ALLPLAN 2018

Engineering Tutorial

Engineering Tutorial

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Before You Start ...

Dear Customer,

The following guide is based on Allplan 2018-0. Consequently, this guide does not describe the following changes on the Actionbar, which were implemented in Allplan 2018-1 due to your positive feedback.

Allplan 2018-0	Allplan 2018-1
Labeling task	renamed **Label**
Collaboration task	renamed **Teamwork**
3D Design task area	integrated in **3D Objects**
Selection task area	expanded and renamed **Work Environment**
Reference task area	integrated in the following task areas: **Work Environment** (⬦ **Work Plane** tool, ...) **Analyses** (📊 **List Default Planes** tool, ...) **Roof** (✏ **Custom Planes** tool, ...) **Edit**
Labeling task area	integrated in the following new task areas: **Label Styles** and **Reports, Legends**
🔄 **Restore 3D View** tool	moved to new **Update** task area
▨ **Hatching**, ▦ **Pattern** tools, ...	moved to new **2D Areas** task area
⊞ **Axis Grid**, △ **Polar Axis Grid** tools, ...	moved to new **Axis Grid** task area
⬜ **Union**, ⬜ **Subtract and Retain Solid** tools, ...	moved to new **Boolean Operators** task area

Tip: If you cannot find a tool, use the search function of the Actionbar.

To do this, click 🔍 at top right on the **Actionbar**, enter the search term and click **Continue**.

Contents

Welcome

Welcome to Allplan 2018, the high-performance CAD program for civil engineers.

In this tutorial workbook, you will learn about the most important tools in Allplan 2018.

You will find that within a short time you will be in a position to use Allplan 2018 effectively in your daily work.

This chapter covers the following:

- Contents of this tutorial
- Documentation for Allplan 2018
- Additional help for Allplan 2018
- 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 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 2018. As it only touches on the possibilities of some of the tools, please consult — especially later when you work with Allplan 2018 — 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 finished project including all the data so that you can compare the model you created yourself with the model provided.

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 318) 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 2018.

Sources of information

Documentation for Allplan consists of the following parts:

- The help is the main source of information for learning about and working with Allplan.
  While you work with Allplan, you can get help on the current tool by pressing the F1 key, or activate **What's This** in the **Help** dropdown list (title bar on the right) and click the icon on which you require 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 using 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 2018** 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 ⑦ **Help** dropdown list (title bar on the right) provides **Tips for Efficient Usage**. This topic includes practical tips and tricks showing you how to use Allplan efficiently and how to carry out operations with ease.

User forum (for Serviceplus customers)

Allplan forum in Allplan Connect: Users exchange information, valu-able 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 the technical support team 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 not only encompass Allplan issues but also include analysis and optimization of processes and project organization.

For more detailed information on the current training program, please consult our online seminar guide you can find on our homepage (http://www.allplan.com/de/events/termine/schulungen-kurse-cad-ava-d2c-fm.html).

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

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Unit 1: Basics

You will start this unit by installing the **Allplan 2018 Engineering Tutorial** project template. After this, you will start Allplan, create a new project and make a few basic settings.

The **Allplan 2018 Engineering Tutorial**, which you can download from **Allplan Connect**, comes with a **fileset structure** and assigned drawing files. The project template includes four print sets. Using 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 277) to this tutorial. The appendix also includes 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 2018 Engineering Tutorial (with model)** project template from **Allplan Connect**. This project template includes 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 318)¨.
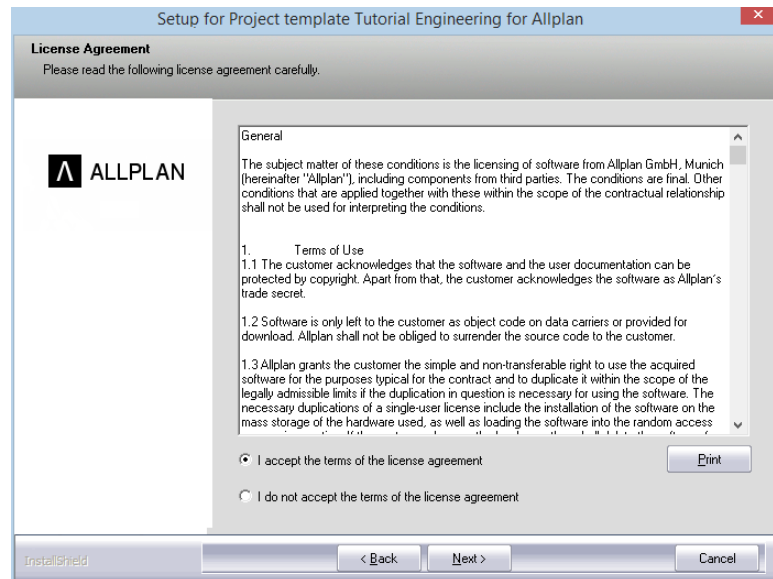
At the end of this unit, you will find a short troubleshooting section you may find helpful.

installing the project template

After having installed and configured Allplan 2018, you can install the **Engineering Tutorial** project template (with or without the model).

To install the project template

➲ Allplan 2018 must be installed, registered and correctly configured. After having installed Allplan, start Allplan to check whether it works properly.

➲ You downloaded the **Allplan 2018 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 acknowledge the Welcome screen.

4 Read the license agreement carefully and accept it. 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 2018 and the **Engineering Tutorial** project template on your computer. Now you want to start working. To do this, start Allplan 2018 and create the project.

To start Allplan and use the project template

1   Open the Windows start menu, point to **Allplan** and click ⋀ **Allplan 2018**.

Or

Double-click ⋀ **Allplan 2018** on the desktop.

2   After having started Allplan 2018, you can create a project straight from the **Welcome Screen**. Click the corresponding tool.

If you have switched 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, select the **All-plan 2018 Engineering Tutorial** project template and click **Finish**.

The project opens.

Initial settings

Start by making the following settings:

Settings on the Actionbar

The Actionbar configuration is set by default in Allplan 2018. This configuration shows the **Actionbar** above the workspace. In addition, you can see the **Properties**, **Wizards**, **Library**, **Objects**, **Task Board**, **Connect** and **Layers** palettes on the left.
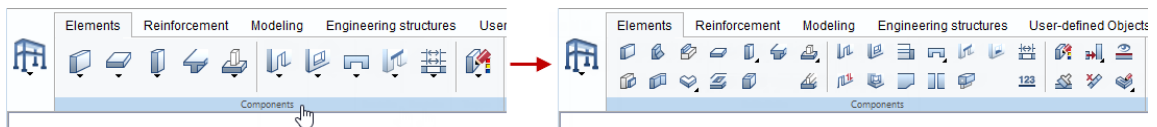
Note: You can find detailed information on the Actionbar configuration in the appendix (see "Actionbar configuration" on page 307) to this tutorial and in the help for Allplan 2018.

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

Tip: You can expand or collapse all task areas by pressing CTRL while double-clicking the left mouse button within the name line of a task area.

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 do this, double-click with left mouse button 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 the left mouse button, you can dock it to the place where it was docked last.
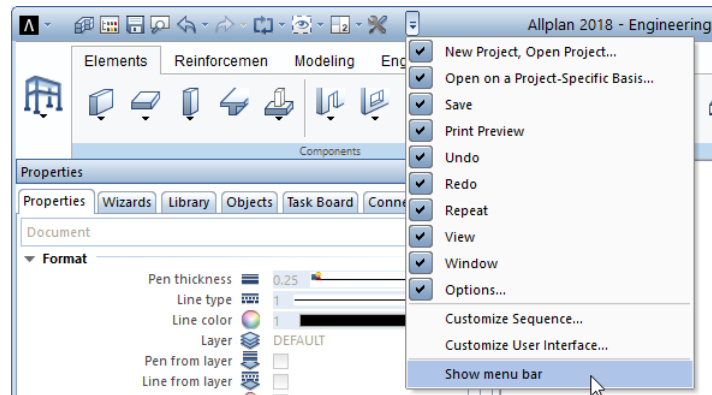
Showing the menu bar

When you work with the Actionbar configuration, the menu bar is hidden by default. To quickly access tools that are not on the **Actionbar** by default, you will show the menu bar for the exercises that follow.

To show the menu bar

Tip: Press the ALT key to show the menu bar for a short time. As soon as you select a tool, the menu bar disappears again.

1   Click the dropdown list on the quick access toolbar (title bar).

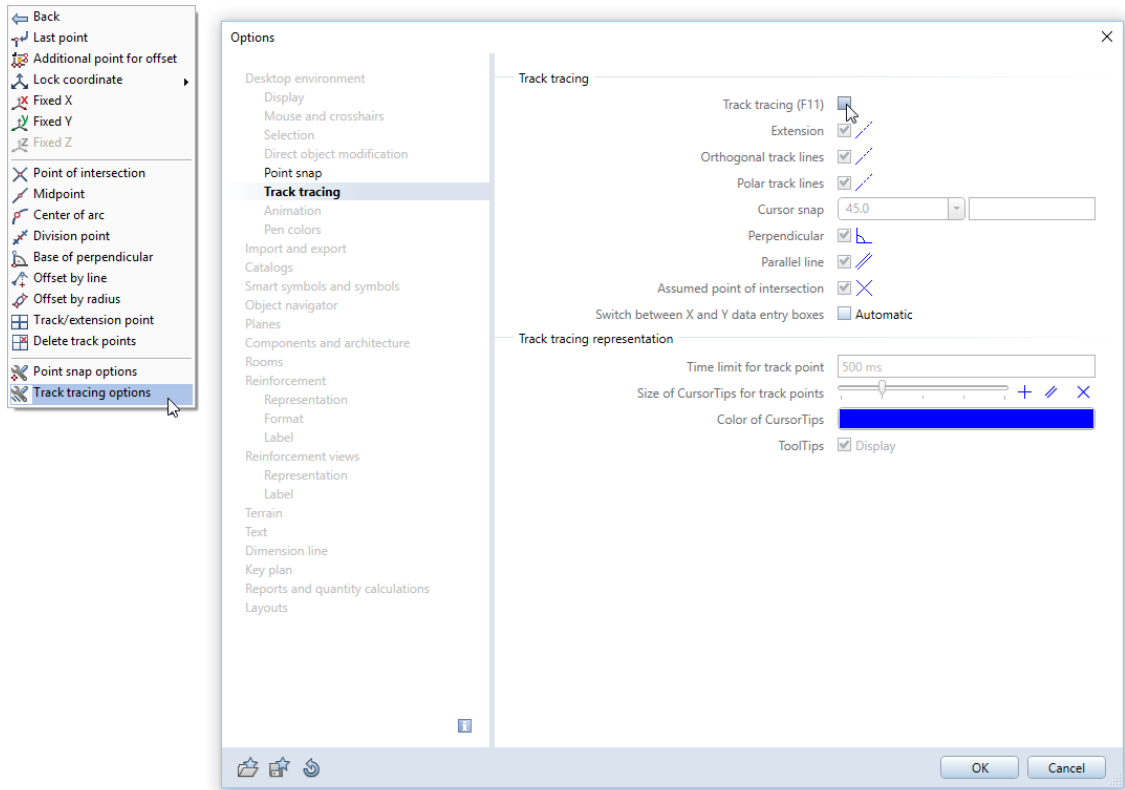2   Click **Show menu bar**.

The menu bar is displayed below the title bar.

Track tracing

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

To switch off track tracing

1   Click ✏ **Line** (**Create** menu – **Draft** module).

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

3   Switch **Track tracing** off.

Note: You can quickly enable and disable track tracing at any time while entering points by pressing the **F11** key or clicking the ✏ **Track line** icon in the dialog line.

4   Click **OK** to confirm the settings and press ESC to quit the ✏ **Line** tool.

Layer settings

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

Allplan 2018 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 **ARCHI-TECTURE** 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 and displayed 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).
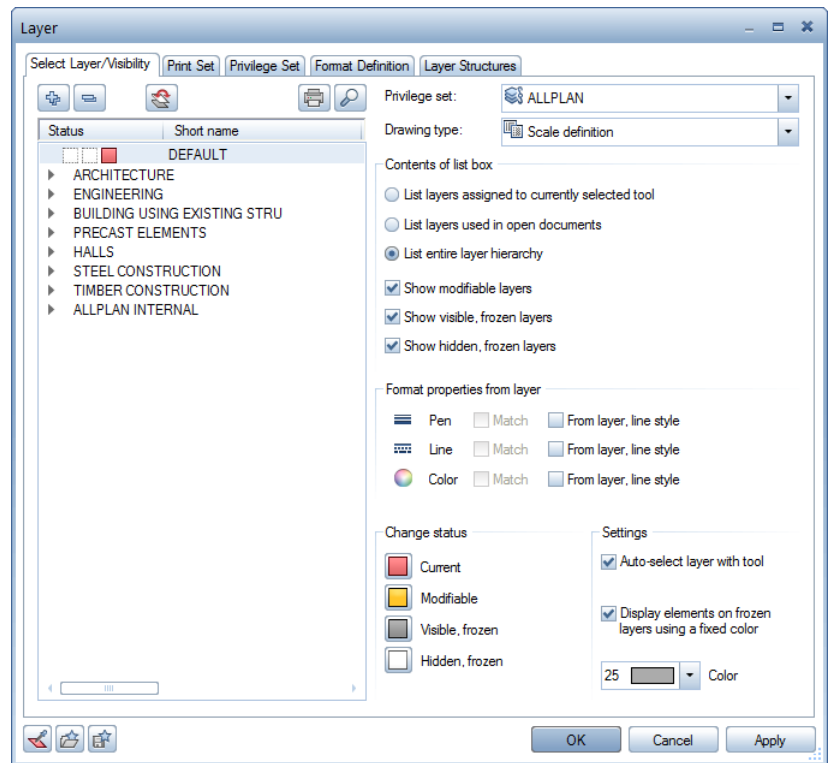
For the exercises in this tutorial, you will configure Allplan to select the layer automatically with the tool. Furthermore, you will work independently of the predefined layer format properties and define these settings while drawing.

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 bo-xes in the **Format proper-ties from layer** area.

1   Click ⬙ **Select, Set Layers** in the 🔲 **View** dropdown list on the quick access toolbar or on the **Format** menu.

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 at top left 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?**
  Press ESC and click the correct icon.

- **… I make a mistake as I go along?**
  Press ESC to quit (you may have to do this several times).
  Click ⟲ **Undo**.

- **… I have inadvertently deleted the wrong elements?**
  If ✖ **Delete** is still active, press the right mouse button 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** dropdown list on the quick access toolbar).

Tip: Check whether the relevant layer is set to visible.

- **… specific kinds of elements such as text or hatching do not appear in the workspace?**
  Click 👁 **Show/Hide** (👁 **View** dropdown 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.
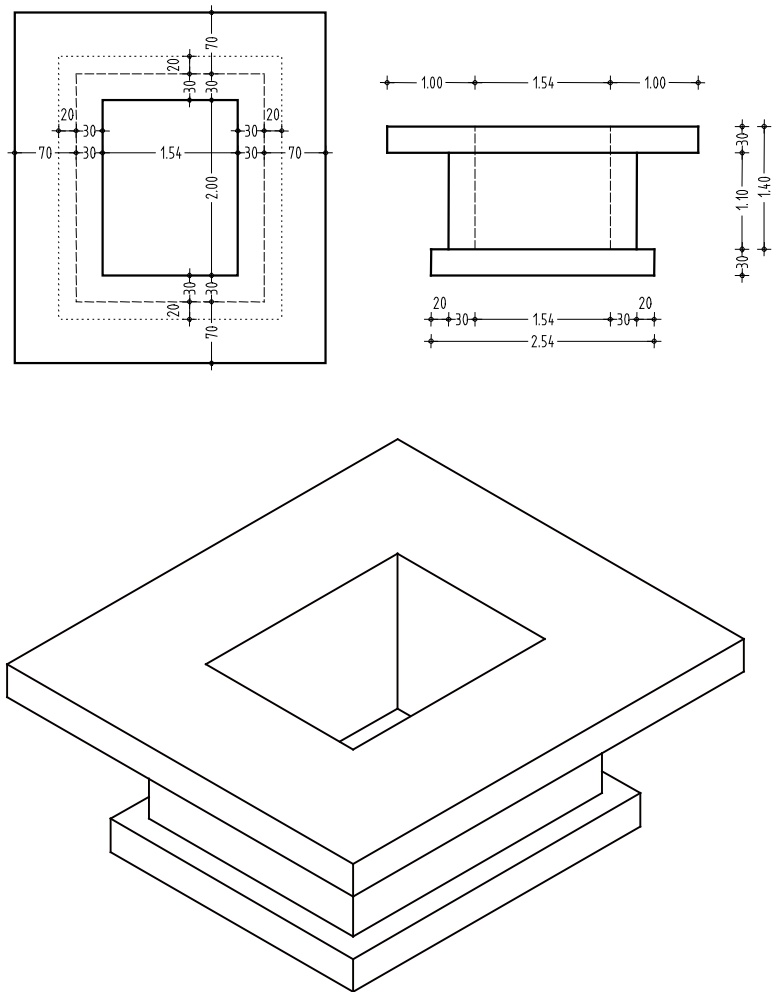
- You will use the tools in the ⯐ **Basic: Walls, Openings, Components** module to create a 3D building model of a basement. You will also learn about viewports.
  As an alternative, you will create a floor plan of a basement in 2D using the tools in the ◹ **Draft** module.

- Using the tools in the ⬢ **3D Modeling** module, you will create a three-dimensional general arrangement drawing of an elevator shaft.
  As an alternative, you will create the same 3D general arrangement drawing using the tools in the ⯐ **Basic: Walls, Openings, Components** module.

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 using the tools in the ▥ **Basic: Walls, Openings, Components** module and in 2D using the tools in the ▧ **Draft** module.

Exercise 2: 3D elevator shaft

You will draw an elevator shaft for the basement created in exercise 1 using the tools in the ⬡ 3D Modeling module. As an alternative, you will use the tools in the ⎍ Basic: Walls, Openings, Components module.

Exercise 1: Floor Plan of Basement

Requirements:

Allplan 2018 Engineering comes in different module packages.

Open the **Create** menu and check whether the ▣ **Architecture** family includes the following module(s):

Ⅲ **Basic: Walls, Openings, Components**

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

You will mainly use the tools in the Ⅲ **Basic: Walls, Openings, Components** module. You can find these tools in the **Components** task area of 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 using the Basic: Walls, Openings, Components module

If you have not licensed the ![icon] **Basic: Walls, Openings, Components** module, create the floor plan in 2D (on page 74), dimension (see ¨Dimensions¨ on page 59) it and create the stair (on page 64).
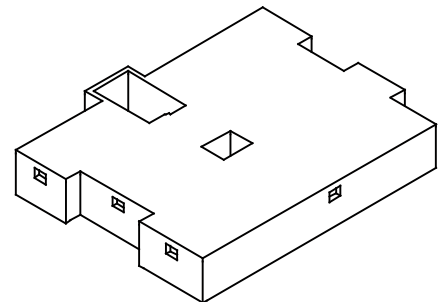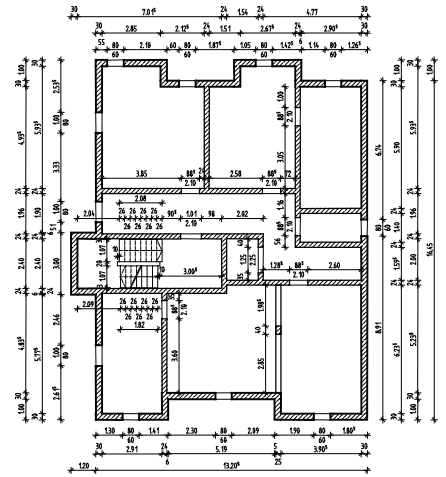
Tools

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

Viewports:

- ![icon] 3 Viewports
- View Type: Hidden Line Image
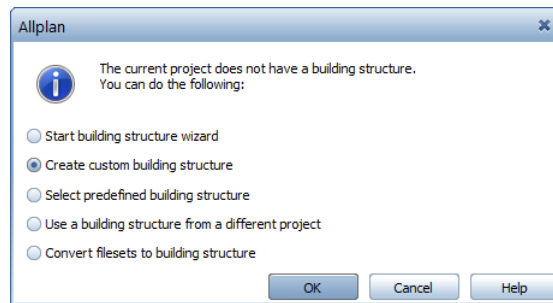- ![icon] Save, Load View

Objective:

Settings

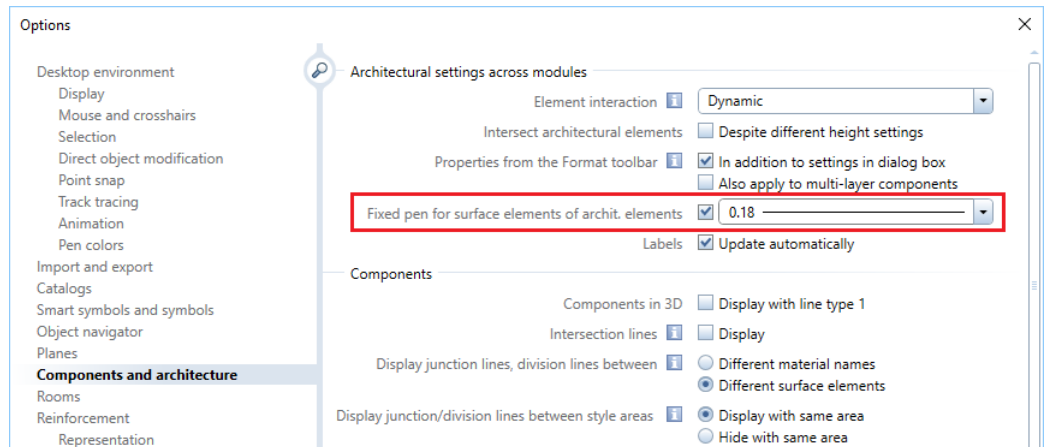Start by making initial settings.

To select a drawing file and to set options

➲ **Actionbar**: ⊞ **Engineering** role – **Elements** task. The **Compo-nents** task area is expanded.

1   Click ▦ **Open on a Project-Specific Basis** (quick access tool-bar).

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.

5   Click ⚒ **Options** (quick access toolbar) and select the **Compo-nents and architecture** page on the left.

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** dropdown list on the quick access toolbar) and select the **Color stands for pen** option.

Walls

Note: When you are working with the tools in the architectural mo-
dules, you are effectively working in three-dimensional space. To
define the position of a component (wall, door, window etc.) in space,
you require the height of the component's top and bottom levels.
Here, you will use absolute values to specify 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 are working with unfinished dimensions. As a result, the unfinis-
hed floor is at **-2.79 m** and the bottom of the floor slab at **-0.31 m**.

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

You need to enter a wall thickness, which is important for the wall to
be displayed to scale. A hatching style, fill or style area can be applied
to intersected walls.

You need to enter the height so that Allplan 2018 can generate a
three-dimension model based on the floor plan. You can also specify
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 thick-
ness and height of the wall and select a style area.

Start by defining wall parameters.

To set wall parameters

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

2   On the **Wall** Context toolbar, 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 graphics.

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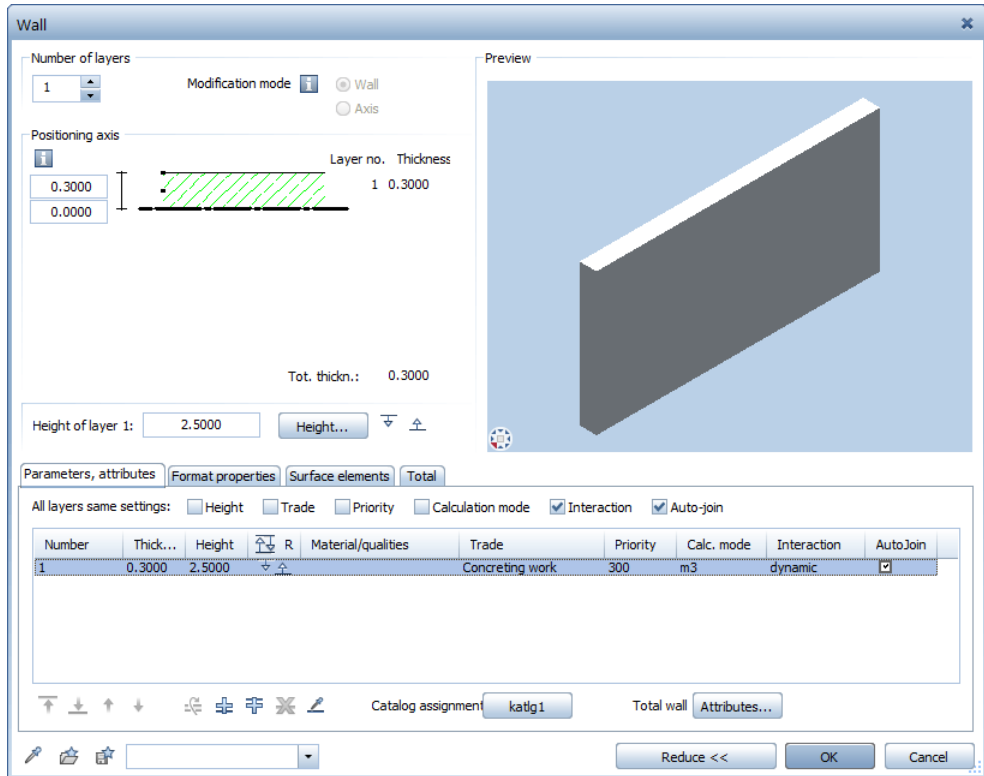
4   Enter the following information for layer number 1 on the **Parameters, attributes** tab:

    - Click the value displayed for **Thickness**, click in the list box, enter **0.300** and click **OK** to confirm. (This selects 0.30 and adds it to the list.)

