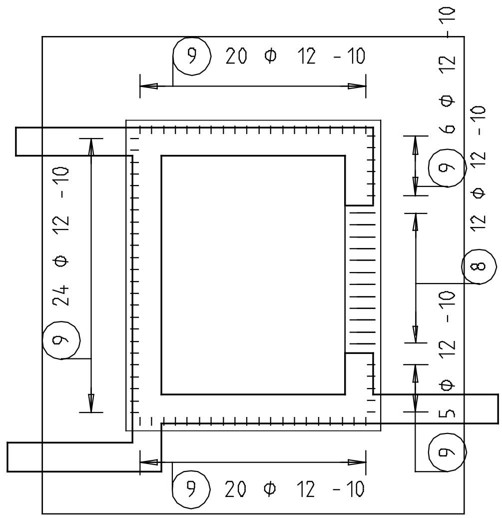
11 Select **Show all bars** in the input options. Open the shortcut menu and select the **Dimension Line, Label** tool.

12 Create the dimension line and label for the placement in the floor plan of the shaft walls. The result should now look like this:



Tip: After you have defined the placing region, switch to isometric view to check whether you have placed the cranked bar correctly. If the position of the bar is not correct, rotate the bar by selecting **Perpendicular+180°** for the rotation angle.

13 Place this mark in the floor plan of the shaft walls (not in the area near the door!) and apply labels. To select the bar you want to place, always click the bar shape in section B-B. Note that the concrete cover of the placement beside the reveal of the door is 0.04 instead of 0.10.
Turn off the **Align** option and select **Perpendicular** for the rotation angle.



14 To ensure that the wall reinforcement, which protrudes above the clipping area defined, is visible in its entirety, you will now modify the upper section border in the two sections. Go to the reinforcement model to the left of the sections. Double-click the clipping path of section B-B in the reinforcement model to open the **Modify Clipping Path** tool. Change the **Top level** to –1.7900 and **Close** the palette to confirm the change. Use the same approach to change the top level of section A-A.

To complete the vertical wall reinforcement, you will create and place a straight bar. In addition, you will insert an L-shaped bar in the upper floor slab.

To enter a straight bar and an L-shaped bar and to place them together

1 Open drawing file **201** (or **203**) in **reference mode**. Open the **Repeat** drop-down list, click **Bar Shape** and select the **Straight bar** bending shape.
Check the **Layers** palette to see whether the **BR_GEN** layer is selected. If it isn't, select it now.

2 Turn off the **Expand to adapt to edges** option in the input options.

3 Select diameter **12 mm**, turn off the **Same concrete covers** option, change **Concrete cover 1** to **0.04** and change **Concrete cover at start** and **Concrete cover at end** to **0.00**.

4 To define the starting point, click the corner of the left inside edge of the shaft wall (see figure) in section B-B.

5 Enter **0.00** for the **x-coordinate** in the dialog line and **2.40** for the **y-coordinate**. Select the Enter key to confirm.

6 This creates the bar with the mark number **10**. Select ESC and place the label for the bar in the section.

7 Select ESC, as you do not want to place the bar now.

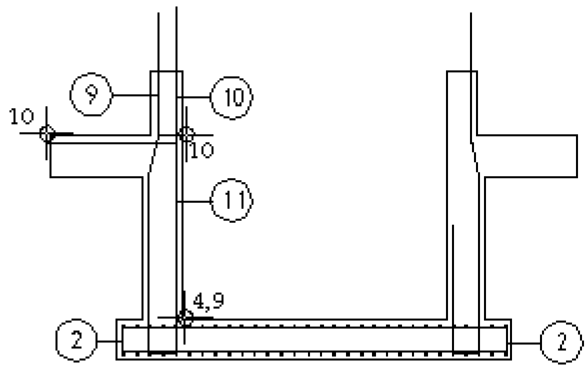
8 The **Bar Shape** tool is still open. Select the **L-shaped bar** bending shape.

9 Here, too, click the corner of the left inside edge of the shaft wall in section B-B to define the starting point.

10 To define the other points, click the point where the inside edge of the shaft wall and the top level of the upper floor slab intersect and then click the upper-left end point of the floor slab.

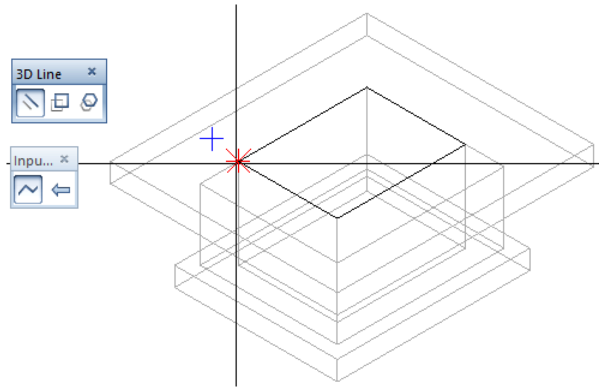
11 Select diameter **12 mm**, change **Concrete cover** to **0.04** and enter **1.00** for segment lengths 1 and 2.

12 Select ESC and place the label for the bar in the section. Then select ESC twice to stop placing the bar and to close the tool.



13 Click **Front Right, Southeast Isometric View** on the viewport toolbar, open the **Layers** palette and switch the BR_GEN layer to **Hidden, frozen**.

14 Select the **Modeling** task on the **Actionbar** and click **3D Line** (**3D Objects** task area). Create a 3D polyline along the inside edges of the shaft wall at the height of the upper floor slab. Finally, select ESC to close the tool.



15 Change the layer BR_GEN back to **Modifiable** and click **Plan** on the viewport toolbar.

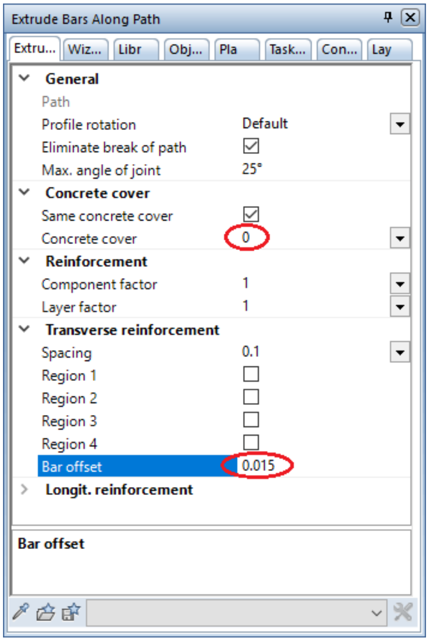
16 Right-click any bar and select **Extrude Bars Along Path** on the shortcut menu.

17 *Select reinforcing bars to extrude:* Go to section B-B and select marks **10** and **11** by means of the **Brackets** (**Actionbar - Work Environment** task area).

18 *Element for path:* Click the 3D polyline you just created.

Allplan displays the placement in the reinforcement model and in all sections.

19 Go to the **Extrude Bars Along Path** palette and select **0.00** for the concrete cover and **0.015** for the bar spacing.
You can leave the other settings as they are. As you do not place longitudinal reinforcement, you can ignore the parameters in this region.



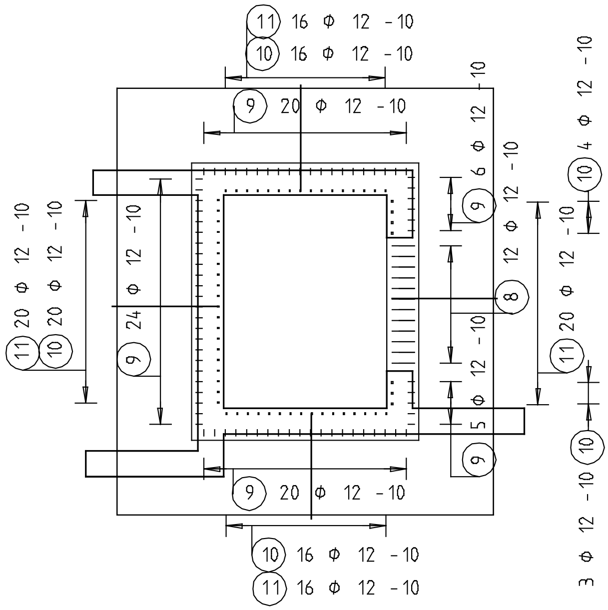
20 Select ESC to create the placement.

21 L-shaped bars are required near the door. Therefore, **Delete** (**Actionbar - Edit** task area) the straight bars (mark **10**) placed on the inside.
To do this, enclose the bars in a selection rectangle you open from left to right (if the **Select elements based on direction** setting is selected) or select the **Fully bounded selection** option on the **Actionbar - Work Environment** task area.

22 Right-click an L-shaped bar placed, select **Modify Placement Display Mode** on the shortcut menu and click **Show middle bar only** in the input options.

23 Click all the L-shaped bars placed and select ESC.

24 Use the **Dimension Line, Label** tool on the shortcut menu to label marks **10** and **11** as shown in the illustration.



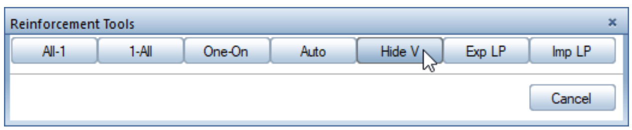
The floor plan of the floor slab also includes marks 9 and 10. You will now hide the wall reinforcement in this area.

To hide reinforcement placed

1 Select the **Reinforcement** task on the **Actionbar** and click **Reinforcement Tools** (**Bar Reinforcement** task area – **Modify Placement Display Mode** flyout menu).

2 Click **Hide V** (hides selected reinforcement in one view).

Tip: Click All-1 to show hidden reinforcement again.



3 In the floor plan of the floor slab, click all the bars of the wall reinforcement you want to hide.

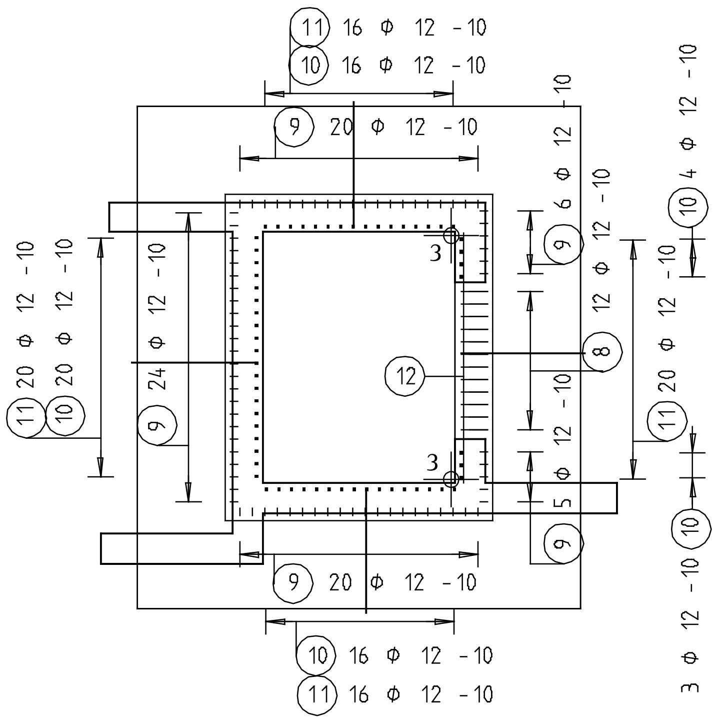
Next, you will create horizontal bars as straight bars. They will be entered in the floor plan of the shaft walls and placed in the sections.

To create and place horizontal bars for the transverse reinforcement

1 Double-click a mark (**10**, for example) in the floor plan of the shaft walls with the right mouse button to open the **Bar Shape** tool. Select the **Straight bar** bending shape.

2 Change the value for **Concrete cover 1** to **0.055**, as the bar is to be within the transverse reinforcement.

3 Start at the top and click the inside corners of the right shaft wall in the floor plan of the shaft walls. The bar is visible in the preview. Select ESC and place the label for the bar.



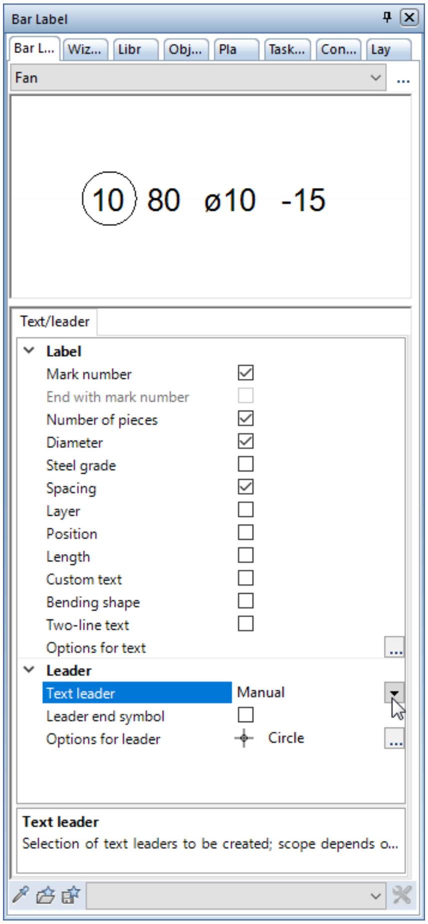
4 Place the bar in section A-A. **Place automatically** is not selected in the input options.
Select the **Align** option and the **Show all bars** option.

5 Click the upper and lower wall corners on the right side. Go to the parameter area of the palette and enter **0.055** for **Concrete cover at start** and **0.02** for **Concrete cover at end**.

6 Select ESC twice to close the tool and to start the **Dimension Line, Label** tool.

7 Select a different dimension line for the label of mark **12**: Select the **Fan** dimension line type in the **Bar Label** palette.

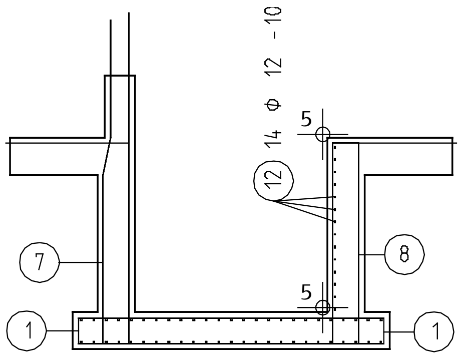
8 Define the parameters so that the number of pieces, diameter and spacing are included and change the setting for the text leader to **Manual**.



9 Select the **Options for text** parameter and click [...], enter **1.00** for the aspect and click **OK** to confirm.

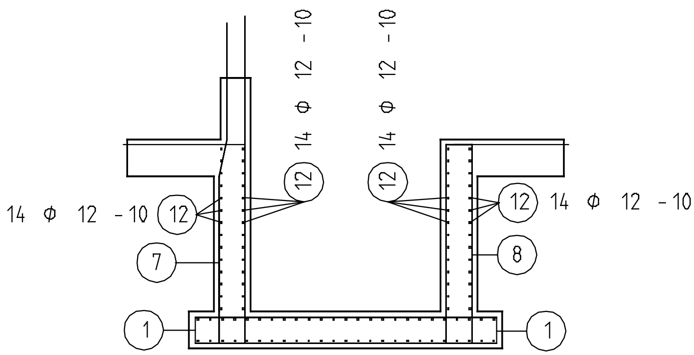
10 Place the label and click all the bars to which leaders are to be drawn.

11 Select ESC twice to close the tool.



12 You can now place mark 12 along the other vertical bars or you can copy and mirror the placement:

Tip: If you consider the spacing between the mark border and label to be too large, open the **Options – Reinforcement – Labels** page and change the space after the mark to "0" (in the preview for **Bar reinforcement** at the top of the page).



13 Now use the same procedure to create horizontal reinforcement for the transverse side. To enter the bending shape, select **Expand to adapt to edges** in the input options. Define a new placing line in the area of the shaft wall in section B-B. The starting point of this new placing line is at the top and the end point at the bottom. Finally, hide the transverse reinforcement in the floor plan of the floor slab.

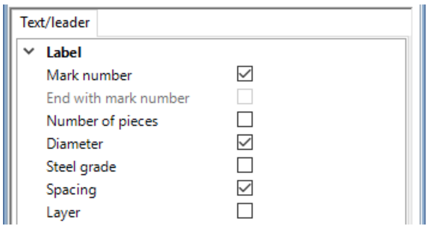
Next, you will complete the labels in the sections and floor plans. Start with section A-A.

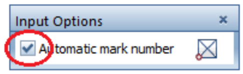
To label reinforcing bar placements later

Tip: If you want to modify an existing label, click it and open the **Properties** palette. Change the settings in the parameter area of the palette and click in the workspace to finish.

1 Right-click mark **3** (lower longitudinal reinforcement in the floor slab) in section A-A and select **Label** on the shortcut menu.

2 Select the **Diameter** and **Spacing** parameters and place the label. **Automatic** is selected to the text leaders. As **Automatic mark number** is selected in the input options, the program places the mark number at the beginning or end depending on the position of the label. If you want, you can turn off this option.



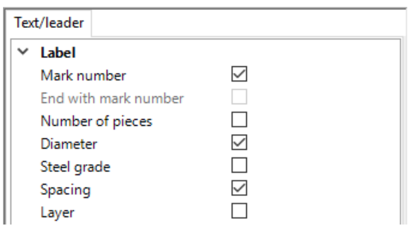


3 Click mark **5**, check the settings, place the label and select ESC.

4 Right-click mark **4** and select **Dimension Line, Label** on the shortcut menu.

The **Fan** dimension line type is selected from the label of the horizontal reinforcement. In addition, **Manual** is selected for the text leaders.

5 Turn off the **Number of pieces** parameter and place the label.



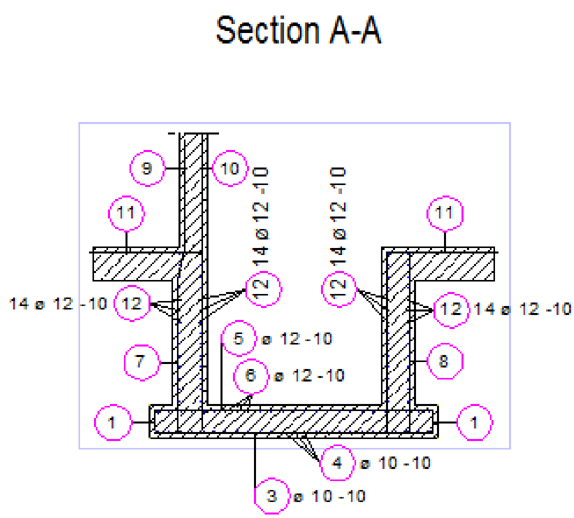
6 Click all the bars that are to get leaders.

7 Select ESC to finish placing leaders.

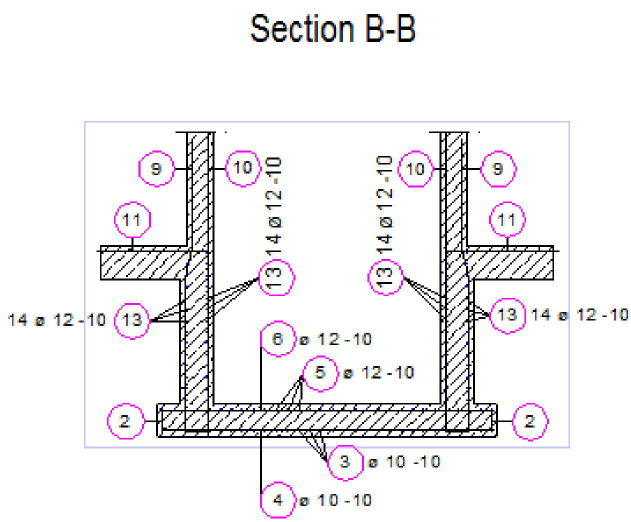
8 Click mark **6**, check the settings and place the label.

9 Click all the bars that are to get leaders and select ESC to finish.

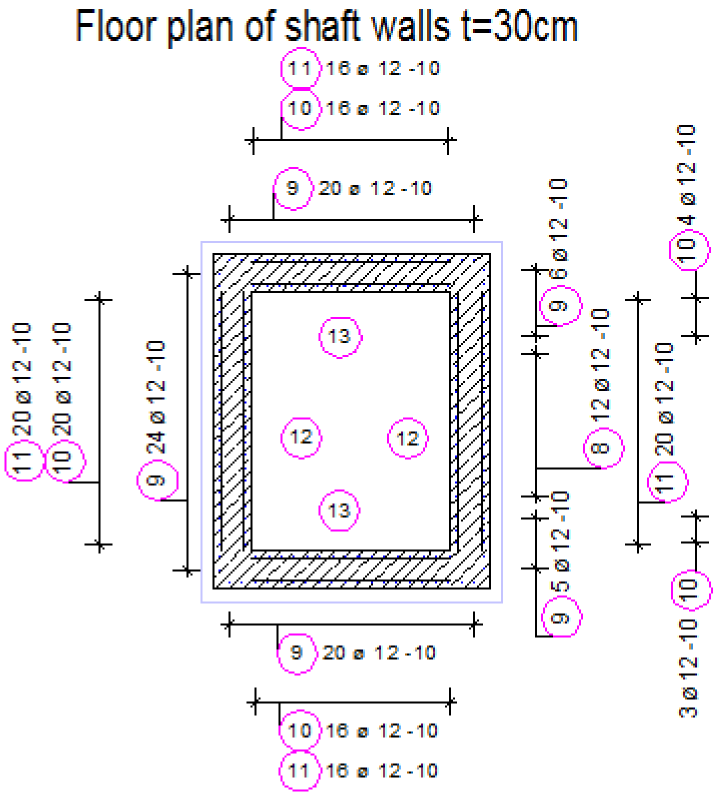
10 Click **Label** in the **Repeat** drop-down list and label marks **9**, **10** and **11**. Turn off the **Diameter** and **Spacing** parameters. **Automatic** is selected to the text leaders.



11 Now create the labels for section B-B as shown in the illustration:



12 Complete the labels in the floor plan of the shaft walls as shown in the illustration:



Now you have reinforced the elevator shaft except the horizontal corner reinforcement, which you will display with a PythonPart. Finally, you will define the clipping area of the shaft walls.

To modify the clipping area

1 Right-click the view border in the floor plan of the shaft walls and select **Modify Section** on the shortcut menu.

2 The **Modify Section** palette opens. In the **Representation** area, select the **Show clipping path** option and apply the change by clicking **Apply** and **Close**.

3 Double-click the visible clipping path and change the **Top level** of the section object to
-3.1000 and the **Bottom level** to **-3.4000**.

4 To confirm the changes, **Close** the palette. Then, open the **Show Clipping Path** tool and hide the clipping path.

Task 6: standard section

In this part of the exercise, you will learn how to place PythonParts with reinforcement.

Tools:

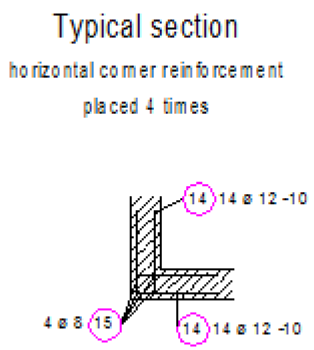
Library

Move

Modify Format Properties

Modify Number Off Factors

Objective:



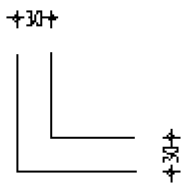
By using PythonParts, you assign placement quantities to the reinforcement without having to place the bars in a specific region. Consequently, you can display the reinforcement in a view only.

This placing mode is useful for displaying standard details. The three-dimensional reinforcement component ensures that the bar lengths and quantities will be managed automatically.

To create a standard section with a three-dimensional PythonPart

➲ Drawing file **204** is current; drawing file **201** (or **203**) is open in reference mode.

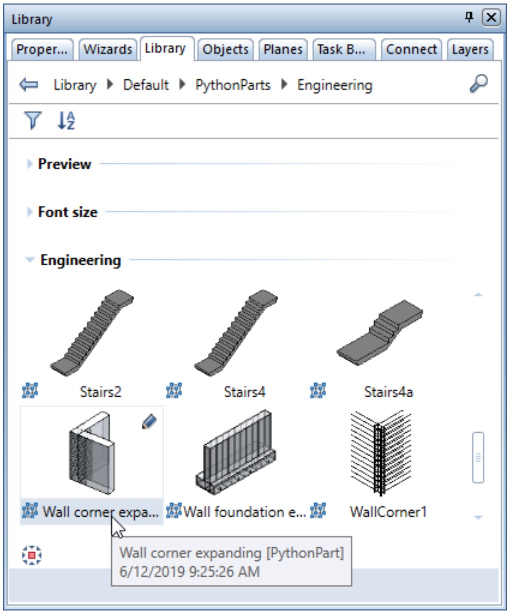
1 Use the tools in the **Design** and **Label** tasks (for example, **Quick Access** task area of the **Reinforcement** task) to draw a wall corner to the right of the floor plan of the shaft walls. Label this standard section and select style area **301 Reinforced concrete** (see following illustration).



2 Open the **Layers** palette and switch the BR_GEN layer to **Hidden, frozen**. This helps you place the PythonPart within the model data.

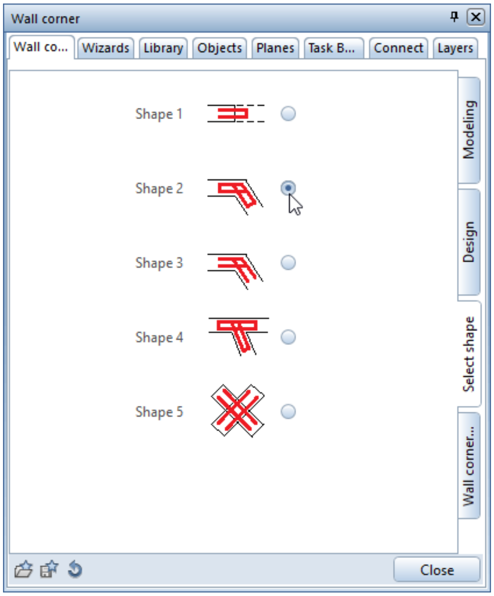
3 Open the **Library** palette and the **Default - PythonParts - Engineering** folders.

4 Double-click the **Wall corner expanding** PythonPart.

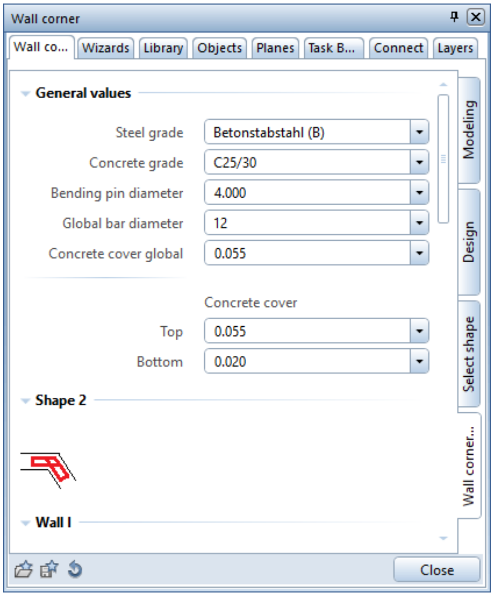


5 Check the **Modeling** tab to make sure that the **Save as a PythonPart** option is selected.
Do not change the other settings on this tab and on the **Design** tab.

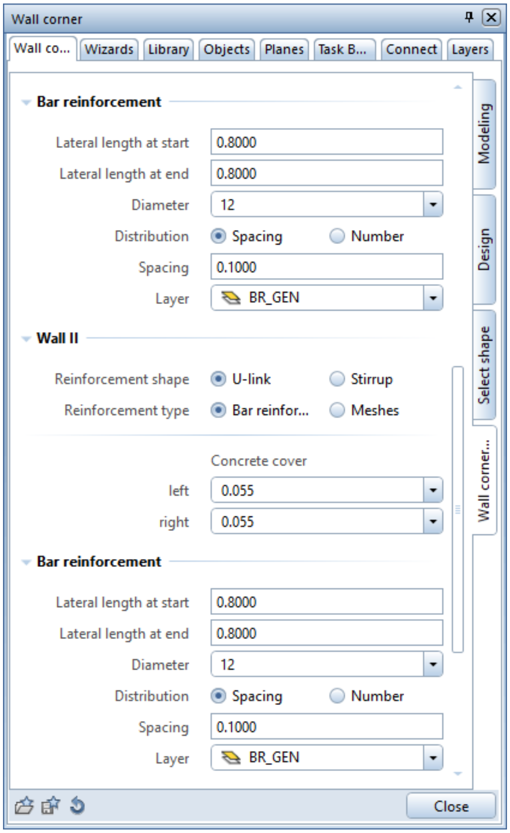
6 Open the **Select shape** tab and select **Shape 2**.



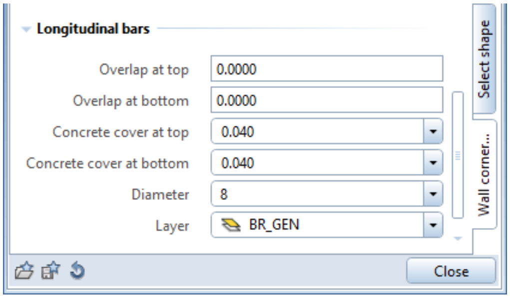
7 Switch to the **Wall corner reinforcement** tab, enter **0.055** for the global **concrete cover** and change the concrete covers at the **Top** and **Bottom** to **0.040**.
Do not change the other values or the global bar diameter.

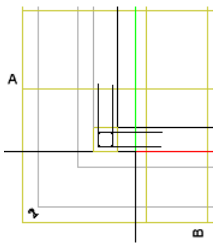


8 Check the concrete covers and the bar diameter for **Wall I** and **Wall II**. Enter **0.80** for the **lateral lengths at start and end**. In addition, select the **Spacing** option for the **Distribution** and enter **0.10**.



9 To define the **longitudinal bars**, which are used for assembly only, change the bar diameter to **8** and the concrete cover at bottom to **0.020**. Do not change the values for the projection at top and bottom.

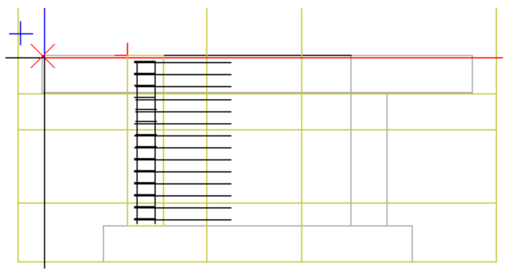




10 Go to the 3D model of the elevator shaft and point to the outer edge of the shaft wall at the bottom. Wait until the reinforcement of the wall corner automatically fits into the lower-left corner. Then, click.

11 Go to the 3D model of the elevator shaft and click the middle **Point handle** in the wall corner.
Before you click this point handle, have a look at the sections A-A and B-B and check whether the upper-left **Point handle** has an arrow that points up. As an alternative, you can also select the required **Point handle** in any isometric view.

12 Click **Front, South Elevation** on the viewport toolbar. Point to the top level of the floor slab and click.

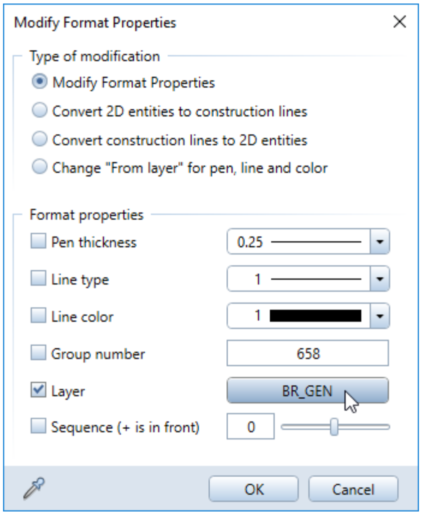


13 Select ESC to finish creating the PythonPart and select **Plan** view on the viewport toolbar.

14 **Move** the PythonPart into the 2D design you created to the right of the floor plan of the shaft walls. Open the **Layers** palette and change the BR_GEN layer back to **Modifiable**.

15 Select **Rearrange Marks** (**Bar Reinforcement** task area) and click **OK** to assign the same mark numbers to the open stirrups and the longitudinal bars.

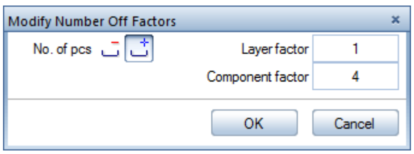
16 Click **Modify Format Properties** (**Actionbar – Change** task area), click the **Layer** button and select the **BR_GEN** layer.



17 Click **OK** to confirm the dialog box and select the entire standard section including its label. Then, select ESC to close the tool.

18 As the wall corner exists four times, click **Modify Number Off Factors** (**Actionbar – Bar Reinforcement** task area).

19 *Select placed reinforcement to modify factor:* Select the entire reinforcement of the standard section, enter **4** for the **Component factor** and click **OK** to confirm.



20 Open the **Repeat** drop-down list, click **Dimension Line, Label** and label the horizontal bars (mark **15**) by enclosing them in

a selection rectangle. Select **Number of pieces** and **Diameter** for the label parameters and **Automatic** for the text leaders.

21 In addition, label the open stirrups by selecting the **Number of pieces**, **Diameter** and **Spacing** parameters.

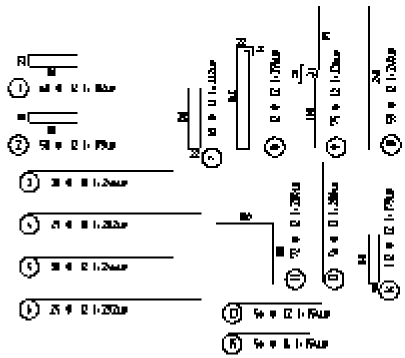
Task 7: bar schema

The following part of the exercise involves creating bar schemas. You will create full schemas to scale and place them beside the design.

Tools:

Full Schema

Objective:



The partial and full schema tools provide a way of displaying the internal number-off and bending shape management in the reinforcement drawing. You can place a schema bar and label for every mark in the drawing file. The program updates the schema automatically to reflect any changes you make to the placed reinforcement or bending shapes.

There are two types of schema:

- **Full Schema**
  Number off information on all the placements of a mark
- **Partial Schema**
  Number off information on one placement of a mark

The bending shape can be drawn to scale or not. You can align the bending shape with the placement.

To create a full schema

1 Click Full Schema (**Actionbar** – **Bar Reinforcement** task area).

2 Select **Meshes** or **Rebars** in the input options and enter the number of the mark of which you want to create a full schema. As an alternative, click the mark or placement.

