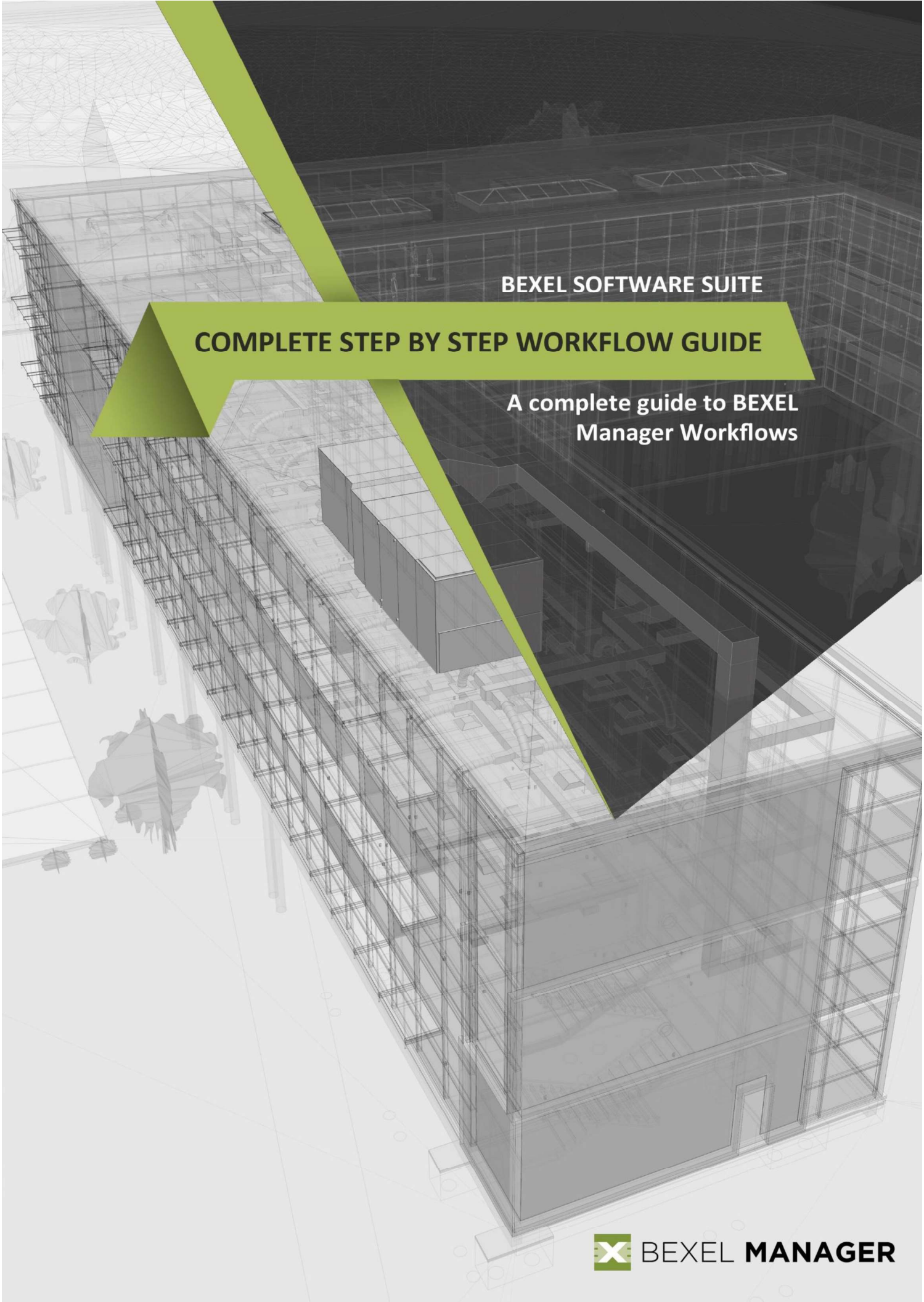

BEXEL SOFTWARE SUITE

COMPLETE STEP BY STEP WORKFLOW GUIDE

A complete guide to BEXEL Manager Workflows

BEXEL MANAGER

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August 2020

BEXEL MANAGER

By

BEXEL CONSULTING

Visit Bexel Manager site **www.bexelmanager.com** for more information.

Complete Step by Step Workflow Guide

A Complete Guide to Bexel Manager Workflows

(International English version)

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INTRODUCTION

This document is a complete step by step guide which describes detailed process of developing a BIM model from a 3D to a 6D BIM phase. To demonstrate the workflows while managing the BIM model in different stages, this document contains complete explanation of the processes of importing a model into Bexel Manager, explains performing various model analyzes, such as CBS and QTO formation, creation of Selection Sets, Cost databases, Schedules and Animations, and usage of various useful Bexel Manager features.

Various exercises are prepared to explain detail software usage. Each Lesson contains examples of exercises that User can train on **Bexel Manager Sample Project V02 Start** and guides the User through the whole process. The content of training material is described below.

Content of training material:

- File archive **Bexel_Step_By_Step_Workflow_Guide_ENG.rar** contains all necessary files to work on the model from start to finish. Files are distributed in four main folders**:**
  - **Bexel Manager Sample Project V02 Start** folder contains Sample Model of the project which does not have analysis. The user goes through exercises of the described workflows and enters its own analysis.
  - **Bexel Manager Sample Project V02 Complete** folder contains complete Sample Model of the project including results of all exercises. This project user uses to review if the exercises are done properly.
  - **Lessons** folder contains folders named by lessons from the guide, for example, **Lesson 1.0**. Every **Lesson** contains sub-folders the **Complete Model** and the **Exchange** folder. **Complete Model** contains the model with all analysis that are described through exercises for certain **Lesson**. The other folder, named **Exchange,** contains all files, which are needed to follow the process of exercises explained in a certain lesson. Each **Lesson** folder contains PDF document step by step guide for certain topic that lesson explains.
  - **User manual** folder contains a complete step by step guide, which is a PDF document with detailed explanation of processes.

Files from compressed file archive should be extracted before starting work on Bexel Manager model, because they will be used in various steps of this guide.

How to use training material?

- Install Bexel Manager software package.
- Follow detailed instructions from this document.
- Check out additional training material on **Bexel User Area** and Support section of official **Bexel Manager Website** and explore other features and workflows in Bexel Manager.

Training material instructions

Training instructions in this document are organized in thematical lessons. Training materials are organized in corresponding folder structure with **Exchange** sub-folders containing files to be imported for training purposes. Training folders for every lesson also contains BEXEL Manager model with all files for training exercise executed so user is able to analyze how final result of his work for every lesson should look like in order to compare its work.

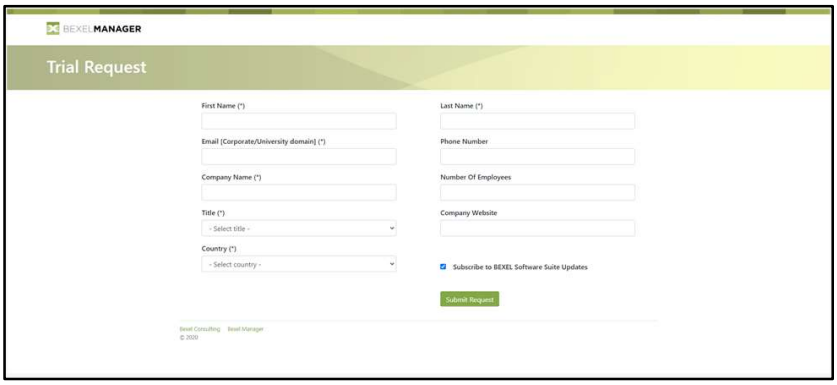
Training process starts with Software activation and opening of Start project file named **Bexel Manager Sample Project V02 Start**. Every lesson exercise starts with this starting model. User is able to exercise every lesson independently or following consecutive order of exercises.

In case user decides to exercise every lesson independently there are exchange files that have to be imported before every exercise start (according to instructions), but if user practice exercise in consecutive order. In many cases exercises are continuing on previous lessons so in such cases user is able to skip first step of importing exchange files and exercise work on previously created files to experience integrated workflow.

User can use the complete **Bexel Manager_Step by Step Workflow Guide (PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\User manual)** or **individual lessons for each topic** located within **Lessons** folder.

How to get BEXEL Manager?

If you are not using Bexel Manager, you can try it with a free 30-day software trial - **Trial Request Form.**



Free Trial Request form

You just need to provide contact data in the form. The trial license will be sent to the e-mail indicated. The key will allow you to activate BEXEL Manager software and test it in full function mode for 30 days.

Along with BEXEL Manager trial version, you will get a password for entering BEXEL Manager User Area on the following link **BEXEL Manager User Area**, where you can access a range of free information, including manuals, tutorials, add-ins, API Scripts, Demo / Samples, Databases, to get full support during your free trial.

In case that you are student or professor, download a fully functional version of BEXEL Manager and ask for an education license from **Educational Licence Request.**

In case that you are a professional, download a fully functional version of BEXEL Manager and ask for a 30-day trial license from **Standard Trial Request**. Projects saved with this version can be automatically upgraded to full versions when purchasing a commercial license - **Plans & Pricing.**

We hope that BEXEL Manager software will be both helpful and enjoyable to use, and we wish you a pleasant journey through the next generation of construction management!

"The first step toward creating an improved future in construction management"
The BEXEL Manager Team

Contact us

We are devoted to providing you with the comprehensive support for your use of BEXEL Manager software. If you have any technical inquiries please contact our technical support team at **support@bexelmanager.com**, and our team will get back to you as soon as possible.

If you have any inquiries about the successful implementation of BIM technology and processes in the company and implementation of BIM processes on the pilot project, please contact our team of consulting experts for BIM Implementation. Our specialized team is at your full disposal to provide all the information required to see through your projects involving our software solution. Our vast international experience in project management utilizing BIM processes and technology stand as major assets in guidance that we can deliver. You can contact us at **consulting@bexelconsulting.com**.
We are always here for you!

LESSON 01

BEXEL MANAGER

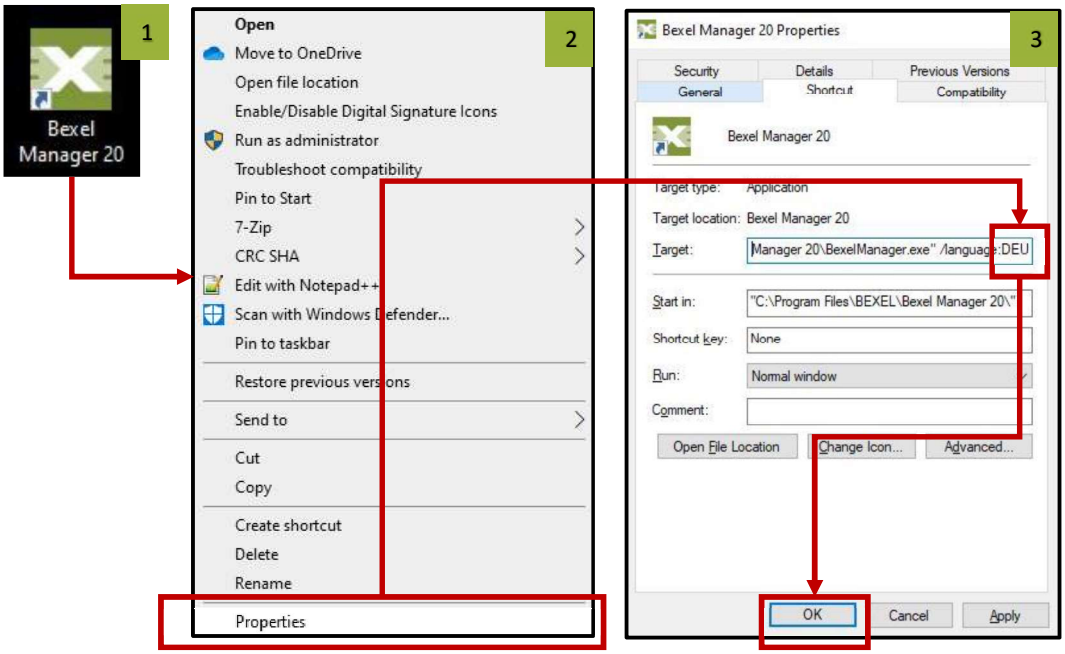
1. ACTIVATION OF THE SOFTWARE, PROJECTS AND VERSIONS

In this lesson the process of activating the software and opening files in three different file formats will be described. The BESLN. file format is created while using the BEXEL Manager software. A BM add-in was created to simplify the work while dealing with huge amount of information on projects of larger scale in Revit software and enables the user to create a BX3 file format for an easier import in Bexel Manager. As BEXEL Manager software is a BIM management tool and not an authoring tool, which means the geometry of the model cannot be changed, it supports IFC file format which enables the user to import files from various authoring tools as long as they support open BIM. Please note, the IFC and BX3 files used in this lesson are located in **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson1.0\ Exchange)**.

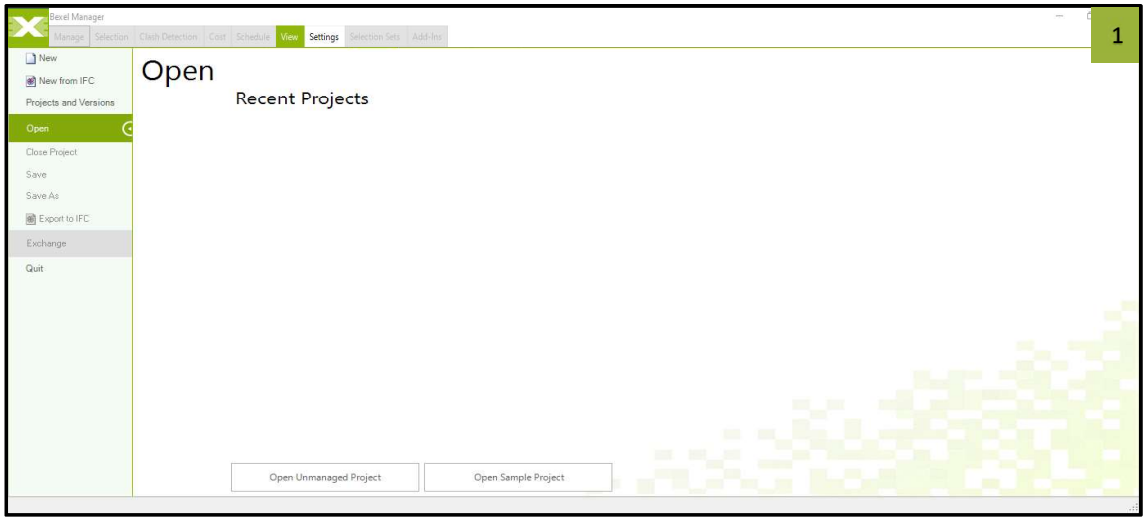
1.1. PROGRAM ACTIVATION

After successfully downloading the software an icon will occur on the desktop. If the user would like to change the language of Bexel Manager, the process below should be followed.

1. Click on the **Bexel Manager shortcut** on the **desktop** with the **right-click**. →
2. In the **context-menu** choose the **Properties** option. →
3. In the **Shortcut** tab change the part after **'/ language:'** to the preferred language code. The full list of currently supported languages and their codes is here: **English → ENU**, **German → DEU**, **Spanish→ ESP**, **French → FRA**, **Italian → ITA** and **Russian → RUS**.



1. To activate the software, please **double-click** on the shortcut. The **Welcome** window opens, which enables the user an overview of recently opened projects and basic commands. As we have just activated the software, the **Recent Projects** section is empty.

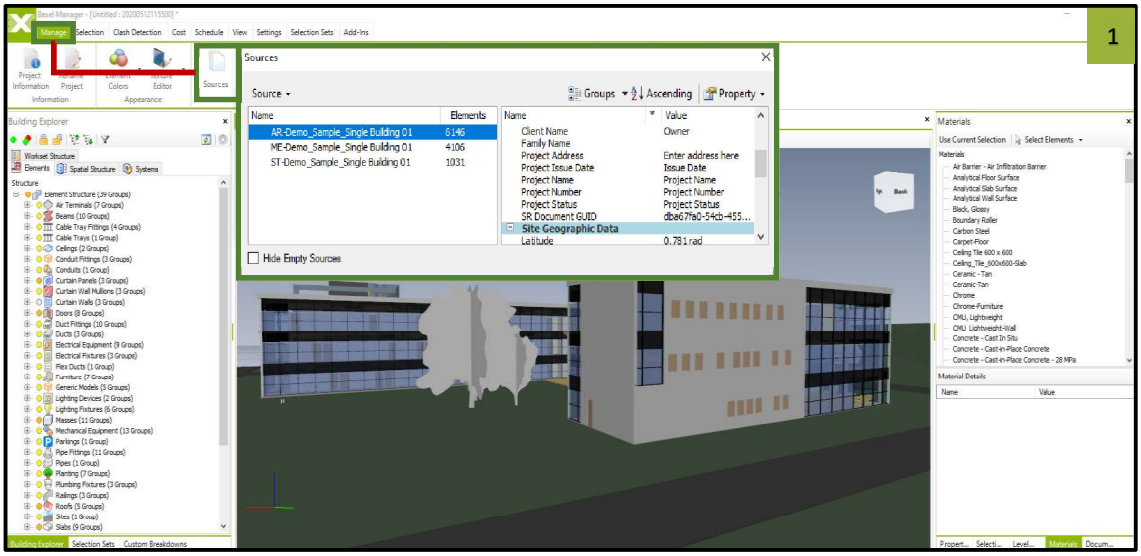


NOTE: To activate the interface of the software, click on the Bexel Manager icon.

1.2. OPENING A PROJECT WITH THE DRAG-AND-DROP OPTION

For a quick overview of a BIM model, the drag-and-drop option can be used, which enables the user to create an untitled document with the date of opening stated in the name of the project file. To open a file using the drag-and-drop option, a BX3 or IFC files format can be used. For the section 1.2., please use BX3 files located in the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson1.0\Exchange)**. → The files are: **AR-Demo_Sample_Single Building 01**, **ME-Demo_Sample_Single Building 01** and **ST-Demo_Sample_Single Building 01** in BX3 file format.

1. After activating the software, open the location of three, for example, **BX3 files** that will be opened in Bexel Manager. →Select one or more files and **drag them to the Welcome window**. → The software starts to create an **Untitled** file and opens it in the viewport.

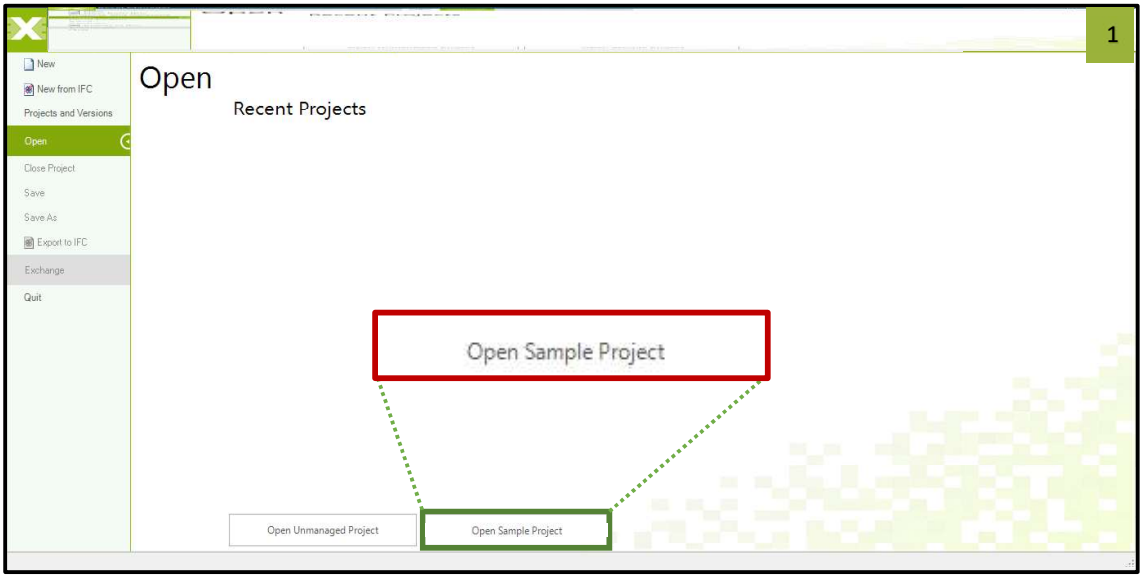


NOTE: The preview of the viewport is shown on the picture above, where we have also activated the Sources command within the Manage tab. The Sources command gives us a preview of how many sources contains our BIM model. As we have in previous steps selected three different BX3 files to create an Untitled file, this is shown in the Sources window. The Untitled project that we have created, cannot be renamed although a version within the Untitled project can be renamed. To rename the version, please use the command Rename Project within the Manage tab. For a preview of projects and versions, use the Project and Versions command within the welcome window.

WARNING: If the changes that occur during the process of developing a BIM project should be tracked, creating a project using the New Project command is recommended.

1.3. OPENING THE SAMPLE PROJECT USING THE OPEN SAMPLE PROJECT COMMAND

1. To open the Sample Project in BESLN. file format, which comes with the installation files, click on the **Open Sample Project** command within the welcome window.

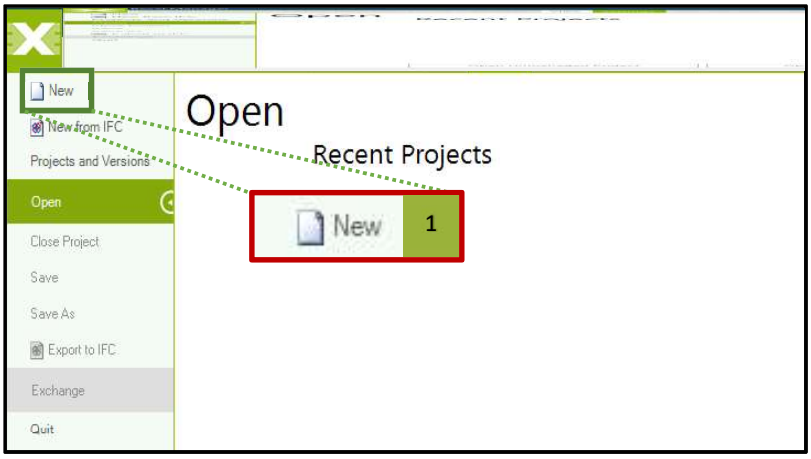


NOTE: When the process of opening the Sample Project is finished, the interface opens, where we have the preview of the model. The difference between these two commands described above is, that with the first process we have created an Untitled folder and within it a version with the date of the creation stated in the name. With the second process we have created a new project named Bexel Sample Project and within this project a new version named V1. This information can be reviewed within the Manage Projects and Versions window on the picture above. This window is activated using the Projects and Versions command within the welcome window.

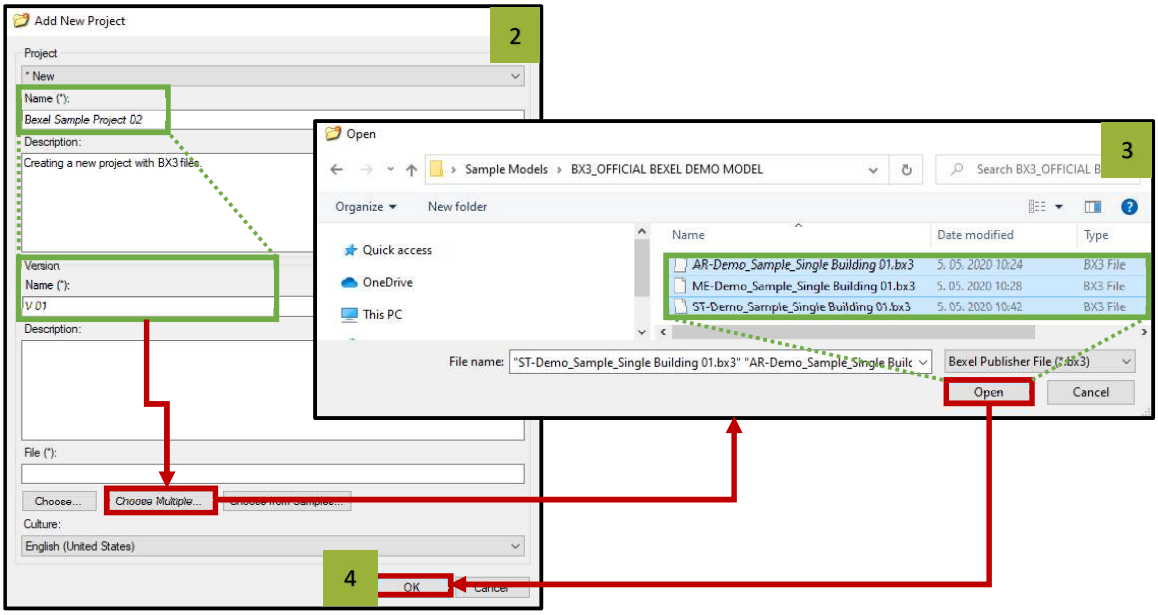
1.4. CREATING A NEW PROJECT USING DIFFERENT BX3 FILES

While we are working on a project for a longer period of time and as the project evolves, we want to have a preview of all created versions of the project. For this purpose, we suggest, that a new project is created. For the creation of a new project, we will use three files already mentioned above: **AR-Demo_Sample_Single Building 01, ME-Demo_Sample_Single Building 01** and **ST-Demo_Sample_Single Building 01** in BX3 format file located in the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson1.0\Exchange).**

1. Activate the software. → In the **Welcome** window click on the **New** command. →



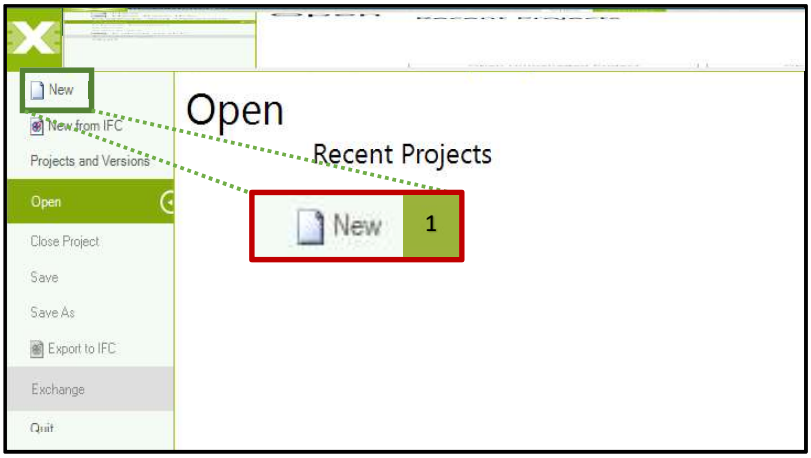
2. An **Add New Project** window opens, where the **name** of the project should be defined, for example, **Bexel Sample Project 02** within the **Project** section and the **name** of the version, for example, V 01 in the **Version section**. → After defining the names and adding description if needed, click on the **Choose Multiple…** button. →
3. In the **Open** window choose **BX3** files and click on the **Open** command. → Finish the process by clicking on the **OK** button within the **Add New Project** window.



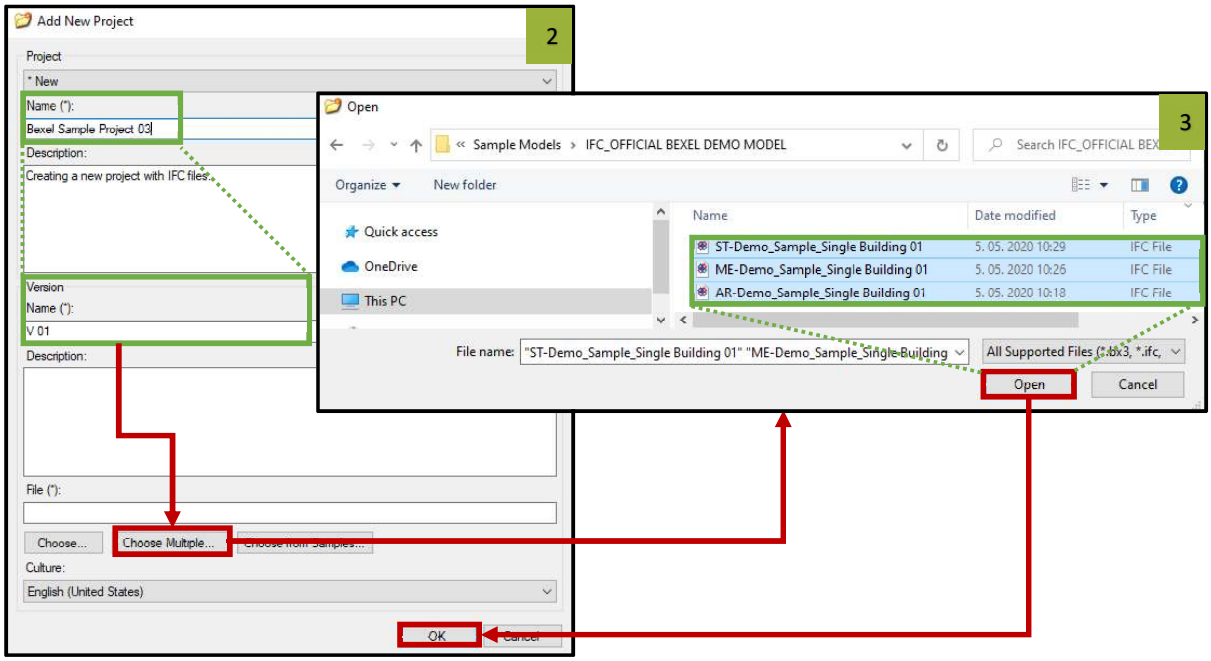
1.5. CREATING A NEW PROJECT USING IFC FILES

The process of creating a new project from IFC files is the same, the only difference is that we select IFC format files which are also located within the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson1.0\Exchange).**

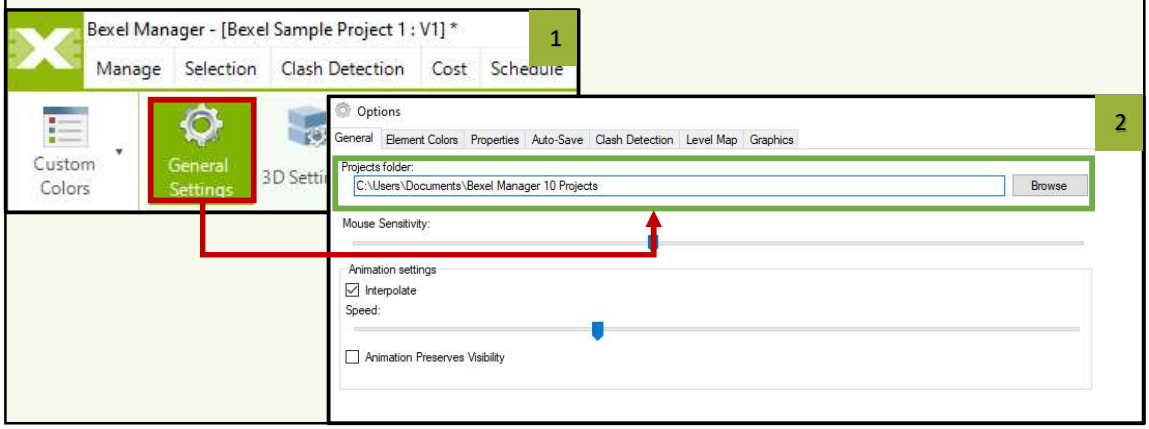
1. Activate the software. → In the **Welcome** window click on the **New** command. →



2. An **Add New Project** window opens, where the **name** of the project should be defined, for example, Bexel Sample Project 03 within the **Project** section and the **name** of the version, for example, V 01 in the **Version** section. → After defining the names and adding description if needed, click on the **Choose Multiple…** button. →
3. In the **Open** window choose **IFC** files and click on the **Open** command. → Finish the process by clicking on the **OK** button within the **Add New Project** window.



ADDITIONAL TIP: When a new project is created, software creates a folder stored on disc C, where all later versions of the project will be afterwards saved. If the user wants to change the location, where the files are automatically saved, the command General Settings within the Settings tab should be used. In the Options window define the location of saved files in the Project folder window.

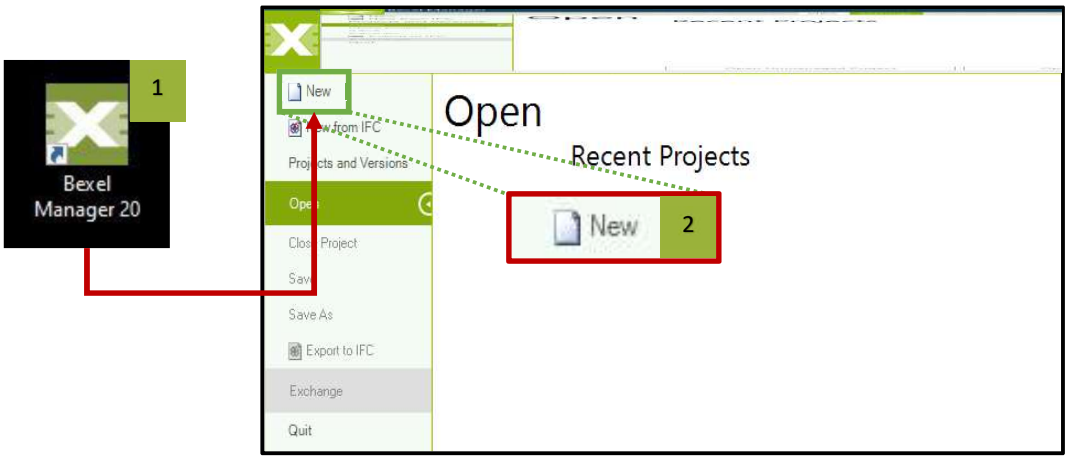


1.6. UPDATING THE MODEL

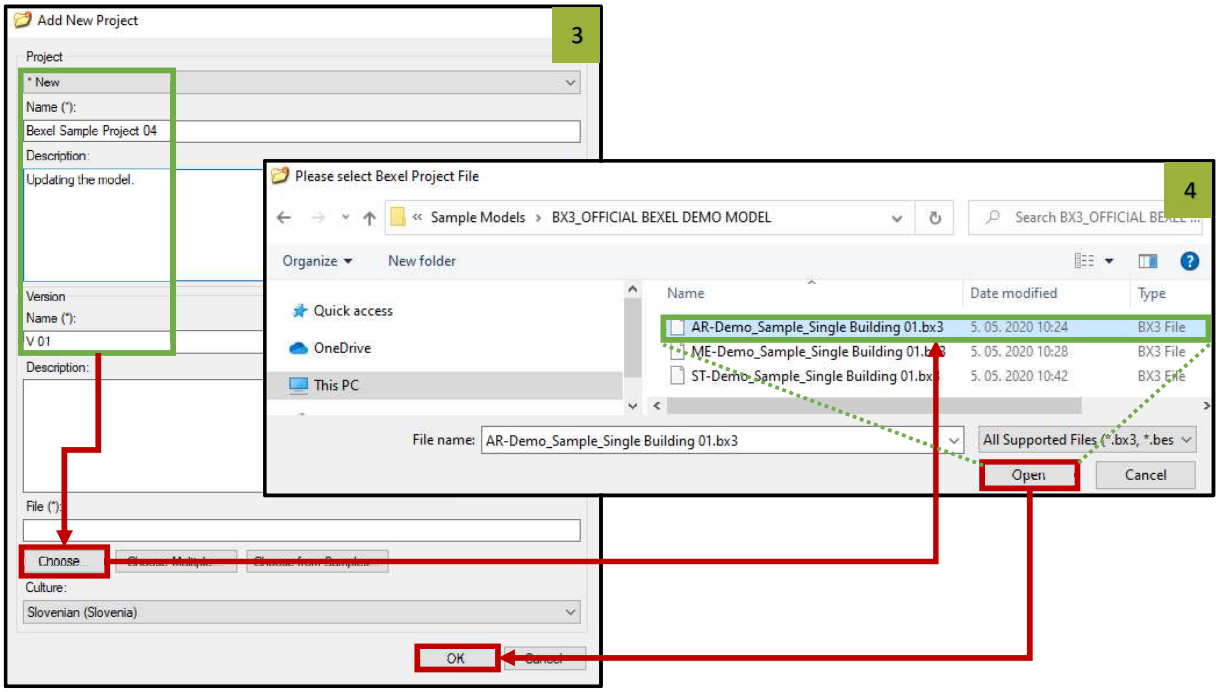
In this chapter we will describe the process of updating the model, which is useful when dealing with updates during the development of the project. The process will be represented using three BX3 files located in the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson1.0\Exchange)**, which were used in previous chapters. To repeat the material from the previous chapter, first we will create a new project opening only one partial model and afterwards we will update this partial model with other two partial models, with each update a new version of the project will be created.

STEP 1: Creating a new project using BX3 files

1. If the software is not activated, double-click on the icon, which is located on the desktop. →
2. In the **Welcome** window click on the **New** command. →



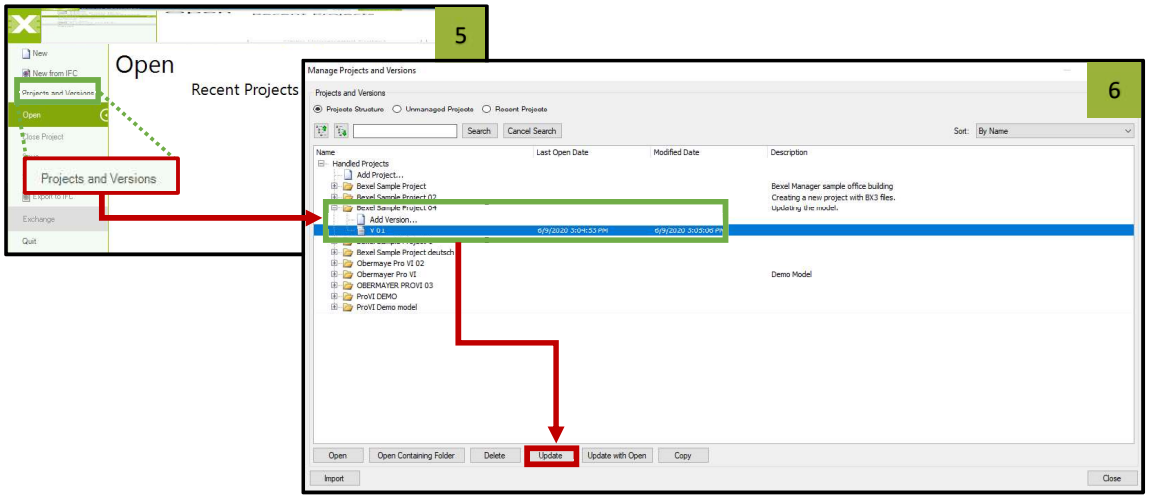
3. An **Add New Project** window opens, where the **name** of the project, for example, Bexel Sample Project 04 within the **Project** section and the **name** of the version, for example, V 01 in the **Version** section should be defined. → After defining the names and adding description if needed, click on the **Choose** command. →
4. In the **Please select Bexel Project File** window choose 1 **BX3** file, for example, **AR-Demo_Sample_Single Building01.bx3** and click on the **Open** command. → Finish the process by clicking on the **OK** button within the **Add New Project** window.



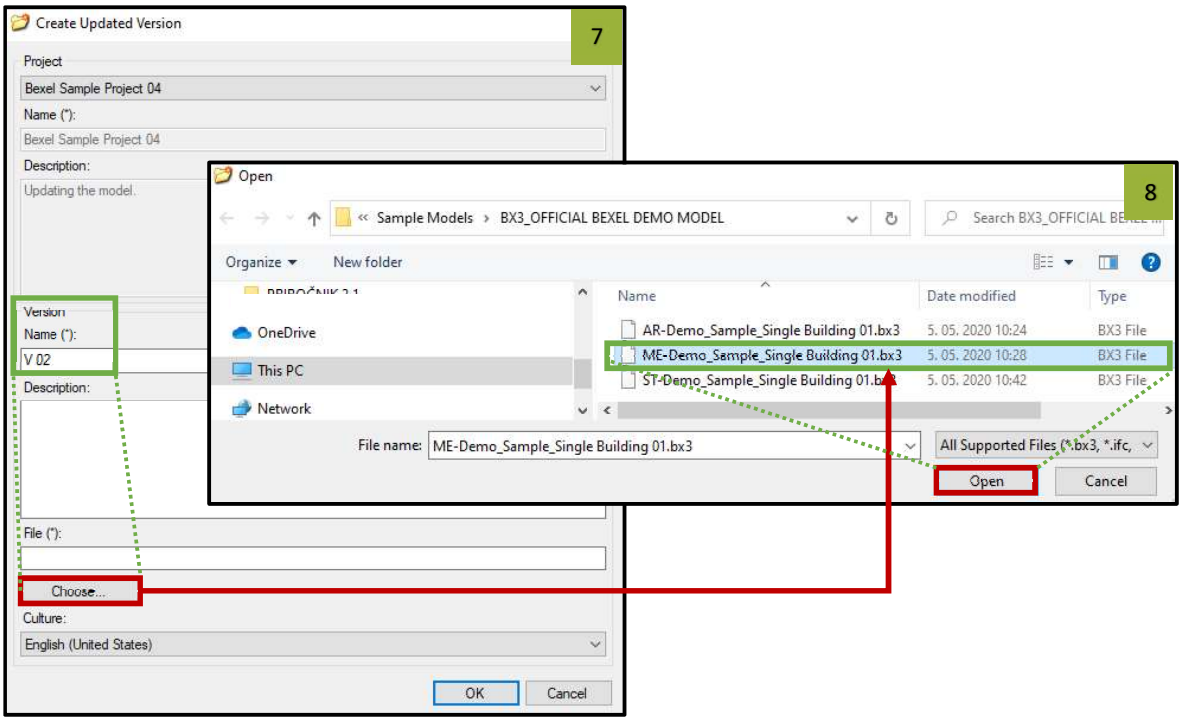
STEP 2: Updating the model

In the second step we will update the existing file by adding another file and during the update the software will automatically create a new version. Before the update begins, close all opened files by clicking on the Close Project command within the welcome window. To execute an update of the model, please follow the process described below.

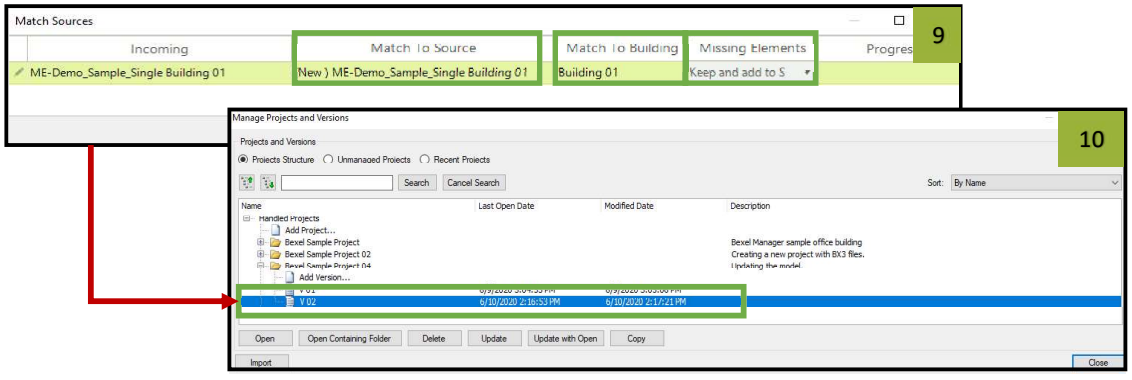
5. Activate the **Project and Versions** command, which is located in the **Welcome window**. →
6. Select a **version** of the project, which should be updated and click on the **Update** command.