    - Set the **Priority** to **300**.

    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 takeoff operations.
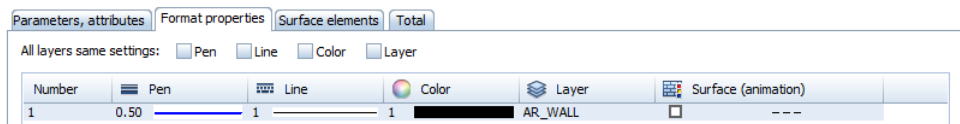
    - For the **Calculation mode** select: **volume**.

    - Set **Interaction** to **dynamic**.

    - Select the **Auto-join** check box.

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

The **Wall** dialog box should now look like this:

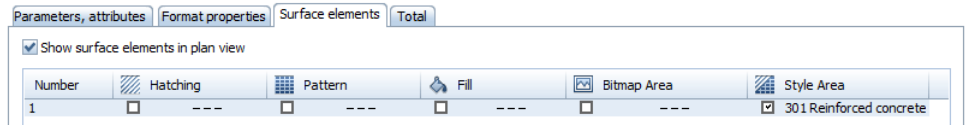5   Select pen **0.50** on the **Format properties** tab:

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

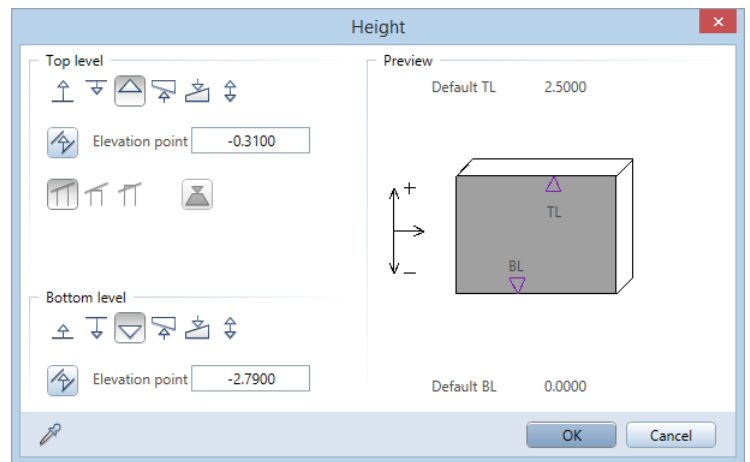6   Enter the following information on the **Surface elements** tab:

- 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 should now look like this:

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

7	Now click the **Height…** button and set 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 property sheets

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

F1

This will display the relevant topic in the Allplan help.

To **enter a value**, click in the data entry box. Enter the value at the keyboard and press ENTER.

To enter and add values in custom list boxes, click ➕ first.

To apply entries, click **OK**.

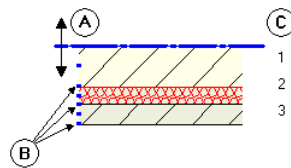To discard entries, click **Cancel** or press ESC.

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:

- **Intuitive**
  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 displayed on the left of the pre–view show the distance 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

- **Custom position based on numerical value**
  Click one of the data entry boxes on the left of the preview area and enter any value defining the offset of the axis to the wall edge. The program automatically calculates the value for the other side.

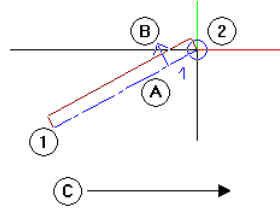## Offset direction of components, single–layer walls

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: Using the offset direc–tion, you can quickly toggle 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 activate and deactivate these symbols using the **Symbols when entering walls** option in the ⌁ **Point snap options**, **Point snap representation** area.
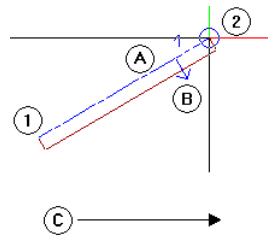
Depending on the position of the component axis, the following options are available:

• Single-layer wall, lateral component axis:

1	Start point of component
2	End point of component
A	Component axis
B	Offset direction
C	Direction in which component is entered

After clicking ⟍ **Reverse offset direction**:

1	Start point of component
2	End point of component
A	Component axis
B	Offset direction
C	Direction in which component is entered

• Single-layer wall, centered component axis:
Clicking ⟍ **Reverse offset direction** does not make any dif-ference.

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 towards 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 press the TAB key to switch between the data entry boxes, you can select the **Switch between X and Y data entry boxes auto-matically** 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 start point is marked with a cross. Switch track tracing off by pressing 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 below). Start by drawing a horizontal wall at bottom left. As the start point is on the outside, the wall's offset direction is upwards (= towards the inside).

- Check the preview displayed with the crosshairs. The small arrow should point upwards (= towards the inside).

Tip: While entering elements, you can quickly change the component axis using shortcut keys or in the dialog line.

- If the arrow does not point upwards, change the wall's offset direction by clicking **Reverse offset direction** on the **Wall** Context toolbar.

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.
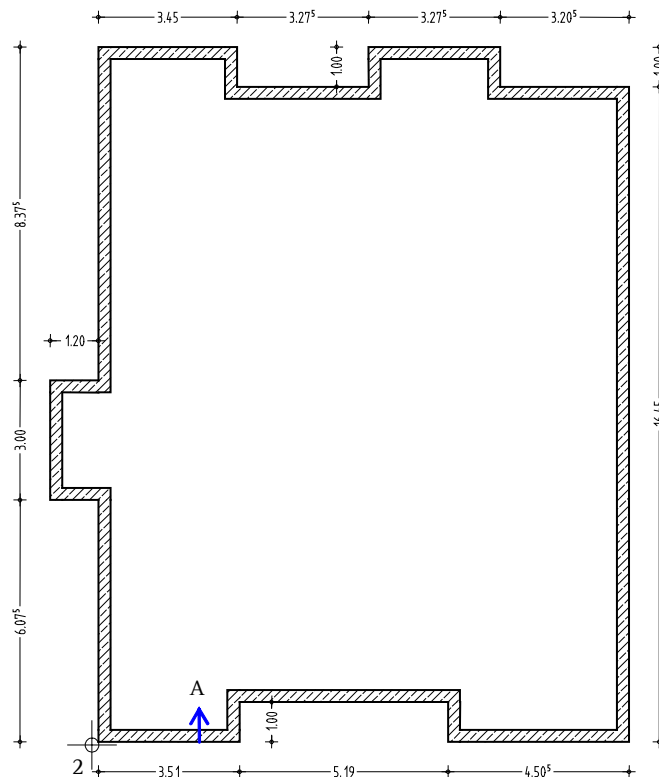
5   Enter the following values:

Δy	dY: 1.0	Δx	dX: 5.19
Δy	dY: –1.0	Δx	dX: 4.505
Δy	dY: 16.45	Δx	dX: –3.205
Δy	dY: 1.0	Δx	dX: –3.275
Δy	dY: –1.0	Δx	dX: –3.275
Δy	dY: 1.0	Δx	dX: –3.45
Δy	dY: –8.375	Δx	dX: –1.2
Δy	dY: –3.0	Δx	dX: 1.2
Δy	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, open the **View** menu, point to **Toolbars** and click **Viewport toolbar at the top**. You can also show the viewport toolbar permanently.

A Wall's offset direction

6   The wall polyline closes automatically.
    Press ESC to quit the ⬜ **Wall** tool.

Draw the interior walls using different thickness and priority rating settings than those of the exterior walls. The height of the wall is the same.

To draw interior walls

1   Double-click an exterior wall with the right mouse button.

    This activates the ▯ **Wall** tool and gets the element's properties at the same time. So you no longer need to associate the component with the planes (to define its height).

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

3   Change the ☑ **Properties** as shown.

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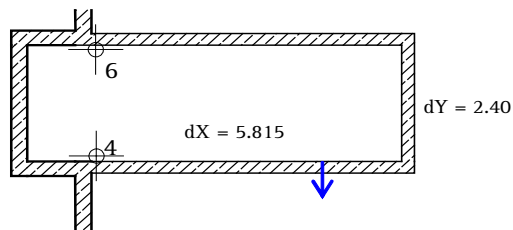
    • **Format properties** tab:
      Pen thickness (2) = **0.35** mm

    Then click **OK** to confirm.

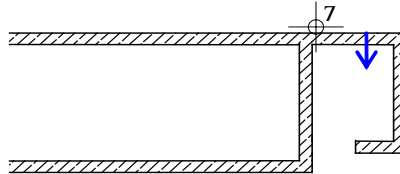4   *Set properties, place start point*
    Draw the first horizontal interior wall by placing the start point on the bottom left wall corner (see illustration below) of the stairwell area. Check the wall's offset direction in the preview. If it is not correct, change it by clicking ▦ **Reverse offset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

5   Enter **5.815** for the △ˣ X-coordinate. Then enter **2.40** for the △ʸ Y-coordinate.

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

7   Click the point at top right to set the first point for the elevator walls (see illustration below).

8   Enter **1.78** for the Δx X-coordinate.

9   Enter **–2.48** for the Δy Y-coordinate and then **–1.00** for the Δx X-coordinate.
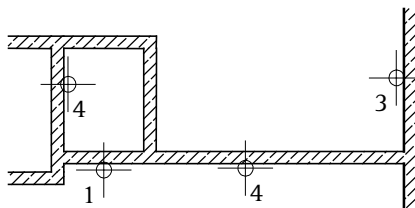

10 Press ESC to close the wall polyline and to quit the 🔲 **Wall** tool.

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 set to **0.00**. If it isn't, change this setting in the dialog line, if necessary.

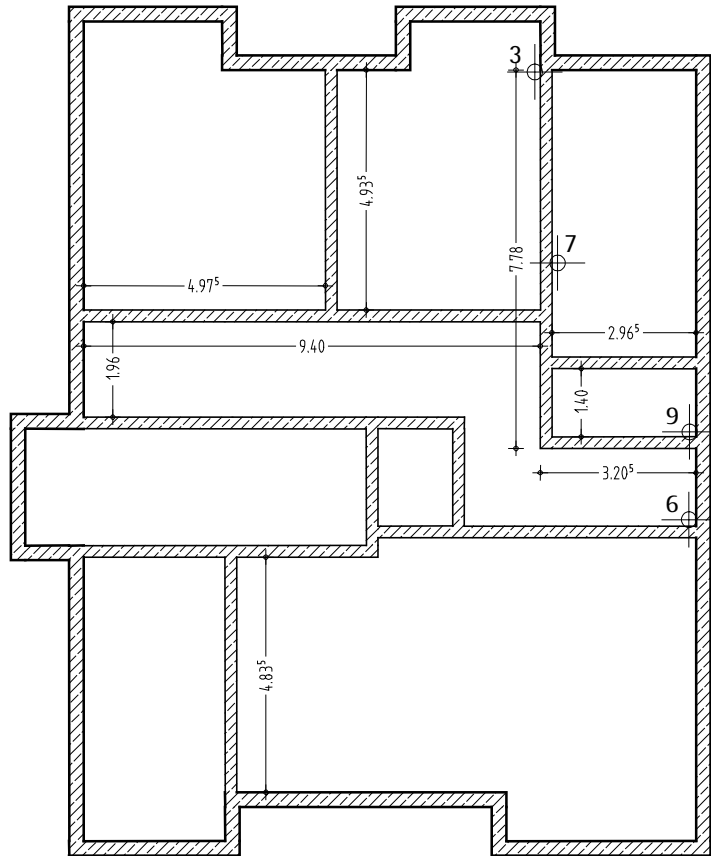3   Click the exterior wall through to which the wall is to extend.

4   Using the same approach, lengthen the elevator wall by joining it with the wall of the stairwell. Then quit the tool.

You will design more interior walls based on the reference point of existing walls and using the 'enter at right angles' option, which creates elements at right angles to existing elements. After you have drawn the interior wall at top left, which is described in this section, you should be able to create the other walls yourself using the information provided below.

To draw more interior walls

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

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

3 Click the first interior wall corner at top right (see illustration below) and specify the offset direction towards the bottom 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 set the start point of the horizontal wall at the top, click the line to the right of the vertical wall you just created. The reference point is displayed.

8 If required, move the reference point onto the bottom left corner and enter the offset between the reference point and the start of the wall: **1.40**

9   **Enter at right angles** is still active in the dialog line. Check that the offset direction is towards the top and click the wall corner at bottom right.

10 Now draw the other interior walls yourself.

11   The wall polylines close automatically. Press ESC to quit 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 on the viewport toolbar

Using the tools on the viewport toolbar, you can not only navigate freely on screen but also set 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 (e.g. **Line**) is active.

You cannot see the viewport toolbar until you move the cursor to the bottom of the viewport, guaranteeing as large a workspace as possible. When you work with multiple viewports, each viewport has its own viewport toolbar.

Icon	Tool	Use
Area on the left		
	View flyout	Using the **View** tool or the **Standard views** flyout, you can choose between plan view and any of the standard views.
	Zoom All	**Zoom All** sets the display scale so that you can see all the elements in the visible files. **Note**: If you have loaded a view using **Save, Load View**, you can only see this view.
	Zoom Section	**Zoom Section** zooms in on a section. To do this, press and hold down the left mouse button and enclose the elements you want to zoom in a selection rectangle.
	Navigation Mode	**Navigation Mode** enables the navigation mode in the current viewport. In this mode, you can use the mouse to view a 3D model. **Note**: You can navigate in sphere mode or in camera mode (keep the CTRL KEY pressed down).
	Previous View	**Previous View** restores the previous view or display scale set (provided you had selected a different view or scale before you selected the current setting).
	Next View	**Next View** restores the next view or display scale set (provided you have already selected a subsequent view or scale).

	Save, Load View	Using Save, Load View, you save the current view under a na-me of your choice or retrieve a view you saved beforehand.
	3D View	You can use 3D View to display 3D models in three-dimensional space in a perspective view by entering an eye point (observer) and target point. You can also use this tool to create a view based on the building structure.
	Element Selection	Using Element Selection, you select the design entities you want to display in the current viewport. The program temporarily hides all the other design entities.
	Drawing File Selection	You can use Drawing File Selection to temporarily hide drawing files that are currently visible in the active viewport. Click Drawing File Selection again to restore the initial situation in the active viewport. As a result, you can see all the drawing files that had been visible before you selected this tool.
	Always on Top	Always on Top places the viewport so that it is always on top (i.e., in front of) the other ones.
or		You can use this tool only if you have *not selected* the **Connected** option and the viewport is *not maximized*.

Area on the right

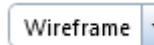|		
`0.0 ▲▼`	**Exposure** (only for the **Animation** and **RTRen‑der** view types).	Using **Exposure**, you can control the brightness in a viewport of the **Animation** or **RTRender** view type. You can enter a value between – 25 and 25.
		Important! This setting *only* applies to the current viewport. It has *no* effect on the settings used for rendering.
`Off ▾`	**Section Display**	Using the ⬓ **Activate Section** tool or the **Section Display** list box, you can display your design in an architectural section (provided you defined its ⬓ **Clipping Path** beforehand).
`100,00 ▾`	**Display Scale**	You can use **Display Scale** to set the scale for displaying the model on screen.
		The display scale governs the ratio between the model as displayed on the screen and its real‑life dimensions. The scale therefore chan‑ges automatically if you change the size of sections displayed on screen. The current display scale is shown on the viewport toolbar in the lower border of a viewport.
`Wireframe`	**View Type**	Using the **View Type** list box, you can select one of the predefined view types (**Wireframe**, **Hidden**, **Animation**, **Sketch** or **RTRender**) for the current 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 using this view type. Click **New view ty‑pe...** 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** dropdown lists on the quick access toolbar and on the shortcut menu (in navigation mode only).
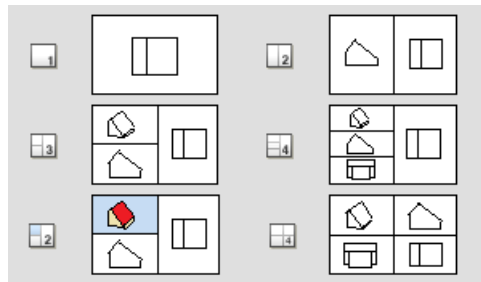
Note: This tutorial uses the **Connected** option, which is set by default (⊟2 **Window** dropdown list on the quick access toolbar). When you change the size of a viewport, all the other viewports adapt automatically. New viewports will be fitted into the arrangement. If the **Connected** option is *not active*, you can place and resize the viewports independently of each other within the Allplan application window.

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

To maximize the workspace, you can float all viewports freely. If you have a second monitor, you can leave the Allplan application 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 help for Allplan. See ¨Viewports¨.

By opening several viewports in parallel and arranging them as you need, you can display your model using different views, scales and view types. You can set 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 reflected in all the others.

You can find the tools for using and arranging viewports in the ⊟2 **Window** dropdown list on the quick access toolbar. You can also select one of the standard viewport arrangements provided and then modify this arrangement to suit your needs.
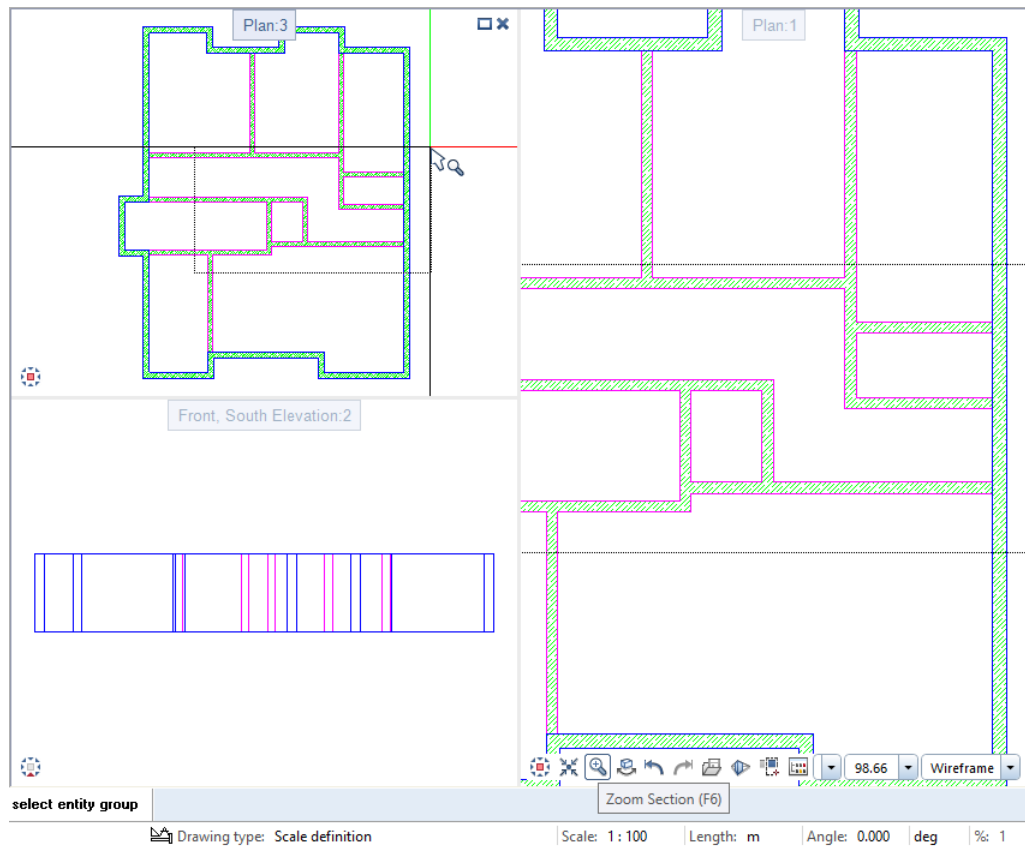

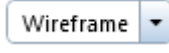The following exercise will help you understand how the viewports work.

How to use viewports: detailed view and full view

1   Click ⊟3 **3 Viewports** in the ⊟2 **Window** dropdown list on the quick access toolbar.

2   Click ▣ **Plan** in the viewport at top left.

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

4   Zoom in on a section in the viewport at top left.
    You can see this section in the viewport where you clicked
    🔍 **Zoom Section** (here: in the viewport on the right).
    This way, you can work on details and still see your entire design
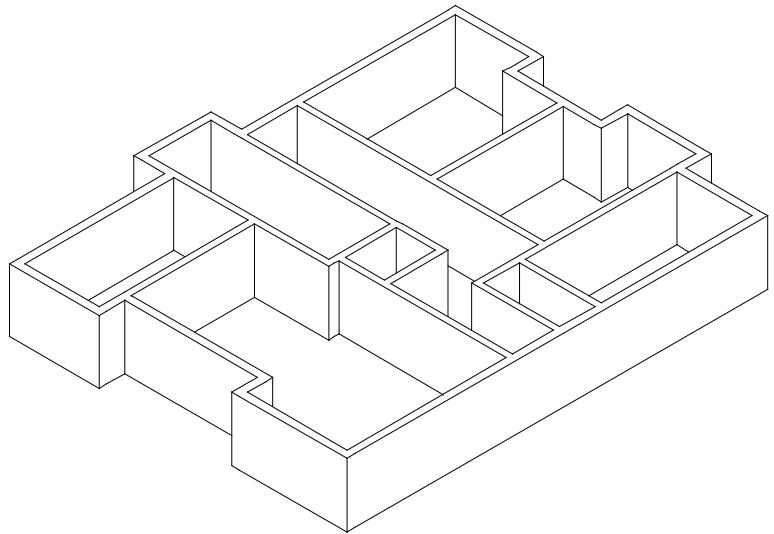   in plan, perspective and elevation.

To create a hidden line image

1   Click ⊞ 3 Viewports.

2   In the viewport at top left, click [Wireframe ▾] on the viewport toolbar and set the view type to Hidden. 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 dropdown list on the quick access toolbar) and select the Use co-lor 1 for all elements option.

To save a view

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

2   Click 🗁 **Save, Load View**.

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

The view is now active (the 🗁 icon is pressed in); in other words, when you click ⚹ **Zoom All**, you can see this view.

Tip: Using **Save, Load Arrangement** in the ▦ **Window** dropdown list (quick access toolbar), you can thus save the arrangement of all viewports and load it again with a single click.

4   Switch off 🗁 **Save, Load View** (icon is not pressed in) and then click
⚹ **Zoom All**.

Allplan now displays the entire design again.

5   Click ▣ **1 Viewport** in the ▦ **Window** dropdown list on the quick access toolbar. This also switches 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.
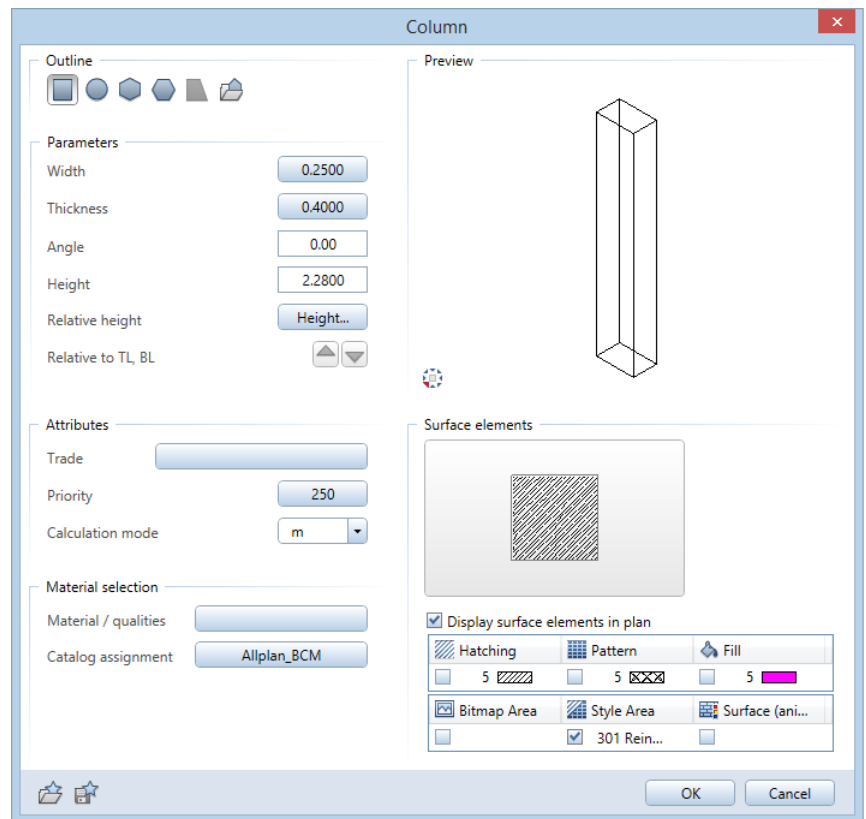
To draw a column

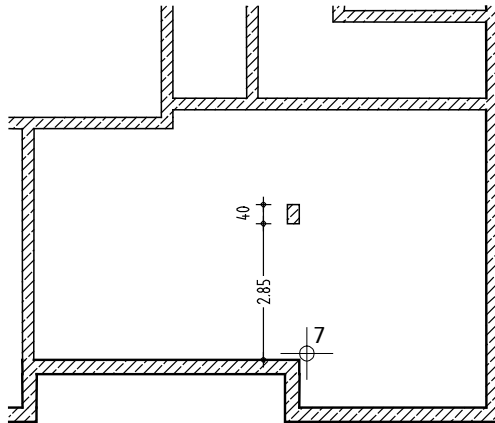➲ Drawing file **101** is current and plan view is active. Line type **1** is selected.