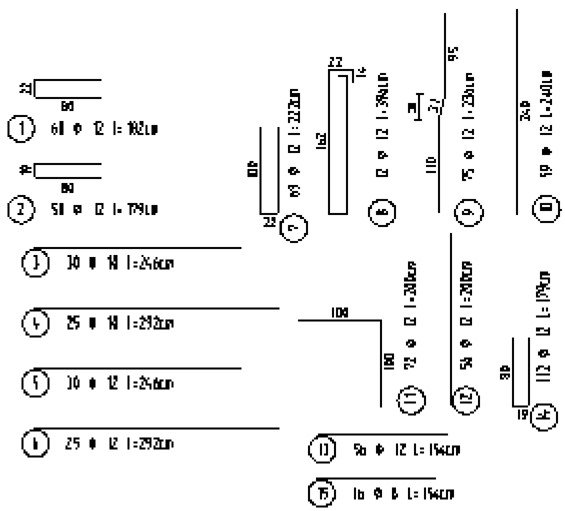
Tip: If you have deleted a bar, the bar's mark number will remain 'unassigned'. You can use **Rearrange Marks** to close this "gap".

3 Enter the settings as shown in the illustration.

4 The schema and its label are attached to the crosshairs. You can use the **Rotate** and **Mirror** options to specify how the bars are positioned. Place the schema to the right of the sections.

5 Create the other bar schemas yourself. For straight bars, you can turn off **Segment dimensioning**. Define the text angle so that it matches the position of the bar shape.

Tip: If you consider the spacing between the diameter and length to be too small, open the **Options – Reinforcement – Labels** page and insert a space in front of the length ("L=" in the preview for **Bar reinforcement** at the top of the page).



Task 8: reinforcement schedule and bending schedule

The last part of this exercise involves creating a reinforcement schedule and a bending schedule.

Tools:

Reinforcement Reports

Reinforcing Bar Legend

Objective:

Bar schedule - bending shapes

Mark	Pcs	ø [mm]	Single length [m]	Dimensioned bending shape (not to scale)	Total length [m]	Mass [kg]
1	60	12	1.82	220 / 800	109.20	96.97
2	50	12	1.79	190 / 800	89.50	79.46
3	30	10	2.46	2460	73.80	45.53
4	25	10	2.93	2920	73.00	45.04
5	30	12	2.46	2460	73.80	65.53
6	25	12	2.93	2920	73.00	64.82
7	69	12	2.22	200 / 1000	153.20	136.02
8	12	12	3.99	155 / 220 / 1820	47.90	42.52

While you are working, the program creates reinforcement schedules in the background. They are always up to date. You can also print them whenever you need.

Start by printing the bar reinforcement schedule, which Allplan 2020 has created automatically in the background.

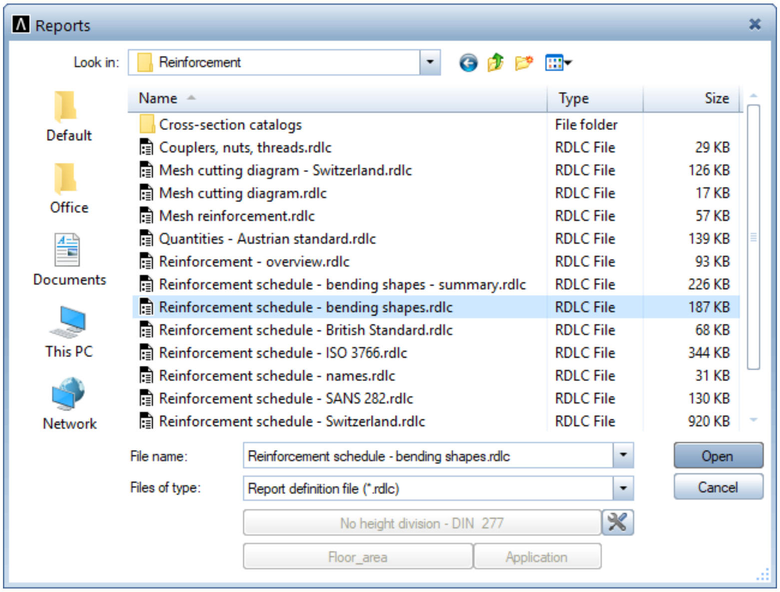
To output a bar reinforcement schedule

1 Click **Reinforcement Reports** (**Actionbar – Bar Reinforcement** task area).

2 Allplan opens the **Reports** dialog box, where you can select predefined reports.
Click the **Default** folder on the left side and select the **Reinforcement schedule – bending shapes** report.

Tip: Parameters relevant to marks (like number off value, steel grade, diameter and individual length) are saved for reports.

You can create reports both in document edit mode and in layout edit mode.



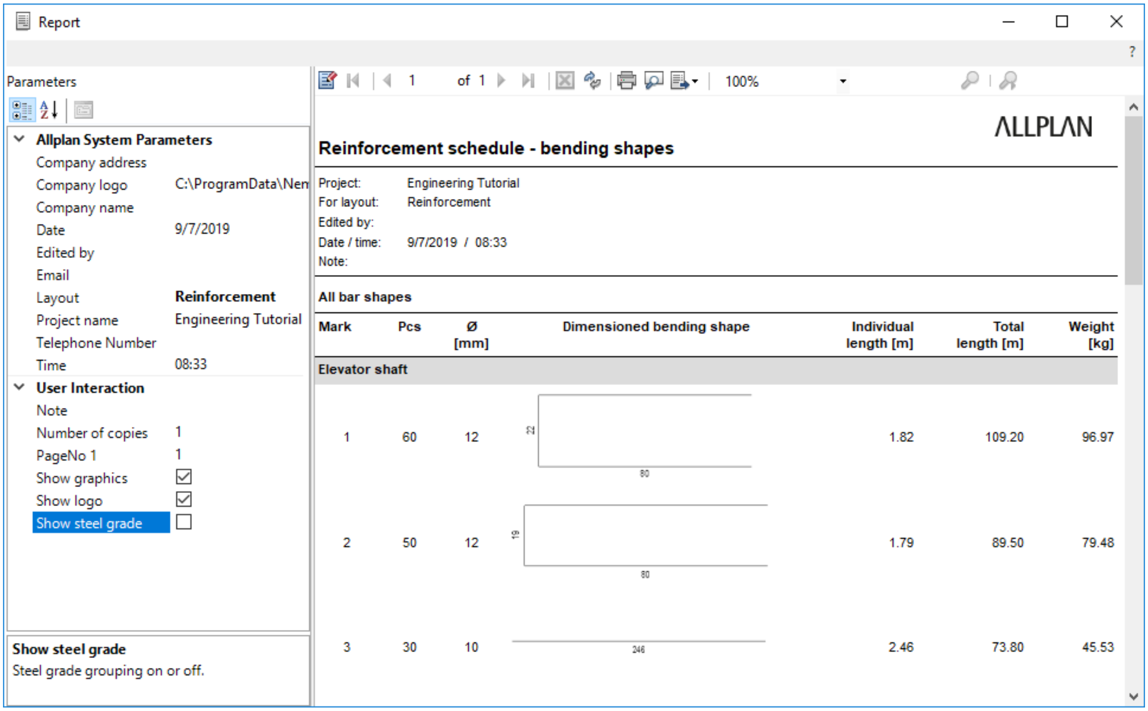
3 Click **All** in the input options.

The report appears in Report Viewer. Some attributes, such as the project, will be used automatically.

Tip: Click the dimensioned bending shapes in **Report Viewer** – **Print Preview** to modify them in the workspace.

4 Enter **Elevator shaft – reinforcement drawing** for the **Layout** parameter. When you work in layout edit mode, the program automatically takes this attribute from the layout name.

5 Clear the **Show steel grade** check box, as there is only one steel grade in the layout.



6 Click **Print**, select the printer and start printing.

Note: In Allplan 2020, you can place bending schedules in layouts. To print a bending schedule, you can use the **Reinforcement schedule – bending shapes** report in the **Reinforcement Reports** tool.

Next, you will place the bending schedule in the drawing file.

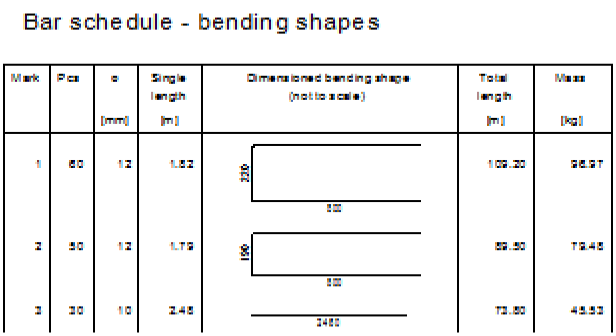
To place the bending schedule in the drawing file

1 Click **Reinforcing Bar Legend** (**Actionbar – Bar Reinforcement** task area – **Reinforcement Reports** flyout menu).

2 Select the legend you want to use.

3 Select the **Associative legend of active document** option and click **OK** to confirm the **Legend selection** dialog box.
When this option is selected, the program updates the bending schedule automatically when you add or delete marks later.

4 Place the bending schedule in the workspace.
A section of the cutting diagram looks like this:



Bar schedule - bending shapes

Mark	Pcs	ø [mm]	Single length [m]	Dimensioned bending shape (not to scale)	Total length [m]	Mass [kg]
1	60	12	1.82	220 / 800	109.20	96.97
2	50	12	1.79	190 / 800	89.50	79.48
3	30	10	2.46	2460	73.80	45.53

5 Switch to the **Properties** palette – **Format** area and define the **DEFAULT** layer as the current one.

Printing layouts is covered in exercise 9.

Exercise 5: 2D door lintel with a 3D model (method 2)

Requirements:

Allplan 2020 Engineering comes in different packages.

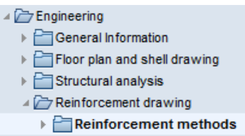
Check whether the **Reinforcement** task of the **Engineering** role contains the **Bar Reinforcement** and **Sections** task areas.

Check the **Actionbar** to see whether the program contains the following tools:

Bar Shape

In exercise 4, you reinforced a 3D general arrangement drawing and created a 3D model (method 1, see Tip).

Tip: Look in the Allplan Help for information on the reinforcement methods and the 3D reinforcement model:



In the following exercise, you will create a precast element of a reinforced door lintel as a symbol. You will reinforce a 2D general arrangement drawing and create a 3D model at the same time (method 2, see Tip). To do this, you will use an auxiliary 3D solid.

This approach is particularly useful with complex components you do not want to model in detail.

Start by selecting fileset **3** with the following drawing files:

Fileset	Drawing file number	Drawing file name
3	301	2D general arrangement
	302	Bar reinforcement with 3D model
	303	Modified door lintel
You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").		

Task 1: designing a reinforced door lintel

First, you will use the tools in the **Design** task to create an elevation and a section as the general arrangement drawing for a precast door lintel. So that you can create the reinforcement with a 3D model, you need an additional 3D solid that is parallel to the coordinate planes and that has the dimensions of the precast element. To do this, you will use the **Box** tool. Based on this auxiliary 3D solid, you will then create an auto-updating view and place this view so that the 2D section and this view are congruent.

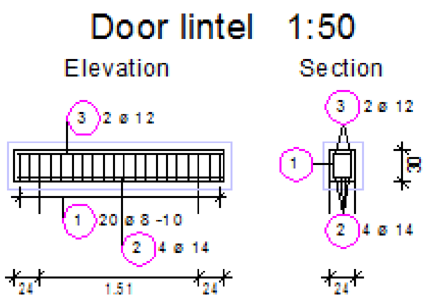
After this, you will apply reinforcement with the tools in the **Bar Reinforcement** task area. You can find these tools on the **Actionbar** and on the shortcut menu.

Finally, you will delete the auxiliary 3D solid and save the precast door lintel as a symbol in the library.

Tools:

- Box
- Create view
- Options
- Bar Shape:
  Stirrup, closed
  Straight bar
- Place Bar Shape
  Along placing line
  Along placing segment
  Single placement
- Dimension Line, Label
- Modify View
- Library

Objective:



Draw the outline without switching to a different task on the **Actionbar**.

To draw the outline in 2D

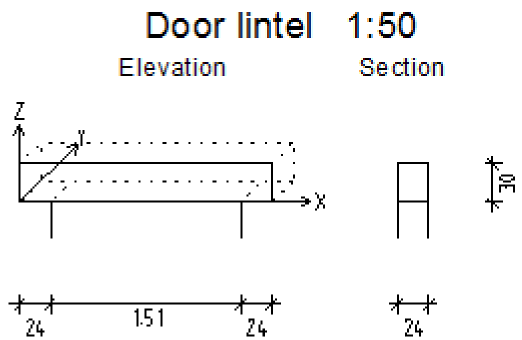
1 Go to the **Actionbar** and select the **Engineering** role - **Reinforcement** task.

2 Click **Open on a Project-Specific Basis** (Quick Access Toolbar), open the drawing file tree for fileset **3** and double-click drawing file **301**.

3 Click the current **scale** on the status bar and select **1:50**. Make sure the unit of length is **m**.

4 Use the tools in the **Design** task to create the design as shown in the illustration. Select pen thickness **0.35** mm for the elevation and **0.50** mm for the section. Use the **Rectangle** and **Line** tools (**Repeat** drop-down list on the Quick Access Toolbar or **Quick Access** task area).

Assign the layer **DE_GEN02** to the elements. To do this, go to the **Properties** palette - **Format** area, open the **Layer** drop-down list and click the **DE_GEN02** layer.



You do not need to draw the coordinate system and the 3D view (shown as dashed lines), which serve as an aid to orientation.

5 Double-click the middle mouse button in the workspace to restore the full view.

Next, you will create a box as an auxiliary 3D solid. Based on this solid, you will generate an auto-updating view.

To create an auxiliary solid for the 2D drawing

1 Make drawing file **302** current and open drawing file **301** in edit mode.

2 Use **Box** (**Repeat** drop-down list on the Quick Access Toolbar or **Modeling** task - **3D Objects** task area) to create a box of 1.99 x 0.24 x 0.30 m that is parallel to the coordinate planes. Place this box so that it is below the elevation and aligned with it.

3 If you want to create the reinforcement model at a specific height, move the box by the corresponding value in the z-direction.

4 Use **Create View** (**Actionbar** - **Reinforcement** task - **Sections** task area - **Create Section** flyout menu) to create a view of the box. Select a lateral viewing direction and make sure you create an auto-updating view.

5 Select the **Left, West Elevation** view and check the settings.

6 Turn off the **heading** and place the view so that this view and the section of the 2D drawing are congruent. Finally, select ESC to close the tool.

Next, you will create and place stirrup reinforcement for the beam. If you enter the bar shape in a 2D general arrangement drawing, Allplan cannot define the spatial orientation of the reinforcement. Therefore, you must select an existing view. However, there is no view, because you are about to create the first reinforcement element. So you will use an auxiliary 3D solid instead.

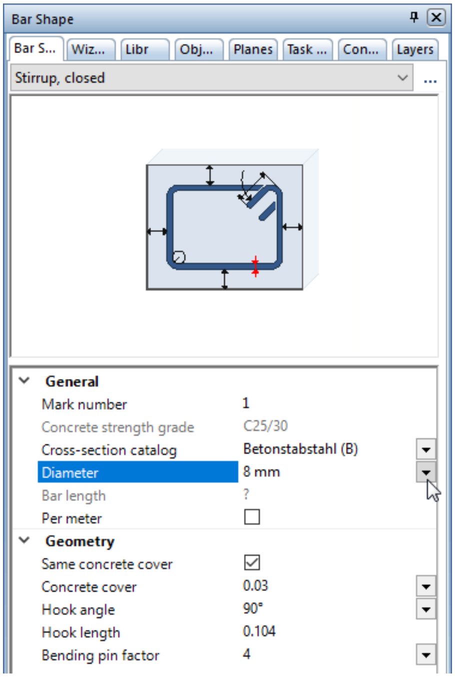
The **BR_GEN** layer is proposed for bar reinforcement. You can use this layer, as it is not necessary to differentiate between the upper and lower reinforcement layers.

To manually create and place stirrup reinforcement

1 Open the **Default Settings** drop-down list on the Quick Access Toolbar and click **Options**. Select the **Reinforcement** page and check that the **Reinforce with 3D model** option is selected in the **General** area.

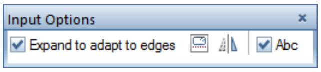
2 Click **Bar Shape** (**Actionbar - Bar Reinforcement** task area). Check the **Layers** palette to see whether the **BR_GEN** layer is selected. If it isn't, select it now.

3 Select the **Stirrup, closed** bending shape in the list box at the top of the **Bar Shape** palette.

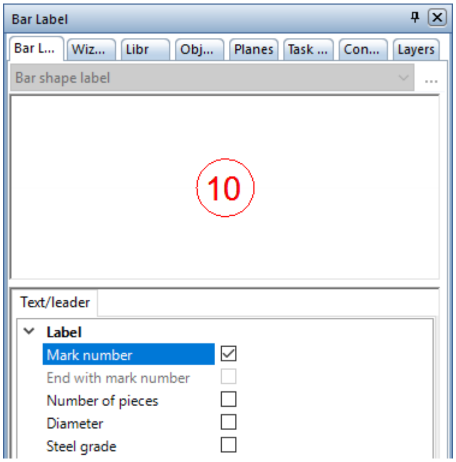


4 Go to the parameter area of the palette, select a diameter of **8 mm** and enter **0.03** for the concrete cover.
You can leave the other settings as they are.

5 The **Expand to adapt to edges** and **Label** options are selected in the input options. In the section, point to the left component line within the outline until the bending shape expands, then click in the workspace.



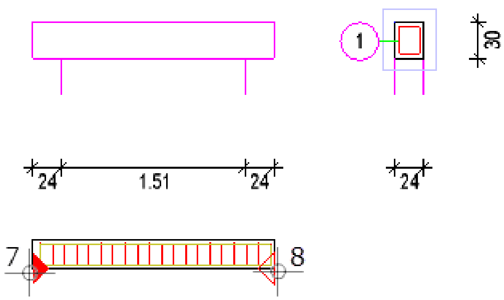
6 Select ESC to start the **Label** tool and place the bar label in the section. Define the parameters so that you can see the mark number only.



The **Place Bar Shape** tool opens automatically.

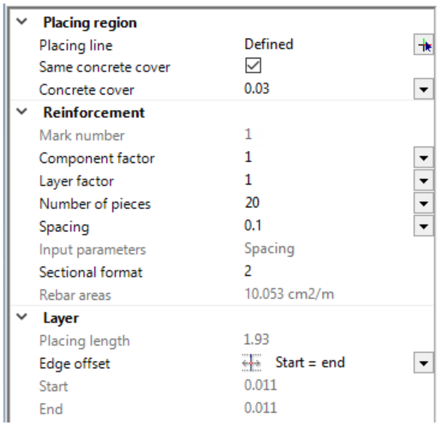
7 *Placing line from point:* Click the lower-left corner of the box.

8 *Placing line to point:* Click the lower-right corner of the box.



Tip: You can change the placement display mode immediately in the input options or later by using **Modify Placement Display Mode**.

9 Go to the parameter area of the **Place Bar Shape** palette, select the **Same concrete covers** option and enter **0.03** for **Concrete cover**. Change the spacing to **0.10**. You can leave the other settings as they are.



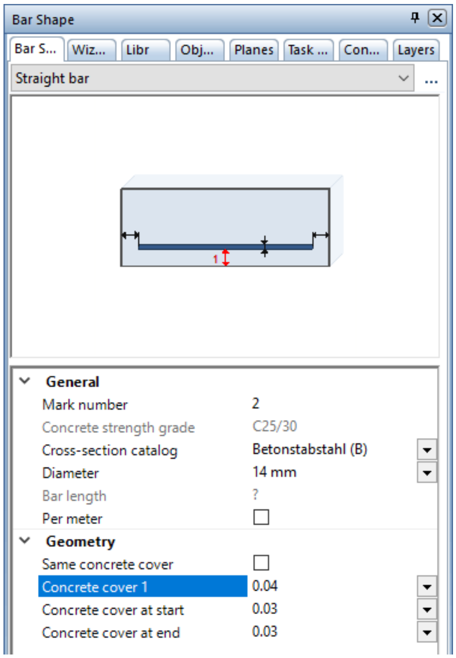
10 Select ESC twice to close the tool and to start the **Dimension Line, Label** tool.

11 Select ESC twice to skip labeling the model and to close the tool.

Next, you will create and place the longitudinal reinforcement of the beam based on the stirrup reinforcement you just entered.

To create and place longitudinal reinforcement at the bottom

1 Click **Bar Shape** again (**Actionbar – Bar Reinforcement** task area).



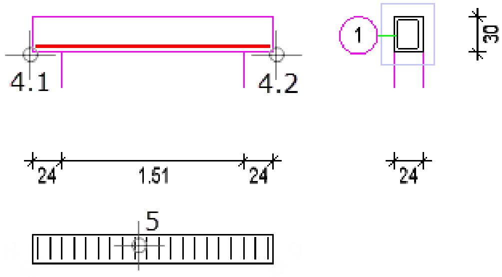
2 Select the **Straight bar** bending shape in the list box at the top of the **Bar Shape** palette.

3 Select diameter **14 mm**, clear the **Same concrete covers** option, change the **Concrete cover 1** to **0.04** and change the **Concrete cover at start** and **Concrete cover at end** to **0.03**.

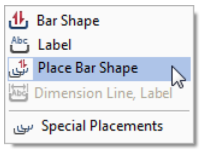
4 Turn off the **Expand to adapt to edges** option in the input options and click the two bottom corners of the beam in elevation view.

5 *Select view:* Click the stirrups you placed in the box.
This creates the bar.

If you want, you can still change all the parameters except the bending shape.

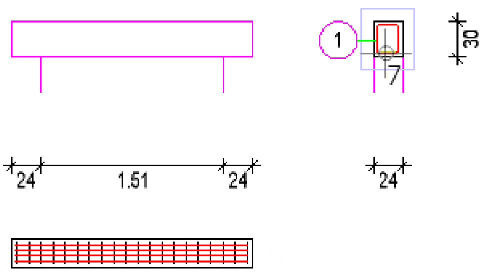


6 Right-click in the workspace and select **Place Bar Shape** on the shortcut menu.

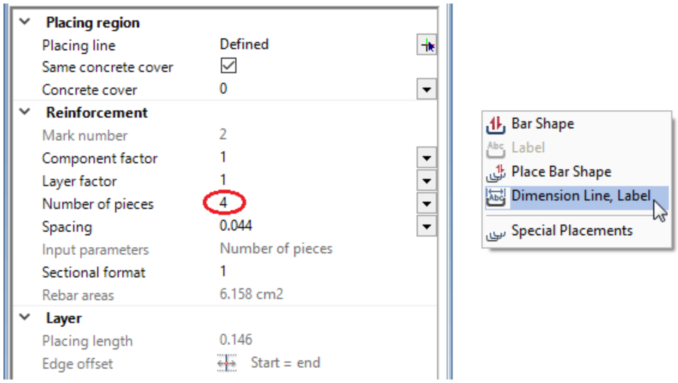


7 Click **Segment** in the input options and click the bottom stirrup leg in the section (see following illustration).

Allplan moves the longitudinal bar into the box.

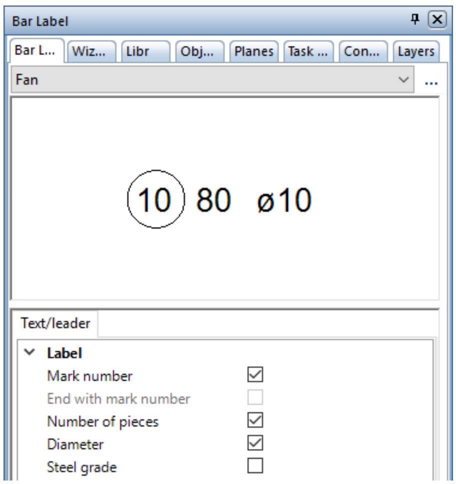


8 Go to the parameter area of the **Place Bar Shape** palette, enter **4** for the **Number**, right-click in the workspace and select **Dimension Line, Label** on the shortcut menu.



9 Select the **Fan** dimension line type. Define the parameters so that the number of pieces and diameter are included and change the setting for the text leader to **Automatic**.

Note: If you have not yet worked through exercise 4, you must change the aspect to **1.00** by clicking to the right of **Dimension line options**.



As **Automatic mark number** is selected in the input options, the program creates the mark number at the beginning or end of the label depending on the drop-in point.

10 Place the label below the bars. The system automatically draws leaders to all the bars.

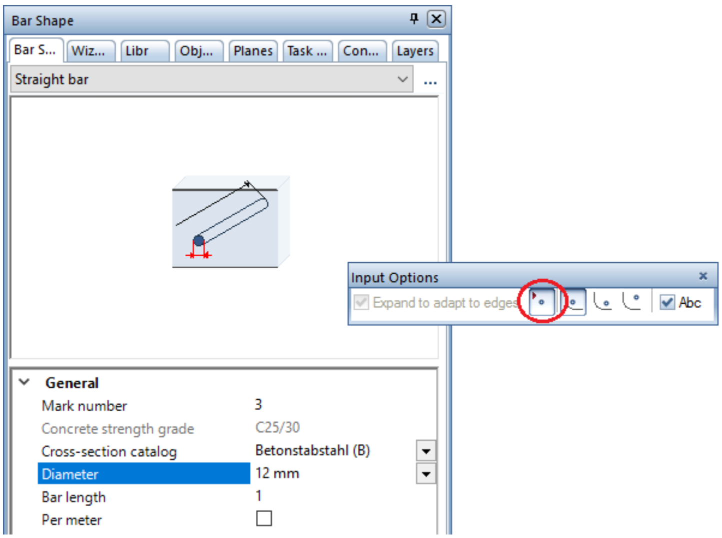
The next step is to enter top longitudinal reinforcement. You will learn about an approach that is particularly useful for reinforcing components in section or plan without creating an additional view.

To create the top longitudinal reinforcement in the section and to place the reinforcement freely in the view

1 The **Bar Shape** tool is still open. If this is not so, select this tool in the **Repeat** drop-down list on the Quick Access Toolbar.

The **Straight bar** bending shape is selected.

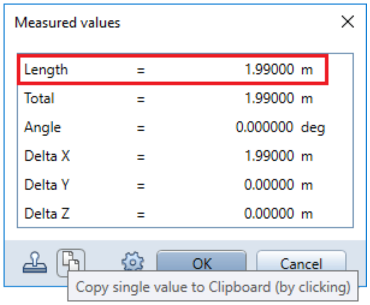
2 Select **Straight bar as point** in the input options and select a diameter of **12 mm** in the parameter area of the palette.



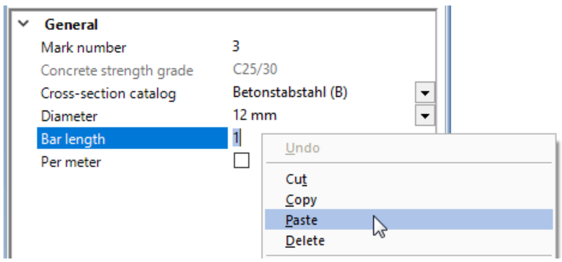
3 Select CTRL+ALT+M to open the **Measure** tool; click **Length** in the **Measure** dialog box.

4 Click the upper-left and upper-right end points of the beam.

5 Click in the **Measured values** dialog box and then click **L = 1.99000 m**.

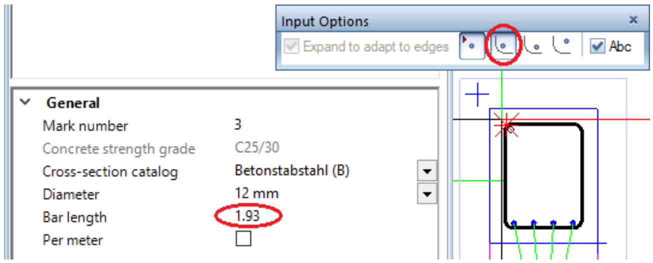


6 Select the value for the **Bar length** in the parameter area of the palette, right-click this box and, on the shortcut menu, choose **Paste**.



7 The value **1.99000** is entered. Change this value to **1.93**, taking the concrete cover of 3.0 cm at the start and end into account. **Place bar in fillet** is selected in the input options. Do not change this setting.

8 The cut bar is attached to the crosshairs. Point to the upper-left rounded corner of the stirrup in the section and click.

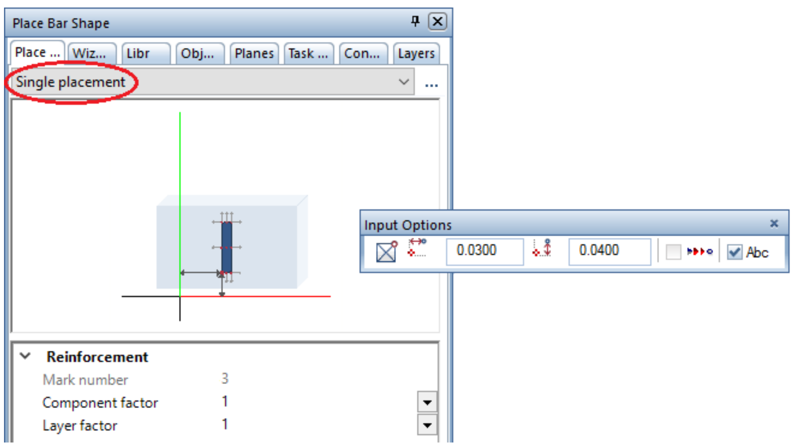


9 Right-click in the workspace and select **Place Bar Shape** on the shortcut menu.

10 Select **Single placement** in the list box at the top in the **Place Bar Shape** palette.

11 *Select view:* Click the reinforcement in the box.

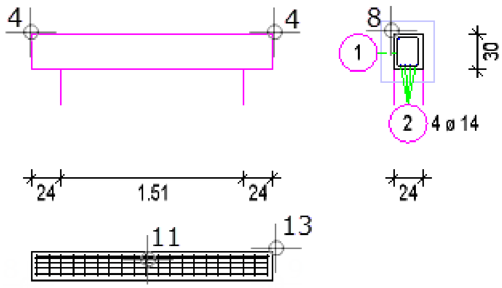
12 Switch the **Anchor point** to the upper-right point in the input options and enter **0.03** for the **Offset in x-direction** and **0.04** for the **Offset in y-direction**.



13 Click the upper-right corner of the box.

14 Select ESC, as you do not want to create an additional placement.

15 Select ESC twice to skip labeling and to close the tool.



16 Click Copy and Mirror (open the shortcut menu in the workspace) and mirror the top longitudinal bar in the section.

17 Select ESC to close the tool.

You can now create the missing labels. The top longitudinal bars are two separate placements. To create a common label, you must select both placements.

To label the top bars later

1. Click **Dimension Line, Label** (**Actionbar** – **Bar Reinforcement** task area).
2. Enclose the two bars at the top in a selection rectangle you open from left to right.
   Select elements based on direction is selected in the **Work Environment** task area.
3. **Fan** is selected for the dimension line type. Place the label above the bars. You can enter a direction angle for the label in the dialog line. Allplan automatically draws leaders to all the bars.
4. Select ESC to close the tool.

Although you used the elevation view for defining the bar shape when creating reinforcement, Allplan did not generate any reinforcement as the general arrangement drawing is in 2D. However, the reinforcement is available as a 3D model. So you can create a new view of all reinforcing elements and place this view in the 2D general arrangement drawing.

To create reinforcement in the 2D general arrangement drawing

1 Right-click the border of the section and select **Create View** on the shortcut menu.

2 Select **Front, South Elevation** and switch the **Anchor point for preview** to **Centered**.

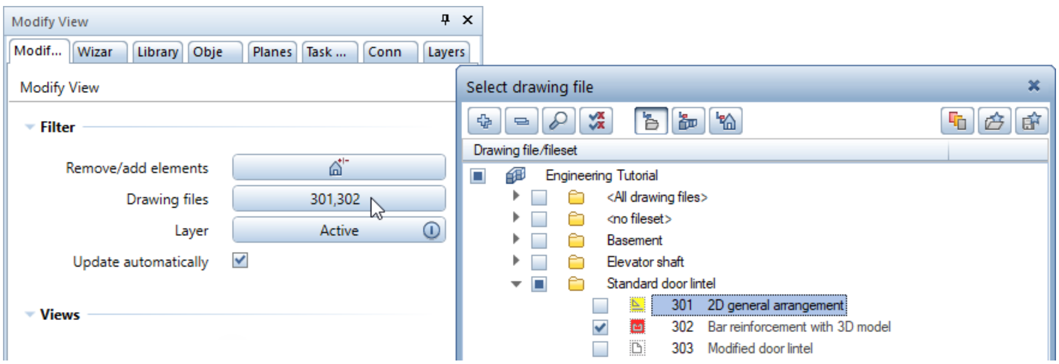
3 *To point or angle of rotation:* Right-click the lower-left corner in elevation view and select **Midpoint** on the shortcut menu.

4 *End point of line:* Click the upper-right corner of the view.

5 Select ESC to close the tool. Select the box and click **Delete** in the **Edit** task area.

6 Double-click the view border of the view to open the **Modify View** tool.

7 Go to the **Filter** area of the **Modify View** palette and click the **Drawing files** button. The **Select drawing file** dialog box opens. Turn off drawing file **301** to unlink this drawing file.



8 Click **OK** to confirm the **Select drawing file** dialog box and click **Apply** to confirm the **Modify View** palette.

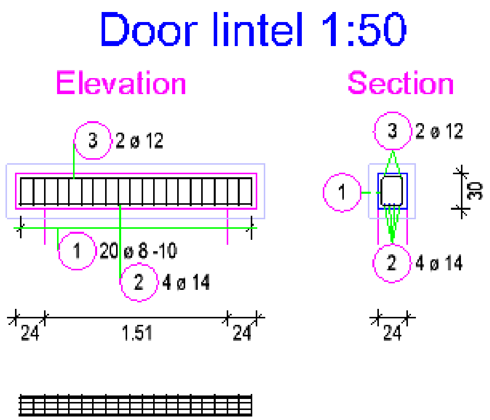
9 **Close** the palette. Use the same approach to modify the section. Here, too, unlink drawing file **301**.

10 Finally, you can use **Reinforcement Tools** (**Actionbar – Bar Reinforcement** task area – **Modify Placement Display Mode** flyout menu) to dimension and label the view automatically. To do this, select the **Auto** option.

Select the view you want to dimension: Click any placement and define the parameters for the dimension lines and labels as you need. Select ESC to skip a placement.

11 Use **Dimension Line, Label** to label the longitudinal reinforcement at the top. Use the same settings as for the labels in the section.