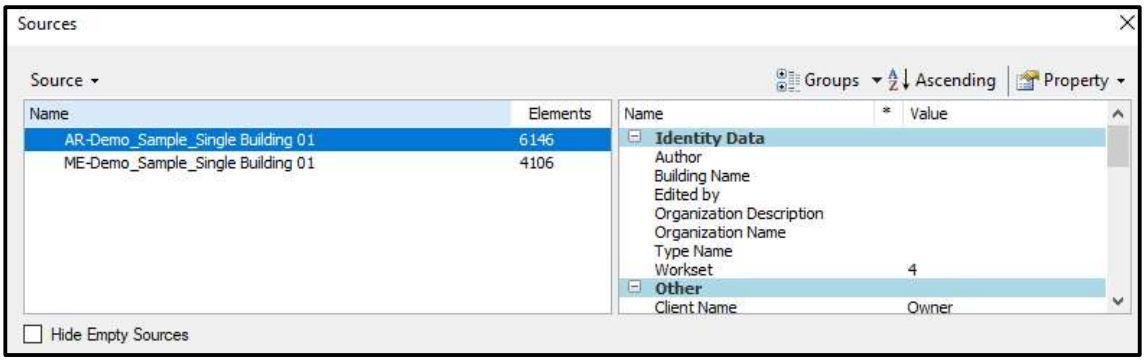
7. Within the **Create an Updated Version** window define the **name** of the new version and click on the **Choose** command. →
8. In the **Open** window select a file, for example, **ME-Demo_Sample_Single Building 01 in BX3** file and click on the **Open** button. →



9. Within the **Match Sources** window in the **Match To Source** column define the **New** source. In the **Match To Building** column define **Building 1** and in the **Missing Elements** column select **Keep and add to selection** option. → Finish the process by clicking on the **OK** button. →
10. When the update is finished, the **Projects and Versions** window opens, where the updated version occurs. →



11. To review if the model was properly updated, please activate the **Manage** tab and afterwards the **Sources** command.



As it is shown on the picture above our federated model now contains two different partial models **AR-Demo_Sample_Single Building 01** and **ME-Demo_Sample_Single Building 01.** Please repeat the process of updating the model by adding another partial model named **ST-Demo_Sample_Single Building 01.** After the update, check within the Sources window how many models does the federated model contain. It should contain three different models.

NOTE: Please note, with each update we have added one partial model and a new version was created, for which we have defined the name. In the Manage Projects and Versions window, which is activated by clicking on the Projects and Versions command, there is a preview of all projects and version we have created during this first lesson.

1.7. MANAGING PROJECTS AND VERSIONS

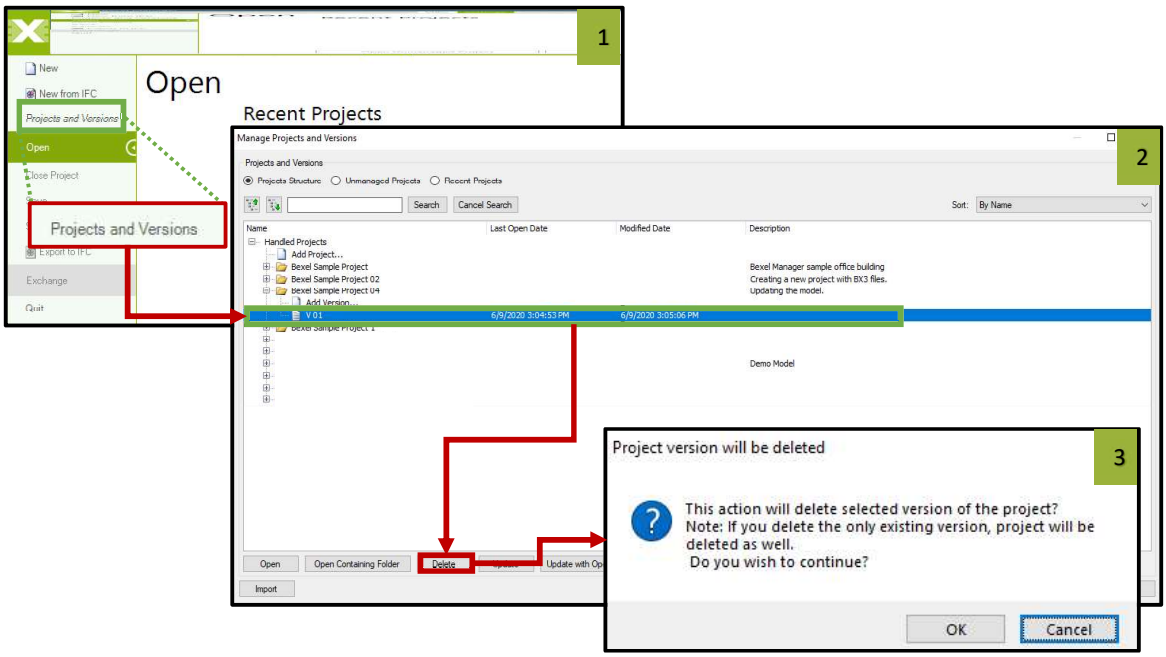
So, in previous sections, we have created a new Untitled project using the drag-and-drop option. The next project we have created was the Bexel Sample Project using the Open Sample Project command in the welcome window. Afterwards we have created two different projects Bexel Sample Project 02 and Bexel Sample Project 03 with different file formats using the New command within the welcome window. We have demonstrated the process of the update by creating the Bexel Sample Project 04. For further lessons we do not need so many projects and versions, so for this purpose we will now demonstrate how to manage projects and versions within the Manage Project and Versions window.

1.7.1. DELETING A PROJECT OR A VERSION

To delete a version or a project, please follow the process below.

1. Click on the **Projects and Versions** command. →
2. Within the **Manage Projects and Versions** window choose a certain version that should be deleted, for example, the created version **V 01** of the **Bexel Sample Project 04**. → By selecting it, the software colors our selection blue and commands in the lower part of the screen are activated. →

3. Click on the **Delete** command. → The software asks again if the user is certain he wants to delete the version. → Finish the process by clicking on the **OK** button.

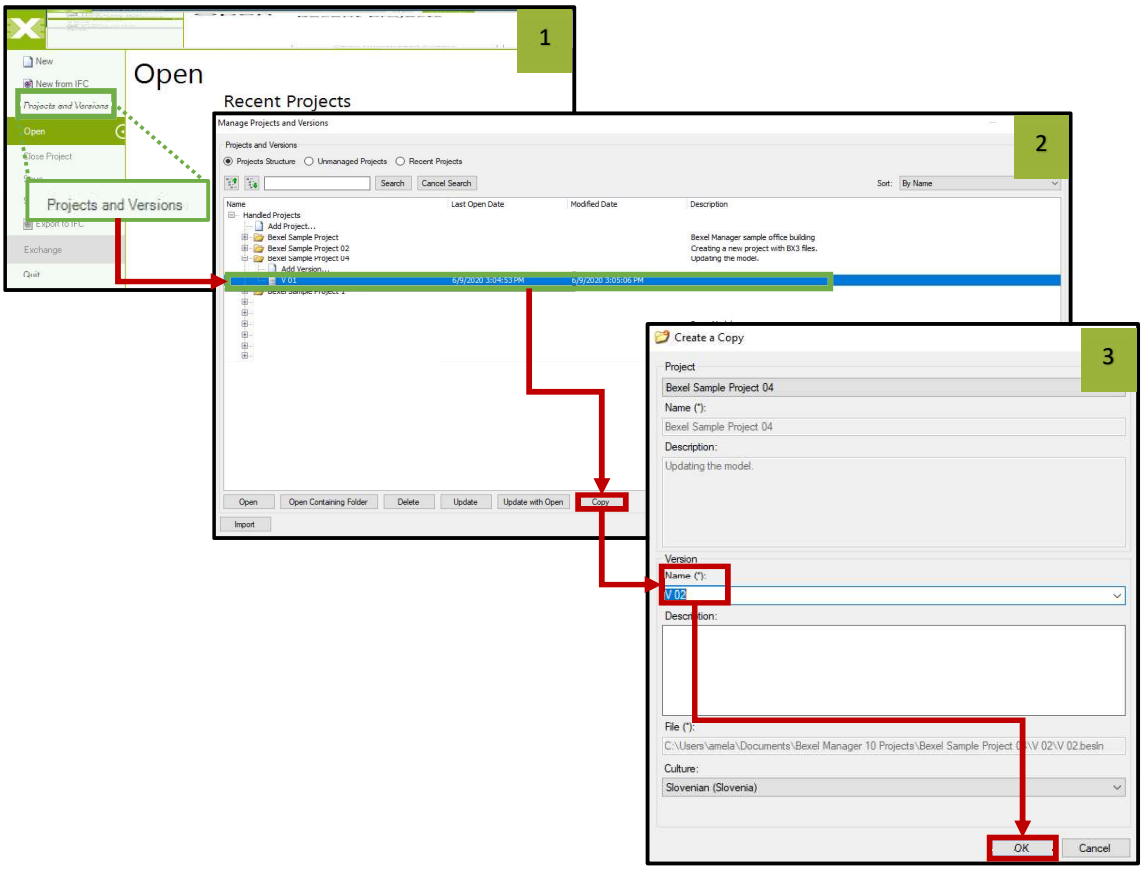


NOTE: Please note, while deleting the only existing version of a certain project, the whole project will be deleted as well. The software triggers this notification, which can also be reviewed on the picture above. The deleted project cannot be restored within the Recycle Bin.

1.7.2. COPYING A VERSION OF A PROJECT

To copy a certain version, please follow the process below.

1. Click on the **Projects and Versions** command. →
2. Within the **Manage Projects and Versions** choose a certain version that should be copied and click on the **Copy** command. →
3. In the window **Create a copy** define the name of the copied version and finish the process by clicking on the **OK** button.



NOTE: NOTE: Please note, in lesson 1 we have used partial IFC and BX3 files but for the exercises in further lessons we will use a Bexel Manager Sample Project V02 Start model which does not contain any analysis and to review the results we will use the Bexel Manager Sample Project V02 Complete model, which will be placed in the folder according to lessons. Exchange files within the Lesson 1 do not contain a completed model because we are only describing the process of activating software and creating new projects.

LESSON 02

BEXEL MANAGER

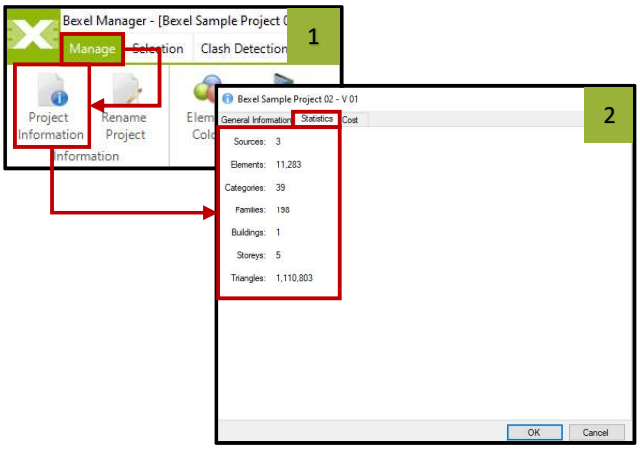
2. A QUICK REVIEW OF THE MODEL

In the first Lesson we have demonstrated how a new project can be created in Bexel Manager. Now we will talk about tools that enable the user a quick overview of the BIM model. For this purpose, we will use the model which is located in the **Bexel Manager Sample Project V02 Start** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Bexel Manager Sample Project V02 Start)** and to review the results the model within the completed model, please review the model within the **Lesson 2.0 Complete model** folder.

2.1. GENERAL INFORMATION ABOUT THE PROJECT

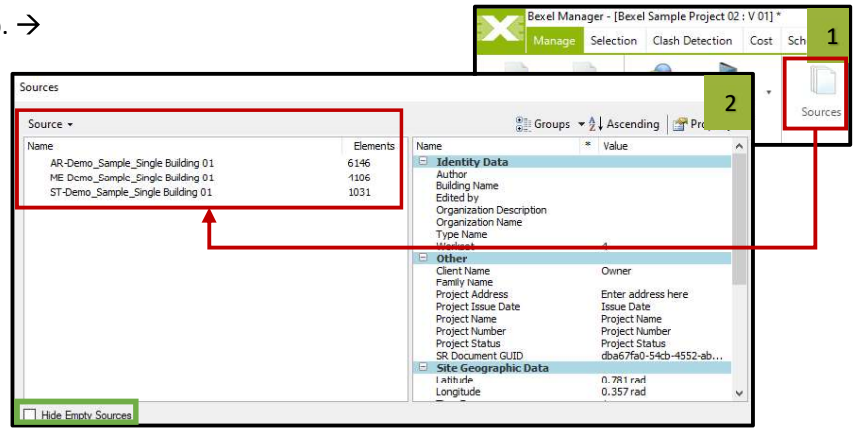
When opening a BIM model for the first time, we would like to know basic statistics, for example, the number of sources, elements, categories and etc. To get this kind of information, please follow the process below.

1. Activate the **Manage** tab. → Click on the **Project Information** command.
2. A **Bexel Sample Project 02 – V01** window opens where the user activates the **Statistics** tab.



As we have talked about different sources, which a BIM model contains, we would like to examine this type information further on. This is demonstrated on the picture below.

1. Activate the **Manage** tab. →
2. Click on the **Sources** command and in the **Sources** window a preview of all sources is shown.

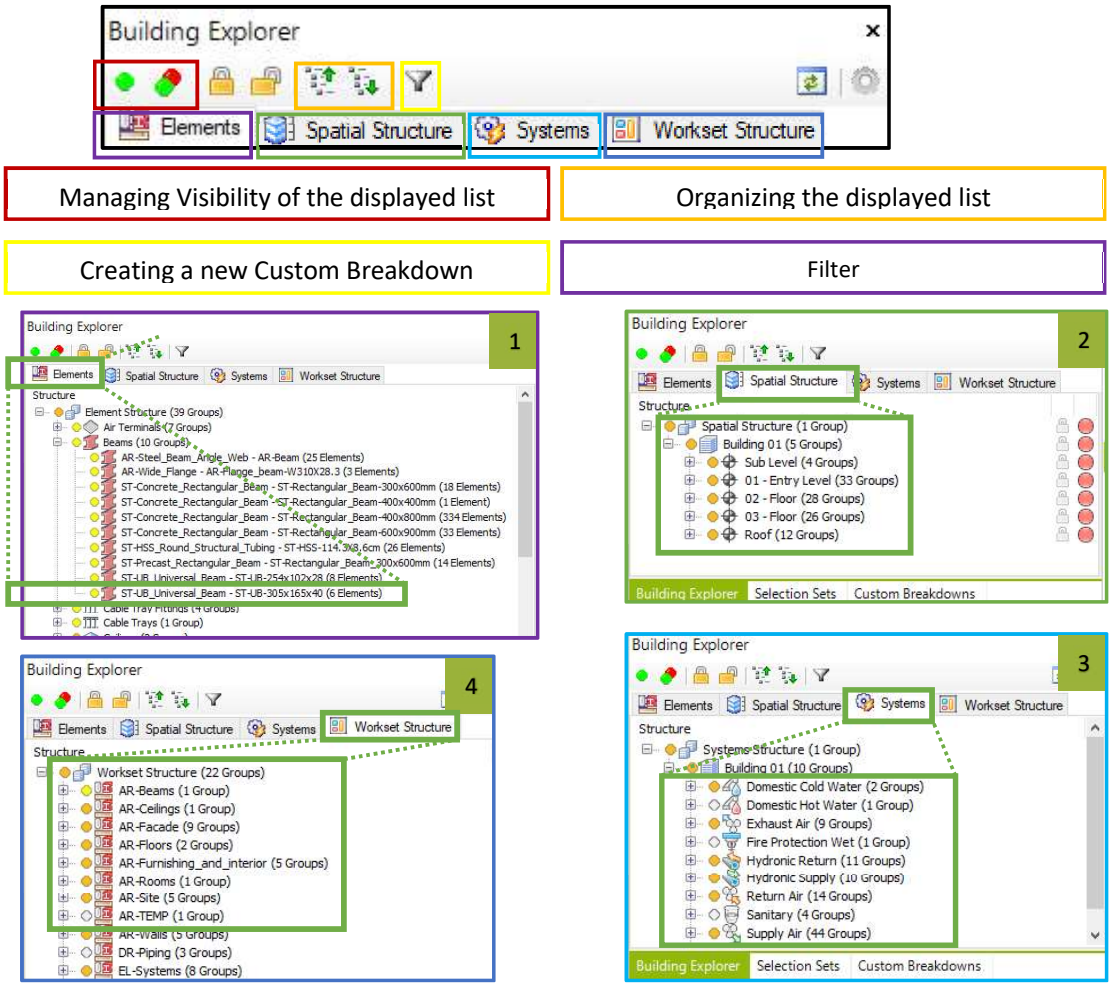


NOTE: Within the Sources window a Hide Empty Sources option is demonstrated. If the user would like to examine also empty sources, which means that they do not contain elements, then the box in front of the option should be unchecked. This type of information can be useful while dealing with projects that contain dozens or even hundreds of sub models and user can examine if all sources were properly imported in to the federated model in Bexel Manager software.

2.2. BUILDING EXPLORER PALETTE

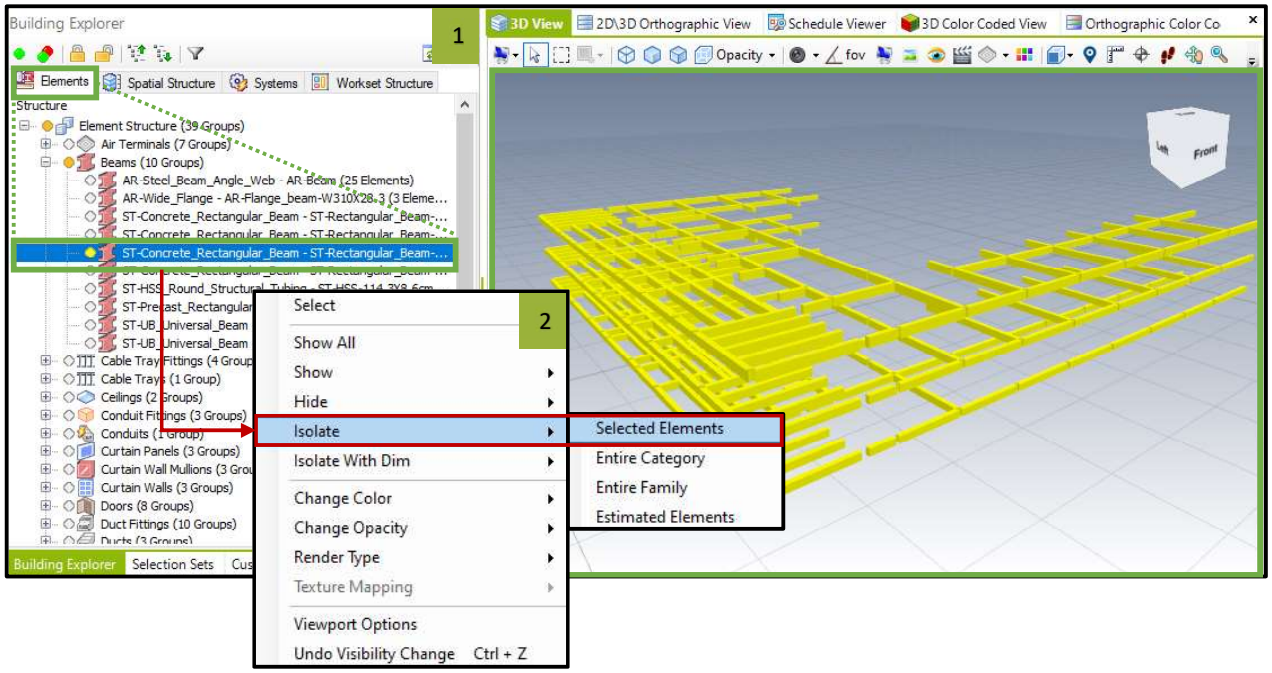
Our sample model was created in Revit. That means that the elements are grouped in families and categories. To review the structure of the BIM model, activate the Building Explorer palette, which is located on the left side of the screen and is divided in four different tabs: Elements, Spatial Structure, Systems and Workset.

1. To activate either one of these tabs, first activate the **Building Explorer** palette and then **Elements**, **Spatial Structure**, **Systems** or **Workset Structure** tab.



To get a preview of elements of a certain group in the viewport, follow the process below.

1. Click on the family, for example, **ST-Concrete_Rectangular_Beam - ST-Rectangular_Beam-400x800mm** which is located under the **Beams** category in the **Elements** tab so it colors blue.
2. Click with the **right-click** in the **viewport**. → Within the contextual menu choose **Isolate** and afterwards **Selected elements**.



NOTE: The circle before each of the group can be colored yellow, grey or white. If it is white, the group is not active in the viewport. In case the circle is yellow, the group can be seen in the viewport. The circle appears orange when not all elements from a certain group, for example, a family are visible.

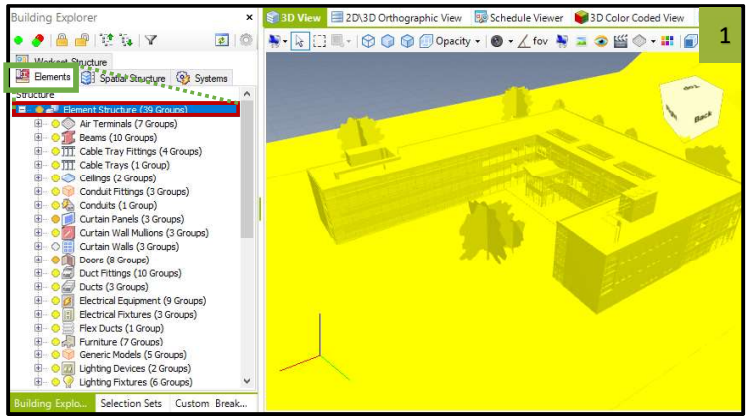
2.3. PROPERTIES PALETTE

Building Explorer enables the user to review the elements of the model within the viewport. On the right side of the screen a Properties palette is located, which allows users to review the properties of a certain group of selected elements. Based on these properties the user can further one create a custom breakdown structure, smart selection sets, quantity takeoffs and various other analysis for different phases of the BIM model. Please note, the Properties palette is active only when elements are selected.

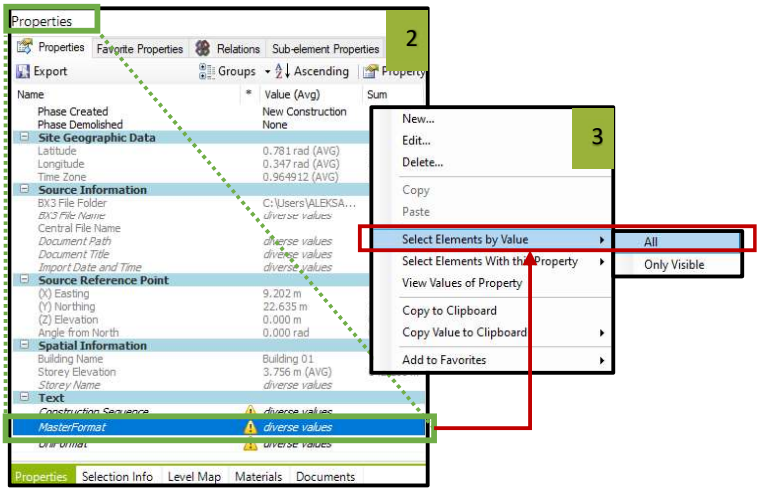
2.3.1. SELECTING ELEMENTS BASED ON A PROPERTY

To select elements based on a certain property, for example, MasterFormat within the Properties palette, please follow the process below.

1. Activate the **Building Explorer** palette and the **Elements** tab. → Click on the **Element Structure** group to select all elements of the project. → The selected elements are colored yellow in the viewport. →



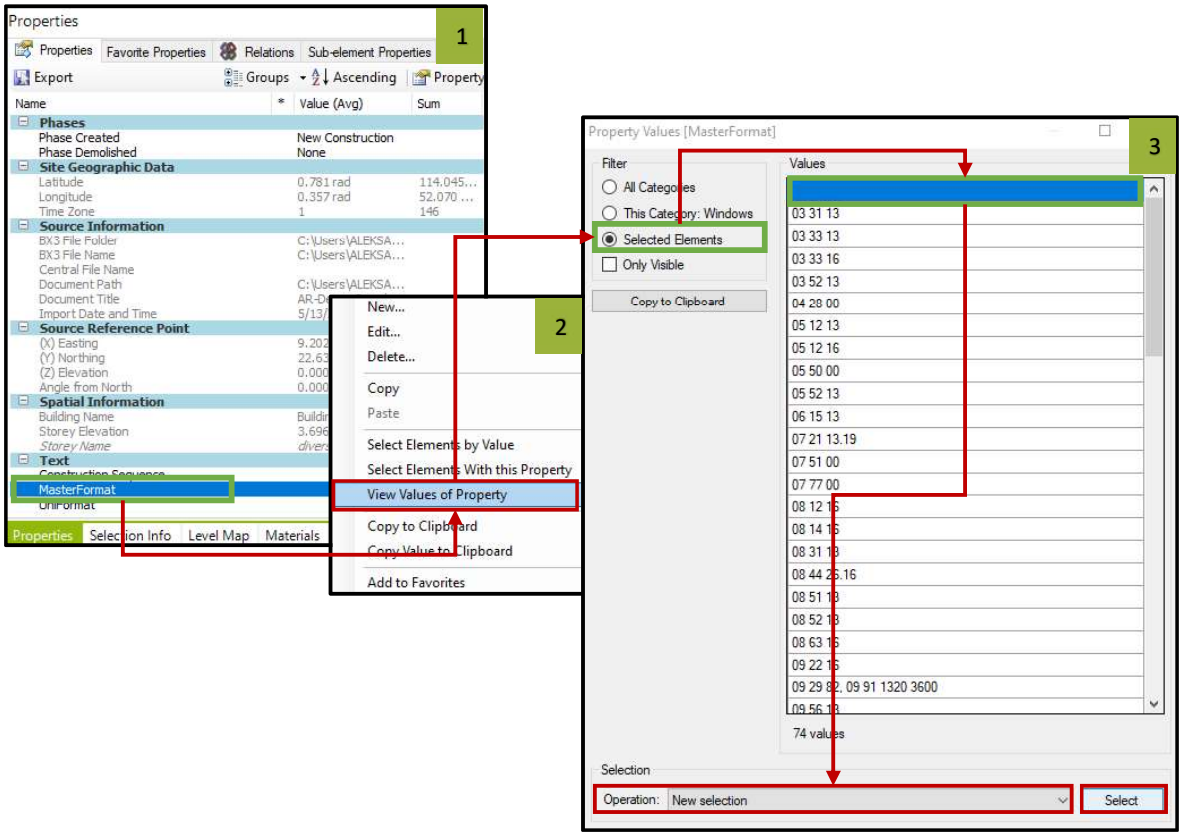
2. Activate the **Properties** palette and choose from the list **MasterFormat** property. →
3. Click on the **MasterFormat** property with the **right-click** and in the menu that opens choose **Select elements with this Property** option and afterwards the **All** option.



2.3.2. PREVIEW OF VALUES OF A CERTAIN PROPERTY

In the previous section we have selected a group of elements which have a MasterFormat property but we do not know the values for the chosen property. In the process below, we will explain how to select elements with a certain value or no value at all for the chosen property.

1. Activate the **Properties** palette. → Click on the **MasterFormat** property so it colors blue. →
2. With the **right-click** activate the menu, where the **View Values of Property** option should be chosen. →
3. In the **Property Values (MasterFormat)** window click on the **Selected Elements** option within the **Filter** section. → In the **Values** window choose the first row, where there is **no value** displayed. → In the **Selection** section choose the **New Selection** option and click on the **Select** button.

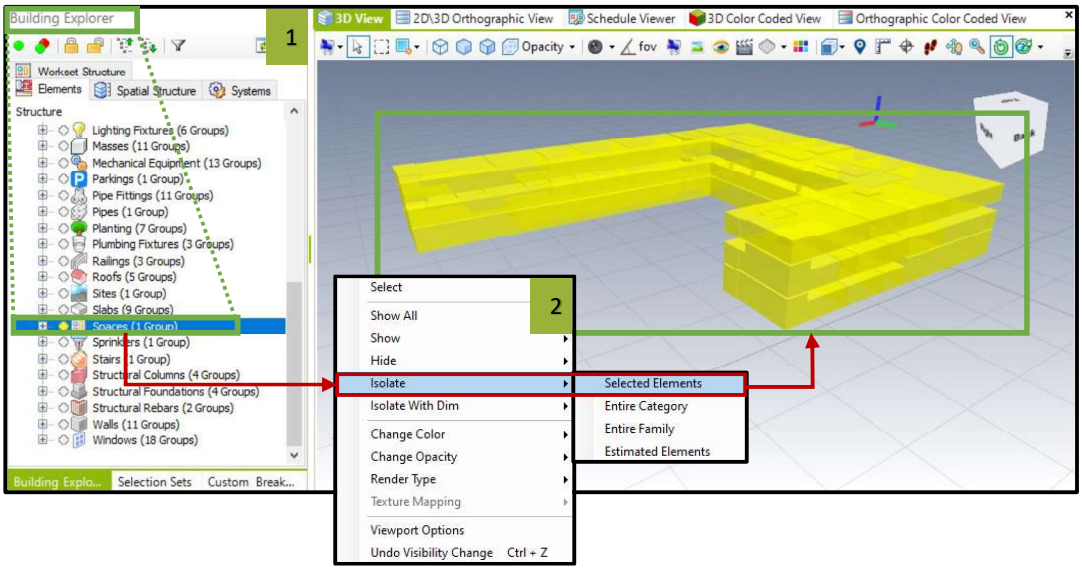


ADDITIONAL TIP: For a better preview of elements that have a MasterFormat property but do not have a value for it, Isolate and Selected Elements commands from the contextual menu can be used. The contextual menu is activated by clicking in the empty space in viewport with the right-click.

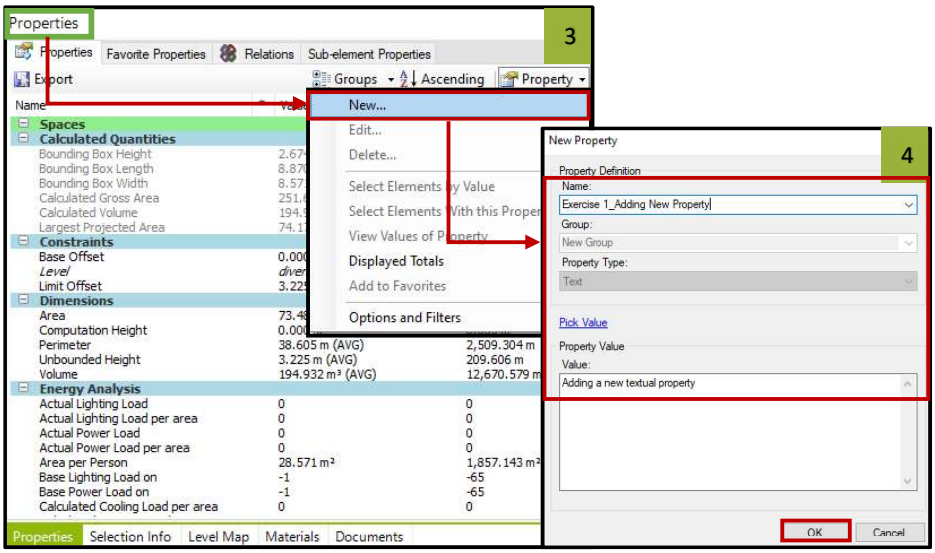
2.3.3. ADDING PROPERTY

Adding property to the BIM model is usually performed in the BIM authoring tool but it can also be performed in Bexel Manager software. The software enables the user to export the model as an IFC file format, which means that the properties added to elements can be preserved. In the process below, we will add a new textual property to the Spaces category.

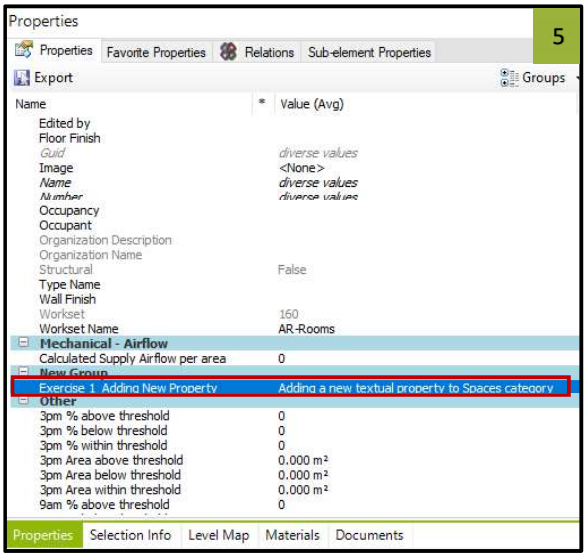
1. Activate the **Building Explorer** palette and in the **Elements** tab choose the **Spaces** category. →
2. Click in the **empty space** of the **viewport** in the **3D View** with the **right-click** and choose from contextual menu the **Isolate** option and afterwards the **Selected elements** option.



3. Activate the **Properties** palette and then click on the **New…** command.
4. In the **New Property** window define the name of the property, for example, **Exercise 1_Adding New Property** and the group were the new property will be placed, for example, **New Group**. Under the **Property Type** define the **Text** as the type of created property. → Finish the process by clicking on the **OK** button.



5. To review if we have finished the process of adding a new property correctly, please activate the **Properties** palette and find the property.

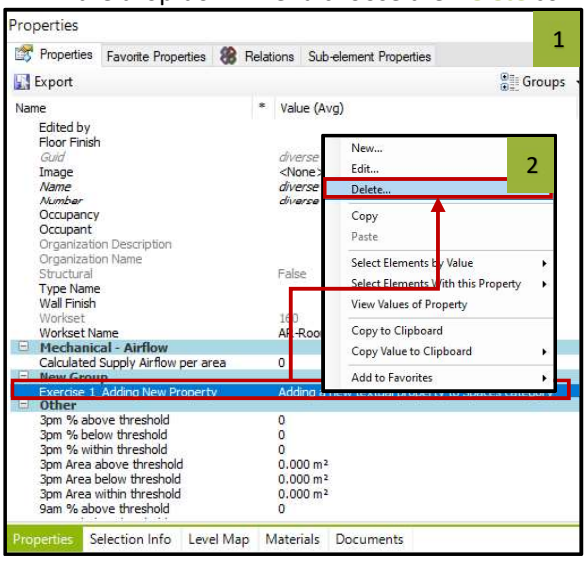


ADDITIONAL TIP: If the property that was created is not on the list of the properties within the Properties palette, please click on the Property command in the upper right corner and in the drop-down menu choose the Options and filters command. In the Options windows click on the Check All button. By that we have defined that all properties will be displayed in the Properties palette.

2.3.4. DELETING A PROPERTY

To delete a property, we have created in the process demonstrated above, please follow the process.

1. Click on the **Exercise 1_Adding New Property** property with the right-click. →
2. In the drop-down menu choose the **Delete** command.



LESSON 03

BEXEL MANAGER

3. VISUAL PROCESSING OF THE MODEL

As we have mentioned before, Bexel Manager is not an authoring tool, which means the geometry of the model cannot be changed. In this lesson we will talk about how to change the appearance of the model by adding colors and texture. For this purpose, we will use a version of the model with no texture named **V3.0S**, which is located in the **Exchange** folder (**PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson3.0\ Exchange)**. Within the folder **Lesson 3.0 Complete model (PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 3.0)** there is a model, where the results of the described processes in this lesson are represented and user can review if he has worked properly on the model.

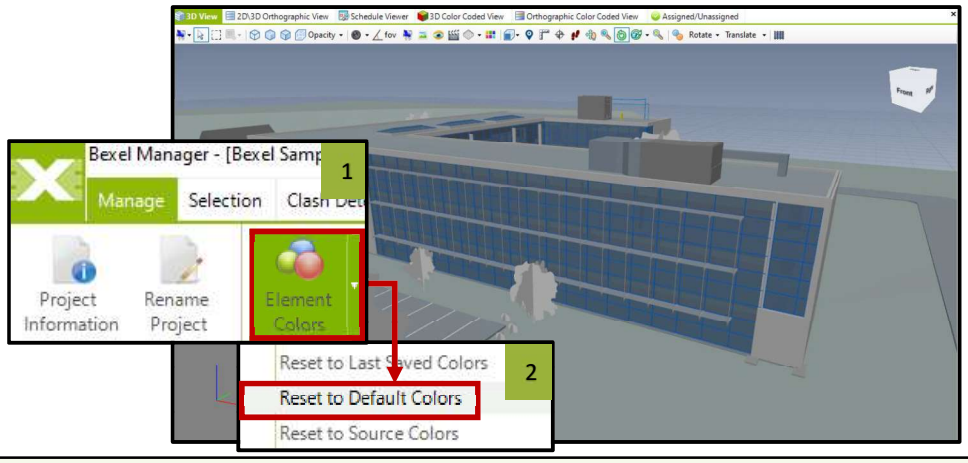
3.1. ADDING COLORS

When the model is imported, it can appear in grey as if there where now colors added in the authoring tool. To add some colors, two options can be used in Bexel Manager within the Manage tab and the Element colors command. The first option is Reset to Default colors and the other option is Reset to Source Colors.

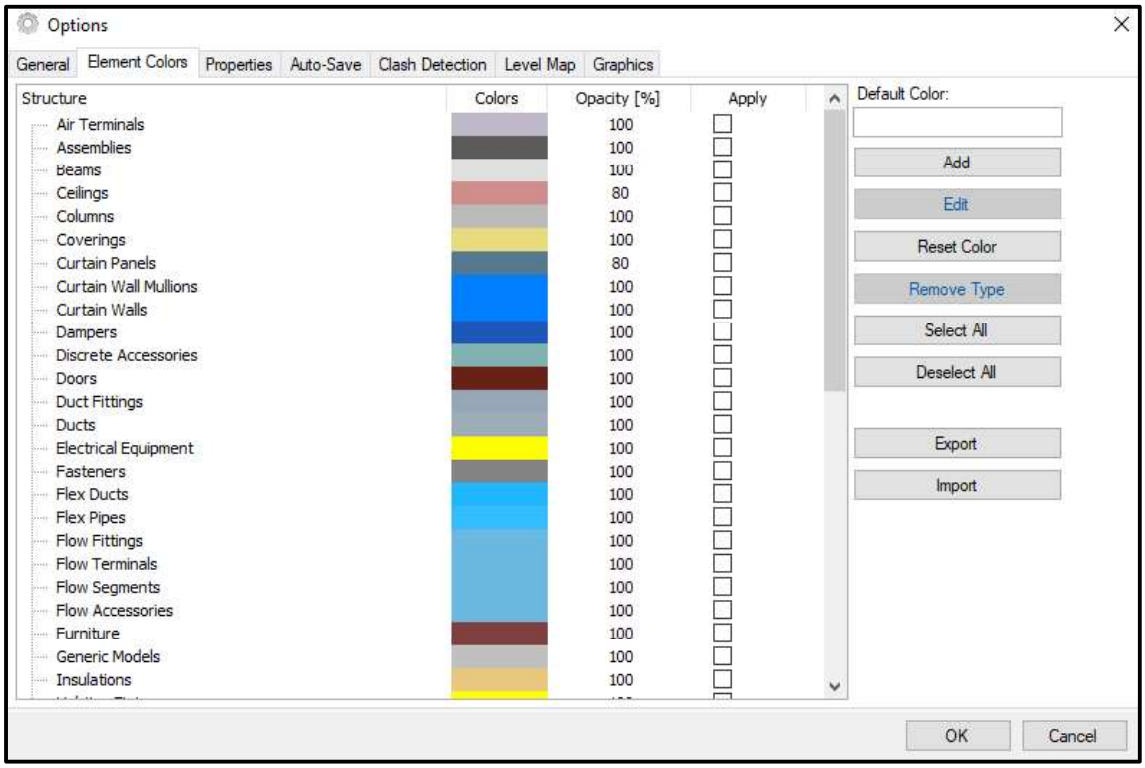
3.1.1. THE RESET TO DEFAULT COLOR COMMAND

This command enables the user to reset the colors of the model to default color palette of our software. To color a model to default colors, follow the process below.

1. Click on the **Manage** tab. → Afterwards click on the **arrow** beside the **Element Colors** command. →
2. In the drop-down menu choose option **Reset to Default Colors**.



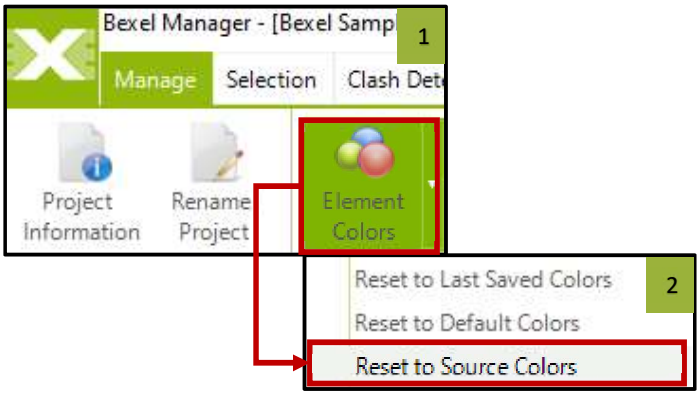
ADDITIONAL TIP: The software enables the user to add or edit default colors, which can also be later on exported ass a Binary file format and used on another project by using the import command. These options are available by clicking on the Element Colors command within the Manage tab. An Options window opens and within it there is an Element Colors window, where all options stated above can be executed.



3.1.2. THE RESET TO SOURCE COLORS COMMAND

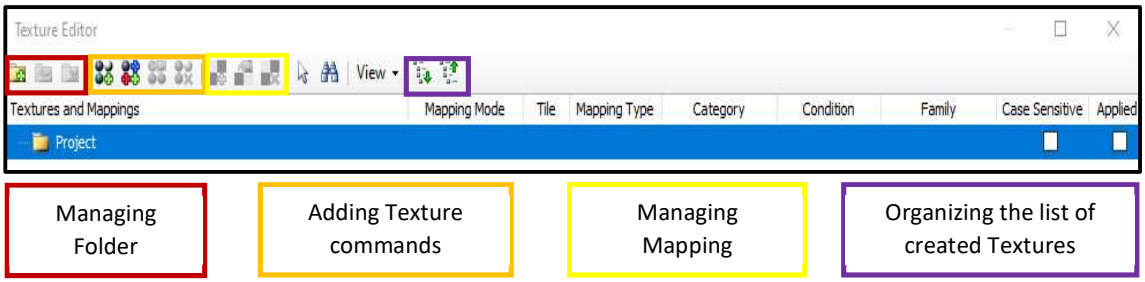
To reset the colors of the model according to materials and colors specified in the authoring tool use the Reset To Source Color command.

1. Click on the **Manage** tab. → Afterwards click on the **arrow** beside the **Element Colors** command. →
2. In the drop-down menu choose option **Reset to Source Colors**.



3.2. ADDING TEXTURE

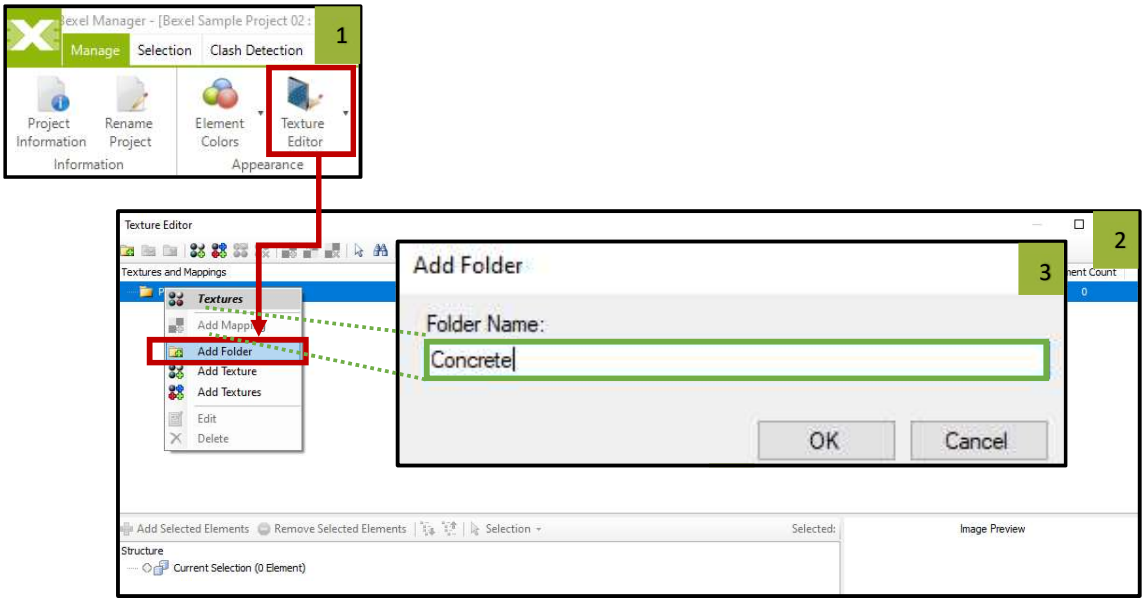
As the user can see our model is colored but does not have any texture. The process of adding texture will be represented in this chapter. Textures can be manually added to selected elements or the Predefined Texture Mapping option can be used.