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 On the **Column** Context toolbar, click ☑**Properties**.

3   Set the parameters in the **Column** dialog box as shown above:
    Outline: 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   On the **Column** Context toolbar, set the **Anchor point for
    preview** to bottom right.

7   Move the crosshairs to the interior corner (see above).

    This point now serves as the reference point for further entries.
    Consequently, the data entry boxes in the dialog line are high-
    lighted in yellow.

8   Enter **0.00** for the **X-coordinate** and **2.85** for the
     Y-coordinate in the dialog line and press ENTER to confirm.

    Allplan positions the column.

9   Press ESC to quit 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 set the layers as described in unit 1, the appropriate layer for the selected tool is activated automatically.
If it isn't or you want to use a different layer, do the following.

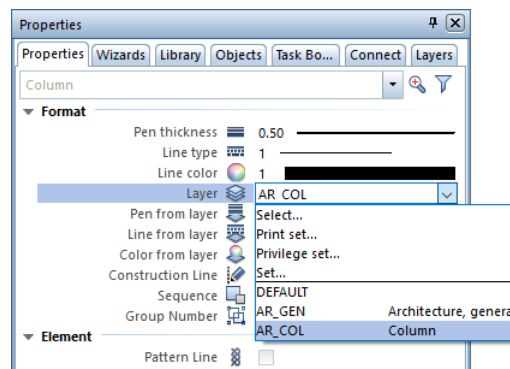**Tip**: **How to select layers**

Always proceed as follows:

– First select a tool.

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

– Select a different layer.

To select the current layer

➾ The [▯] **Column** tool is active.
The dialog box with the properties is closed.

1 Open the [≋] **Layer** dropdown list in the **Properties** palette – **Format** area.

Tip: To see which layers have already been assigned, click [≋] **Select, Set Layers** on the **Format** menu 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**.
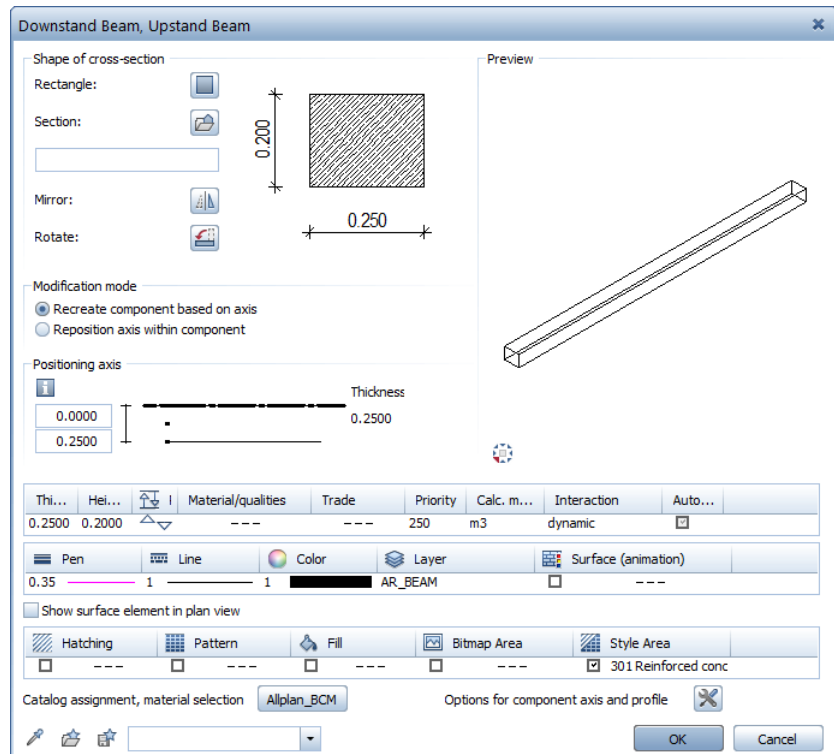
2 If the layer **AR_COL** is available in the quick selection list, click this layer.

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 Set the parameters for the beam as shown above:
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, activate 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 start point (see below).

7 Click ⌐ **Enter at right angles** and enter **0** for **dX**.
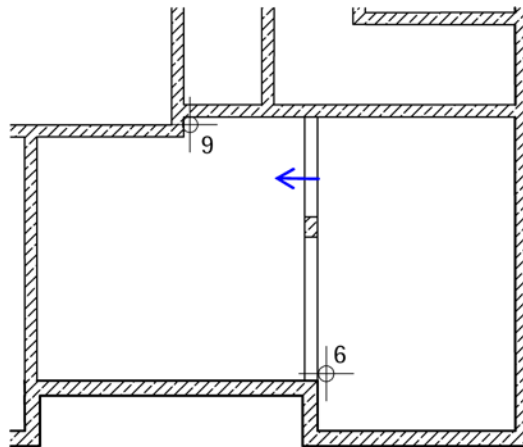
8 Check the beam's offset direction in the preview. If it is not cor-
   rect, change it by clicking ▭ **Reverse offset direction**.

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 Press 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, there is an inherent association between walls and openings in Allplan. When you move a wall, for example, its openings will move too.

All the doors in the basement are single doors of a size 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 set the height.

- Enter the width of the opening.

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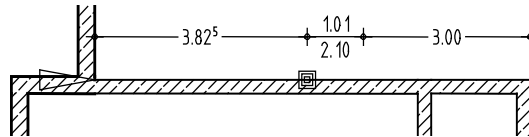
To create door openings

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

　　The program suggests the layer **AR_SMSY**. Openings always have the same layer as the component into which they are inserted, regardless of which layer is currently active.
　　Here, the layer setting is irrelevant.

2　Set the ⊠ **Anchor point for preview** to bottom right on the **Door** Context toolbar and check that ⚬ **Enter offset directly** is switched 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.
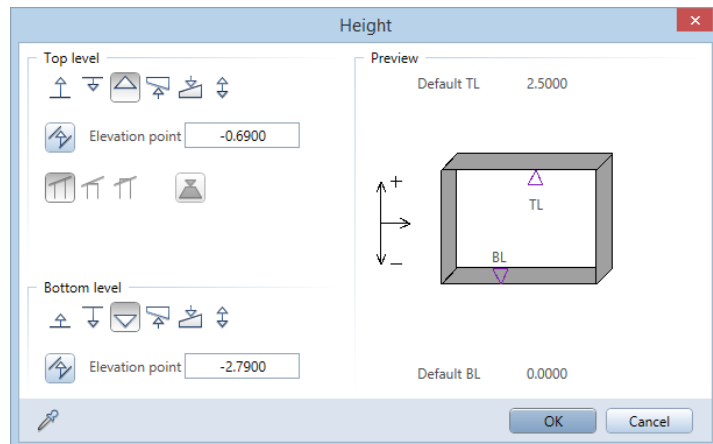

4 If the reference point is not displayed on the inside corner at top left, click on the corner to move it there and enter **3.825** m for the offset in the dialog line.

5 Click **Properties**.

6   Select the ▢ rectangular shape for the door type.

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 based on the door height plus the thickness of the floor (0.09 cm). Enter **-0.69**.
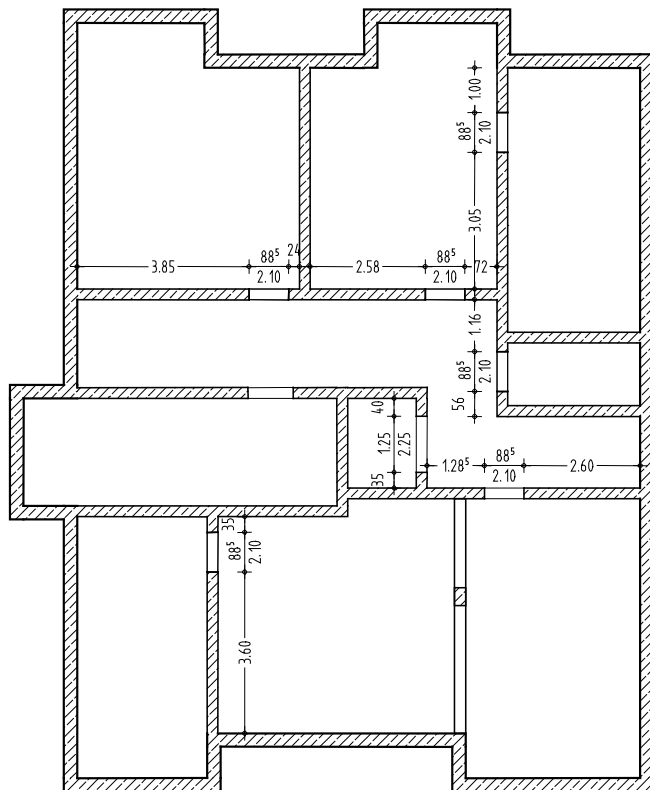

9   Click **OK** to confirm the dialog box.

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.
Switch 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 set the anchor point (left, right or centered) on the **Door** Context tool-bar.

You can also switch 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 setting the view type to **Hidden**.
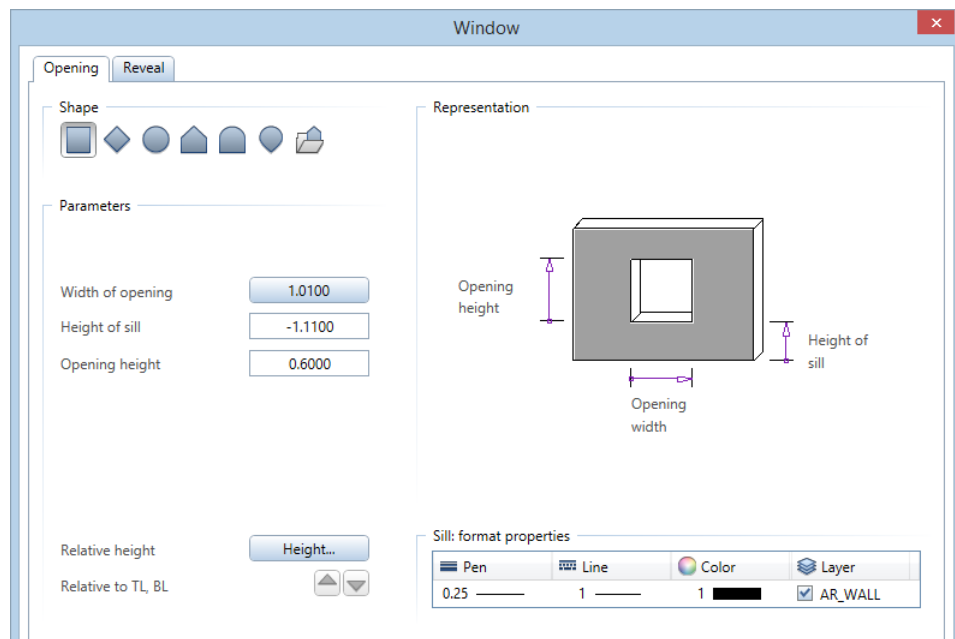

14 Press ESC to quit the tool.

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 are displayed with a **sill**.

You are already familiar with the approach. Set the height, define the shape of the window and place the opening in plan.
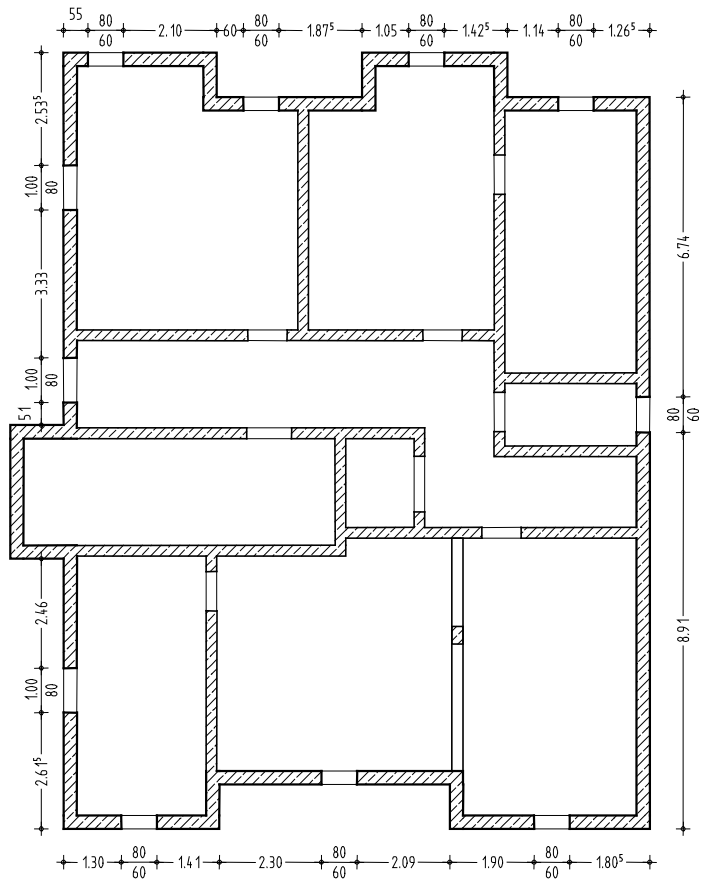
To create window openings

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

1   Click **Window** (**Actionbar** – **Components** task area).

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

3   Click the line representing the exterior of the wall at top left 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. Switch 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 exterior wall on the left.

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 set the bottom level to **–1.31**.

9   Press ESC to quit the tool.

Defining the reference point

To change the position of the small arrow representing the nearest significant reference point, you can
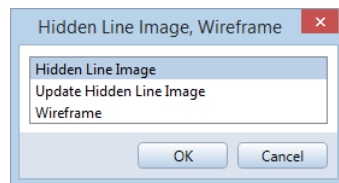
- click a point on the wall or

- click a point beyond the wall. The reference point will move to the point on the wall that is perpendicular to the point you clicked.
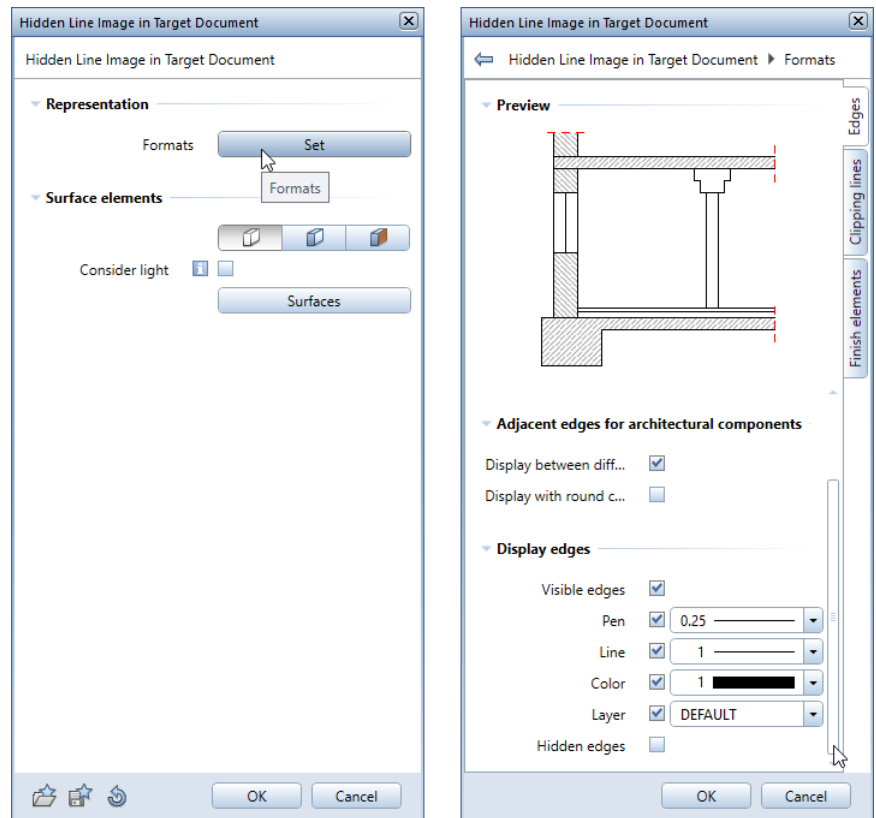
Checking the design

You can generate a hidden line image to check the design. This way, 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.

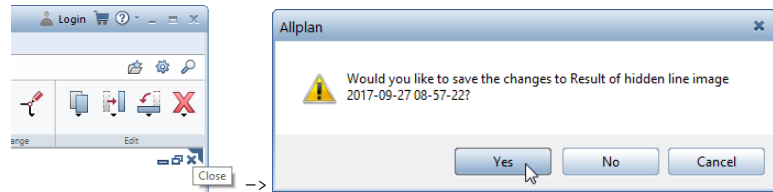2   Click ⬚ **Hidden Line Image, Wireframe ...** (⬚ **Window** dropdown list on the quick access toolbar).

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

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

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

The hidden line image is displayed in a separate window.

6   Close this window by clicking the **X** in the top right corner. Acknowledge the prompt by clicking **Yes**.

Tip: To save the hidden line image as an NDW file, click ⊞ **Save as ...** on the **File** menu.

7   Select drawing file **105** in the **Select target 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, nothing is displayed in the workspace.

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

10 Your workspace should now look like this. You can also print the image by clicking **Print** in the dropdown list of the Allplan icon on the title bar.
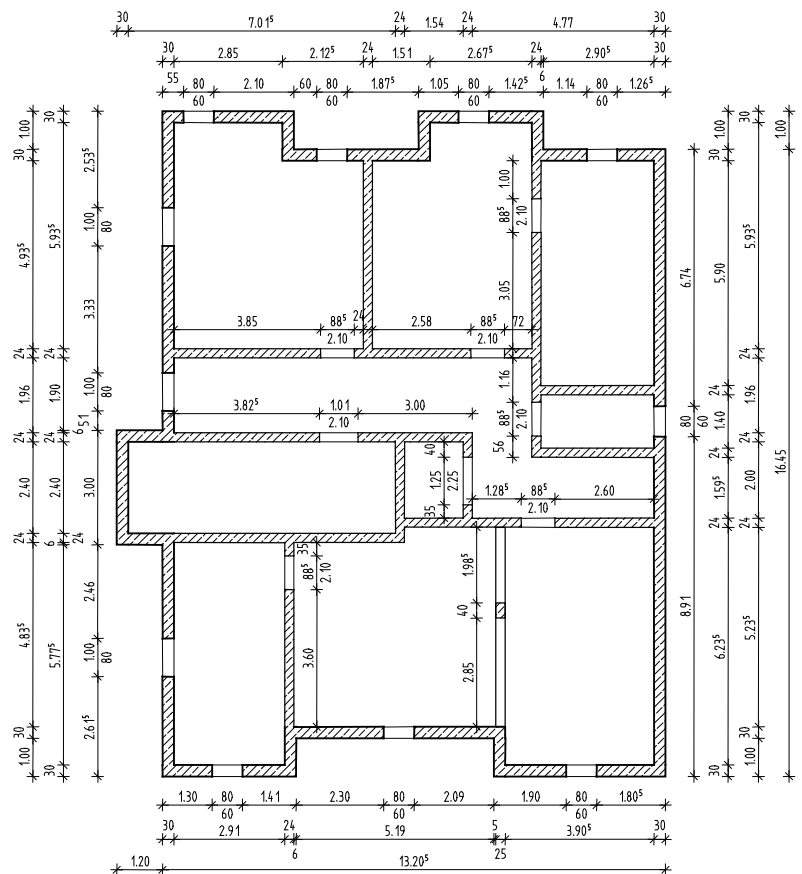

Note: When checking the design, you can also show or hide elements or element groups or zoom in on a particular element. To do this, use the **Objects** palette, which lists all components of your virtual building model in a compact and clear manner. You can use predefined sorting criteria to show and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

Dimensions

Now you will dimension the floor plan 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 set 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**.
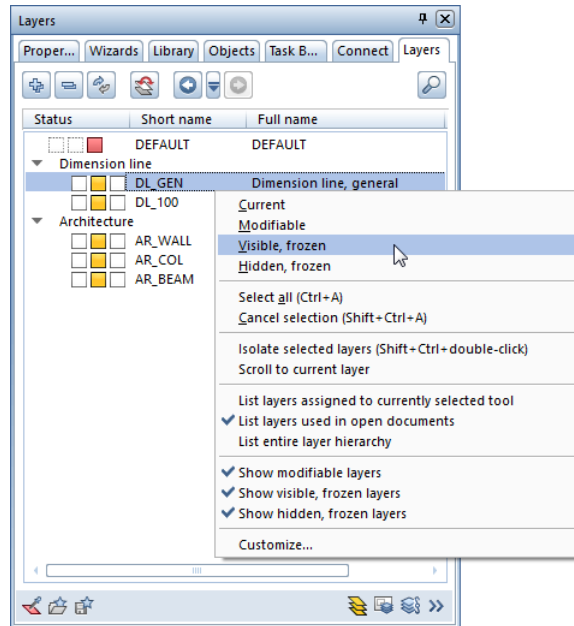
Turning layers on and off

To check the layers assigned to the dimensions, set the **DL_GEN** layer with the dimensions of the openings to visible, frozen.

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.
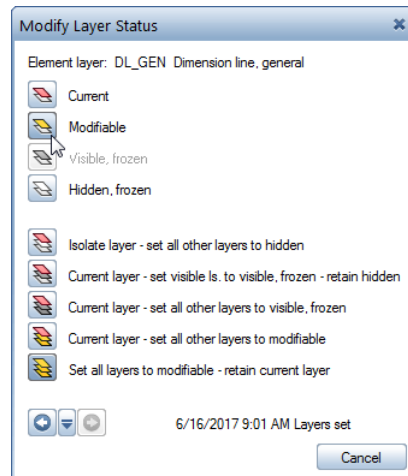

The dimensions on the **DL_GEN** layer are in color **25**, which you selected for frozen layers.

Tip: When no tool is active, you can also open the **Layer** dialog box by double-clicking the right mouse button in the workspace.
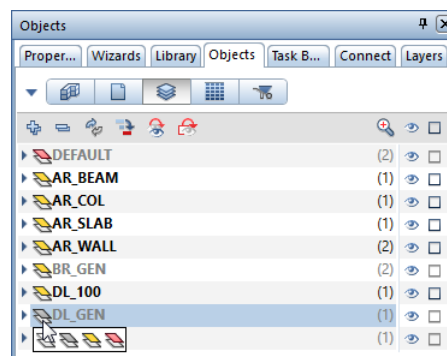
You can also show and hide layers by selecting the ![icon] **Select, Set Layers** tool on the shortcut menu of a viewport. The shortcut menu of the **Select Layer/Visibility** tab provides the options you require.

To set the frozen layer to modifiable again, right-click any frozen dimension line, select ![icon] **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 ![icon] **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 where you can change the status of the layer.

What to do when elements are no longer visible?

- 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) to set all the layers to visible.

- If the elements are still not visible, the selected privilege set may 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 displayed by default.

- You can find out which layers individual elements are on by turning each individual layer on using 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** 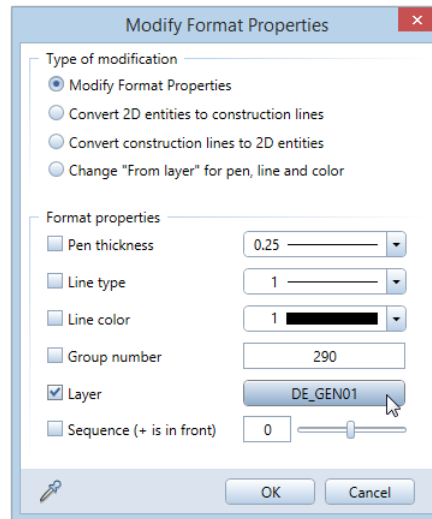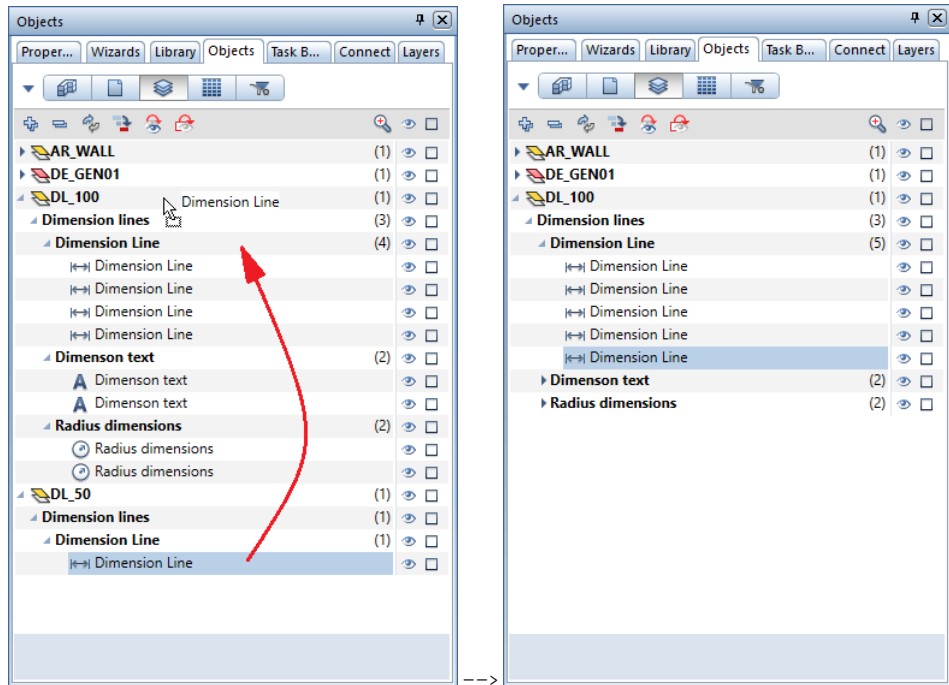or **open in reference mode**). If you want to know the layer of a particular element, click this element in the workspace. As a result, this element gets the ■ **Active** icon in the **Objects** palette and you can see the layer to which it belongs.