The result should now look like this:

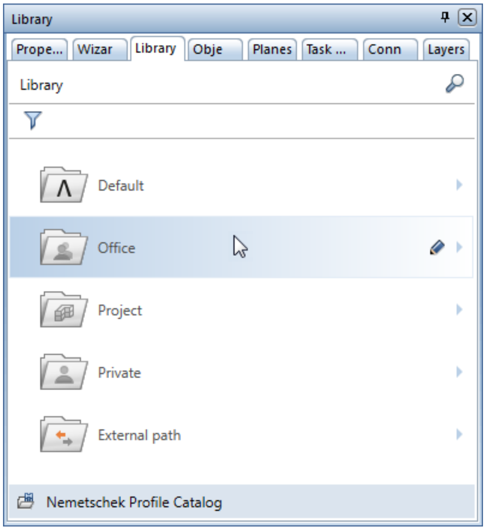


Now that you have completed the reinforcement of the door lintel, you will save it as a symbol. You will then retrieve and modify it. Symbols and their use are covered in the Basics Tutorial.

To create and save a symbol

1 Open the **Library** palette.

2 All users in your office should be able to access this reinforcement symbol. Therefore, open the **Office** folder.



3 Click **New group** at the bottom of the **Library** palette, enter **Standard details** for the name of the new group and select ENTER to confirm.

4 Open the new **Standard details** group. At the bottom of the **Library** palette, point to **Insert element** and click **Insert symbol**.

5 *Select elements you want to save as a symbol file* Open a selection rectangle around the reinforcement symbol and the reinforcement model.

Tip: You can also change the position of a symbol's base point when you retrieve the symbol.

6 *Set the symbol's base point*

So that you can place the symbol in the same position in another drawing file, you must define a unique point as the symbol's base point. Therefore, click **Global point** in the dialog line and enter the following values for the global point:

Global x-coordinate: **0.000**

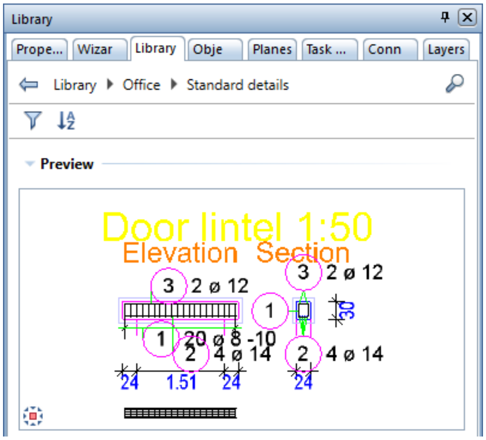
Global y-coordinate: **0.000**

Global z-coordinate: **0.000**

7 Select the **Dumb symbol without Snoop functionality** option in the dialog box and click **OK** to confirm.

8 Enter **Door lintel** for the name of the new symbol and select ENTER to confirm.

This saves the new **Door lintel** symbol to the **Standard details** folder.



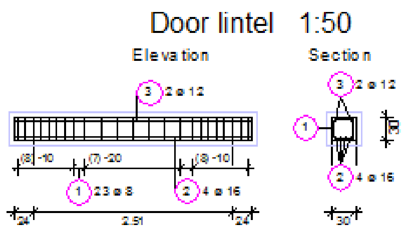
Task 2: modifying the reinforced door lintel

Now you will retrieve the door lintel and modify it.

Tools:

- Library
- Stretch Entities
- Direct object modification
- Dimension Line, Label
- Properties palette

Objective:



This task also requires fileset **3**:

Fileset	Drawing file number	Drawing file name
3	301	2D general arrangement
	302	Bar reinforcement with 3D model
	303	Modified door lintel

You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").

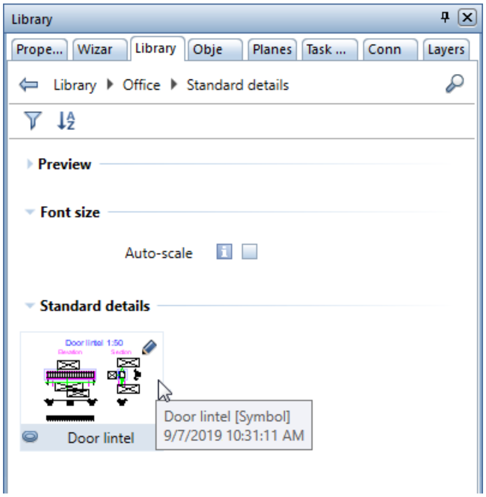
First, you will retrieve the symbol and place it in a separate drawing file.

To retrieve the symbol

1. Click **Open on a Project-Specific Basis** (Quick Access Toolbar) and double-click drawing file **303**.
2. Click the current **scale** on the status bar and select **1:50**. Make sure the unit of length is **m**.

3 The **Library** palette is still open from the last task; you can see the **Standard details** group in the **Office** folder. If this is not so, open the **Library** palette and the **Office** and **Standard details** folders.

4 Clear the **Auto-scale** option and double-click the **Door lintel** symbol.



As you used the  **Global point** to create and save the symbol, the global point with the coordinates 0/0/0 is still selected. If this is not so, enter these coordinates.

5 To place the symbol in the drawing file, select the Enter key to confirm the coordinates 0/0/0 of the symbol's base point.

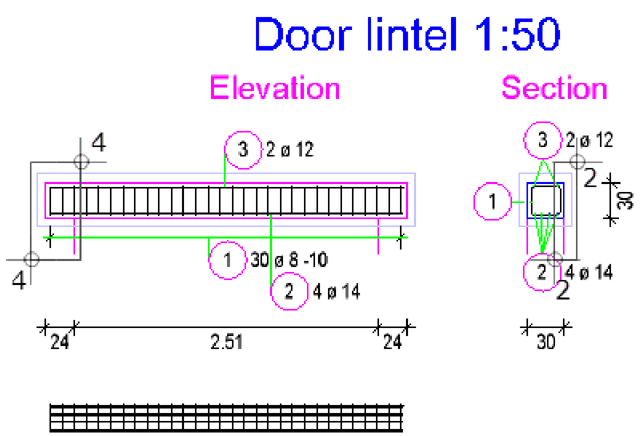
6 Double-click the middle mouse button in the workspace to restore the full view.

Next, you will modify the clear dimensions of the door opening and the width of the door lintel. In addition, you will modify the spacing between the stirrups in the middle and the diameter of the bottom longitudinal reinforcement.
As you saved the door lintel with the 2D general arrangement drawing when you defined the symbol, you do not need to create the general arrangement again. If you save only the reinforcement as a symbol, you can also place the reinforcement in a new general arrangement drawing.

To modify the door lintel's dimensions

1. Click **Stretch Entities** (open the shortcut menu in the workspace).
2. Open a selection rectangle around the right stirrup leg and the top and bottom corner bars in the right part of the section (see illustration).
3. Enter **dx** = **0.06** and **dy** = **0.00** to change the width to 30 cm. The outline and reinforcement adapt automatically.
4. Use the same approach to modify the left support area in the elevation (**dx** = **–1.00** and **dy** = **0.00**).

The door lintel now looks like this:



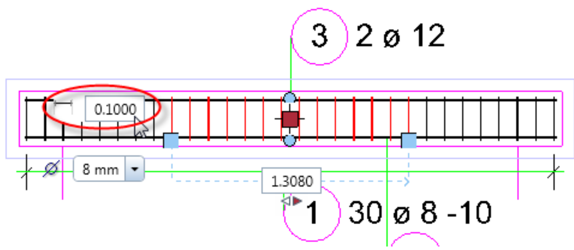
Next, you will alter the spacing in the middle of the beam by using direct object modification. Finally, you will change the diameter of the bottom longitudinal reinforcement by using the Properties palette.

To modify reinforcement

➲ No tool is active.

1 Click to the left of the 14 stirrups in the middle of the beam and enclose them in a selection rectangle (**Select elements based on direction** is selected in the **Work Environment** task area).

You can see the **Central move handle**, the **Geometry handles** and the **Point handles**. In addition, you can see a selection box for the diameter and a box for the placing length and the spacing or number of pieces.



2 Change the spacing to **0.20** in the box for the spacing or number of pieces.
To switch between the **Spacing** and **Number of pieces** parameters, click the symbol to the left of the box.

Allplan separates the modified part from the placement, giving this part its own label. If you change the diameter of the modified part, it will get a new mark number.

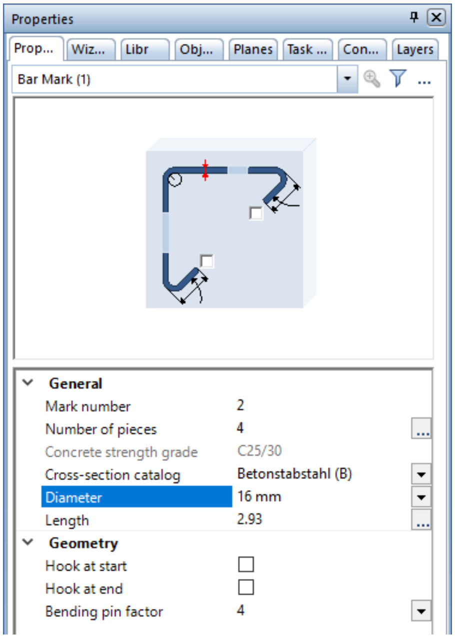
3 Delete the label for the stirrups in the elevation, click **Dimension Line, Label** and use the brackets to select all the stirrups in the elevation.

4 Click **Delta point** in the dialog line. Select the **Dimension line** type and the **Dimension line text** option, select **No. of pieces + spacing** for the text and place the dimension line.

5 For the label, turn off spacing, place the label and select ESC to close the tool.

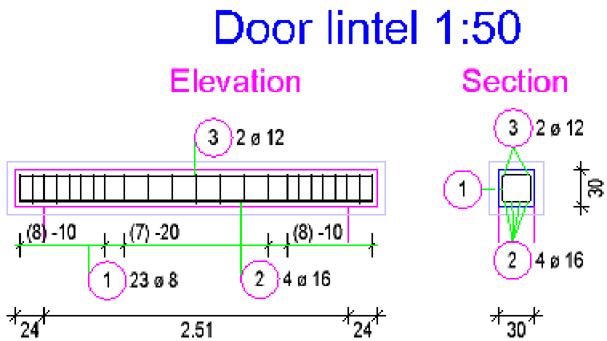
6 Click a bar in the bottom longitudinal reinforcement and select **Reinforcing bar mark (1)** in the list box at the top in the **Properties** palette.

7 Go to the parameter area of the palette, change the **Diameter** to **16 mm** and click in the workspace to finish.



Note: If you want to change the diameter of the bottom longitudinal reinforcement by means of direct object modification, select the entire placement in the section as an entity group by selecting and holding the Shift key while clicking.

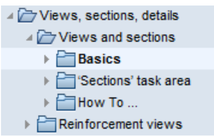
Your drawing should now look like this:



Finally, you can create a bar schema. The approach is the same as with the elevator shaft in exercise 4. Consequently, it is not described any further here.

As you created the reinforcement with a 3D model, you can delete the elevation view or section at any time and create the elevation view or section again with the tools in the **Sections** task area. As opposed to the elevator shaft, only the three-dimensional reinforcement cage is visible (see Tip).

Tip: The essentials are described in the Allplan Help. Read the chapters about the **Sections** task area and the 'Reinforcement methods – 3D reinforcement model'.



Printing layouts is covered in exercise 9.

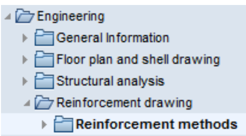
Exercise 6: 2D slab without a 3D model (method 3)

Requirements:

Allplan 2020 Engineering comes in different packages.

Check whether the **Reinforcement** task of the **Engineering** role contains the **Meshes** and **Bar Reinforcement** task areas.

Tip: Look in the Allplan Help for information on the reinforcement methods and the 3D reinforcement model:



This exercise involves reinforcing a floor slab based on the 2D floor plan of the basement created in exercise 1. This time, you will not create a 3D model (method 3, see Tip). This exercise requires exercise 1.

Start by selecting fileset **4** with the following drawing files:

Fileset	Drawing file number	Drawing file name
4	102	2D floor plan
	401	Reinforcement, bottom layer - without 3D model
	402	Reinforcement, top layer - without 3D model
You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").		

Instead of drawing file **102**, you can also open drawing file **101** of exercise 1 in edit mode. In this case, change the status of the existing layers to **Modifiable** and hide the style areas so that you can see better what you are doing: Click **Show/Hide** (**View** drop-down list on the Quick Access Toolbar) and turn off the style area.

Task 1: mesh reinforcement, bottom layer

In this part of the exercise, you will create the mesh reinforcement for the bottom layer.

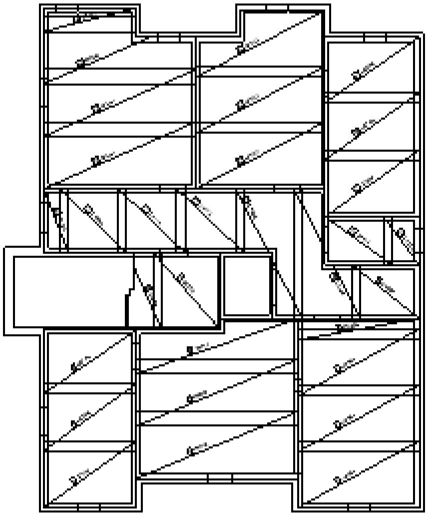
You will use the tools in the **Meshes** task area. You can find these tools on the **Actionbar**.

Tools:

Options

Span Reinforcement

Objective:



Start by defining the default settings.

To select drawing files and to define options

Tip: You can define how **mesh reinforcement** looks in the **Options**. You can find more information in the Allplan Help.

1 Go to the **Actionbar** and select the **Engineering** role – **Reinforcement** task.

2 Click **Open on a Project-Specific Basis** (Quick Access Toolbar), open the drawing file tree for fileset **4**, make drawing file **401** current and open drawing file **102** in edit mode.

3 Click the current **scale** on the status bar and select **1:50**. Make sure the unit of length is **m**.

You will start by placing meshes in the lower-left span in the floor plan.

To place by span in a rectangular area

1 Open the **Default Settings** drop-down list on the Quick Access Toolbar and click **Options**. Select the **Reinforcement** page, turn off the **Reinforce with 3D model** option in the **General** area and click **OK** to confirm.

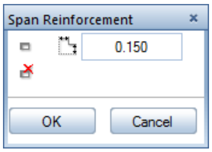
2 Click **Span Reinforcement** (**Actionbar** - **Meshes** task area - flyout menu of the **Place Individually** tool).
The system proposes the layer **MR_GEN**.

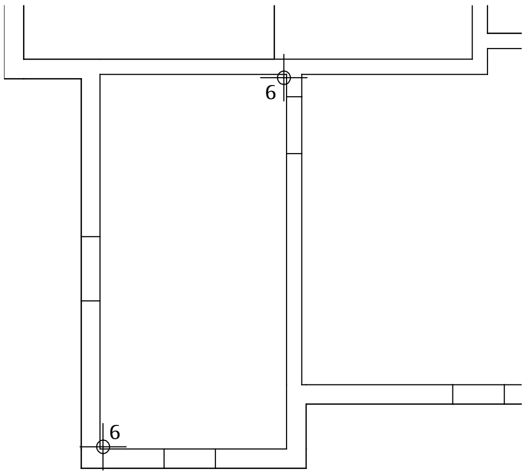
3 Go to the **Properties** palette - **Format** area, open the **Layer** drop-down list and click **Select...**.

4 Open the shortcut menu in the **Single layer selection** dialog box, select the **List layers assigned to currently selected tool** option and double-click the layer **MR_M_B**.

5 *From point or element or enter offset:* Enter **0.15** for the support depth in the dialog line.

6 Define the placing polygon by clicking the lower-left inside corner of the wall and then the upper-right wall corner. Select ESC to finish.



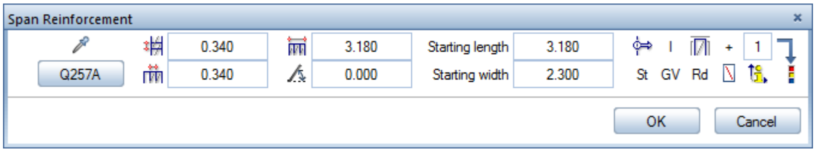


7 Change the support depth on the right side and at the top. To do this, click **Support depth** in the dialog box.

8 *Click side of polygon:* Click the right side of the polygon and enter **0.12**.

Tip: When you select **Transverse Overlap**, the program places meshes of full width only. The box shows the value proposed by the system. You cannot change this value.

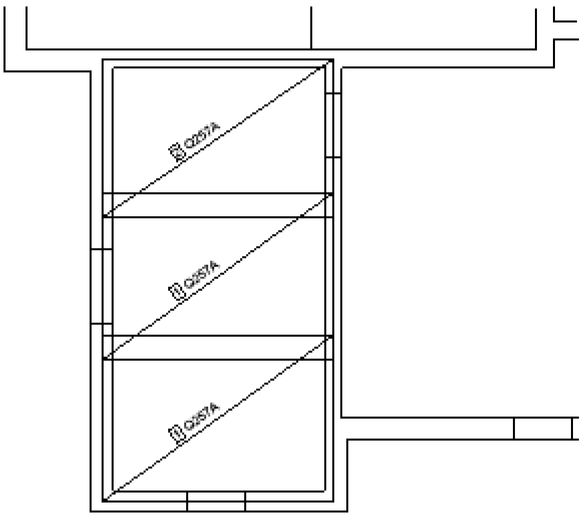
9 Repeat these steps with the top side of the polygon and click **OK** to confirm the settings.



10 Click Q188 A **Mesh type** and select **Q257A**. This changes the values for **Longitudinal Overlap** and **Transverse Overlap** to **0.340**.
Define the other settings as shown in the illustration.

Tip: Allplan 2020 automatically calculates the overlap depending on the type of reinforcing steel mesh you select. The placement algorithms are designed with economic considerations in mind. However, you can change this at any time by specifying the lap joint yourself. You can also label the lap joint (**Options – Reinforcement – Labels** page).

11 Click **OK** to confirm the entries.
The placement should now look like this:



12 Select ESC to close the tool.

The next step is to apply reinforcement to the adjacent span on the right side.

To place by span in a polygonal area

1 Click **Span Reinforcement** (**Actionbar** - **Meshes** task area - flyout menu of the **Place Individually** tool).

2 Enter **0.12** for the support depth in the dialog line.

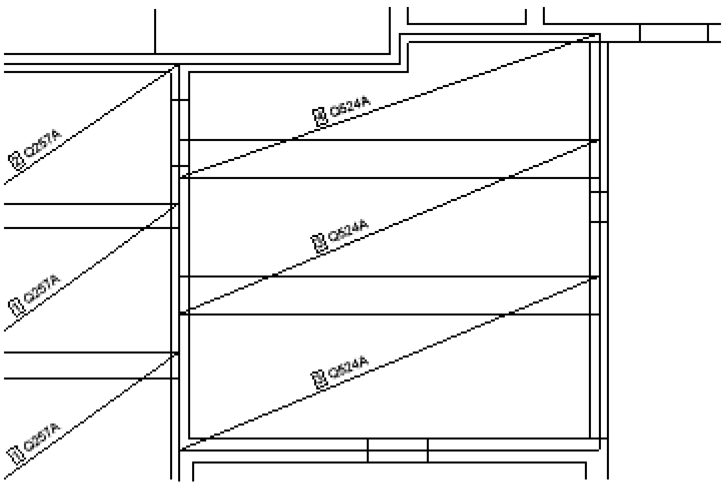
Tip: The placing polygon of the area reinforcement is placed in construction-line format. Clicking this polygon selects the entire placement.

3 Working counterclockwise, click the inside corners of the span and select ESC to finish.

4 The support depth for the exterior wall is 0.15. Click **Support Depth** in the dialog box, click the exterior wall, enter **0.15** and click **OK** to confirm.

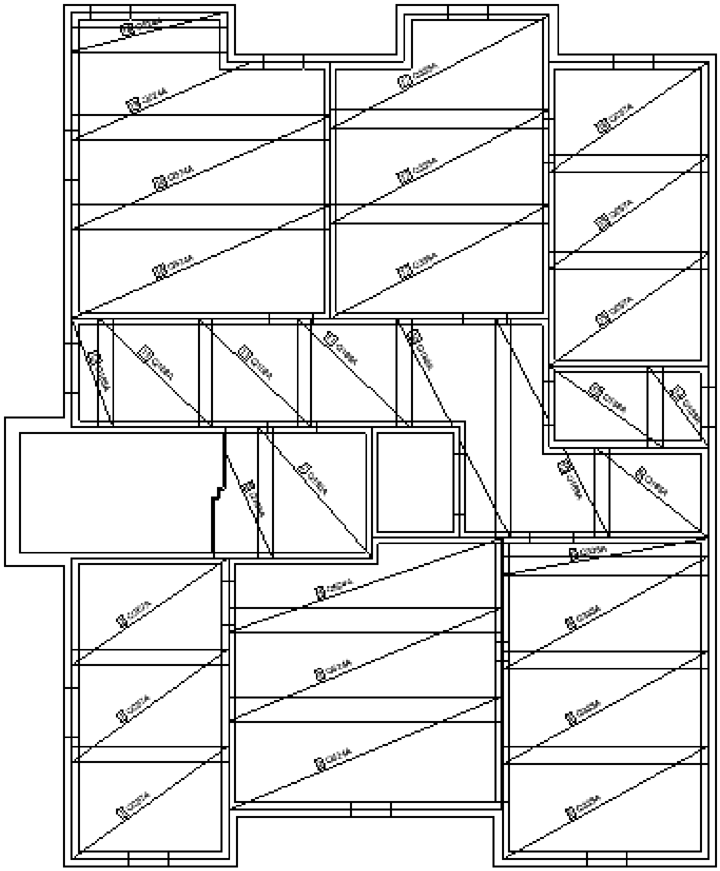
5 Select mesh type **Q513A** and enter a placing angle of **0.00** degrees.

6 Confirm.
Allplan draws and labels the reinforcing steel mesh placement.



7 Select ESC to close the tool.

Now you should be able to place the reinforcing steel meshes yourself as shown in the illustration. The support depth for interior walls is 0.12 and that for exterior walls 0.15:



Finally, you can place various labels.

- If you inadvertently deleted labels, you can use **Label** to label meshes with the mark number or mesh type at a later stage. In addition, you can label the mesh dimensions of individual meshes. In general, dimensions of the same mark number must be labeled only once.
- You can use **Dimension Overlap** to manually dimension splices in the longitudinal and transverse directions. Automatic labeling dimensions all splices.

Task 2: recess

Now you will apply reinforcement to the slab opening created for the elevator shaft.

You will use the tools in the **Bar Reinforcement** task area. You can find these tools on the **Actionbar**.

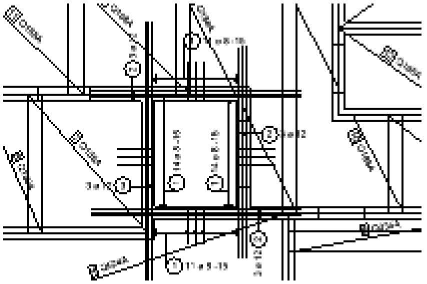
Tools:

Edge Reinforcement

Secondary Reinforcement

Rearrange Marks

Objective:



Start by placing open stirrups around the elevator shaft.

To place edge reinforcement

➲ **Actionbar**: **Engineering** role – **Reinforcement** task.

1 Click **Enter Area Reinforcement** (**Actionbar** – **Bar Reinforcement** task area).
The system proposes the layer **BR_GEN**.

2 Go to the **Properties** palette – **Format** area, open the **Layer** drop-down list and click **Set...**.

3 Select the **List layers assigned to currently selected tool** option and use the shortcut menu to make layer **BR_B_B Current**.

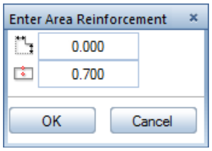
4 Select the **List layers used in open documents** option and switch the layer **MR_M_B** to **Hidden, frozen** so that you can see better what you are doing.

5 Click **Edge Reinforcement** on the context toolbar.

6 *1st edge point or click a line*: Click the bottom inside corner of the right shaft wall.

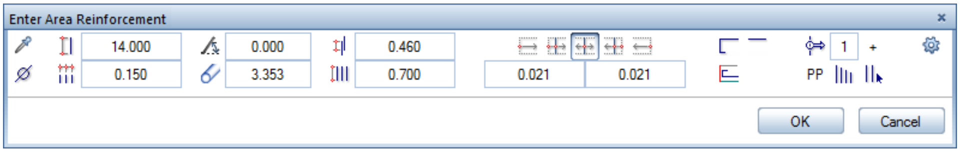
7 *2nd edge point*: Click the top inside corner.

8 To specify the direction point, click the slab to the right of the shaft wall.



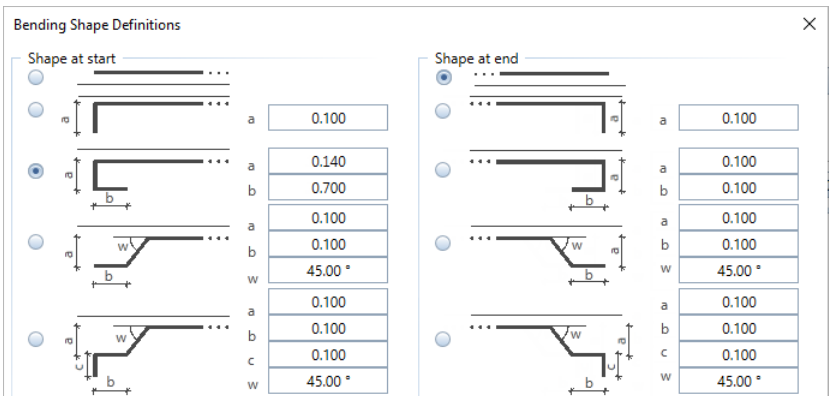
9 Click **Support Depth** in the **Enter Area Reinforcement** dialog box, click a side of the polygon and enter the offset. Enter **-0.03** for the side toward the recess and **0.00** for all the other sides.

10 Enter **0.70** for **Edge Reinforcement Length** and click **OK** to confirm.



11 Switch the **Diameter** to **8 mm** and the **Spacing** to **0.15** and click **Shape**.

Tip: You can use the **Shape for each side of polygon** parameter to define the bending shape at the edges of the placing polygon, regardless of the general bending shape selected for the reinforcing bars. For example, you can define hooks at the supports and create straight lap joints at the same time.



12 In the **Bending Shape Defaults** dialog box, select the bending shapes for the start and end of the bar as shown in the illustration.

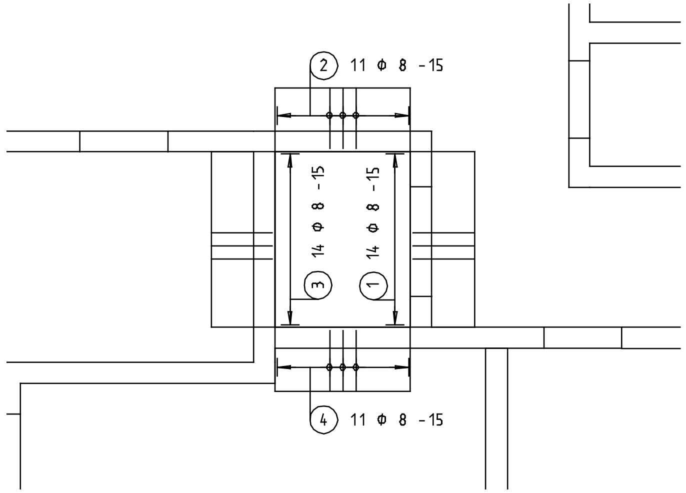
13 Enter values as shown for the **a** (**0.14**) and **b** (**0.70**) parameters of the bending shape at the start of the bar and click **OK** to confirm.

14 Select the **Show selected bars** display mode, switch the starting point so that the placement starts on the left side and click **OK** to confirm.

15 Select the bars you want to display and place the dimension line and the label.

- Select the **Dimension line** type and layer **BR_B_B** for the dimension line. Enter an aspect of **1.00** by selecting the **Dimension line options** line and clicking .
- Clear the **Dimension line text** check box for the dimension line. For the label, select **Number of pieces**, **Diameter** and **Spacing** and select the automatic text leaders.

16 The next edge point for the next placement is now attached to the crosshairs. Click the upper-left corner, define parameters and complete the edge reinforcement as shown in the illustration. Finally, select ESC.



The longitudinal reinforcement is still missing.

To place secondary reinforcing bars as area reinforcement

➲ The context toolbar of the **Enter Area Reinforcement** tool is still open. If it isn't, select this tool again.

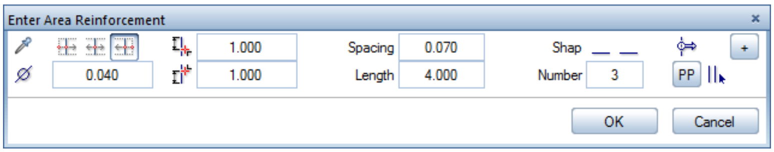
1 Click **Secondary Reinforcement** on the context toolbar. Check that the **BR_B_B** layer is selected. If it isn't, select it in the **Properties** palette – **Format** area.

2 Click **From, to** in the input options.

3 *Enter starting point*: Click the top inside corner of the right shaft wall.

4 *Enter end point*: Click the bottom inside corner.

5 Define the following settings on the **Enter Area Reinforcement** Context toolbar:



Diameter: 12 mm
Offset to edge: 0.04
Spacing: 0.07
Bar length: 4.00
Shape: straight bar
Number of bars: 3
Placement display mode: **Show All Bars**.

6 Click **OK** to confirm.

7 Place the dimension line and the label. Define the text parameters so that only the **Number of pieces** and the **Diameter** are included.

8 Now place the secondary reinforcement above the three other shaft walls yourself.
The bar length for the reinforcement at the top and bottom is 4.0 m and 5.0 m for the reinforcement on the left side.

9 Select ESC twice to finish placing reinforcement and to close the tool.

10 Although the same bar shape has been placed along each edge, the individual placements have been assigned consecutive marks. Click **Rearrange Marks** (**Actionbar - Bar Reinforcement** task area) and confirm the settings.

11 Finally, go to the **Properties** palette - **Format** area, open the **Layer** drop-down list and click **Set...**.

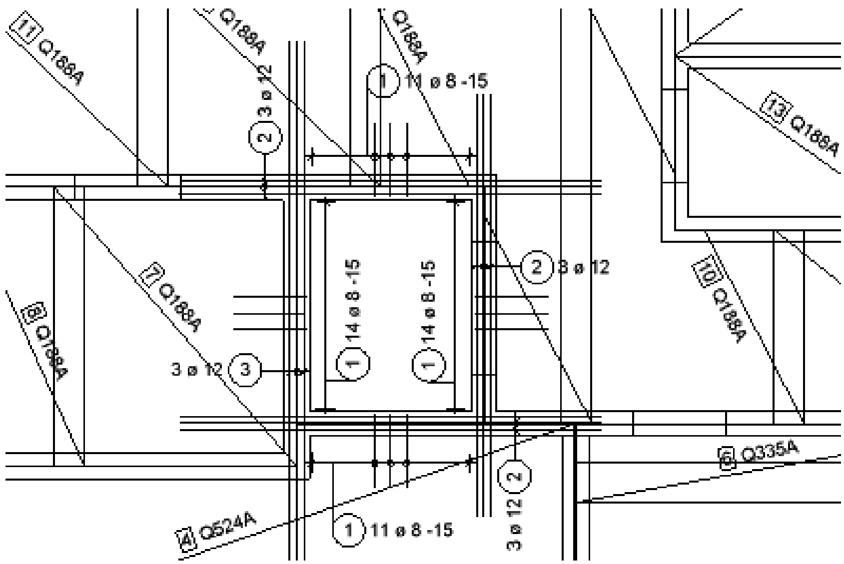
12 Right-click in the layer structure and select **Match visibility from print set...**.

13 Select the **Reinforcement, bottom layer** print set and the **Set all layers visible in print set to modifiable** option and click **OK** twice.

All you can now see is the entire reinforcement (bottom layer) and the floor plan without style areas.

14 Move the labels of the bar and mesh reinforcement so that they do not collide.

The drawing now looks like this:



Task 3: support reinforcement and spacers

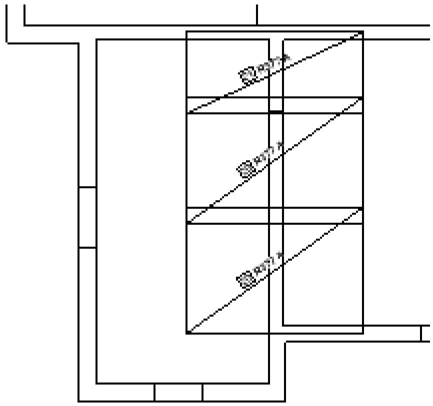
Now you will create support reinforcement. Finally, you will enter spacers.

You will use the tools in the **Meshes** task area. You can find these tools on the **Actionbar**.

Tools:

- Support Reinforcement
- Place Individually
- Modify Format Properties

Objective:



Start by defining the default settings.

To select drawing files and to define options

➲ **Actionbar**: **Engineering** role – **Reinforcement** task.

1 Click **Open on a Project-Specific Basis** (Quick Access Toolbar) and make drawing file **402** current. Drawing files **102** and **401** are still open in edit mode.

2 Check the current reference scale (**1:50**) and unit of length (**m**) on the status bar.

You will now create support reinforcement.

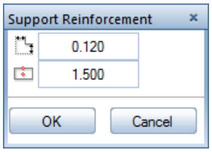
To place support reinforcement

1 Click **Support Reinforcement** (**Actionbar** – **Meshes** task area – flyout menu of the **Place Individually** tool).

2 Click **Select, Set Layers** in the **View** drop-down list (Quick Access Toolbar), match the layer visibility from the **Reinforcement, top layer** print set to hide the reinforcement at the bottom, select the **List layers assigned to currently selected tool** option and double-click the layer **MR_M_T**.

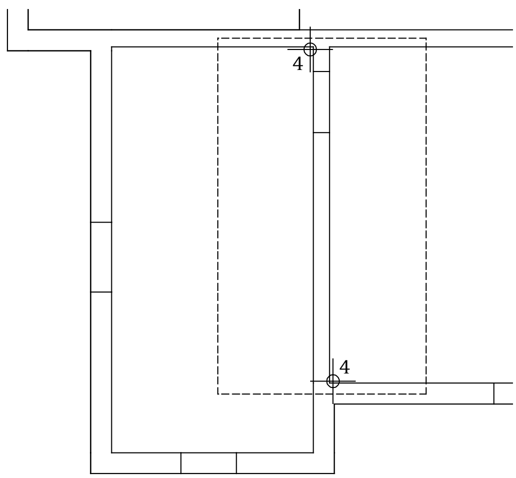
3 *1st support point, direction or angle:* Enter **90.0**.