3.2.1. ADDING TEXTURE WITH THE TEXTURE EDITOR TOOL

To add texture manually to certain elements, please follow the process described below. First a process of creating a custom breakdown structure will be explained and afterwards how to apply texture. If user would like to skip the step of creating a custom breakdown structure, a bxf. file named **Creating a Custom Breakdown based on Material property** can be used. The file is located within the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 3.0\ Exchange)**. To create a folder if needed, please follow the process below.

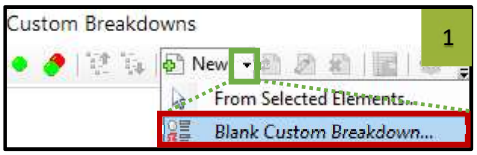
1. Click on the **Texture Editor** tool within the **Manage** tab. → A **Texture Editor** window opens, which is divided in two sections, **Texture and Mappings** section and **Structure** section. →
2. Click on the **Project** folder and then click on the **Add Folder** icon and create a new folder. →
3. In the **Add Folder** window add the name of a new folder, for example, **Concrete** and finish the process by clicking on the **OK** button.



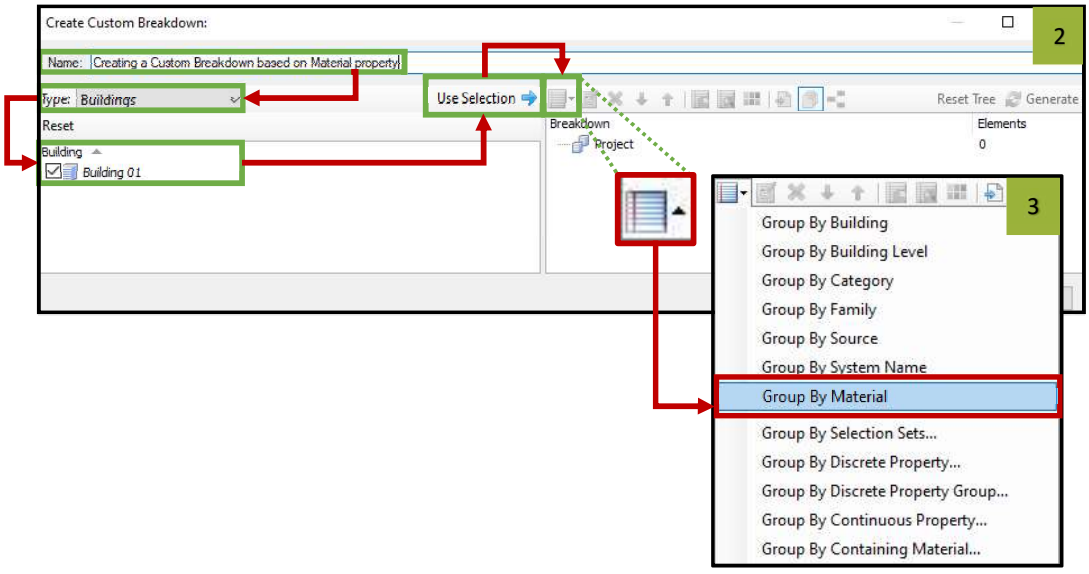
ADDITIONAL TIP: To add a certain texture, the user can also first select elements. The selection of elements can be done in various ways using different tools, for example, the Navigation or Selection Regime tool or with the help of Find Elements tool and etc. Another option is to create selection sets or custom breakdowns using a material property as a criterion based on which a custom breakdowns structure is done, which we will do in this chapter.

STEP 1: Creating a custom breakdown structure based on Material property

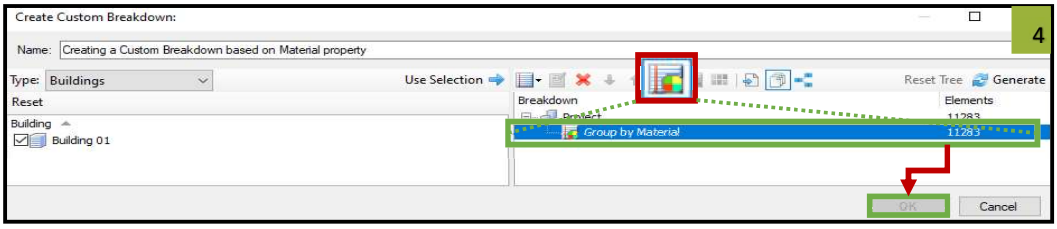
1. To create a custom breakdown structure, activate the **Custom Breakdowns** palette placed on the left side of the screen. → Click on the **arrow** beside the **New** command and choose **Blank Custom Breakdown…** option.



2. Add the name of the structure, for example **Creating a Custom Breakdown based on Material property**, in the **Name** section. → Under the **Type** choose **Buildings** option and check the **box** before the **Building 01**. → Afterwards click on the **Use Selection** command. →
3. Click on the **Add Breakdown Rule** command and in the drop-down menu choose option **Group by Material**. Select the rule **Group by Material** so it colors blue. →



4. Click on the **Set Color Coding Rule** command to color the breakdown structure. → Finish the process by clicking on the **OK** button.

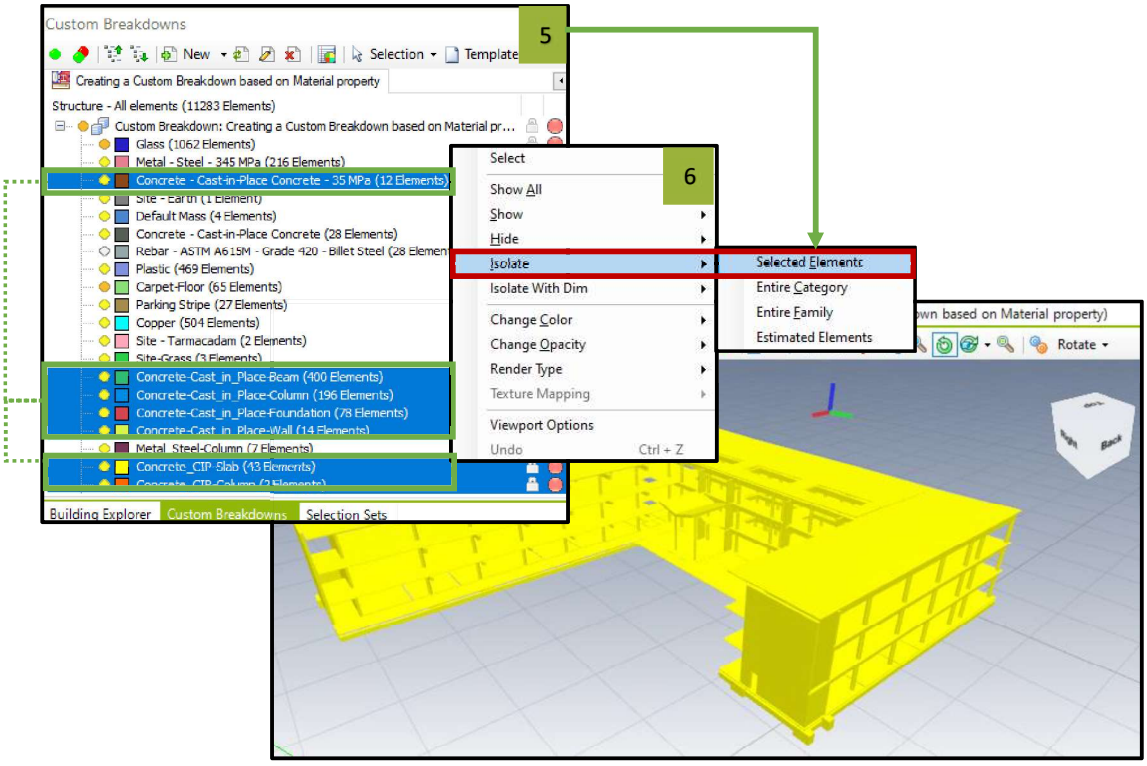


NOTE: In the Custom Breakdowns palette the structure we have just created, appears. So, to see our structure color coded, activate the 3D Color Coded View and the structure of our building divided according the material will appear, where each of the material is colored in different color.

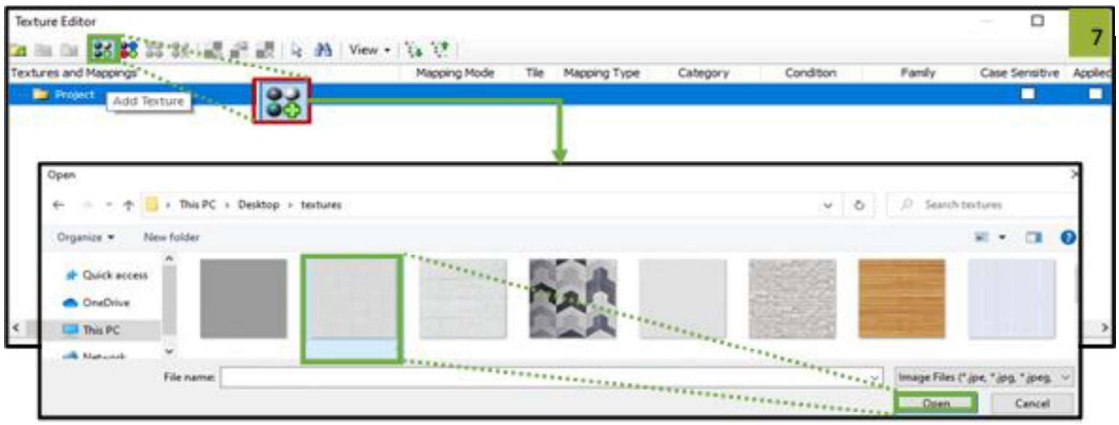
ADDITIONAL TIP: To select elements that have a certain material, click on the selected group within the structure and then click with the right-click in the viewport. In the contextual menu which opens, choose option Isolate and then Selected elements. Now only the selected elements appear in the viewport.

STEP 2: Add texture to selected elements

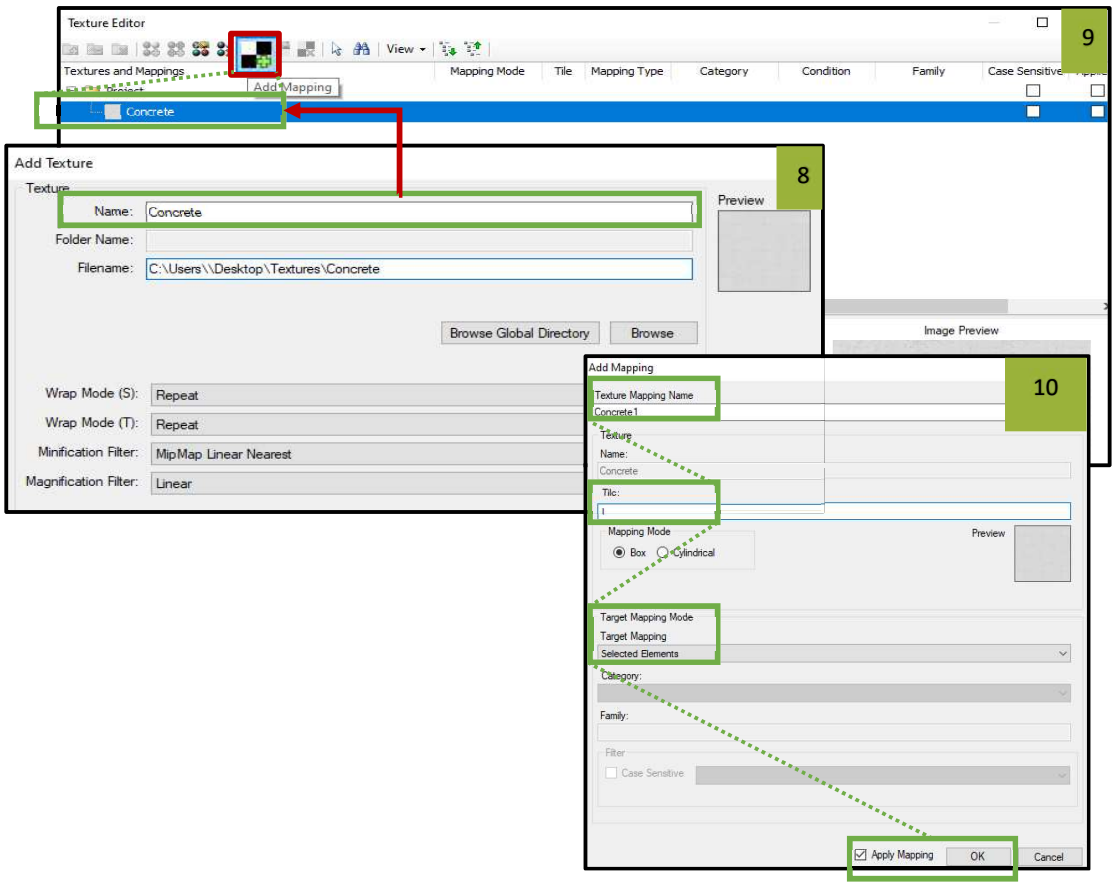
5. To add texture to elements, the user should first select certain elements, for example, elements from groups of just created custom breakdown named **Creating a Custom Breakdown based on Material property** in the **Custom Breakdowns** palette which contains **Concrete** in the name.
6. Isolate selected elements by clicking with the right-click in viewport and choosing the **Isolate** command in the drop-down menu and them option **Selected elements** in the next drop -down menu.



7. Activate the **Texture Editor**. → Click on the **Add Texture** command and choose a certain material. → Afterwards click on the **Open** button. →
8. An **Add Texture** window opens. → In this window define the name of the material, for example, Concrete, and click on the **OK** button. →



9. Click on the **Concrete** material within the **Texture Editor** and choose **Add Mapping** command.
10. In the **Add Mapping** window define the **Texture Mapping** name and in the **Title** section insert a number, for example, **1**. → In the **Target Mapping** section choose **Selected Elements** option.

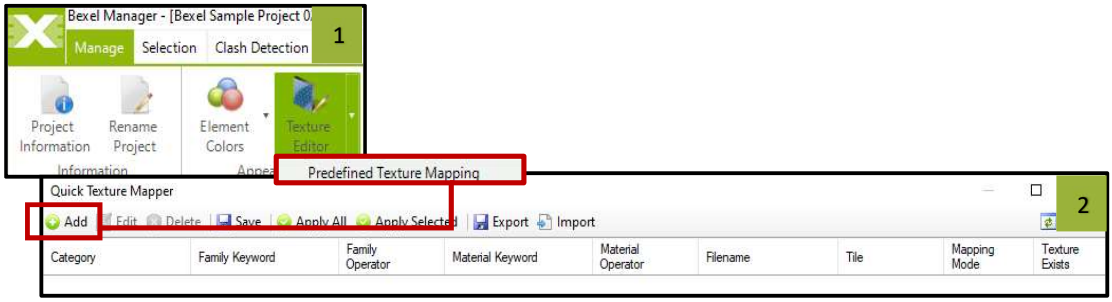


ADDITIONAL TIP: If the texture raster is not appropriate, it can be edited afterwards. Activate the Texture Editor, click on the material which should be edited with the right-click and choose option Edit. In the window Edit Mapping in the Tile section insert a greater number to enlarge the scale of the texture or a smaller number then before to reduce the scale of the texture. To remove the texture from elements, please select a certain element with texture in the viewport and click on it with the right-click. In the drop-down menu first choose option Texture Mapping and then Remove texture.

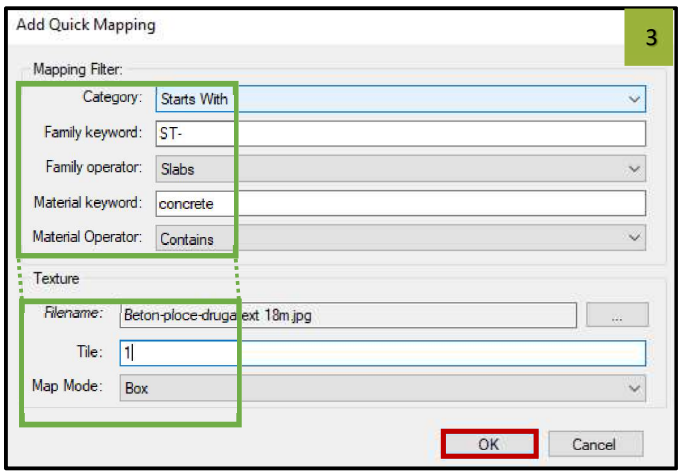
3.2.2. ADDING TEXTURE USING THE PREDIFENED TEXTURE MAPPING OPTION

In the previous section we have demonstrated how to apply texture on selected elements. Now we will describe the process of using the Predefined Texture Mapping. This option allows the user to define the texture that is applied directly to a certain family or a category. To demonstrate the process, we will apply to all families of slabs which the name begins with ST- and have defined the concrete material one texture at the same time. To demonstrate this option, follow the process below.

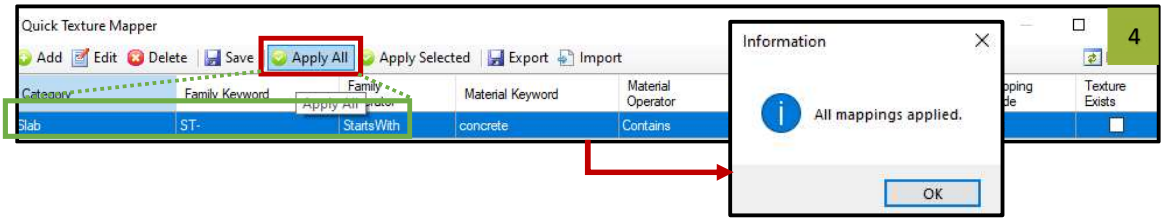
1. Click on the **arrow** next to the **Texture Editor** icon and click on the **Predefined Texture Mapping** command. →
2. In the **Quick Texture Mapper** window click on the **Add** command. →



3. In the **Add Quick Mapping** window under the **Mapping Filter** section in the **Category** box choose **Starts With** option. In the **Family keyword** box insert **ST-** and in the **Family Operator** box choose **Slabs** family. Under the **Material keyword** insert **concrete** and in the **Material Operator** window choose **Contains** option. → In the **Texture** section choose in the **Filename** the texture that should be applied and in the **Tile** box insert the scale of the texture. Under the **Map Mode** box leave the **Box** option. To finish the process, click on the **OK** button. →



4. Afterwards click on the created texture and the **Apply All** command. → If the process was successful a window pops up on the screen notifying the user that all mapping where applied.

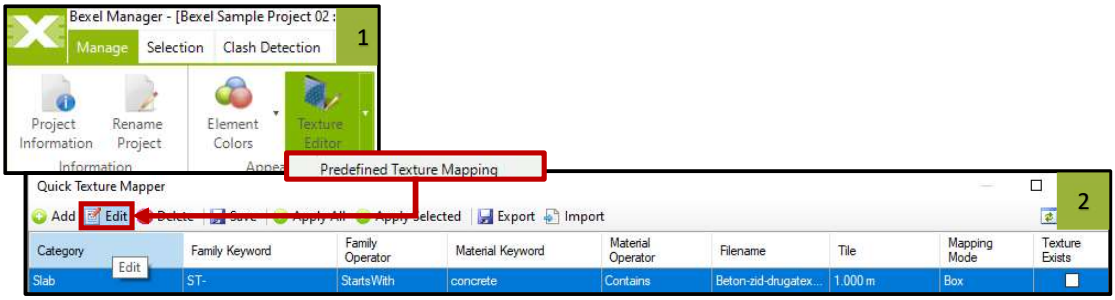


> **NOTE:** To review if the texture was applied to all families of slabs that the name starts with ST- and contain the concrete material, activate the Building Explorer and isolate the chosen families in the viewport.

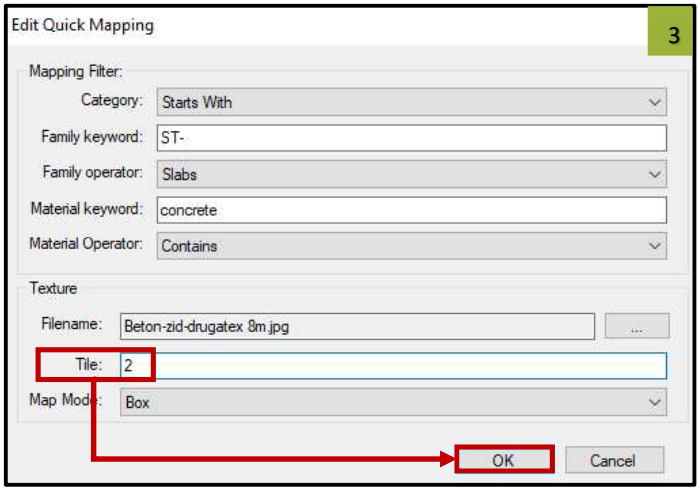
3.2.3. EDITING THE TEXTURE CREATED BY PREDIFENED TEXTURE MAPPING OPTION

If the scale of the material should be changed, the material can be edited afterwards, following the process below.

1. Click on the **arrow** next to the **Texture Editor** icon and click on the **Predefined Texture Mapping** command. →
2. First choose a certain texture in the **Quick Texture Mapper** window and then the **Edit** command.



3. In the **Edit Quick Mapping** window insert in the **Tile** box the scale of the texture that is appropriate. Finish the process by clicking on the **OK** command.

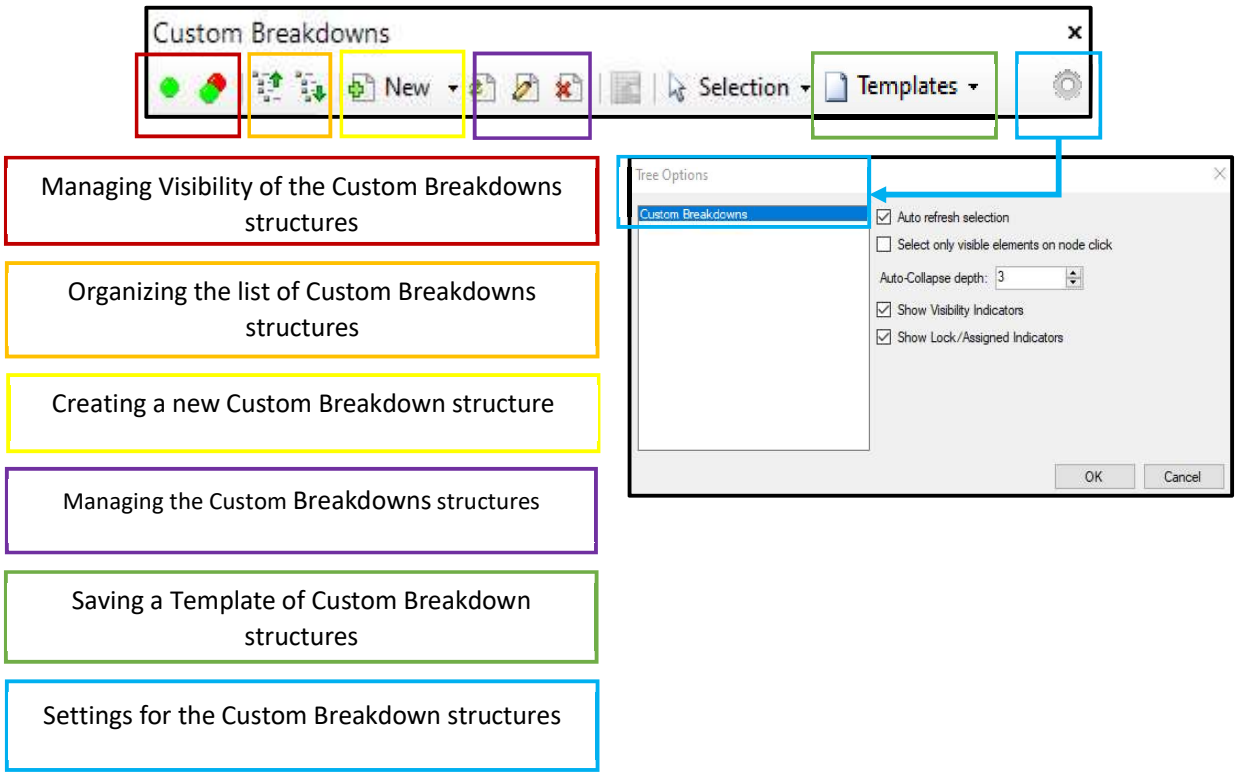


LESSON 04

BEXEL MANAGER

4. CREATING A CUSTOM BREAKDOWN STRUCTURE

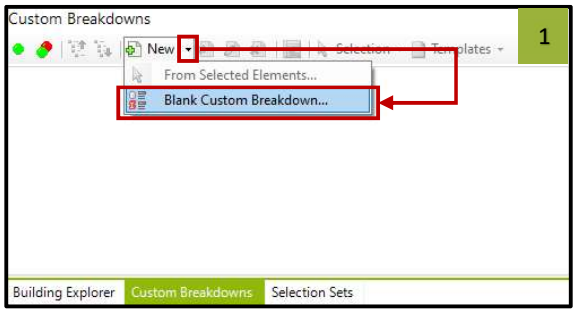
In this Lesson we will demonstrate how to use a Custom Breakdowns tool to create a structure which divides our project based on a chosen criterion. This tool is used to review if the model has all attributes that are needed in the upcoming processes or to create selection sets based on the custom breakdown structure. The user can review results with the help of model located in **Lesson 4.0 Complete model** folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson 4.0\ Lesson 4.0 Complete model)**. Also, a bxf. file was created to demonstrate how to import a file using the Exchange command within the welcome window. More information about Custom Breakdowns tool can be found in the Handbook and Manual regarding this topic. The picture below shows the Custom Breakdowns command line.



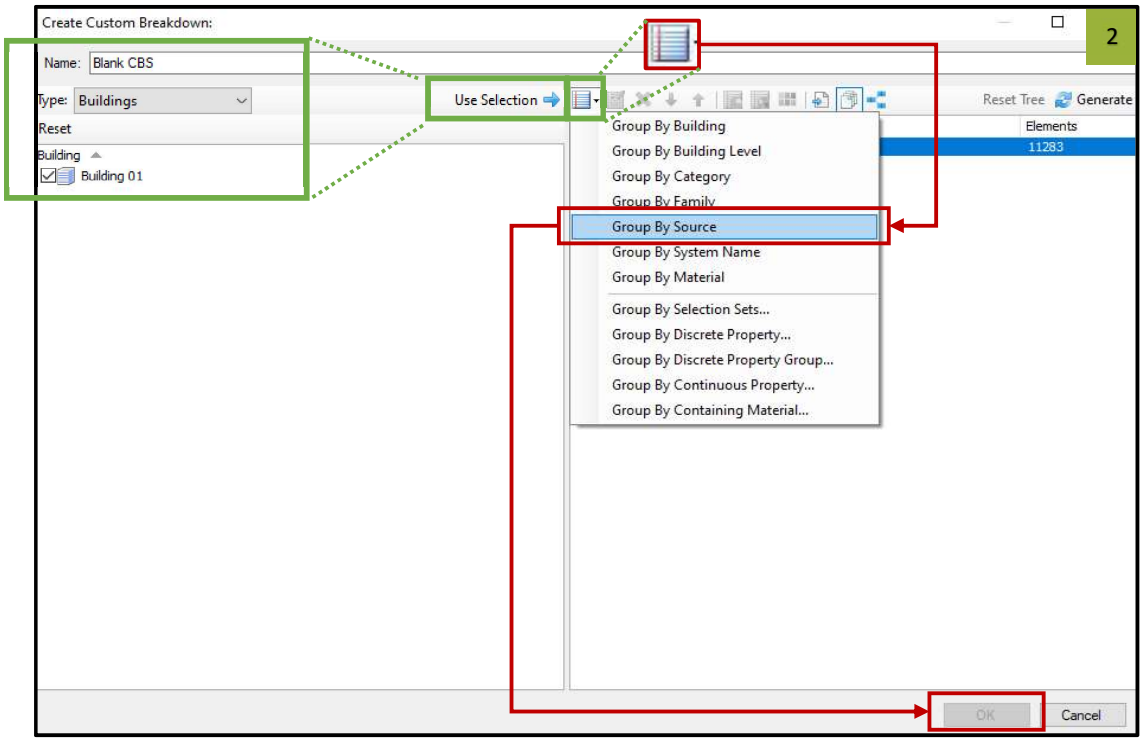
4.1. CREATING A CUSTOM BREAKDOWN BASED ON A SOURCE

A BIM model usually contains numerous partial models, for example, our project consists from a structural, architectural and MEP model. But when dealing with larger models it often occurs that the model consists from couple of dozen models. So, to check if all models where imported properly, the user can create a custom breakdown structure, where he divides the project according to sources. To create a custom breakdown like mentioned above, please follow the steps below.

1. Activate the **Custom Breakdowns** palette, which is located on the left side of the screen. → Since we haven't created a custom breakdown structure yet, the palette is empty. → Click on the **arrow** beside the **New** command and choose the **Blank Custom Breakdown** option. →



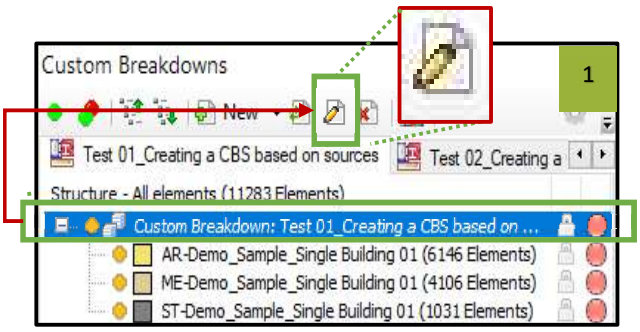
2. In the window **Create Custom Breakdowns** define the **name** of the structure, for example, **Test 01_Creating a CBS based on source**. → Under the **Type** choose option **Buildings** and check the **box** in front of the **Building 01**. → Click on the **Use Selection** button. → Click on the **Add Breakdown Rule** and in the drop-down menu choose option **Group by Source**. → Finish the process by clicking on **OK** button.



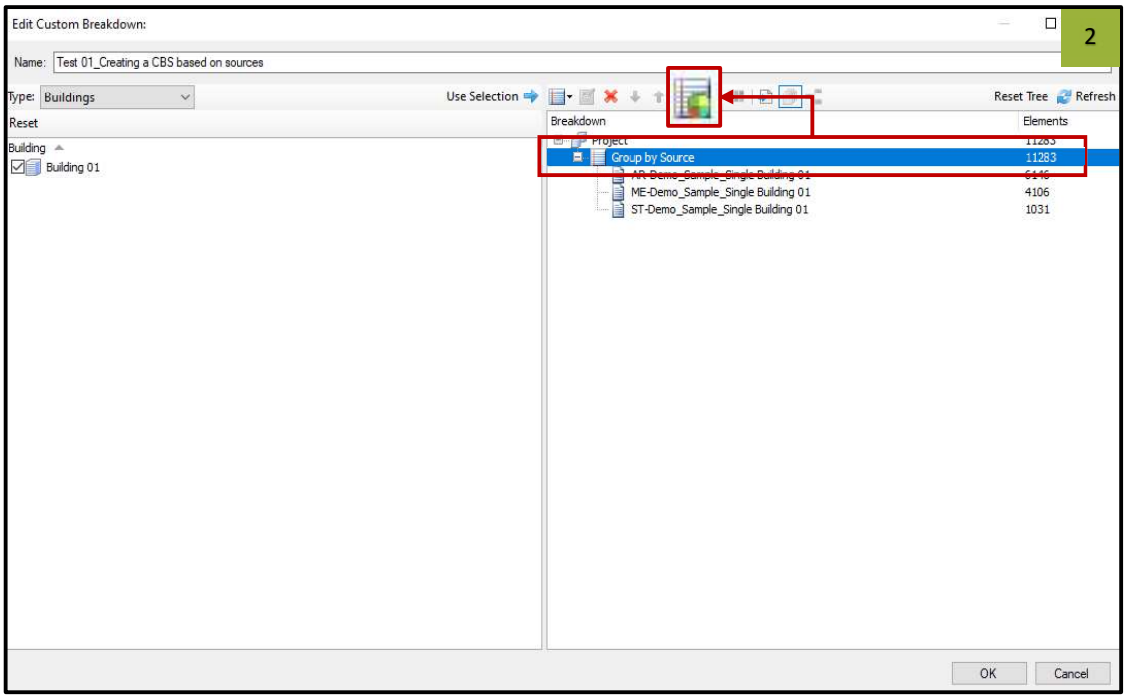
4.2. EDITING THE CUSTOM BREAKDOWN STRUCTURE BY ADDING THE COLOR CODING RULE

The Set Color Coded rule enables the user to color the custom breakdown structure based on the defined criteria and enables a better visual representation within the 3D Color Coded View. To add the rule mentioned before to our custom breakdown structure, we have to edit structure following the steps written below. Please note, that the Edit command enables various things, for example, editing the name, deleting a rule or adding a new one to an existing structure.

1. Click on the **custom breakdown structure** within the **Custom Breakdowns** palette. → Click on the **Edit** command. →



2. The **Edit Custom Breakdown** window opens where the user clicks on the **Group by Source** rule and afterwards clicks on the **Set Color Coding** rule.

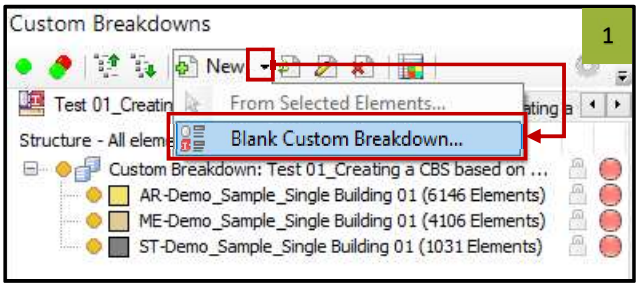


3. After adding the **Color Coding Rule** to a custom breakdown structure activate the **3D Color coded View** or the **Orthographic Color Coded** view to review the result.

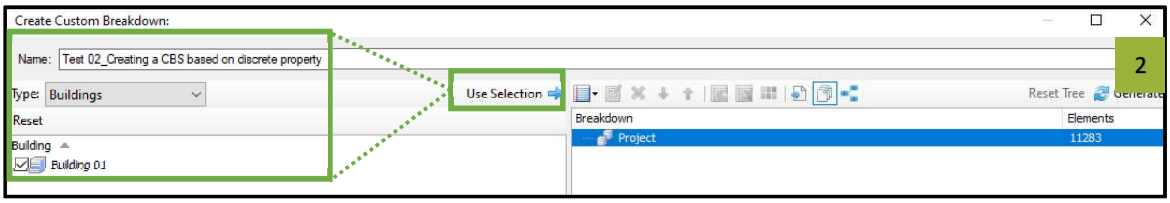
4.3. CREATING A CUSTOM BREAKDOWN STRUCTURE BASED ON A DISCRETE PROPERTY

In this section we will create a blank custom breakdown structure using the discrete property option with the purpose of creating a custom breakdown based on the MasterFormat attribute. During the process of creating a structure we will also add the Color Coding rule and activate the 3D Color Coded View. The process is described below.

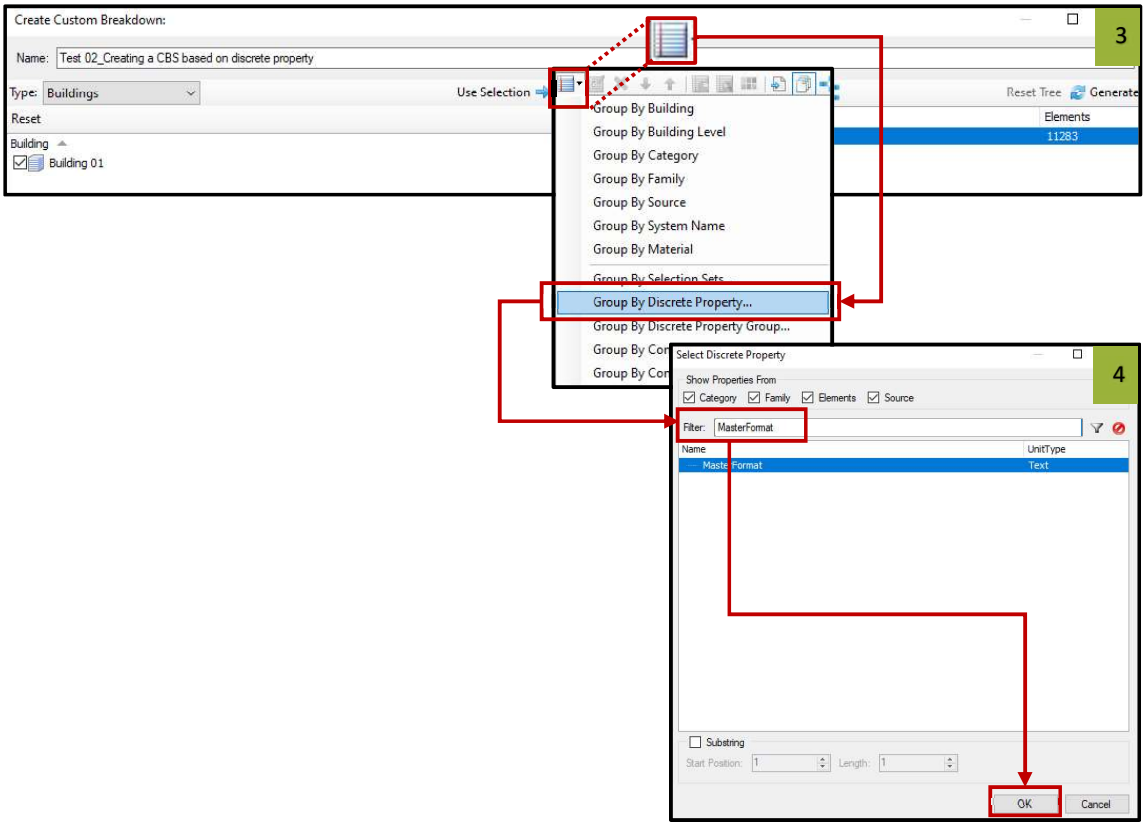
1. Activate the **Custom Breakdowns** palette, which is located on the left side of the screen. → Click on the **arrow** beside the **New command** and choose the **Blank Custom Breakdown** option. →

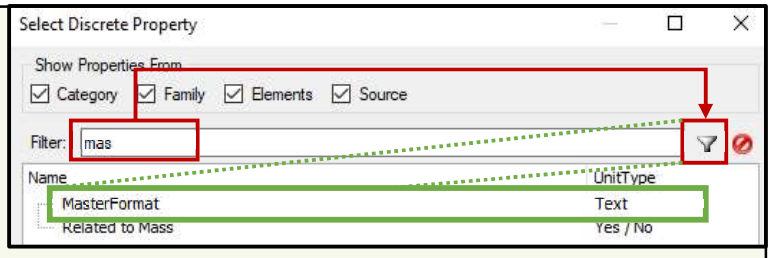


2. In the window **Create Custom Breakdown** define the **name** of the structure, for example, **Test 02_Creating a CBS based on discrete property**. → Under the **Type** choose option **Buildings** and check the **box** in front of the **Building 01**. → Click on the **Use Selection** button. →



3. Click on the **Add Breakdown** Rule and in the drop-down menu choose **Group by Discrete Property** option. →
4. Within the **Select Discrete Property** window in the **Filter** section enter **Masterformat** and click on the **Filter** command. → Afterwards choose the appropriate textual attribute. → Finish the process by clicking on the **OK** button.





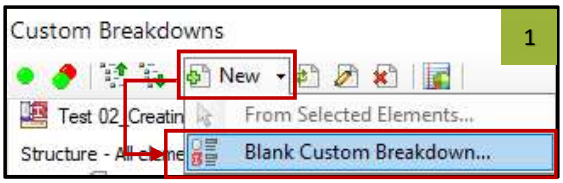
ADDITIONAL TIP: Within the Select Discrete Property is a Filter command, which enables the user to write only a part of the properties name, for example, mas for the MasterFormat property name and by clicking on the Filter command, the software will find appropriate attributes. This enables an easier search of discrete property.

NOTE: In the exercise above we have created a Custom Breakdown structure where we have divided our BIM-model according the chosen parameter, which in our case was the MasterFormat property. The created structure demonstrates us how many elements have a certain value of the chosen property but not only this, it also shows how many elements do not have this property or do have but the property value is not defined. This gives us very important information for further analysis in this is also a way how to make a quick in simple property check.

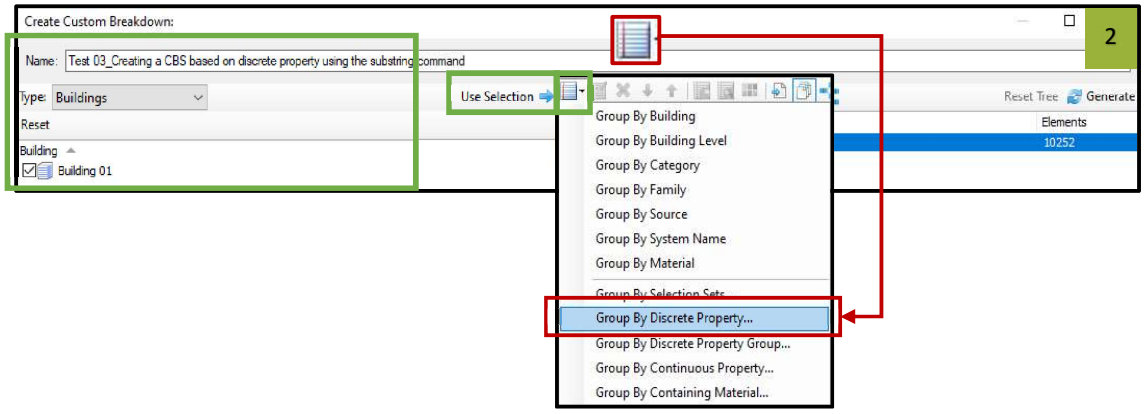
4.3.1. CREATING A CUSTOM BREAKDOWN STRUCTURE BASED ON A DISCRETE PROPERTY USING THE SUBSTRING COMMAND

Another very useful option within the Custom Breakdown palette is the Substring command, which enables the user to create a structure, that for example corresponds to a real Masterformat or UniFormat classification structure. In the process below, we will demonstrate how to create a structure like this.