- You can find out which layer a single element is on by right-clicking the element and selecting **Format Properties**.
  All the properties including the layer are displayed and can be changed directly.
  You can also change the layer of the current element. The layers of linked components (e.g. 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 ele-
  ments 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** criteri-
  on. Open the tree structure of a layer down to its lowest level.
  There, select one or more elements. You can now drag the ele-
  ment(s) to another layer (the uppermost level in the hierarchy) in
  the list.

However, you can reassign the element(s) only to a layer that is included in this list.

Stair outline

You can create stairs in two ways:

- You can model it in 3D using the tools in the ⬛ **Stairs** module or

- You can draw it in 2D using the tools in the ⬛ **Draft** module.

As half-space landings and flights of stairs are usually produced as precast elements, you do not need to design or reinforce them. You will therefore draw the outline of the stair using the tools in the ⬛ **Draft** module. The following exercise has a ¨rough design guide-line¨. Tools that you have already encountered are no longer explai-ned in detail.

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**.

Tip: To select a tool you have already used before-hand, you can also open this tool by clicking it in the **Repeat** dropdown list (quick access toolbar). You can choose from the 30 tools you have selected most recently.

3   Use ✏ **Line**, ▭**Rectangle** and ▯▯▯ **Parallel to Element** (**Action-bar** – **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 element(s) to modify:* Click the elements to which you want to apply the new line type. Then press ESC to quit 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. Double-click a frozen opening dimension line with the right mouse button.

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

Slab

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

To set the slab's properties

Tip: You can also use the ⬛ **Slab** tool to create floor slabs.
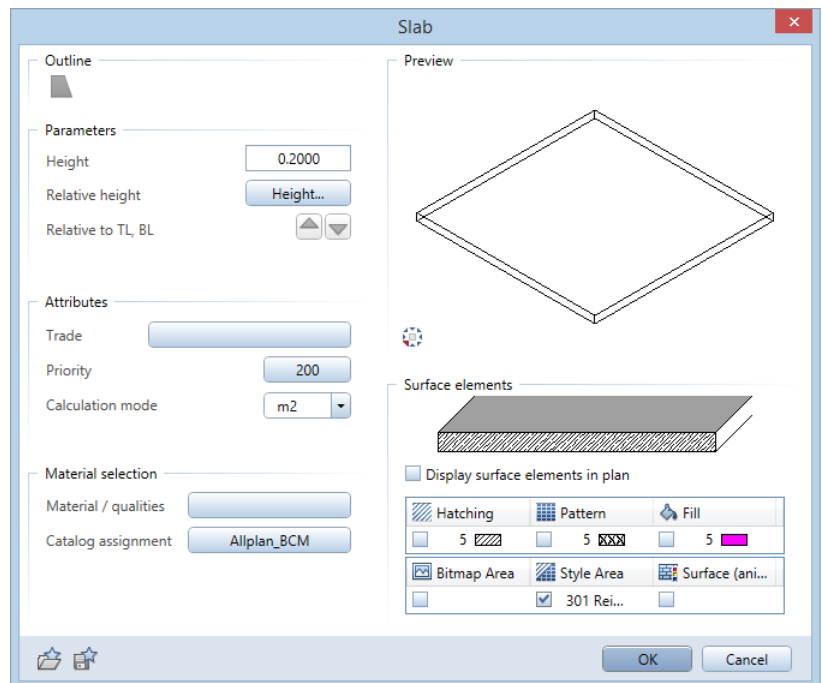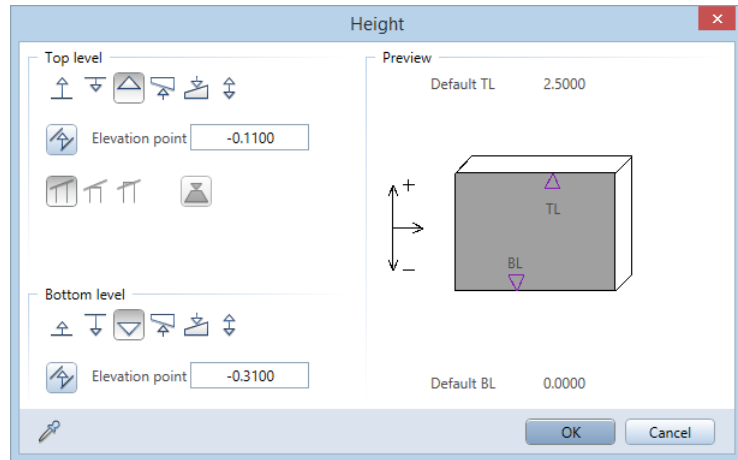A separate set of tools is provided for designing foundations.

1   Make drawing file **101** current and set drawing file **103** to 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**.
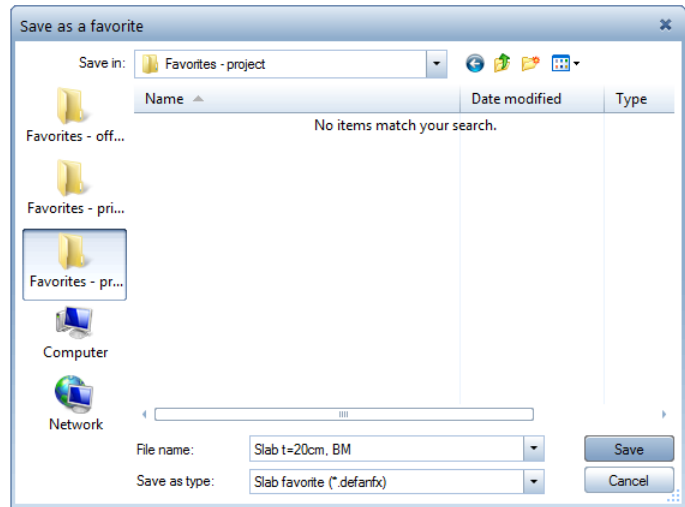

5　Click **OK** to confirm the height settings, define the **priority** rating and select a **style area**. Do not close the **Slab** dialog box.

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

To save component properties as a favorite file

➲　The ⬚ **Slab** tool is still active and the dialog box is open. If it isn't, select this tool and click ⬚ **Properties**.

1　Click ⬚ **Save as a favorite** in the bottom 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 using the polyline entry tools. Using 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: uses the start point for the direction. You can specify the number of segments for circles and curves.

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

Enter reference point: identifies a point on the element as the start point for the new element. To define this start point, click a point on the element and enter the offset between this point and the nearest significant point (displayed as an arrow).
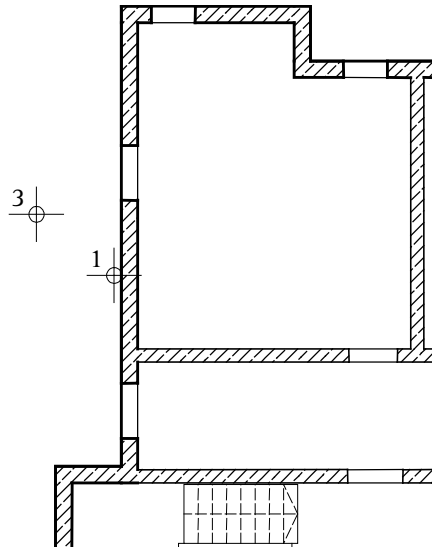
Area detection using additional point: uses a point you click on a polyline to detect the entire boundary.

To create the slab using the polyline entry tools

1 *From point, 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 In the input options, click ⊛ **Area detection using additional point** and deactivate 🔲 **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 Press ESC to quit 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.
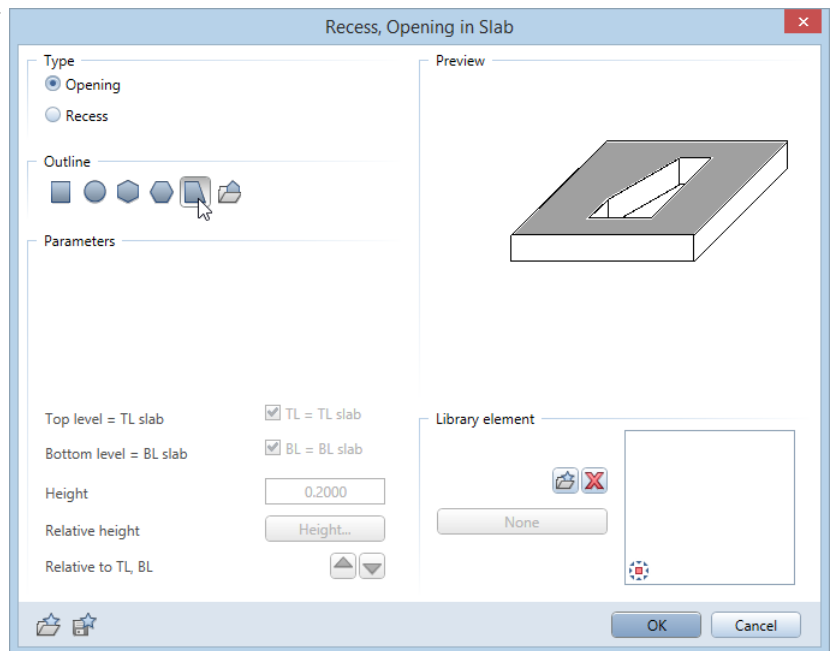
You will also insert a slab opening for the elevator shaft. To define the outline, you will use the ⬥ **Area detection** tool. Using this tool, you can detect a closed polyline simply by clicking within its bounda‐ries.

To create a freeform slab opening

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

2   Click the basement slab.

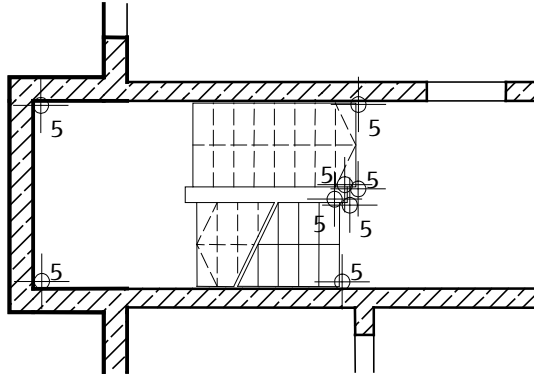3   On the **Recess, Opening in Slab** Context toolbar, click ☑ **Pro‐ perties**.

Tip: Slab openings are crea‐ted 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 enti‐ rety.

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 currently active.
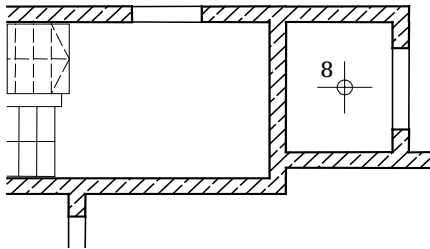

4   Select the **Opening** type and the ▭ **Freeform** outline.

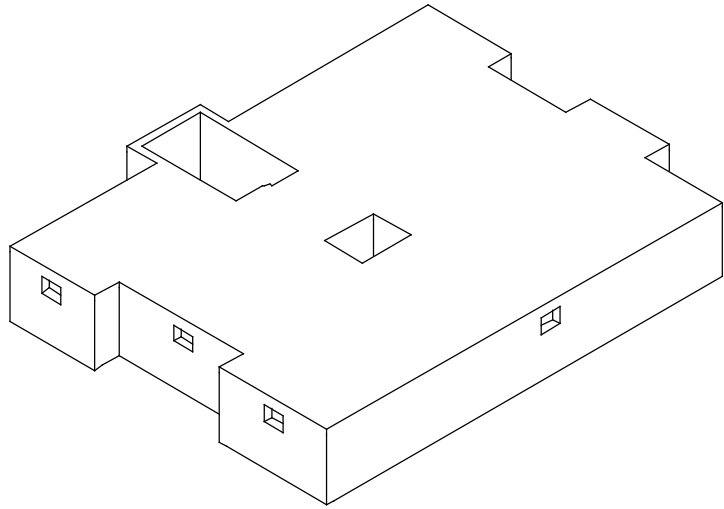5   Click the corners of the stair outline one after the other.

6   To close the outline, click the first point again or press 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   Switch 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   Press ESC to quit 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 design should look like this:

Printing layouts is covered in **exercise 9**.

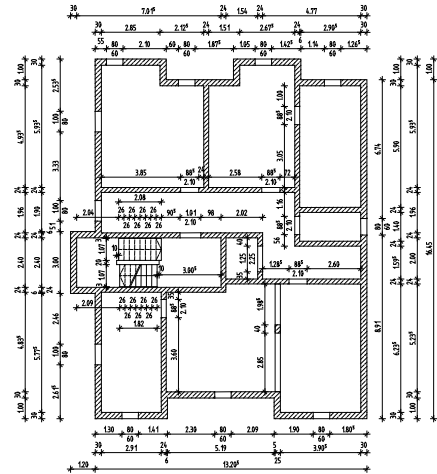# Walls in basement as a 2D design using the Draft module

As an alternative to the tools in the ▐▊ **Basic: Walls, Openings, Components** module, you will now create the walls in the basement in 2D

using the tools in the ◣ **Draft** module. You can find these tools in the **2D Objects** task area of the **Actionbar**.

Tools:	Objective:

Tools:

▐▅ Offset Polyline

▢ Rectangle

✕ Delete Double Lines

╱ Line

▐▐▐ Parallel to Element

|✕| Auto-Delete Segment

→▌ Move

Objective:

Start by making initial settings.

To select a drawing file and to set 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 using the ⟋ **Line** and ⦀ **Parallel Lines** tools. You should already be familiar with this approach; you used it to draw the title block in the Basics Tutorial.

- Create the walls using 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 using the ⟊ **Offset Polyline** tool.

Instead of using these tools to create a drawing in 2D, you can also use the tools in the ⬛ **Basic: Walls, Openings, Components** module to create the floor plan without taking the height into account (top level = bottom level = 0.00). This approach is equivalent to the one described above.

To draw exterior walls as offset polylines

➲ 🔲 Plan view is active and the **Hidden Line Image** view type is switched off.
If this is not so, click ⬛ **1 Viewport** in the ⬛ **Window** dropdown list on the quick access toolbar.

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

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

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 to place the first point at bottom left.

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.
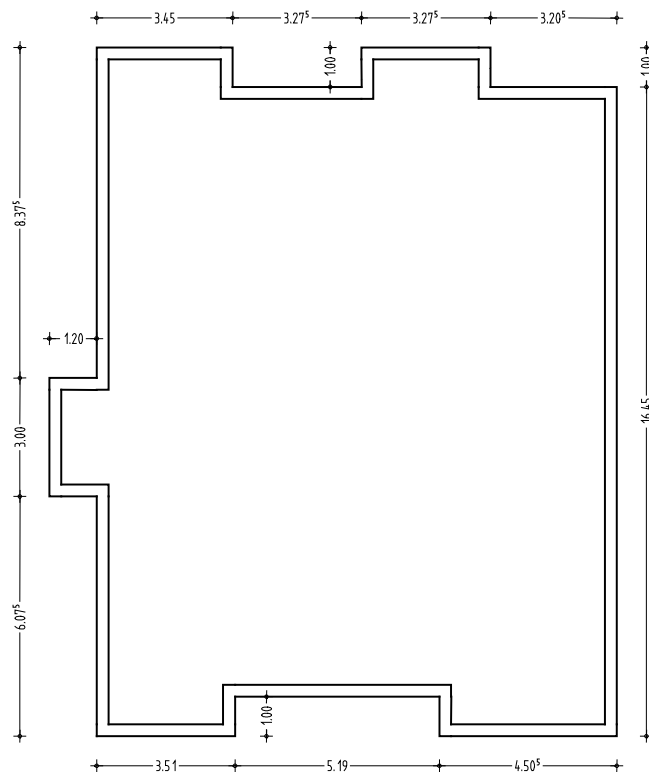
6   Click **left** in the input options to define the offset direction. Use
Δx **X–coordinate** and Δy **Y–coordinate** in the dialog line to enter
the values in the x–direction and y–direction as shown below.
Then press ESC to quit the tool.

Use the TAB key to switch between the data entry boxes.

Δx dX = 3.51	Δy dY = 1.00
Δx dX = 5.19	Δy dY = –1.00
Δx dX = 4.505	Δy dY = 16.45
Δx dX = –3.205	Δy dY = 1.00
Δx dX = –3.275	Δy dY = –1.00
Δx dX = –3.275	Δy dY = 1.00
Δx dX = –3.45	Δy dY = –8.375
Δx dX = –1.20	Δy dY = –3.00
Δx dX = 1.20	Δy dY = –6.075

Tip: If you have entered an incorrect value or made an error, press ESC and ✗ **Delete** (**Actionbar – Edit** task area) the error. You can then resume your work.
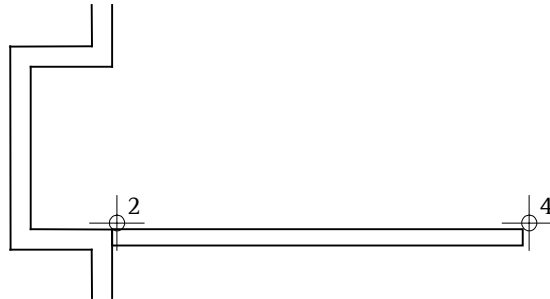
Tip: If you want to create a floor plan of varying wall thickness, you can enter the offset values each time you place a point or you can use the ⧉ **Modify Offset** tool to correct the wall thick-ness after you have en-tered the floor plan.

Draw the interior walls using the ⬜ Rectangle tool. This way, door openings can be taken 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   *Start point:* Click the re-entrant corner of the exterior wall on the left (see below).

3   *Diagonal point:* Enter 6.055 (= length of wall) for the △x X–coordinate and –0.24 (= thickness of wall) for the △y Y–coordinate. Then press ENTER to confirm.

4   To create the vertical wall, click the top right corner of the wall you just created and enter △x X–coordinate = –0.24 for the length and △y 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 start point is the interior edge of the corner (see il–lustration below); length = **3.825**, width = **0.24**.

7   The ☐ **Rectangle** tool is still open. To define the start point of the next rectangle, use the options to snap to points and to enter offset values.

8   Move the crosshairs to the bottom right corner of the wall you have just drawn (see below). The data entry boxes are high–lighted in yellow in the dialog line

9   Enter **1.01** for the △x **X–coordinate** in the dialog line and press ENTER to confirm.

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

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).

Moreover, you can open tools you have already used by clicking the tool in ques–tion in the ↻ **Repeat** dropdown list on the quick access toolbar.

11 You can delete the superimposed lines at the point where the horizontal and vertical walls intersect 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.

Now the window openings in the exterior walls are missing.

To draw window openings

1 Select pen thickness **0.50** mm and click ⟋ **Line** (**Actionbar** – **2D Objects** task area).

2 Move the crosshairs to the top left corner of the exterior wall. The data entry boxes are highlighted in yellow in the dialog line.

3 Enter **0.55** for the △x **X-coordinate** in the dialog line and press ENTER to confirm.

4 Enter **-0.30** for the △y **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 and complete the lintels for the windows using a pen thickness of **0.25** mm.

Using the same approach, you should be able to draw all the other window openings yourself (see figure).

Experiment with the numerous tools provided. 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 Objects** 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 layer **SU_STYL** is selected while you are creating the style area.

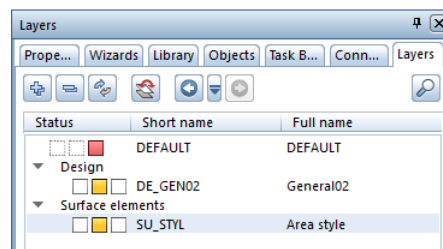To finish, you will check the layers used, move the 2D floor plan in such a way that the 2D and 3D floor plans are congruent, add the opening for the stair and check the entire design using the **Key plan** and **General arrangement drawing** print sets.

To check the layer settings

1   Open the **Layers** palette.

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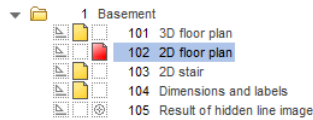

Tip: You can also use the **Objects** palette.

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

The style area is displayed using color **25**, which you selected for frozen layers.

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

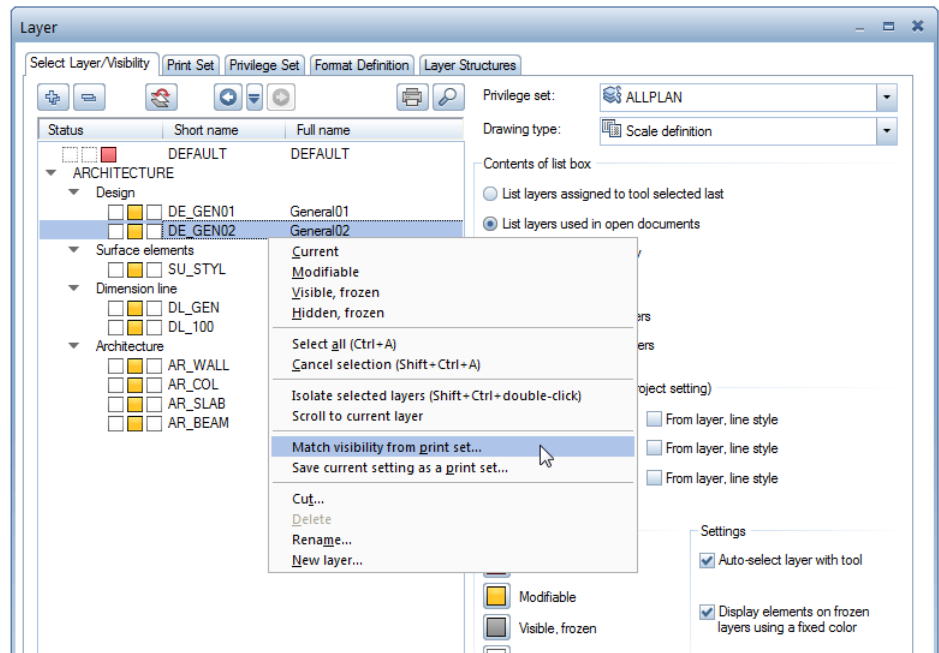## To move the drawing in the workspace

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 using print sets

1   Set drawing file **101** to 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 one floor plan only, 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 2018 Engineering comes in different module packages.

Open the **Create** menu and check whether the **Bonus Tools** family includes the following module(s):
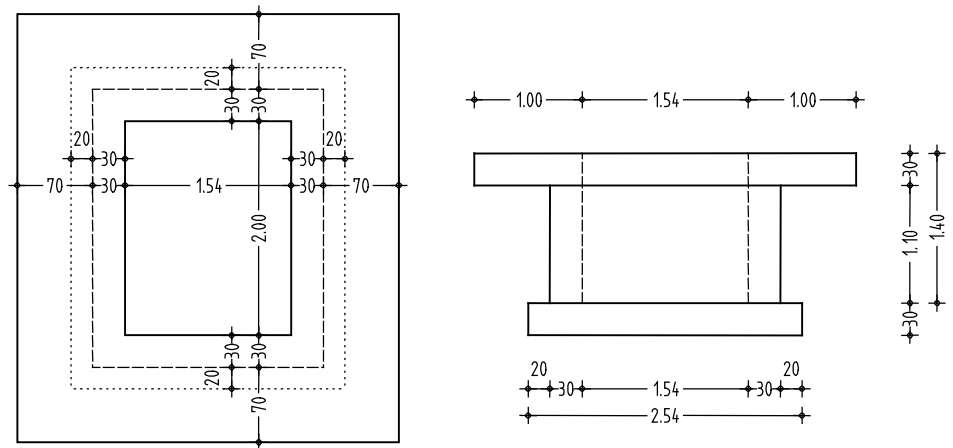
 3D Modeling

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

You will mainly use the tools in the **3D Modeling** module. You can find these tools in the **3D Objects** and **3D Design** task areas of 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 Modeling module
	202	Concrete component
	203	General arrangement − Walls, Openings, Components module
	204	Associative views
	205	Bar reinforcement with 3D model
You can find the fileset in the 'Engineering Tutorial' project (see ''Appendix: creating the training project'').		

Creating the 3D model using the 3D Modeling module

If you do not have the ⬙ **3D Modeling** module, you can also use the tools in the ⬙ **Basic: Walls, Openings, Components** module to design (on page 98) the elevator shaft.

Tools:

⬙ Box

⬙ 3D Surface

⬙ 3D Line

⬙ Extrude Along Path

⬙ Convert Elements

⬙ Change Archit. Properties

⬙ Move

Objective:

Start by making initial settings.