4 Click the diagonally opposite points in the wall.



5 Click **Support Reinforcement Length** and enter **1.50**.

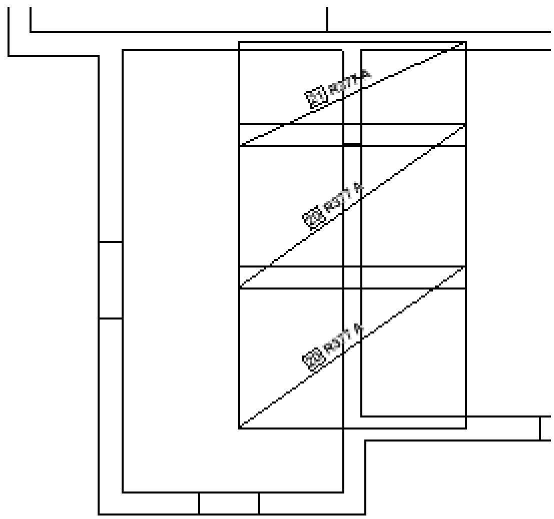
6 Click **Support Depth** and make the following settings: **0.15** for the exterior wall and **0.12** for the interior wall.



7 The area delimited by a dashed line represents the placing geometry.

8 Click **OK** to confirm the dialog box.

9 Switch the **Mesh Type** to **R335A** and click **OK** to confirm. Allplan draws the reinforcing steel mesh placement.



10 Select ESC to close the tool.

Edge reinforcement

Edge reinforcement for meshes works just like edge reinforcement for reinforcing bars. The procedure was described with the edge reinforcement around the slab recess. The procedure for selecting the mesh type and defining parameters is the same as for the tool in the **Meshes** task area. Consequently, this tool is not described any further here.

For edge reinforcement, you can use a special placing mode: surplus mesh placement. To use this placing mode, create a reinforcing steel mesh cutting diagram in a separate window. There, you can click a left-over mesh and place it in its entirety or just parts of it (see further down).

Spacers

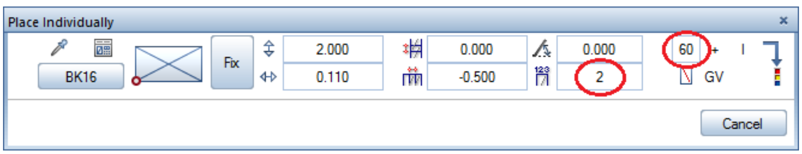
Spacers are usually important for ordering steel only. Therefore, they are included in reinforcement schedules. The steel quantities must be calculated from the drawing file with the meshes.
You have two options to display spacers:

- You can define the placing region for the spacers by using the **Span Reinforcement** tool. Enter areas without upper reinforcement as recesses. Then select the spacer for the **Mesh Type**.
  When you create the placement as construction lines, the placement is visible on the screen but not in printouts.
  Advantage: The required number will be calculated automatically.
  Disadvantage: The cutting diagram and the mesh list include cut spacers. This does not reflect standard on-site practice and bending shop practice (only whole spacers are ordered and supplied).
- You can define a spacer by using the **Place Individually** tool and calculate the required number manually. This method is relatively fast and fully appropriate for display purposes.

Finally, you will enter spacers by placing them individually.

To enter spacers

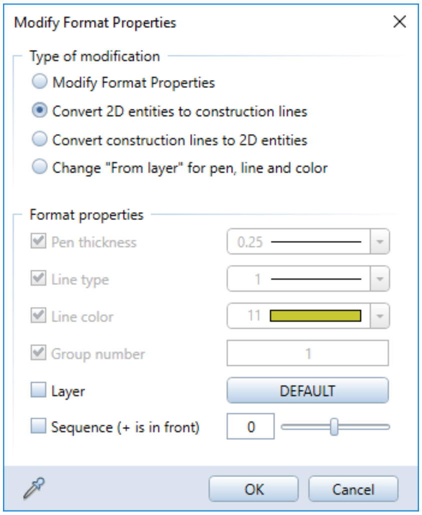
1 Click **Place Individually** (**Actionbar** - **Meshes** task area).
Check that the **MR_M_T** layer is selected. If it isn't, select it in the **Properties** palette - **Format** area.



2 Click Q188 A **Mesh Type** and select spacer **BK16**. Enter the required number (for example, **120**). Enter **2** for the number of meshes and **60** for the layer factor. Switch the placing angle to **0.00** degrees.

3 *Set placing parameters or specify position*: Click anywhere in your drawing and select ESC to close the tool.

4 Click **Modify Format Properties** (**Actionbar** – **Change** task area), select the **Convert 2D entities to construction lines** option, click **OK** to confirm and select the meshes you just created (assuming that you want to exclude the spacers from subsequent printouts).



Task 4: cutting diagram and excess mesh

To finish, you will create a cutting diagram for the bottom mesh reinforcement layer and place excess mesh.

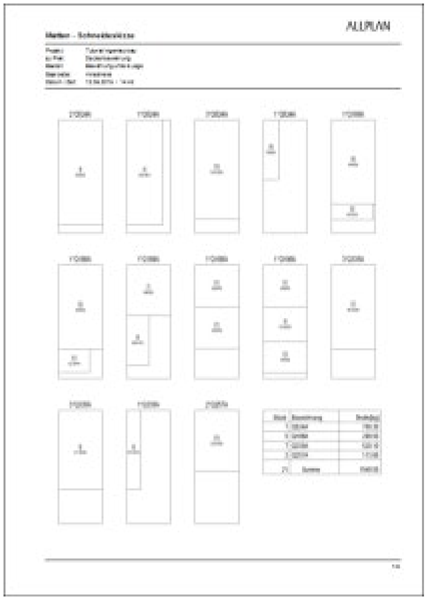
You can find these tools in the **Meshes** task area on the **Actionbar**.

Tools:

Mesh Reports

Place Individually

Objective:

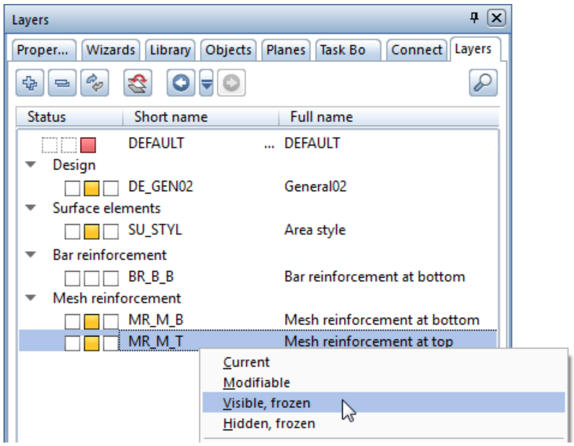


Start by creating the cutting diagram for the bottom reinforcement layer.

Note: To create a cutting diagram, a drawing file with reinforcing steel meshes must be current. If the reinforcing steel meshes you want to include in the cutting diagram are in different drawing files, you must open the other drawing files in edit mode. The cutting diagram does not include meshes on visible but frozen layers.

To place a cutting diagram in a drawing file

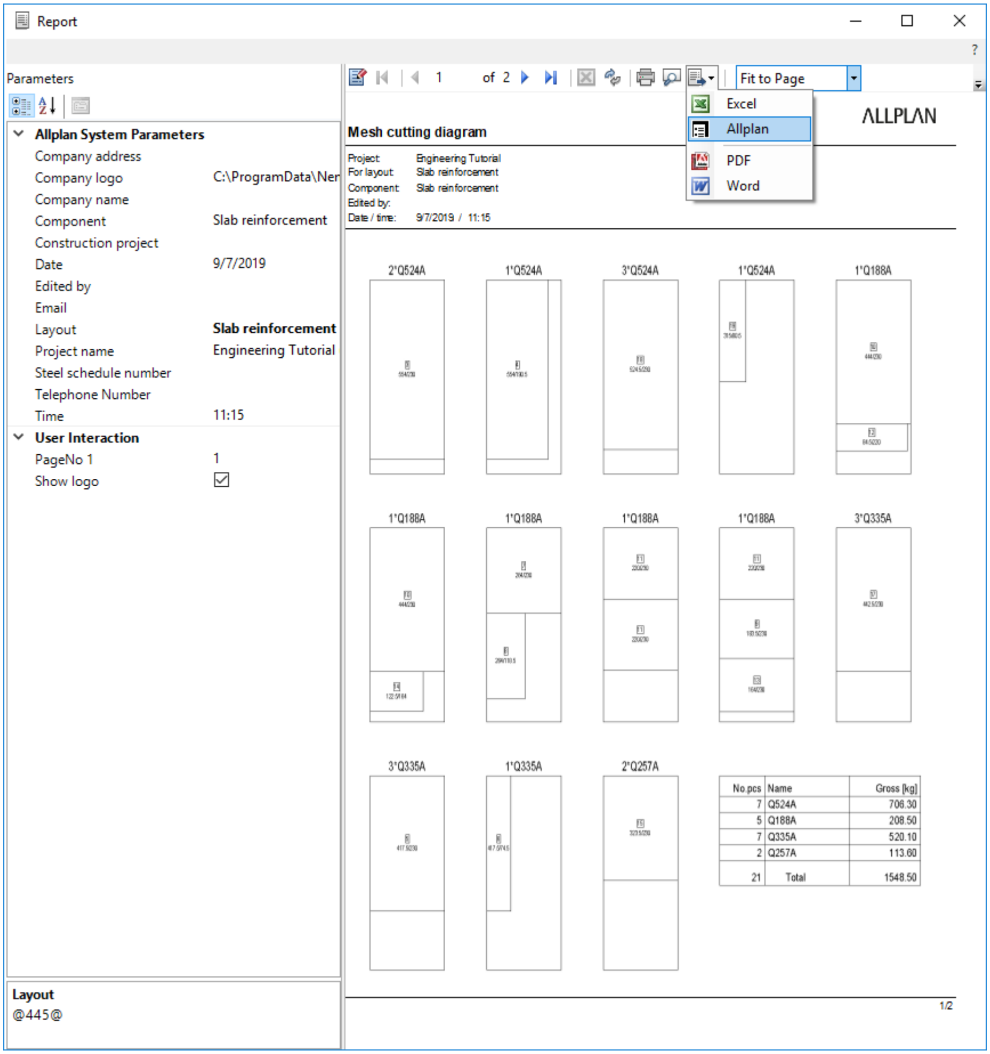
1. Make drawing file **401** current. Drawing files **102** and **402** are open in edit mode.
2. Select pen thickness **0.25** mm and line type **1** in the **Properties** palette – **Format** area.
3. Open the **Layers** palette and change the layer **MR_M_B** to **Modifiable** and **MR_M_T** to **Visible, frozen**.



Tip: If you want to place the mesh cutting diagram in the drawing file only, you can also use the **Mesh cutting diagram** of the **Mesh Legend** tool. However, this diagram cannot be sent to the printer.

4. Click **Mesh Reports** (**Actionbar** – **Meshes** task area – **Mesh Legend** flyout menu).
5. Go to the **Reports** dialog box, click the **Default** folder on the left side, select the **Mesh cutting diagram** report and click **All** in the input options to include all marks.

   The report appears in Report Viewer.



6 Click Export and select **Allplan**.

You can see the current drawing file; the report is attached to the crosshairs.

7 Place the report in the drawing file.

This saves the mesh cutting diagram in the drawing file and prints it along with the drawing file with reinforcing steel meshes placed in the layout.

After you have created a cutting diagram in which the whole meshes are filtered out, you can see which excess pieces are left. You can click and then place these.

To place excess mesh

1. Click **Place Individually** (**Actionbar** – **Meshes** task area).
2. Select a layer. Make sure that you do not mix the bottom and top reinforcement layers.
3. Click **Excess Mesh Placement** on the **Place Individually** Context toolbar.

   In addition to the active viewport, the **Excess Mesh Placement** viewport opens, showing all meshes with pieces of excess mesh in a cutting diagram.
4. Click the piece of excess reinforcing steel mesh you want to place.

   The **Excess Mesh Placement** viewport closes again.
5. Place the piece of excess mesh. You can retain or change the dimensions of the reinforcing steel mesh copied automatically.
6. To place more pieces of excess mesh, click **Excess Mesh Placement** again.

Printing layouts is covered in exercise 9.

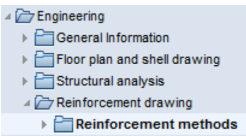
Exercise 7: BAMTEC® reinforcement

Requirements:

Allplan 2020 Engineering comes in different packages.

Open the **Create** menu and check whether the **Engineering** family contains the **BAMTEC** module.

Tip: Look in the Allplan Help for information on the reinforcement methods and the 3D reinforcement model:



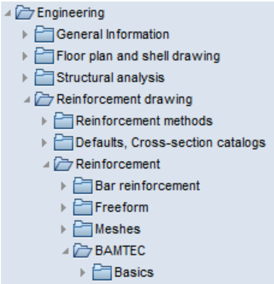
In this exercise, you will manually create **BAMTEC carpet reinforcement** based on FEA calculation results (that is, the FEA results will not be used automatically). You will not work with the 3D model (method 3, see Tip), as you will create only a floor plan without sections.

You will use the tools in the **BAMTEC** task area. As this task area is not on the **Actionbar** by default, you will use the **Create** menu to open these tools.

Start by selecting fileset **5** with the following drawing files:

Fileset	Drawing file number	Drawing file name
5	501	Structure
	502	Carpet outline
	503	
	504	
You can find the fileset in the Engineering Tutorial project (see "Appendix: creating the training project").		

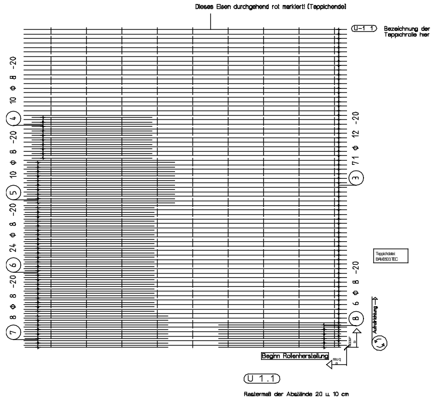
Tip: Look in the Allplan Help for basic information on the **BAMTEC** task area:



Tools:

- Carpet Outline
- Separate into Files
- Carpet Mounting Strips
- Basic Carpet Reinforcement
- Secondary Carpet Reinforcement
- BAMTEC File
- Library

Objective:

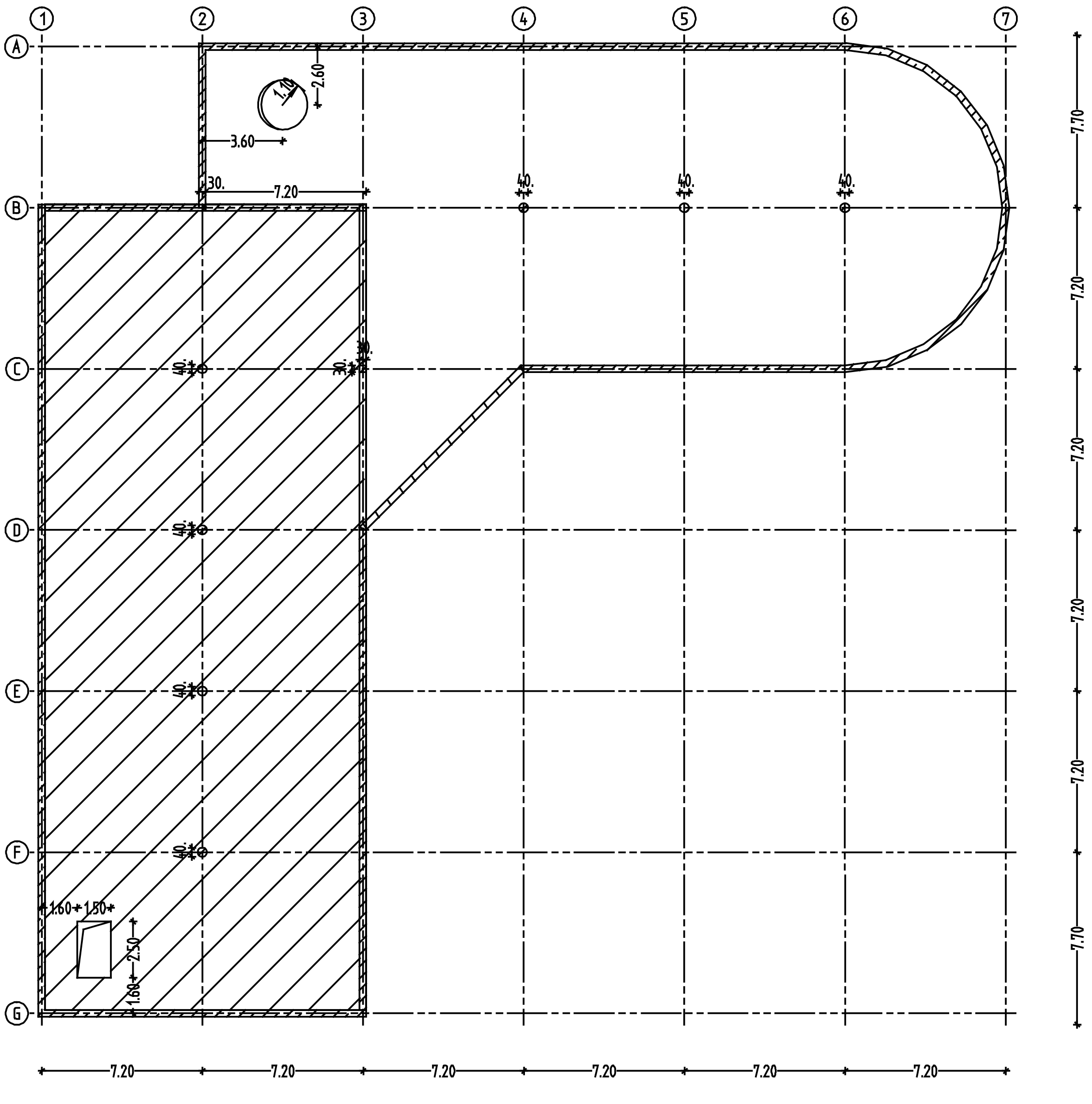


The following exercise is based on the slab outline shown in the illustration. Consult the "Finite Elements" manual to find out how to create and reinforce this slab outline. The FEA results used here are also taken from this manual.

In this exercise, you will reinforce the area with hatching (see illustration). If you have downloaded the training project from the internet, you will find the slab outline in drawing file 501. All you need to do is make the layers visible. Otherwise, create the slab outline yourself.

To copy or draw the slab outline

1. If you have already done FEA calculations for this example, copy the floor plan (consisting of grid, walls and recesses) to drawing file **501**.
   Place the grid, walls, beams, columns and recesses on different layers.
2. If these drawing files are not available to you, you can create the slab outline yourself with the tools in the **Components** or **2D Objects** task areas. Use the dimensions in the illustration. Place the grid, walls, beams, columns and recesses on different layers. You can use the layers proposed by Allplan.


1
2
3
4
5
6
7
A
B
C
D
E
F
G
2.60
1.10
3.60
30.
7.20
40.
40.
40.
40.
30.
30.
40.
40.
40.
1.60
1.50
2.50
1.60
7.20
7.20
7.20
7.20
7.20
7.20
7.70
7.20
7.20
7.20
7.20
7.70

When you use the Actionbar configuration, the menu bar is hidden by default. The **BAMTEC** task area is not on the **Actionbar** by default. To access the tools in this task area, you will show the menu bar for the following exercise.

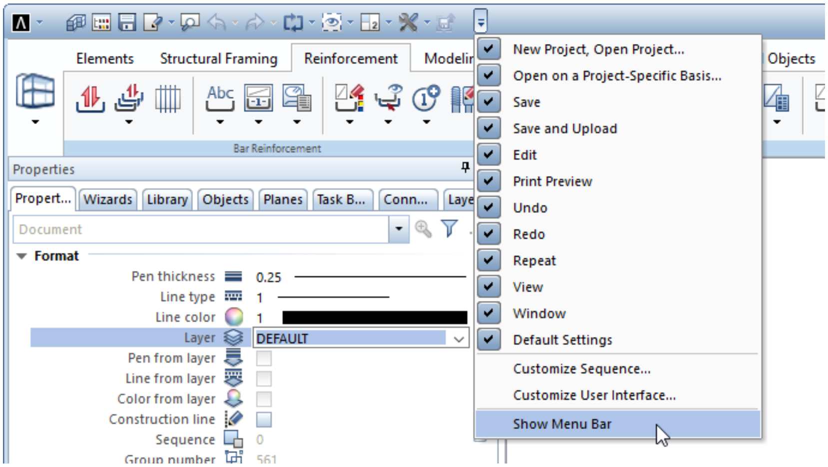
Note: You can also add the **BAMTEC** task area to the Actionbar by means of **Actionbar Configurator**.

To show the menu bar

Tip: Use the Alt key to show the menu bar for a short time. The menu bar disappears again after you have selected a tool.

1 Click the drop-down list on the Quick Access Toolbar (title bar).

2 Click **Show menu bar**.



The menu bar is below the title bar.

To select drawing files and to define options

Tip: You can define how **BAMTEC** reinforcement looks in the **Options**. You can find more information in the Allplan Help.

1 Click **Open on a Project-Specific Basis** (Quick Access Toolbar), make drawing file **502** current and open drawing file **501** in edit mode.

2 Check the current scale (**1:100**) and unit of length (**m**) on the status bar.

3 Select pen thickness **0.25** mm and line type **1** in the **Properties** palette – **Format** area.

4 Open the **Options** and check that the **Reinforce with 3D model** option is not selected.

The first step involves defining the carpet outline, that is, the size of the carpets, the unroll direction, the label and the position of the carpets in the slab.

Note: Make sure you comply with the technical criteria pertaining to the application guidelines for the **BAMTEC** reinforcement technology (see Tip on page 242)!

To define the carpet outline

1 Click **Carpet Outline** (**Create** menu – **Engineering** family – **BAMTEC** module).
The system proposes the layer **BA_B**.

2 Go to the **Properties** palette – **Format** area, open the **Layer** drop-down list and click **Select...**.

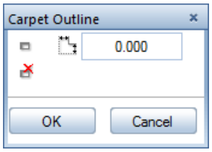
3 The **List layers assigned to currently selected tool** option is selected. Double-click the **BA_B_B_1** layer.

4 *From point, element or offset*: Enter the support depth = **0.00** in the dialog line. Select the Enter key to confirm.

5 To define the starting point of the first carpet, click the inside wall corner in axis B/1.

6 Go to the dialog line and enter **x-coordinate** = **14.10** and **y-coordinate** = **-14.25**. Select the Enter key to confirm.

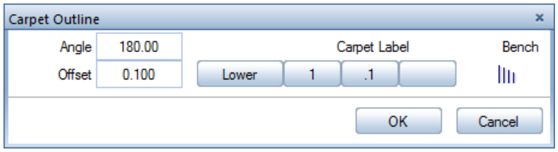
7 Select ESC to close the polyline and click **OK** to confirm.



8 Enter an angle of **180°** on the **Carpet Outline** Context toolbar.
This defines the position of the first bar and thus the unroll direction.

9 Enter **0.10** m for the offset between the first bar and the edge.

10 Define the carpet label as shown. "B 1.1" stands for: bottom layer, carpet 1, 1st carpet.

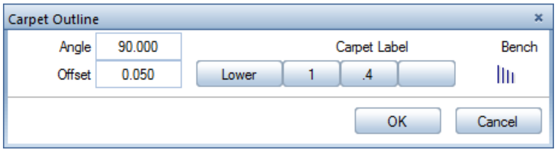


11 Click **OK** to confirm the values.
Allplan creates the carpet outline with the unroll direction, first bar and label.

12 Now you can enter the next carpet. Repeat steps 4 through 11 and create the other carpets. Name them B1.2, B1.3, B1.4., B1.5 and B1.6. Note the following points.

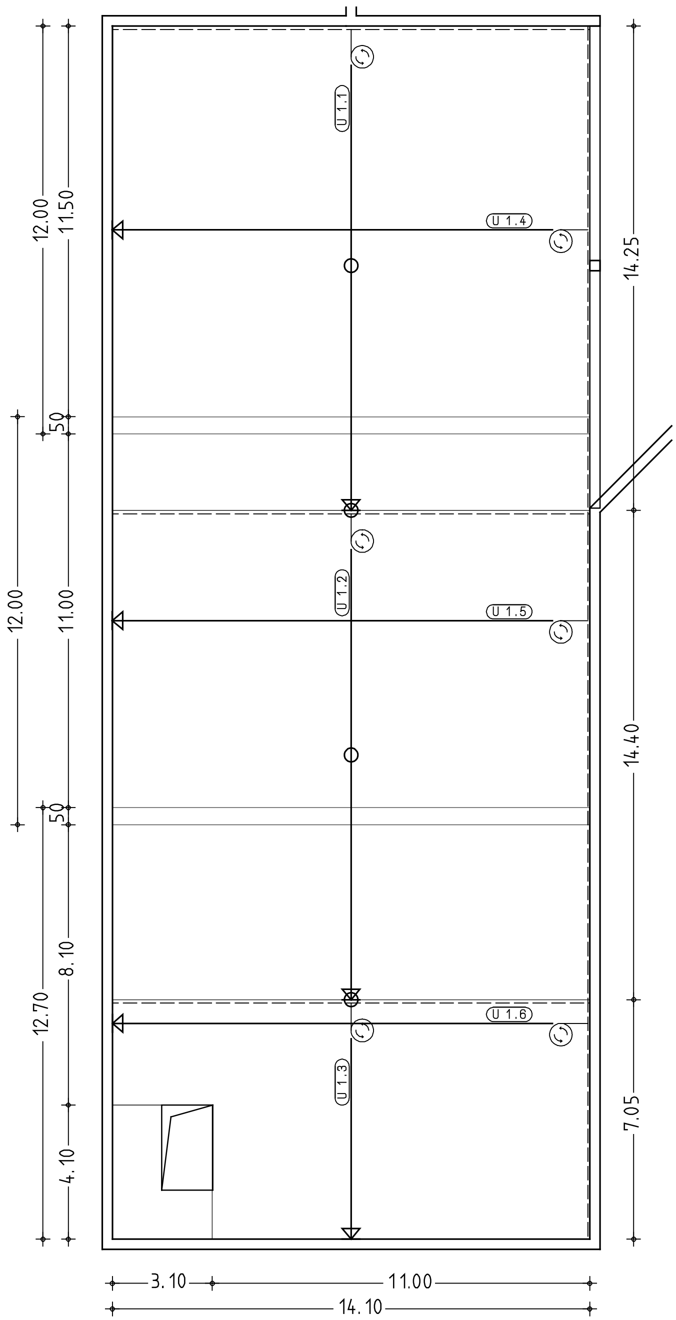
Enter the outlines of the carpets B1.2 and B1.3 for the longitudinal direction yourself. Be sure to note the following:

- In axes D and F, the carpets are joined without overlap.
- When you define the carpet outline for carpet B1.3, do not include the lower-left rectangular area between grid point G/1 and the upper-right corner of the recess, as this would cause the program to generate illegal reinforcing bars. Select **0.05** m for the offset around the recess.



- The values on the context toolbar are valid for the carpets B1.4, B1.5 and B1.6. The angle for the unroll direction (**90°** instead of 180 degrees) and the offset to the first bar (**0.05** m instead of 0.10 m) are different. Use the layer **BA_B_B_2**.
- The carpets B1.4 and B1.5 are **12.00** m long in the transverse direction. With an overlap length of **0.50** m, the length of carpet B1.6 is **12.70** m. Carpet B1.6 has a recess in the lower-left area (like carpet B1.3).
- To define the lap joint, specify the starting point by pointing to the lower-left corner of the carpet you just created. Enter **0.50** in the Δy **y-coordinate** box, which is highlighted in yellow. In this case, the offset values are **0.00**.
  Alternatively, you can enter an offset of **-0.50** for the top sides of the outlines of carpets B1.5 and B1.6.

Compare what you have drawn with the finished carpet placing drawing.


U 1.1
U 1.2
U 1.3
U 1.4
U 1.5
U 1.6
12.00
11.50
50
12.00
11.00
50
12.70
8.10
4.10
14.25
14.40
7.05
3.10
11.00
14.10

Before you create the reinforcement for the carpets, you will copy the individual carpets in the placing drawing to different drawing files. You will use carpet B1.1 as an example.

Tip: You can also separate all the carpets in one go by selecting the following option:
Copy ALL carpet outline polygons to different drawing files

To separate carpets into different drawing files

1 Click **Separate into Files** (**Create** menu – **Engineering** family – **BAMTEC** module).

2 Select the **Copy ONE carpet outline polygon to a different drawing file** option in the **File Settings and Reinforcement Mode** dialog box.

3 Select the check box in the **File Splitting** area and click **OK** to confirm the dialog box.

4 Click the first bar of carpet B1.1.

5 Select the first drawing file – **503** – in the **Select destination drawing file** dialog box.
The program automatically creates drawing files **503** (data for assembly drawing) and **504** (layout). See for yourself:

Tip: As opposed to manual reinforcement, the **Re-inforce** tool reinforces carpets automatically.
This tool is designed with economic considerations in mind. Thus, you can create a structurally adequate reinforcement system in a fully automatic manner.

Using carpet B1.1 as an example, you will now learn about the tools for reinforcing carpets manually. You will use the following tools:

Carpet Mounting Strips

Basic Carpet Reinforcement

Secondary Carpet Reinforcement

Note: For production reasons, make sure you comply with the following values defining the spacing between mounting strips:
The first mounting strip begins after 52.5 cm. After this, the mounting strips are spaced at 1.55 m intervals.

To place mounting strips

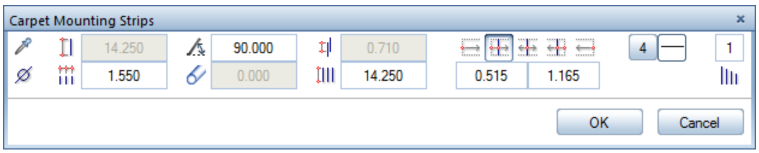
1 Click **Open on a Project-Specific Basis** (Quick Access Toolbar) and double-click drawing file **503**.

2 Click **Carpet Mounting Strips** (**Create** menu - **Engineering** family - **BAMTEC** module).
Carpet mounting strips are always created on layer **BA_B_MST**, regardless of the selected layer.

3 As you separated the carpet polygon beforehand, a placing polygon already exists. Click **Match** in the input options.

4 *Select the polygon you want to match:* Click the polygon and click **OK** to confirm.

5 Define the following settings on the **Carpet Mounting Strips** Context toolbar:
Spacing 1.55
Angle 90° (an angle of 90° places the starting point at the lower-right point. Production also starts
at this point.)
Offset to starting edge: 0.515
Line type for bar display: 4



6 Click **OK** to confirm the entries.

7 The mounting strips appear in the selection color. The dimension line is attached to the crosshairs. You do not need to dimension the mounting strips manually, as they will be arranged automatically by the production machine. Skip labeling by selecting ESC.

8 Select ESC to close the **Carpet Mounting Strips** tool.

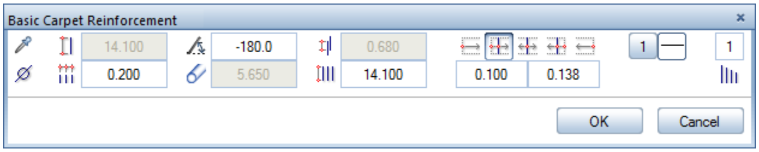
The basic carpet reinforcement has a diameter of 12 mm and is spaced at 20-cm intervals. It has the mark number 3. See the illustration of the reinforced carpet at the beginning of this exercise (objective).

To define basic carpet reinforcement

1 Click **Basic Carpet Reinforcement** (**Create** menu – **Engineering** family – **BAMTEC** module).

2 *Select carpet to which you want to apply basic reinforcement:* Click the carpet polygon.

3 Enter the following parameters on the **Basic Carpet Reinforcement** Context toolbar:
Diameter: **12 mm**
Spacing: **0.20**
Offset to starting edge: **0.100**
Line type for bar display: **1**



4 Click **OK** to confirm the entries.

5 The basic reinforcement appears in the selection color. The palette for the dimension line opens.

- Select the **Dimension line** type and layer **BA_B_B_1** for the dimension line. Enter an aspect of **1.00** by selecting the **Dimension line options** line and clicking .
- Select the **Bar markers** option and place the dimension line in the workspace.

6 Open the **Text/leader** tab. Define the label parameters so that the **Number of pieces**, **Diameter** and **Spacing** are included, select the automatic text leaders and place the label.

7 Select ESC to close the **Basic Carpet Reinforcement** tool.

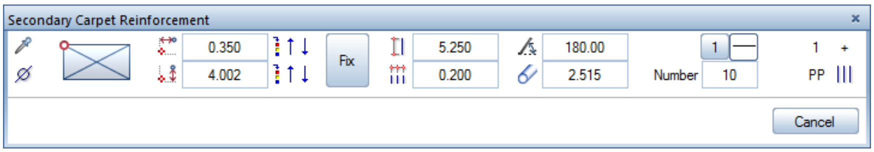
You will place five different types of secondary reinforcement in carpet B1.1. Marks 4, 5, 6, 7, and 8 are used for the secondary reinforcement. See the illustration of the reinforced carpet at the beginning of this exercise (objective).

To place secondary carpet reinforcement

Tip: The entries you make are immediately visible in the preview. So, you can check the effects of your settings at any time.

1 Click **Secondary Carpet Reinforcement** (**Create** menu – **Engineering** family – **BAMTEC** module) and select the layer **BA_B_B_1**.

2 Define the following parameters on the **Secondary Carpet Reinforcement** Context toolbar:
Diameter: **8 mm**
Anchor point (start of placement): **upper left**,
dx offset = **0.35**
dy offset = **4.002**
Placing length: 5.25
Spacing: 0.20
Angle = 180°
Number of pieces: 10



3 Place the secondary reinforcement at the upper-left corner of the carpet polygon.

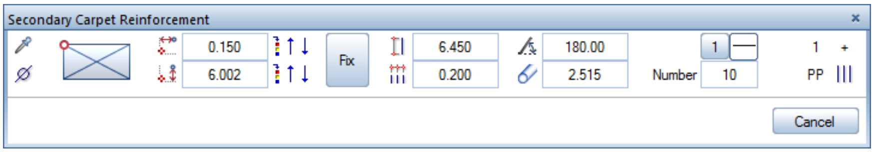
4 The secondary reinforcement appears in the selection color. Place the dimension line and the label with the settings proposed by the system.