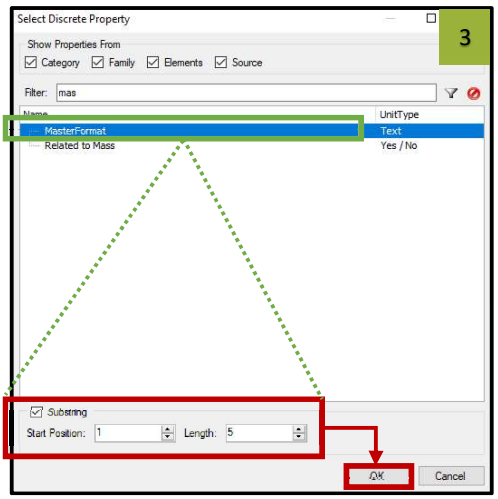
1. Activate the **Custom Breakdowns** palette, which is located on the left side of the screen. → Click on the **arrow** beside the **New command** and choose the **Blank Custom Breakdown** option. →



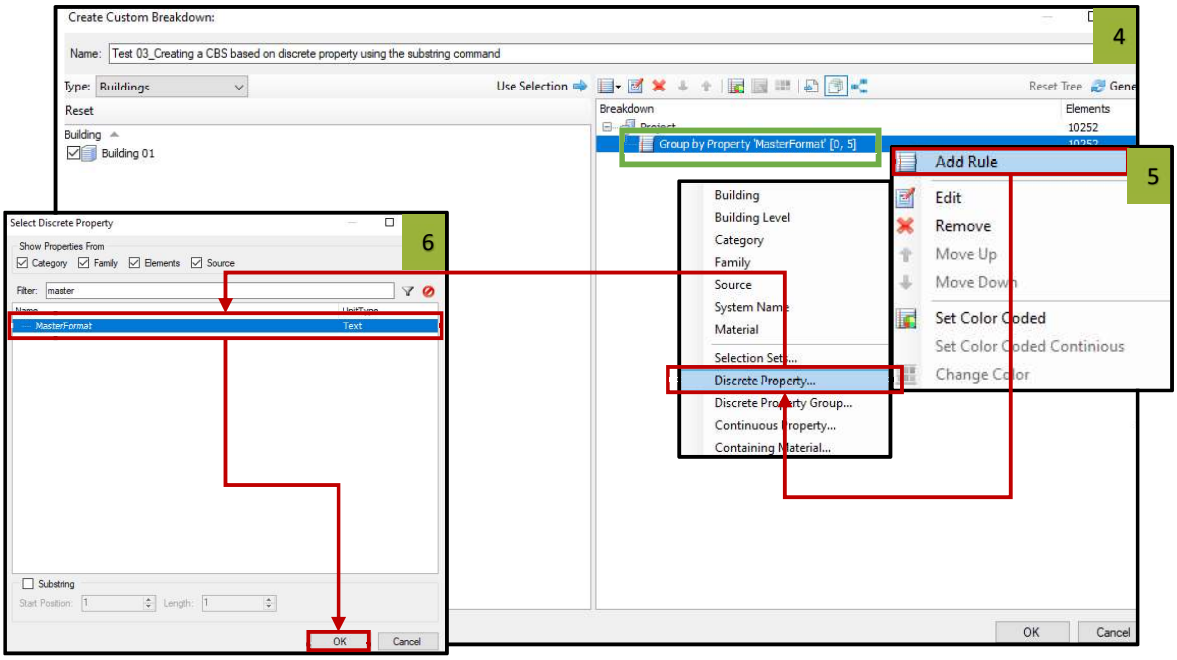
2. In the window **Create Custom Breakdown** define the name of the structure, for example, **Test 03_Creating a CBS based on discrete property using the substring command**. → Under the **Type** choose option **Buildings** and check the **box** in front of the **Building 01**. → Click on the **Use Selection** button. → Click on the **Add Breakdown Rule** and in the drop-down menu choose option **Group by Discrete Property** option. →



3. Within the **Select Discrete Property** in the **Filter** section enter **MasterFormat** and choose the appropriate textual attribute. → Afterwards click on the **MasterFormat** property within the **Select Discrete Property** window to activate the **Substring** command and check the **box** before the command in the lower corner of the window. → In the **Starting Box** window enter number **1** and in the **Length box** window enter number **5**. → By that we have defined that our first rule will apply to first four letters of the MasterFormat property. → Click on the **OK** button to finish the process. →



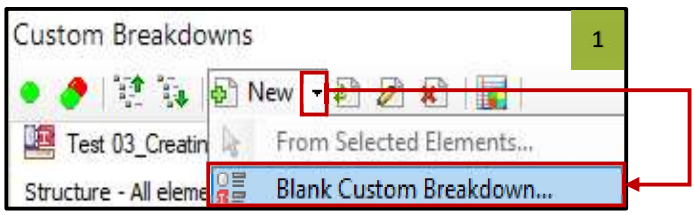
4. In the **Create Custom Breakdown** window click on the rule with **right-click**. →
5. In the drop-down menu choose option **Discrete Property** and afterwards click on the **Add Rule** command. →
6. In the **Select Discrete Property** window define **Masterformat** property and click on the **OK** button to finish the process. → The preview of the created custom breakdown structure is shown in the **Custom Breakdown** palette.



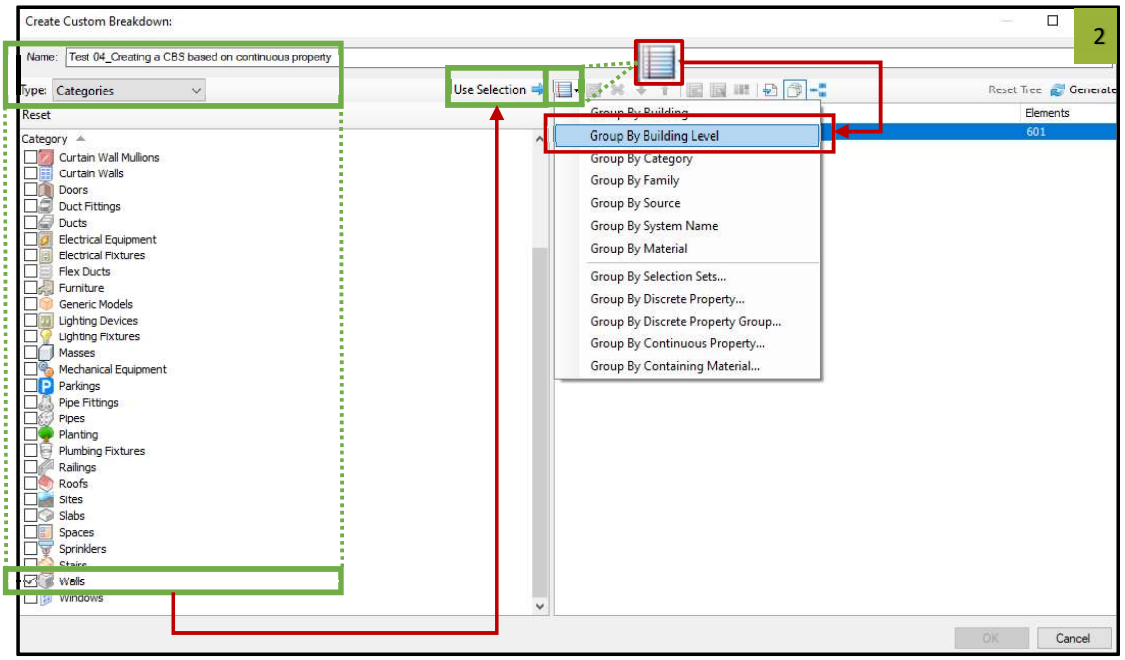
4.4. CREATING A CUSTOM BREAKDOWN STRUCTURE BASED ON A CONTINUOUS PROPERTY

A Custom Breakdown structure based on the continuous property enables the user an overview of different ranges of the same property, for example, Area. In this structure we will examine the property Area for category Walls according building levels. To create a custom breakdown like this, please follow the steps below.

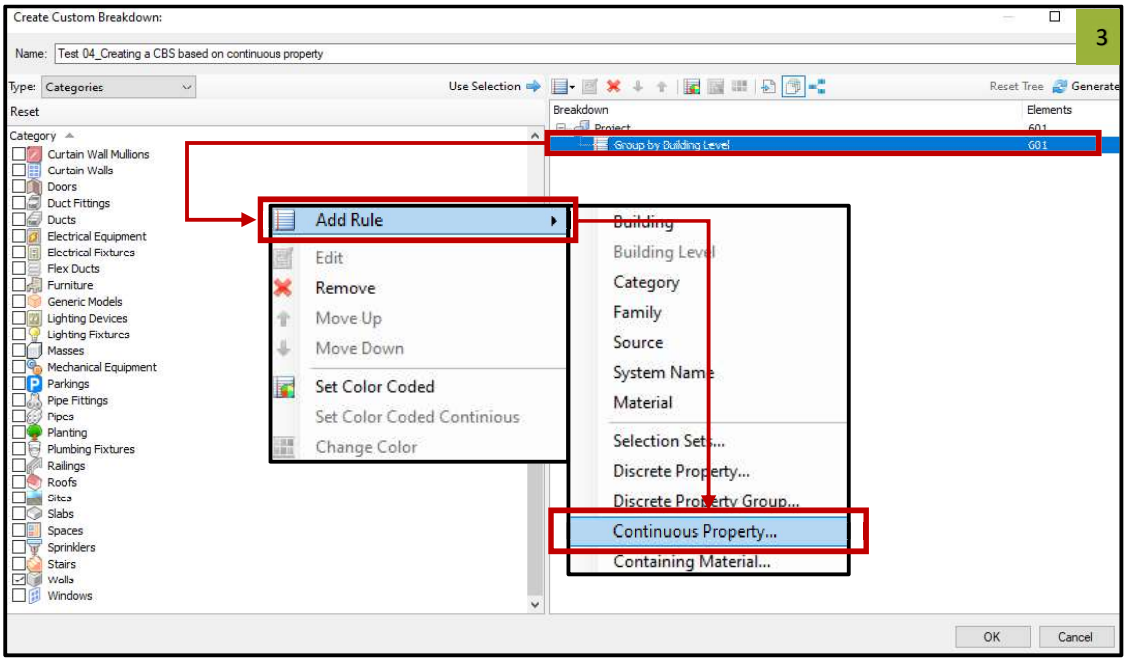
1. Activate the **Custom Breakdowns** palette, which is located on the left side of the screen. → Click on the **arrow** beside the **New** command and choose the **Blank Custom Breakdown** option. →



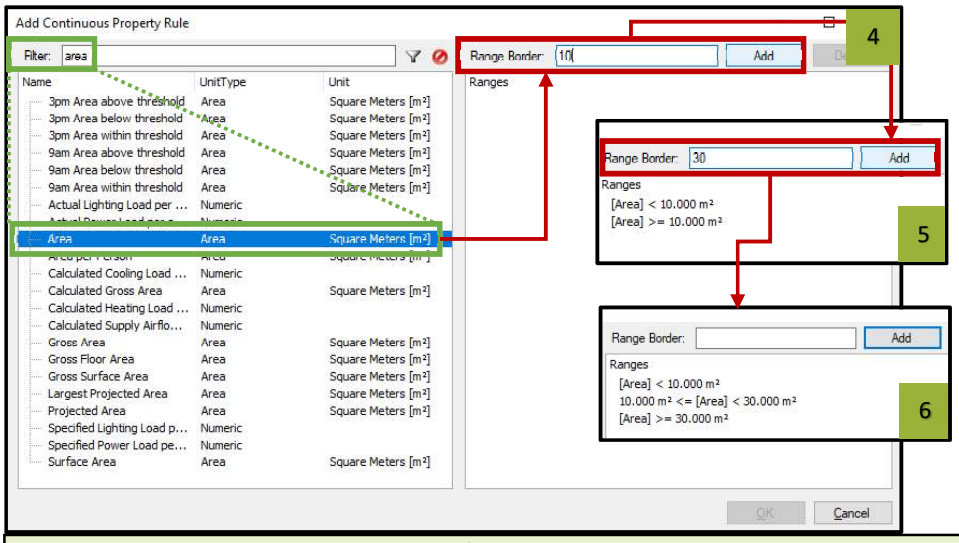
2. In the window **Create Custom Breakdown** define the name of the structure, for example**, Test 04_Creating a CBS based on continuous property**. → Under the **Type** choose option **Category** and check the **box** before the category **Walls**. → Click on the **Use Selection** button. → Click on the **Add Breakdown Rule** and in the drop-down menu choose option **Group by Building Level** option. →



3. Click on the **Group by Building Level** rule with **right-click** and in the drop-down menu choose option **Group by Continuous Property**. →

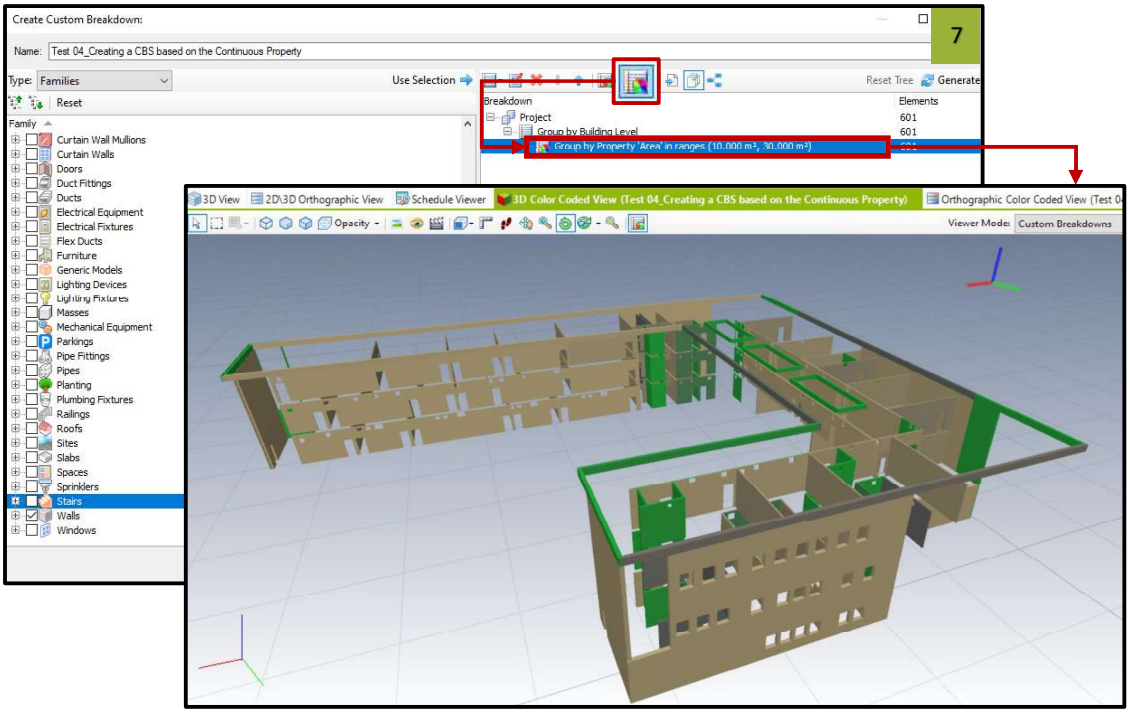


4. Within the **Add Continuous Property Rule** window in the **Filter** section enter **Area** and choose the appropriate attribute. →
5. Afterwards enter in the **Range Border** box **10** and click on the **Add button**. →
6. Afterwards enter in the **Range Border** box **30** and again the **Add** button. → Finish the process by clicking on the **OK** button.



NOTE: When we have set the first rule, we have divided the structure according building levels. With the second rule we have divided areas by building levels and in three different groups. The first one represents areas smaller than 10 square meters, the second group summons areas between 10 and 30 square meter and the last one area larger than 30 square meters.

7. In the last step we will add the **Set Color Coding Rule Continuous** to review the result of our **Custom Breakdown** structure in **3D Color Coding** view. → Click on the **Group by Property Area** in ranges (10.000 m2, 30.000 m2) and afterwards the **Set Color Coding Rule Continuous** command.



ADDITIONAL TIP: To review only colored elements within the 3D Color Coded View, please click on the Show only Colored Elements command which is located in the command line within the 3D Color Coded View and is shown on the picture below.

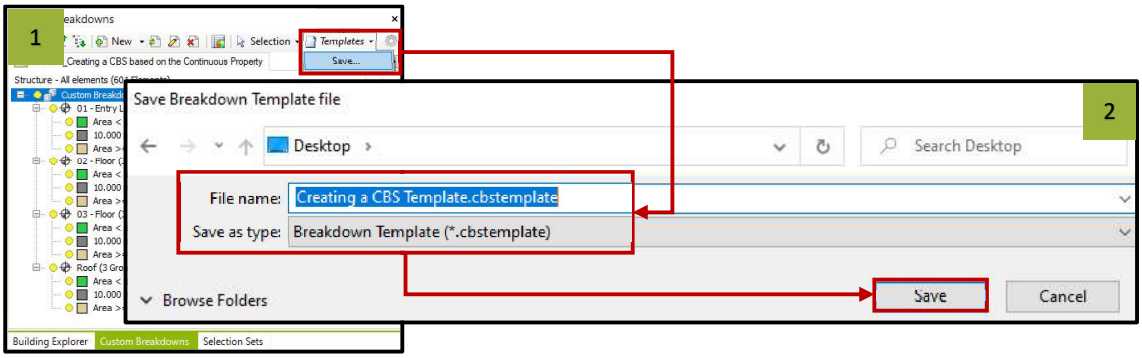
4.5. EXPORTING CREATED CUSTOM BREAKDOWN STRUCTURES

For the purpose of demonstrating the Custom Breakdowns palette we have created various examples of custom breakdowns structures. A created custom breakdown structure can be saved as a template and later one used on a new project or can be exchanged with another user as a .bxf file. Further one we will demonstrate different ways of exchanging this type of information.

4.5.1. CREATING A CUSTOM BREAKDOWN TEMPLATE

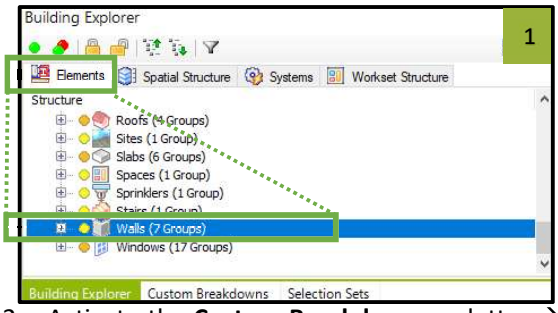
To create a template, follow the process below.

1. Activate the **Custom Breakdowns** palette and choose, for example, **Test 02_Creating a CBS based on discrete property**. → Click on the **Templates** command and then **Save** button. →
2. In the **Save Breakdown Template file** window define the name of the file, for example, **Creating a CBS Template** and the location where the file will be saved. → Finish the process by clicking on the **Save** button.

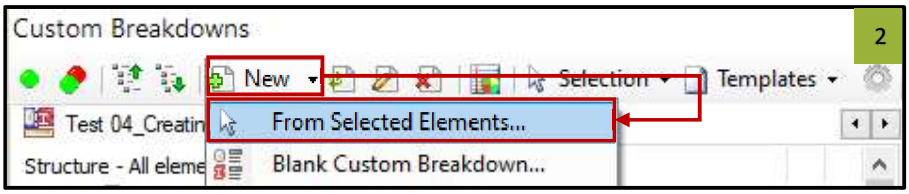


Now we will demonstrate how to use the template we have created in the process described above. This time we will create a Custom Breakdown based on Selected elements and with the help of Build Explorer palette. Please follow, the process mentioned below.

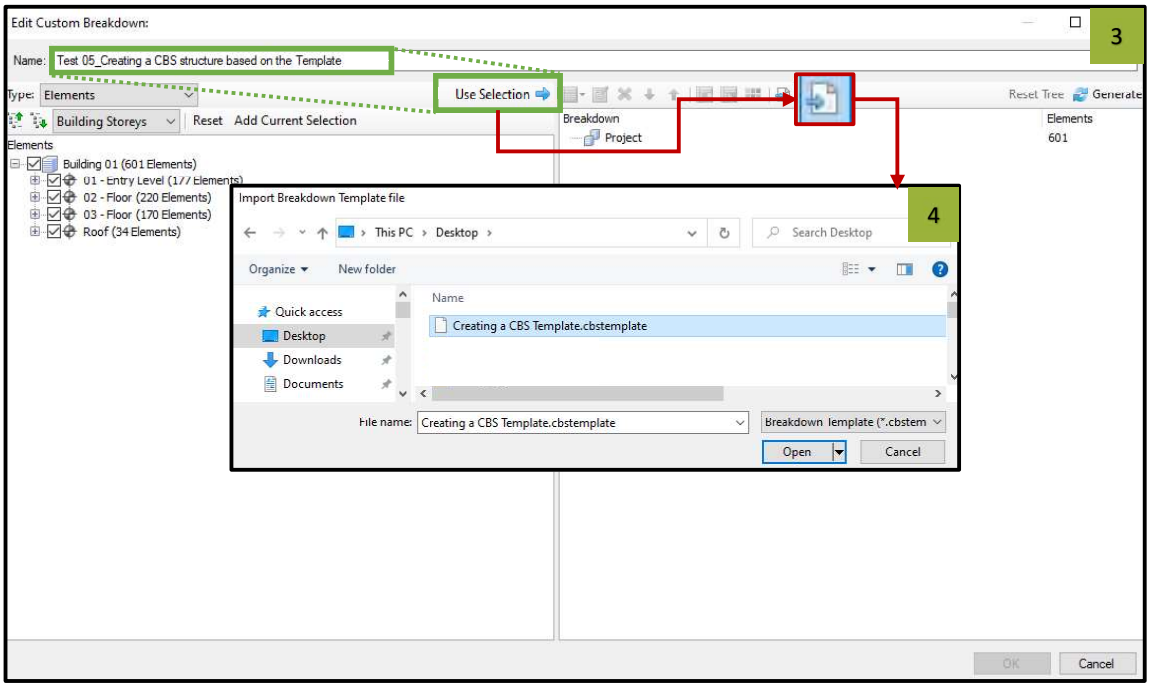
1. First activate the **Building Explorer** palette and click on the **Elements** tab. → Within this tab click on the **Walls** category. →



2. Activate the **Custom Breakdowns** palette. → Click on the **arrow** beside the **New** command and then choose **From Selected Elements** option.



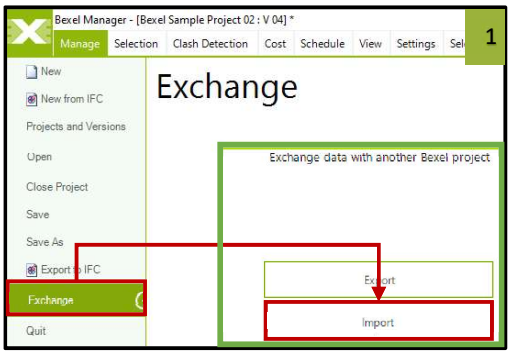
3. In the **Create Custom Breakdown** window define the name of the file, for example, **Test 05_Creating a CBS structure based on the Template**. → Under the **Type** choose option **Buildings** and check the box in front of the **Building 01**. → Click on the **Use Selection** button.
4. Within the **Create Custom Breakdown** window choose the command **Import QTO from Template** and then choose the appropriate template and click on the **Open** button. → In the **Create a Custom Breakdown** window the structure of the template appears, afterwards finish the process by clicking on the **OK** button.



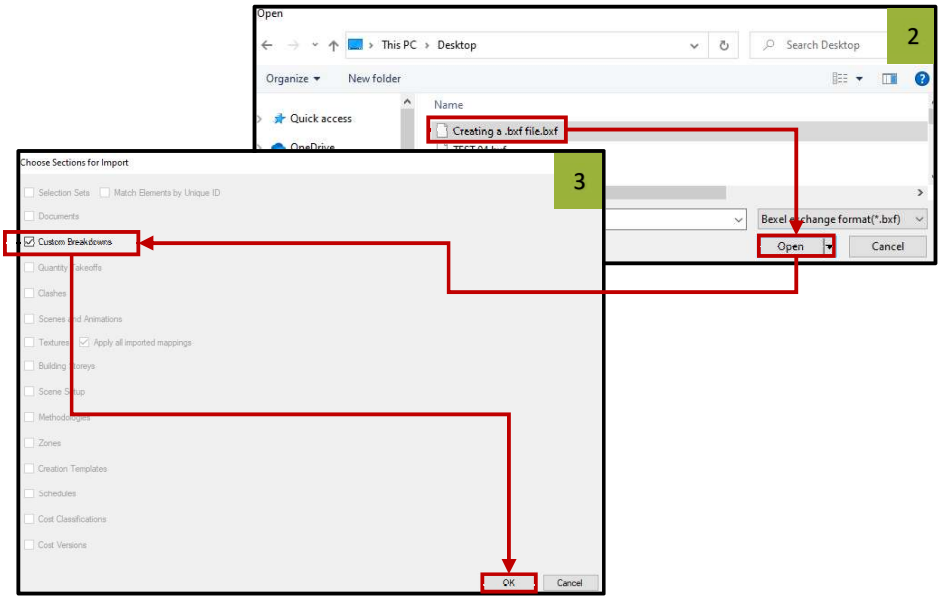
NOTE: Custom Breakdown structure has divided category Walls according the discrete property MasterFormat on the bases of the template. The created custom breakdown template can be later on used to create a quantity takeoff structure. The process of importing the created template is the same as in the process described above. For this purpose, the user should also use the Import QTO from Template command.

4.6. IMPORTING THE CUSTOM BREAKDOWN STRUCTURES WITH THE EXCHANGE COMMAND

As we have demonstrated how to create custom breakdown structures and a template in the processes the user has followed, we will now demonstrate how to import the structures. With this purpose we have created a bxf. file which is located in the Exchange file **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson 4.0\ Exchange)**. The file named Creating a bxf file, contains all examples of the structures mentioned in previous chapters. To import a bxf. file to exchange the parts of the project between two Bexel Manager users, please follow the process below.



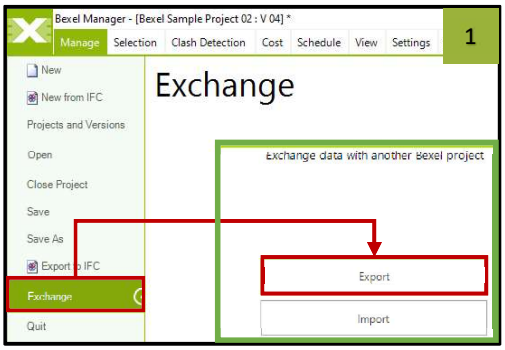
1. Activate the **Welcome** window. → Click on the **Exchange** command and click on the **Import** command within the **Exchange data with another Bexel project**. →
2. In the **Open** window define the **.BXF file**, for example, **Creating a .bxf file,** which should be imported and then click on the **Open** button. →
3. In the **Choose Sections for Import** check the **box** before the **Custom Breakdowns** and finish the process by clicking on the **OK** button.



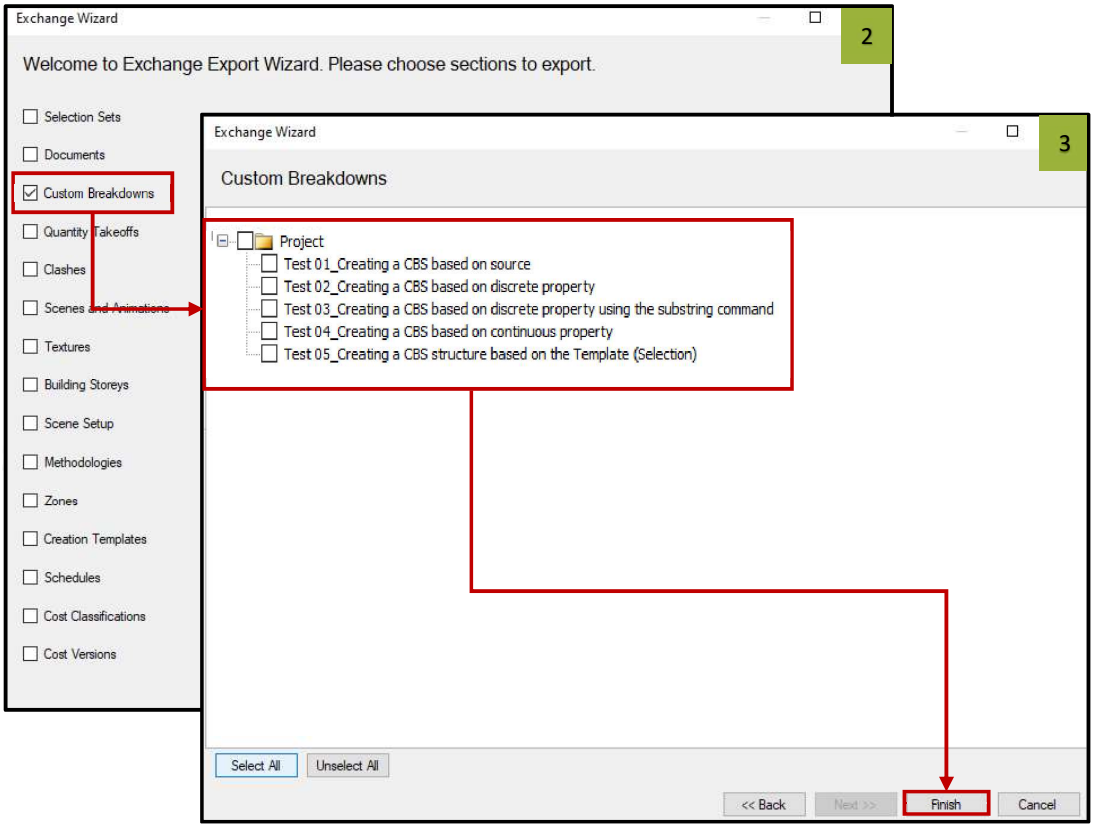
4.7. EXPORTING THE CUSTOM BREAKDOWN STRUCTURES WITH THE EXCHANGE COMMAND

If different parts of the project, for example, selection sets, custom breakdowns and quantity takeoff structures should be exported, please follow the process below.

1. Activate the **Welcome** window. → Click on the **Exchange** command and click on the **Export** command within the **Exchange data with another Bexel project**.



2. In the **Exchange Wizard** window check the **box** before the **Custom Breakdowns** window and click on the **Next** button. →
3. In the next step all the breakdowns structure will be displayed and choose the **Select All** button and afterwards the **Finish** button. → The process of exporting a .bxf file is done.

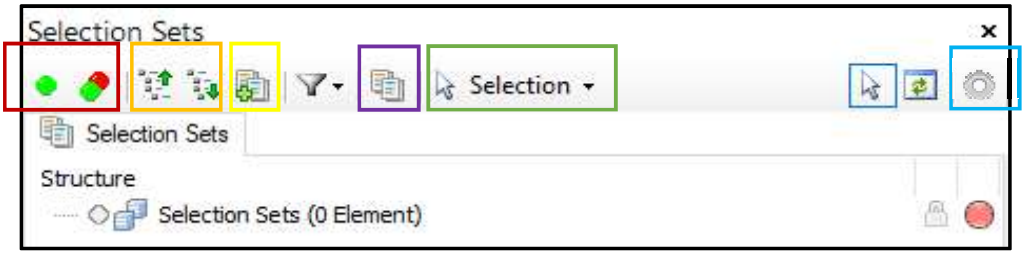


LESSON 05

BEXEL MANAGER

5. SELECTION SETS

In this Lesson we will demonstrate how to create different types of selection sets, for example, smart and regular selection sets as well as how to edit and organize them further on. Selection sets are a group of elements, which were grouped together according to certain rules we have set or because we have previously selected them. The group of elements created based on rules is called smart selection set and the group of elements created by randomly selecting them is named regular selection set. The main difference is that with the update of the model all elements that apply to certain rules of a selection set, will be automatically placed in corresponding smart selection set. Please note, that selection sets are one of the basic topics regarding the fact that they are used in almost any stage of developing a BIM model. The palette Selection Sets is located on the left side of the screen and is at the moment empty, as we have not created a selection set yet. To find out more about this topic, please review the Handbook or the Manual.



Managing Visibility of Selection Sets

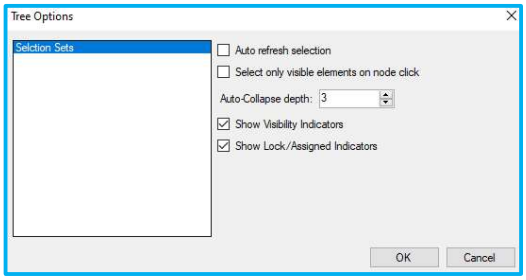
Organizing the list of Selection Sets

Creating a new Selection Set

Managing Selection Sets

Adding or deleting elements from Selection Sets

Options for Selection Sets

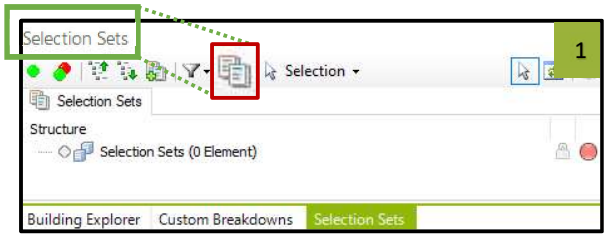


To follow the exercises from this lesson files where prepared and are located within the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson 5.0\ Exchange)**. To review if the exercises were done properly, please open the model which is located in the **Lesson 5.0 Complete model** folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson 5.0\ Lesson 5.0 Complete model)**.

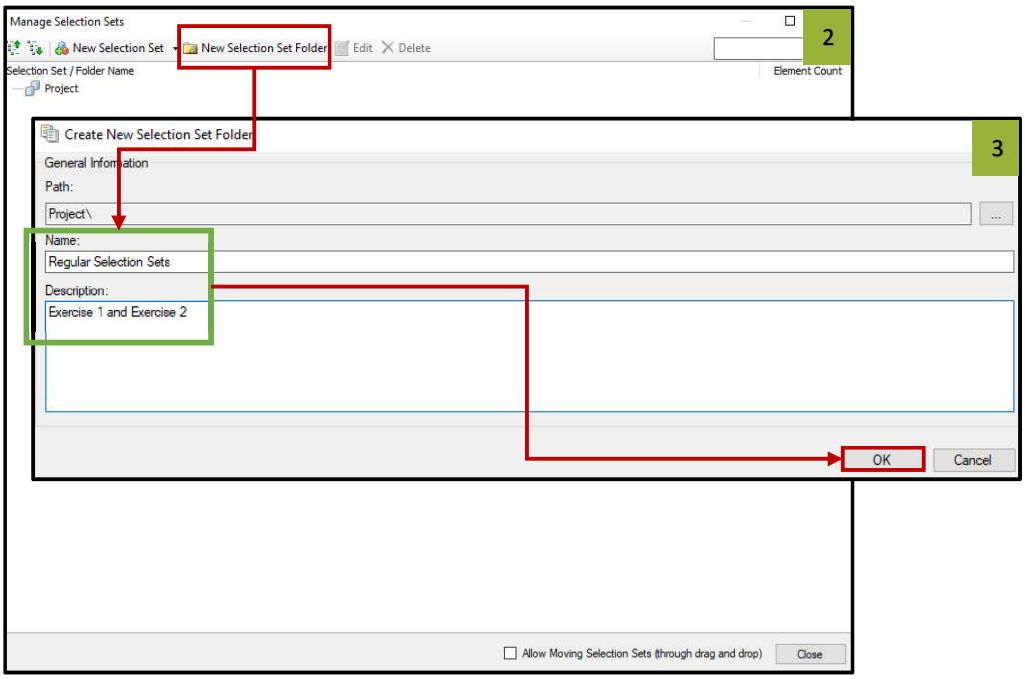
5.1. CREATING A SELECTION SET FOLDER

Before we start to create different types of the selection sets, we will first create two different folders, where our selection sets will be later one placed. To create a folder within the Selection Set palette, please follow the process below.

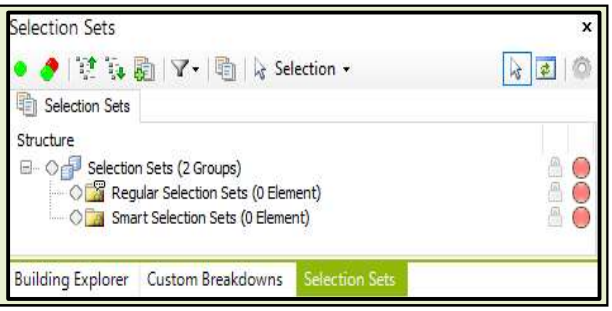
1. Activate the **Selection Sets** palette. → Click on the **Manage Selection Sets** command. →



2. In the **Manage Selection Sets** window click on the **New Selection Set Folder** command. →
3. A **Create New Selection Set Folder** window opens, where we define name of the folder in the **Name** window, for example, **Regular Selection Sets** and in the **Description** window we add description if needed. → Finish the process by clicking on the **OK** button.



NOTE: In the next step, please create another folder, which will be named **Smart Selection Sets** following the process described above. The description, if needed, can be added later on. In the picture on the right the user can see the result of the work. For now, the palette contains only two folders with 0 elements.

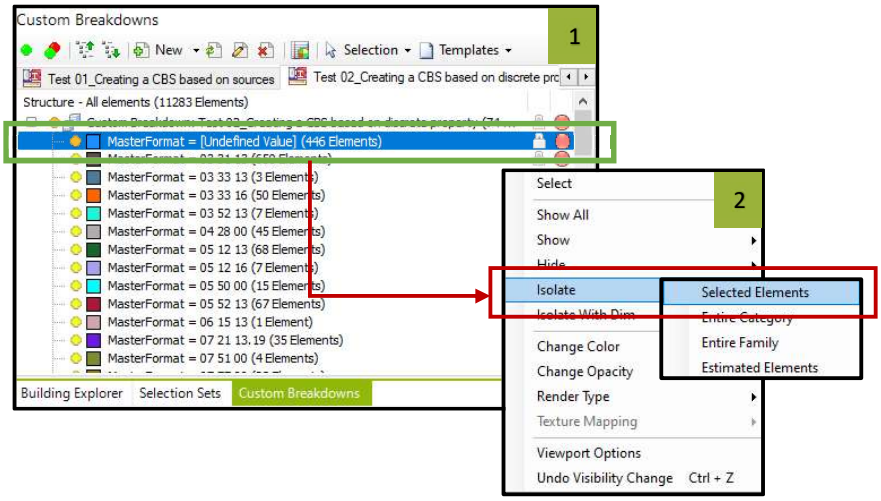


5.2. CREATING A REGULAR SELECTION SET

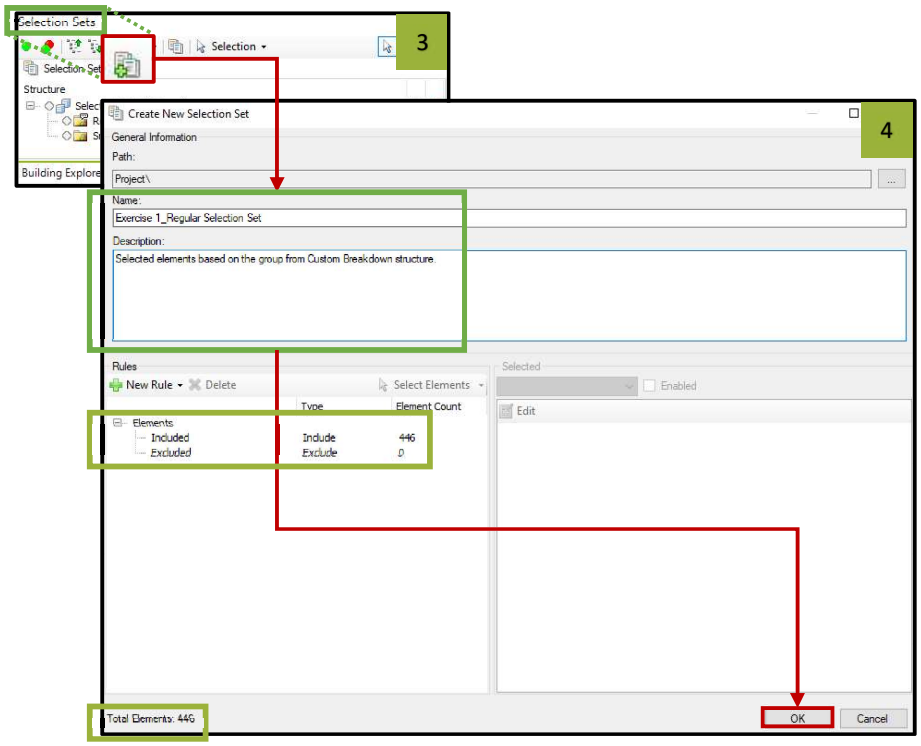
In this section we will create two different types of regular selection sets. The first one will be created by selecting a group from a custom breakdown structure that we have created in the previous chapter. For this purpose, you can import the .bxf file named Test 02_Creating a CBS based on discrete property, which is located in the Exchange folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson 5.0\ Exchange)**. How to import a .bxf file is described in the **Chapter 4.6**. The second selection set will be created with the help of the Find Elements tool. To create a selection set named, for example, Exercise 1_Regular Selection Set we will first activate the Custom Breakdown palette and then we will choose the CBS structure named Test 02_Creating a CBS based on discrete property. Within this group we will select the elements with the Undefined Value. By that we mean that these elements do not have a MasterFormat property or they have the property but do not have the value for it.

5.2.1. CREATING A REGULAR SELECTION SET BY SELECTING A GROUP OF ELEMENTS

1. Activate the **Custom Breakdowns** structure. → Click on the group of elements named **MasterFormat=(Undefined Value)**, so the group colors blue. →
2. In the **viewport** click with the **right-click** and choose in the drop-down menu **Isolate** command and afterwards **Selected Elements command**. →

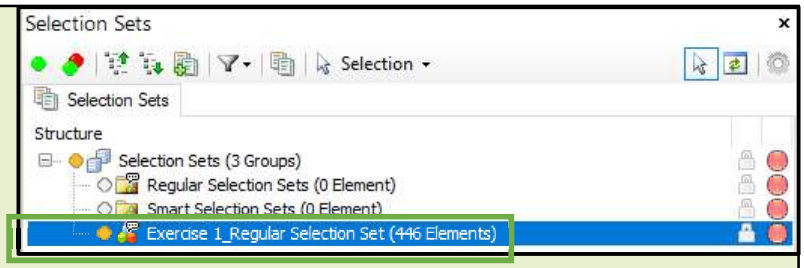


3. Activate the **Selection Sets** palette and click on the **New Selection Set** command. →
4. In the window **Create New Selection Set** define the name of the group in the **Name** section, for example, **Exercise 1_Regular Selection Set**. → In the **Description** section add description if needed. → Finish the process by clicking on the **OK** button.



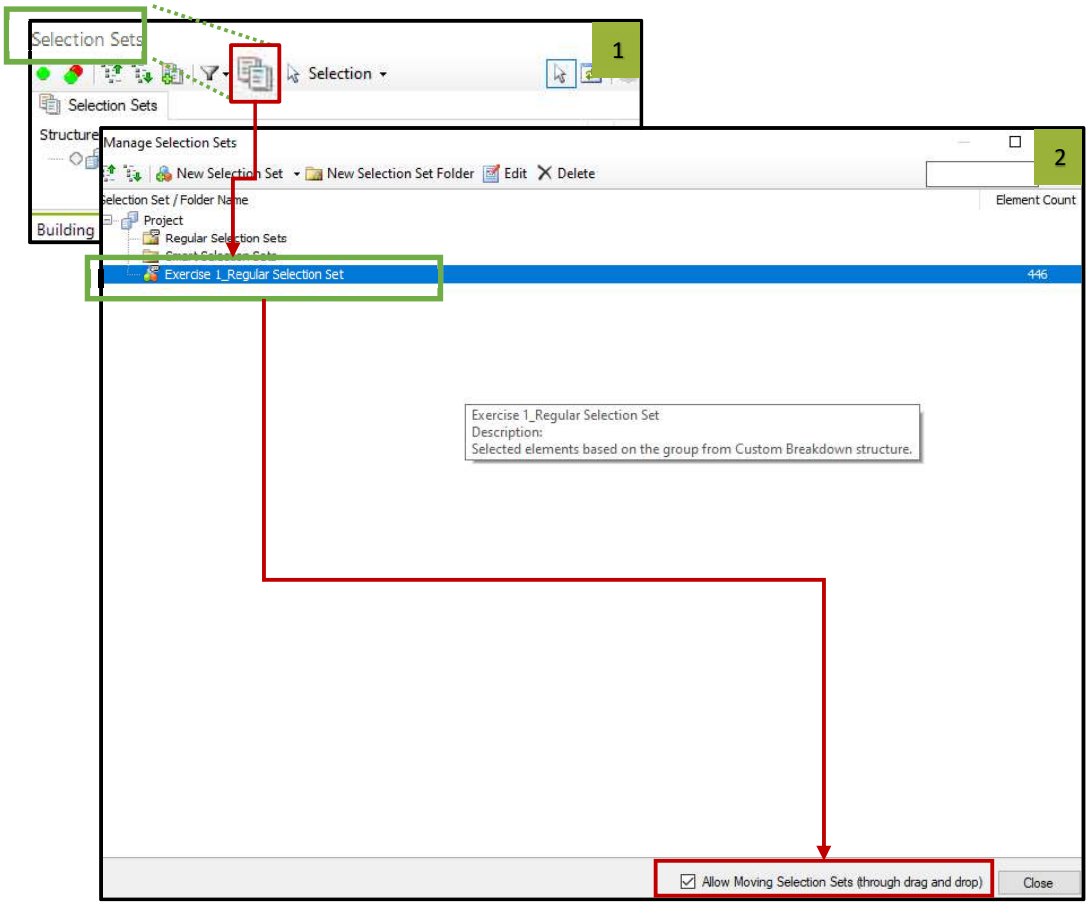
NOTE: On the picture above there are two sections framed which are very important. The first one is mention under the Elements, where it is stated that 446 elements are included in this group. That means that 446 elements where selected before we started to create a selection set. The user should be very careful regarding this information while creating a selection set because if he has selected elements by mistake in the process of creating a selection set, the selected elements will be automatically counted in the group. The next information is the number of Total Elements in the left corner of the window, which defines how many elements are counted in the final selection.