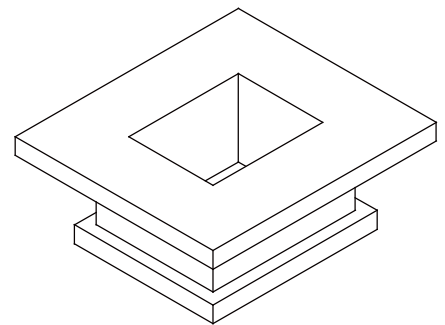## To select a drawing file and to set options

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

2 Click ⊞ **Open on a Project-Specific Basis** (quick access tool-bar), 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 Click ⊟ **3 Viewports** in the ⊟ **Window** dropdown list on the quick access toolbar.
This way, you can always see the design in plan, perspective and elevation.

Start by designing the floor slab using the 📦 **Box** tool.

To draw a cube

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

Note: The tools in the ⬡ **3D Modeling** module use the **AR_GEN** layer by default. Here, the layer setting is irrelevant, as you will create sections with their own layers later using the tools in the ⬧ **Reinforcement Views** module.

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

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

4 Open the ⊟ **Window** dropdown 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 using 3D lines.

- Creating 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 (viewport at top left), point to the top front corner of the box, so that the data entry boxes are highlighted in yellow in the dialog line.

4 Enter ⬛ **X–coordinate** = **–0.20** and
⬛ **Y–coordinate** = **0.50** and press ENTER to confirm.

The start point is attached to the crosshairs.

5   Enter values in the Δz Z-coordinate and Δx X-coordinate data
    entry boxes as shown below.

    Use the TAB key to switch between the data entry 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 Design** task area).

~ **Polyline** is active in the input options.

2   In isometric view, click the top left point of the outline (see be-low).

3   Enter the dimensions of the shaft using the Δx **X-coordinate** and Δy **Y-coordinate** data entry boxes in the dialog line:
Δx dX = –1.54
Δy dY = 2.00
Δx dX = 1.54
Δy dY = –2.00

4   Press ESC twice to quit 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).

2   *Select profile to extrude*: Click to the left of the polygonal surface and enclose it in a selection rectangle without releasing the left mouse button.

3   *Select path* Click the 3D polyline.

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

4   Press 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.

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 press ESC twice to confirm the settings in the input options and to quit the tool.

Your screen should now look like this:

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

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 it is congruent with the 3D floor plan created in exercise 1. 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).

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   Press ESC to quit the tool.

To move the volume model

1 Make drawing file **201** current and open drawing file **101** in refe-
rence mode.

2 **3 Viewports** should still be active. Click **Move** (**Actionbar** –
Edit task area).

3 In plan view (viewport on the right), select the entire volume mo-
del.

4 Open the **Window** dropdown 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 is based on 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 that shows you how to create sections using the tools in the ⟐ Reinforcement Views module and apply rein‐forcement using the tools in the ⟐ Bar Reinforcement module.

Printing layouts is covered in exercise 9.

A note on concrete components

Using the ⊞ **Concrete Construction – 3D Object** tool in the ⬡ **3D Modeling** module, you can create three-dimensional engineering components quickly and easily.

This tool, which requires a separate license, contains predefined components whose dimensions can be customized in component-specific dialog boxes. All entries you make are immediately displayed in a preview on screen.

A number of tools are provided to assist you when you place these components.

Now you will create the floor slab and the walls of the elevator shaft using a concrete component.

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 Click ⊞ **Concrete Construction – 3D Object** (**Actionbar** – **3D Objects** task area).

Note: Only the **All** catalog comes with the program. In addition, you can define your own component-specific catalogs (see the Allplan Help).

3　The **Select Component** dialog box opens. Select **Sleeve foundation type 2**.

4　Select the **Place sleeve on foundation axis** check box.

5　In the section view, click the overall height of the foundation, enter **1.40** and press the TAB key to go to the next data entry box. Enter the dimensions of the component as shown below.

6　Click **OK** to confirm the settings.
A preview of the component is attached to the crosshairs. Click the bottom left corner of the elevator shaft to specify the drop-in point. The bottom center of the foundation plate serves as the component's reference point.

7　Enter half the length of the opening in the dialog line:

- Δx X-coordinate = **0.77**

- Δy Y-coordinate = **1.00**.

8　Point to the bottom left wall corner of the elevator shaft, right-click in the workspace and select ┋ **Component dialog** on the shortcut menu.

The component's dialog box opens so that you can modify the data.

9   Click **Enter elevation points** and enter **–4.49** for the reference elevation of the component. Check the height by moving the crosshairs in the workspace.

Tip: Any changes you make are displayed directly in the workspace.

10   Click **OK** to confirm the dialog box and place the component. Then press ESC to quit the tool.

11   Select the **Change Archit. Properties** tool and assign the **301 Reinforced concrete** style area to the concrete component. Use the procedure previously described.

Creating the 3D model using the Basic: Walls, Openings, Components module

As an alternative to the tools in the ⬙ **3D Modeling** module, you can also use the tools in the ⬙ **Basic: Walls, Openings, Components** module to create the elevator shaft.

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

Tools: **Objective:**

▯ Wall

▱ Slab

▨ Recess, Opening in Slab

▸▮ Move

Start by making initial settings.

To select a drawing file and to set options

1 Go to the **Actionbar** and switch to the ⊞ **Engineering** role – **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** dropdown list on the quick access tool–
    bar).

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

8   Switch off ⌐ **Enter at right angles** and check that the wall's
    offset direction is towards 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 **Y-coordinate**. Press ENTER 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** dropdown list).

2 Click ☑ **Properties**.

3 The **Slab** dialog box opens. Set the priority rating to **300**, select area style **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 bottom left corner of the wall you have just created.

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

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

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 Press ESC to quit the tool.

The slab now needs an opening.

To create a slab opening

1   Click ![icon] **Recess, Opening in Slab** (![icon]**Repeat** dropdown list).

2   Click the upper slab.

3   On the **Recess, Opening in Slab** Context toolbar, click ![icon]**Pro‐perties**.

4   Select the **Opening** type and the ![icon]**Freeform** outline. Then click **OK** to confirm.

5   Switch on ![icon] **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   Press ESC to quit the tool.

8   Open the ![icon] **Window** dropdown list and click ![icon] **3 Viewports** to restore the view in all three viewports.

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

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

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 **3 Viewports** should still be active. Click ⤷ **Move** (**Actionbar** – **Edit** task area).

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

4　Open the ⊞₂ **Window** dropdown list and click ⊞₃ **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 2018 Engineering comes in different module packages.

Open the **Create** menu and check whether the ⊞**Engineering** family includes the following module(s):

① **Key Plan**

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 ① **Key Plan** module. You can find these tools on the **Create** and **Change** menus.

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: **Objective:**

① Horizontal Mark

① Slab Mark

→| Move

🔧 Modify Lines

Tip: Look in the Allplan help
for basic information
on the Key Plan module:

Start by making initial settings.

To select drawing files and to set options

➲ The menu bar is visible.

1 Click 🔲 **Open on a Project-Specific Basis** (quick access tool-
bar), 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.

2 Click 🔲 **1 Viewport** in the 🔲 **Window** dropdown list on the quick
access toolbar.

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

4 Select pen thickness **0.25** mm and line type **1** in the **Properties**
palette – **Format** area.

5 Click 🔧 **Options** (quick access toolbar) and select the **Key plan**
page.

6   Make settings as shown above and click **OK** to confirm.

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

To control which design entities are visible

1   Click ╱ **Line** in the ⟳ **Repeat** dropdown list on the quick access toolbar.

2   Go to the **Properties** palette – **Format** area, open the ≋ **Layer** dropdown list and click **Select...**.

3   The **Single layer selection** dialog box opens. To close the tree structure, click ▦ at top left.

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 press ESC to quit the tool.

6　Open the ⬙ **Layer** dropdown 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** (**Create** menu – **Engineering** family – **Key Plan** module).
Check that the **KP_KEY** layer is selected. If it isn't, select it in the **Properties** palette – **Format** area.

2   On 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.

Horizontal Mark							✕
🖉	A‡	2.500	↑A	1.000	A	90.0	
🖼	A	2.500	𝑓ₙ	Arial			

5   Set 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 press ENTER to confirm.

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

Tip: You can specify the type of the leader 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. Press ESC to finish.

9   *Set a start point, click text or enter additional text:* Set the text parameters and click where the additional text is to appear.

10 Enter **d=30** for the additional text and press ENTER to confirm.

11 Press 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 Press ESC twice to quit the tool.

Two options are available for displaying slab marks: a mark can be displayed horizontally 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** (**Create** menu – **Engineering** family – **Key Plan** module).

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

3 Enter **01** in the dialog line and press ENTER to confirm.

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

5   *Diagonal point, match text or enter mark text*: Click the top right corner. The mark is displayed.

6   Click where the additional text is to appear.

7   Enter the additional text in the dialog line and press ENTER to confirm.

8   Press ESC twice to finish.

Allplan provides several methods for modifying key plans:

 You can use this tool to modify marks.

 You can use this tool to modify text in marks.

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

 You can use this tool to edit additional text.

 You can use this tool to change text settings.

 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 element(s) 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 upwards to the right.

The slab diagonals have also moved.

5   Click 🖼 **Modify Lines** (**Change** menu – **Engineering** family – **Key
    Plan** module).

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

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

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

9   Press ESC to quit the tool.

Note: You can also accomplish this task using **direct object modifi‒ cation**, which is covered in the Basics Tutorial.

Mark reports

You can assign detailed additional text to the marks. In order for the marks to be displayed more clearly, you can select the **Additional text as construction lines** setting in the options. You can then print the marks and the additional text using the **Report** tool (**Create** menu – **Engineering** family – **Key Plan** module).

Complete the key plan as shown below. 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 displayed.

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 🔁 **Reinforcement Views** and 🔲 **Bar Reinforcement** modules to reinforce a 3D elevator shaft and create a reinforcement model in 3D 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** module to reinforce a basic 2D door lintel and create a reinforcement model in 3D 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 ◿ **Mesh Reinforcement** modules to reinforce a basic 2D slab without creating a 3D model from the reinforcement (method 3).

- You will use the tools in the ▨ **BAMTEC** module 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 use the tools in the **Reinforcement Views** and **Bar Reinforcement** modules to reinforce the elevator shaft you created in exercise 2. Based on the reinforcement, a three-dimensional model will be created automatically.

Floor plan of floor slab t=30cm

Floor plan of shaft walls t=30cm

Typical section
horizontal corner reinforcement
placed 4 times

Section A-A

Section B-B

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		109.20	96.97
2	50	12	1.79		89.50	79.48
3	30	10	2.46		73.80	45.53
4	25	10	2.93		73.00	45.04
5	30	12	2.46		73.80	65.53
6	25	12	2.93		73.00	64.82
7	69	12	2.22		153.20	136.02
8	12	12	3.99		47.90	42.52

Exercise 5: creating a 2D door lintel with a 3D model (me‐
thod 2)

You will draw a door lintel using the tools in the **Draft** module, create
an auxiliary 3D solid and reinforce the door lintel using the tools in the
Bar Reinforcement module. Based on the reinforcement, a three‐
dimensional model will be created automatically.

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: creating 2D slab without a 3D model (method 3)

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

Exercise 7: BAMTEC® reinforcement

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

Initial settings

So far you have used the tasks for creating a building model, which are provided by the ⊞ **Engineering** and ◣ **Draft** roles on the **Actionbar**.
To reinforce the components in the following exercises, you just have to select the tab of the required task:

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

Exercise 4: 3D Elevator Shaft with a 3D Model (Method 1)

Requirements:

Allplan 2018 Engineering comes in different module packages.

Open the **Create** menu and check whether the ⊞ **Engineering** and ⬗ **Views, Sections, Details** families include the following modules:

⬗ Reinforcement Views ⬗ Bar Reinforcement

Check whether the following tools are available on the **Actionbar**:

⬗ Bar Shape
⬗ FF Components

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

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

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 Modeling module
	202	Concrete component
	203	General arrangement – Walls, Openings, Components module
	204	Associative views
	205	Bar reinforcement with 3D 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 associative sections, which will form the basis for placing reinforcement later (see Tip).

Tip: You can find more information on the 🔁 **Reinforcement Views** module in the Allplan help:

You will mainly use the tools in the 🔁 **Reinforcement Views** module. You can find these tools in the **Reinforcement Views** task area of the **Actionbar**.

```
▷ 📁 Engineering
▲ 📂 Views, Sections, Details.
  ▷ 📁 Views and Sections module
  ▲ 📂 Reinforcement Views module
    ▷ 📁 Basics
    ▷ 📁 Tools
    ▷ 📁 How To ...
```

Tools:

🔁 Create Section

🔳 Copy

🔁 Modify View and Section Properties

🖼 Properties palette

Objective:

Floor plan of floor slab t=30cm   Floor plan of shaft walls t=30cm

Section A-A   Section B-B

You can use the tools in the 🔁 **Reinforcement Views** module to create clipping paths and views. These form the basis for the reinforcement drawing you will create later.

At first glance, associative views and sections 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 component will automatically update 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 associative views and sections of your general arrangement drawing will adapt automatically. You can also modify 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 require at least two orthogonal views or sections. You can create any number of additional sections by deriving them from the three-dimensional model. The reinforcement is automatically displayed in the appropriate manner and can be labeled immediately.

Sections are different to views in that they have a spatially delimited depth. This delimitation is defined by two clipping lines.

Start by making initial settings.

To select drawing files and to set options

⊃ **Actionbar**: Check whether the ⊞ **Engineering** role and the **Reinforcement** task are selected. In addition, make sure that the **Bar Reinforcement**, **Meshes** and **Reinforcement Views** 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** dropdown list on the quick access toolbar.

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

4   Click ✖ **Options** (quick access toolbar) and select **Reinforcement views**.

5   Check that the **Automatically transfer 3D components to sec‐
tions** option is selected. If it isn't, select it.

6   Open the ⟨icon⟩ **View** dropdown list on the quick access toolbar, click
⟨icon⟩ **Select, Set Layers**, select the **List layers used in open
documents** option, click the **ARCHITECTURE** layer structure and
then the ⟨icon⟩ button at top left to expand the tree structure.

7   Select the layers **AR_GEN** and **AR_WALL**, right‐click the selec‐
tion 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, set the **AR_SLAB** layer to
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 set **SH_SHL** to Modifiable.

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

To create a plan view

1   Click Create Section (**Actionbar** – **Reinforcement Views**
task area).
The layer set in the **Properties** palette – **Format** area is used for
the label. You cannot select a different layer. The layer for the
section is taken from the 3D components. You can also specify
the layer when defining settings for hidden line images and sec‐
tions.

2 *Select 3D elements of which you want to create a section:* Click to the left of the elevator shaft's upper floor slab and enclose it in a selection rectangle without releasing the left mouse button (see below). This selects the elements fully bounded and intersected by the selection rectangle (⬚ **Select elements based on direction** is selected in the **Selection** task area).

Note:
You can also activate ⬚ **Select elements fully bounded and intersected by selection rectangle** in the **Selection** task area and define the selection rectangle independently of the direction.

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 set to **Folded**, however, Allplan simply folds the section.

3 On the **Create Section** Context toolbar, you can switch between **Observer** and **Folded** by clicking the buttons. Select **Observer**.

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

5   *From point*: Click to the left of and below the bottom left corner of the upper floor slab (see below).

6   *To point*: Click a point above the top right corner of the upper floor slab (see below). Then press ESC to finish.

The **View and Section Properties** Context toolbar opens; the section is attached to the crosshairs.

7   The **Status** box is set to **Hidden**. If it isn't, click the box to switch to Hidden.

8   Click the **Def...** button on the **View and Section Properties** Context toolbar to open the **Settings for hidden line images** dialog box. Check that the **Display visible edges** option is selected. In addition, select all the settings for **Display hidden edges**, specify the following format properties and click **OK** to confirm the dialog box.

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

Hidden edges:
Do not change the pen, line and color; layer **SH_SHL**

9　On the **View and Section Properties** Context toolbar, click **Section settings for associative view** beside.

10　Go to the **Representation of clipping path** area and select the **Place clipping line** option. Go to the **Section display** area and select the **Apply thick line around intersected components** option and then **Outer edges**. Select the **SH_SHL** layer for all linear elements. Finally, go to the **Section object** area, deactivate the **Display section object (as construction lines)** option and click **OK** to confirm the dialog box.

Leave the other settings as they are.

11 On the **View and Section Properties** Context toolbar, click
    Dimension Line to switch off dimensioning.

Tip: Track tracing helps you place points in exact align-ment with existing points. You can press the **F11** key or click **Track line** in the dialog line to quickly switch track tracing on and off.

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

13 Press ESC, as you do not want to define additional sections.

14 To define the label for the plan view, enter
    Floor slab, t = 30 cm
    in the dialog line and press ENTER to confirm.

15 Set the label's parameters (text height 5mm, text width 4mm) and place the label for the view.

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

To create sections

➲ The 🔁 **Create Section** tool is still active. If it isn't, activate it now.

1 *Select 3D elements of which you want to create a section:* Select the entire plan view you created beforehand by enclosing it in a selection rectangle or by clicking the view border.

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

3 Define the clipping area by clicking the bottom left corner and the top right corner in the area of the door opening (see below). Then press ESC to finish.

4 On the **View and Section Properties** Context toolbar, click ☑ **Section settings for associative view** beside 🔲 and make the following settings in the **Section object** area of the **Section** dialog box:

• Select the **Display section object (as construction lines)** check box.

• Clear the **Height of section object based on intersected elements** check box and enter
–2.29 for the top level and –4.49 for the bottom level.

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

5 *To point or enter a rotation angle:* Place the section so that it is below and aligned with the floor plan and press ESC.

6 Enter the label for the section in the dialog line, press ENTER and place the label.

7 The **Create Section** tool is still active. Select the plan view again and create the longitudinal section (viewed from the right).

8 Place the section to the right of the transverse section.

9 Press ESC to quit the tool.

Note: You can configure the program to automatically dimension associative views and sections. All you need to do is select the type of dimension line you want to use and make appropriate settings on the **View and Section Properties** Context toolbar.

Finally, you will copy the plan view and modify the height settings in order 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.

Tip: If no tool is active, you can also open the modification tool by double-clicking the section with the left mouse button.

3 Click **Modify View and Section Properties** (**Actionbar** – **Reinforcement Views** task area) and select the entire plan view on the left.

4   On the **View and Section Properties** Context toolbar, click
     ☑ **Section settings for associative view** and make the follo-
     wing settings in the **Section object** area of the **Section** dialog
     box:

   - Clear the **Height of section object based on intersected
     elements** check box.
     Enter **–4.00**. Leave the bottom level as it is: **–4.49**.

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

   Section object
   ☐ Display section object (as construction lines)
   ☐ Height of section object based on intersected elements
   Top level   -4.0000   Bottom level   -4.4900
                                          OK   Cancel

5   Click **OK** to confirm the **View and Section Properties** Context
     toolbar.

6   Use the same approach to modify the height settings of the plan
     view on the right. Enter the following values:

   - Top level **–2.75**

   - Bottom level **–3.15**

   Section object
   ☐ Display section object (as construction lines)
   ☐ Height of section object based on intersected elements
   Top level   -2.7500   Bottom level   -3.1500
                                          OK   Cancel

7   Press ESC to quit the tool, switch to the **Properties** palette, click the label of the plan view on the right and change it as shown be–low.

Floor plan of floor slab t=30cm

Floor plan of shaft walls t=30cm

Section A-A

Section B-B

Task 2: edge reinforcement of floor slab

Next, you will place bar reinforcement and create a three-dimensional model as you go along (method 1; see Tip).

Tip: Read the chapter ''Rein-forcement methods – 3D reinforcement model'' in the Allplan help:

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

```
▲ 🗁 Engineering
  ▷ 📁 General Information
  ▷ 📁 Floor plan and shell drawing
  ▷ 📁 Key Plan module
  ▲ 🗁 Reinforcement drawing
    ▲ 🗁 Reinforcement methods
      ▷ 📁 Basic approach
```

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 specifying individual points.

- For the transverse direction, you will use a predefined bending shape that expands to adapt to the existing outline.

Tools:

Objective:

⬚ Options

⬚ Bar Shape: Freeform

⬚ Place Bar Shape: Along placing line

⬚ Copy and Mirror

⬚ Label

⬚ Dimension Line, Label

⬚ Bar Shape: Open stirrup

⬚ Modify Placement Dis-play Mode

Start by making initial settings.

To select drawing files and to set options

1 Click ▦ **Open on a Project-Specific Basis** (quick access tool-bar) or double-click the left mouse button in the workspace.
Make drawing file **205** current.
Drawing files **101**, **201** (or **203**) and **204** are now 🗋 **open in edit mode**.

Note: If the **Automatically transfer 3D components to sections** option is selected and you work in a workgroup environment, you need to open drawing file **204** in 🗋 **reference mode** to ensure a smooth workflow.

2 **Close** the dialog box and check the current reference scale (**1:50**) and unit of length (**m**) on the status bar.

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

4 Use the 🖼 **Modify View and Section Properties** tool to hide the section object in each of the two sections.

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

The hatching in the sections changes to fills.

6 Click ▦ **Open on a Project-Specific Basis** again and close drawing files **101** and **201** (or **203**).

Before you start, you must specify whether Allplan is to create a 3D reinforcement model (see Tip on page 134).

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 using the tools in the 🏛 **Reinforcement Views** module.

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   Click ✖ **Options** (quick access toolbar), 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 and the **Freeform** bending shape is active by default. You can use it to create any bending shape. To use a different bending shape, click the button above the graphics area and select one of the predefined shapes. Click ⬜ to open a dialog box that displays all the bending shapes graphically in groups.

3   In the parameter area of the palette, set the diameter to **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 below. The next step is to define the segment length.

A 1st point

B 2nd point

C 3rd point

D 4th point

5   Press ESC to finish entering the open stirrup.

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

Note: You can still change almost all the parameters. The preview updates automatically to reflect any changes you make.

7   Press ESC to finish entering the bending shape. As the **Label** option was active 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 short-cut 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 press ESC and place the mark later 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 it isn't, right-click the open stirrup you want to place and, on the shortcut menu, choose ⬛ **Place Bar Shape**.

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

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

Symbols indicate the placing region.

Using the input options, you can define the position of the placed bar, specify how the placement looks and select automatic la‐beling.

Tip: Refer to the chapter "Reinforcement methods – placing mode: align / move / rotate" in the Allplan help:

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

4   In the parameter area of the **Place Bar Shape** palette, 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. Alternatively, press ESC twice to quit 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 work-space.

10 Place the label and press ESC to quit the tool.

Note: When you click ⚹ **Zoom All**, you can see that the program has not only created the reinforcement in the associative views but also generated a reinforcement model for 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.

❙❙ Lets you 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. Allplan presents the different directions in which the bar can be folded. Select the 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:

Abc **Label**

Abc **Dimension Line, Label**

Reinforcement placed is displayed in all the views and sections. During creation, however, reinforcement can only be labeled in the placing view. You need to 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 activate 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).

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.

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

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

4   Press ESC to quit the tool.

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

6   Place the mark where you require and press ESC to quit the tool.

7   Due to the three-dimensional association of the sections, the mirrored placement is also displayed 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 press ESC to quit 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   In the parameter area of the palette, set the diameter to **12 mm** and clear the **Same concrete covers** check box, as 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.

⊿	**General**	
	Mark number	2
	Concrete strength grade	C25/30
	Cross-section catalog	Betonstabstahl (B)
	Diameter	12 mm
	Bar length	?
	Per meter	☐
⊿	**Geometry**	
	Same concrete cover	☐
	Concrete cover 1	0.055
	Concrete cover 2	0.04
	Concrete cover 3	0.055
	Segment length 1	0.8
	Segment length 3	0.8
	Hook	☐
	Bending pin factor	4

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

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

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

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

8   Click ⬚ **Dimension Line, Label** in the ⟳ **Repeat** dropdown 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** dropdown 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 press ENTER to confirm. Press ESC.

12 Right-click one of the placements in plan, select ⬚ **Modify Placement Display Mode** on the shortcut menu and activate
| **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 follo–wing part of the exercise involves creating area reinforcement.

Tools: **Objective:**

Enter
Area Reinforcement

Span Reinforcement

New Mark Number

Modify Mark

Modify Placement Dis–
play Mode

You will start by creating two–way bar reinforcement.

To create span reinforcement for the bottom layer

Tip: You can also select the **Create** menu – **Engineering** – **Bar Reinforcement** – Enter Area Reinforce–ment and click Span Reinforcement on the context toolbar.

1   Click Enter Area Reinforcement (**Actionbar** – **Bar Rein–forcement** task area) and check the **Properties** palette – **For–mat** 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 bottom 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 towards the inside.

5   Click the top right corner of the floor plan.

6   Press ESC to finish. This selects the area.

7   Define the layer depth. Click in the box beside ⬇ **Layer Depth**.

8 *Layer in reference view:* Click the bottom left point in section B–B.

The dashed line indicates the current layer depth of the rein-forcement. 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 Set placing parameters:
Diameter 10 mm
Spacing 0.10
Angle 0.00
Equal offsets to edge
Select **PP** (= place in polygon) at bottom right.
As the bars and the edge reinforcement are congruent in the floor plan, set the placement display mode to **Show selected bars** 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 press 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 provided 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 should now look like this:

Now that you have completed the bottom layer, you should be able to create the bars for the top layer yourself. The following section should serve as a guideline.