You will now create more secondary reinforcement. Repeat steps 2 to 4 and use the settings in the following section.

To create more secondary reinforcement

1 The **Secondary Carpet Reinforcement** tool is still open.

2 Define the following settings on the context toolbar:
Diameter: **8 mm**
Anchor point (start of placement): **upper left**,
dx offset = **0.15**
dy offset = **6.002**
Placing length: 6.45
Spacing: 0.20
Number of pieces: 10

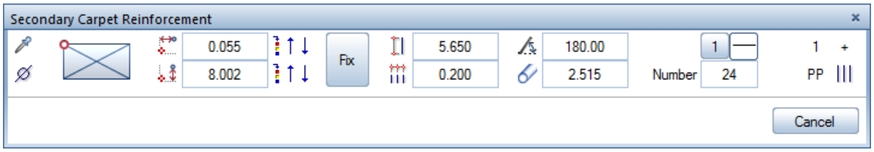


3 Place the secondary reinforcement at the upper-left corner of the carpet polygon.

4 Place the dimension line and the label.

5 The **Secondary Carpet Reinforcement** tool is still open.

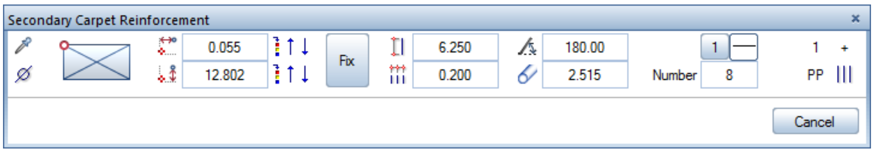
6 Define the following settings on the context toolbar:
Diameter: **8 mm**
Anchor point (start of placement): **upper left**,
dx offset = **0.055**
dy offset = **8.002**
Placing length: 5.65
Spacing: 0.20
Number of pieces: 24



7 Place the secondary reinforcement, the dimension line and the label.

8 The **Secondary Carpet Reinforcement** tool is still open.

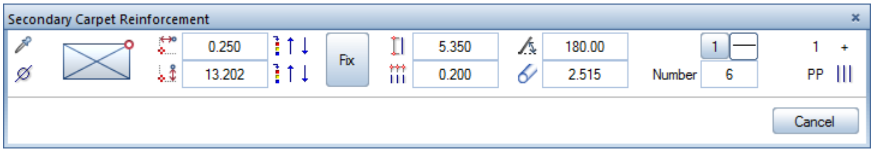
9 Define the following settings on the context toolbar:
Diameter: **8 mm**
Anchor point (start of placement): **upper left**,
dx offset = **0.055**
dy offset = **12.802**
Placing length: **6.25**
Spacing: **0.20**
Number of pieces: **8**



10 Place the secondary reinforcement, the dimension line and the label.

11 The **Secondary Carpet Reinforcement** tool is still open.

12 Define the following settings on the context toolbar. Do not forget to change the anchor point:
Diameter: **8 mm**
Anchor point (start of placement): **upper right**,
dx offset = **0.25**
dy offset = **13.202**
Placing length: **5.35**
Spacing: **0.20**
Number of pieces: **6**



13 Place the secondary reinforcement at the upper-**right** corner of the carpet polygon.

14 Place the dimension line and the label.

15 Select ESC to close the **Secondary Carpet Reinforcement** tool.

You can use the **Reinforcement Reports** and **Reinforcing Bar Legend** tools to generate various reinforcement schedules.

Now you will create a BAMTEC file for carpet B1.1.

To create a BAMTEC file

1 Click **BAMTEC File** (**Create** menu - **Engineering** family - **BAMTEC** module).

2 *Select placements from which you want to derive the BAMTEC file:* Use the **Brackets** (**Actionbar** - **Work Environment** task area) or the left mouse button to select all placements.

Tip: If drawing file **504** is open in edit mode, you can use the definition point you specified when you separated the carpets.

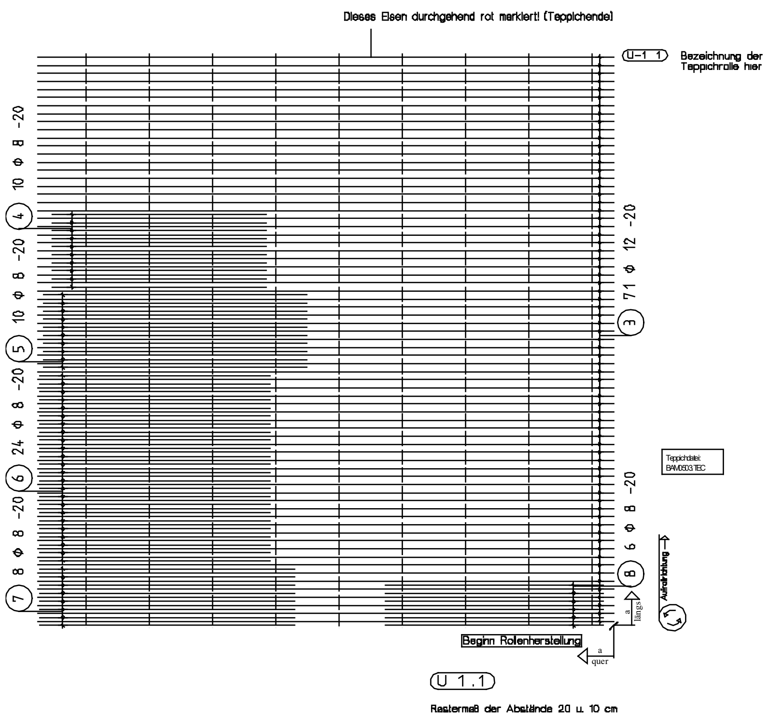
3 *Place the definition point*: Specify the carpet's local reference point. The system proposes two points. Click the lower-right point.
The point clicked is marked by a symbol.

4 Place the name of the carpet file.

As opposed to automatic reinforcement, you need to manually create the symbols required for carpet production. You can download the symbol from Allplan Connect. If you have installed the training project you can find on the internet, you can retrieve the symbol from the **Library**.

To place symbols

1. Open the **Library** palette. If you still see the **Standard details** in the **Office** folder, click **Library** on the navigation bar at the top.
2. Open the **Project**, **Engineering Tutorial** and **BAMTEC symbols** folders one after the other.
3. Double-click the **BEZ-Aufroll 1:50** symbol.
4. Place the symbol with the text to the right of the carpet.
5. **Delete** (**Actionbar - Edit** task area) all the redundant elements.
6. **Move** (**Actionbar - Edit** task area) the text into the correct position.



Reinforce carpet B1.4 yourself. The approach is the same as with carpet B1.1. The starting point of carpet B1.4 is the lower-left corner of the carpet polygon. The secondary reinforcement is spaced as follows (upper-right or lower-right reference point):

Secondary reinforcement 1 (mark 3): **dx** = 4.151, **dy** = 1.00, **L** = 5.85

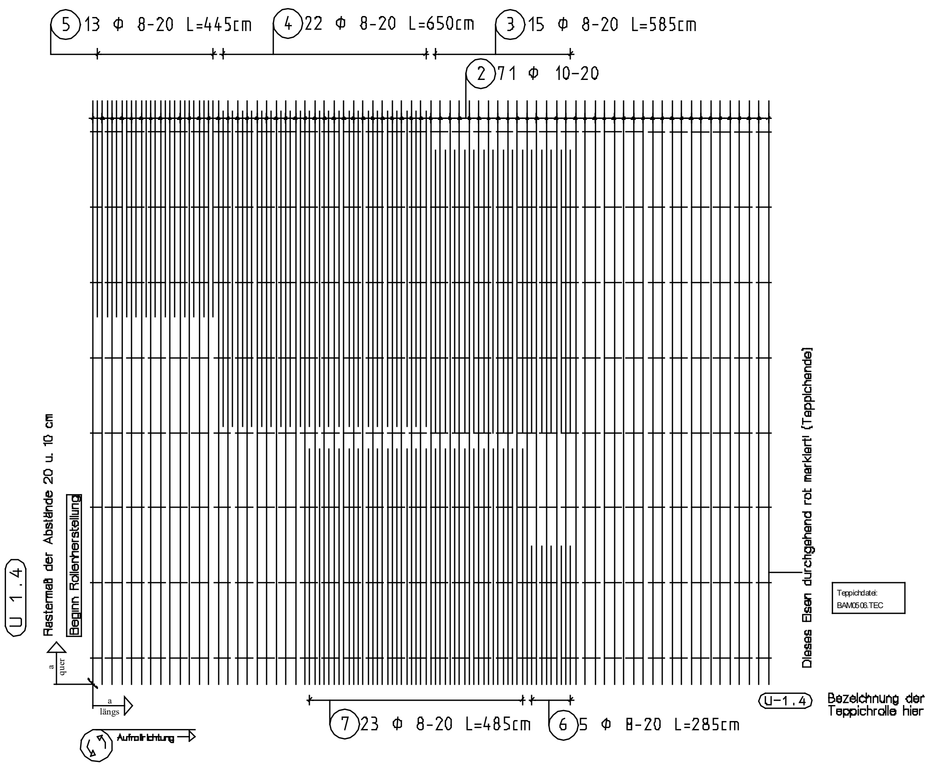
Secondary reinforcement 2 (mark 4): **dx** = 7.151, **dy** = 0.20, **L** = 6.50

Secondary reinforcement 3 (mark 5): **dx** = 11.551, **dy** = 0.00, **L** = 4.45

Secondary reinforcement 4 (mark 6): **dx** = 4.151, **dy** = 0.00, **L** = 2.85

Secondary reinforcement 5 (mark 7): **dx** = 5.151, **dy** = 0.00, **L** = 4.85

After you have rearranged the marks, carpet B1.4 should look like this:



Printing layouts is covered in exercise 9.

Cross-section catalogs

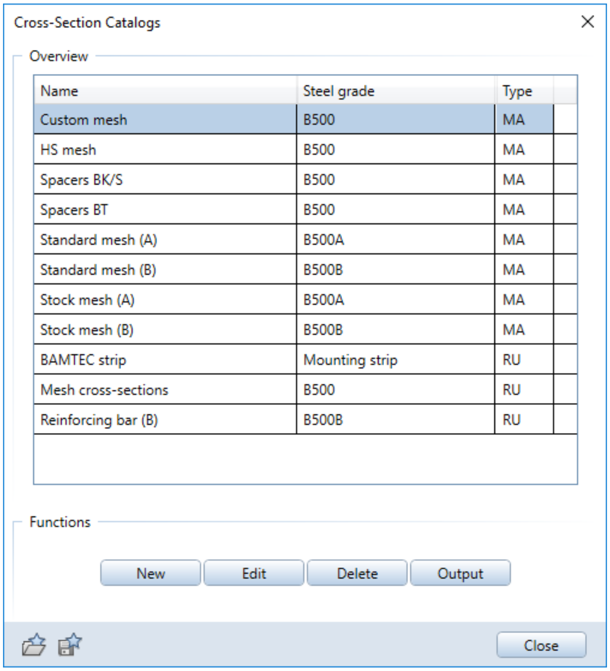
This chapter shows two examples of cross-sections catalogs. You will learn how to modify mesh cross-section catalogs and add a new custom mesh.

Note: With the self-explanatory forms of the **cross-section catalogs**, you can define new catalogs (for example, custom mesh) or change existing ones. Cross-section catalogs can be viewed on the screen and listed in reports. You can create reports for individual cross-section catalogs straight from the overview of all cross-section catalogs.
These reports can be customized, printed, placed in the current document or saved as a file in Excel, Word or PDF format. Numeric input for custom meshes is supported, as is output of a mesh with a single bar representation.

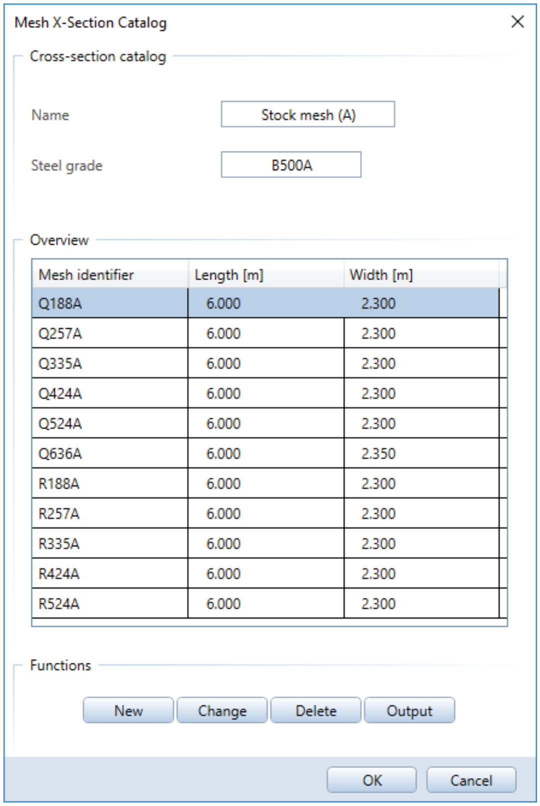
Now you will change the length of a standard stock mesh from 6.00 m to 12.00 m.

To modify a mesh cross-section catalog

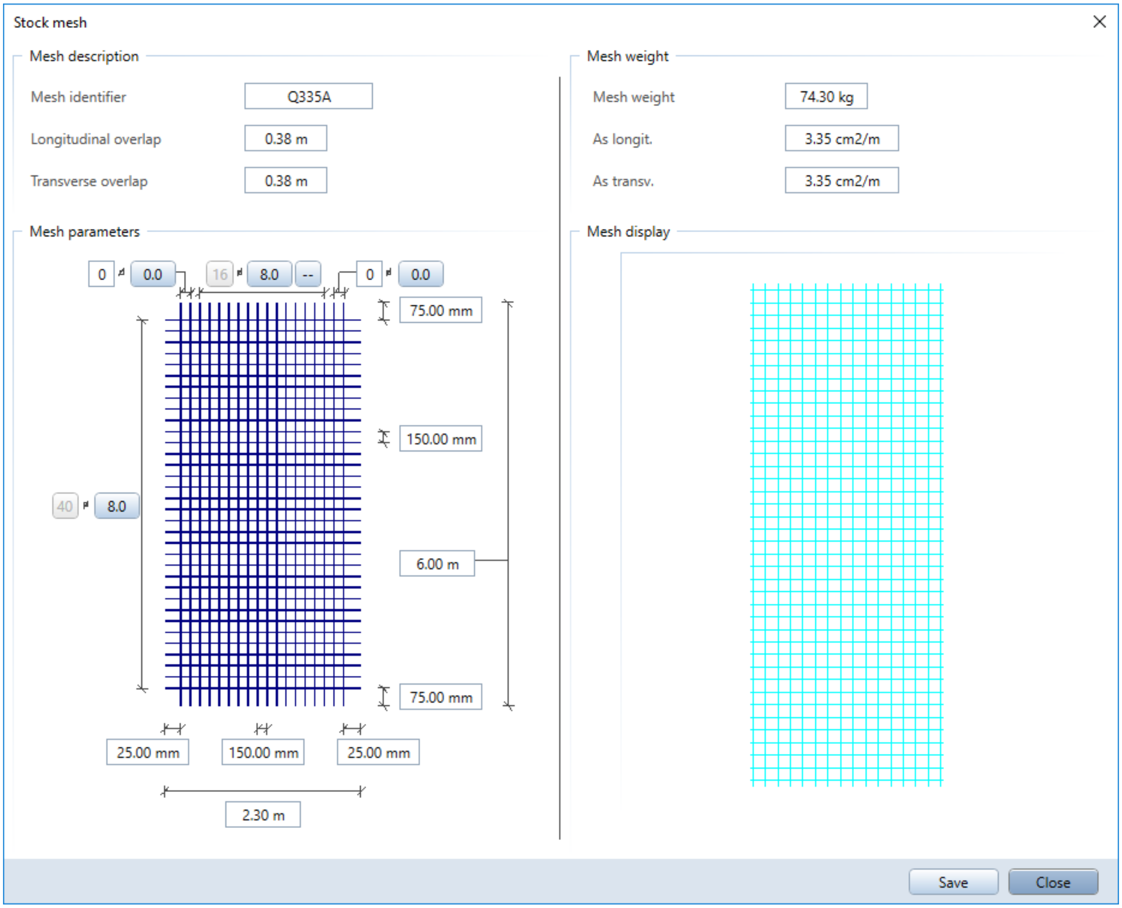
1 Open the **Default Settings** drop-down list on the Quick Access Toolbar and click **Defaults**. Select **Cross-Section Catalogs**. The following dialog box opens:



2 Click **Stock mesh (A) BSt 500 M(A)** and then **Edit**. You can see a full overview of the mesh cross-section catalog:



3 Click a mesh and then **Edit**.
The following dialog box opens:



4 Enter **12.00** m for the length of the mesh.

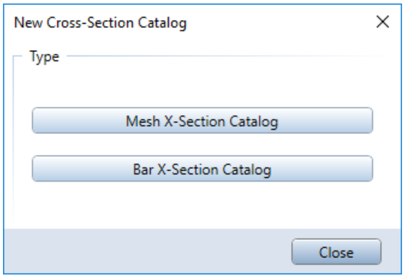
5 The program automatically calculates the weight of the mesh based on the modified length. Thus, you can modify and save settings without any problems.

Next, you will enter a new custom mesh.

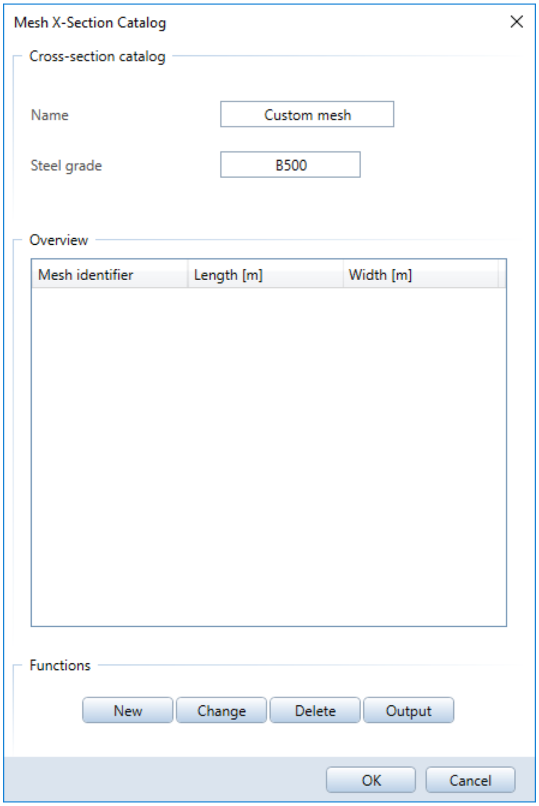
To enter a new custom mesh

1 The **Stock meshes (A) BSt 500 M(A)** dialog box is still open from the last task. Click **Cancel** to return to the overview of the **Cross-Section Catalogs**.

2 Go to the **Cross-Section Catalogs** dialog box and click **New**. The following dialog box opens:



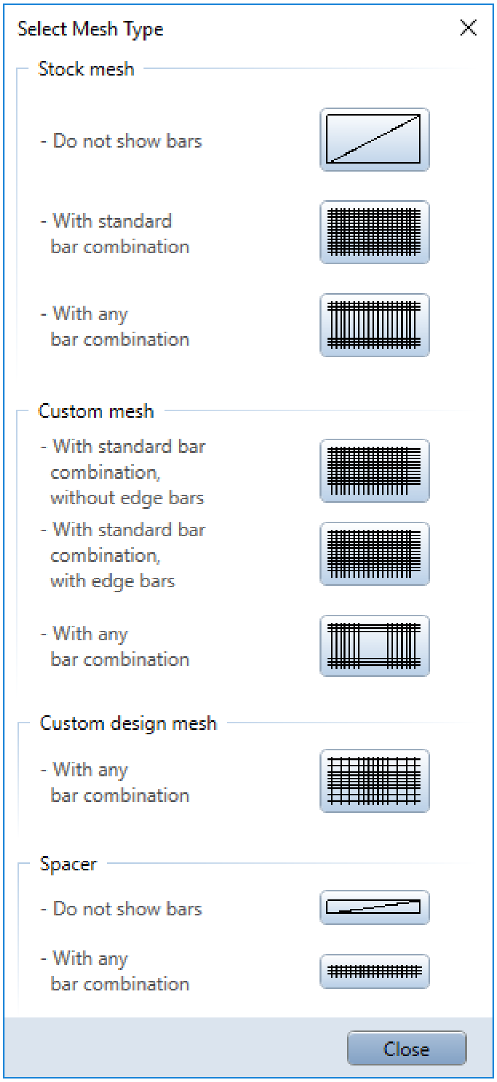
3 Click **Mesh X-Section Catalog**.
Another dialog box opens:



4 Click in the **Label** box and enter **Custom Meshes**.

5 Click in the **Steel grade** box and enter **M500**.

6 Click **New**.
A dialog box shows which meshes can be defined and how:



Stock meshes without a single bar representation; only the length, width and overlap are variable.

Stock meshes with a single bar representation; enter the parameters in a dialog box.

Stock meshes that you can define in the workspace.

Custom meshes without edge bars; define them in a dialog box.

Custom meshes with edge bars; define them in a dialog box.

Custom meshes that you can define in the workspace.

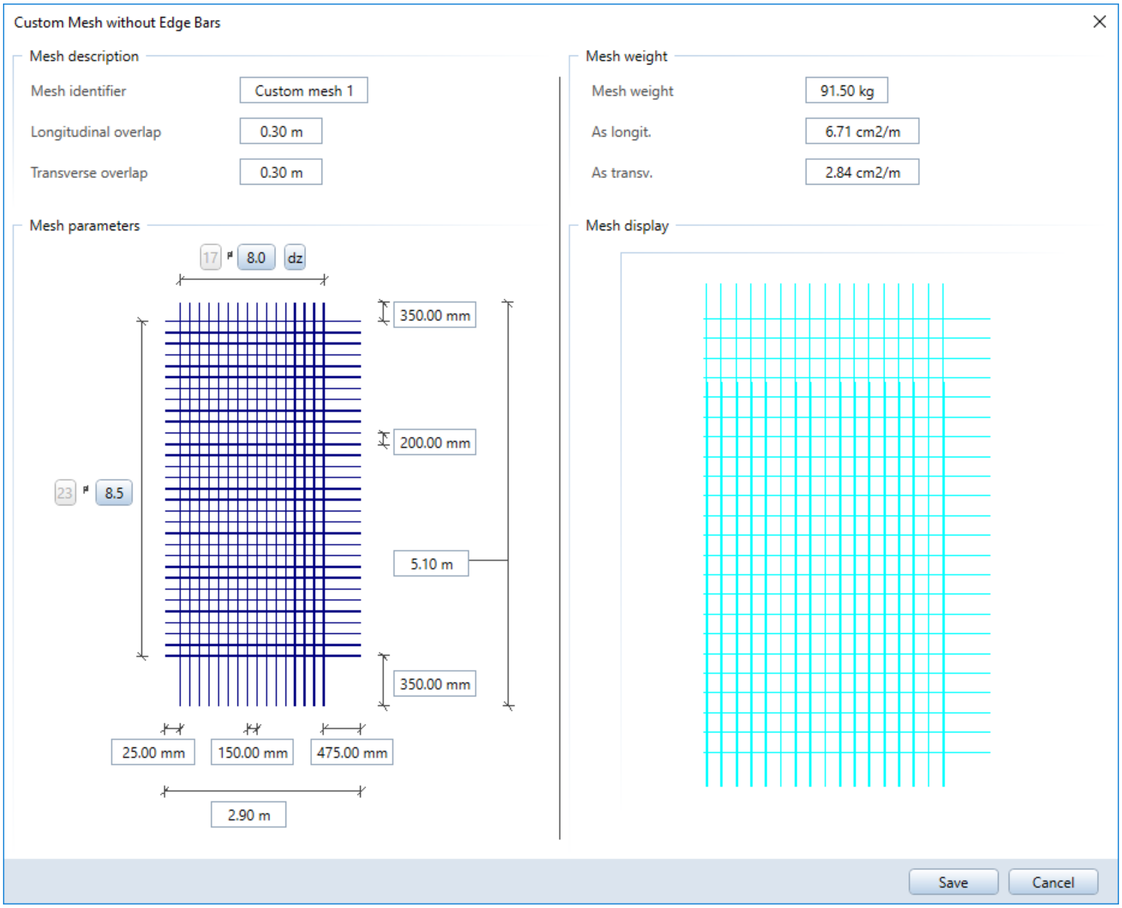
Custom meshes with any bar combination; special functions are available for defining these meshes in the workspace.

Spacers that can be defined without single bars; enter spacers in the same way as stock meshes without a bar representation.

Spacers with a single bar representation; define them in the workspace.

7 Click **Custom mesh, without edge bars**.

8 A dialog box opens. Enter a name for the new mesh: **LIMA1**.



9 You can now define the parameters. Start by entering values for the length, width and the spacing between the bars. The projection values depend on these parameters.

10 Save the settings and finish.

Unit 5: Layouts

This unit, which consists of two exercises, shows you how to assemble and print layouts.

- First, you will create a title block as a label style.
- Then, you will use the tools in the **Layout Editor** task to print the layout of the elevator shaft that you reinforced in exercise 4 (unit 4).

Requirement for printing

Before you print, you need to configure the output device correctly. If you work on a network, you can use any device connected to a remote machine (assuming it is configured correctly).

To do this, connect the output device and install it in Windows Print Manager. On a network, install the device on the computer to which the device is connected and then share the device.

For further information, consult the user guides of your printer and operating system.

Printing the screen contents

Printing the screen contents is covered in the Basics Tutorial. Here is a short description of this approach.

To print the screen contents

1 Select the drawing files and layers you want to include in the printout.

2 Click **Print Preview** (Quick Access Toolbar).

3 Make the following settings in the **Print Preview** palette:

- Select the printer in the **Settings** area.
- Go to the **Display of elements** area and select the **Thick line** option.
  This not only makes the different line thicknesses visible on the screen but also ensures that they are printed as such.

  By using the **Print construction lines** option, you can choose to include construction lines in the printout. Define the other options as you like.

4 Select the **Scale** and click **Print**.

5 Select ESC to close print preview.

Exercise 8: custom title block

Requirements:

Allplan 2020 Engineering comes in different packages.

Check whether the **User-Defined Objects** task contains the **Label Styles** task area.

Allplan 2020 provides a wide range of "intelligent" title blocks based on label styles. Label styles contain design entities, texts and attributes.
The advantage of a title block with attributes is that the program updates the text whenever you open the layout.

You can create your own label styles or modify existing title blocks. Attributes can only be used when you assigned them during project creation or later.

This exercise requires an empty drawing file.

Tools:

Library

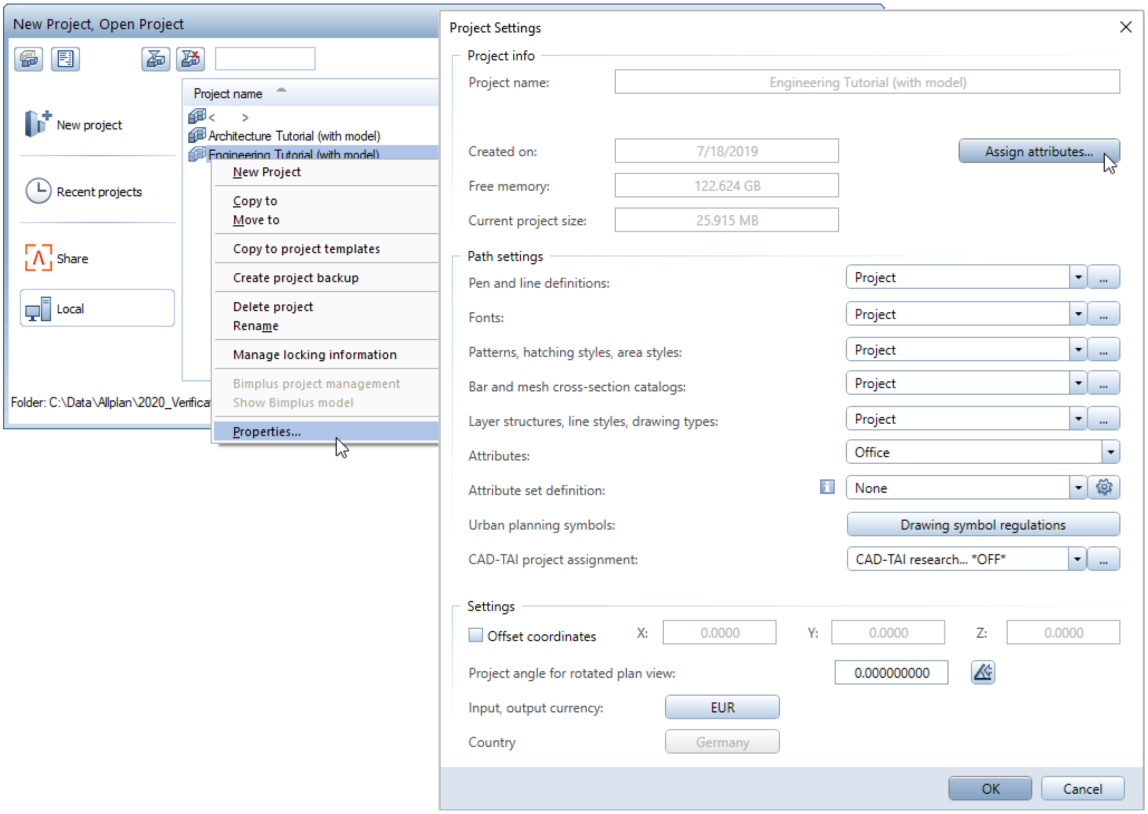
Label Style

To assign attributes

1 Click **New Project, Open Project...** on the Quick Access Toolbar.

2 Select the **Engineering Tutorial** project, open the shortcut menu and click **Properties...**

3 The **Project Settings** dialog box opens. Click the **Assign attributes...** button.



4 In the **Project Attributes** dialog box, click  **Hide unassigned values** and open the **Architect** group.

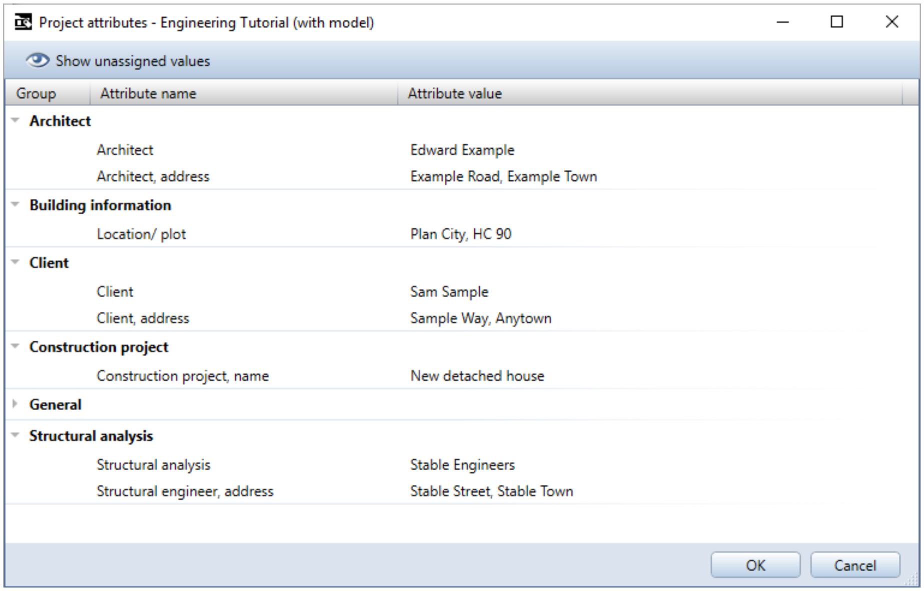
5 In the **Attribute value** column of the **Architect** row, click in the box and type in the following:

Sam Sample

6 Use the same approach to enter the **Sample Street, Anytown** value for the **Architect address** attribute.

7 Specify the attributes for the **Client**, **Construction project**, **Building information** and **Structural analysis** groups as shown in

the illustration. After this, click **Hide unassigned values** to see all the attributes you have defined.



8 Click **OK** to confirm the **Project Attributes**, **Project Settings** and **New Project, Open Project** dialog boxes.

Tip: You can find the title block as a drawing file and as a symbol in the project template for the training project. Look in the appendix for information on how to download the project template from the internet: Project templates on the internet (on page 337).

The attributes you just assigned will now be used in the label style for the title block.
This exercise assumes that the title block created in exercise 5 of the Basics Tutorial is available to you. You have already drawn this title block and saved it as a symbol with the name **Original** in the **Title blocks** library file.

To create the title block as a label style

- You can access the **Original** title block you created in the Basics Tutorial.
- Open an **empty drawing file** and close all the others.
- Switch the scale to **1:1**.

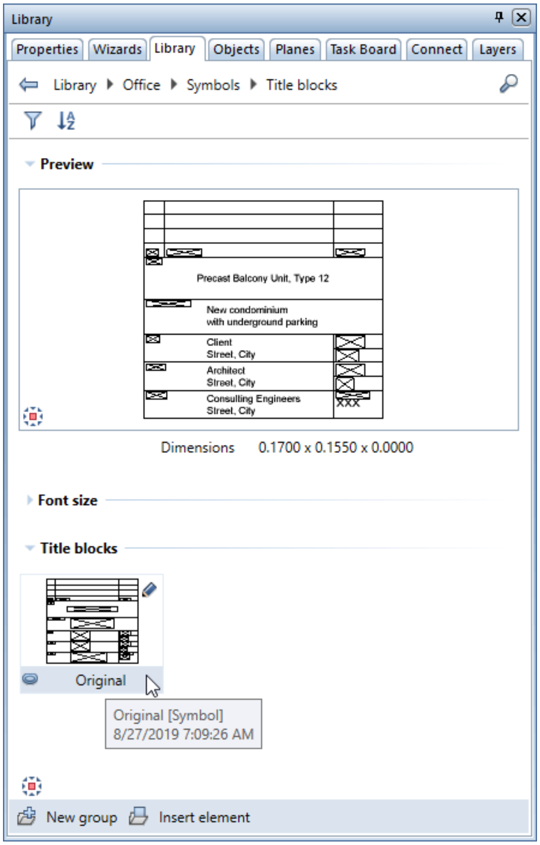
1 In the **Library** palette, open the **Office** folder (or the **Project** folder if you work with the training project).