NOTE: When the selection set is created, it appears in the Selection Sets palette, like it is demonstrated on the picture. This group contains elements that either do not have the value for the MasterFormat property or do not have the MasterFormat property at all.



As we have not placed the created selection set in the appropriate folder, we will now use the **Manage Selection Sets…** command to arrange it.

1. Click on the **Manage Selection Sets…** command. →
2. In the **Manage Selection Sets** window click on the certain selection set which should be moved, so it colors blue. → **Check** the **box** before the **Allow Moving Selection Sets (through drag and drop)** option and drag the selected selection set in a certain folder.

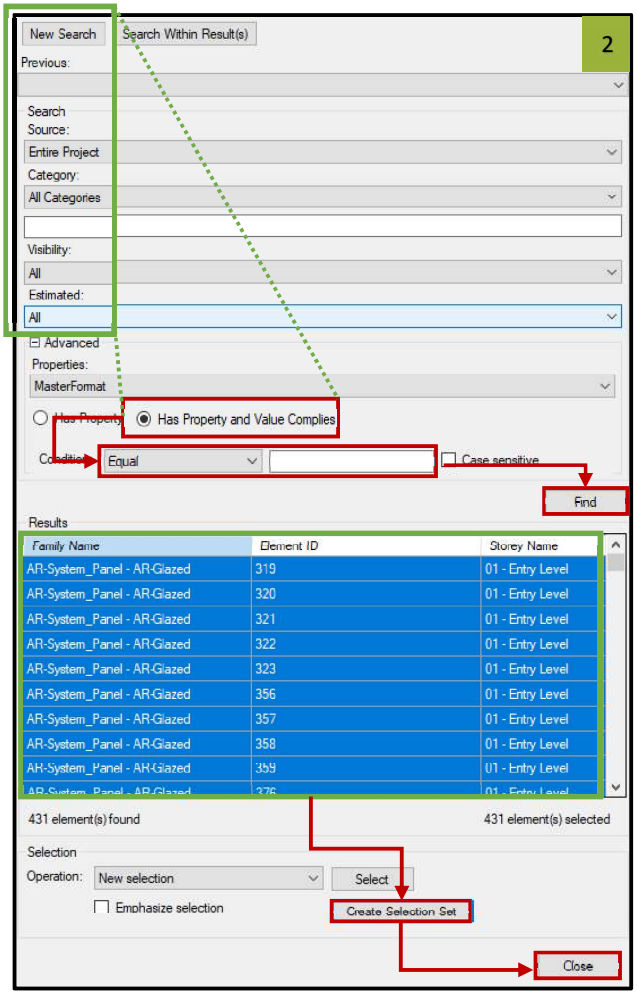


The next regular selection set will be created with the Find elements tool, which can be used when the user is looking for elements based on a specific criterion. For example, we would like to see how many elements do not have a defined value for the MasterFormat property.

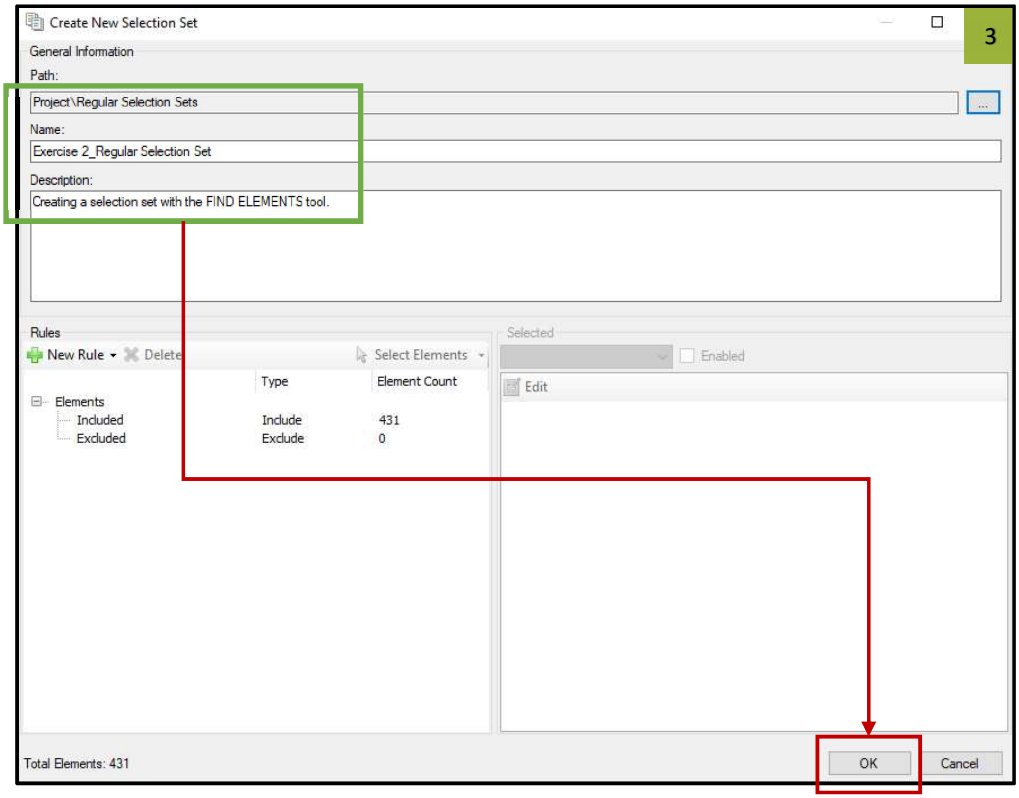
5.2.2. CREATING A REGULAR SELECTION SET USING THE FIND COMMNAD

1. Activate the **Selection** tab and click on the **Find Elements** command. →

2. In the **Find Elements** window first define **New Search**. → In the **Source** section define **Entire Project**. → Click on the **Advanced** button and choose **MasterFormat** property. → Check the **Has Property and Value Complies** option and under **Condition** define **Equal** in leave an **empty window** for the **value**. → Click on the **Find** command. → **Select** all 431 elements by clicking on **CTRL+A** and afterwards click on the **Create Selection Set** command. →



3. In the **Create New Selection Set** window define in the **Path** section the folder where the created selection set will be saved. → In the **Name** section define the name, for example, **Exercise 2_Regular Selection Set**. → Add description if needed. → Finish the process by clicking on the **OK** button.



NOTE: We have created two different groups or so-called regular selection sets. The first group contains elements that do have the MasterFormat property but do not have a defined value for it. Also, this group contains elements that do not have a MasterFormat property at all. The second group has only those elements that contain the MasterFormat property but do not have a defined value for it. That is the reason why this group also contains less elements. This tool is useful for a quick overview but the created selection set is also a regular one even though we have defined some search parameters.

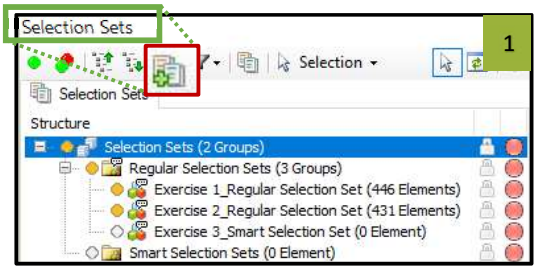
5.3. CREATING A SMART SELECTION SETS

As mention before, the created selection sets can be used in all phases of a BIM model development. They can be used while performing a quality check, in the process creating analysis for clash detection, generating a 4D/5D model in Bexel Manager or in the process of creating an as-built model for the facility maintenance, where we link the documentation with the BIM model.

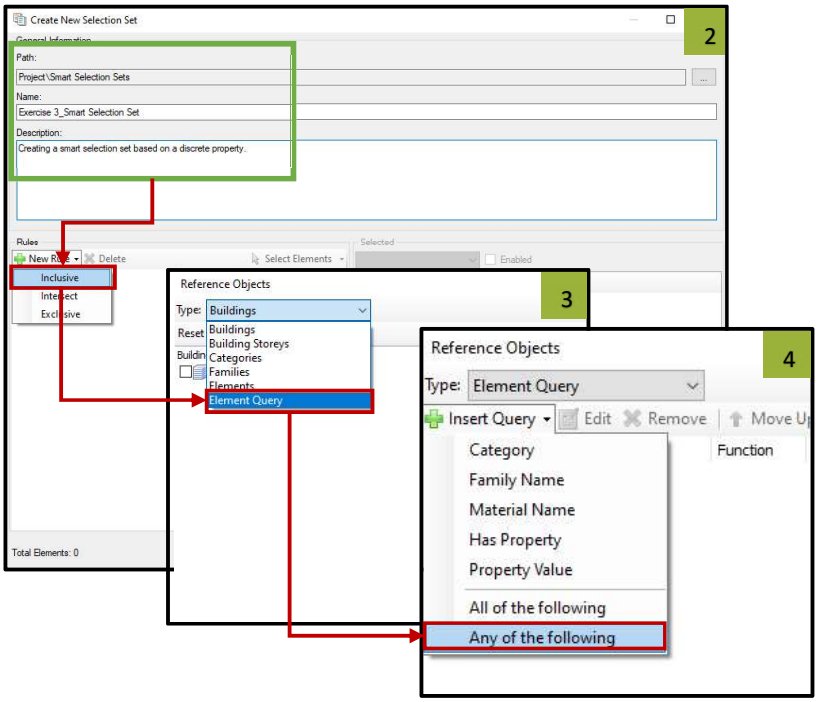
5.3.1. CREATING A SMART SELECTION SET FOR THE PROCESS OF THE QUALITY OVERVIEW OF THE MODEL

In the Exercise 3 we will create a smart selection set based on the chosen discrete property named MasteFormat. We will define two parameters, which were already mentioned before. The first criterion are elements that do not contain the MasterFormat property at all and the second criterion is that we would also like include the elements that do have MasterFormat property but do not have the value for it. To do so, please follow the described process below.

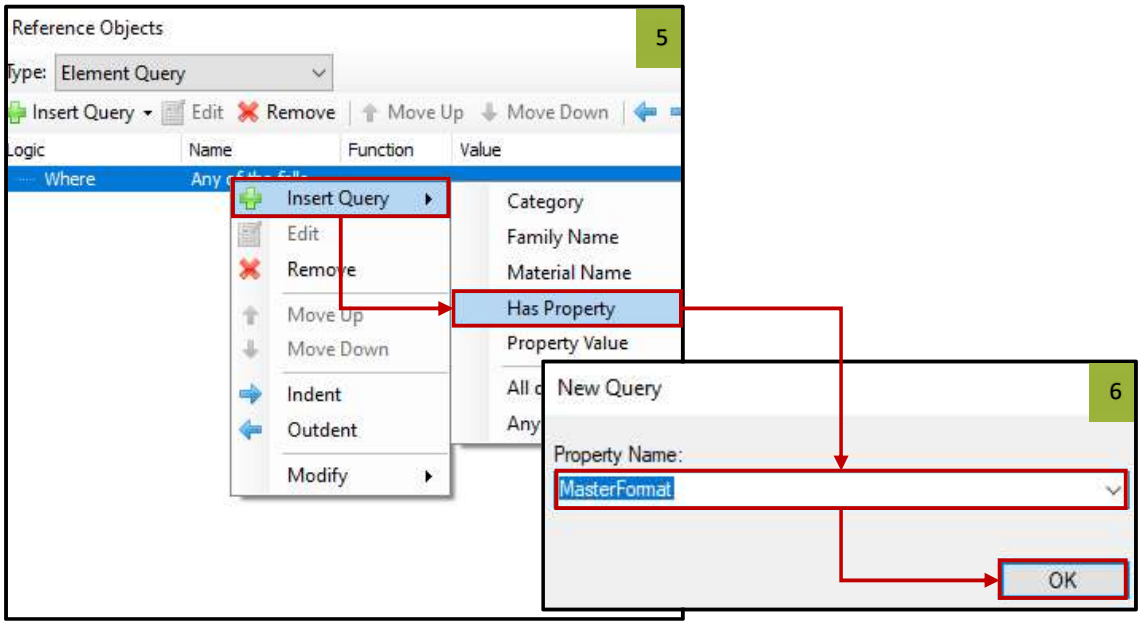
1. Activate the **Selection Sets** palette and click on the **New Selection Set…** command. →



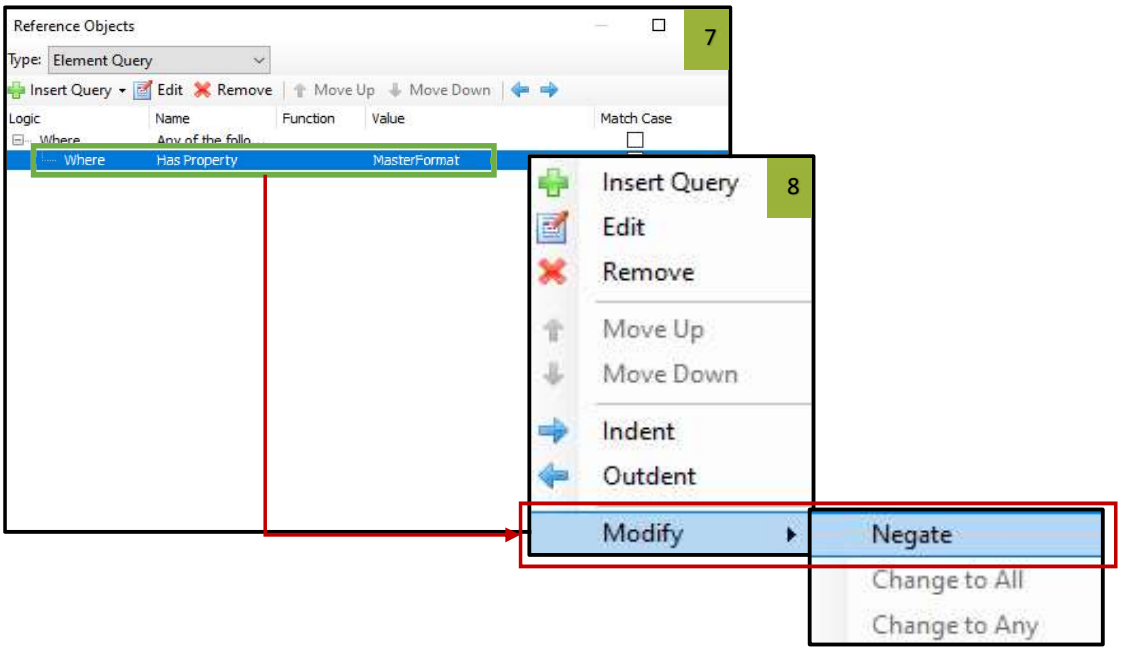
2. In the **Create New Selection Set** first define the folder where the selection set will be saved, afterwards define the name, for example, **Exercise 3_Smart Selection Set** and add description if needed. → Click on the **New Rule** and choose in the drop-down menu **Inclusive**. →
3. In the **Reference Objects** window choose option **Element Query** in the **Type** section. →
4. Click on the **Insert Query** command and choose **Any of the following command**.



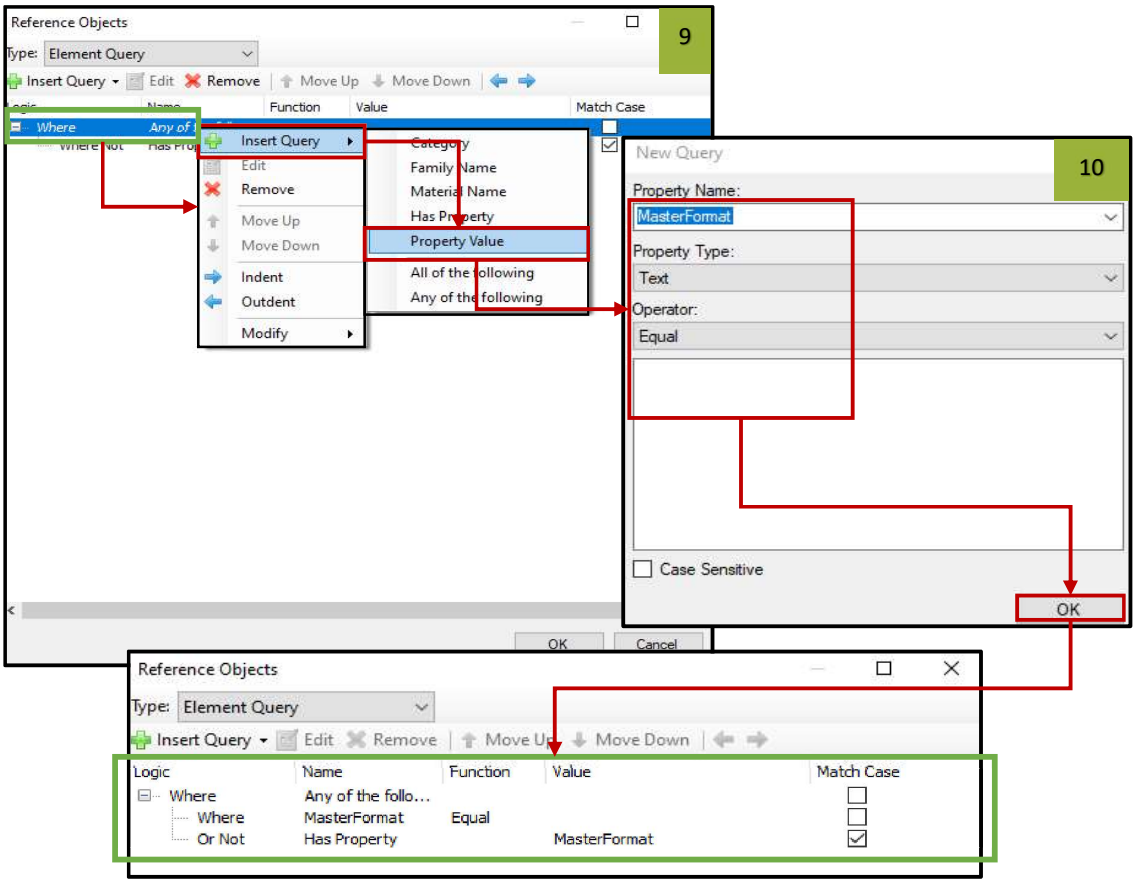
5. Click on the **first rule** so it is **colored blue** with the **right-click** and in the first drop-down menu choose the **Insert Query** option and in the second menu **Has Property** option. →
6. A **New Query** window opens where the user defines the name of the property, for example, **MasterFormat**. →

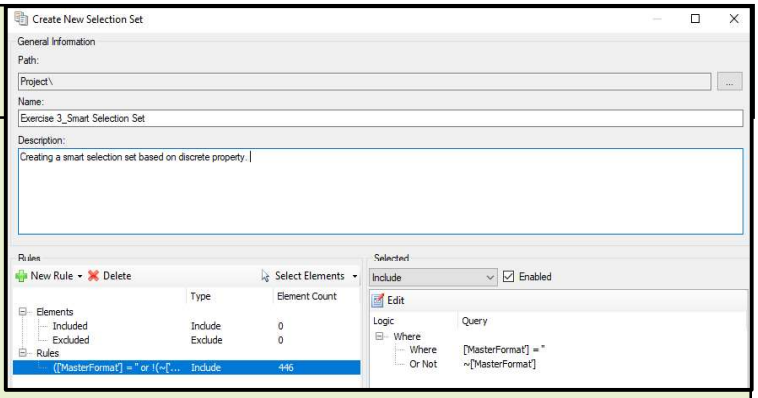


7. Click on the **first condition** within the **Reference Objects** with the **right-click** and in the drop-down menu choose **Modify** command. →
8. In the next drop-down window choose **Negate** option. →



9. Click on the **first condition** within the **Reference Objects** with the **right-click** and in the drop-down menu choose **Insert Query** command and in the next drop-down menu choose **Property Value**.
10. In the **New Query** window define the **Property Name**, for example, **MasterFormat**. In the **Property Type** section define the type of the property, in our case **Text**. In the **Operator** section define **Equal** and do not write anything down in the window, because we are looking for elements that have the MasterFormat property but do not have a defined value for it. Finish the process by clicking on the **OK** button.



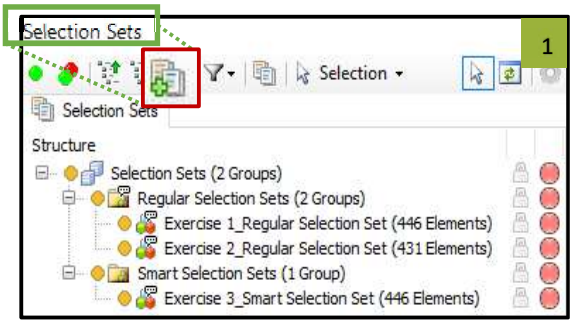


NOTE: On the picture on the right, the user can see the result of the created selection set in the Exercise 3. It has defined two rules. For elements to be a part of this group, they have to apply to one of the created rules. Please note, with each update of the model, the elements will be automatically placed in this smart selection set if they apply to one of the listed rules. The process of creating a smart selection set of this type can be used while reviewing the quality of the model. This kind of selection set can be then sent back to the project team to review if the values of the property MasterFormat are correct. Also, if the elements that did not have the defined property should have been without it. If the elements do not have the required property, further analysis cannot be executed.

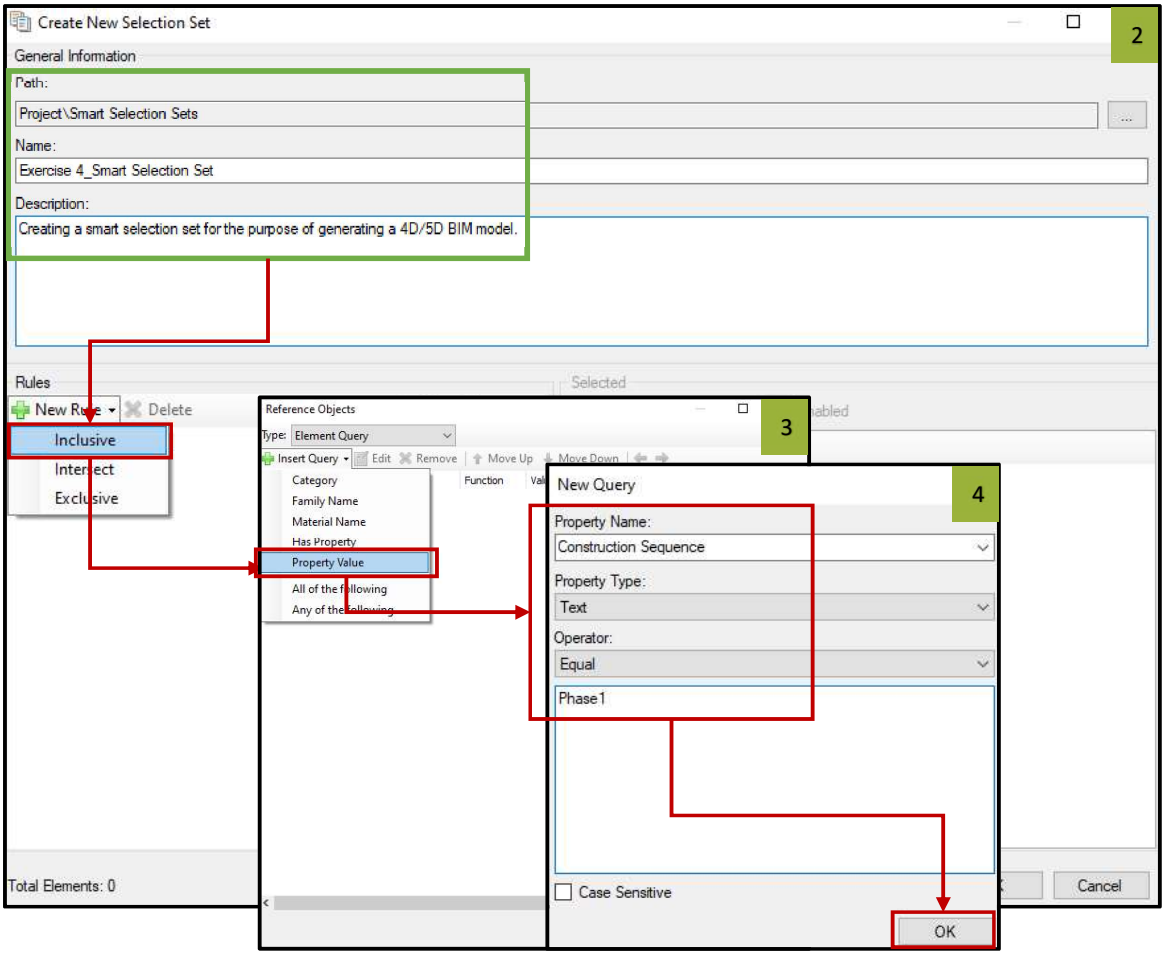
5.3.2. CREATING A SELECTION SET WHICH CAN BE USED IN THE PROCESS OF GENERATING A 4D/5D BIM MODEL

In the Exercise 4_Creating a smart selection set we will create a selection set based on the Construction Phase property which can be later on used in the process of creating a zone for the creation of the schedule. As we want to create a selection set for elements, that are built in phase 1, the value of the property should correspond to this parameter.

1. Activate the **Selection Sets** palette and click on the **New Selection Set…** command.



2. In the **Create New Selection Set** first define the folder where the selection set will be saved, afterwards define the name and add description if needed. →Click on the **New Rule** and choose in the drop-down menu **Inclusive**. →
3. In the **Reference Objects** window choose option **Element Query** in the **Type** section. → Click on the **Property Value** command. →
4. In the **New Query** window define the **Property Name,** for example, **Construction Sequence**. → In the **Property Type** define **Text** and in the **Operator** section choose **Equal** option. → Enter **Phase 1** value for the chosen property. → Finish the process by clicking on the **OK** button.

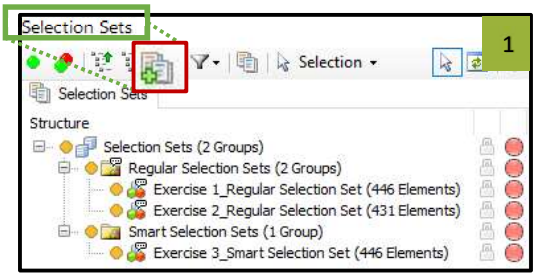


ADDITIONAL TIP: Using the same process describing above, another three selection sets based on the Construction Sequence property for values Phase 2, Phase 3 and Exterior Works can be created. They can be later on placed in folder Construction Sequence. To review the results, open the complete model located in the **Lesson 5.0 Complete model** folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson 5.0\ Lesson 5.0 Complete model)**.

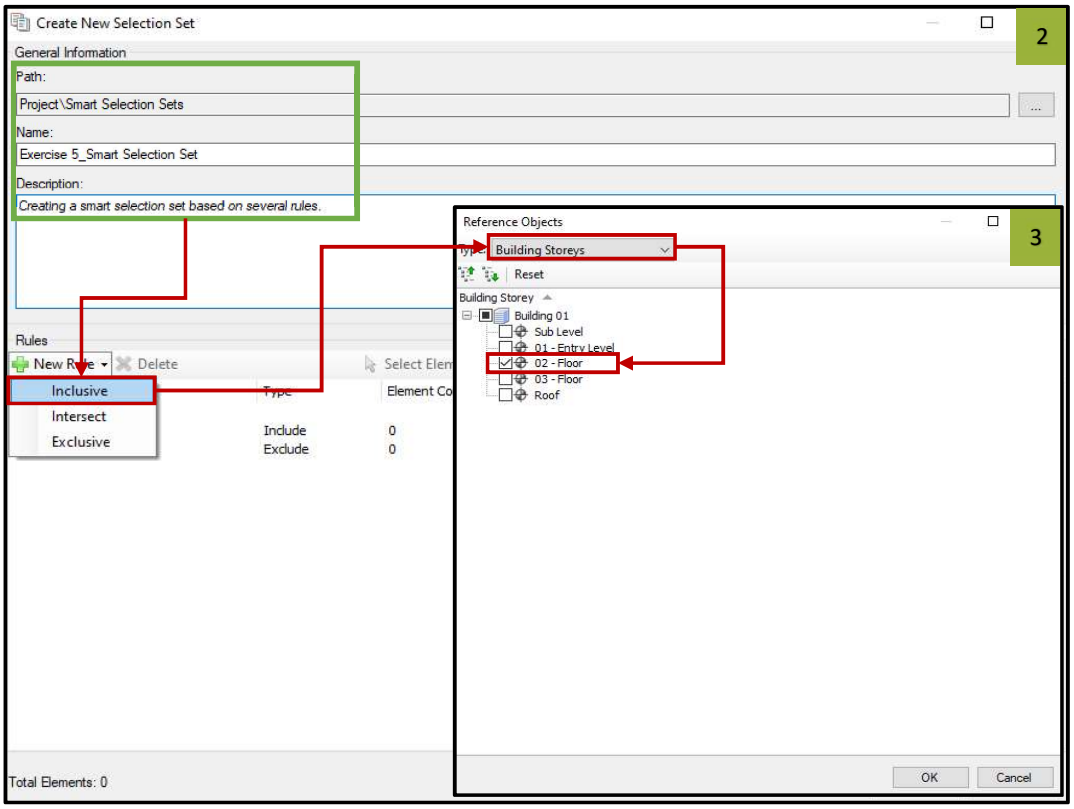
5.3.3. CREATING SELECTION SETS BASED ON SEVERAL RULES

Now we will demonstrate how to create a selection set based on several rules. We would like to create a selection set which contains, for example, all doors on the second floor, which are wider than 1.2 m.

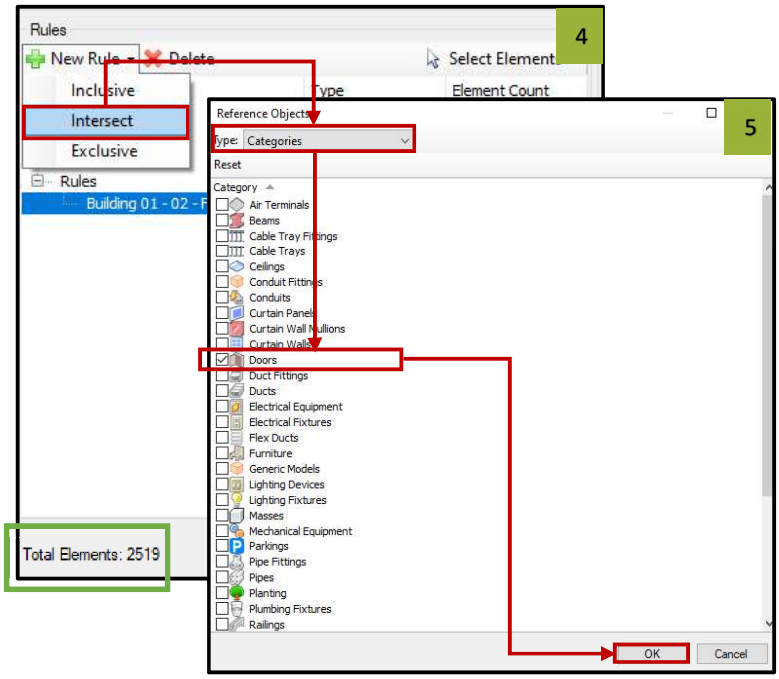
1. Activate the **Selection Sets** palette and click on the **New Selection Set…** command.



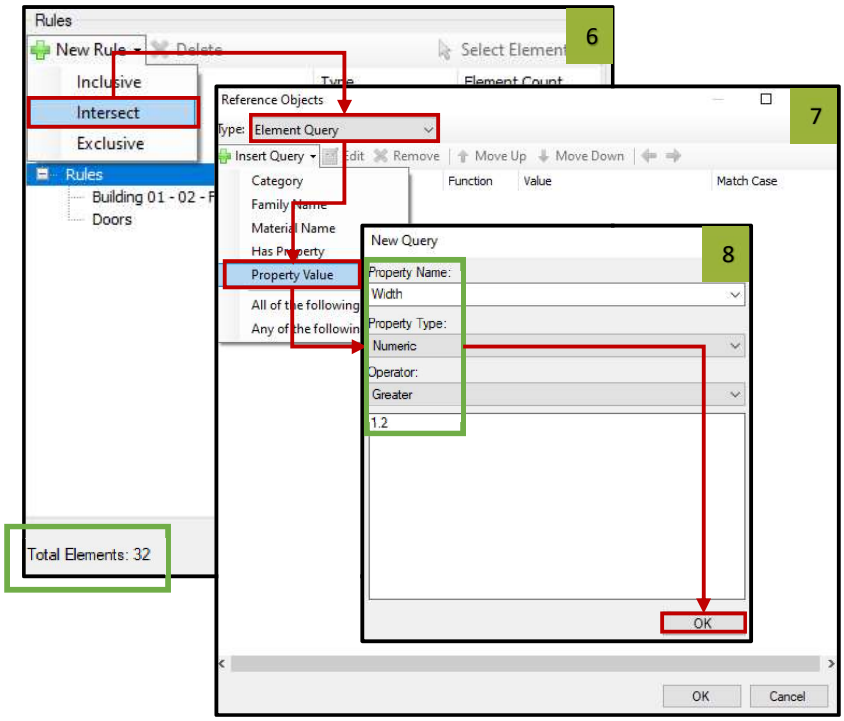
2. In the **Create New Selection Set** window first define the folder where the selection set will be saved, afterwards define the name and add description if needed. → Click on the **New Rule** and choose in the drop-down menu **Inclusive**. →
3. In the **Reference Objects** window choose option **Building Storeys** in the **Type** section and check the **box** before the **02-Floor**. → Finish this step by clicking on the **OK** button. →



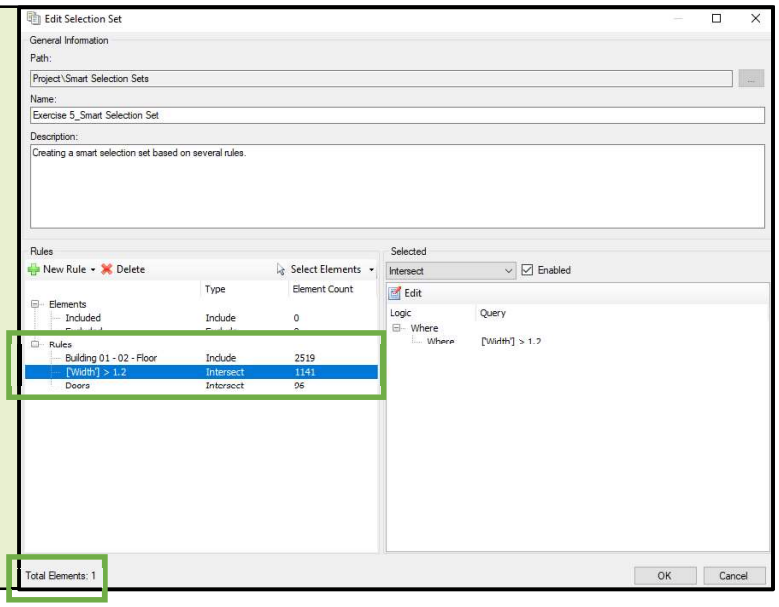
4. Click on the **New Rule** command again and this time choose the **Intersect** option. →
5. In the **Reference Objects** window choose in the **Type** section **Category** and then select **Doors** from the list. Finish this step by clicking on the **OK** button. →



6. Click on the **New Rule** command again and choose the **Intersect** option. →
7. In the **Element Query** window choose the **Property Value** option. →
8. In the **New Query** window choose the **Width** property and define **Numeric** in the **Property Type** section. → In the **Operator** section choose **Grater** option. → Enter **1.2** value for the chosen property. → Finish the process by clicking on the **OK** button.



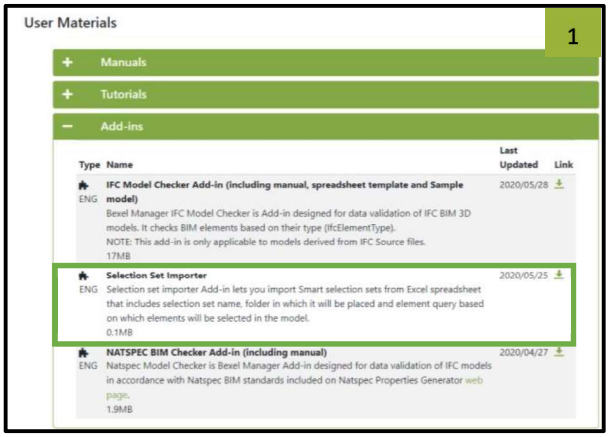
NOTE: On the picture on our right the created selection set is shown. As the user can see only one door on the second floor are wider than 1.2 meters. With each new defined rule, the number of elements was smaller. The created selection set can be further one used or edited and even deleted or copied. All of that can be done within the Edit Selection Set and Managing Selection Sets window.



5.3.4. CREATING A SELECTION SET WITH THE HELP OF AN ADD-IN

Now we will describe a process of creating a selection set with the help of an add-in named Selection Set Importer. The add-in allows the user to define rules of a selection set in Excel and then based on those rules selection sets are created in Bexel Manager. This is a process which is very useful while dealing with colossal projects where the quality check is performed. The add-in can be found and downloaded from our User Area under the Add-Ins section. To demonstrate the full process, we will create a selection set based on two rules. The first rule is to find all elements that do not have the value MasterFormat and the second rule is to define all elements that have the mentioned property but not a defined value for it. As the user can see, this selection was already done on various ways in previous sections but we wanted to demonstrate how same results appear using different paths. Assuming the user has properly downloaded and installed the add-in mentioned above, the first step is to define the rules in the Excel spread sheet. Please note, the excel file Exercise 6 is located in exchange folder **(PATH: Bexel Step By Step Workflow Guide ENG\Lessons\Lesson 5.0\ Exchange).**

1. Visit the **User Are** on our website and download the **add-in**. →

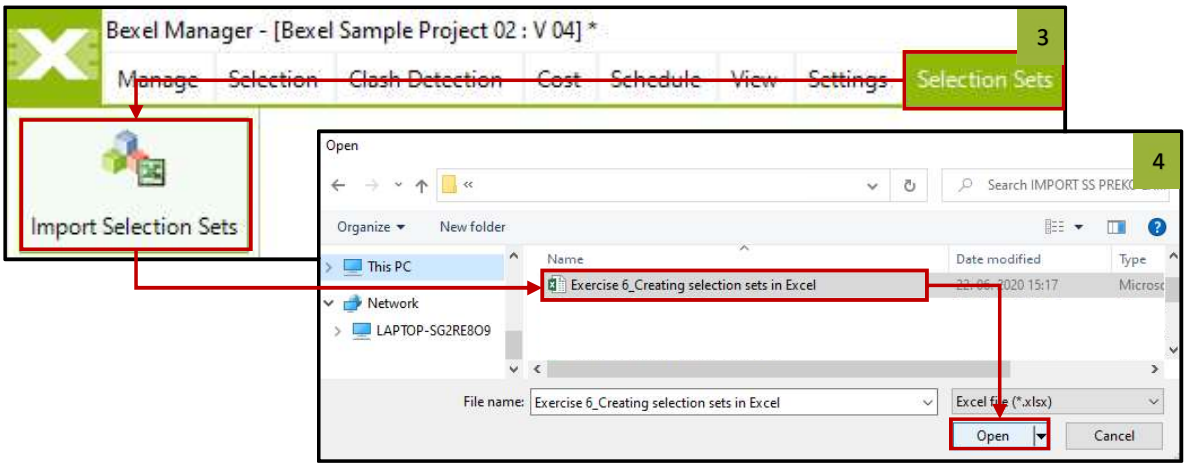


2. After the user has properly downloaded and installed the add-in, the excel spreadsheet has to be created. It should have three columns: **FOLDER**, **NAME** and **QUERY**. In the **Folder** column define the name of the folder, where the selection set will be placed. → In our case this is the **Smart Selection Sets** folder. → In the **Name** column define the name of the selection set, for example, **Exercise 6_Smart Selection Set**. → Afterwards in the **Query** column define rules based on which the elements will be placed in the smart selection set, for example, **(['MasterFormat'] = '') or !(~['MasterFormat'])**. →

	A	B	C
1	Folder	Name	Query
2	Smart Selection Sets	Exerise 6_Smart Selection Set	(['MasterFormat'] = '') or !(~['MasterFormat'])
3			

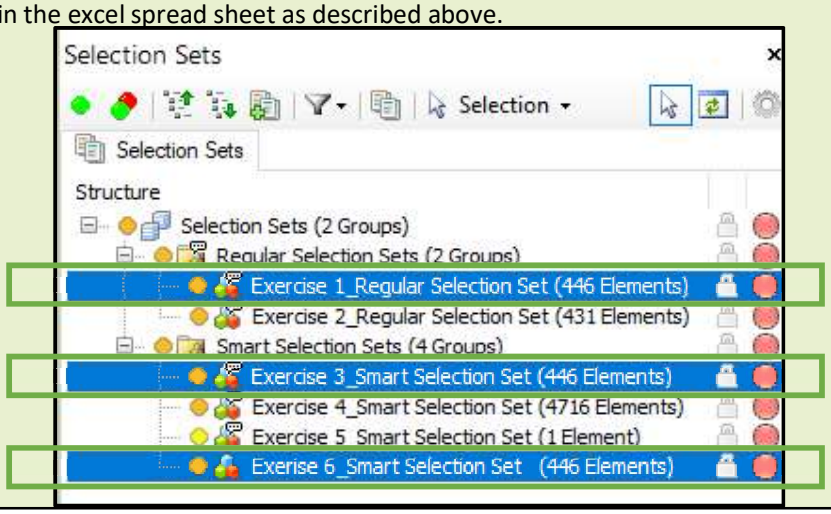
2

3. In the next step activate the **Selection Sets** tab and click on the **Import Selection Sets** command. →
4. In the **Open** window choose the folder which should be opened, for example, the spread sheet created in the previous step, named **Exercise 6_Creating selection sets** in Excel. → Finish the process by clicking on the **Open** button.



ADDITIONAL TIP: The selection set created with the help of Excel software can be easily edited and changed in the Bexel Manager. First the user should activate the Selection Sets palette and then click on the Edit command. In the Edit Selection Set window, the user can add new rules or delete existing ones as if the selection set was created directly in Bexel Manager environment.

NOTE: The selection set based on the rules defined in Excel is automatically placed in the Smart Selection Sets folder. As it is shown on the picture below, it contains the same number of elements as selection set Exercise 1_Regular Selection Set, which was created by selecting elements with undefined value in the custom breakdown based on the MasterFormat property. Also, the same number of elements has the smart selection set named Exercise 3_Smart Selection Set as the rules for both of them were the same. The only difference is that for the Exercise 3 we have defined rules in the Selection Sets palette within the Bexel Manager and for the last selection set we have defined rules in the excel spread sheet as described above.