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 top 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 set the **placing angle** to **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 need to associate the **layer depth** with the top level and click **Concrete Cover (Top)** after you have copied the placing polygon. Here, too, set the diameter to **12 mm**.

The floor slab should now look 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 using the Modify Mark tool, select the bars to be displayed using the Modify Placement Display Mode tool and place labels.

Task 4: starter bars

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

Tools: **Objective:**

🔧 Bar Shape:
Open stirrup
Stirrup, closed

🔧 Modify Placement Display Mode

🔧 Place Bar Shape:
Along placing line

🔧 Dimension Line, Label

To enter and place starter bars

1   Using the right mouse button, double-click the open stirrups of the floor slab wherever you like.

The 🔧 **Bar Shape** tool starts and the **Open stirrup** bending shape is active. The diameter is set to **12 mm**.

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

3   In 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 left–click.

5   Press ESC to label the bar.

6   Place the bar label in the section.

     Place automatically is still set in the input options. As you can see, the open stirrups are placed across the entire shaft wall on the left 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 ![icon] **Dimension Line, Label** in the ![icon] **Repeat** dropdown list, click a bar in the placement you just created in plan, deactivate the **Bar markers** option and place the dimension line.

8   Deactivate the **Custom text** option and place the label.

9   Press ESC to quit the tool, right–click the placement in plan. On the shortcut menu, choose ![icon] **Modify Placement Display Mode**.

10 Choose ![icon] **Show selected bars**, click the three bars just below the middle (see following illustration) and press ESC twice.

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 wall on the right 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 pla–cing region for mark 7 using the floor plan of the shaft walls. The placed bars, however, will only be displayed 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 displayed in the dialog line: mark 7.

2   Deactivate 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.

Read the chapter "Reinforcement methods – placing mode: align / move / rotate" in the Allplan help:

4   In the parameter area of the palette, set the **Angle of rotation** to **Perpendicular**. 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 press ESC.

6   Right–click in the workspace and choose ⎙ **Dimension Line, Label**. Place the dimension line and the label in the floor plan and press ESC to quit the tool.

7   Use the ⬜ **Copy and Mirror** tool to copy the reinforcement and its label to the transverse wall at the top. (Alternative: Do not change the **Angle of rotation** and continue to place the bars in the transverse wall at the top.)

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

The **Align** option is not active; the angle of rotation is set to **Perpendicular**.

9   *Placing line from point:* Click the bottom 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 displayed, regardless of the selected display mode.

11   Press 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 top right outer corner of the 30-cm shaft wall.

13 Select ▦ **Dimension Line, Label** in the 🔁 **Repeat** dropdown 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 press ESC to quit 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 press ESC to quit 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 Click 🔊 **Bar Shape** in the 🔁 **Repeat** dropdown list.
   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 In the parameter area of the palette, set the diameter to **12 mm** and enter **0.04** for the concrete cover.

4 Move the crosshairs in section A-A over the left outer edge of the wall on the right until the open stirrup expands correctly; then left-click.

5   Press ESC and place the label for the bar in the section.

6   Here, automatic depth placement is not useful, as you will only place the stirrups around the door opening. Therefore, deactivate the ⬆️⬇️ **Place automatically** option in the input options. The **Align** option is active.

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** dropdown list and create dimension lines and labels for the placements in the floor plans.

9   Click 🔧 **Modify Placement Display Mode** in the 🔁 **Repeat** dropdown list, select ❘ **Show middle bar only** and click the placement in the floor plan of the floor slab.

10 Press ESC to quit the tool.

This completes the starter bars for the walls.

Floor plan of floor slab t=30cm

Task 5: bar reinforcement for the walls

The following part of the exercise involves applying reinforcement to the walls up to 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 View and Section Properties

Extrude Bars Along Path

Reinforcement Tools

Objective:

Section A-A

Tip: If you want to generate complex bending shapes (for example, bent–up bars for silos, towers or barrel roofs), you can use the **Convert, Match Elements** tool to convert a bending shape you have drawn using tools in the **Draft** module to a bar. 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, a cranked bar needs to be created for the exterior wall reinforcement. You will create this bar manually using the **Freeform** bending shape provided by 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 top left wall in section B–B. Start at the top.

Tip: You can also define the segment type in the graphics area.

5   In the parameter area of the palette, set 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 need to approach the point from the outside.

7   Press 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   Press ESC and place the label for the bar in the section.

A 1st point

B 2nd point

C 3rd point

D 4th point

9   In this example, **automatic depth placement** would not be crea-
      ted where you require 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 bottom left outside corner of
        the 30-cm shaft wall.

   •   *Placing line to point*: Click the bottom 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 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 **Perpendicu-
lar+180°** for the angle of
rotation.

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.
      Switch off the **Align** option and set the angle of rotation to **Per-
      pendicular**.

14　To ensure that the wall reinforcement, which protrudes above
the clipping area defined, is displayed in its entirety, you will now
modify the upper section border in the two sections. Double-click
the view border of a section with the left mouse button and click
Yes to confirm the message. Double-click the view border of a
section with the left mouse button again to open the **Modify
View and Section Properties** tool. Click **Section settings
for associative view** and change the **Top level** to **-1.7900**. Then
click **OK** to confirm both the dialog box and the context toolbar.
Use the same approach to change the top level of the second
section.

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   Close drawing file **101** and open drawing file **201** (or **203**) in
    📄 **reference mode**. Open the 🔁 **Repeat** dropdown 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   Deactivate the **Expand to adapt to edges** option in the input
    options.

3   Set the diameter to **12 mm** in the parameter area of the palette.
    Deactivate the **Same concrete covers** option. Then change the
    value for **Concrete cover 1** to **0.04** and the values for **Concrete
    cover at start** and **Concrete cover at end** to **0.00**.

4   To define the start 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 Δx **X–coordinate** in the dialog line and **2.40** for
    the Δy **Y–coordinate**. Press ENTER to confirm.

6   This creates the bar with the mark number **10**. Press ESC and
    place the label for the bar in the section.

7   Press ESC, as you do not want to place the bar now.

8   The 🔧 **Bar Shape** tool is still open. Select the **L–shaped bar** ben-
    ding shape.

9   Here, too, click the corner of the left inside edge of the shaft wall
    in section B–B to define the start 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 top left end point of the floor slab.

11 Set the diameter to **12 mm** in the parameter area of the palette.
    Change the value for **Concrete cover** to **0.04** and enter **1.00** for
    segment lengths 1 and 2.

12 Press ESC and place the label for the bar in the section. Then press ESC twice to stop placing the bar and to quit the tool.

13 Click ⬛ **Front Right, Southeast Isometric View** on the viewport toolbar, open the **Layers** palette and set the BR_GEN layer to ⬜ **Hidden, frozen**.

14 Go to the **Actionbar**, select the ▲ **Draft** role and the **Modeling** task and click ⬙ **3D Line** (**3D Design** task area). Create a 3D polyline along the inside edges of the shaft wall at the height of the upper floor slab. Finally, press ESC to quit the tool.

15 Set the layer BR_GEN to ⬜ **Modifiable** again 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** using the Σ**Brackets** (**Activate** - **Selection**
task area).

18 *Element for path:* Click the 3D polyline you just created.

Allplan displays the placement in the reinforcement model and in
all associative sections.

19 Go to the **Extrude Bars Along Path** palette and set the concrete
cover to **0.00** and the bar spacing to **0.015**.
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 Press 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 using the 🔲 **Select elements based on direction** setting or select the 🔲 **Fully bounded selection** option on the **Actionbar** – **Selection** 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 press ESC.

24 Use the 🔲 **Dimension Line, Label** tool on the shortcut menu to label marks **10** and **11** as shown below.

The floor plan of the floor slab also contains marks 9 and 10. You will now hide the wall reinforcement in this area.

To hide reinforcement placed

1   Click Reinforcement Tools (**Create** menu – **Engineering** family – **Bar Reinforcement** module).

Tip: Click [All-1] to show hidden reinforcement again.

2   Click **Hide V** (hides selected reinforcement in one view).

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 transverse reinforcement using horizontal bars

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 shaft wall on the right in the floor plan of the shaft walls. The bar is displayed in the preview. Press ESC and place the label for the bar.

4   Place the bar in section A–A. Check the input options: 🔼 **Place automatically** is not selected; **Align** is selected. Select ||| **Show all bars** in the input options.

5   Click the upper and lower wall corners on the right. In the parameter area of the palette, enter **0.055** for **Concrete cover at start** and **0.02** for **Concrete cover at end**.

6   Press ESC twice to quit 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   Set the parameters so that the number of pieces, diameter and spacing are displayed 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 Press ESC twice to quit 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 spa‐cing between the mark border and label to be too large, open the ✕ **Options – Reinforcement – Labels** page and set the blank after the mark to ¨0¨ (in the pre‐view 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 **Ex‐pand 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 start 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 <img> **Label** on the shortcut menu.

2   Select the **Diameter** and **Spacing** parameters and place the label. The text leaders are set to **Automatic**. 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 deactivate this option.

3   Click mark **5**, check the settings, place the label and press ESC.

4   Right-click mark **4** and select <img> **Dimension Line, Label** on the shortcut menu.

The **Fan** dimension line type is selected from the label of the horizontal reinforcement. In addition, the text leaders are set to **Manual**.

5   Deactivate the **Number of pieces** parameter and place the label.

6   Click all the bars to which leaders are to be drawn.

7   Press ESC to finish.

8   Click mark **6**, check the settings and place the label.

9   Click all the bars to which leaders are to be drawn and press ESC to finish.

10 Click ⬚ **Label** in the ↻ **Repeat** dropdown list and label marks **9**, **10** and **11**. Switch off the **Diameter** and **Spacing** parameters. The text leaders are set to **Automatic**.

Section A-A

11 Now create the labels for section B–B as shown below:

Section B-B

12 Complete the labels in the floor plan of the shaft walls as shown below:

Floor plan of shaft walls t=30cm

Now you have reinforced the elevator shaft except the horizontal corner reinforcement, which you will display using FF components. Finally, you will define the clipping area of the shaft walls.

To modify the clipping area

1 Double-click the view border of a section with the left mouse button and click **Yes** to confirm the message.

2 Right-click the view border in the floor plan of the shaft walls and, on the shortcut menu, choose **Modify View and Section Properties**.

3 Click **Section settings for associative view** and set the **Top level** of the section object to
−3.1000 and the **Bottom level** to −3.4000.

4 Click **OK** to confirm both the dialog box and the context toolbar.

Task 6: standard section

In this exercise, you will learn how to place bars in views.

Tools: **Objective:**

FF Components

Modify Number Off Fac-
tors

Typical section

horizontal corner reinforcement
placed 4 times

Using the 'Place in View' option, you can assign placement quantities
to bars without having to place the bars in a specific region. The rein-
forcement is only displayed in one view.

This placing mode is useful for displaying standard details. If you do
not enter the dimensions in the placement direction, you need to
determine the number of bars manually.

The location of the bars in space is not defined when you place bars
in this mode. The placement only influences the quantities (number
off figures).

To create a standard section using FF components and to place it in view

1　Click **Open on a Project-Specific Basis** (quick access tool-
bar) and make drawing file **204** current. Drawing files **101**, **201** (or
203) and **205** are now open in edit mode.

2　Use the tools in the **Draft** and **Text** modules (**Quick Access** task
area or **Create** menu) 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).

Assign the **BR_GEN** layer to the elements. To do this, open the ⬛**View** dropdown list on the quick access toolbar, click ◈**Select, Set Layers** and double–click the **BR_GEN** layer .

3   Make drawing file **205** current. Drawing files **101**, **201** (or **203**) and **204** are now open in edit mode.

4   Go to the **Actionbar**, switch back to the ⊞**Engineering** role – **Reinforcement** task and click 🖱 **FF Components** (**Bar Reinforcement** task area).
Check the **Properties** palette – **Format** area to see whether the **BR_GEN** layer is selected. If it isn't, select it now.

5   Select the **Wall corners** catalog in the **Select Component** dialog box and double-click **Wall corner**.

6   Enter the global values in the first line of the **Wall corner** dialog box: **12 mm** for ⌀ Diameter, **0.10** for Bar spacing, **0.80** for Segment length and **0.055** for Concrete cover.

7   Change the diameter of the corner reinforcement, which is only used for assembly, to **8 mm**. Set the concrete cover at the bottom to **0.020**. Enter **0.050** for the anchorage length of assembly reinforcement and **0.100** for the concrete cover at the bottom so that the assembly bars do not project beyond the floor slab.

8   Click **OK** to confirm the dialog box. Point to the left edge of the wall corner until the reinforcement expands correctly, then left-click.

9   The **Place in View** dialog box opens. Enter **1.400** for **Dimension in placing direction**.

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

Using the settings you defined, Allplan calculates the number of stirrups and the length of longitudinal bars.

11 The dialog line prompts you to specify the position of the label for the first stirrup. Select **Number of pieces**, **Diameter** and **Spacing** and place the label.

Allplan creates the second stirrup.

12 Place the label and press ESC to quit the tool.

13 As the wall corner exists four times, click ▦**Modify Number Off Factors** (**Change** menu – **Engineering** family – **Bar Reinforcement** module).

14 *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.

15 Open the ▦**Repeat** dropdown 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 set the text leaders to **Automatic**.

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: **Objective:**

⊞ Full Schema

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 schema will automatically update 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 and it can be displayed so that it is aligned with the placement.

To create a full schema

1 Click ![icon] **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 while working, the bar's mark number will remain 'unassigned'.
You can use ![icon] **Rearrange Marks** to close this "gap".

3 Enter the settings as shown above.

4 The schema and its label are attached to the crosshairs.
You can use the ![icon] **Rotate** and ![icon] **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 switch off ![icon] **Segment dimensioning**. Set 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 ![icon] **Options** – **Reinforcement** – **Labels** page and insert a blank 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: **Objective:**

Reinforcement Reports

Reinforcing Bar Legend

Reinforcement schedules are created as you work and are thus al‐ways up‐to‐date. You can also print them whenever you need.

Start by printing the bar reinforcement schedule, which Allplan 2018 has created automatically in the background.

To output a bar reinforcement schedule

1   Click Reinforcement Reports (**Actionbar** – **Bar Reinforce‐ment** task area).

2   Allplan opens the **Reports** dialog box, where you can select predefined reports.
    Click the **Default** folder on the left 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.

Tip: Click the dimensioned bending shapes in **Report Viewer** – **Print Preview** to modify them in the workspace.

3   Click **All** in the input options.

Report Viewer displays the report, which automatically includes various attributes such as the project.

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 2018, you can place bending schedules in layouts. To print a bending schedule, you can use the **Reinforcement schedule – bending shapes** report provided by 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).

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 bending schedule updates automatically when you add or delete marks later.

4   Place the bending schedule in the workspace.
     A section of the bending schedule should now look 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		109.20	96.97
2	50	12	1.79		89.50	79.48
3	30	10	2.45		73.50	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)

<div style="border">

Requirements:

Allplan 2018 Engineering comes in different module packages.

Open the **Create** menu and check whether the ⊞ **Engineering** and 🏠 **Views, Sections, Details** families include the following modules:

🔁 **Reinforcement Views** 📇 **Bar Reinforcement**

Check whether the following tools are available on the **Actionbar**:

⚖ **Bar Shape**

</div>

In exercise 4, you reinforced a 3D general arrangement drawing and created a 3D model (method 1, see Tip).

In the following exercise, you will create a precast element of a reinforced door lintel as a symbol. You will apply reinforcement to a 2D general arrangement drawing and create a 3D model (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.

Tip: Read the chapter "Reinforcement methods – 3D reinforcement model" in the Allplan help:

```
▲ 📂 Engineering
   ▶ 📁 General Information
   ▶ 📁 Floor plan and shell drawing
   ▶ 📁 Key Plan module
   ▲ 📂 Reinforcement drawing
      ▲ 📂 Reinforcement methods
         ▶ 📁 Basic approach
```

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 ⬔ **Draft** module to create an elevation view and a section view as the general arrangement drawing for a precast door lintel. So that you can create the reinforcement with a 3D model, you require 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. You will then create an associative view from this auxiliary 3D solid and place this view so that the 2D section and this view are congruent.

After this, you will apply reinforcement. You will mainly use the tools in the ⬚ **Bar Reinforcement** module. You can find these tools in the **Bar Reinforcement** task area of 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

▥ Library

Objective:

Draw the outline without switching to a different task on the **Ac-tionbar**.

To draw the outline in 2D

1   Click ⊞ **Open on a Project-Specific Basis** (quick access tool-bar), open the drawing file tree for fileset **3** and double-click dra-wing file **301**.

2   Click the current **Scale** on the status bar and select **1:50**. Make sure the current unit of length is set to **m**.

3   Use the tools in the **Draft** module to create the design as shown below. Select pen thickness **0.35** mm for the elevation and **0.50** mm for the section. Use the ☐ **Rectangle** and ╱ **Line** tools (⟲ **Repeat** dropdown list on the quick access toolbar or **Create** menu – **Draft** module).

Assign the layer **DE_GEN02** to the elements. To do this, go to the **Properties** palette – **Format** area, open the ⬚ **Layer** dropdown list and click the **DE_GEN02** layer.

Door lintel 1:50

You do not need to draw the coordinate system and the 3D view (shown as dashed lines), which serve as an aid to orientation.

4   Double-click with the middle mouse button in the workspace to restore the full view.

Next, you will create a box as an auxiliary 3D solid and derive an associative view from this 3D solid.

To create an auxiliary solid for the 2D drawing

1 Make drawing file **302** current and set drawing file **301** to edit mode.

2 Use 🔲 **Box** (🔁**Repeat** dropdown list on the quick access tool-bar or **Create** menu – **Bonus Tools** family – **3D Modeling** module) 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 given height, move the box by the corresponding value in the z-direction.

4 Use 🏠 **Create View** (**Actionbar** – **Reinforcement Views** task area) to create a view of the box. Check that reference mode is set to **Observer**. Define the viewing direction by clicking to the left.

5 Check the settings and place the view so that this view and the 2D section are congruent.

6 Press ESC twice to skip labeling and to quit 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 need to select an existing view. However, there is no view, because you are about to create the first reinforcement element. So you will use the 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   Click ✖ **Options** (quick access toolbar), 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   In the parameter area of the palette, set the diameter to **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 active in the input options. In the section, point to the component line on the left within the outline until the bending shape expands, then click in the workspace.

6   Press ESC to start the ⌨**Label** tool and place the bar label in the section. Set the parameters so that only the mark number is displayed.

The ⚡**Place Bar Shape** tool opens automatically.

7   *Placing line from point:* Click the bottom left corner of the box.

8   *Placing line to point:* Click the bottom right corner of the box.

Tip: You can change the placement display mode immediately using the input options or later 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 Press ESC twice to quit the tool and to start the 🏷 **Dimension Line, Label** tool.

11 Press ESC twice to skip labeling the model and to quit 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 ![icon] 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   Set the diameter to **14 mm** in the parameter area of the palette. Deactivate the **Same concrete covers** option. Then change the value for **Concrete cover 1** to **0.04** and the values for **Concrete cover at start** and **Concrete cover at end** to **0.03**.

4   Deactivate 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   In 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. Set the parameters so that the number of pieces and diameter are displayed and change the setting for the text leader to **Automatic**.

Note: If you have not worked through exercise 4, you need to set the aspect to **1.00** by selecting the **Dimension line options** line and clicking ⬚.

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 specified.

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** dropdown list on the quick access toolbar.

The bending shape is set to **Straight bar**.

2   Select ▸ **Straight bar as point** in the input options and set the diameter to **12 mm** in the parameter area of the palette.

3   Press CTRL+ALT+M to open the ▦ **Measure** tool; click **Length** in the **Measure** dialog box.

4   Click the top left and 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. Taking the concrete cover of 3.0 cm at the start and end into account, change this value to **1.93**. **Place bar in fillet** is active in the input options. Do not change this setting.

8   The cut bar is attached to the crosshairs. Point to the top-left
     rounded corner of the stirrup displayed in the section and left-
     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   Set the ⊠ **Anchor point** to top right 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 top right corner of the box.

14   Press ESC, as you do not want to create an additional placement.

15 Press ESC again to skip labeling.

16 Click ⊿⊿ **Copy and Mirror** (open the shortcut menu in the work–
    space) and mirror the top longitudinal bar in the section.

17 Press ESC to quit the tool.

You can now create the missing labels. The top longitudinal bars are
two separate placements. To create a common label, you need to
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 the section in a selection
   rectangle you open from left to right using the left mouse button.
   ↖ **Select elements based on direction** is selected in the **Selec–
   tion** task area.

3 The dimension line type is set to **Fan**. 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 Press ESC to quit 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   Select the box and click ✖ **Delete** in the **Edit** task area.

2   Right-click the border of the section and select 🏠 **Create View** on the shortcut menu.

3   Click **OK** to confirm the note and select the reinforcement model.

4   Define the viewing direction by clicking below the circle displayed and set the **Anchor point for preview** to ▣ **Centered**.

5   *To point or angle of rotation:* Right-click the bottom left corner in elevation view and select ✏ **Midpoint** on the shortcut menu.

6   *End point of line:* Click the top right corner of the view.

7   Press ESC twice to skip labeling and to quit the tool.

8   Finally, you can use the 📐 **Reinforcement Tools** (**Create** menu – **Engineering** family – **Bar Reinforcement** module) 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 set the parameters for the dimension lines and labels as you need. Press ESC to skip a placement.

9   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 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 press EN-TER 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 element(s) 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*
Click the bottom left corner of the beam in elevation view to define the symbol's base point. This is the point at which the symbol will be attached to the crosshairs when it is retrieved.

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 press EN-TER to confirm.

The new **Door lintel** symbol has been saved to the **Standard details** folder.

Task 2: modifying the reinforced door lintel

Now you will retrieve the door lintel and modify it.

Tools: **Objective:**

Library

Stretch Entities

Direct object modificati–
on

Dimension Line, Label

Properties palette

This task also requires fileset **3**:

Fileset	Drawing file number	Drawing file name
3	301	2D general arrangement
	302	Reinforcement drawing with 3D model
	303	Modified door lintel
You can find the fileset in the 'Engineering Tutorial' project (see "Appen–dix: creating the training project").		

First, you will retrieve the symbol and place it in a separate drawing file.

To retrieve a symbol

1 Click ▦ **Open on a Project-Specific Basis** (quick access tool-bar) and double-click drawing file **303**.

2 Click the current **Scale** on the status bar and select **1:50**. Make sure the current unit of length is set to **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 with the left mouse button.

The symbol's base point is attached to the crosshairs.

5 To place the symbol, click in the workspace.

6 Double-click with 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 it again. If you only save the reinforcement itself 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 Using the left mouse button, open a selection rectangle around the stirrup leg on the right and the top and bottom corner bars in the right-hand part of the section (see below).

3 Enter **dX = 0.06**, **dY = 0.00** and **dZ = 0.00** to change the width to 30 cm. The outline and reinforcement adapt automatically.

4 Use the same approach to modify the support area on the left in the elevation (**dX = –1.00**, **dY = 0.00** and **dZ = 0.00**).

The door lintel should now look like this:

Next, you will alter the spacing in the middle of the beam using direct object modification. Finally, you will change the diameter of the bottom longitudinal reinforcement using the properties palette.

To modify reinforcement

➲ No tool is activated.

1   Click to the left of the 14 stirrups in the middle of the beam and enclose them in a selection rectangle without releasing the left mouse button (⬚ **Select elements based on direction** is selected in the **Selection** task area).

Allplan displays the ✛ **Central move handle**, the ☐ **Geometry handles** and the ⬤ **Point handles**. In addition, you can see a selection box for the diameter and a data entry box for the placing length and the spacing or number of pieces.

2   Change the spacing to **0.20** in the data entry box for the spacing or number of pieces.
    To toggle between the **Spacing** and **Number of pieces** parameters, click the symbol to the left of the data entry 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   Set the type to **Dimension line**, select the **Dimension line text** option, select **No. of pieces + spacing** for the text and place the dimension line.

5   For the label, switch off spacing, place the label and press ESC to quit the tool.

6   Click a bar in the bottom longitudinal reinforcement and select **Bar mark (1)** in the list box at the top in the **Properties** palette.

7   In 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 longitu–dinal reinforcement using direct object modification, select the entire placement in the section as an entity group using SHIFT + click.

Your drawing should now look like this:

Door lintel 1:50

Tip: The essentials are described in the Allplan help. Read the chapter about the **Reinforcement Views** module and the ''Reinforcement methods – 3D reinforcement model'' chapter.

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 using the tools in the **Reinforcement Views** module. As opposed to the elevator shaft, only the three-dimensional reinforcement cage is displayed (see Tip).

Printing layouts is covered in exercise 9.

Exercise 6: 2D Slab without a 3D Model (Method 3)

Requirements:
Allplan 2018 Engineering comes in different module packages.
Open the **Create** menu and check whether the ⊞ **Engineering** family includes the following module(s):
▱ **Mesh Reinforcement** 🖉 **Bar Reinforcement**

Tip: Read the chapter "Rein-forcement methods – 3D reinforcement model" in the Allplan help:

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, set 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** dropdown list on the quick access toolbar) and switch 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 mainly use the tools in the �«Mesh Reinforcement module. You can find these tools in the **Meshes** task area of the **Actionbar**.

Tools: **Objective:**

◈ Options

▥ Span Reinforcement

Start by making initial settings.