2 Open the **Symbols** folder (or the **Engineering Tutorial** folder if you work with the training project).

3 Open the **Title blocks** folder.

Tip: To position the label styles quickly and accurately, you can place **Point Symbols** as **Construction Lines** to mark where the original texts start. You can then delete these texts (**Engineering** role – **Reinforcement** task – **Quick Access** task area).

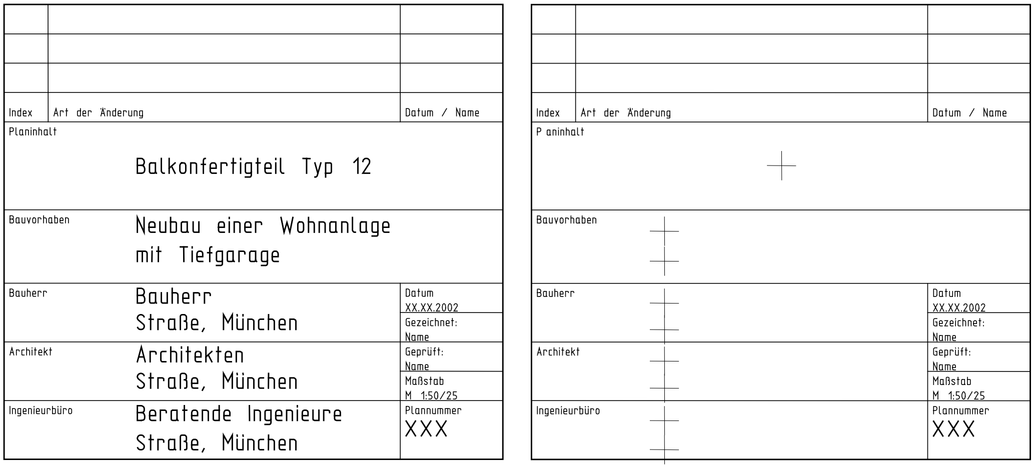
4 Double-click the **Original** symbol.



5 To place the symbol, click in the workspace.

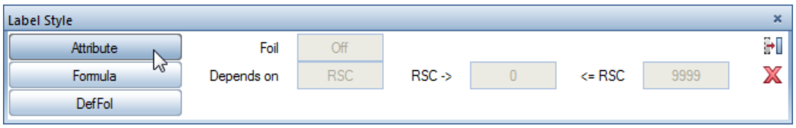
6 If the title block appears too small, click **Zoom All** on the viewport toolbar.

7 Delete the text that is to be replaced by attributes (project-specific information).

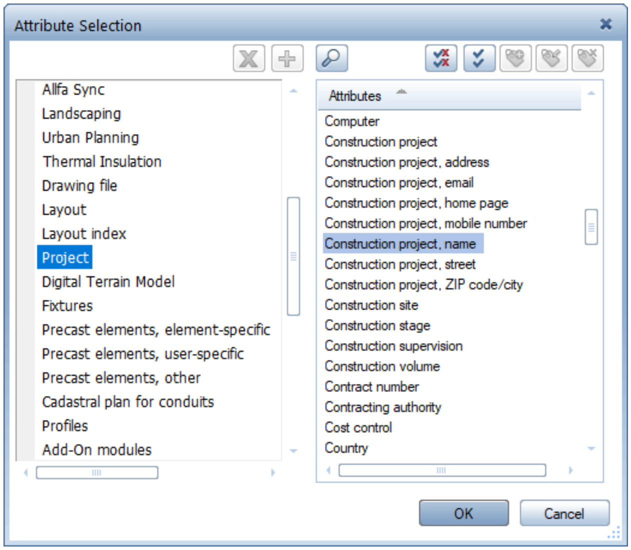


8 Click **Label Style** (**Engineering** role - **User-Defined Objects** task - **Label Styles** task area).

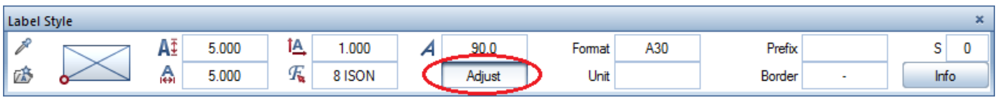
9 Click **Attribute** on the context toolbar.



10 Select the **Project** area, choose the **Construction project name** attribute and click **OK** to confirm.



11 Define the text parameters as shown in the illustration and change the format to **A30**.
This defines the attribute as a text item with 30 characters maximum.

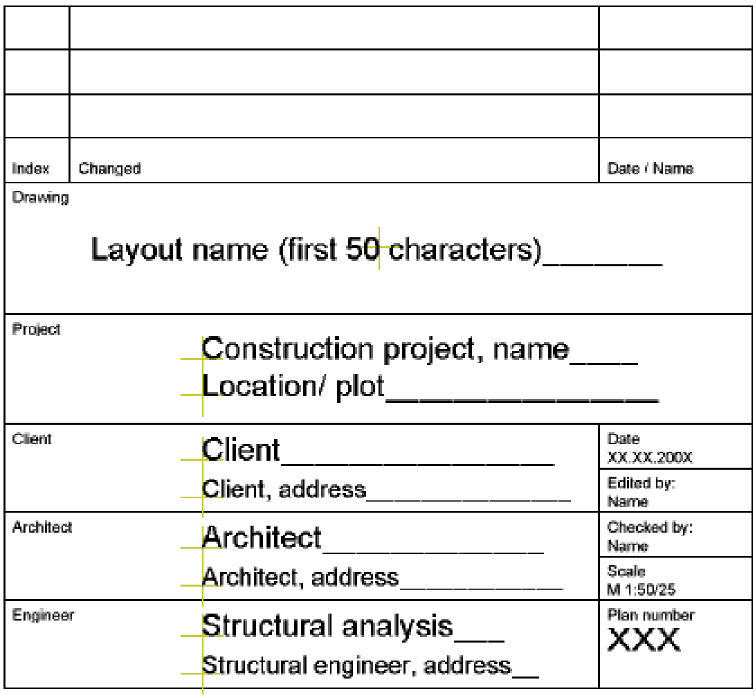


12 Turn off **Adjust height/width to scale** and place the attribute so that it is left-aligned in the box for the construction project details.

13 Repeat steps 9 through 11 and place the following attributes:
Use a text height and width of **4.000** mm for the **Client address**, **Architect address** and **Structural engineer address** attributes.
Use **5.000** mm for all other text items.

Group	Attribute	Format	Text height
Project	Construction project, name	A30	5.000 mm
	Location/plot	A30	5.000 mm
	Client	A22	5.000 mm
	Client, address	A30	4.000 mm
	Architect	A22	5.000 mm
	Architect, address	A30	4.000 mm
	Structural Analysis	A22	5.000 mm
	Structural engineer, address	A30	4.000 mm
Layout	Layout name	A40	5.000 mm

Tip: When placing text, you can align it by using track lines or you can do this later by using the **Align Text** tool (**Draft** role – **Label** task – **Text** task area).



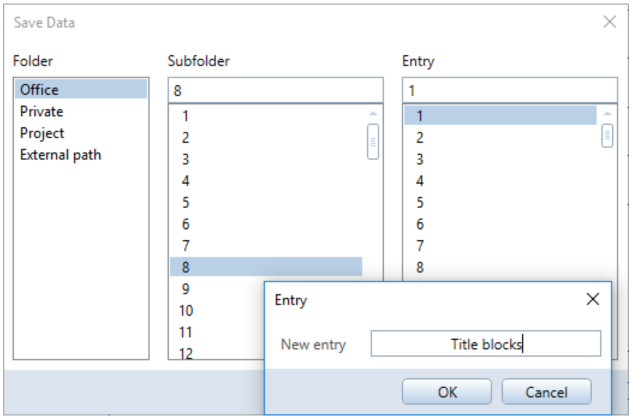
14 Click **DefFol** (Define Foil) on the context toolbar.

15 Enclose the entire title block in a selection rectangle.

16 Click the lower-right point, which will serve as the reference point.

Note: Title blocks must be saved to subfolder 7 or 8, as these subfolders are linked with the **Label** tool of the **Layout Editor** task.

17 Click subfolder number **8** and enter **Title blocks**.



18 Click line **1** and enter **Reinforcement drawing**.

19 Click **OK** to confirm the **Save Data** dialog box.

20 Select ESC to close the tool.
You have now saved the title block as a label style.

Note: You can also find the **Label Style** tool in other roles in the **Label Styles** task area of the **User-Defined Objects** task.

Exercise 9: assembling and printing layouts

Printing finished layouts is a critical step. In Allplan 2020 a layout is the unit you send to the printer.

As opposed to designing on a conventional drafting board, you do not need to define the scope of the layout in advance. Generally, you leave the layout (which involves arranging drawing files) until you're finished with the design. This is also the stage where you define the paper size, scale, border, angle, and so on. Each project can contain up to 9999 layouts.

Tools:

- Set Up Page
- Layout Element
- Update Layout
- Print Layouts
- Layout Window

Task 1: assembling layouts

Next, you will assemble a layout with the general arrangement and reinforcement of the elevator shaft. This involves two steps:

- Define the layout, that is, the sheet size, border and title block.
- Select the layouts elements, that is, the filesets and drawing files.

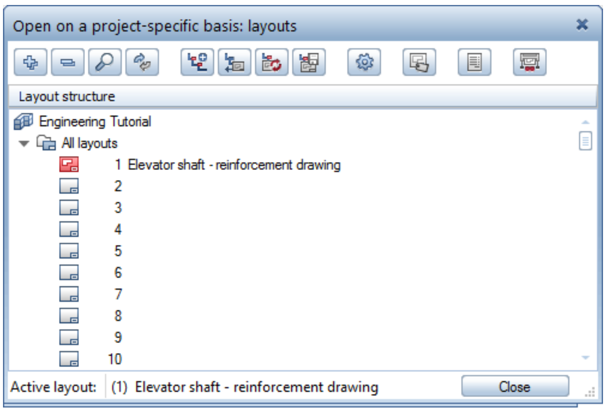
To define a layout

1 Switch to the **Layout Editor** task on the **Actionbar**.

2 Click **Open on a Project-Specific Basis** (Quick Access Toolbar) to select the layout in the **Open on a project-specific basis: layouts** dialog box.

3 Select layout **1**, select the F2 key and enter **Elevator shaft – reinforcement drawing** for its name.
Close the dialog box.

Tip: The name you enter here will appear as the **Plan name** attribute in the title block!

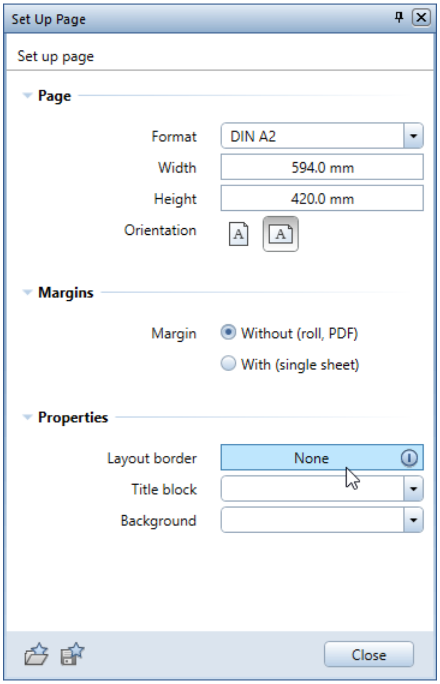


4 Click **Set Up Page** (**Actionbar** – **Layout Editor** task area).

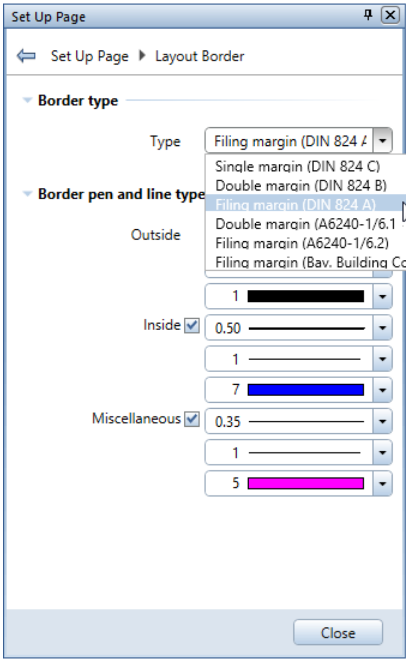
5 Go to the **Page** area, change the **Format** to DIN A2 and select **Landscape**. Go to the **Margins** area and select the **Without (role, PDF)** option.

With this setting for the margins, Allplan always places the page so that its lower-left corner coincides with the lower-left corner of the printable area of the printer selected in the **Print Layouts** tool. This ensures that the printout includes all elements that extend as far as the margins of the page.

6 Click the **Layout border** button in the **Properties** area.

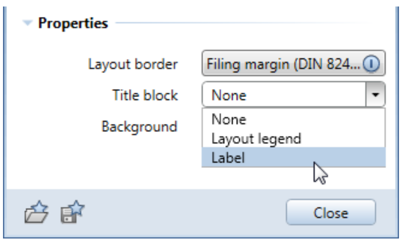


7 Switch the border type to **Filing margin (DIN 824 A)**, change the format properties of the layout border and click **Close** to return to the **Set up page** palette.

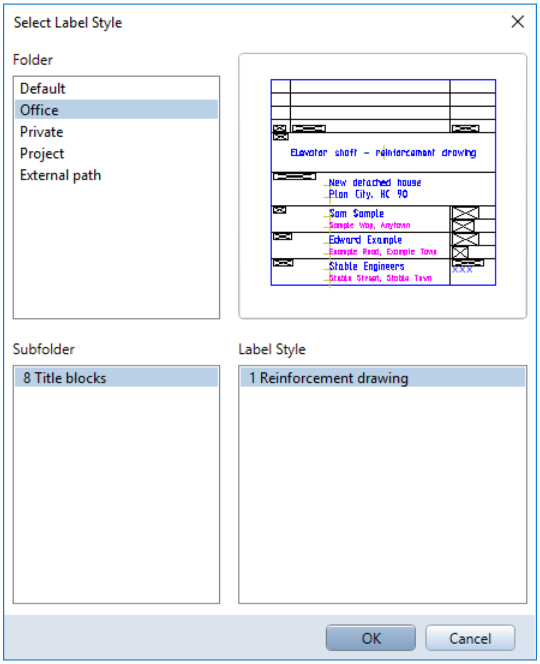


Note: If you want to place a layout border of any size on the page, use the **Layout Border** tool (**Actionbar** – **Layout Editor** task area). Here, you can define custom border sizes by means of the input options.

8 In the **Properties** area, click the **Title block** box and select the **Label** option.



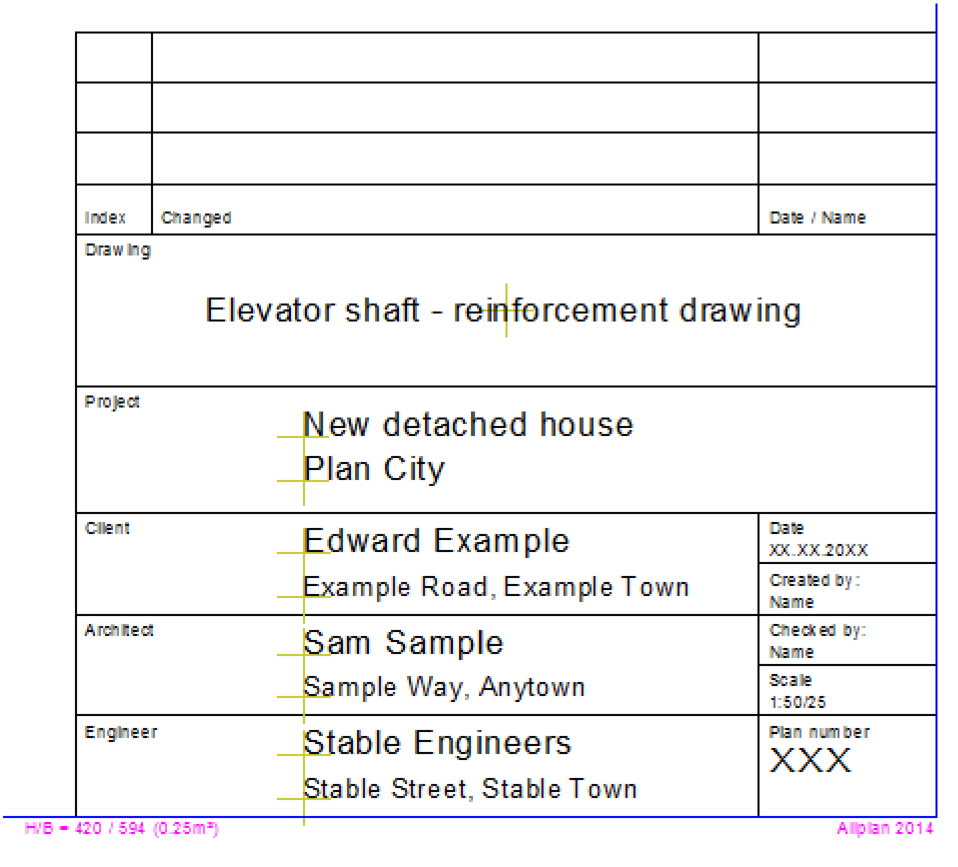
9 In the **Office** folder, select the **Reinforcement drawing** label style and click **OK** to confirm.



Taking the offsets into account, Allplan automatically places the title block in the lower-right corner.
Instead of attributes, you can now see the values you have assigned.

Tip: To change the layout label, you can use the standard text tools on the shortcut menu or in the **Quick Access** task area.

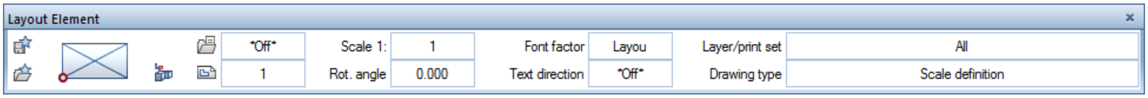
10 Enter **0.00** for both the **Offset to the right** and the **Offset to the bottom**. Then click **Close** to close the **Set Up Page** tool.



Layout elements are mainly drawing files that you place in the layout. Drawing files can be positioned individually or as a fileset. You can define the layers you want to include in the printout by selecting a print set.

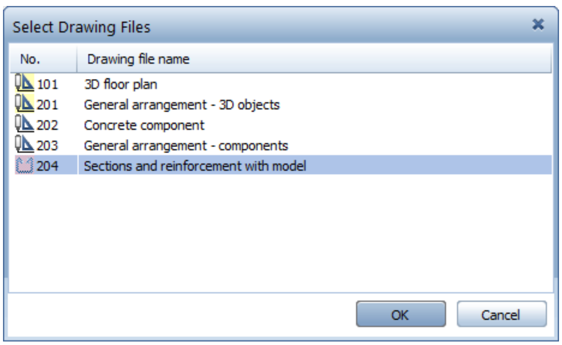
To select layout elements

1 Click **Layout Element** (**Actionbar** – **Layout Editor** task area).



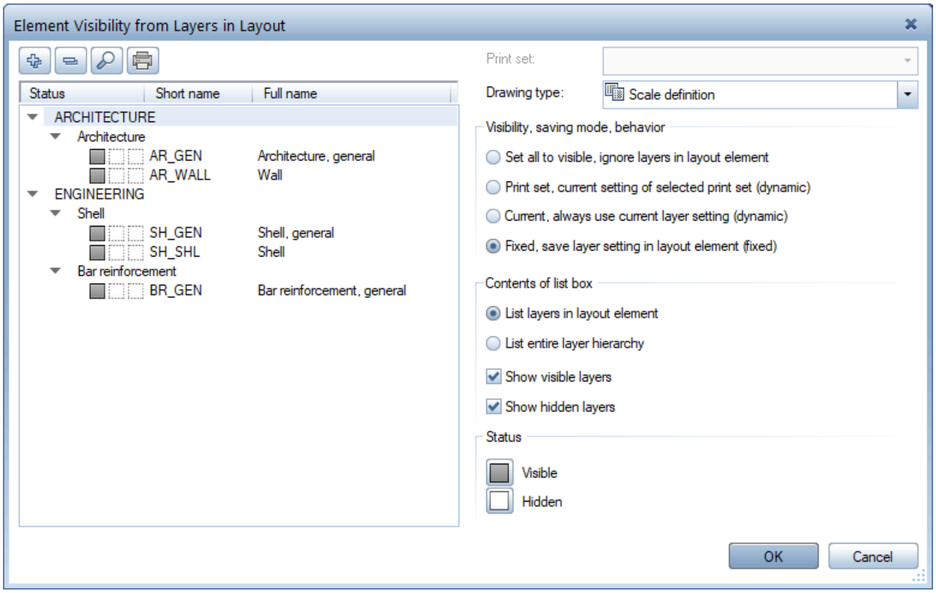
2 Click **Fileset** and select fileset **2, Elevator shaft** on the context toolbar.
The drawing file selection is the same as in document edit mode: Drawing files **202** and **203** are turned off.

3 It is enough if you place the sections and the reinforcement model in the layout. Therefore, select drawing file **204** only and click **OK** to confirm the dialog box.



4 Click the **Layer/print set** box. You can use layers to define visibility settings for the layout elements:

- The **Print set, current setting of the selected print set** option displays only elements on layers of the current print set.
- The **Current, always use current layer setting** option uses the visibility settings you defined with **Select, Set Layers**.
- Use the **Fixed, save layer setting in layout element** option to define the visibility setting for each layer individually.



5 Select the **Reinforcement drawing** drawing type and place the selected drawing file in the layout.

The next drawing file is now automatically attached to the crosshairs.

6 Select ESC to finish selecting layout elements.

Allplan saves the finished layouts. You can print them now or later. When documents have changed, you must update the layout by selecting
Update Layout (**Actionbar – Layout Editor** task area).

Task 2: printing layouts

You can now print the finished layout. Make sure the printer is installed and configured correctly.

To print the layout

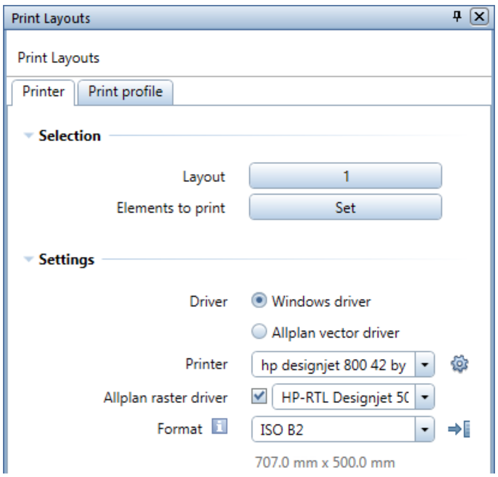
1 Click **Print Layouts** (**Actionbar - Layout Editor** task area).

The **Print Layouts** palette opens and you can see the **Printer** tab. Everything else closes. The printout will be an exact match of what you see on the screen.

In the **Selection** area, layout **1** is selected.
Click the **Set** button to select the elements you want to print. You can limit the output to certain types of design elements only. Furthermore, you can place the surface elements of each document in the background.
Leave the settings as they are.

2 Choose the output device (printer, large-format printer) and the paper size (for example, ISO B2) in the **Settings** area. So that the layout is printed in its entirety, the printable area (printable area minus device margins) must be larger than the page.

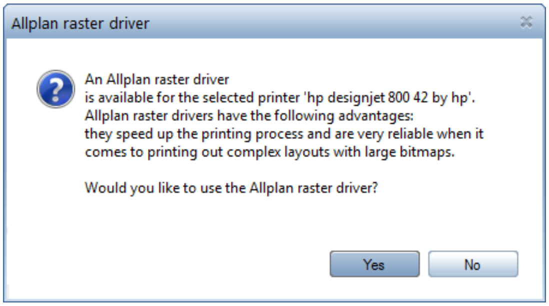
Note: If you have configured output channels in the **Services** application, you can select them via the **Allplan vector drivers** option.



3 Depending on the selected output device, you can use Allplan raster drivers. These printer drivers are especially suitable for printing large-format layouts. Raster drivers speed up printing, enhance the quality of printouts and are very reliable.
If you want to use raster drivers, select the **Allplan raster driver** option and open the list box to select a raster driver that can be used with the selected printer.

Note: You can define the properties of the Allplan raster driver by clicking **Properties** beside the selected printer.

Note: The following prompt appears the first time you select an output device that can be used with Allplan raster drivers:

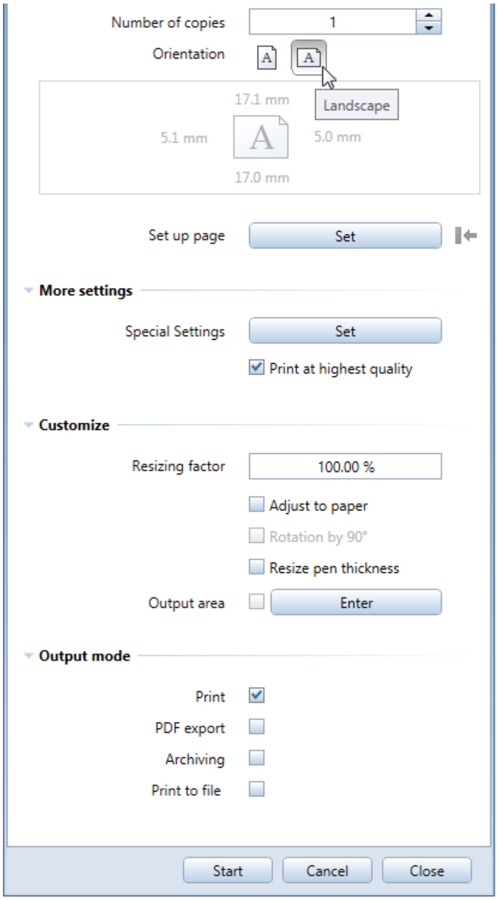


Click **Yes** if you want to use Allplan raster drivers. The **Allplan raster driver** option and an appropriate raster driver are selected.

Tip: You can define specific settings for printing in the **More settings**, **Customize** and **Output mode** areas and on the **Print profile** tab. You can find more information in the Allplan Help.

4 Do not change the number of copies - **1** - and select **Landscape** for the orientation.

Here, too, you can set up the page by clicking the **Set** button. Click to match the device margins of the selected printer.



5 Click **Start** to start printing.

If you want to save the settings and print the layout later, click **Close**.

Task 3: layout windows

You can use layout windows to position just portions of drawings in your layout. This is useful if you want to display just specific areas or elements that are far from each other in the fileset. In the following exercise, you will create layout windows and display sections of individual drawing files.

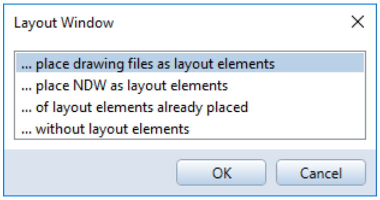
To create layout windows

1 Use **Open on a Project-Specific Basis** to open an empty layout. Then select **Set Up Page** and define the format, orientation and margins of the page.

2 Click **Layout Window** (**Actionbar - Layout Editor** task area).

You will create the window so that you can immediately select the drawing file you want to display.

3 Click .. **place drawing files as layout elements**.



4 Select drawing file **102** and place it in the layout. The drawing type is **Reinforcement drawing**.

5 Select drawing file **401** and click within the boundary of the drawing file already placed.

6 Select ESC, as you do not want to select more drawing files for this layout window.

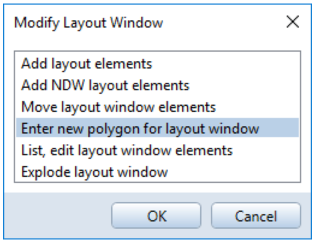
7 Define the size of the layout window by clicking two diagonally opposite points (lower-left and upper-right points; see illustration). Then select ESC twice.

Note: Check that **Area detection** is turned off in the input options. Otherwise, the border or boundary of the layout element placed defines the size of the layout window.

8 Repeat steps 2 through 7 to create a layout window for drawing file **204** or **303**.

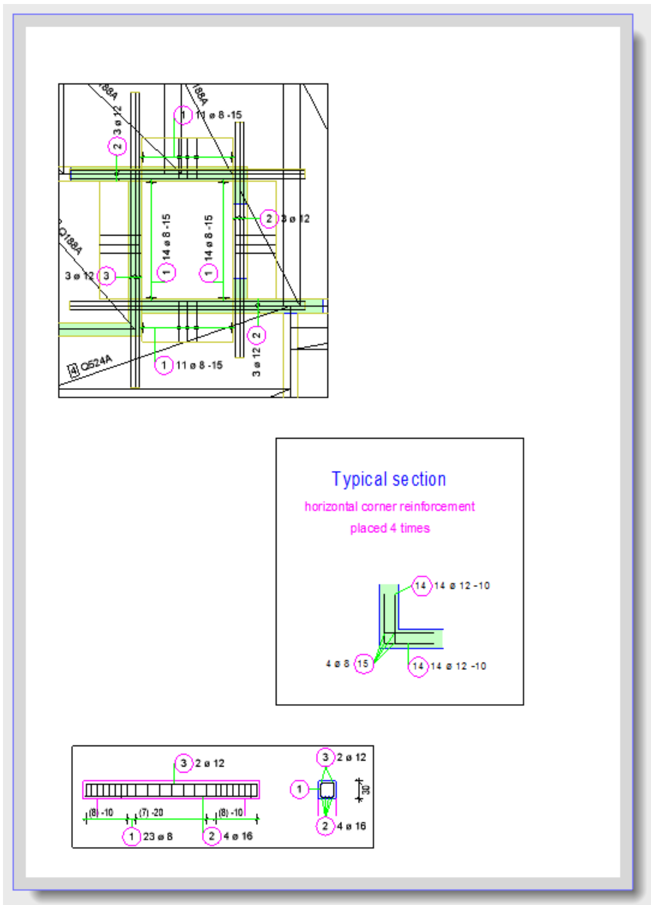
9 Click **Modify Layout Window** (**Actionbar - Layout Editor** task area) and select **Enter new polygon for layout window** to change the size of the window.

Tip: By using the polyline entry tools, you can also define freeform layout windows or create layout windows composed of several polygons.



10 To rearrange the layout windows, you can use **Move** (**Actionbar** – **Edit** task area).

The result might look like this:



Appendix

If you want to create the project yourself, this appendix provides useful information and step-by-step instructions on the following topics:

- Project organization - managing data with ProjectPilot
- Using layers
- Creating a project
- Creating filesets
- Defining print sets

In addition, you can find general information on drawing files.

Note: If you want to skip the general sections and start creating the project at once, continue at **Creating the training project** (on page 309).

Note: You can also download the project template for the training project from the internet. For more information, see **Project templates on the internet** (on page 337).

Project organization

Project structure, that is, the way in which you organize your data, is an essential part of any building design project. With an efficient and logical structure, you can locate the data you need without having to spend a long time looking for the data.

It is worth spending time carefully planning a project's structure before even drawing the first line. Consider the time and effort spent doing this as a good investment - after all, in the long term, it will save you time and money.

With Allplan 2020's flexible approach, you can create your own office-specific structures which, in turn, can be altered to suit the needs of special projects.

Managing data with ProjectPilot

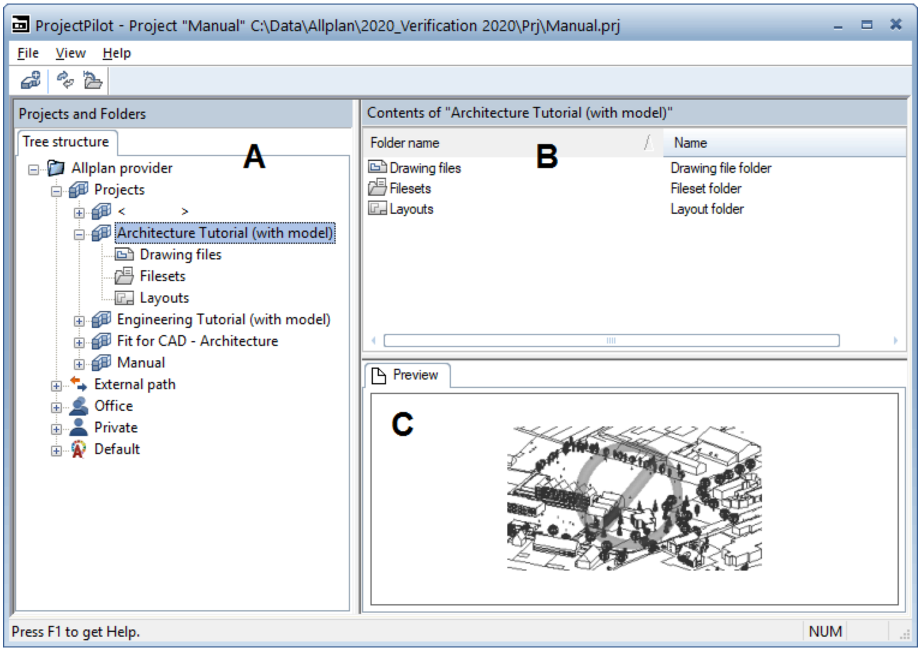
What is ProjectPilot?

You use **ProjectPilot** to create and structure projects in a simple and clear manner.

ProjectPilot is a powerful data management tool developed specially for the data structure of Allplan. ProjectPilot provides tools for copying, moving, renaming and deleting data (for example, projects, drawing files).

If you are already familiar with File Explorer, then you'll find that working with ProjectPilot is just as easy. You can use the shortcut menu for almost everything. If you find that you need to move or copy files, you can simply drag them to the new folder.

User interface



Left window (A)

The left window shows the projects and folders in a tree structure. The current project is selected and open. Click the plus sign (+) to display the levels in a folder. Click the name of a folder to display its contents in the right window.

By double-clicking, you can display the contents of the folder and open it at the same time.

Right window (B)

The right window shows the folders and documents in the selected node (in the left window). You can sort the documents by clicking the title of a column. Right-click in the background to display the documents as a list or as icons.

Preview (C)

You can see the currently selected document (drawing file, layout) in the preview. To move the preview, click it with the middle mouse button and drag. Use a selection rectangle to zoom in on an area in the preview. Double-clicking with the middle mouse button restores the preview to its original size. Alternatively, select the * key on the numeric keypad.

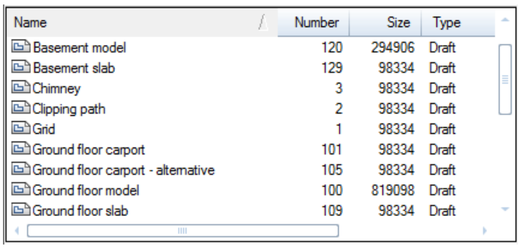
To display an isometric view: use the number keys on the numeric keypad. Check that the Num Lock key is active as you do so.