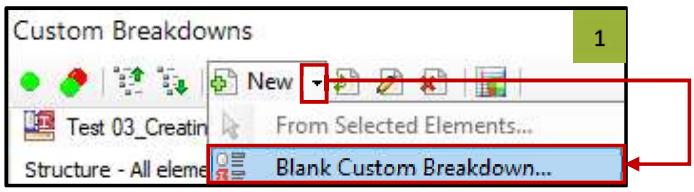


5.3.5. CREATING A SMART SELECTION SET BASED ON A CREATED CUSTOM BREAKDOWN STRUCTURE OR QUANTITY TAKEOFF

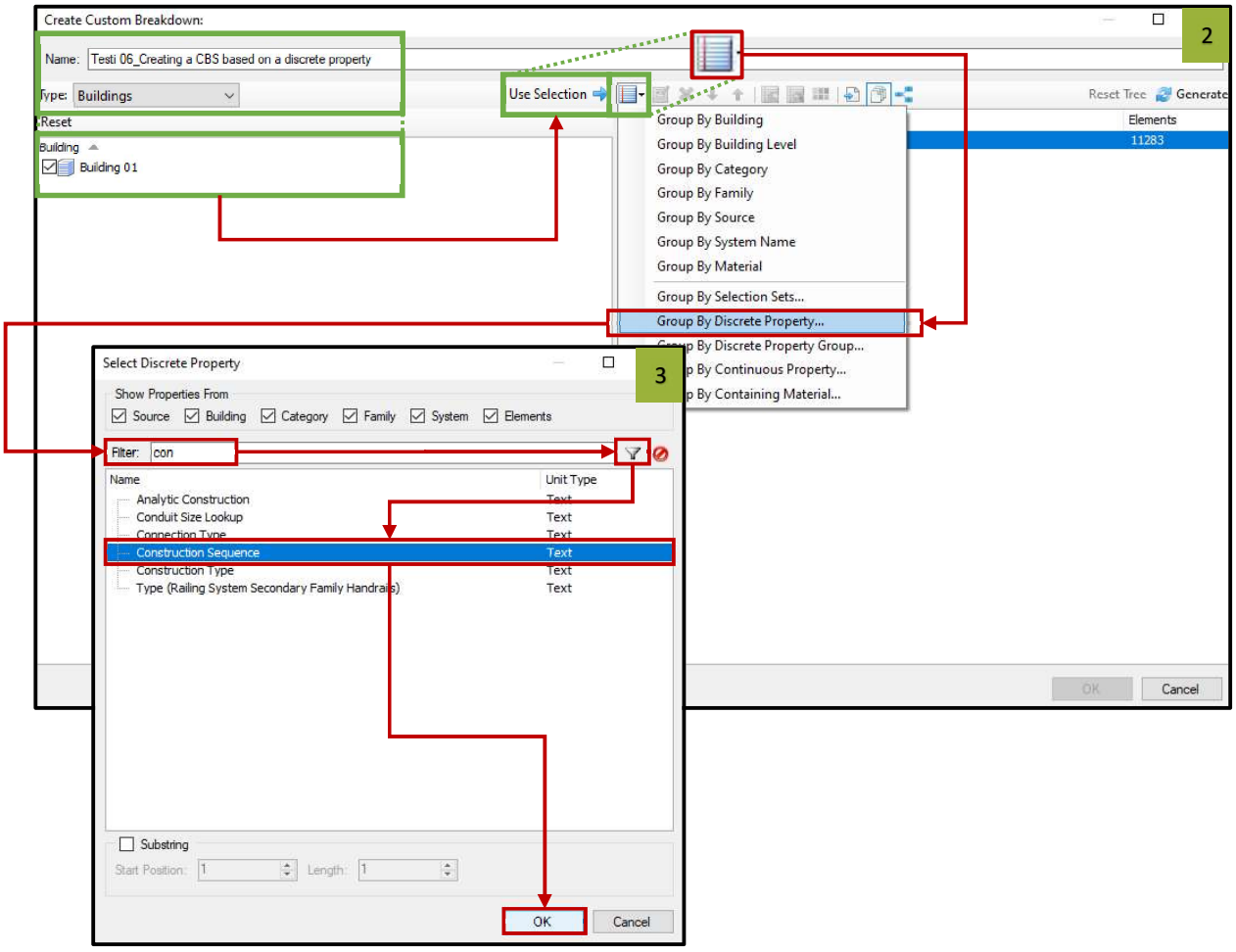
In this section we will lead the user through the process of creating a selection set based on a created custom breakdown. The process will be divided in few steps. In the first step we will create a custom breakdown based on a construction sequence property. In the next step we will create a folder in which selection sets will be placed and in the final step a creation of selection sets based on the custom breakdown structure will be described. These selection sets can be later on used as a base for the template of the schedule.

Step 01: Creating a custom breakdown structure

1. Activate the **Custom Breakdowns** palette, which is located on the left side of the screen. → Click on the **arrow** beside the **New** command and choose the **Blank Custom Breakdown** option. →

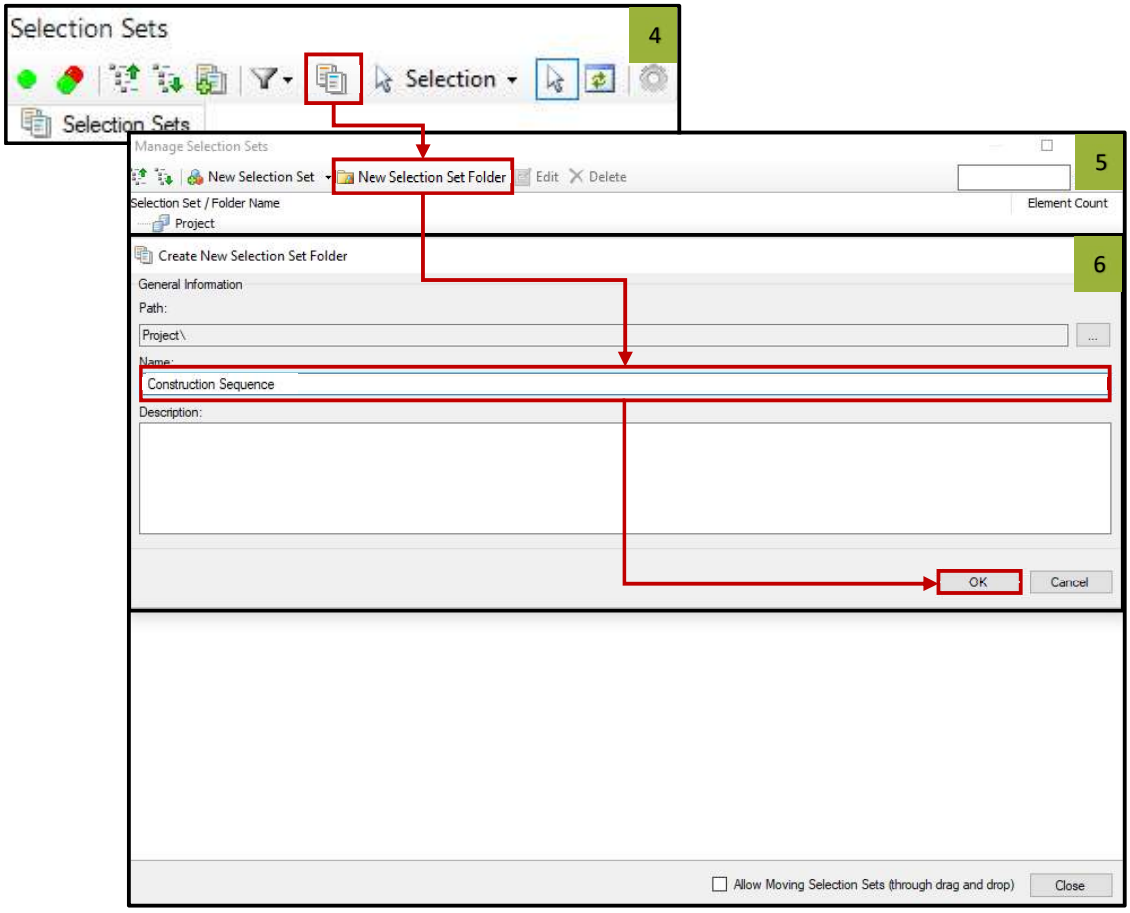


2. In the window **Create Custom Breakdown** define the name of the structure, for example**, Test 06_Creating a CBS based on discrete property**. → Under the **Type** choose option **Buildings**. → Check the box before the **Building 01** option. → Click on the **Use Selection** button. → Click on the **Add Breakdown Rule** and in the drop-down menu choose option **Group by Discrete property** option. →
3. In the **Select Discrete Property** window type in the **Filter** section **CON** and click on the **Filter** icon. → Choose the **Construction Sequence** property from the displayed list and finish the process by clicking on the **OK** button. →



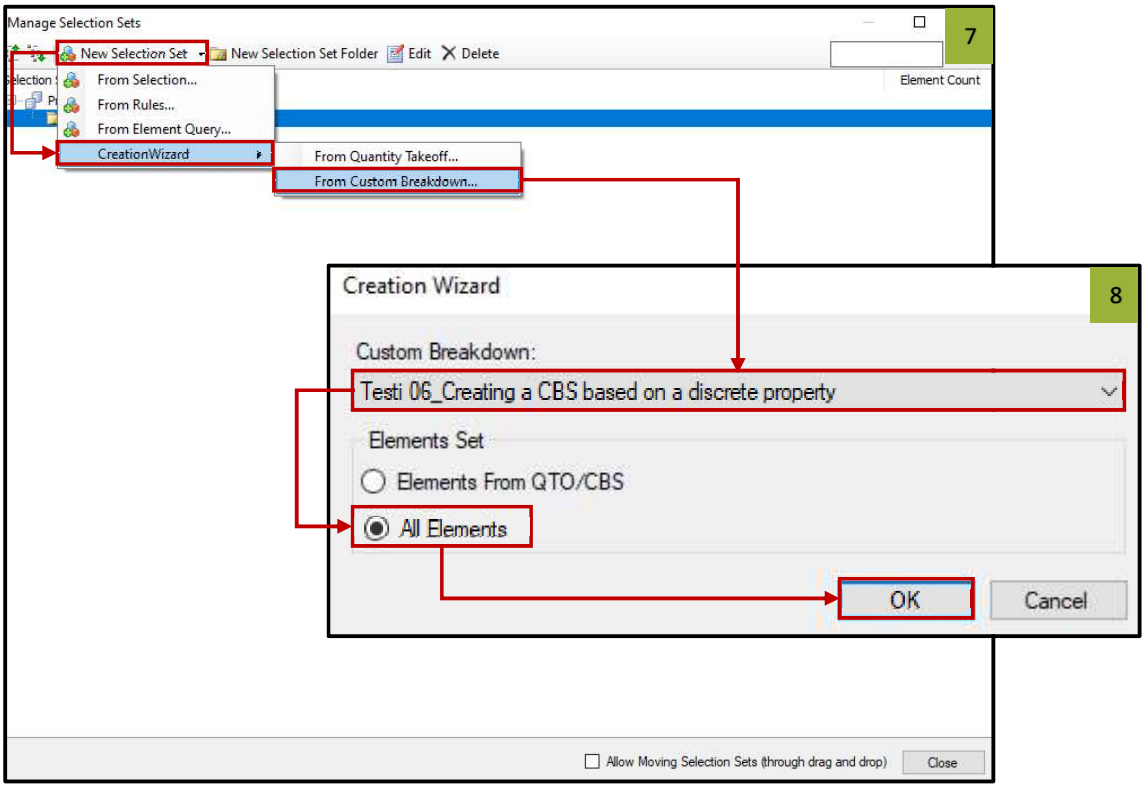
Step 02: Creating a new Selection Set folder

4. Activate the **Selection Sets** palette and click on the **Manage** command. →
5. In the **Manage Selection Sets** window click on the **New Selection Set Folder** command. →
6. Within the **Create New Selection Set** folder in the **Name** section define the **Construction Sequence** folder name and finish the process by clicking on the **OK** button. →



Step 03: Creating a Selection Set based on the Custom Breakdown structure

7. Activate the Selection Sets palette. → Within the **Manage Selection Sets** window click on the **arrow** beside the **New Selection Set** command and choose in the drop-down menu **Creation Wizard** option and afterwards from **Custom Breakdown**. →
8. In the **Creation Wizard** choose the wright custom breakdown for example, **Test 06_creating a CBS based on a discrete property** and in the **Elements set** section choose the **All Elements** option.

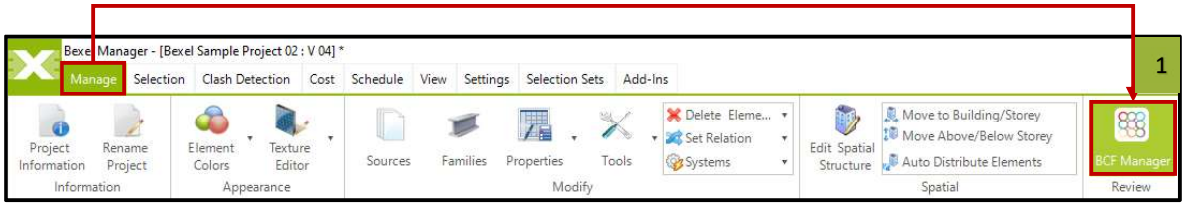


NOTE: In the **Construction Sequence** folder four different selection sets are created named **Exterior Works**, **Phase1**, **Phase2** and **Phase3**. These selection sets are smart selection sets. For example, the selection set Exterior Works contains all elements which have a defined value for the **Construction Sequence** property **Exterior Works**. The selection set Phase1 contains all elements, which have the defined value for the **Construction Sequence** property **Phase1**, etc. As the user can review those 4 selection sets are the same as selection sets **Exercise 4_Smart Selection Set, Exercise 4_Smart Selection Set_2**, **Exercise 4_Smart Selection Set_3** and **4_Smart Selection Set_Exterior Works**. The versatility of the software is demonstrated by showing the user how he can get the same result using different paths.

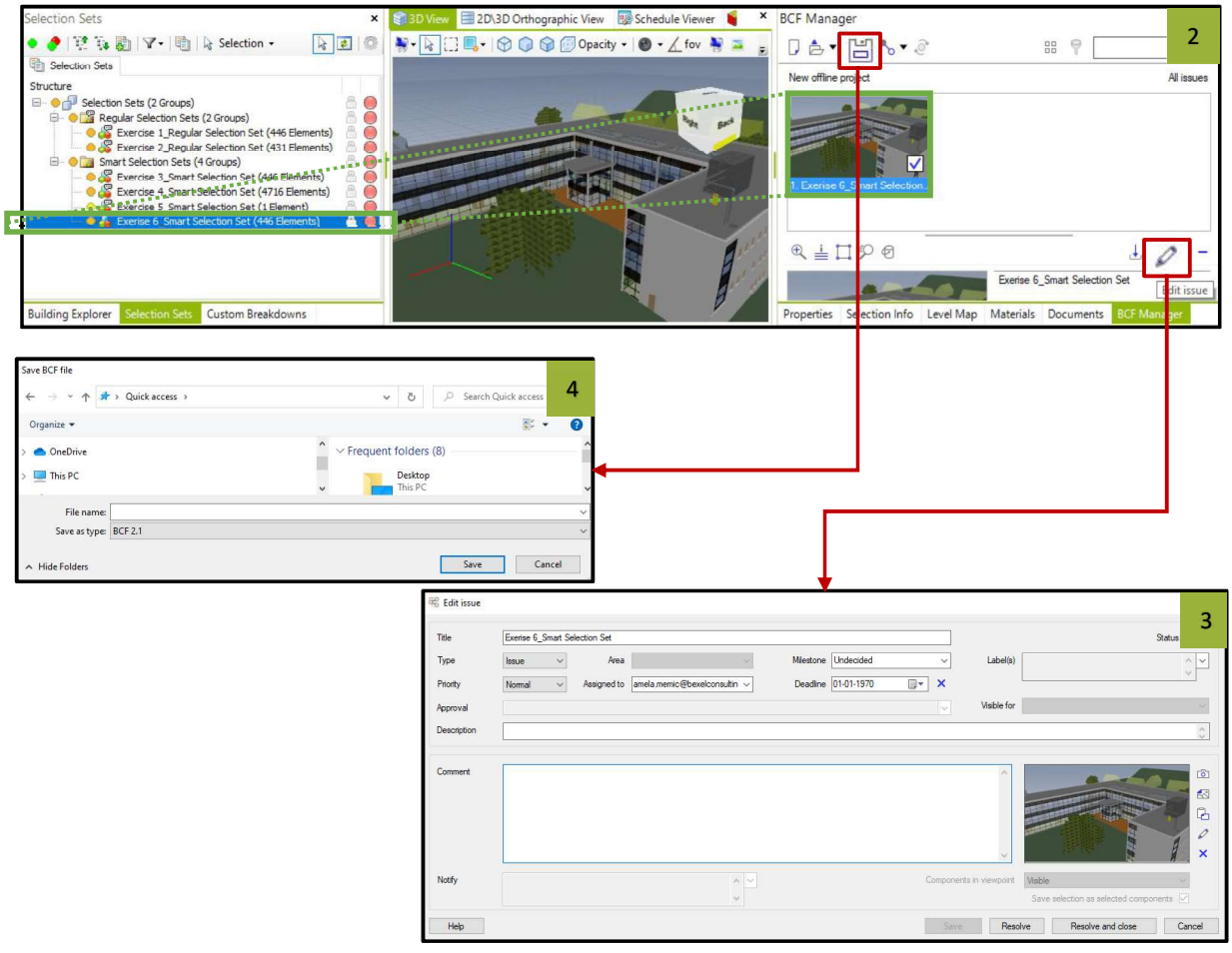
5.3.6. BCF MANAGER

As we have demonstrated various ways how to create a selection set for different purposes, we will now demonstrate how to exchange those selection sets with the help of BCF Manager. In order to exchange a selection set, for example, Exercise 6_Smart Selection Set with another user by using the BCF Manager, please follow the rules below.

1. Activate the **Manage** tab and click on the **BCF Manager**.



2. Activate the **Selection Sets** palette and click on the selection set which should be exchanged with another user, for example**, Exercise 6_Smart Selection Set**. → Click on the set and **drag** it into the BCF Manager **New offline project section** like shown on the picture below. →
3. To edit the issue, click on the **Edit issue** command within the **BCF Manager** window. →
4. To save the .bcf file, click on the **Export BCF file** button as shown on the picture below.



LESSON 06

BEXEL MANAGER

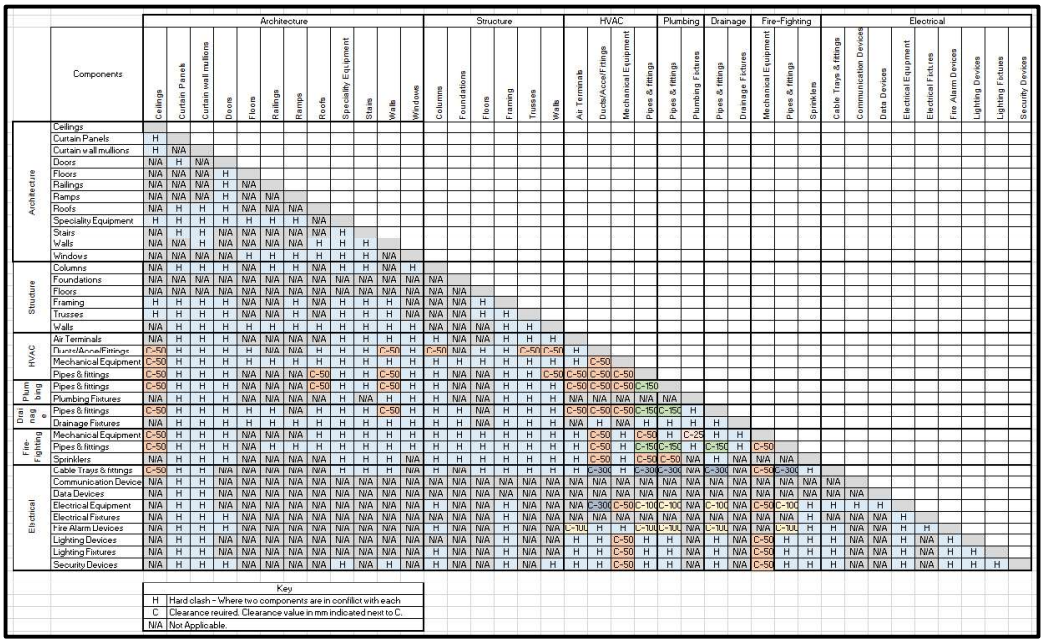
6. CLASH DETECTION

Clash Detection is a software module that allows clash analysis between the individual elements of the 3D BIM model. Clash detection is extremely important in all project phases, in order to execute the project without many problems in quality, delays or additional costs.

In this Lesson we will explain the process of creating the Clash Detection jobs but first we will describe the main terms and functions we use. For further exercise and explanations use **The Bexel Manager Sample Project V02 Start**.

- The **Clash Detection palette** is located at the bottom of the screen by default. We can drag this palette and move it on the desired place inside the software interface.

- **Clash Matrix and Clash detection rules** are the main inputs for Clash detection jobs. Clash Matrix represents the main rules for clashing groups for all construction disciplines, defining type of clash and set exact distances for soft clashes (clearance tolerance). It can be in the table form where we can clearly set and see the intersection of different disciplines and its categories.

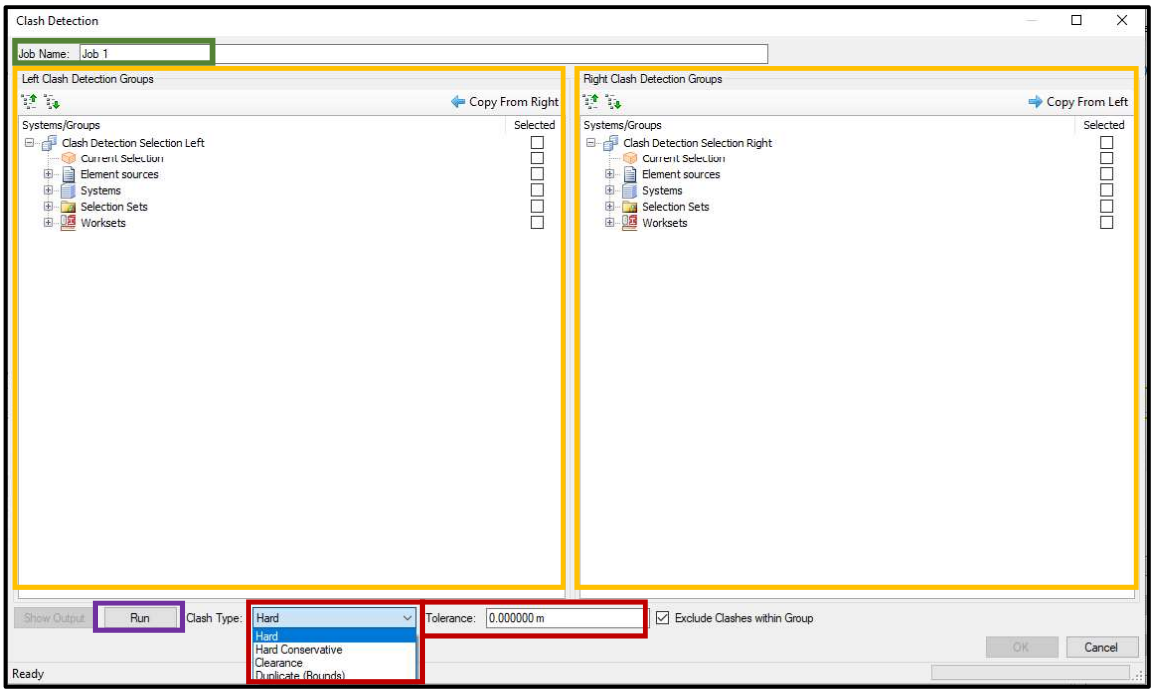


Components	Ceilings	Curtain Panels	Curtain wall mullions	Doors	Floors	Railings	Ramps	Roofs	Speciality Equipment	Stairs	Walls	Windows	Columns	Foundations	Floors	Framing	Trusses	Walls	Air Terminals	Ducts/Accel Fittings	Mechanical Equipment	Pipes & fittings	Pipes & fittings	Plumbing Fixtures	Pipes & fittings	Drainage Fixtures	Mechanical Equipment	Pipes & fittings	Sprinklers	Cable Trays & fittings	Communication Devices	Data Devices	Electrical Equipment	Electrical Fixtures	Fire Alarm Devices	Lighting Devices	Lighting Fixtures	Security Devices
Architecture																																					
Ceilings		H	H	N/A	N/A	N/A	N/A	H	H	H	N/A	H	N/A	N/A	N/A	H	H	N/A	N/A	N/A	N/A	C-50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	C-50	C-300	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Curtain Panels	H		N/A	H	N/A	N/A	N/A	H	H	H	H	N/A	H	N/A	N/A	H	H	H	N/A	N/A	N/A	C-50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	C-50	C-300	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Curtain wall mullions	H	N/A		N/A	N/A	N/A	N/A	H	H	H	H	N/A	H	N/A	N/A	H	H	H	N/A	N/A	N/A	C-50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	C-50	C-300	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Doors	N/A	H	N/A																																		
Floors	N/A	N/A	N/A	H																																	
Railings	N/A	N/A	N/A	H	N/A																																
Ramps	N/A	N/A	N/A	H	N/A	N/A																															
Roofs	N/A	H	H	H	N/A	N/A	N/A																														
Speciality Equipment	H	H	H	H	H	H	H	N/A																													
Stairs	N/A	H	H	N/A	N/A	N/A	N/A	N/A	H																												
Walls	N/A	N/A	H	N/A	N/A	N/A	N/A	H	H	H																											
Windows	N/A	N/A	N/A	N/A	H	H	H	H	H	H	N/A																										
Structure																																					
Columns	N/A	H	H	H	N/A	H	H	N/A	H	H	N/A	H																										
Foundations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A																									
Floors	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A																							
Framing	H	H	H	H	N/A	N/A	H	N/A	H	H	H	N/A	N/A	N/A	H																						
Trusses	H	H	H	H	N/A	N/A	H	N/A	H	H	H	N/A	N/A	N/A	H	H																					
Walls	N/A	H	H	H	H	H	H	H	H	H	H	H	N/A	N/A	N/A	H	H																				
HVAC																																					
Air Terminals	N/A	H	H	H	N/A	N/A	N/A	N/A	H	H	H	H	H	N/A	N/A	H	H	H																			
Ducts/Accel Fittings	C-50	H	H	H	H	N/A	N/A	H	H	H	C-50	H	C-50	N/A	H	H	C-50	C-50	H																		
Mechanical Equipment	C-50	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	C-50																		
Pipes & fittings	C-50	H	H	H	N/A	N/A	N/A	C-50	H	H	C-50	H	H	N/A	N/A	H	H	C-50	C-50	C-50	C-50																
Plumbing																																					
Pipes & fittings	C-50	H	H	H	N/A	N/A	N/A	C-50	H	H	C-50	H	H	N/A	N/A	H	H	H	C-50	C-50	C-50	C-150															
Plumbing Fixtures	N/A	H	H	H	N/A	N/A	N/A	N/A	H	N/A	H	H	H	N/A	N/A	H	H	H	N/A	N/A	N/A	N/A															
Drainage																																					
Pipes & fittings	C-50	H	H	H	H	H	N/A	C-50	H	H	C-50	H	H	N/A	N/A	H	H	H	C-50	C-50	C-50	C-150	C-150	H													
Drainage Fixtures	N/A	H	H	H	H	H	H	H	H	H	H	H	H	N/A	N/A	H	H	H	N/A	H	N/A	H	H	H													
Fire Fighting																																					
Mechanical Equipment	C-50	H	H	H	N/A	N/A	N/A	H	H	H	H	H	H	H	H	H	H	H	H	C-50	H	C-50	H	C-25	H	H											
Pipes & fittings	C-50	H	H	H	N/A	H	H	H	H	H	H	H	H	H	H	H	H	H	H	C-50	H	C-150	C-150	H	C-150	H	C-50									
Sprinklers	N/A	H	H	H	N/A	N/A	N/A	N/A	H	H	H	N/A	H	H	H	H	H	H	H	C-50	H	C-50	C-50	N/A	H	N/A	N/A	N/A								
Electrical																																					
Cable Trays & fittings	C-50	H	H	N/A	N/A	N/A	N/A	N/A	H	H	H	N/A	H	N/A	H	H	H	H	H	C-300	H	C-300	C-300	N/A	C-300	N/A	C-50	C-300	H								
Communication Devices	N/A	H	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A							
Data Devices	N/A	H	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Electrical Equipment	N/A	H	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	H	N/A	N/A	H	N/A	N/A	N/A	C-300	C-50	C-100	C-100	N/A	C-100	N/A	C-50	C-100	H	H	H					
Electrical Fixtures	N/A	H	H	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	H	N/A	N/A	N/A	H			
Fire Alarm Devices	N/A	H	H	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	H	N/A	N/A	H	N/A	N/A	C-10	H	H	C-10	C-10	N/A	C-10	N/A	N/A	C-10	H	H	N/A	N/A	H	H			
Lighting Devices	N/A	H	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	H	N/A	N/A	H	H	C-50	H	H	N/A	H	N/A	C-50	H	H	H	N/A	N/A	H	N/A	H		
Lighting Fixtures	N/A	H	H	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	H	N/A	N/A	H	N/A	N/A	H	H	C-50	H	H	N/A	H	N/A	C-50	H	H	H	N/A	N/A	H	N/A	H	H	
Security Devices	N/A	H	H	H	N/A	N/A	N/A	N/A	H	N/A	H	N/A	H	N/A	N/A	H	N/A	H	H	H	C-50	H	H	N/A	H	N/A	C-50	H	H	H	N/A	N/A	H	N/A	H	H	H

Key	
H	Hard clash - Where two components are in conflict with each
C	Clearance reuired. Clearance value in mm indicated next to C.
N/A	Not Applicable.

- According to Clash Matrix we prepare **groups of 3D model elements** that are going to be used for Clash detection jobs. If model elements are correctly distributed into worksets and categories, we can easily create smart selection sets which are going to be used for further clash analysis. If offered groups of elements does not satisfy predefined clash detection rules, we can manually select elements and create selection sets for certain clash detection job.

- To run clash detection, click The Run Clash Detection button. The **Clash detection window** opens. There are two groups of 3D model elements we use for clash detection job, on the left and right side, which represent the rules from Clash Matrix table. Here we define the clash types which can be Hard, Hard Conservative, Clearance and Duplicate (Bounds). Also, we set tolerance.



Job Name

Groups of elements for clash detection job

Clash Type options and tolerance

Run Clash detection

We will go through Clash detection exercises where we will create Clash detection jobs for different clash type.

Documents for these exercises User can find and download from Bexel User Area. Download **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0\Exchange**. Documents we use: **Exercise - Selection Sets for Import.bxf**, **Clash matrix table – example.jpg, Document for linking.jpg, Clash Report.pdf, Exercise - Clash Detection.bcf.**

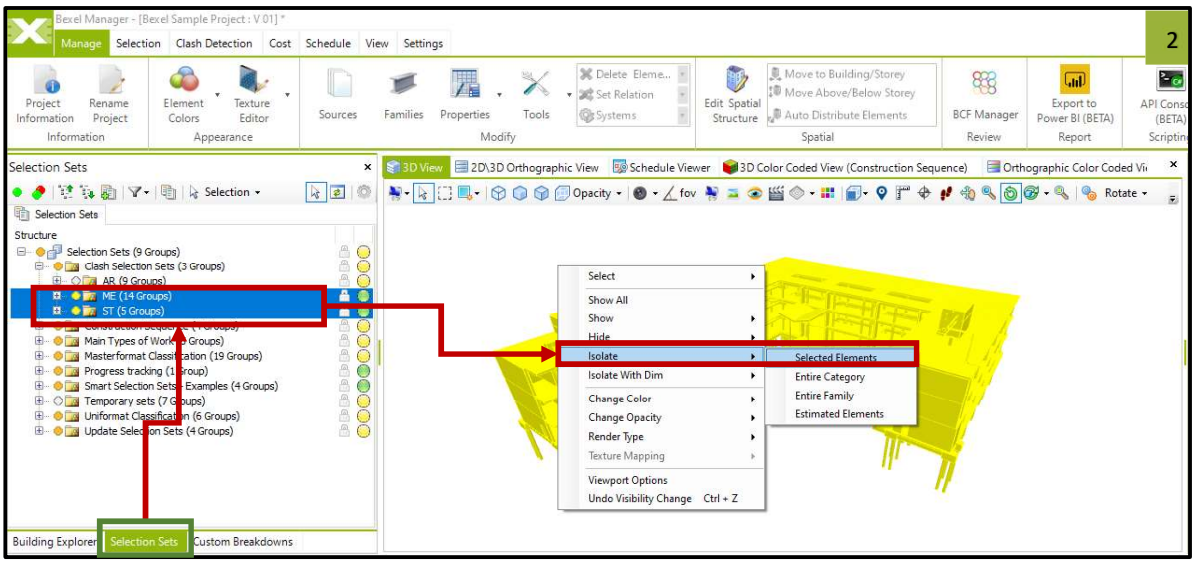
6.1. CLASH DETECTION – CLASH TYPE HARD

This exercise presents process of creating Clash detection job for clash type **Hard clash**. We will check if there are hard clashes between structural floors and HVAC elements.
Documents for this exercise the User can find and download from Bexel User Area within folder **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0 \Exchange**, document **Exercise - Selection Sets for Import.bxf, Clash matrix table – example.jpg.**
First import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf**.

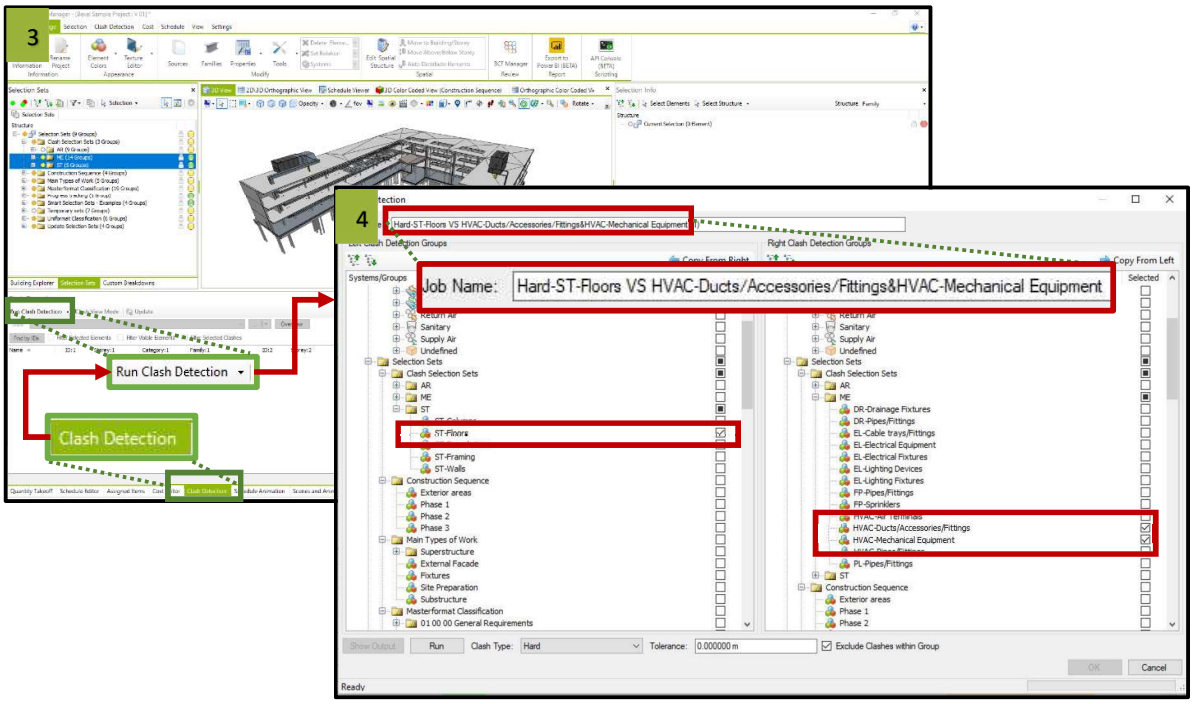
1. When we check example of Clash matrix table for desired elements, we see that if there are clashes between structural floors on one side and Ducts/Acce/Fittings and Mechanical Equipment, on the other side, they are defined as Hard clash. Let check if there is this clash type in our 3D BIM model.

		Structure
		Floors
HVAC	Air Terminals	N/A
	Ducts/Acce/Fittings	H
	Mechanical Equipment	H
1	Pipes & fittings	N/A

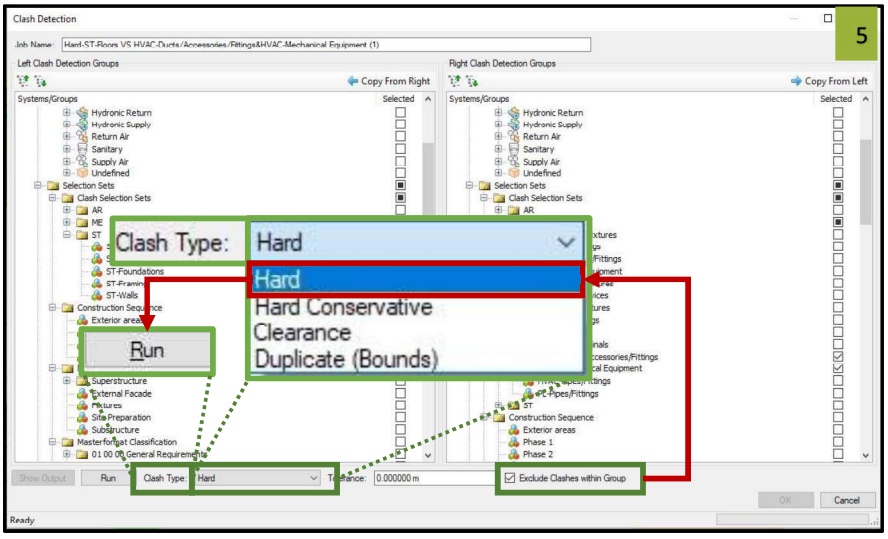
2. For easier exercise we will isolate structural and HVAC elements in the main viewport. We use previously created smart selection sets which are located in Selection sets breakdown tree Clash Selection Sets, such as selection sets within ME and ST folders. → Select these elements. → Right-click on viewport screen. → Choose **Isolate**. → From drop-down list choose **Selected elements**. By double-clicking on mouse scroll button, user can zoom selected elements in the main viewport screen. Press keyboard **Esc** key to cancel selection.



3. Select the **Clash Detection** palette. → Click on the **Run Clash Detection** button. →
4. The Clash Detection window opens. Define the name of the clash in the **Job Name** field, **Hard-ST-Floors VS HVAC-Ducts/Accessories/Fittings&HVAC-Mechanical Equipment.** → Select the group of elements on the left side of the window. According to example of clash matrix from the first step of this process, we select group of elements **Selection sets/Clash Selection sets/ST/ST-Floors**.→ Select the group of elements on the right side of the window, we select group of elements **Selection sets/Clash Selection sets/ME/HVAC-Air Terminals, HVAC-Ducts/Accessories/Fittings** →



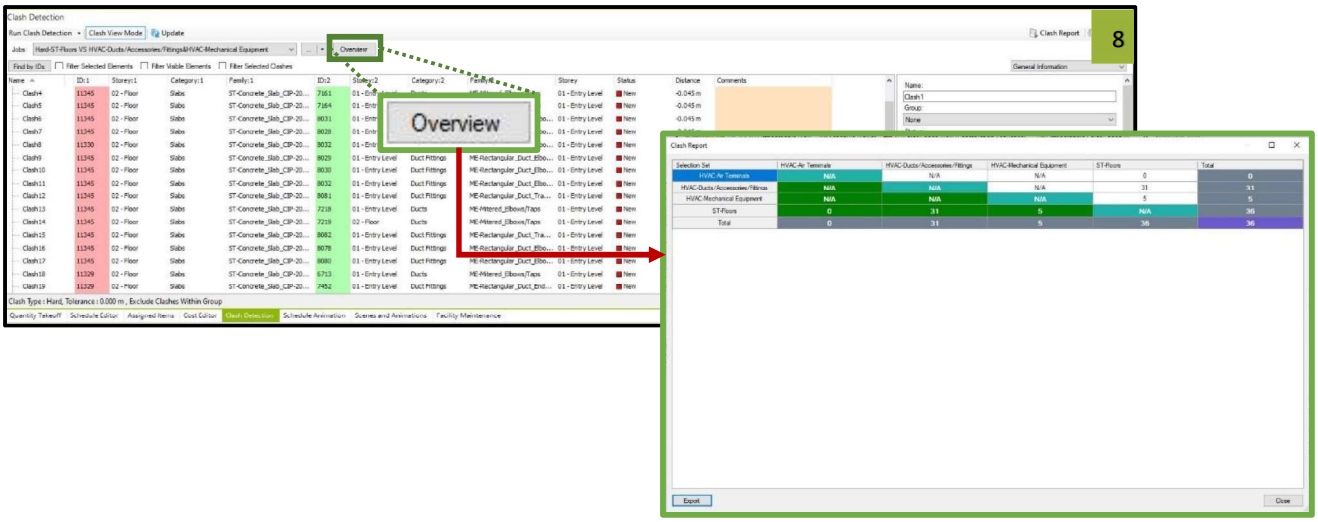
5. The Clash Detection window is still opened. Determine the type of clash, we choose **Clash Type: Hard**. → Check the option the **Exclude Clashes within Group**. → Click on the **Run** button. →



6. When the analysis is complete, the **Analysis Complete** window appears where we see the number of detected clashes. → Click the **OK** button. →

7. The Analysis is completed, click the **OK** button to close the Clash Detection window.

8. Analysis is displayed on the Clash Detection list. → Click on the **Overview** button to see clash report.

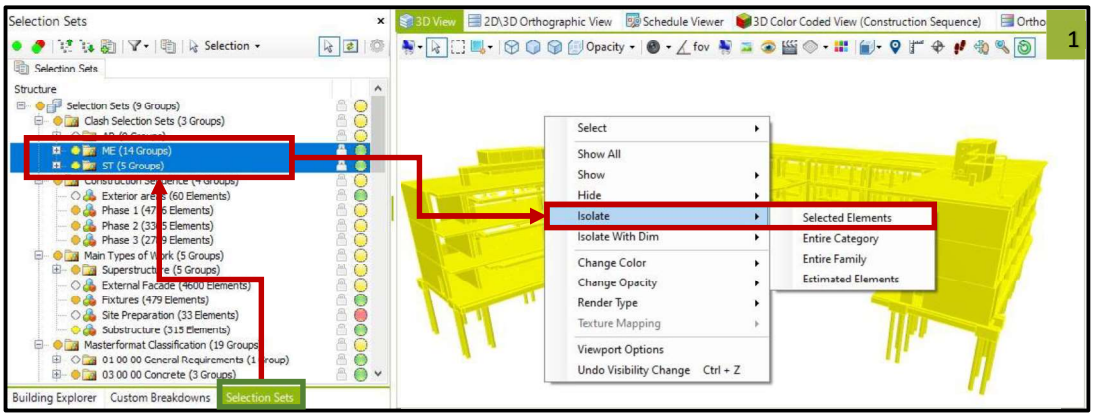


6.2. CLASH DETECTION – CLASH TYPE HARD - CONSERVATIVE

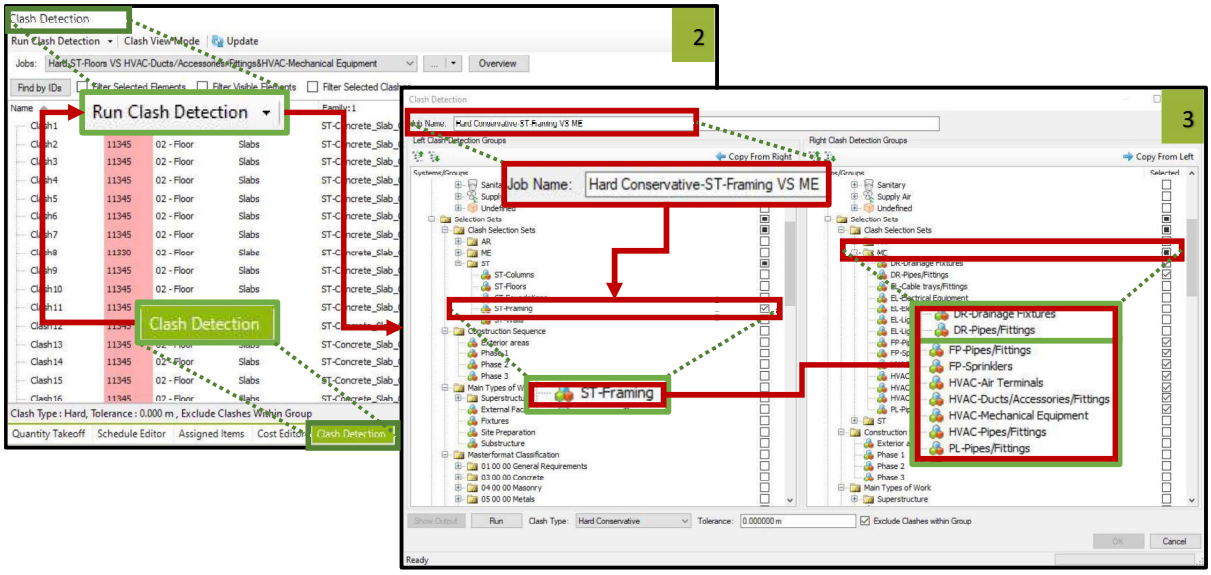
Clash type **Hard - Conservative** is an option which does the same clash test as clash type Hard but it additionally applies a conservative intersection method for clash detection between elements. We can use it as additional clash check. In this exercise we will check if there are hard conservative clashes between structural framing and mechanical and plumbing elements.