To select drawing files and to set options

Tip: You can specify how mesh reinforcement looks using the ◈ **Options** for the **Mesh Reinforcement** module.
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 current unit of length is set to **m**.

Now you will start by placing meshes in the span at bottom left in the floor plan.

To place by span in a rectangular area

1 Click ![icon] **Options** (quick access toolbar), select the **Reinforce-ment** page, clear the **Reinforce with 3D model** check box in the **General** area and click **OK** to confirm.

2 Click ![icon] **Span Reinforcement** (**Actionbar** – **Meshes** task area – flyout menu of the ![icon] **Place Individually** tool).
The system proposes the layer **MR_GEN**.

3 Go to the **Properties** palette – **Format** area, open the ![icon] **Layer** dropdown 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** opti-on 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 bottom left inside cor-ner of the wall and then the top right wall corner. Press ESC to fi-nish.

7   Change the support depth on the right 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**.

9   Repeat these steps with the top side of the polygon and click **OK** to confirm the settings.

Tip: When you select **Transverse Overlap**, the program only places meshes of full width. The data entry box shows the value proposed by the system. You cannot change this value.

Span Reinforcement											
🖊		0.340		3.180	Starting length	3.180	↔	I	▨	+	1
Q257A		0.340		0.000	Starting width	2.300	St	GV	Rd	◫	

OK   Cancel

10 Click Q188 A **Mesh type** and select **Q257A**. This sets the values for **Longitudinal Overlap** and **Transverse Overlap** to **0.340**.
Define the other settings as shown above.

Tip: Allplan 2018 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**).

11 Click **OK** to confirm the entries.
The placement should now look like this:

12 Press ESC to quit the tool.

The next step is to apply reinforcement to the adjacent span on the right. You will mark out the span using a freeform outline.

To place by span in a polygonal area

1   Click [icon] **Span Reinforcement** (**Actionbar** – **Meshes** task area – flyout menu of the [icon] **Place Individually** tool).

2   Enter **0.12** for the support depth in the dialog line.

3   Working counter–clockwise, click the inside corners of the span and press ESC to finish.

4   The support depth for the exterior wall is 0.15. Click [icon] **Support Depth** in the dialog box, click the exterior wall, enter **0.15** and click **OK** to confirm.

5   Select mesh type **Q513A** and set the placing angle to **0.00** degrees.

6   Confirm.
    Allplan draws and labels the reinforcing steel mesh placement.

Tip: The placing polygon of the area reinforcement placed is displayed in construction line format. Clicking this polygon selects the entire placement.

7   Press ESC to quit the tool.

Now you should be able to place the reinforcing steel meshes yours–
elf (support depth for interior walls is 0.12 and 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 only need to be
  labeled once.

- You can use **Dimension Overlap** to manually dimension spli–
  ces in the longitudinal and transverse directions. Automatic la–
  beling dimensions all splices.

Task 2: recess

Now you will apply reinforcement to the slab opening created for the elevator shaft.

You will mainly use the tools in the **Bar Reinforcement** module. You can find these tools in the **Bar Reinforcement** task area of the **Actionbar**.

Tools:

 Edge Reinforcement

 Secondary Reinforce-ment

 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 Click **Edge Reinforcement** on the context toolbar.

3 Go to the **Properties** palette – **Format** area, open the **Layer** dropdown list and click **Set...**.

4 Select the **List layers assigned to currently selected tool** option and use the shortcut menu to make layer **BR_B_B Current**.

5 Select the **List layers used in open documents** option and set the layer **MR_M_B** to **Hidden, frozen** so that you can see better what you are doing.

6   *Enter the 1st edge point or click a line*: Click the bottom inside corner of the shaft wall on the right.

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 towards the recess and **0.00** for all the other sides.

10   Enter **0.70** for **Edge Reinforcement Length** and click **OK** to confirm.

11   Set 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, this allows you to 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 above.

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 Set the display mode to ‖↖ **Show selected bars**, switch the start point so that the placement starts on the left and click **OK** to confirm.

15 Select the bars you want to display and place the dimension line and the label.

- Set the type to **Dimension line**, select layer **BR_B_B** for the dimension line and set the aspect to **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 displayed attached to the crosshairs. Click the corner at top left, set parameters and complete the edge reinforcement as shown below. Finally, press ESC.

The longitudinal reinforcement is still missing.

To place secondary reinforcing bars as area rein-forcement

⮕ 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 start point*: Click the top inside corner of the shaft wall on the right.

4   *Enter end point*: Click the bottom inside corner.

5   Define the following settings in the **Enter Area Reinforcement** dialog box:

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. Set the text parameters so that only the **Number of pieces** and the **Diameter** are displayed.

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.

9   Press ESC twice to finish placing reinforcement and to quit 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** dropdown 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 should now look like this:

Task 3: support reinforcement and spacers

Now you will create support reinforcement. Finally, you will enter spacers.

You will mainly use the tools in the ▱ **Mesh Reinforcement** module. You can find these tools in the **Meshes** task area of the **Actionbar**.

Tools: **Objective:**

▦ Support Reinforcement

▱ Place Individually

✎ Modify Format Proper–
ties

Start by making initial settings.

To select drawing files and to set options

➲ Actionbar: ⊞ **Engineering** role – **Reinforcement** task.

1   Click ▦ **Open on a Project–Specific Basis** (quick access tool–
bar) 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** dropdown list (quick
    access toolbar), match the layer visibility from the **Reinforce-
    ment, top layer** print set to hide the reinforcement at the bot-
    tom, 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 set it to **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 geo-
metry.

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

9   Set the **Mesh Type** to **R335A** and click **OK** to confirm.
Allplan draws the reinforcing steel mesh placement.

10 Press ESC to quit the tool.

Edge reinforcement

The edge reinforcement tool in the mesh reinforcement module is
equivalent to the tool with the same name in the bar reinforcement
module. The procedure was described with the edge reinforcement
around the slab recess. The procedure for selecting the mesh type
and setting the parameters is the same as for the tools you have
already used in the ⊿ **Mesh Reinforcement** module. Consequently,
this tool is not described any further here.

A special placing mode — surplus mesh placement — can be used for
edge reinforcement. To do this, create a reinforcing steel mesh cut-
ting diagram in a separate window. Then you can click a left-over
mesh and place it in its entirety or just parts of it (see further down).

Spacers

Basically, spacers are only important when it comes to ordering steel and they should therefore be included in reinforcement schedules. The steel quantities need to be calculated based on the drawing file with the meshes.
There are two ways to display spacers:

- You can define the placing region for the spacers using the ⬚ **Span Reinforcement** tool. Enter areas without reinforcement at the top as recesses. Then select spacer for the **Mesh Type**. When you create the placement as construction lines, it is displayed on screen but not printed. Advantage: The required number will be calculated automatically. Disadvantage: The cutting diagram and the reinforcing steel mesh schedule include cut spacers. This does not reflect standard on-site and bending shop practice (only entire spacers are ordered and supplied).

- You can define a spacer using the ⬚ **Place Individually** tool and calculate the required number manually. This is a relatively fast approach 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 (e.g. **120**). For the number of meshes, enter **2** and set the layer factor to **60**. Set the placing angle to **0.00** degrees.

3 *Set placing parameters or specify position*: Click anywhere in your drawing and press ESC to quit the tool.

4   Click ✎ **Modify Format Properties** (**Actionbar** – **Change** task
    area), select the **Convert 2D entities to construction lines** opti-
    on, click **OK** to confirm and select the meshes you just created
    (assuming that you want to exclude the spacers from subse-
    quent printouts).

Task 4: cutting diagram and excess mesh

To finish, you will create a cutting diagram for the bottom mesh rein-forcement layer and place excess mesh.

You can find these tools in the **Meshes** task area of the **Actionbar**.

Tools: **Objective:**

⊞ Mesh Reports

⊡ Place Individually

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 to be included in the cutting diagram are in different drawing files, open the other drawing files in edit mode. Meshes on visible but frozen layers are not included in the cutting diagram.

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 set layer **MR_M_B** to **Modifiable** and layer **MR_M_T** to **Visible, frozen**.

Tip: If you want to place the mesh cutting diagram only in the drawing file, 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).

5   In the **Reports** dialog box, click the **Default** folder on the left, select the **Mesh cutting diagram** report and click **All** in the input options to include all marks.

The report is displayed in Report Viewer.

6   Click ⬛ **Export** and select **Allplan**.

The current drawing file is displayed and 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 entire 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 current viewport, the **Excess Mesh Placement** window opens showing all the meshes with pieces of excess mesh as a cutting diagram.

4 In the cutting diagram, click the piece of excess reinforcing steel mesh that you want to place.

   The **Excess Mesh Placement** window is closed again.

5 Place the piece of excess mesh. You can retain the dimensions of the reinforcing steel mesh copied automatically or change them.

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 2018 Engineering comes in different module packages.
>
> Open the **Create** menu and check whether the ⊞ **Engineering** family includes the following module(s):
>
> 🔲 **BAMTEC**

Tip: Read the chapter "Reinforcement methods – 3D reinforcement model" in the Allplan help:

In this exercise, you will manually create **BAMTEC carpet reinforcement** based on FEA calculation results (i.e. the FEA results will not be used automatically). You will not work with the 3D model (method 3, see Tip), as you will only create a floor plan without sections.

You will mainly use the tools in the 🔲 **BAMTEC** module. You can find these tools on the **Create** menu.

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 module:

▲ 📁 Engineering
  ▷ 📁 General Information
  ▷ 📁 Floor plan and shell drawing
  ▷ 📁 Key Plan module
  ▲ 📁 Reinforcement drawing
    ▷ 📁 Reinforcement methods
    ▷ 📁 Defaults, Cross-section catalogs
    ▷ 📁 Bar Reinforcement module
    ▷ 📁 Mesh Reinforcement module
    ▲ 📁 BAMTEC module
      ▷ 📁 Basics

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 below. The process of creating this slab outline is described in detail in the "Finite Elements" manual. The FEA results used here are also taken from this manual.

In this exercise, you will reinforce the area with hatching (see below). 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 set the existing layers to visible. Otherwise, create the slab outline yourself.

To copy or draw the slab outline

1   If you have already carried out 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 using the tools in the 🔲 **Basic: Walls, Openings, Components** or 🔲 **Draft** module. Use the dimensions given. Place the grid, walls, beams, columns and recesses on different layers. You can use the layers proposed by Allplan.

Start by making initial settings.

To select drawing files and to set options

1　Check that the menu bar is visible. If it isn't, open it as described in the initial settings (see "Showing the menu bar" on page 12).

2　Click ▦ **Open on a Project-Specific Basis** (quick access toolbar), make drawing file **502** current and open drawing file **501** in edit mode.

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

4　Select pen thickness **0.25** mm and line type **1** in the **Properties** palette – **Format** area.

5　Open the ✖ **Options** and check that the **Reinforce with 3D model** option is not active.

The first step involves defining the carpet outline, i.e. 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 231)!

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** dropdown 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 **0.00** for the support depth in the dialog line. Press ENTER to confirm.

5   To create the first carpet, use the inside wall corner in the B/1
    axis for the start point.

6   Enter **14.10** for the X–coordinate and **–14.25** for the Y–
    coordinate in the dialog line. Press ENTER to confirm.

7   Press 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 direc–
    tion.

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. Please note the following points.

Enter the outlines of the carpets B1.2 and B1.3 for the longitudinal direction yourself. Please note the following:

- In the D and F axes, the carpets are joined without overlap.

- When you define the carpet outline for carpet B1.3, do not include the rectangular area at bottom left between grid point G/1 and the top right corner of the recess, as this would cause the program to generate illegal reinforcing bars. The offset around the recess needs to be set to **0.05** m.

Carpet Outline					×
Angle	90.000		Carpet Label		Bench
Offset	0.050	Lower	1	.4	IIII
				OK	Cancel

- The values on the context toolbar above 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 bottom left area (like carpet B1.3).

- To define the lap joint, specify the start point by moving the crosshairs to the bottom left corner of the carpet previously created. Then enter a value of **0.50** in the $\triangle y$ **Y-coordinate** data entry 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 below.

Before you can create the reinforcement for the carpets, you need to distribute the individual carpets in the placing drawing onto diffe-rent drawing files. You will use carpet B1.1 as an example.

To distribute carpets onto 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 Mo-de** 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 Specify the first drawing file – **503** – in the **Select target dra-wing 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 car-pets automatically.
This tool is designed with economic considerations in mind, allowing you to 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 Rein-forcement

Note: For production reasons, the following values defining the spa-cing between mounting strips must be adhered to:
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 tool-
    bar) 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 poly-
    gon 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°** (entering an angle of 90° places the start point at
    bottom right. 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 are displayed in the selection color. The di-
    mension line is attached to the crosshairs. You do not need to di-
    mension the mounting strips manually, as they will be arranged
    automatically by the production machine. Skip labeling by pres-
    sing ESC.

8   Press ESC to quit 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 – **Enginee-ring** 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 Reinforce-ment** 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 is displayed in the selection color. The palette for the dimension line opens.

    • Set the type to **Dimension line**, select layer **BA_B_B_1** for the dimension line and set the aspect to **1.00** by selecting the **Di-mension line options** line and clicking ⎙.

    • Select the **Bar markers** option and place the dimension line in the workspace.

6   Switch to the **Text/leader** tab, set the label parameters so that the **Number of pieces**, **Diameter** and **Spacing** are included, select the automatic text leaders and place the label in the work-space.

7   Press ESC to quit 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. This way, 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   Set the following parameters on the **Secondary Carpet Reinforcement** Context toolbar:
    Diameter **8 mm**
    Anchor point (start point of placement): **top 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 top left corner of the carpet polygon.

4   The secondary reinforcement is displayed in the selection color. Place the dimension line and the label using the settings proposed by the system.

You will now create more secondary reinforcement. Repeat steps 2 to 4 and use the settings given in the following section.

To create more secondary reinforcement

1   The ⊞ **Secondary Carpet Reinforcement** tool is still active.

2   Make the following settings on the context toolbar:
    ⊘ Diameter **8 mm**
    ⊠ Anchor point (start point of placement): **top left**
    ↞ dx offset = **0.15**
    ↕ dy offset = **6.002**
    ⫼ Placing length 6.45
    ⫼ Spacing 0.20
    Number of pieces: 10

			0.150	↑↓	Fix	⫼	6.450	⟋ₓ	180.00	1	1 +
⊘	⊠		6.002	↑↓		⫼	0.200	⟋	2.515	Number 10	PP ⫼

Secondary Carpet Reinforcement ✕ Cancel

3   Place the secondary reinforcement at the top left corner of the carpet polygon.

4   Place the dimension line and the label.

5   The ⊞ **Secondary Carpet Reinforcement** tool is still active.

6   Make the following settings on the context toolbar:
    ⊘ Diameter **8 mm**
    ⊠ Anchor point (start point of placement): **top left**
    ↞ dx offset = **0.055**
    ↕ dy offset = **8.002**
    ⫼ Placing length 5.65
    ⫼ Spacing 0.20
    Number of pieces: 24

			0.055	↑↓	Fix	⫼	5.650	⟋ₓ	180.00	1	1 +
⊘	⊠		8.002	↑↓		⫼	0.200	⟋	2.515	Number 24	PP ⫼

Secondary Carpet Reinforcement ✕ Cancel

7   Place the secondary reinforcement, the dimension line and the label.

8   The ⊞ **Secondary Carpet Reinforcement** tool is still active.

9   Make the following settings on the context toolbar:
⌀ Diameter **8 mm**
⊠ Anchor point (start point of placement): **top left**
dx offset = **0.055**
dy offset = **12.802**
Placing length **6.25**
Spacing **0.20**
Number of pieces: **8**

Secondary Carpet Reinforcement												✕
🖊			0.055	↕↑↓	Fix	6.250		180.00		1	1	+
⌀			12.802	↕↑↓		0.200		2.515	Number	8	PP |||
											Cancel	

10   Place the secondary reinforcement, the dimension line and the label.

11   The ⊞ **Secondary Carpet Reinforcement** tool is still active.

12   Make the following settings on the context toolbar: Do not forget to change the anchor point:
⌀ Diameter **8 mm**
⊠ Anchor point (start point of placement): **top right**
dx offset = **0.25**
dy offset = **13.202**
Placing length **5.35**
Spacing **0.20**
Number of pieces: **6**

Secondary Carpet Reinforcement												✕
🖊			0.250	↕↑↓	Fix	5.350		180.00		1	1	+
⌀			13.202	↕↑↓		0.200		2.515	Number	6	PP |||
											Cancel	

13 Place the secondary reinforcement at the top **right** corner of the carpet polygon.

14 Place the dimension line and the label.

15 Press ESC to quit 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 Σ **Brackets** (**Actionbar** – **Selection** task area) or the left mouse button to select all placements.

3 *Set the definition point:* Specify the carpet's local reference point. The system proposes two points. Click the point at bottom right. The point clicked is marked by a symbol.

Tip: If drawing file **504** is open in edit mode, you can use the definition point you specified when you separated the carpets.

4 Place the name of the carpet file where you require.

As opposed to automatic reinforcement, you need to manually create the symbols required for carpet production. You can download the symbol from Allplan Connect (https://connect-allplan-down-loads.s3.amazonaws.com/connect/downloads/BackupForConnect/DEU/Symbole.zip). 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. In the navigation field at the top, click **Library** if you are still in the **Standards details** group of the **Office** folder.

2 Open the **Project**, **Engineering Tutorial** and **BAMTEC symbols** folders one after the other.

3   Double–click the **BEZ–Aufroll 1:50** symbol with the left mouse button.

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 start point of carpet B1.4 is the bottom left corner of the carpet polygon. The secondary reinforcement is spaced at the following intervals (reference point at top or bottom right):

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

Carpet B1.4 should look like this after the rearrangement:

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: Using the self-explanatory forms of the **cross-section catalogs**, you can define new catalogs (e.g., custom mesh) or change existing ones. Cross-section catalogs can be viewed on 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. Numerical 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 **Tools** menu, click **Defaults** and then **Cross-Section Catalogs**. The following dialog box opens:

Cross-Section Catalogs

Overview

Name	Steel grade	Type
Custom mesh (A)	BSt 500 M(A)	MA
Custom mesh (B)	BSt 500 M(B)	MA
HS mesh	BSt 500 M	MA
Spacers BK/S	BSt 500 M	MA
Spacers BT	BSt 500 M	MA
Stock mesh (A)	BSt 500 M(A)	MA
Stock mesh (B)	BSt 500 M(B)	MA
BAMTEC strips	Tragband	RU
Mesh cross-sections	BSt 500 M	RU
Reinf. bars (B)	BSt 500 S(B)	RU

Functions

New   Edit   Delete   Output

2   Click **Stock meshes (A) BSt 500 M(A)** and then **Edit**. A full over-
    view of the mesh cross-section catalog is displayed:

Mesh X-Section Catalog

Cross-section catalog

Name   Stock mesh (A)

Steel grade   B500A

Overview

Mesh identifier	Length [m]	Width [m]
Q188A	6.000	2.300
Q257A	6.000	2.300
Q335A	6.000	2.300
Q424A	6.000	2.300
Q524A	6.000	2.300
Q636A	6.000	2.350
R188A	6.000	2.300
R257A	6.000	2.300
R335A	6.000	2.300
R424A	6.000	2.300
R524A	6.000	2.300

Functions

New   Change   Delete   Output

OK   Cancel

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. This way, 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   Click **New** in the **Cross–Section Catalogs** dialog box. The follo–wing dialog box opens:

3   Click **Mesh X–Section Catalog**.
Another dialog box opens:

4   Click in the **Label** data entry box and enter **Custom mesh**.

5   Click in the **Steel grade** data entry 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; the parameters are entered in a dialog box.

Stock meshes that can be defined in the work-space.

Custom meshes without edge bars; can be defined in a dialog box.

Custom meshes with edge bars; can be defined in a dialog box.

Custom meshes that can be defined in the work-space.

Custom meshes with any bar combination; special functions are provided for defining these meshes in the workspace.

Spacers that can be defined without single bars; spacers are entered in the same way as stock meshes without a bar representation.

Spacers with a single bar representation; can be defined in the workspace.

7   Click **Custom mesh, without edge bars**.

8   A dialog box opens. Enter a name for the new mesh: **Custom Mesh 1**.

9   Now you can set the parameters as you need. Start by entering values for the length, width and the spacing between the bars. The overlap values depend on these parameters.

10 Save the settings and finish.

Unit 5: Layout Output

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** module to print a layout containing the elevator shaft you rein-forced in exercise 4 (unit 4).

Requirements for printing

Before you print, the output device needs to be configured 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 it.

For more detailed information, please consult your printer's user guide or the documentation of the operating system.

Printing the screen contents

Printing the screen contents is covered in the Basics Tutorial. Below 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 screen but also ensures that they are printed as such.

  Using the **Print construction lines** option, you can choose to include construction lines in the printout. Define the other op-tions as you need.

4 Set the **Scale** and click **Print**.

5 Press ESC to close print preview.

Exercise 8: Custom Title Block

> **Requirements:**
>
> Allplan 2018 Engineering comes in different module packages.
>
> Open the **Create** menu and check whether the ⬚ **Bonus Tools** family includes one the following modules:
>
> ⬚ **Templates: Reports, Legends, Labels**
> ⬚ **Smart Symbols**
> ⬚ **Attributes**

Allplan 2018 provides a wide range of ¨intelligent¨ title blocks based on label styles. Label styles contain design entities, text and attribu-tes.
The advantage of a title block with attributes is that the text will update 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...** in the dropdown list 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 attribu-
     tes...** 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.

The attributes you just assigned will now be used in the label style for the title block.
This exercise assumes that you can access the title block you create in exercise 5 of the Basics Tutorial. You have already drawn this title block and saved it as a symbol with the name **Original** in the **Title blocks** library file.

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 318).

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.

➲ Set the scale to **1:1**.

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 (🔺 **Draft** role – **Design** task – **2D Objects** task area).

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.

4 Double-click the **Original** symbol with the left mouse button.

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).

Index	Art der Änderung	Datum / Name	

Planinhalt

Balkonfertigteil Typ 12

Bauvorhaben   Neubau einer Wohnanlage
                 mit Tiefgarage

Bauherr	Bauherr	Datum
	Straße, München	XX.XX.2002
		Gezeichnet:
		Name
Architekt	Architekten	Geprüft:
	Straße, München	Name
		Maßstab
		M 1:50/25
Ingenieurbüro	Beratende Ingenieure	Plannummer
	Straße, München	XXX

Index	Art der Änderung	Datum / Name	

P aninhalt

Bauvorhaben

Bauherr		Datum
		XX.XX.2002
		Gezeichnet:
		Name
Architekt		Geprüft:
		Name
		Maßstab
		M 1:50/25
Ingenieurbüro		Plannummer
		XXX

8   Click ▦ **Label Style** (◣ **Draft** role – **User–Defined Objects** task
     – **Labels, Legends** task area).

9   Click **Attribute** on the context toolbar.

10 Select the **Project** category, choose the **Construction project name** attribute and click **OK** to confirm.

11 Set the text parameters as shown below and change the format to **A30**.
This defines the attribute as a text item with 30 characters maximum.

12 Switch 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:
Set the text height and width for the **Client address**, **Architect address** and **Structural engineer address** attributes to **4.000** mm. Use **5.000** mm for all other text items.

Category	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 using track lines or you can do this later u– sing the **Align Text** tool (**Draft** role – **Label** task – **Text** task area).

14 Click **DefFol** (Define Foil) on the context toolbar.

15 Using the left mouse button, enclose the entire title block in a selection rectangle.

16 Click the point at bottom right. This will serve as the reference point.

> **Note**: Title blocks must be saved to subfolder 7 or 8, as these subfolders are associated with the ▤ **Label** tool in the 🖼**Lay-out** module.

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 Press ESC to quit the tool.
You have now saved the title block as a label style.

Note: You can find the 📇**Label Style** tool in the following modules too:

📇 Templates: Reports, Legends, Labels, ▨ Smart Symbols, 🏷 Attributes, ▢ Rooms, Surfaces, Stories, ⚏ Landscaping, 🏠 Urban Planning

Exercise 9: Assembling and Printing Layouts

Printing finished layouts is a critical step. In Allplan 2018 a layout is the unit you send to the printer.

As opposed to design using a conventional drafting board, the scope of the layout does not have to be defined in advance.
Generally, you leave the layout (which involves arranging and laying out drawing files and filesets) 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 9,999 layouts.

Tools:

Set Up Page

Layout Element

Update Layout

Print Layouts

Layout Window

Task 1: assembling layouts

Next, you will set up 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 (**Engineering** role) 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**, press 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   In the **Page** area, set the **Format** to DIN A2 and select [A] **Lands-
cape**. In the **Margins** area, select the **Without (role, PDF)** option.

Using the setting you make for the margins, Allplan always places
the page so that its bottom left corner coincides with the bottom
left corner of the printable area of the printer set in the 🖶**Print
Layouts** tool. This ensures that the printout includes all the ele-
ments that extend as far as the margins of the page.

6   Click the **Layout border** button in the **Properties** area.

7 Set 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 using 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 bottom 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 in the **Text** module. To open these tools, you can use the shortcut menu or the menu bar.

10 Enter **0.00** for both the **Offset to the right** and the **Offset to the bottom**. Then click **Close** to quit the **Set Up Page** tool.