Common approaches in ProjectPilot

If you are already familiar with File Explorer, you will quickly find your way around ProjectPilot. You can accomplish most steps by using the shortcut menu or the drag-and-drop feature.

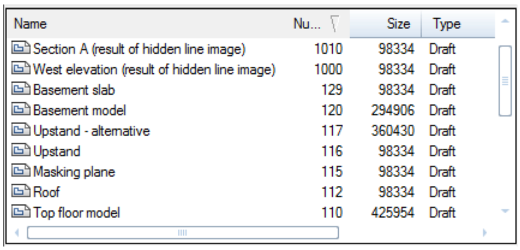
Sorting documents

You can sort the documents by clicking the title of a column. Click the column title to sort the documents in ascending order. Click the same column title again to sort the documents in descending order. An arrow indicates which column is being sorted and whether sorting is in ascending or descending order.



Name	Number	Size	Type
Basement model	120	294906	Draft
Basement slab	129	98334	Draft
Chimney	3	98334	Draft
Clipping path	2	98334	Draft
Grid	1	98334	Draft
Ground floor carport	101	98334	Draft
Ground floor carport - alternative	105	98334	Draft
Ground floor model	100	819098	Draft
Ground floor slab	109	98334	Draft

Sorted in ascending order (arrow points upward) by drawing file name



Name	Nu...	Size	Type
Section A (result of hidden line image)	1010	98334	Draft
West elevation (result of hidden line image)	1000	98334	Draft
Basement slab	129	98334	Draft
Basement model	120	294906	Draft
Upstand - alternative	117	360430	Draft
Upstand	116	98334	Draft
Masking plane	115	98334	Draft
Roof	112	98334	Draft
Top floor model	110	425954	Draft

Sorted in descending order (arrow points downward) by drawing file number

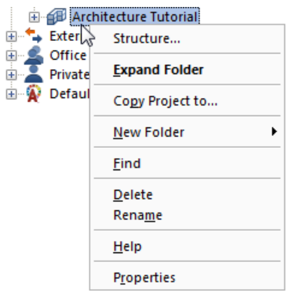
Copying and moving by means of drag-and-drop editing

Instead of the shortcut menu, you can also use the drag-and-drop feature to move or copy selected documents. Select the documents, click within the selection and drag. You can tell whether this is possible by the shape of the cursor when the mouse pointer is positioned over the destination.

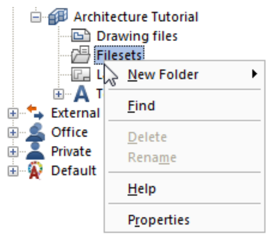
Cursor	Meaning
	Copies the document to the folder to which point.
	Moves the document to the folder to which you point.
	Note: To move documents, select and hold the Shift key while dragging the documents.
	Links the document with the folder to which you point (for example, when you assign drawing files to a fileset).
	The document cannot be placed here.

Working with the shortcut menu

You can use the shortcut menu to do almost everything in ProjectPilot. Depending on which element you click, a shortcut menu appropriate to the element opens.



Shortcut menu of a project



Shortcut menu of the fileset folder

Using the preview

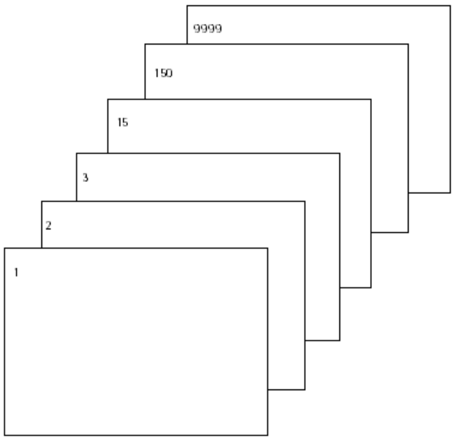
You can see the selected document in the preview. You can zoom in on the preview, pan the preview and display the preview in isometric view. Click **Preview** on the **View** menu to specify whether and where to place the preview.

- **To turn off the preview**, point to **Preview** on the **View** menu and click **None**.
- **To zoom in on the preview**, open a selection rectangle around the area you want to view in detail. The cursor changes to crosshairs.
- **To pan the preview**, move the view with the middle mouse button. The cursor changes to a hand. Alternatively, use the cursor keys.
- **To restore the preview to full view**, double-click the middle mouse button in the preview area or select the * key on the numeric keypad.
- **To display an isometric view**, use the number keys on the numeric keypad. Check that the Num Lock key and the preview are selected as you do so.

Note: The preview is only available with certain documents (drawing files, layouts).

Understanding drawing files

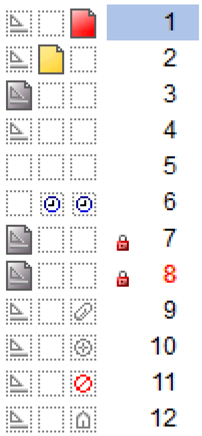
In Allplan, the actual design and data creation happens in *drawing files*. These are the equivalent of the transparencies used in conventional building design. Drawing files can be used to give projects a structure. In IT terms, a drawing file is a conventional file stored on your hard drive. You can display and edit up to 128 drawing files at once – in other words, you can have several files open simultaneously. A project can contain up to 9999 drawing files. Without layers, the individual building elements (such as walls, stairs, labeling) are drawn in different drawing files and superimposed like transparencies.



To edit the drawing files, you must open them. You can do this in the **Open on a project-specific basis: drawing files from fileset/building structure** dialog box.

Drawing file status

With the drawing file status, you define the drawing file on which you draw and which drawing files are visible and can be modified. The following illustration shows the different drawing file statuses. You can find an explanation in the table.

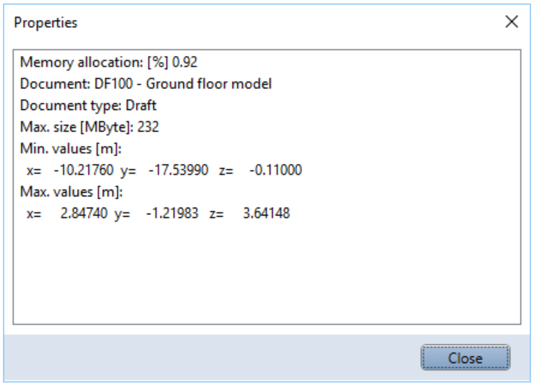


Number	Drawing file status	Comment
1	Current or active	The current or active drawing file is the one in which you draw. There must always be one current or active drawing file.
2	Open in edit mode	Elements in drawing files open in edit mode are visible and can be modified. Up to 128 drawing files can be open simultaneously (regardless of whether they are current, in edit mode or in reference mode).
3	Open in reference mode	Elements in drawing files open in reference mode are visible, but they cannot be modified. You can configure the program to use the same color for all elements in reference drawing files. To do this, select the **Options**, click **Desktop environment** and open the **Display** page. You cannot open empty drawing files in reference mode.
4	Not selected	Elements in these drawing files are not visible.
5	Empty	Empty drawing files have no data type icon.
6	Assigned temporarily	The drawing file is assigned temporarily to the fileset. Allplan clears this assignment as soon as you switch to a different fileset.
7	Open in reference mode	The drawing file has been opened by another user in the workgroup environment.

8	Open in reference mode	The drawing file has been opened by another user in the workgroup environment; the color red indicates that the drawing file has changed. You can apply the changes by selecting **Update drawing file** on the shortcut menu. In the **Options** – **Desktop environment** page, you can configure the program to inform you of changes in reference drawing files.
9	Linked drawing file	The drawing file contains model data or views and sections linked with other drawing files. Allplan links drawing files when you create views and sections with the tools in the **Reinforcement Views** task area. You can use the shortcut menu to list all reference drawing files of the current drawing file or open its reference drawing files in edit or reference mode.
10	Views and sections created automatically	The drawing file contains views and sections that you created by using the shortcut menu in the "Derived from building structure" area or views and sections that you created with the tools in the **Sections** task area of which the results were saved in this drawing file. These views and sections usually refer to other drawing files. Allplan considers the model data in these drawing files.
11	Update locked	By using the shortcut menu in the "Derived from building structure" area, you can lock the update of drawing files with views and sections created with the **Update automatically** option not being selected. Allplan cannot update the result until the drawing file is unlocked or the **Update automatically** option is selected. After having confirmed a prompt, you can create a new view or section in the drawing file.
12	Views and sections placed manually	The drawing file contains views and sections created with the tools in the **Sections** task area. These views and sections can refer to other drawing files. Allplan considers the model data in these drawing files.

Information on the active drawing file

To get information on the active document, right-click in the workspace and choose **Properties** on the shortcut menu. An information box with all the important information about the file opens.



Information	Meaning
Memory allocation	This shows how much of the memory reserved for a file has already been allocated (as a percentage). Background information: A certain amount of memory is reserved for files.
Document	This shows the number of the current file. You can also find this number on the title bar of the Allplan window.
Document type	This shows the file type, which corresponds to the data type icon on the status bar.
Maximum size	This shows the maximum amount of memory available for the file in kilobytes.
Min. values, max. values	This shows the minimum and maximum coordinates in the file.

Using layers

Understanding layers

Layers provide an additional means of structuring design entities within drawing files. You can display exactly the information you need just by turning the relevant layers on and off. This way, you can proceed quickly, as you can see better what you are doing.

You can use layers to define the format properties of elements.

Layers are important organizational elements. Their importance increases the more people are involved in a project and the more a CAD system is used for specialist design processes. Layers do not replace drawing files. Rather, they complement them.

Defining the current layer

When created, each element is given the current layer. The layer which is used as the current layer is governed by the following settings:

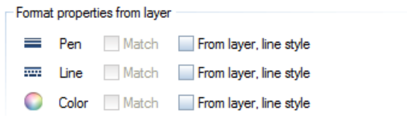
- When you activate a tool (for example, line) for the first time, a specific layer is automatically selected as the current layer (if the **Auto-select layer with tool** option is selected in the **Layer** dialog box). The layer in question depends on which tool you activate. If the **Auto-select layer with tool** option is not selected, the program automatically uses the layer you selected last.
- The **Layers** palette shows the current layer. You can change the layer status with just one click.
  You can display the entire layer hierarchy, the layers assigned to the currently selected tool or the layers used in open documents. To do this, you can use the extensive shortcut menu of the **Layers** palette.
- The **Objects** palette - **Sort by layer** criterion also shows the current layer. You can change the layer status by clicking the icon indicating the layer status.
  You can see all the layers in the documents loaded. The tree structure lists all layers with their elements sorted by element group.

- If a tool (for example, Line) is active, you can use the **Properties** palette to define a different layer as the current one. This layer will then automatically be used as the current layer the next time you activate the tool.
- When you save components as styles or favorite files, the program also saves the current layer. When you retrieve these components later, the layer saved automatically becomes the current layer.
- Normally, openings like recesses in walls and slabs or window and door openings get the same layer as the element into which they are inserted. Click the **Special** button in the **Options – Components and architecture – Miscellaneous area** to specify whether these openings can be assigned separate, independent layers.
- As walls can consist of multiple construction layers and each layer can have different format properties, you can define the layer for each of the construction layers in a wall or upstand directly in the **Properties** dialog box (you usually make these settings in the **Properties** palette).

Defining the format properties of layers

Every layer has **pen**, **line** and **color** properties. In the **Layer** dialog box, you can specify that an element is to automatically assume the properties of the layer on which it is drawn.

The format properties of a layer can also be defined as a **line style** and saved under a name of your choice. Elements can then assume the format properties of this layer.



When defining **line styles**, you can specify how they change with the scale or drawing type. You can define different line styles for various scale ranges or drawing types so that the way the elements look changes with the reference scale or drawing type. By using line styles, you can work across scales.

Drawing types define how elements look on the screen and in printouts. How elements look varies depending on the selected drawing type. Requirements: You take the format properties from the layer in a fixed manner and use line styles.

Layer access rights

There are different layer access rights. On the one hand, there is the visibility setting which controls whether a layer is visible or hidden. On the other hand, there is the edit setting which controls whether a layer can be edited or not (that is, it is frozen). You can save visibility settings in print sets (see "Using print sets" on page 308) and edit settings in privilege sets. The status of a layer is indicated by **icons** in the **Layer** dialog box (**Select Layer/Visibility** tab) and in the **Layers** palette:

Icon	Access right	Explanation
	Current	The layer on which you draw.
	Modifiable	Elements in this layer are visible and can be modified.
	Visible, frozen	Elements in this layer are visible but cannot be modified.
	Hidden, frozen	Elements on this layer are not visible and cannot be modified.

You can restrict access to layers on the **Select Layer/Visibility** tab or in the **Layers** palette. For example, you can change the status of layers from **Modifiable** to **Visible, frozen**.

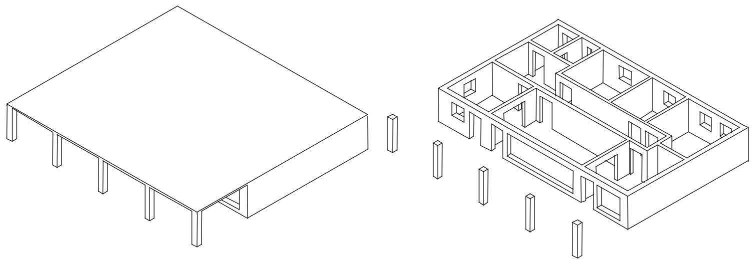
The **Objects** palette – **Sort by layer** criterion shows the layers in the loaded documents. The tree structure lists all layers with their elements sorted by element group.
When you point to the icon indicating the layer status in the list, Allplan opens a flyout menu where you can change the status of the layer. Here, too, you can change access to layers. You can switch between **Current**, **Modifiable**, **Visible, frozen** and **Hidden, frozen**.

Layer access rights also depend on the privilege set to which a user belongs. Therefore, you cannot assign a higher status to layers (for example, switch hidden layers to modifiable) when you belong to a privilege set that is not granted full access rights to the relevant layers.

Setting layer visibility in drawing files

You can make layers visible or invisible, thus showing or hiding the corresponding elements.

Thus, you can quickly hide the elements you don't need during the current design phase, selectively modify elements on the visible layers, check your plan and see whether all the elements are assigned to the correct layer. For example, you might choose to hide the slab layer and then view the spatial arrangement of the building as a hidden-line image in perspective view.



Note: Right-click an element and, on the shortcut menu, select **Modify Layer Status** and then **Isolate layer - set all other layers to hidden** to hide all the layers except the layer of the element clicked.

If you often need the same combination of visible and hidden layers (for dimensioning or labeling at certain scales, for example), we recommend that you define what is known as a print set. You can also use this print set when you assemble the layout later, thus making sure that only the visible layers are included in the printout.

Note: You can choose to **Display elements on frozen layers in a fixed color** by selecting this option in the **Layer** dialog box.

Managing layers and layer structures

The office administrator is usually in charge of managing layers and layer structures. This person defines which layers are used, defines privilege sets and grants access rights. By assigning the other users (architects, engineers and so on) to the privilege sets, the office administrator grants the users access to the layers.

When you create a project, you can decide whether you want to use the layer structure of the office standard or a project-specific layer structure.

You can name and save layer structures and retrieve these structures later. If you have assigned line styles to layers, these line styles are saved together with the layer structure (with the same file name plus the extension `.sty`). When importing a layer structure you saved, you can decide whether to import the associated line style file too.

Advantages of data organization with layers

With large projects in particular, organizing data with layers has significant advantages:

- Associative elements - such as wall dimensions or sill elevation labels - are in the same drawing file and yet can still be hidden from view.
- So that components interact, the components in question must be in the same drawing file. This is also the case for certain analyses. With layers, you can meet these requirements easily.
- Easier to assemble layouts thanks to print sets. Print sets are user-defined compilations of layers, which are very useful for editing and assembling layouts. When assembling a layout, you can choose to display only the elements in a specific print set - switching between 1:50 and 1:100 is thus no problem.
- Exporting drawing files to DXF/DWG layers is easier, because you can assign each layer in a drawing file to a different DXF/DWG layer When importing DXF/DWG files, the DXF/DWG layer structure can be automatically integrated in the layer hierarchy.

- It is often faster to modify the layer of an element than to modify the drawing file of an element.
- If a layer is missing from the layer structure, you can create it quickly and use it in all the drawing files of the project.
- A project can contain more layers (approximately 65,000) than drawing files (9,999). With layers, you can distinguish more precisely between the individual design entities.
- You can display and edit 65000 layers at once whereas the number of drawing files that you can have open simultaneously is 128.
- You can show and hide layers very quickly (for example, by means of print sets, layer favorites, the **Layers** palette or the **Objects** palette - **Sort by layer** criterion).
- You can change the format properties of a layer later. All the elements of this layer that were drawn with the **From layer, line style** setting will adapt automatically. So, you do not need to modify the elements separately.
- You can copy format properties including layers by double-clicking with the right mouse button. This method also works with wizards. Similarly, you can use  **Copy Format** to quickly copy the format properties of an element and apply them to other elements.

Relationship between layers and drawing files

The use of layers doesn't mean that drawing files don't play a role when it comes to organizing your data. With large project in particular, a combination of both is essential. With the same structural depth, the number of drawing files required is far less when working with layers.

The number of drawing files you need not only depends on the size of the project, but also on your hardware. Modern, fast computers with a lot of memory can handle a lot more data per drawing file without this leading to a noticeable downturn in performance.

The interplay between layers and drawing files depends on the following factors:

- The size of the project and the number of designers involved at any one time.
  If several designers are working on one floor, create one drawing file per area of responsibility (East Wing, Central Unit, West Wing, for example.)
- Simultaneous involvement of specialist designers on the project. Always use separate drawing files for specialist designs to facilitate concurrent activity.

Using privilege sets

With privilege sets, you can control users' access to layers. You should assign privilege sets if several people work on the same project. With workgroup manager, you can assign individual users to one or more privilege sets. As a result, these users can see or edit only the layers that are associated with the relevant privilege set.

Privilege sets can do more than just control who accesses which layers. They simplify your whole work, as you can define privilege sets with a selection of layers that are to be available while drawing.

After installation, the ALLPLAN privilege set is preset. This privilege set has read/write permissions for all layers. Consequently, all users can see and modify all data.

Using print sets

A print set is a set of layers that you can select when compiling and arranging layouts. You can also use print sets to control which layers are visible or hidden. Only the elements whose layers are included in the selected print set are visible in the layout.

For example, you can select a print set for working drawings so that only the data that is relevant to a working drawing appears in the final printout.

Creating the training project

Start by creating a project.

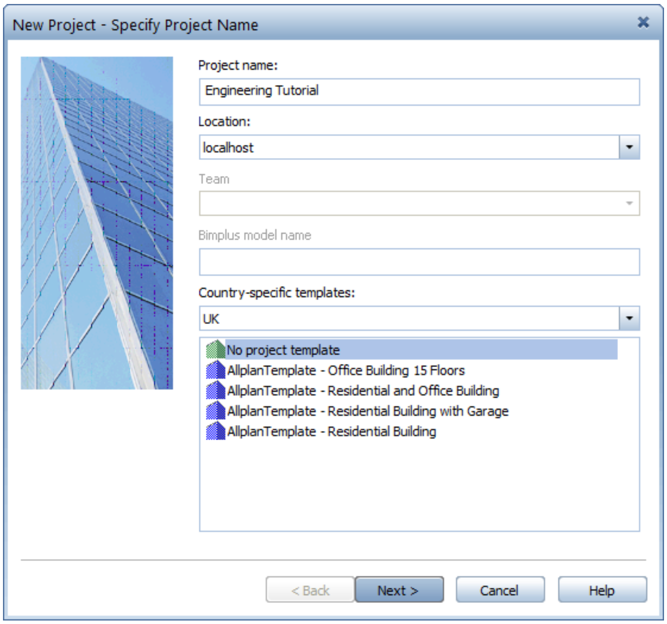
To create a project

1. Click **ProjectPilot** in the drop-down list box of the Allplan icon.

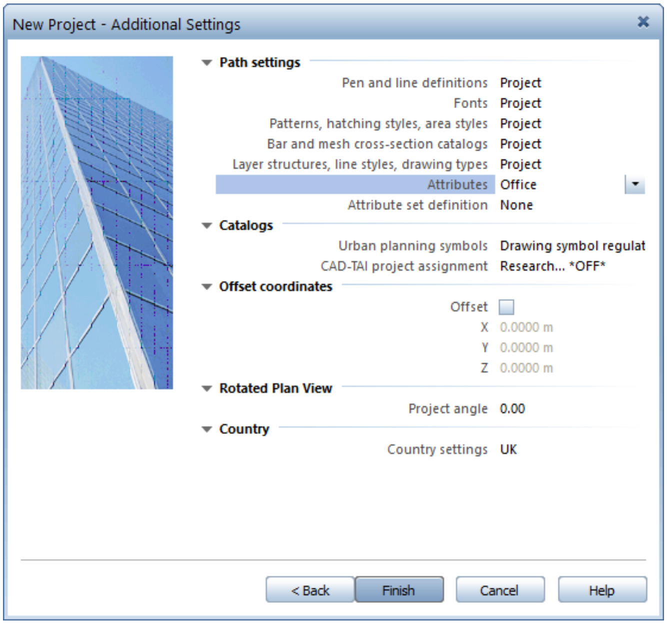
   ProjectPilot opens.

2. In ProjectPilot, click **New Project...** on the **File** menu.

3. For the project name, enter **Engineering Tutorial**. In the **Project templates** area, click **No project template** and then **Next >**.



4 Check that **Project** is selected for all path settings (except **Attributes**). Then click **Finish** to confirm.



5 Close ProjectPilot by clicking **Exit** on the **File** menu.

You are back in Allplan; the **Engineering Tutorial** project is open.

Note: To create new projects, you can also use the **New Project, Open Project...** tool (Quick Access Toolbar).

Path settings

This defines which pen, line, hatching settings, fonts and material catalogs are used. In practice, the office standard is generally used.

Office: Choose this option if you want different projects within the same office to use the same settings (for hatching, line types and so on). If you work on a network, the office standard is the same on all computers and can be changed only by users with special privileges.

Project: Choose this option if you want the settings, for instance for patterns and hatching styles, to apply to this project only (in this case they can be different from those used as the office standard).

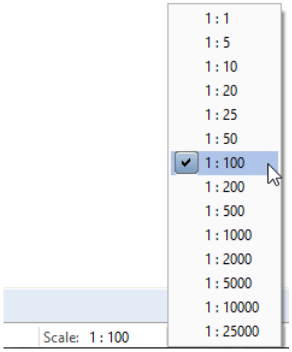
Selecting the scale and unit of length

Define scale and length settings for the project.

Start by selecting a reference scale of 1:100.

To select the reference scale

1 Click in the field beside scale on the status bar and select **1:1**.



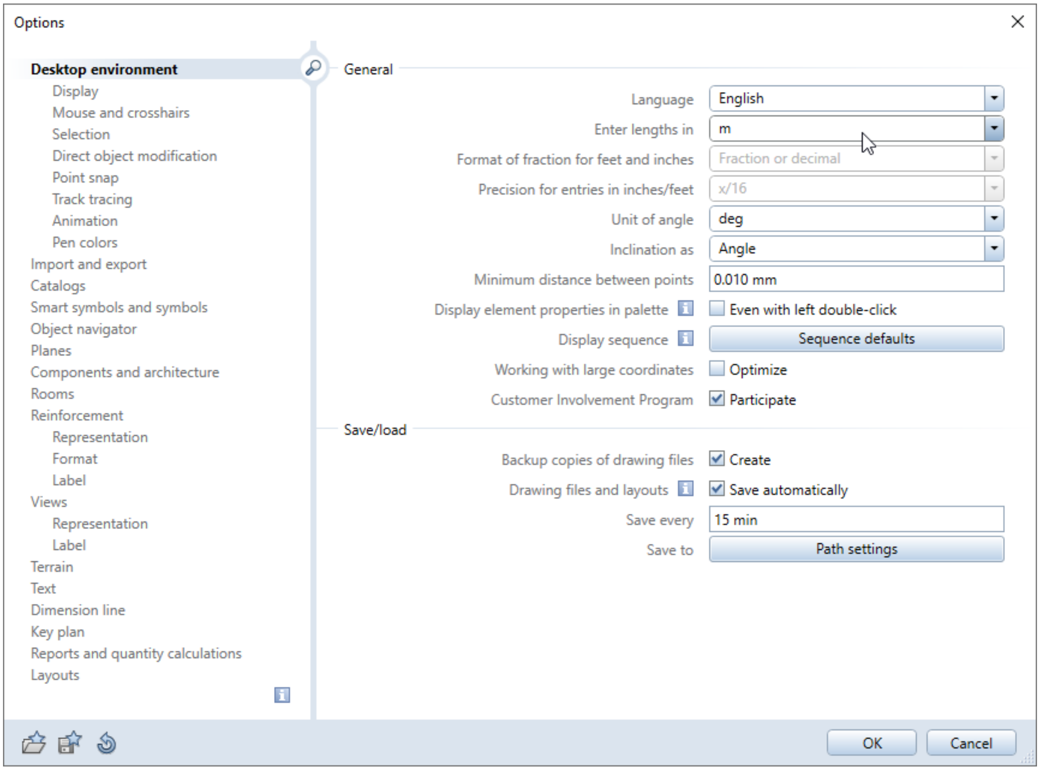
Select the unit you want to use to enter values. The values are to be interpreted in **meters**.

To select units

1 Click **Options** in the **Default Settings** drop-down list on the Quick Access Toolbar (title bar).

2 The **Options** dialog box opens. Click **Desktop environment** in the left area.

3 Go to the **Enter lengths in** box and click **m**.



Tip: Alternatively, select the unit on the status bar: Click to the right of **Length** and select **m**.

4 Click **OK** to confirm the settings.

Drawing file structure

Allplan provides two options you can use to structure drawing files in a project:

- the building structure
- the fileset structure

You can use these two structures in parallel. To define them, use the **Open on a project-specific basis: drawing files from fileset/building structure** dialog box.

The building structure is particularly useful for applying a logical structure to a building. In architecture, the advantage of working with the building structure is that views, sections and building lists can be generated quickly and easily.
An important difference between the building structure and the fileset structure is that each drawing file can be assigned only once in the building structure. However, when it comes to designing reinforcement, drawing files are multiply used for different reinforcement drawings. Therefore, we recommend that you work with filesets.

In this mode, all you need to do is select the relevant fileset and all associated drawing files are available immediately. To do this in the building structure, select the relevant drawing files assigned to the individual structural levels and use the shortcut menu of the project to save the different status settings as a favorite, which you can retrieve later.
When working with the building structure, you cannot place detailing windows in filesets or assemble layouts via filesets.

As the focus of the exercises in this tutorial is to teach you how to create reinforcement, you will use the fileset structure.
You can find detailed information on how to create a building structure in the Architecture Tutorial. Look in the Allplan Help for detailed information on the building structure.

Creating filesets

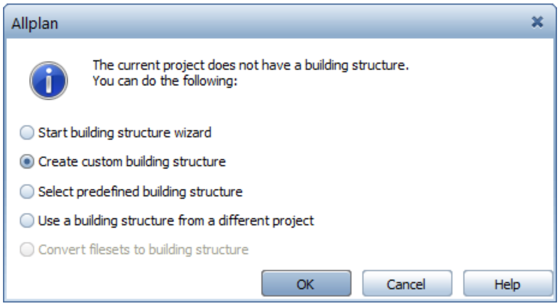
For the exercises in this tutorial, you will create your own project structure. We recommend that you work with stories and print sets in a real project. For more information see **Tips on project organization** (on page 317).

Tip: To display a section of the drawing at a larger scale, open a detailing window in a drawing file or fileset.

To create filesets

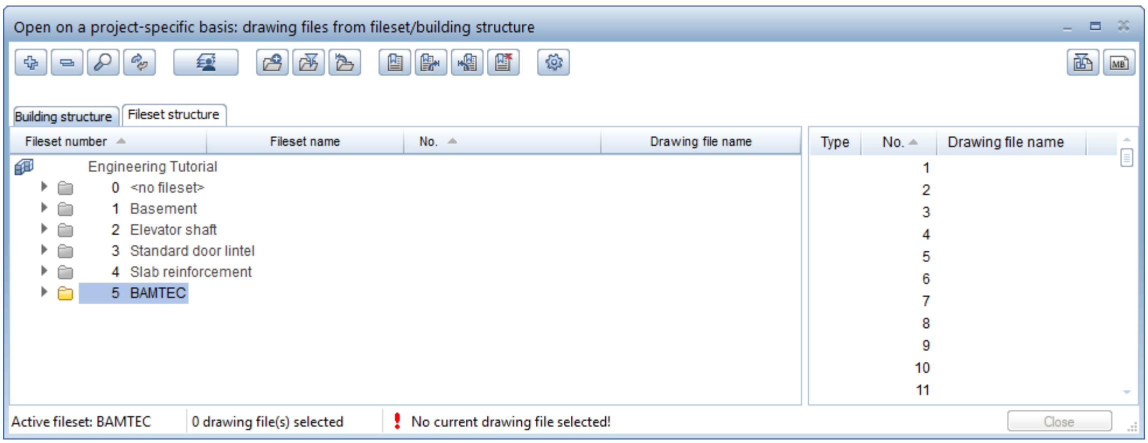
1 Click **Open on a Project-Specific Basis...** (Quick Access Toolbar).

2 You do not need a building structure. Therefore, click **Cancel** and select the **Fileset structure** tab.



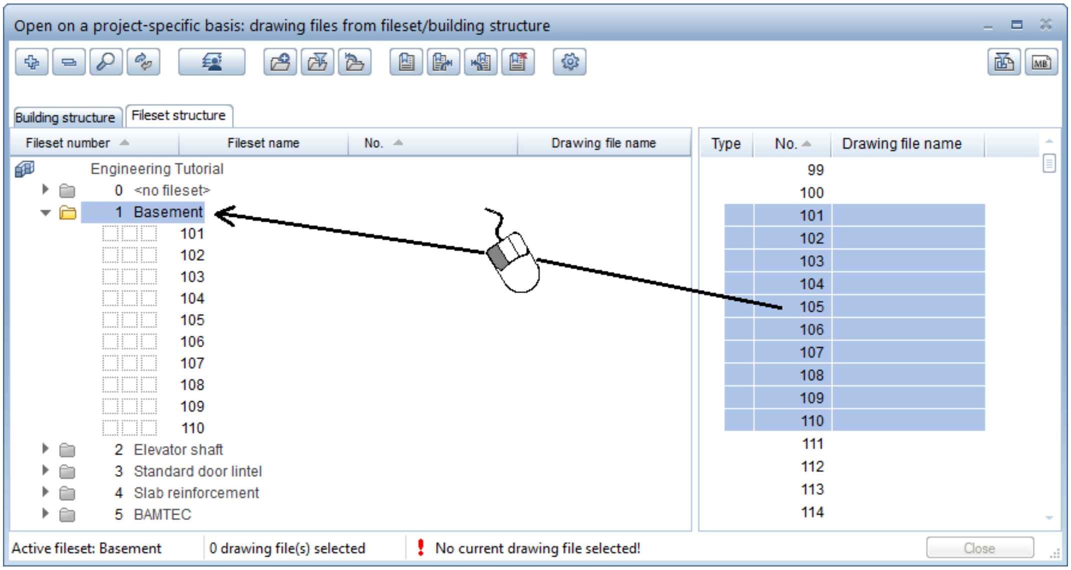
3 Click **Create fileset**, enter the fileset name **Basement** and click **OK** to confirm.

4 Create the filesets **Elevator shaft**, **Standard door lintel**, **Slab reinforcement** and **BAMTEC** in the same way.



5 Click drawing file **101**, select and hold the SHIFT key and click drawing file **110**.

This selects drawing files 101 to 110.



Tip: You **select the drawing files** as you would select them in Windows® Explorer:

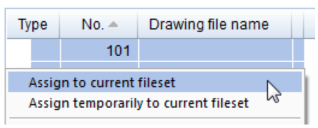
Select and hold the **Ctrl key** to select a series of nonadjacent drawing files (for example, 10, 16 and 28).

Select and hold the **Shift key** to select a range of adjacent drawing files (for example, 10 – 20).
As an alternative, open a selection rectangle around the drawing files with the mouse.

6 Click within the selection and drag the drawing files to the fileset **Basement**. Then release the mouse button again.

The drawing file tree for the fileset opens. The drawing files are thus assigned to the fileset.
If you have selected a drawing file too many, you can drag it out of the list in the same way.

Note: Instead of using the **drag-and-drop** feature, you can also select the fileset and the drawing files and then click **Assign to current fileset** on the shortcut menu.



Notes:
Use the floor plans of the basement you created in exercise 1 for filesets **2** and **4**. You do not need to copy the basement or create it again. Just assign drawing files **101** and **102** to filesets **2** and **4**, respectively.

Assign the empty drawing files **503** and **504** to fileset **5**. You will place the separated carpet outline in these drawing files later.

7 Assign drawing files to the other filesets as shown in the table.

Fileset	Drawing file number	Drawing file name
1	101	3D floor plan
	102	2D floor plan
	103	2D stair
	104	Dimensions and labels
	105	Hidden-line image
	110	Key plan
2	101	3D floor plan
	201	General arrangement – 3D objects
	202	Concrete component
	203	General arrangement – components
	204	Sections and reinforcement with the model
3	301	2D general arrangement
	302	Bar reinforcement with 3D model
	303	Modified door lintel
4	102	2D floor plan
	401	Reinforcement, bottom layer – without 3D model
	402	Reinforcement, top layer – without 3D model
5	501	Structure
	502	Carpet outline
	503	
	504	

8 Name the drawing files as shown.
Labeling drawing files is covered in the Basics Tutorial.

9 Select a drawing file and click **Close**.

Tips on project organization

Allplan is a very flexible system you can use to develop your own custom solutions for projects and entire offices. The structure for large-scale projects is intended only as a guide. You can use the entire structure or just parts of it.

You will probably find this structure useful when you start. As you progress, you will be in a better position to judge what needs changing to suit your own needs and requirements. We would like to emphasize once again that a carefully thought-out project structure will save time for everybody in the long run. The system has the following structure:

- General project-related information is stored in drawing files 1-99. This data is universally required (layouts, axis system and so on).
- Floor design starts at drawing file 100, starting with the excavation. Create the design for the key plan in drawing files 300 and the following files.
- Use the drawing files starting at number 1000 for general arrangement drawings and the associated sections. The first digit indicates the number of the story. The last two digits provide information on the contents. Use the same drawing file sequence on each floor.
- Use drawing files 2000 and the following files for reinforcement drawings. You can use drawing files 2000-2009 for editing and modifying components. Create precast elements and special components in the subsequent drawing files.