Documents for this exercise the User can find and download from Bexel User Area within folder **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0\Exchange**, we need document **Exercise - Selection Sets for Import.bxf.**
First import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf.**

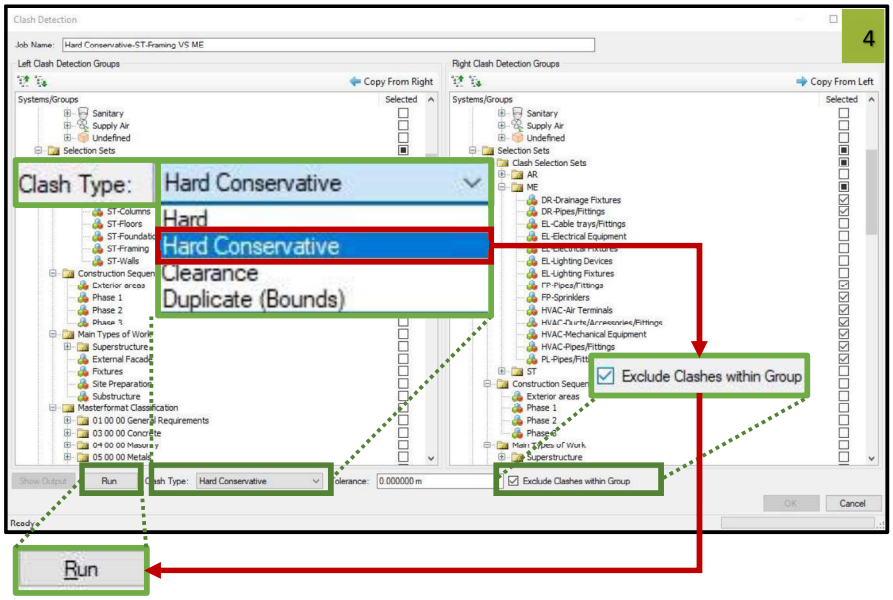
1. For easier exercise we isolate structural elements and mechanical and plumbing elements in the main viewport. We use previously created smart selection sets which are located in Selection sets breakdown tree Clash Selection Sets, such as selection sets within ME and ST folders. → Select these elements. → Right-click on viewport screen. → Choose **Isolate**. → From drop-down list choose **Selected elements**. By double-clicking on mouse scroll button, user can zoom selected elements in the main viewport screen. Press keyboard Esc key to cancel selection.



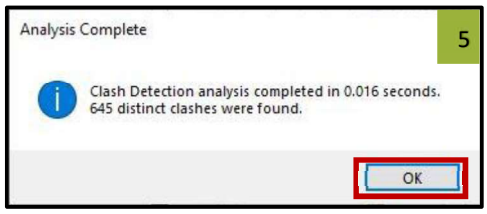
2. Select the **Clash Detection** tab. → Click on the **Run Clash Detection** button. →
3. The Clash Detection window opens. Define the name of the clash in the **Job Name** field, **Hard Conservative-ST-Framing VS ME.** → Select the group of elements on the left side of the window, we select group of elements **Selection sets/Clash Selection sets/ST/ST-Framing**.→ Select the group of elements on the right side of the window, we select group of elements **Selection sets/Clash Selection sets/ME** where we select all selection sets except electrical. →



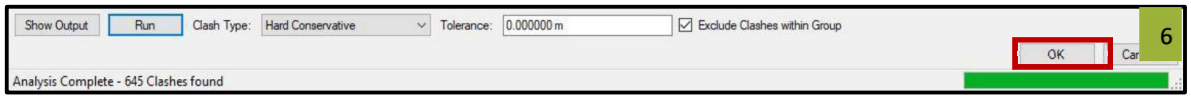
4. The Clash Detection window is still opened. Determine the type of clash, we choose **Clash Type: Hard Conservative**. → Define the **Tolerance**, in this case we set 0.05m. → Check the option the **Exclude Clashes within Group**. → Click on the **Run** button. →



5. When the analysis is complete, the **Analysis Complete** window appears where we see the number of detected clashes. → Click the **OK** button. →



6. The Analysis is completed, click the **OK** button to close the Clash Detection window.



6.3. CLASH DETECTION – CLASH TYPE CLEARANCE

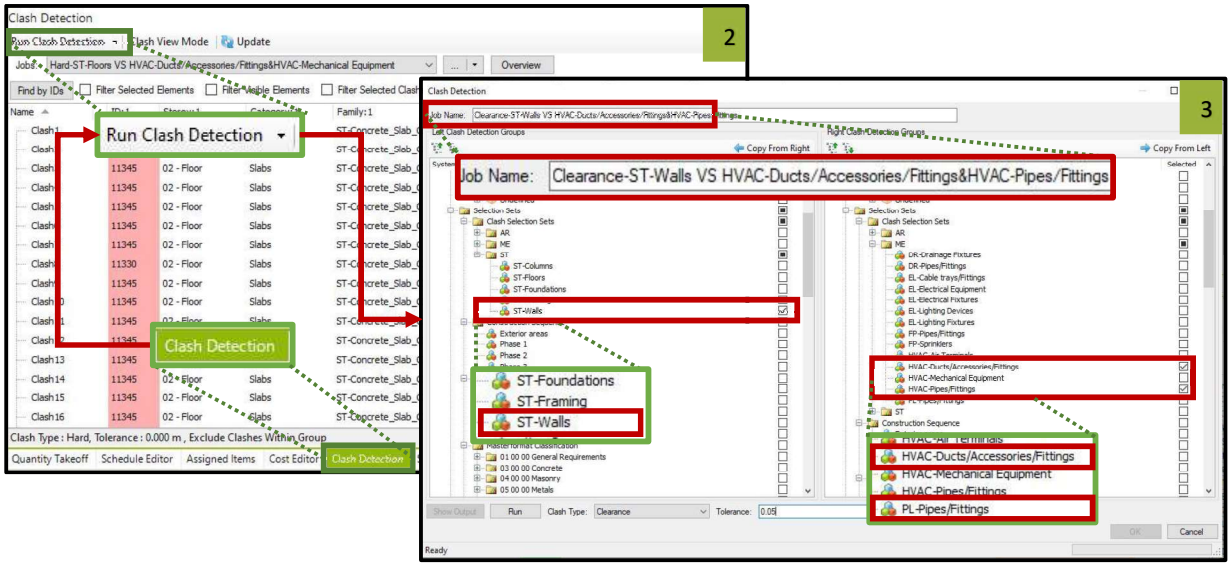
Clash type **Clearance** we use when we want to check if a specific distance between two geometries is satisfied. In this exercise we will check clearance between structural walls and HVAC elements.

Documents for this exercise the User can find and download from Bexel User Area within folder **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0\Exchange**, documents **Exercise - Selection Sets for Import.bxf, Clash matrix table – example.jpg.**
First import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf.**

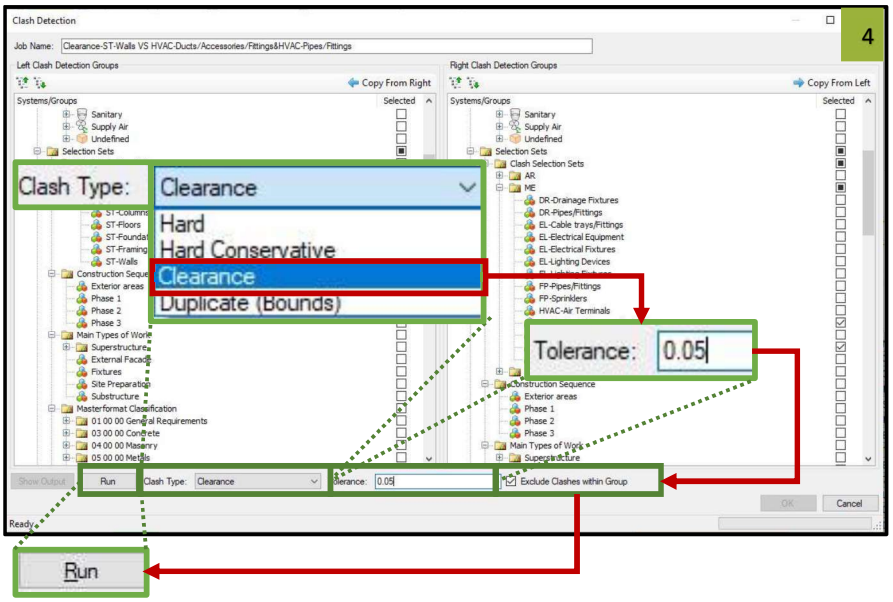
1. When we check example of Clash matrix table for desired elements, we see that, if there are clashes between structural walls on one side and Ducts/Acce/Fittings and Pipes & fittings, on the other side, they are defined as C-50 clash. This means that the clearance between these elements should not be less than 50mm. Let's check if there is this clash type in our 3D BIM model.

		Structure
		Walls
1	Ducts/Acce/Fittings	C-50
	Mechanical Equipment	H
	Pipes & fittings	C-50

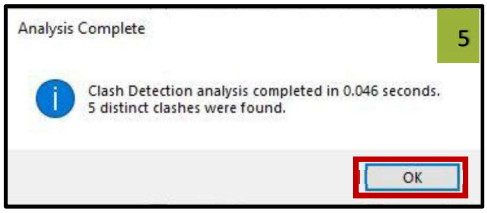
2. Select the **Clash Detection** tab. → Click on the **Run Clash Detection** button. →
3. The Clash Detection window opens. Define the name of the clash in the **Job Name** field, **Clearance-ST-Walls VS HVAC-Ducts/Accessories/Fittings&HVAC-Pipes/Fittings.** → Select the group of elements on the left side of the window. According to example of clash matrix from the first step of this process, we select group of elements **Selection sets/Clash Selection sets/ST/ST-Walls.** → Select the group of elements on the right side of the window, we select group of elements **Selection sets/Clash Selection sets/ME/ HVAC-Ducts/Accessories/Fittings, HVAC-Pipes/Fittings.** →



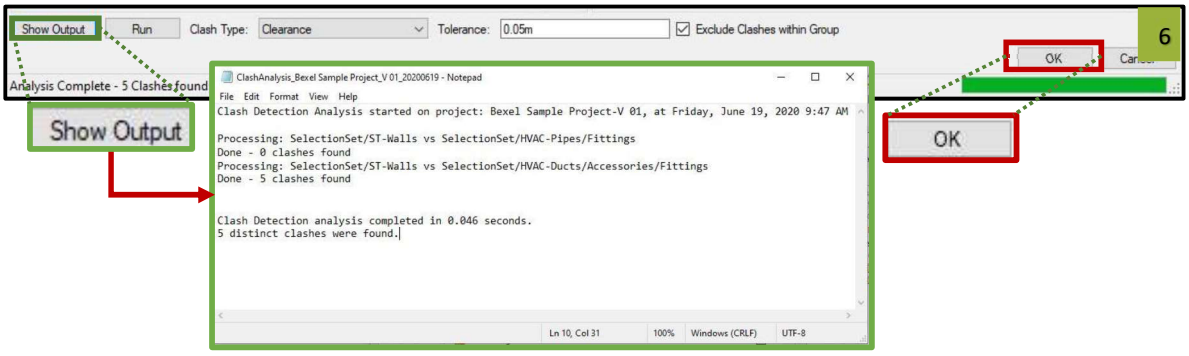
4. The Clash Detection window is still opened. Determine the type of clash, we choose **Clash Type: Clearance**. → Define the **Tolerance**, in this case we set 0.05m. → Check the option the **Exclude Clashes within Group**. → Click on the **Run** button. →



5. When the analysis is complete, the **Analysis Complete** window appears where we see the number of detected clashes. → Click the **OK** button. →



6. User can open Output file, click on the **Show Output** button when Notepad file opens with main technical information about certain Clash detection job. The Analysis is completed, click the **OK** button to close the Clash Detection window.

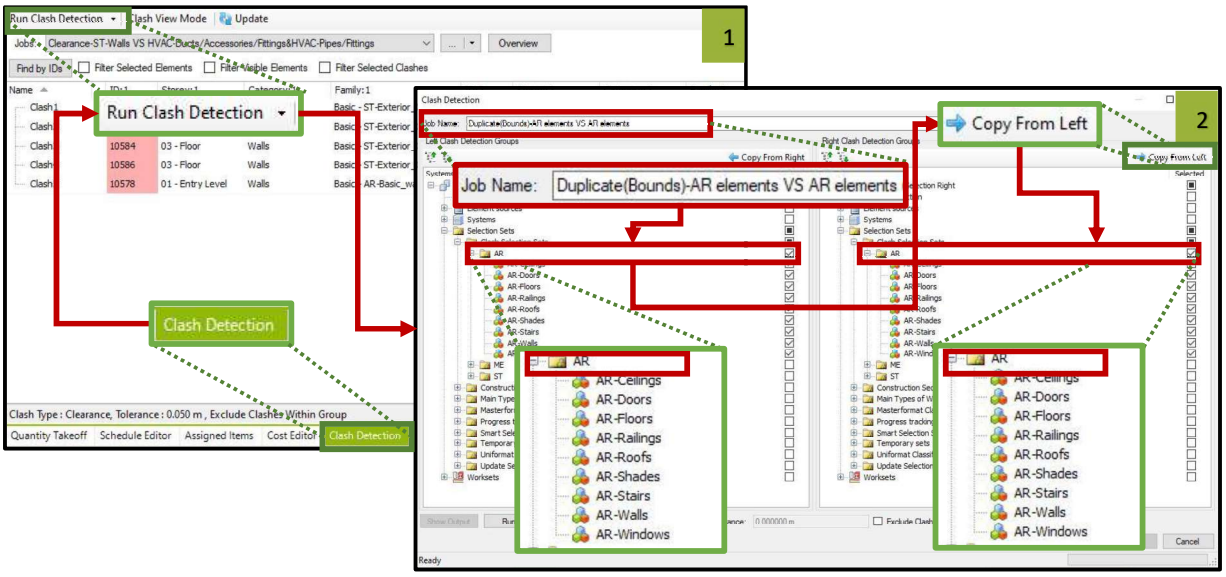


6.4. CLASH DETECTION – CLASH TYPE DUPLICATE (BOUNDS)

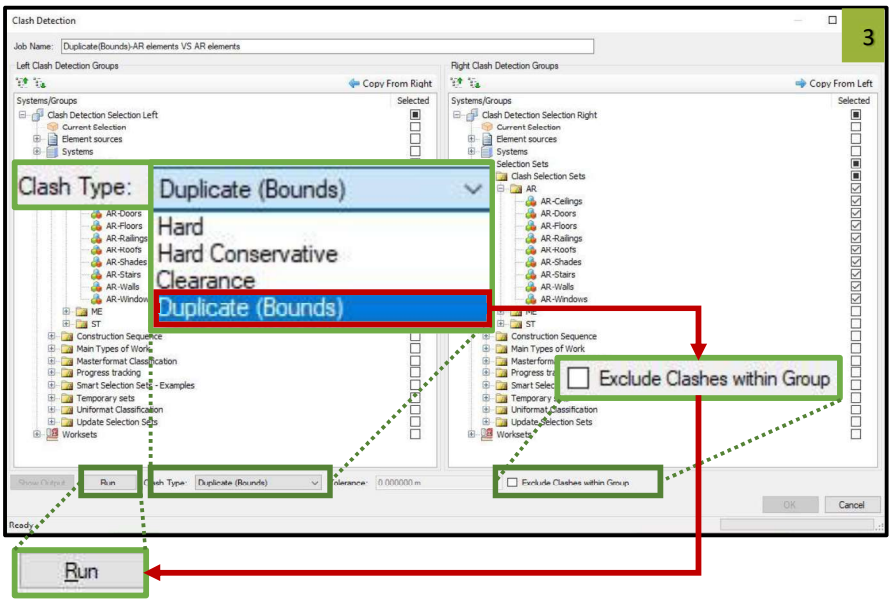
The clash type **Duplicate (Bounds)** is a type of clash we use when we want to check whether the project contains duplicated geometry, we check if the model has duplicated model elements. We will check if there are duplicated architectural elements.

Documents for this exercise the User can find and download from Bexel User Area within folder **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0\Exchange,** we need document **Exercise - Selection Sets for Import.bxf.**
First import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf.**

1. Select the **Clash Detection** palette. → Click on the **Run Clash Detection** button. →
2. The **Clash Detection** window opens. Define the clash name in the **Job Name** window, **Duplicate (Bounds)-AR elements VS AR elements**. → Select the group of elements on the left side of the window, in this case we select the folder **Selection sets/Clash Selection sets/AR**. All selection sets within this folder are checked. → Select the same group of elements on the right side of the window. We can use command in the right corner of the window, the **Copy From Left** button. →



3. Determine the type of clash, **Clash Type: Duplicate**. → Disable '**Exclude Clashes within Group**'. → Click on the **Run** button. →



4. When the analysis is complete, the **Analysis Complete** window appears where we see the number of detected clashes. → Click the **OK** button. →

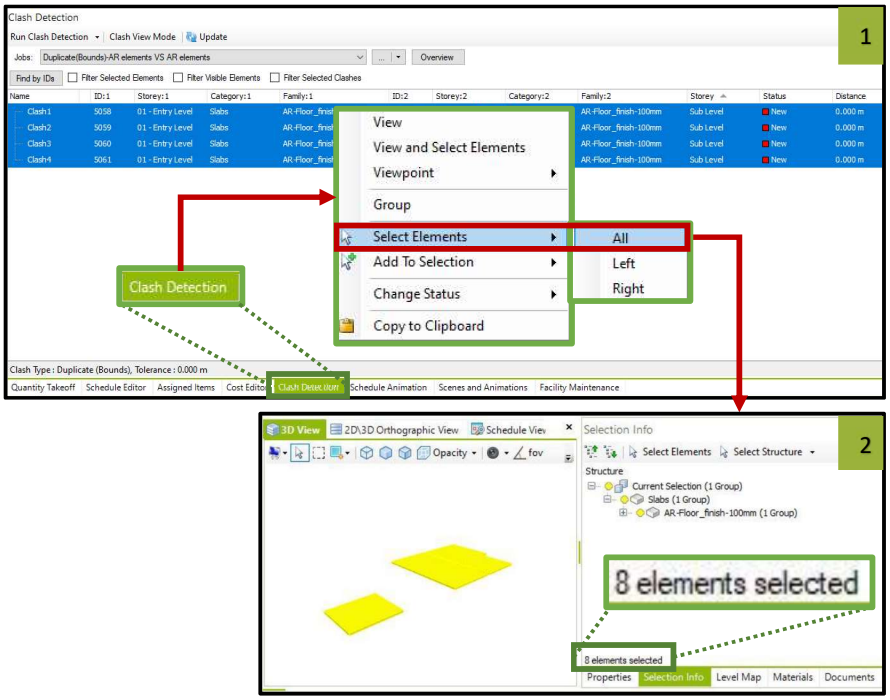
5. The Analysis is completed, click the **OK** button to close the Clash Detection window.

6.5. CLASH REVIEW

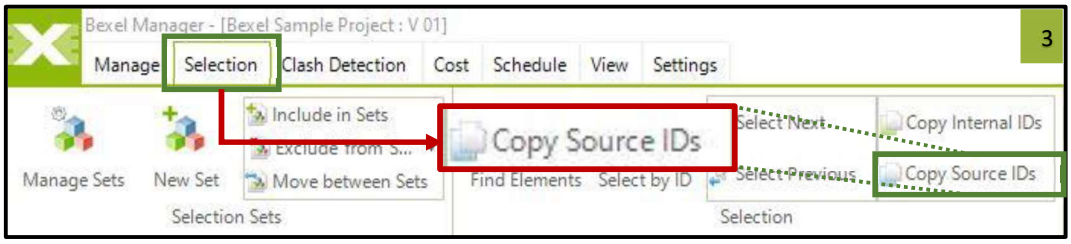
We can select elements which are in conflict and copy their IDs if we need to exchange them with other project users.

Copy elements ID

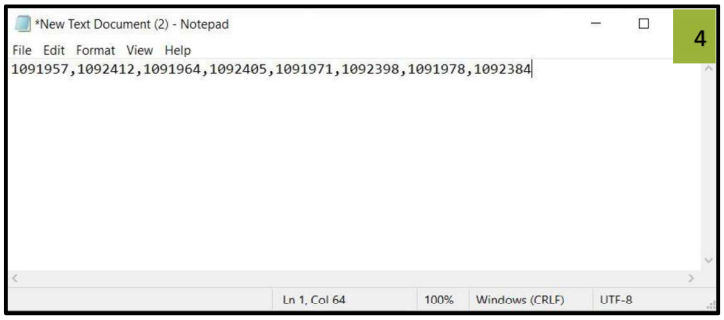
1. Select clashes manually one by one, or use CTRL+A keys to select all clashes. Right-click on selected clashes. → Click on **Selected elements**. →In drop-down list choose option **Left, Right** or **All**. We click the **All** option, which means we have selected all duplicated elements that should be checked. →
2. Check which elements are selected in Selection Info palette.→ We can also isolate selected elements in the main viewport, with right mouse click, choose the **Isolate** option.



3. Click on **Selection tab** on the upper part of the screen. → Click on **Copy Source IDs button**.



4. Now we can paste Source IDs that need to be checked or deleted from authoring software. This document can be sent to corresponding person to correct duplicate elements in the 3D BIM model.



Transfer elements ID through BIM Collab

We can send information about element duplicates through BIM Collab using BCF Manager. More about this topic we will show on **BCF MANAGER.**

6.6. CLASH DETECTION REPORTS

6.6.1. EXPORT REPORT

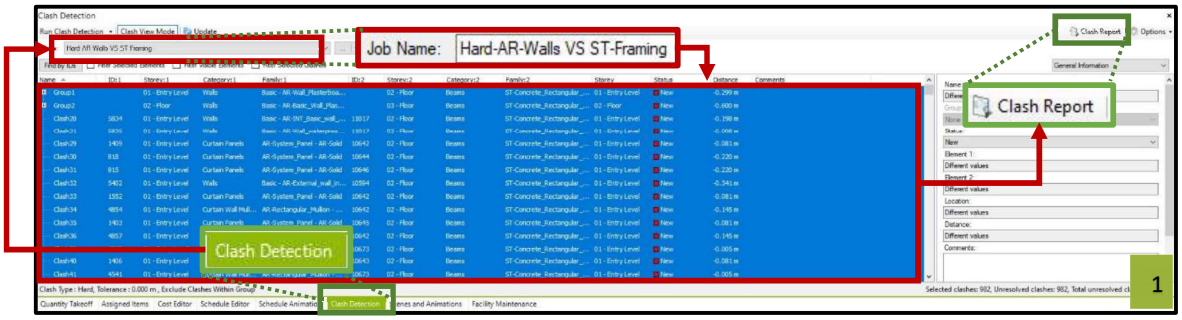
6.6.1.1. Exporting clash analysis report in html and pdf file format

The final product of clash analysis is creating the clash detection report. We can export it as a PDF or HTML file.

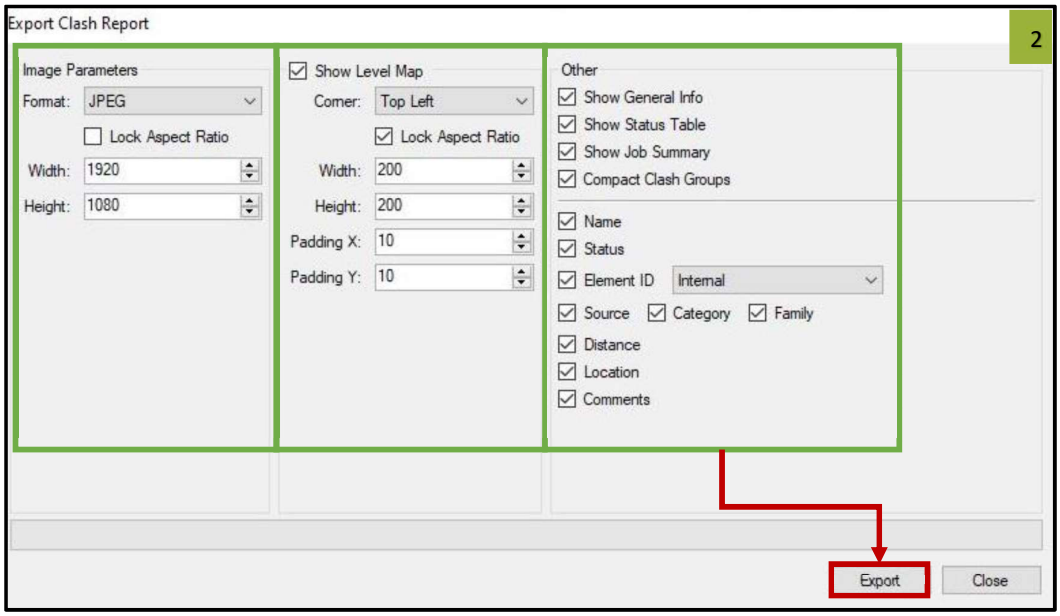
If user wants to export entire clash detection job, user can deselect all clashes, or select all clashes within clash result list pressing CTRL+A at the same time. If user wants to export only selected clashes, select the desired clashes in Clash detection job, adding individual clashes using the CTRL key.

We will create Reports for previously created clash detection job **Hard-AR-Walls VS ST-Framing**. We are going to create report for all clashes we have detected in this job.

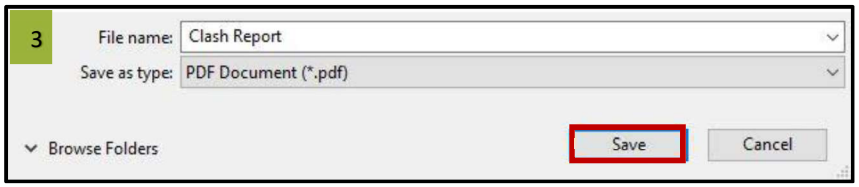
1. The Clash Detection palette is active. The clash detection job **Hard-AR-Walls VS ST-Framing** is also active. Click the **Clash Report** command. →

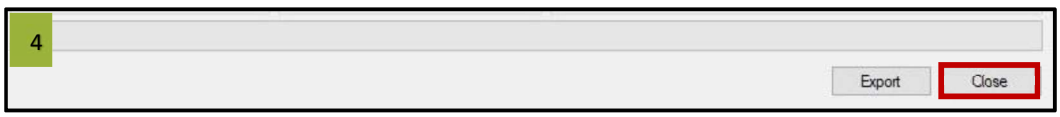


2. The **Export Clash Report** window opens, where we determine the image display properties in the **Image Parameters** field, the Level Map properties in the **Show Level Map** field, and the properties of other information in the **Other Information** field. → Click on the **Export** button.→



3. Choose where to save the clash report. → Choose the **format type** of the report (pdf or HTML), here we choose pdf format. Enter the name of **File name**, here we enter **Clash Report**. →
4. After the process of creating clash report is finished, click the **Close** button to close the Export Clash Report window.





If we save the report as HTML file, it opens using the desired browser. By double-clicking on the chosen clash inside the HTML file, the clash screenshot is enlarged.

Created report User can also download from Bexel User Area within the folder structure **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0\Exchange**, document **Clash Report.pdf.**

6.6.1.2. Reporting issues using Power BI

Clashing results can be analyzed through Power BI platform.

Choose **Manage** tab and select **Export to Power BI Report** tool. Clicking on that button, whole project is being published to Power BI file and we are able to analyze clashing results through Desktop or Web platform.

6.6.2. BCF MANAGER

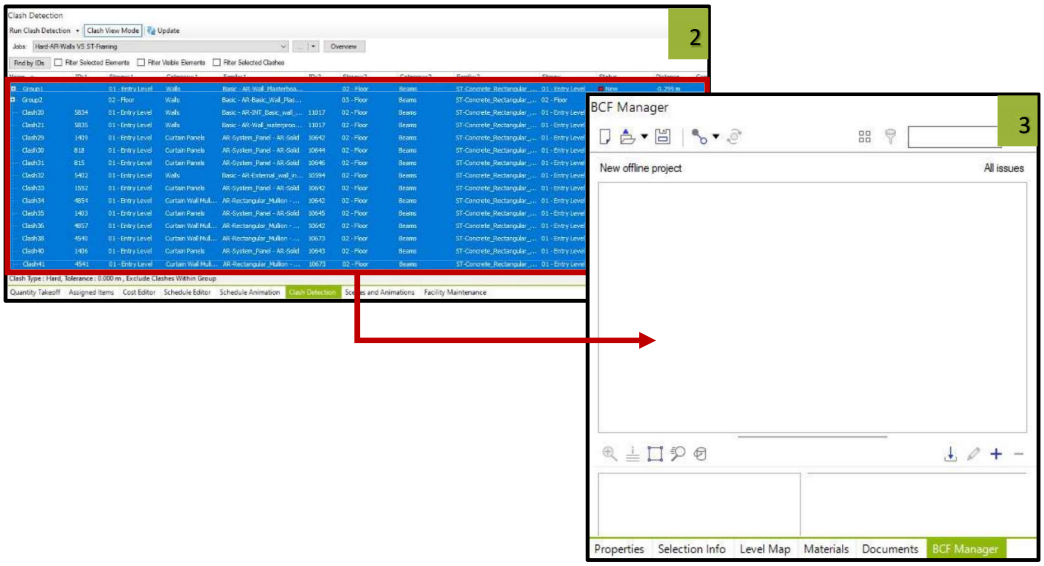
6.6.2.1. Sharing issues, collisions with other stakeholders using BCF Manager

BCF Manager Review allows participants in the same project to exchange files in the form of BCF formats, regardless of the software used. The forwarded file in the BCF format is simply opened in another software tool. Sharing report in the BCF format between different participants using different software tools is only possible if the model originates from the same original IFC model and the software tools of all participants support the open BCF format.

We will export detected clashes to BCF file format. We will use detected clashes in previously created clash detection job **Hard-AR-Walls VS ST-Framing**.

1. Choose the **Manage tab**. → Select the **BCF Manager Review tool**. Follow instructions to activate BCF Manager. →

2. Select clashes from Clash detection list. →
3. **Drag and drop** into BCF Manager palette. →

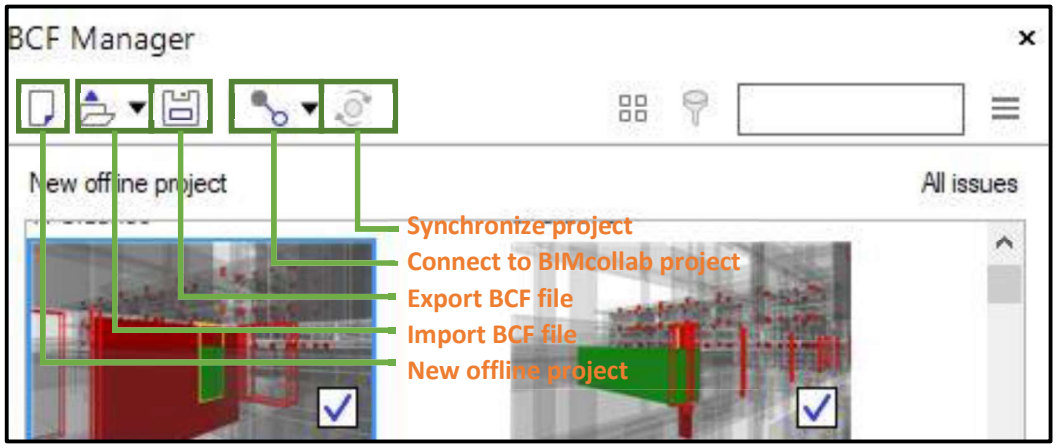


4. Click the **Export BCF file** button.

NOTE: BCF issue requires created viewpoint for each clash. If there are not previously created, software will automatically create viewpoint from default view on viewport screen.

Exported BCF file User can also download from Bexel User Area the folder structure **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0\Exchange**, document **Exercise - Clash Detection.bcf.**

We can create project on BIMcollab platform and share issues directly with other stakeholders, where, after drag and drop collisions into BCF Manager palette, uploaded issues will be automatically seen on BIMcollab platform.

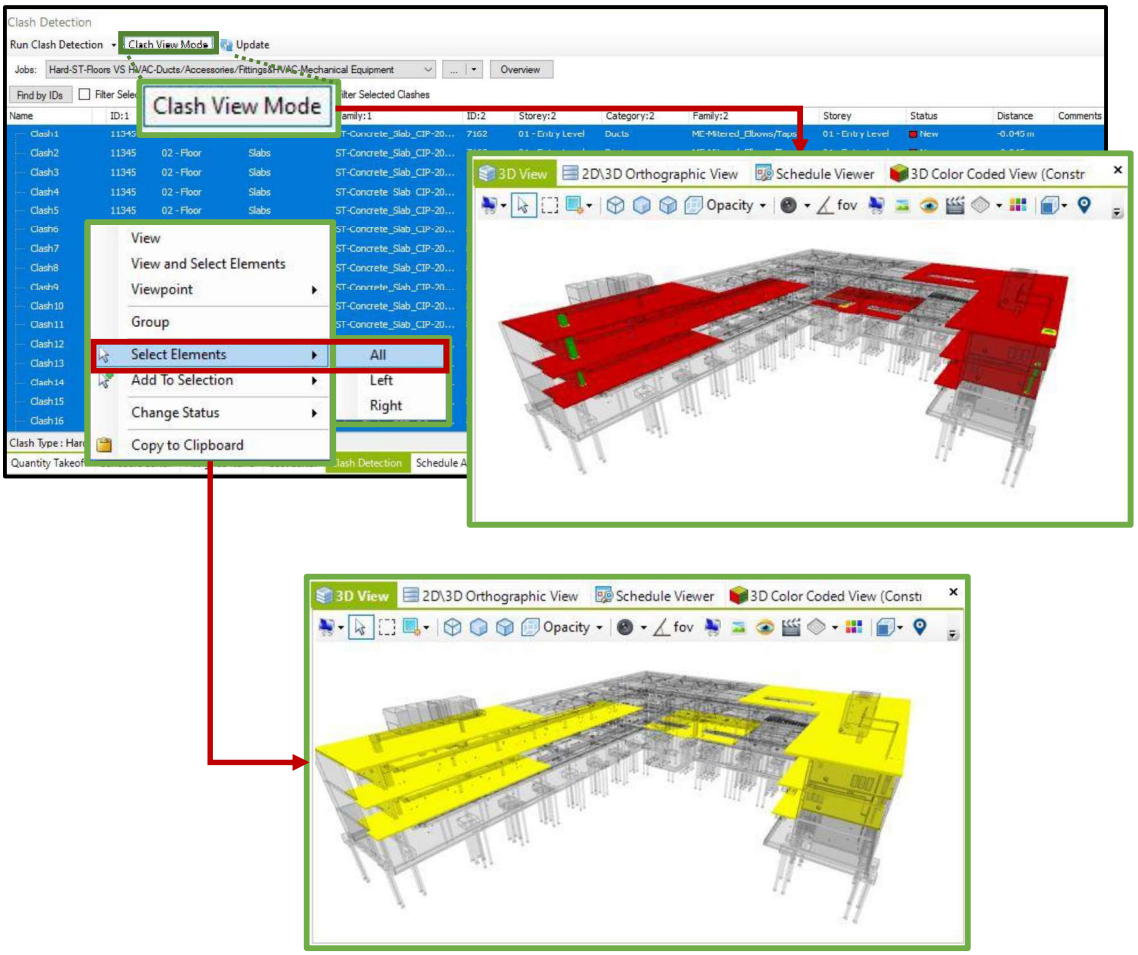


6.7. CLASH DETECTION – OTHER FUNCTIONALITY

6.7.1. CLASH VIEW MODE AND ELEMENT SELECTION

If User need to view detected clashes, select desired clashes by clicking on them (use **CTRL** key for multiple selection), click the **Clash View Mode** button. In the main viewport window, we can clearly see elements which are in conflict. We can set the appearance of elements by click on Settings button. More about these options find out in Bexel Manual.

When we want to select elements that are in conflict, go **right-click** on desired clashes, click the **Select Elements** and choose the option, here we select the **All** option.



6.7.2. CLASH ANALYSIS IN LEVEL MAP PALETTE

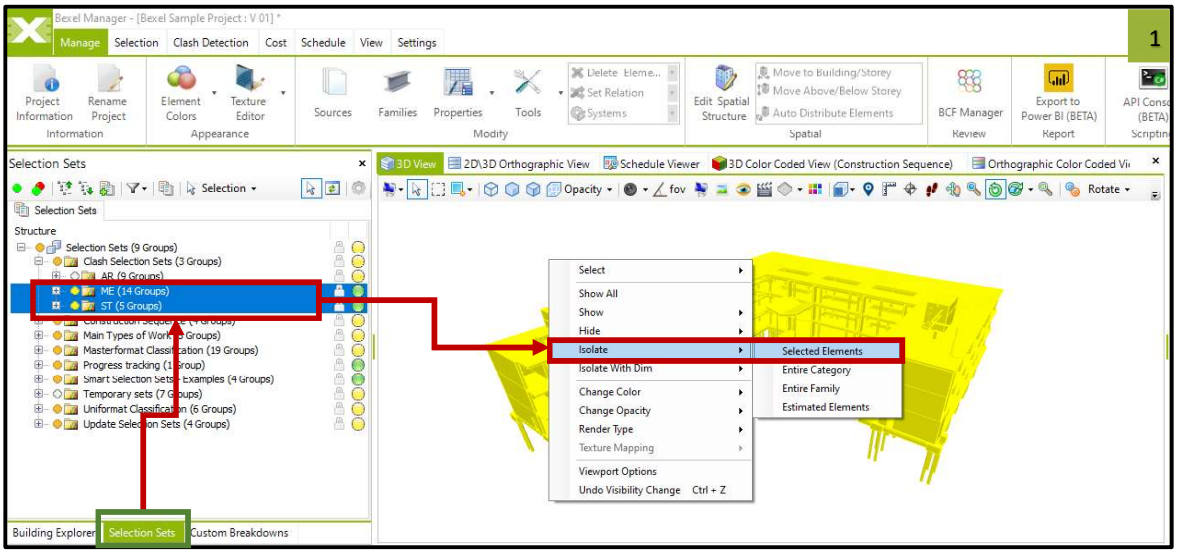
Level MAP helps us to locate clash on the exact floor plan and it allows easier detection of collision density on the current floor.

In this exercise we will use previously created Clash detection job **Hard-ST-Floors VS HVAC-Ducts/Accessories/Fittings&HVAC-Mechanical Equipment.**

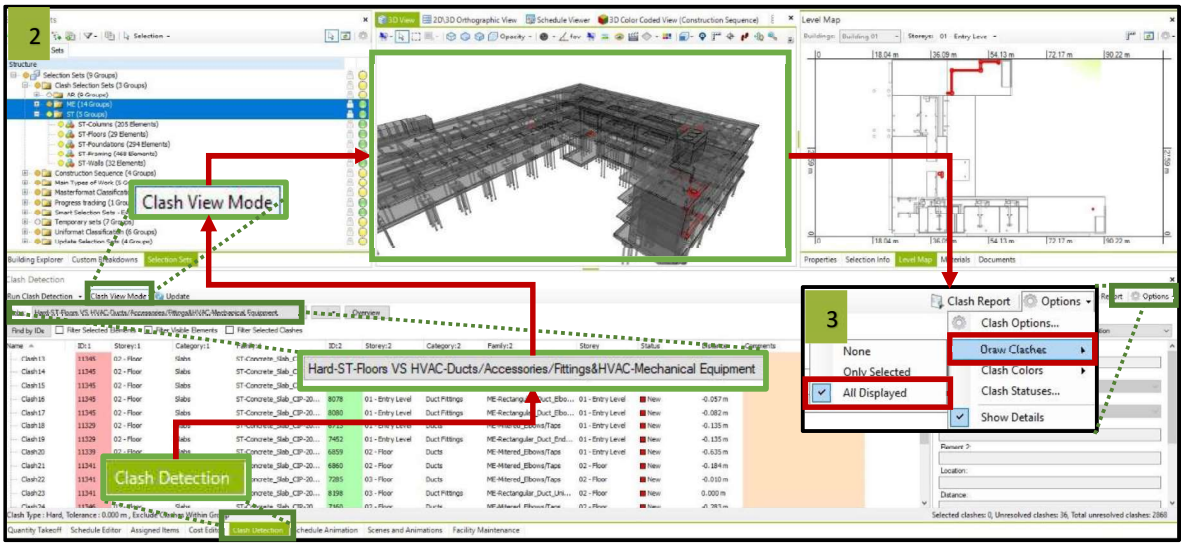
Exercise inputs:

a) We want to locate clashes on the entry level.
b) Level Map background color is gray.
c) Elements that are shown: column, slab, structural column, wall, flex duct, duct, duct fitting, mechanical equipment. The elements are shaded with edges.
d) Level Map cursor is enabled with large size.
e) Level Map Ruler is shown and it is red colored.
f) Level Map should show clashes, clashing elements and clashing edges.
g) In clash detection list, we have information about level for each element, but if we want to see exact floor plan with clashes position in project, we should activate level map tab.

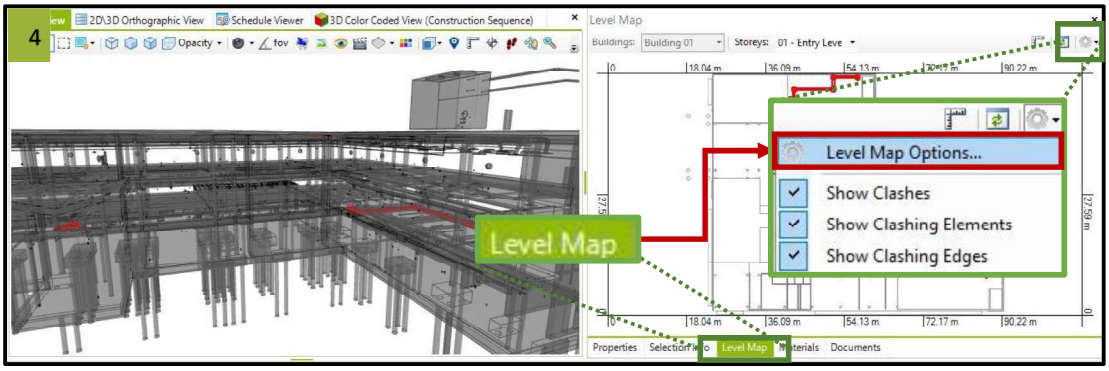
1. We should set elements we want to see in the main viewport, here we choose structural and mechanical elements. We can use previously created smart selection sets which are located in Selection sets breakdown tree Clash Selection Sets, such as selection sets within ME and ST folders. → Select these elements. → Right-click on viewport screen. → Choose **Isolate**. → From drop-down list choose **Selected elements**. By double-clicking on mouse scroll button, user can zoom selected elements in the main viewport screen. Press keyboard Esc key to cancel selection.