Index	Changed			Date / Name
Drawing				

Elevator shaft - reinforcement drawing

Project				
	New detached house			
	Plan City			
Client			Date	XX.XX.20XX
	Edward Example		Created by :	Name
	Example Road, Example Town			
Architect			Checked by:	Name
	Sam Sample		Scale	1:50/25
	Sample Way, Anytown			
Engineer			Plan number	
	Stable Engineers		XXX	
	Stable Street, Stable Town			

H/B = 420 / 594 (0.25m²)   Allplan 2014

Layout elements are mainly drawing files that you place in the lay–out. Drawing files can be positioned individually or as a fileset. You can specify which layers are to be included in the printout by selecting a print set.

To select layout elements

1   Click ⊞ **Layout Element** (**Actionbar** – **Layout Editor** task area).

Layout Element									×
			"Off"	Scale 1:	1	Font factor	Layou	Layer/print set	All
			1	Rot. angle	0.000	Text direction	"Off"	Drawing type	Scale definition

2   On the **Layout Element** Context toolbar, click 🗁 **Fileset** and select fileset **2, Elevator shaft**.

The drawing file selection is the same as in document edit mode: Drawing files **202** and **203** are switched off.

3   It is enough if you place the associative views and the reinforce–ment model in the layout. Select drawing files **204** and **205** and click **OK** to confirm the dialog box.

4   Click the **Layer/print set** box. You can use layers to define visibi–lity settings for the layout elements:

- The **Print set, current setting of the selected print set** opti–on only displays elements on layers of the print set currently selected.

- The **Current, always use current layer setting** option uses the visibility settings you defined with **Select, Set Layers**.

- The **Fixed, save layer setting in layout element** option lets you define the visibility setting for each layer individually.

5   Select the **Reinforcement drawing** drawing type and place the selected drawing files in the layout.

The next drawing file is now automatically displayed attached to the crosshairs.

6   Press ESC to finish selecting layout elements.

The finished layouts are saved and can be printed now or later. When documents have been changed, you need to update the layout using **Update Layout** (**Actionbar** – **Layout Editor** task area).

Task 2: printing layouts

You can now print the finished layout. Before starting, check that the printer is correctly installed and configured.

To print the layout

1   Click ![icon]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 match what you see on 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 using 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,
    improve 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 is selected and an appropriate raster driver
    is set.

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 set the orientation
    to 🅰 **Landscape**.

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 set to **Reinforcement drawing**.

5　Select 🖼 drawing file **401** and click within the boundary of the drawing file already placed.

6　Press ESC, as you do not want to select more drawing files for this layout window.

Tip: Using the polyline entry tools, you can also define freeform layout windows or create layout windows composed of several polygons.

7　Define the size of the layout window by left-clicking two diagonally opposite points (bottom left and top right points; see below). Then press ESC twice.

　　Note: Check that ⬙ **Area detection** is switched 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 files **204** and **205** or for drawing file **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.

10 To rearrange the layout windows, you can use **Move** (**Action-bar** – **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 using 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 294).

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 318).

Project organization

Project structure, i.e. the way in which you organize your data, is an essential part of any building design project. An efficient and logical structure will allow you to locate the data you need without having to perform tedious searches.

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.

Allplan's flexible approach allows users to create their 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 (e.g., projects, drawing files).

If you are already familiar with Windows 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 displayed documents by clicking on the title of a column. Right-click in the background to display the documents as a list or as icons.

Preview (C)

A preview of the currently selected document (drawing file, layout) is displayed in the preview area. To move the preview, click it with the middle mouse button and drag. To zoom in on an area in the preview, open a selection rectangle using the left mouse button. Double-clicking with the middle mouse button restores the preview to its original size. Alternatively, press the * key on the number pad.

To display an isometric view, use the number keys on the number pad. Check that the Num Lock key is active as you do so.

Common approaches in ProjectPilot

If you are already familiar with Windows Explorer, you will quickly find your way around ProjectPilot. You can accomplish most steps using the shortcut menu or drag-and-drop operations.

Sorting the documents displayed

You can sort the documents displayed 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

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 ascending order (arrow points upwards) by drawing file name

Sorted in descending order (arrow points downwards) by drawing file number

Copying and moving using drag-and-drop operations

Instead of using the shortcut menu, you can also use drag-and-drop operations to move or copy selected documents. Select the documents, left-click within the selection, keep the mouse button pressed down and then drag. You can tell whether this is possible by the shape of the cursor when the mouse pointer is positioned over the target area.

Cursor	Meaning
	The document will be **copied** to the folder that is below the mouse pointer.
	The document will be **moved** to the folder that is below the mouse pointer. **Note**: To move documents, hold down the SHIFT key while dragging the documents.
	A shortcut to the document will be created in the folder below the mouse pointer (e.g., when assigning drawing files to a fileset).
	The document cannot be placed here.

Working with the shortcut menu

Almost all tools available in ProjectPilot can be accessed via the shortcut menu. 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

The preview area shows a preview of the selected document. 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 the preview is placed.

- **To switch off the preview**, point to **Preview** on the **View** menu and click **None**.

- **To zoom in on the preview**, use the left mouse button to 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 press the * key on the number pad.

- **To display the preview in isometric view**, use the number keys on the number pad. Check that the Num Lock key and the preview are active 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 process 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 disk. 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. When working without layers, the individual building elements (such as walls, stairs, labeling, etc.) are drawn on different drawing files and superimposed like transparencies.

In order to edit the drawing files, they have to be activated (opened). You can do this using 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 below.

Number	Drawing file status	Comment
1	Current, 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 or 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. Using the ⚒ **Options**, **Desktop environment** page, you can configure the program to inform you of changes in reference drawing files.
9	Update locked	Using the shortcut menu, you can prevent the update of drawing files in which you generate views and sections for objects derived from the building structure. You cannot update the result until you unlock the drawing file in question. But you can create a new view or section in such a drawing file after you have confirmed a prompt.

Information on the active drawing file

To get information on the active document, right-click in the work-space. On the shortcut menu, choose **Properties**. An information box with all the important information about the file opens.

```
Properties                                              ×

 Memory allocation: [%] 0.92
 Document: DF100 - Ground floor model
 Document type: Draft
 Max. size [MByte]: 232
 Min. values [m]:
   x=  -10.21760  y=  -17.53990  z=   -0.11000
 Max. values [m]:
   x=    2.84740  y=   -1.21983  z=    3.64148




                                           [ Close ]
```

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 the number in the title bar of the Allplan application window.
Document type	This shows the file type, which corresponds to the data type icon in the status bar.
Max. 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 switching 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 (e.g. 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 layer currently set is also saved. When you retrieve these components later, the layer saved is automatically set as 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).

Setting 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 and/or drawing types so that the elements are displayed and printed differently, depending on the reference scale or drawing type set. Using line styles, you can work on a scale-independent basis.

Drawing types define how elements are displayed on screen and in the printout. The display of the elements varies depending on the selected drawing type. Requirements: the format properties are taken from the layer (in a fixed manner) and the use of line styles is selected.

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 (i.e. it is frozen). You can save visibility settings in print sets (see ¨Using print sets¨ on page 293) and edit settings in privilege sets. The status of a layer is represented 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 in this layer are not visible and cannot be modified.

You can restrict access to layers using the **Select Layer/Visibility** tab or 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 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, set 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 set layers so that they are visible or invisible and thus show or hide the corresponding elements.

This way, you can quickly hide the elements you don't need during the current design phase, selectively modify elements in the displayed layers, check your plan and see whether all the elements are assigned to the desired 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 find that you often require the same combination of visible and hidden layers (for dimensioning or labeling at certain scales, for example), then it is best to define what is known as a print set. You can also use this print set when you assemble your layout later. This way, you make sure that only the visible layers print.

Note: You can choose to Display elements on frozen layers using 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, sets up the 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 using layers

With large projects in particular, organizing data using 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.

- In order for the interaction between elements to function cleanly, the components in question have to be in the same drawing file. This is also the case for certain analyses and evaluations. 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 as 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.

- You can quickly create layers that are not included in your layer structure and then use these layers in all the drawing files of a project.

- As a project can contain more layers (approximately 65,000) than drawing files (9,999), layers allow you to distinguish more precisely between the individual design entities.

- You can display and edit 65,000 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, using 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 using the **From layer, line style** setting will adapt automatically. This way, you do not need to modify them 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 depends not only 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 (e.g., East Wing, Central Unit, West Wing, for example.)

* Simultaneous involvement of specialist designers on the project. Use separate drawing files for specialist designs in order to facili-tate concurrent activity.

Using privilege sets

Using privilege sets, you can control users' access to layers. You should assign privilege sets if several people work on the same pro-ject. If Workgroup Manager is installed, you can assign users to one or more privilege sets. As a result, these users can only see and edit 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.

When you install the program, the privilege set **ALLPLAN** is created automatically. This privilege set has read and write access for all layers.

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 in the selected print set are displayed in the layout.
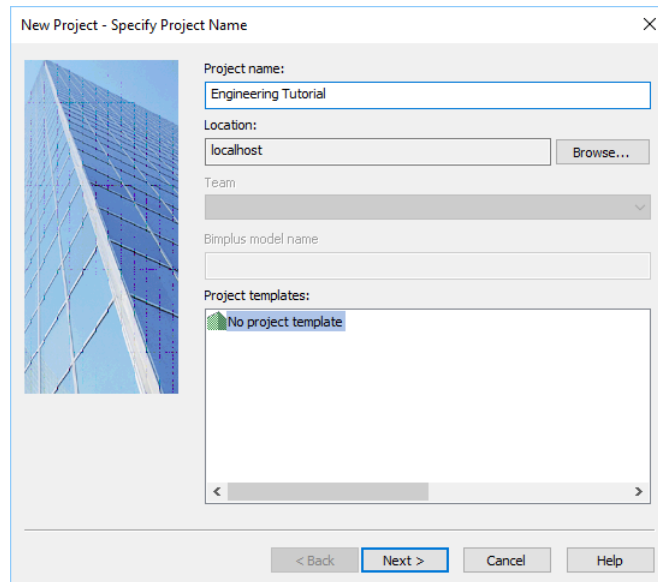
For example, you can select a print set for working drawings so that only the data that are relevant to a working drawing appear in the final printout.

Creating the training project

Start by creating a project.

To create a project

1   Click ⬛ **ProjectPilot** in the dropdown 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 all path settings (except **Attributes**) are set to **Project**. 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 Pro-ject, Open Project...** (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 etc.). If you work on a network, the office standard is the same on all com-puters and can only be changed 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 which case they will probably be different to those used as the office stan-dard).
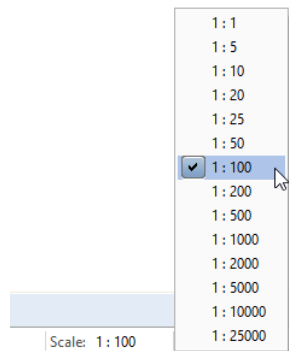
Setting the scale and unit of length

Define scale and length settings for the project.

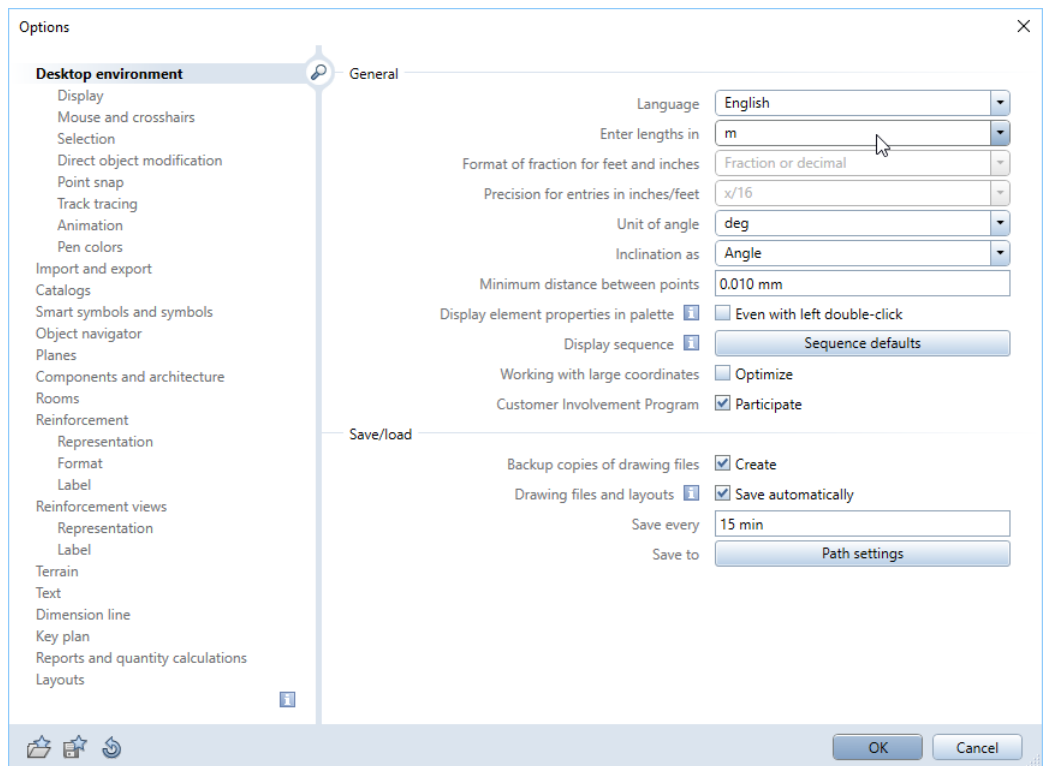Start by setting the reference scale to 1:100.

To set the reference scale

1   Click in the field beside scale on the status bar and select **1:100**.

Set the unit you want to use to enter values. The values are to be interpreted in **meters**.

To set units

1   Click ⚒ **Options** (quick access toolbar) and select **Desktop environment**.

2   Set the **Enter lengths in** option to **m**.

Tip: Alternatively, set the unit on the status bar: Click to the right of **Length** and select **m**.

3   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 and

- the ⬛ fileset structure.

You can define these two structures, which you can use in parallel manner, in 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 only be assigned once in the building structure. However, when it comes to designing rein-forcement, drawing files are multiply used for different reinforce-ment drawings. Therefore, we recommend that you work with file-sets.

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 using filesets.

As the focus of the exercises in this tutorial is to teach you how to create reinforcement, you will use the fileset structure.
Please refer to the Architecture Tutorial for information on creating a building structure, which you can also use here. Look in Allplan's help for detailed information on the building structure.
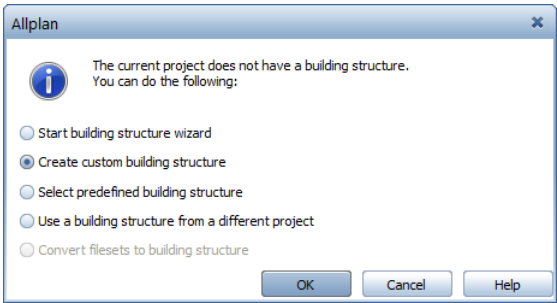
Creating filesets

For the exercises in this tutorial, you will create your own project structure. It is advisable to work with stories and print sets in a real project. For more information see **Tips on project organization** (on page 302).
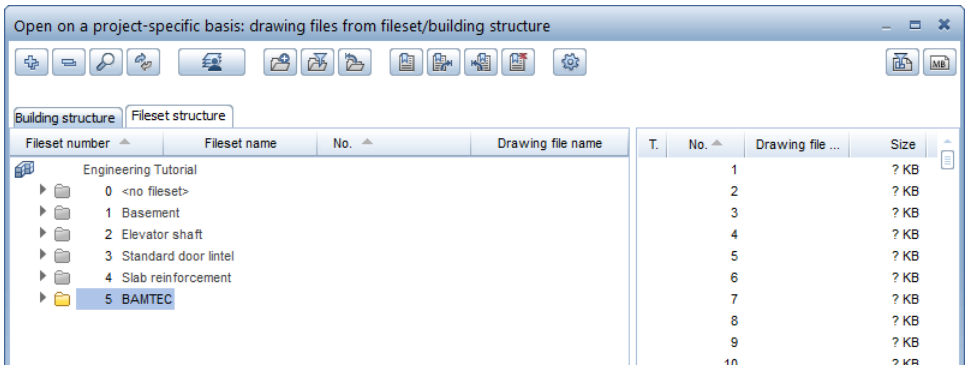
To create filesets

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.
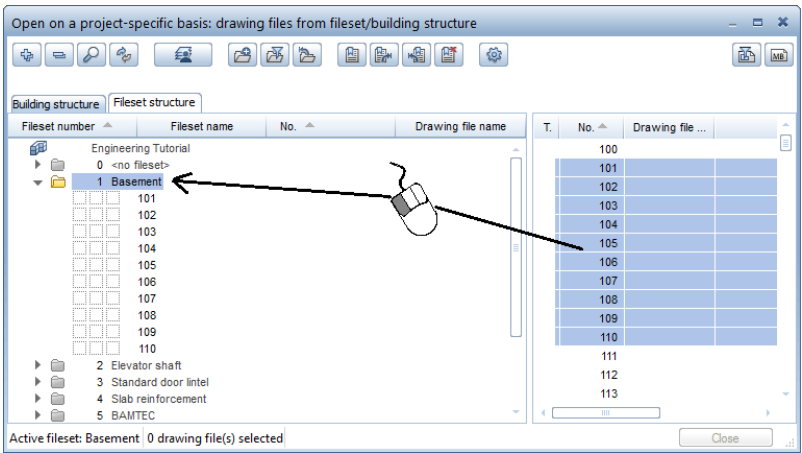
Tip: You **select the drawing files** as in Windows® Explorer:

Press the **CTRL key** to select a series of non-adjacent drawing files
(e.g., 10, 16 and 28).

Press the **SHIFT key** to select a range of adjacent drawing files (e.g. 10 – 20). As an alternative, open a selection rectangle around the drawing files with the mouse.

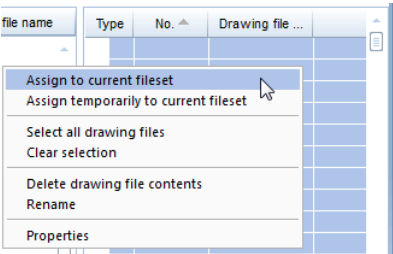5   Click drawing file **101**, press and hold down the SHIFT key and click drawing file **110**.

This selects drawing files 101 to 110.

6   Click within the selection, keep the mouse button pressed down 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 **drag-and-drop operations**, 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 below.

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 Modeling module
	202	Concrete component
	203	General arrangement – Walls, Openings, Components module
	204	Associative views
	205	Bar reinforcement with 3D 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 that allows you to develop your own custom solutions for projects and entire offices. The structure presented here 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/adding 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 on drawing files 1–99. This is universally required data (plan layout, axis system etc.).

- Floor design starts at drawing file 100, starting with the excavation. Create the design for the key plan in drawing files 300 and higher.

- 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. The sequence in which the drawing files are named should be identical on each floor.

- Use drawing files 2000 and higher for reinforcement drawings. Drawing files 2000-2009 can be used for editing and modifying components. Create precast elements and special components in the subsequent drawing files.
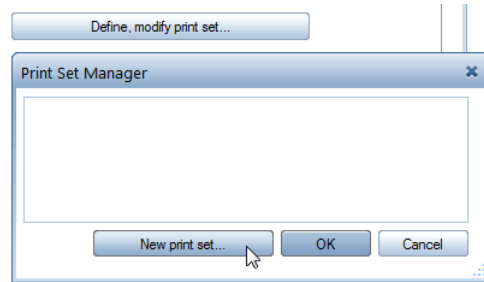
Defining print sets

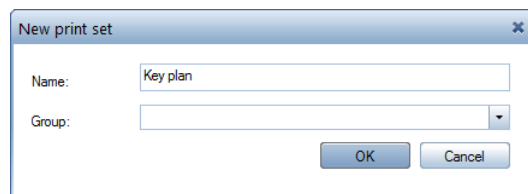A print set (see "Using print sets" on page 293) is a saved combination of visible and hidden layers.
Both when setting up your layouts and when turning layers on and off, activating a print set is a rapid way of showing or hiding only those layers that are required for a specific print set. First create and name the print sets. Then assign layers to these print sets.

To define print sets

1 Click ⊗ **Select, Set Layers** in the 👁 **View** dropdown list on the quick access toolbar or on the **Format** menu.

2 Select the **Print Set** tab and click **Define, modify print set...**.

3 In the **Print Set Manager** dialog box, click **New print set...**.

4 Enter **Key plan** for the name of the first print set and click **OK** to confirm.
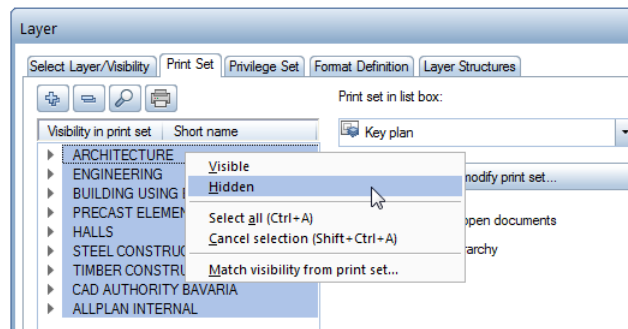   You do not need to define a group.

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.

Now you need to define which layers are to be visible and which hid-
den in each print set.

To define visible and hidden layers for the print sets

➲   The **Layer** dialog box is still open. The first print set – **Key plan** – is
    displayed.

1   Click 🖶 at top left 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. Press 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 struc-
    tures 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 below).

Category	Layer	Short name	Key plan	General arrangement drawing	Reinforcement at bottom	Reinforcement at top
Draft	General 01	DE_GEN01		✓		
	General 02	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_COL		✓		
	Downstand beam	AR_BEAM		✓		
Shell	Shell, general	SH_GEN			✓	✓
	Shell	SH_SHELL			✓	✓
Bar reinforcement	Bar reinforcement at bottom	BR_B_B			✓	
	Bar reinforcement at top	BR_B_T				✓
Mesh reinforcement	Mesh reinforcement at bottom	MR_M_B			✓	
	Mesh reinforcement at top	MR_M_T				✓
Key plan	Key plan, general	KP_GEN	✓			
	Key plan	KP_MARK	✓			

7 When you have assigned layers to all print sets, click **Apply** and then **OK**.

Actionbar configuration

The **Actionbar configuration** is set by default in Allplan 2018. This configuration shows the **Actionbar** above the workspace. In addition, you can see the **Properties**, **Wizards**, **Library**, **Objects**, **Task Board**, **Connect** and **Layers** palettes on the left.

If the **Actionbar configuration** is not set, select it as follows:

To set the Actionbar configuration

- Open the **View** menu, point to **Default Configurations** and click **Actionbar Configuration**.

You can access the most important tools on the **File** menu by clicking the Allplan icon on the title bar on the left.
The title bar also includes the quick access toolbar. Using a dropdown 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.

The **Actionbar** includes 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 and dock it there. You can also make the **Actionbar** float anywhere on your screen. By double-clicking the left mouse button, 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 – Load favorite:

8 – Actionbar configurator

9 – 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. The fixed task areas (6) are always included in all roles and tasks, such as the **Selection** and **Filter** task areas. The **Quick Access** task area (5) includes tasks with frequently used tools.

The first time you open Allplan the task areas of the **Actionbar** are collapsed. To open the flyout menu of the tools displayed, 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 the left mouse button within the name line of a task area. A maximized task area shows more tools, which may also have flyout menus.

Note: You can expand or collapse all task areas by pressing CTRL while double-clicking the left mouse button within the name line of a task area. The width of the program window defines how many task areas are maximized. The tasks areas expand from left to right.

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

Using the first two palettes, you can select the properties of design entities and the wizards that come with the program.

Properties palette

When the **Properties** tab is open at the top, the following options are available:

Dropdown list at the top	Tools at the top and bottom	Element properties
Select active elements	▼ Filter Step by Step ⊕ Zoom in on selected objects ✎ 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:

Dropdown 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 includes a ▽ **Filter** 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), provided 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 or trade. You can show or hide the individual objects as you need. You can even activate or deactivate objects and elements using the **Objects** palette.

Task Board palette

You can use the **Task Board** palette to communicate with all those involved in a Bimplus project. Allplan allows you to 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 log in to Bimplus and if the Allplan project is linked with a Bimplus project, that is to say, the Allplan project data have 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 ALL-PLAN GmbH.

Connect palette

The **Connect** palette takes you straight from Allplan to content provided by Allplan Connect. You can enter your user name and password either directly in the palette or on the **Palettes** tab of the **Customize User Interface...** tool on the **Tools** menu.

Layers palette

Using the **Layers** palette, you can 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.

Note:
You can arrange and customize the palettes to suit your needs. To do this, select the **Customize User Interface...** tool on the **Tools** menu and open the **Palettes** tab. 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 2018 Engineering Tutorial.** This project template comes with a fileset structure and assigned drawing files. The project template includes four print sets Using 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 2018 Engineering Tutorial (with the model)**. This project template includes 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 immediately start placing the reinforcement. 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 international 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 two project templates for this tutorial in Allplan Connect in the **Training** – **Documentation** – **Manuals and Tutorials** area.

- You can also find the latest version of this document as a PDF file (**Allplan 2018 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 a number of advanced step-by-step guides in the **Training** area of Allplan Connect. It usually takes one to two working days until you can access this restricted area and download these documents. Please note that this service is available to Serviceplus customers only.

For general information on Serviceplus, go to http://www.connect.allplan.com

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