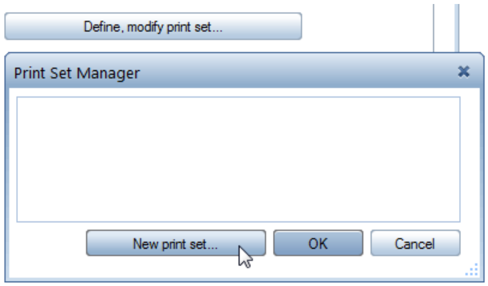
Defining print sets

A print set (see "Using print sets" on page 308) is a saved combination of visible and hidden layers.
Both when setting up your layouts and when turning layers on and off, activating a print set is a rapid way of showing or hiding those layers that are required for a specific print set. First create and name the print sets. Then assign layers to these print sets.

To define print sets

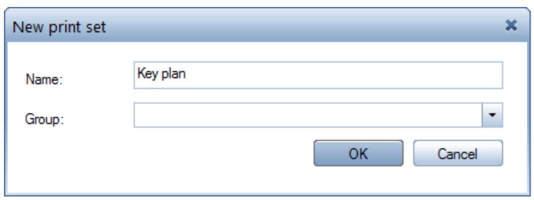
1 Click **Select, Set Layers** in the **View** drop-down list on the Quick Access Toolbar.

2 Select the **Print Set** tab and click **Define, modify print set...**.



3 The **Print Set Manager** dialog box opens. Click **New print set...**.

4 Enter **Key plan** for the name of the first print set and click **OK** to confirm.
You do not need to define a group.



5 If you work with Workgroup Manager, assign the user **local** to the print set.

6 Repeat steps 3 to 4 (5) and create more print sets:

- General arrangement drawing
- Reinforcement, bottom layer
- Reinforcement, top layer

7 Click **OK** to confirm print set manager.

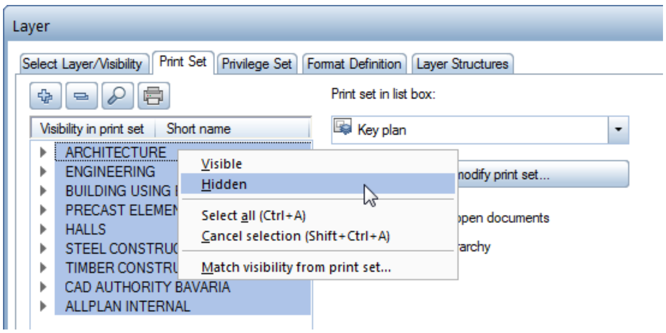
Next, define which layers are to be visible and which hidden in each print set.

To define visible and hidden layers for print sets

➲ The **Layer** dialog box is still open. The first print set – **Key plan** – is visible.

1 Click  to collapse the tree structure.

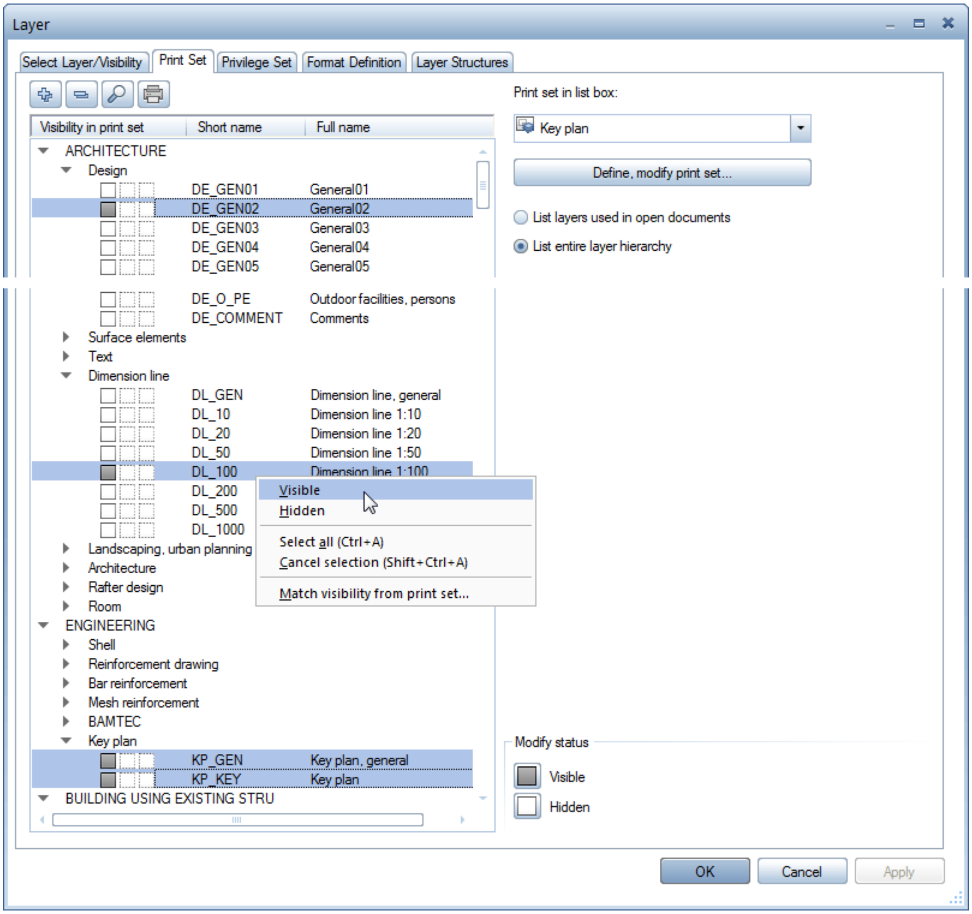
2 As only a few layers are to be visible, start by setting all layers to **Hidden**. Select all layer structures, right-click the selection and, on the shortcut menu, choose **Hidden**.



3 Expand the **Draft**, **Dimension line** and **Key plan** areas by clicking the respective triangle symbols. Select and hold the Ctrl key and select the layers which are to be visible in the **Key plan** print set (see table).

4 Right-click the selection and select **Visible** on the shortcut menu.

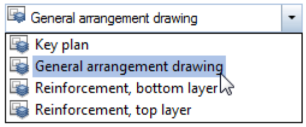
Make sure that you select individual layers (and not layer structures or even the entire layer hierarchy!).

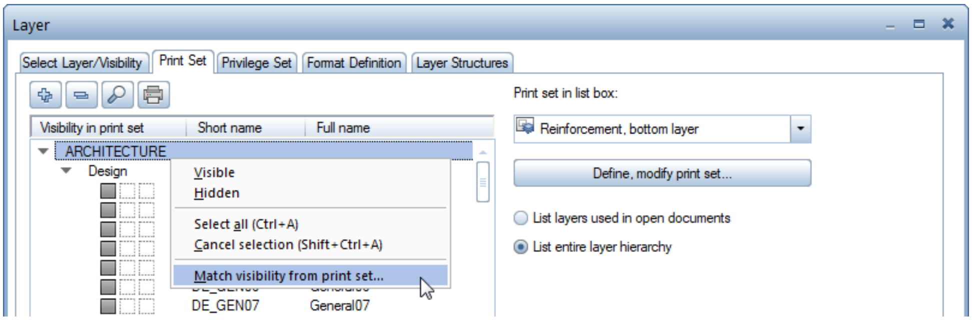


5 Click **Apply** to save the current setting.

Tip: For other print sets, you can match the setting of a print set you have already defined and then adapt it as appropriate.

6 Select the next print set in the **Print set in list box** area and define which layers are to be visible and which hidden in this print set (see table).





Hierarchy	Layer	Short name	Key plan	General arrange-ment drawing	Reinforce-ment at bottom	Reinforce-ment at top
Design	General01	DE_GEN01		✓		
	General02	DE_GEN02	✓	✓	✓	✓
Surface elements	Style area	SU_STYL		✓		
Text	General text	TX_GEN		✓		
Dimension line	Dimension line, general	DL_GEN		✓		
	Dimension line 1:100	DL_100	✓	✓		
Architecture	Wall	AR_WALL		✓		
	Column	AR_COL		✓		
	Slab	AR_SLAB		✓		
	Downstand beam	AR_BEAM		✓		
Shell	Shell, general	SH_GEN			✓	✓
	Shell	SH_SHELL			✓	✓
Bar reinforcement	Bar reinforce-ment at bottom	BR_B_B			✓	
	Bar reinforce-ment at top	BR_B_T				✓
Mesh reinforcement	Mesh reinforce-ment at bottom	MR_M_B			✓	
	Mesh reinforce-ment at top	MR_M_T				✓
Key plan	Key plan, general	KP_GEN	✓			
	Key plan	KP_KEY	✓			

7 When you have assigned layers to all print sets, click **Apply** and then **OK**.

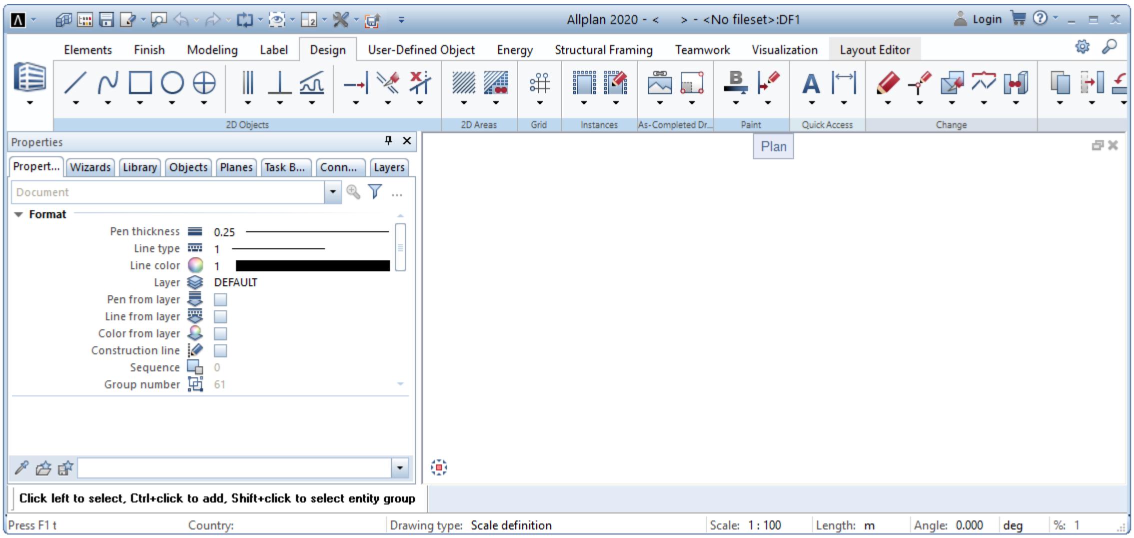
Actionbar configuration

The **Actionbar configuration** is the default setting in Allplan 2020. This configuration shows the **Actionbar** above the workspace. In addition, you can see the **Properties**, **Wizards**, **Library**, **Objects**, **Planes**, **Task Board**, **Connect** and **Layers** palettes on the left.

If the **Actionbar configuration** is not set, select it as follows:

To select the Actionbar configuration

- Open the **View** menu, point to **Default Configurations** and click **Actionbar Configuration**.



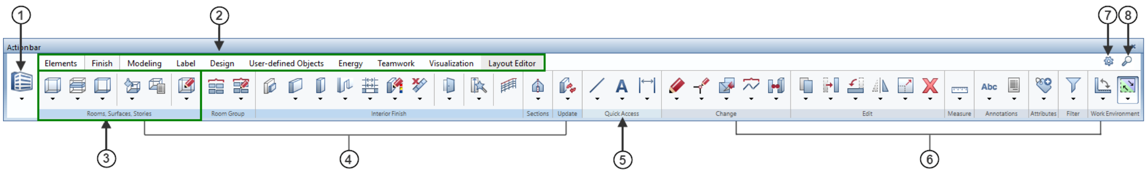
Click the **Allplan icon** on the left to open important tools such as save, copy, import and export. The title bar also includes the **Quick Access Toolbar**. Using a drop-down list, you can select the tools you want to display on this toolbar. In addition, you can also show and hide the menu bar, define the sequence of the tools on the Quick Access Toolbar and click **Customize User Interface...** to open the **Customize** dialog box - **Actionbar** tab.

Contents and structure of the Actionbar

The **Actionbar** contains all Allplan tools grouped by role and task.

The **Actionbar** is docked to the top of the working area. If you want, you can drag the Actionbar to the bottom of the workspace and dock it there. You can also make the **Actionbar** float anywhere on your screen. By double-clicking, you can dock it to the place where it was docked last.

Structure of the Actionbar



1 – Role

2 – Tasks arranged on tabs

3 – Task area

4 – Varying task areas

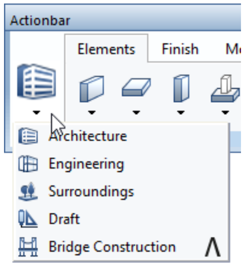
5 – **Quick Access** task area

6 – Fixed task areas

7 – **Actionbar Configurator**

8 – **Find**

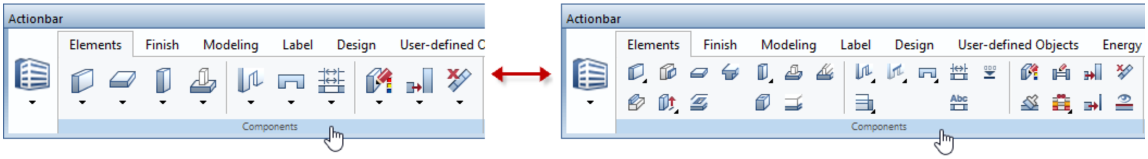
Selecting the role



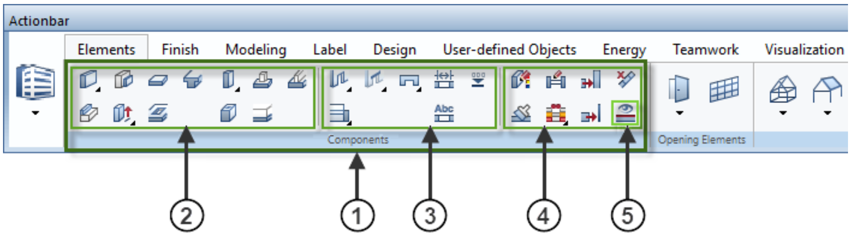
You start by selecting a **role** (1). The roles that are actually available to you depend on the selected **configuration** (7). If **Actionbar [Default]** is selected, you can choose from all the roles you purchased (depends on the license).
The **tasks** (2) that are available to you change with the selected role. To open a task, click the corresponding tab. Each task is subdivided into appropriate areas. You can find areas in different colors, indicating varying and fixed **task areas** (3). The varying task areas (4) change with the selected task, such as the **Components** task area of the **Elements** task. You can find the fixed task areas (6) in all roles and tasks, such as the **Change** and **Filter** task areas. The **Quick Access** task area (5) contains tasks with tools used frequently.

The first time you open Allplan the task areas of the **Actionbar** are collapsed. To open the flyout menu of the tools, click the downward arrow. You can then see all the tools in the collapsed area.
When you point to the name line of a task area, the cursor changes to .
You can maximize or minimize a task area by double-clicking within the name line of a task area. A maximized task area shows more tools, which can also have flyout menus.

Note: You can maximize or minimize **all** task areas of the task currently selected by selecting and holding the Ctrl key while double-clicking within the name line of a task area. You can expand or collapse **all** areas **across tasks and roles** by selecting and holding Ctrl+Shift while double-clicking within the name line of a task area. The width of the Allplan window defines how many task areas can be maximized. If the window is not wide enough, Allplan starts on the left side, expanding as many task areas as possible.



Structure of a task area in detail



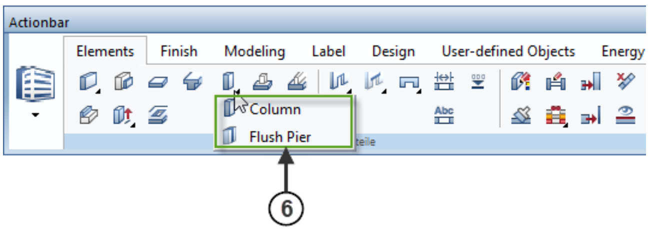
1 – Task area

2 – **Create** group of tools

3 – **Create in context** group of tools

4 – **Modify in context** group of tools

5 – Tool



6 – Tool menu = flyout menu of a tool

An expanded task area (1) contains one or more groups of tools (2/3/4). Different groups of tools are separated by vertical lines. The tools are grouped by topic. Some tools have flyout menus (6) where you can find similar tools.

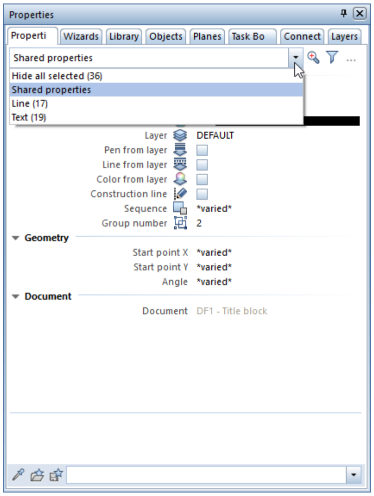
Palette window

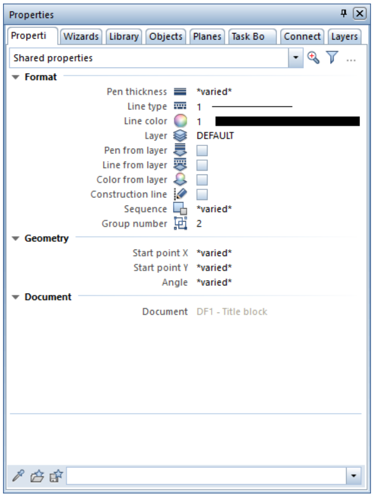
The palette window displays the palettes as tabs. Palettes are important controls of Allplan, making the user interface simple and easy to use. You can float or dock each palette individually. In addition, you can arrange the palette window or individual, free-floating palettes around the edge of the workspace or make them float anywhere on your screen. You can even configure Allplan to automatically show or hide the palette window or palettes arranged around the edge.

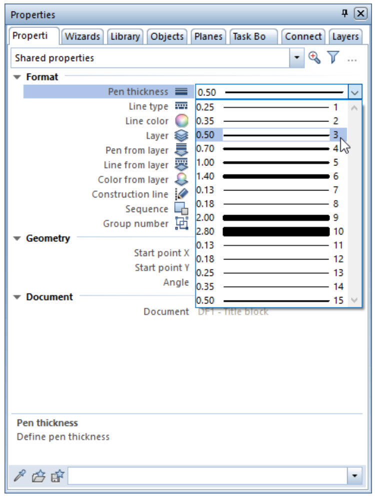
Properties palette

When the **Properties** tab is open at the top, the following options are available:

Drop-down list at the top	Tools at the top and bottom	Properties
Select active elements	Zoom in on selected objects Filter step by step Change the properties of the selected object Match parameters Load favorite Save as a favorite	Modify properties (also possible for some reinforcement elements)

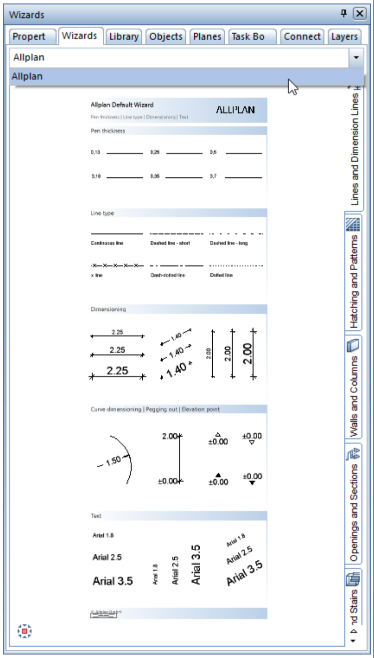
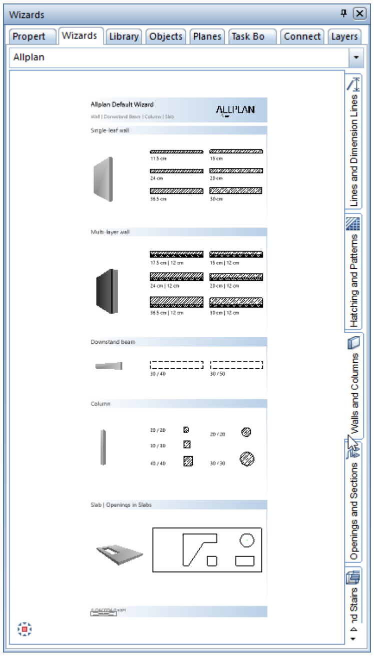
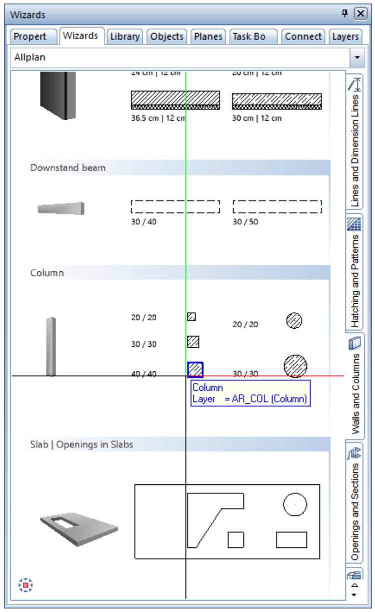






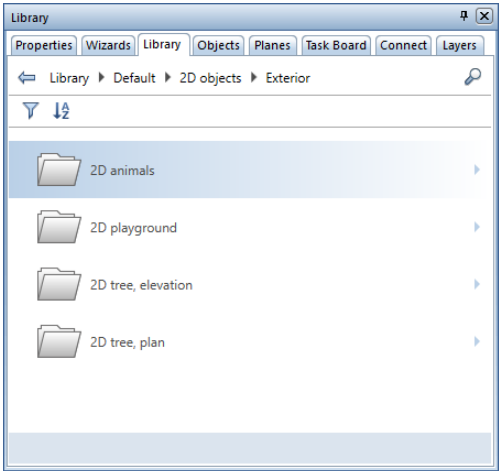
Wizards palette

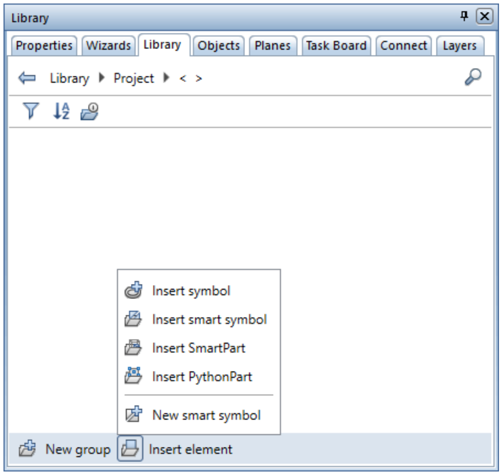
When the **Wizards** tab is open at the top, the following options are available:

Drop-down list at the top	Tabs on the right	Available tools
Select a wizard group	Select a wizard	Select a tool
		

Library palette

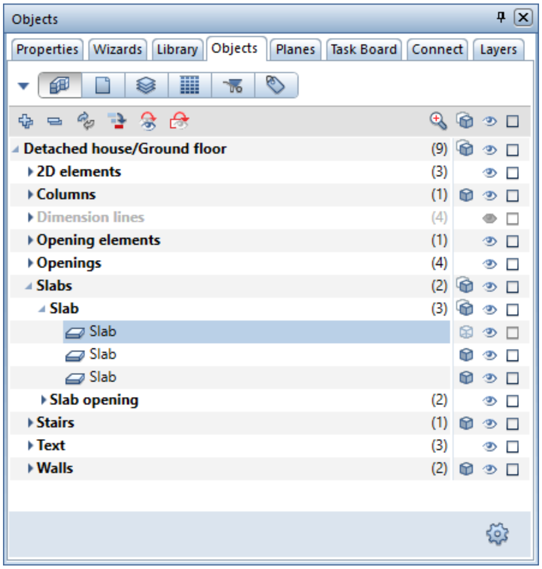
The **Library** palette provides a **Filter** that you can use to show or hide specific types of library elements (symbols, smart symbols, SmartParts and PythonParts).
After having opened a folder, you can see all subfolders with library elements (symbols, smart symbols, SmartParts and PythonParts) if you have not filtered out library elements. You can select the objects you want to use. You can also add your own objects to the corresponding library folders.





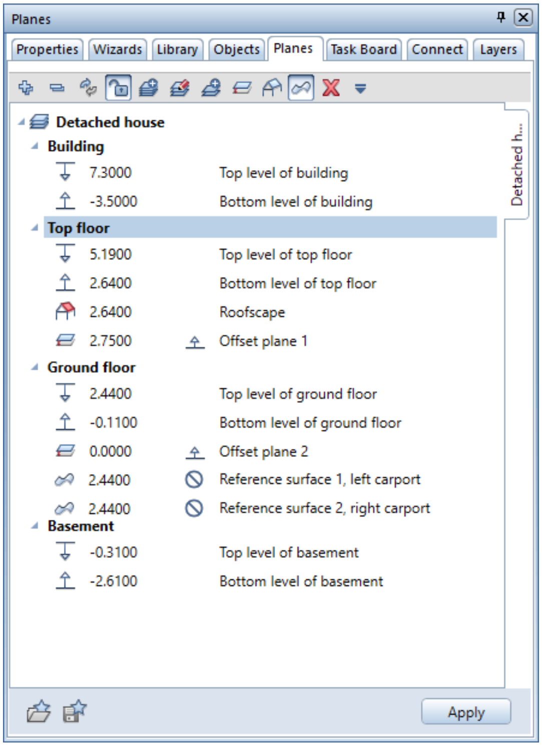
Objects palette

The **Objects** palette lists all objects and elements in the currently open drawing files (**current** or **open in edit mode** or **open in reference mode**). You can sort these objects by **Topology**, **Drawing file**, **Layer**, **Material**, **Trade** or **Attribute**. You can show or hide selected objects as you need. In addition, you can define the transparency of 3D objects (this effect is evident only in viewports of the **animation** view type). You can even activate or deactivate objects and elements via the **Objects** palette.



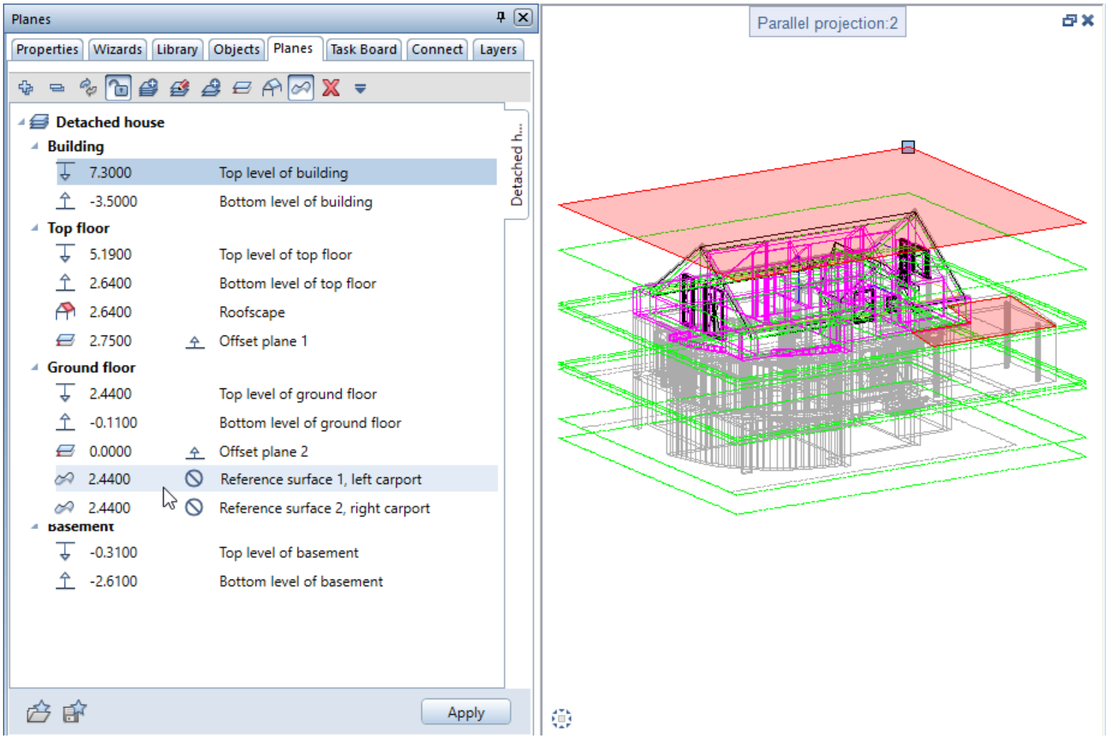
Planes palette

The **Planes** palette displays all plane models in the active project. Each plane model has its own tab. While creating components, you can keep track of the default planes and all other objects on which the heights of the components can be based.



To edit a plane model, click **Modification mode on/off**. If modification mode is on ( ), you can make entries in the **Planes** palette. Allplan displays the planes of the plane models in all viewports. When you point to or select an entry of the plane model in the tree structure, this entry is also highlighted in the detection color in the viewport. So, you can immediately check the position of the plane and see the effects of changes.

The tools in the **Planes** palette are similar to those provided by the **Floor Manager** dialog box of the building structure. For example, you can use the **Insert pair of planes**, **Insert or replace roofscape**, **Insert or replace reference surface** and **Insert offset plane** tools. Use **New model** to create a new plane model.



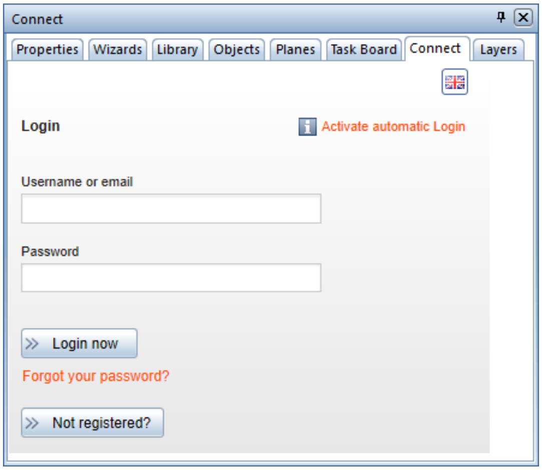
Task Board palette

You can use the **Task Board** palette to communicate with all those involved in a Bimplus project. In Allplan, you can access the tasks of the currently loaded Allplan project straight from Bimplus. In addition, you can use Allplan to create new tasks for Bimplus or edit existing tasks. You can also import or export tasks in BCF format or export the complete task list as an Excel table.

Note: This is only possible if you have used the Allplan workstation to sign in to Bimplus and if the Allplan project is linked with a Bimplus project, that is to say, the Allplan project data has been uploaded to Bimplus *at least once*. See Handling projects using Allplan Bimplus in the Allplan Help for more information on handling projects in a BIM-compliant manner using Bimplus, the web service offered by ALLPLAN GmbH.

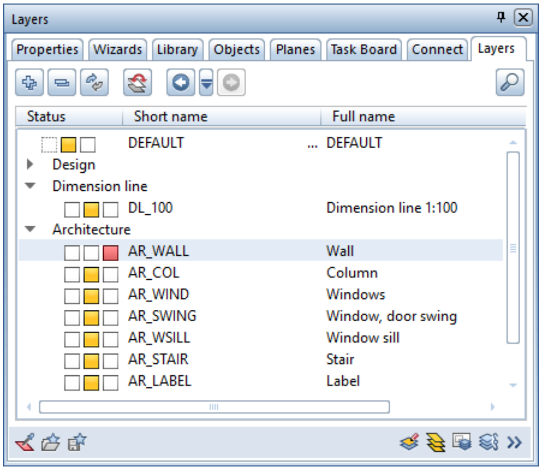
Connect palette

The **Connect** palette takes you straight from Allplan to content on Allplan Connect. You can enter your username and password either directly in the palette or on the **Palettes** tab of the **Customize User Interface...** tool you can find in the drop-down list of the **Quick Access Toolbar**.



Layers palette

You can use the **Layers** palette to access the layer structure quickly and easily. The palette displays the entire layer hierarchy. You can define the visibility of layers, change the layer status, select the current layer and choose privilege sets and print sets. When you select the **Match current layer** button at the bottom of the palette, you can click an element to use its layer as the current layer. Click to save the current layer setting as a favorite file (*.lfa); click to load a favorite file.



Note:
You can find the **Customize User Interface...** tool in the drop-down list of the Quick Access Toolbar. When you open the **Palettes** tab, you can arrange and customize the palettes to suit your needs. You can show and hide the palettes as you need.
As an alternative, open the shortcut menu of a palette and select **Customize...**.

Project templates on the internet

Allplan Connect offers two project templates:

- **Allplan 2020 Engineering Tutorial**. This **project template** comes with a fileset structure and assigned drawing files. The project template contains four print sets. With these print sets, you can control which layers are visible. You will use the different print sets in various places.
  You can use this project template if you want to start with **Unit 1: Basics** and work through the entire **Engineering Tutorial**.
- **Allplan 2020 Engineering Tutorial (with the model)**. This project template contains all drawing files with the complete design and drawing files at different levels of completion so that you can get started wherever you want. For example, you can start placing the reinforcement immediately. You can fall back on this project template if you do not want to work through the entire tutorial. In addition, you can use the **Engineering Tutorial (with model)** project template to compare this model with the model you created yourself.

Downloading project templates

You can download the project templates with the training data for this tutorial from Allplan Connect, the service portal for all Allplan users.

Go to
connect.allplan.com

- Register with your customer number and email address. Registration is free and not subject to any conditions.

  After a few minutes, you will be able to access the data and information there.

- You can find the project templates with the training data for this tutorial in Allplan Connect. Go to the **Training - Documentation - Manual and tutorials** area.
  Here, you can find the two project templates.
- You can also find the latest version of this document as a PDF file (**Allplan 2020 Engineering Tutorial**).
- Save the zipped project templates with the training data to any folder on your computer.
- Extract the data in any folder, for example, **C:\Training data for Allplan Engineering Tutorial**.

Note: Serviceplus customers have access to more step-by-step guides in the **Training** area of Allplan Connect. It usually takes one to two working days until Serviceplus customers can access this restricted area and download documents. This service is available to Serviceplus customers only.

For general information on Serviceplus, go to
http://www.connect.allplan.com

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