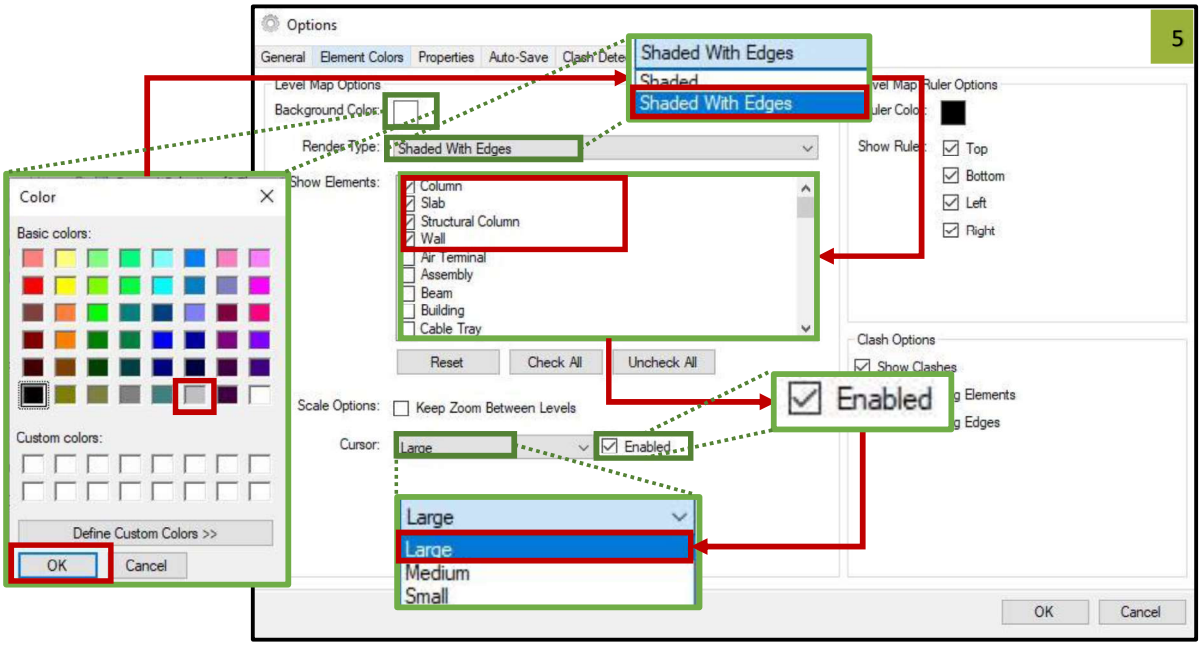
2. The Clash Detection palette is active. Choose desired Clash Detection job, in this case we set **Hard-ST-Floors VS HVAC-Ducts/Accessories/Fittings&HVAC-Mechanical Equipment.** → Enable **Clash View mode**. →
3. We can set that all displayed clashes are shown. Click on the Options button in the clash Detection palette. → From drop-down window select the Draw Clashes command and choose the All Displayed option. →



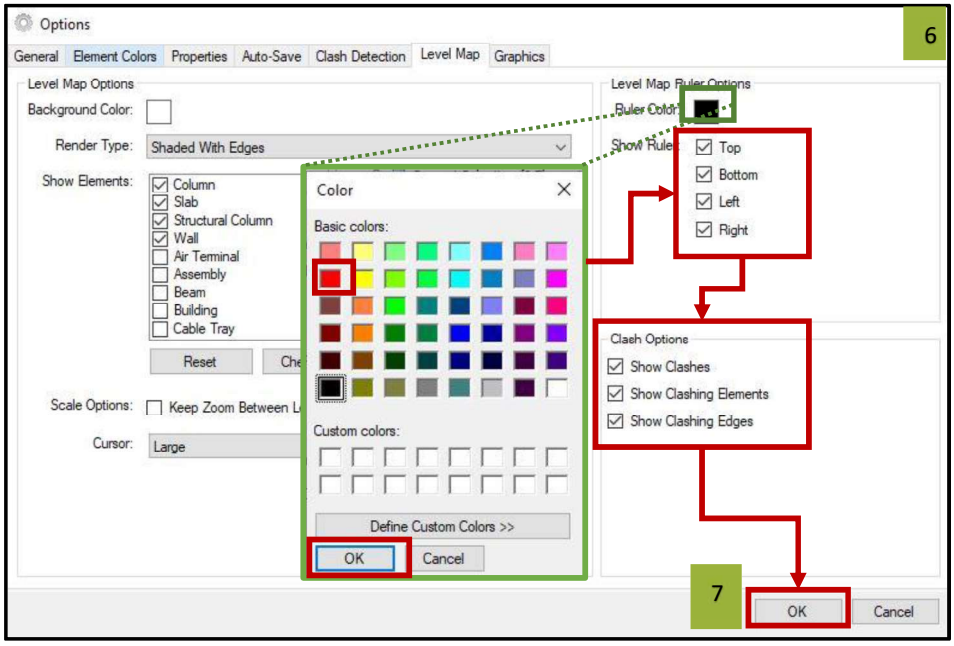
4. Activate **Level Map** palette which is located on the right side of the screen by default. → Click the **Options** button in the right corner of the Level Map window. From the drop-down window choose the **Level Map Options** button. →



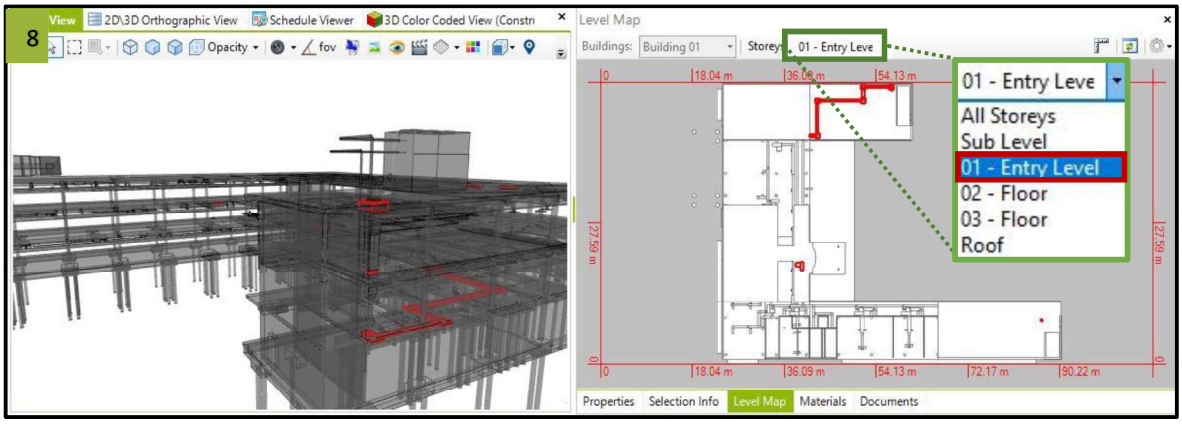
5. The **Options** window opens where the **Level Map** tab is active. On the left side of the window we set the **Level Map** options. → To change **Background color**, click the colored square. → The **Color** palette window opens where we choose gray color. → Click the **OK** button to close the Color window. → For the **Render Type** from the drop-down window we choose the **Shaded with Edges** option. → In the **Show Elements** field, we check desired elements that are going to be shown in the level map. → Check the **Enabled** option for the Cursor and from the drop-down window choose the **Large** option for the cursor size. →



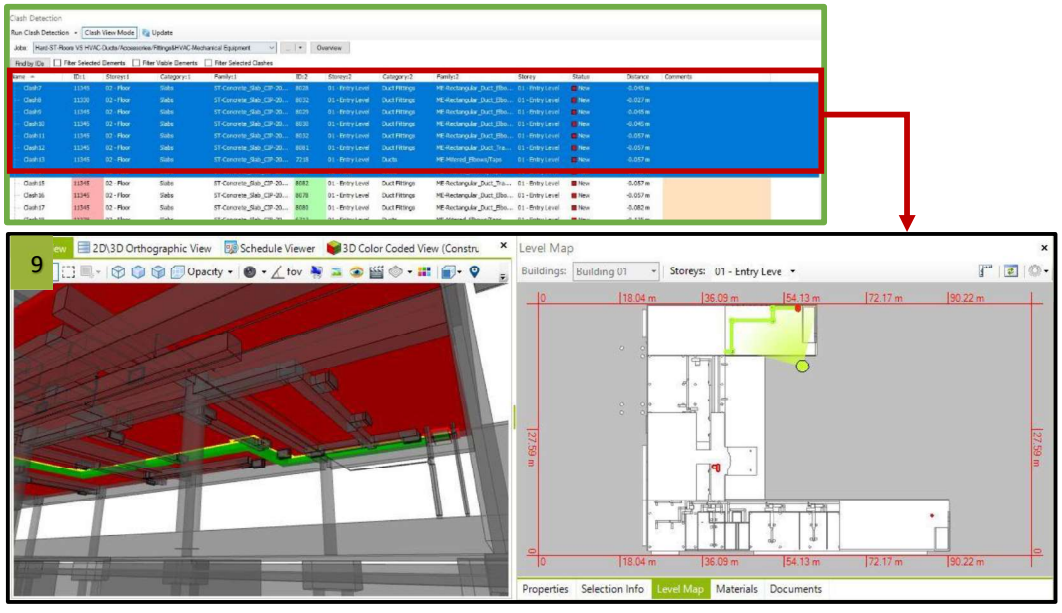
6. On the right side of the screen we can set the **Level Map Ruler** options and **Clash Options**. Click the colored square to change the ruler color. → The **Color** palette window opens where we choose the red color for the ruler. → Check all options for the **Show Ruler**: the Top, the Bottom, the Left, the Right. → For the **Clash Options** check all, the Show Clashes, the Show clashing Elements and the Show Clashing Edges options. →
7. Click the OK button to close the Options window. →



8. We have just set desired Level Map options. To see certain level in the Level Map palette, choose desired Storey from the drop-down storey options in the upper part of the Level Map palette. Here we choose 01 – Entry Level.



9. When we select clashes from the Clash Detection clashes list, they are also selected in the Level Map. All clashes in the Level Map are marked red because, in the Clash Detection palette, we choose to draw all displayed clashes.

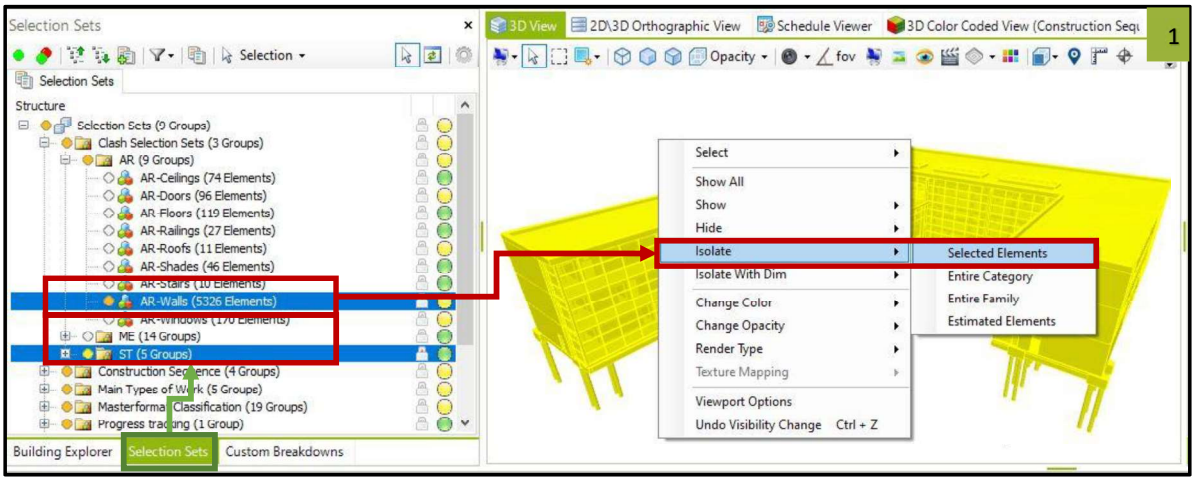


6.7.3. CLASH DISTRIBUTION AND FILTRATION

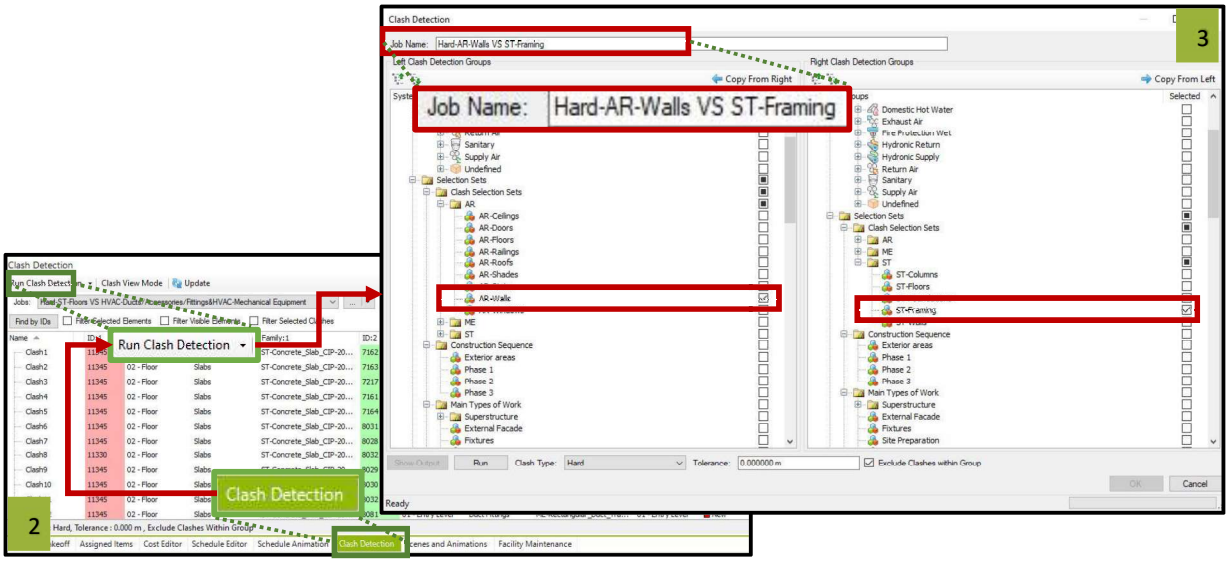
We can filter clash detection list by various criteria, such as story, category, family and clash status.

For this exercise we will do new clash detection job between architectural walls and structural framing, clash type Hard. Then we will filter clashes on second floor.

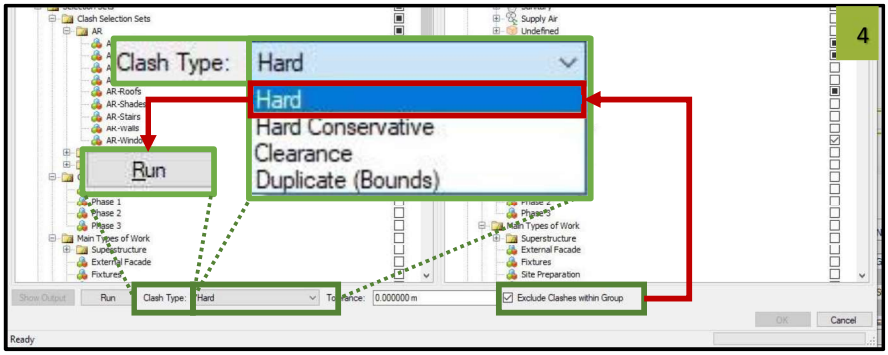
1. For easier exercise we will isolate architectural and structural elements in the main viewport. We use previously created smart selection sets which are located in Selection sets breakdown tree Clash Selection Sets, such as selection sets within AR and ST folders (Selection sets AR-Walls and ST-Framing). → Select these elements. → Right-click on viewport screen. → Choose **Isolate**. → From drop-down list choose **Selected elements**. By double-clicking on mouse scroll button, user can zoom selected elements in the main viewport screen. Press keyboard Esc key to cancel selection.



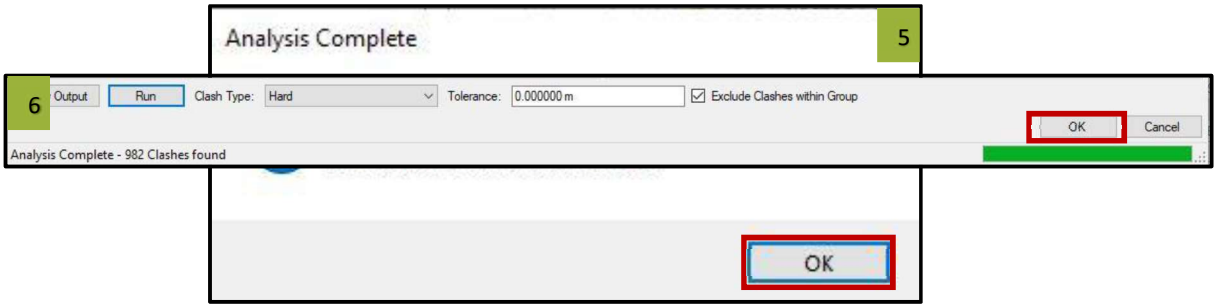
2. Select the **Clash Detection** palette. → Click on the **Run Clash Detection** button. →
3. The Clash Detection window opens. Define the name of the clash in the **Job Name** field, **Hard-AR-Walls VS ST-Framing.** → Select the group of elements on the left side of the window. We select group of elements **Selection sets/Clash Selection sets/AR/AR-Walls.** → Select the group of elements on the right side of the window, we select group of elements **Selection sets/Clash Selection sets/ST/ST-Framing.** →



4. The Clash Detection window is still opened. Determine the type of clash, we choose **Clash Type: Hard**. → Check the option the **Exclude Clashes within Group**. → Click on the **Run** button.



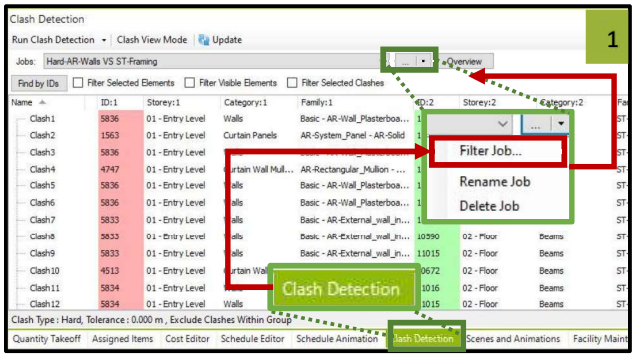
5. When the analysis is complete, the **Analysis Complete** window appears where we see the number of detected clashes. → Click the **OK** button. →



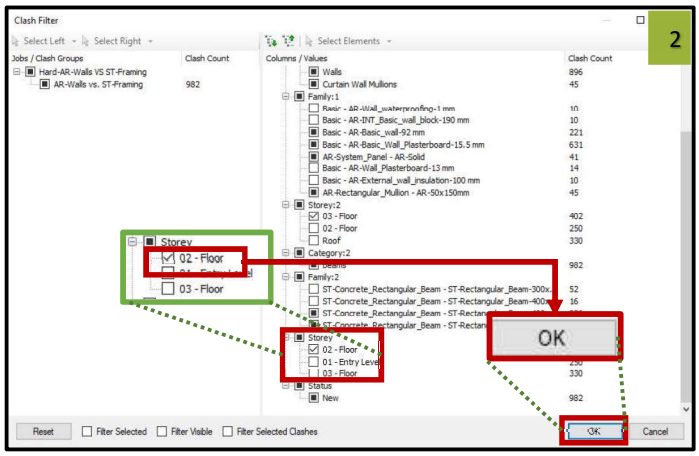
6. The Analysis is completed, click the **OK** button to close the Clash Detection window.

The Filter Job option

1. The Clash Detection palette is active. Click the button **'…'** and from the drop-down list select the **Filter Job**. →

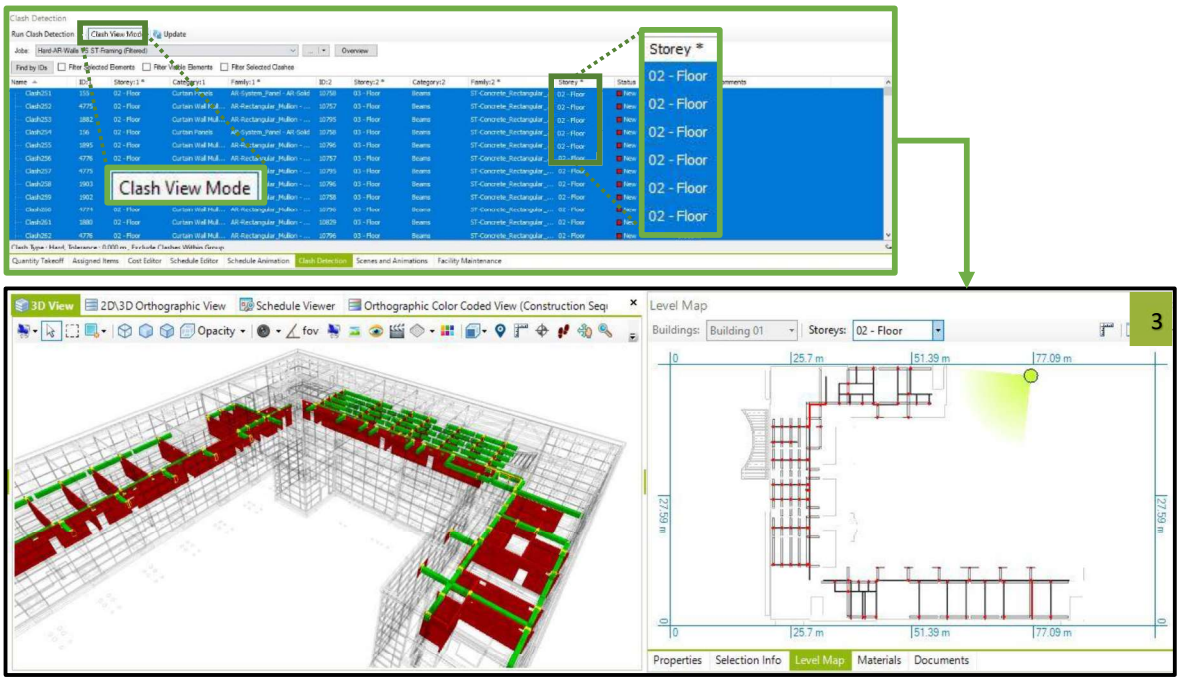


2. The **Clash Filter** window opens. On the right side we select **Storey: 02 – Floor**. → Click the **OK** button to close the Clash Filter window. →

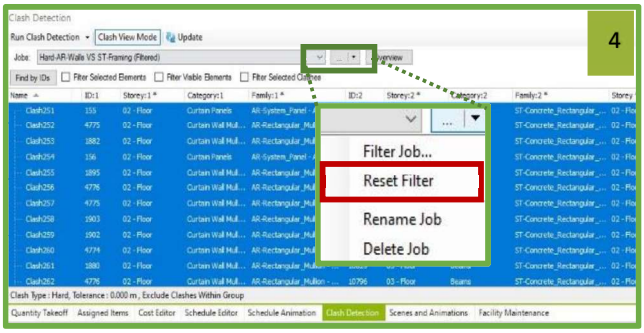


NOTE: If filter option is enabled, the appropriate column in clash detection list will have symbol '*' next to column name. Also, the Job name has the word Filtered.

3. When we select all filtered clashes from the list, in the main viewport we can see all clashes on the second floor, with colored clashed elements (previously we set option Draw clashes, only Selected Clashes). →



4. To reset filter, click the button **'...'** and from the drop-down list select the **Reset Filter** option.



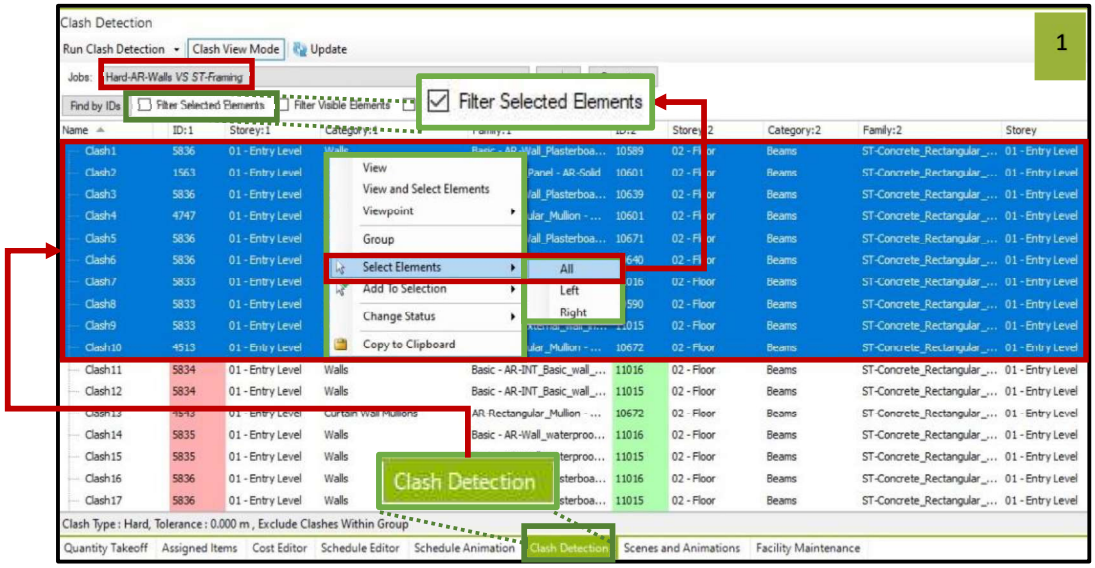
6.7.4. CLASH DETECTION GROUPS

It often happens that individual clashes are interconnected, because they arise from the same problem or are resolved in the same way. Such clashes can be combined into one group of clashes. This way we can simplify clash detection list with large number of clashes.

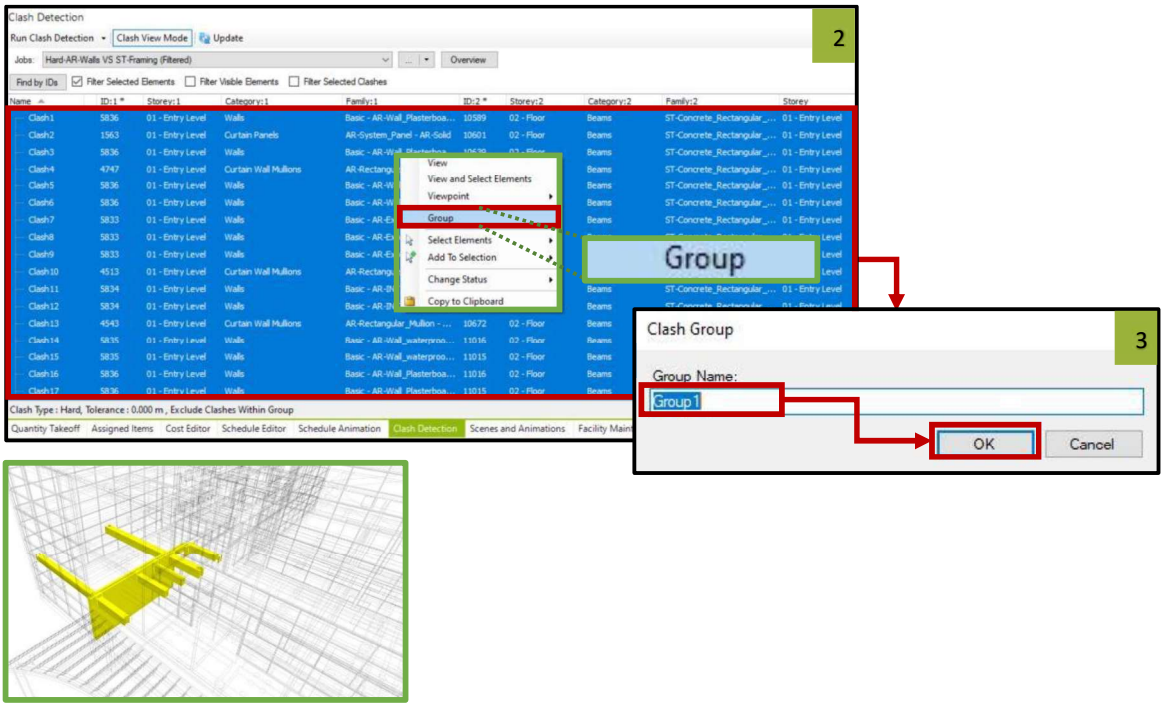
In this exercise we are going to use the clash detection job **Hard-AR-Walls VS ST-Framing.**

- We will make Group 1 with those clashes that contains elements that first 10 clashes make.

1. The Clash Detection palette is active. The Clash job **Hard-AR-Walls VS ST-Framing** is also active. Select first ten clashes. Right-click on the selection. → Choose the **Select elements**, the **All option**. → Enable option **Filter selected elements**. →



2. Select filtered clashes in clash detection list, we can use **CTRL** keys. → Right-click on selection. → Choose **Group** option in drop-down list. →
3. The **Clash Group** window opens where we define group name, we enter the name **Group 1**. Click the **OK** button to close the Clash Group window.→ Activate the Clash View Mode to see selected clashed elements in the main viewport.

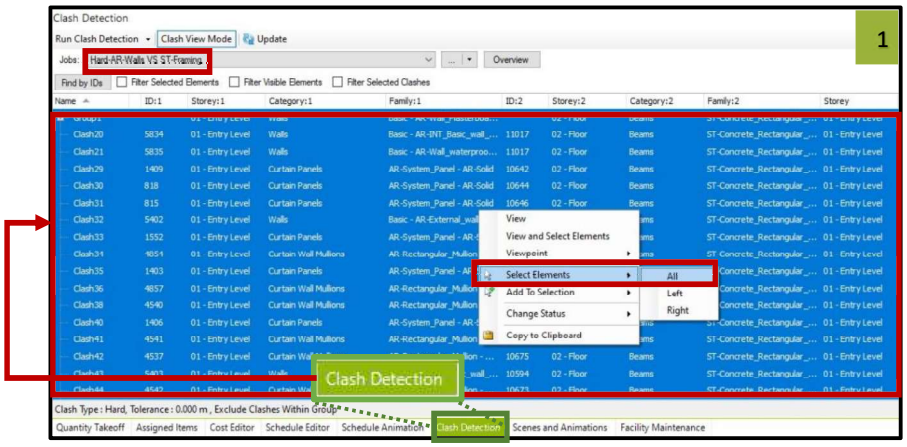


4. Disable option the **Filter selected elements**.

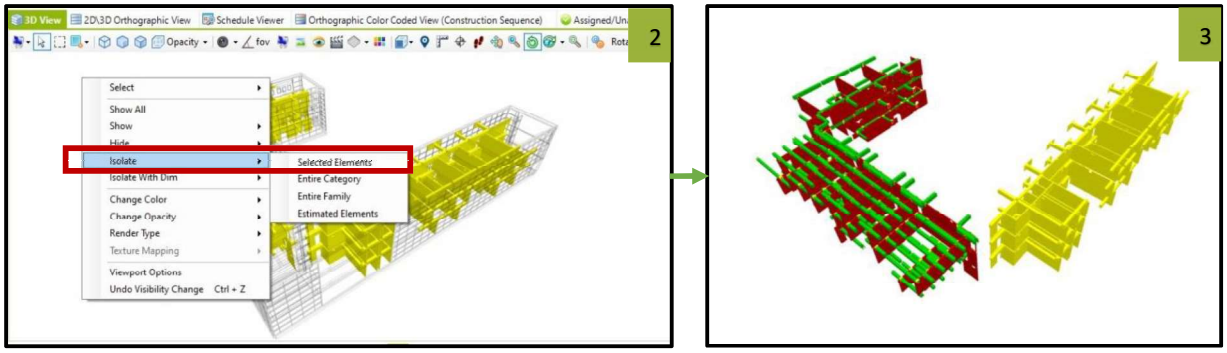
WARNING: When option 'Filter selected elements' is active, and there are notice two or more groups in clashing list, user is not available to see all clashes which belong to groups. If user wants to merge groups, disable option 'Filter selected elements'. → Select clashes from one group. → Drag and drop selected clashes into another group. → If needed, rename group with added clashes.

- Now we can make group of clashes, Group 2, which will contain clashes only from one part of the building (longer side of the object along the x axis). We will use the same Clash detection job as in previous exercise, **Hard-AR-Walls VS ST-Framing.**

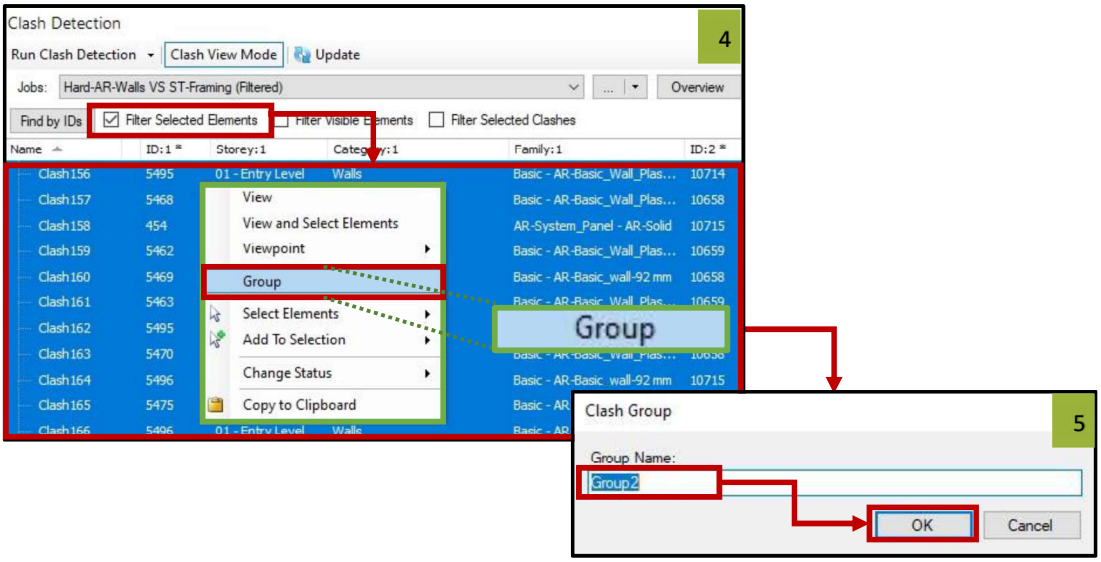
1. The **Clash Detection** palette is active. The Clash job **Hard-AR-Walls VS ST-Framing** is also active. Select all clashes within clash list, user can use **CTRL+A** key. → Right-click. → Choose an option **Select Elements**, the **All**. →



2. Isolate selected elements in viewport screen. →
3. In viewport screen select group of elements, in this case we select elements which are on the longer side of the building along the x axis. →



4. In the **Clash Detection** palette check the option **Filter selected elements**. → Select isolated clashes from clash list. → Right-click. → Choose **Group** option in drop-down list. →
5. The **Clash Group** window opens. Name Clash group, **Group 2**. → Click the **OK** button to close the **Clash Group** window. →



6. Disable option **Filter selected elements**. → Select created groups Group 1 and Group 2 and turn the **Clash View Mode** to see the result of these exercises.

To remove created group, go right-click on desired group and choose the **Remove Group** option.

6.7.5. CLASH DETECTION STATUS, APPEARANCE OF CLASHED AND OTHER ELEMENTS

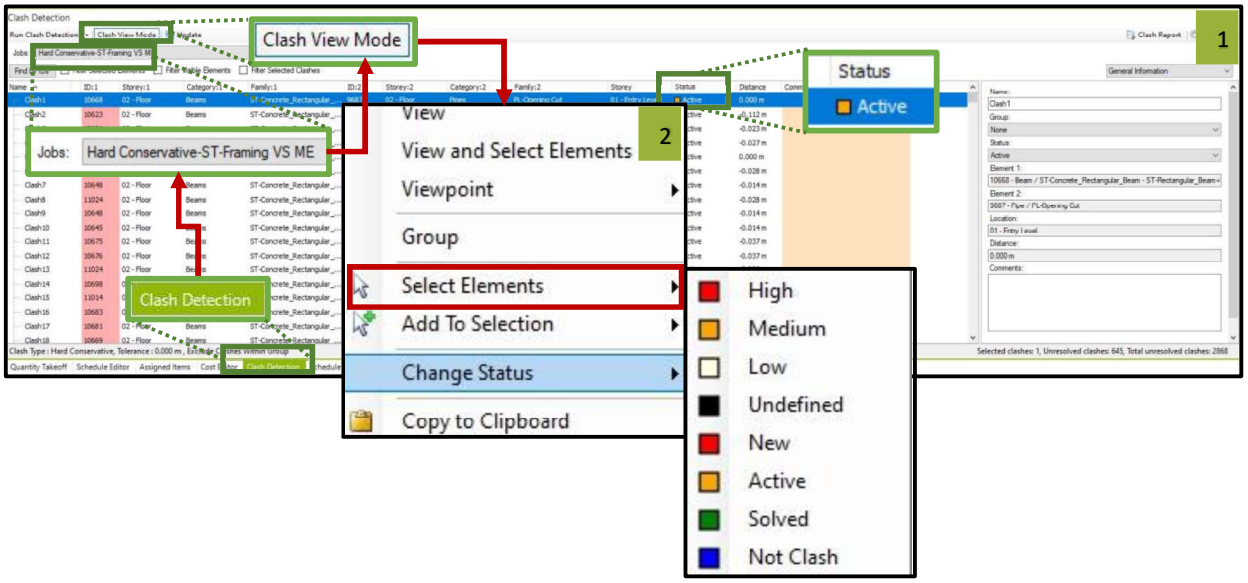
In this exercise we will set clash status, change appearance of clashed and other elements.

The exercise inputs:
We will use the previously created Clash detection job **Hard Conservative-ST-Framing VS ME**

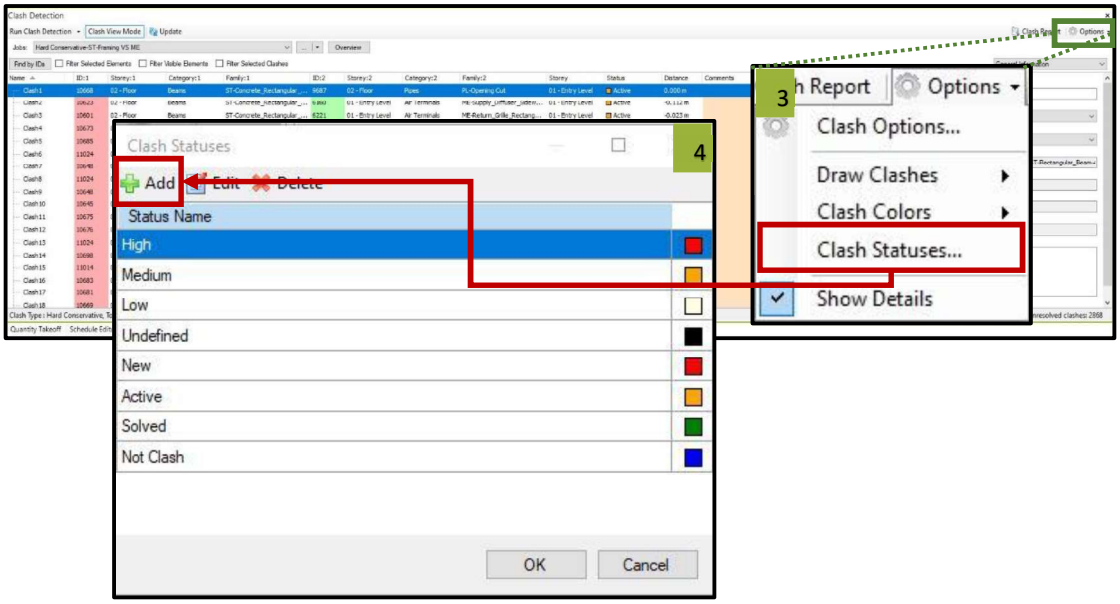
a) Clash status: Hard Conservative, color is Cyan.
b) Clash bounding Box: Draw all displayed clashes, its status colored, size is wide.
c) Clashed elements appearance: Clash elements are colorized in blue and yellow color.
d) Other elements appearance: Elements are transparent with dimming transparency 60, render type is shaded with edges and dimming color is gray.

Clash Status

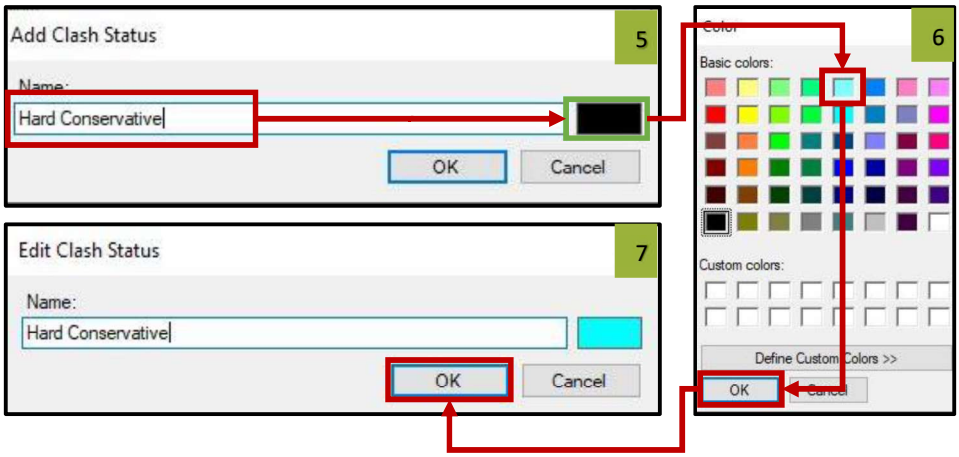
1. The Clash Detection palette is active. Check if the desired clash detection job is also active **Hard Conservative-ST-Framing VS ME.** Click the button Clash View Mode to track the changes in the main viewport.
2. We notice that current clash status is the Active.
   Choose the desired clash. → Right-click → Click on the **Change Status** command. → Predefined statuses do not have an option Hard Conservative.



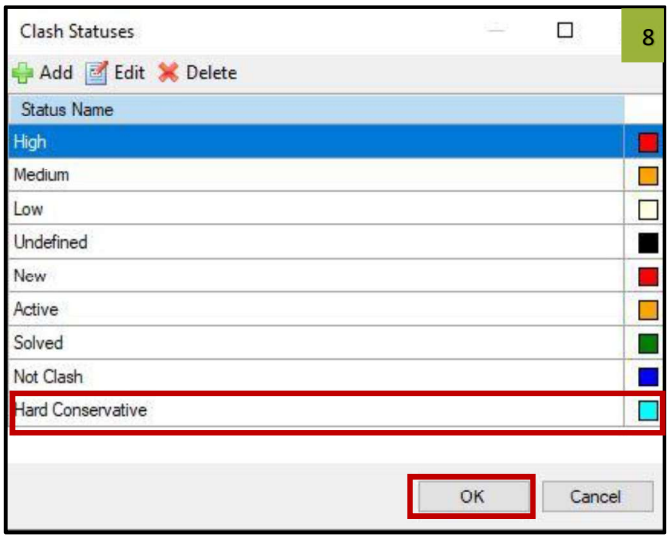
3. To create new status, do the following steps: Click on the **Options** drop-down button in the top right corner of clash detection palette and select the **Clash Statuses** option. →
4. The **Clash Statuses** window opens where we can edit or delete existing status, or specify new ones. Click the **Add** button to create the new one.



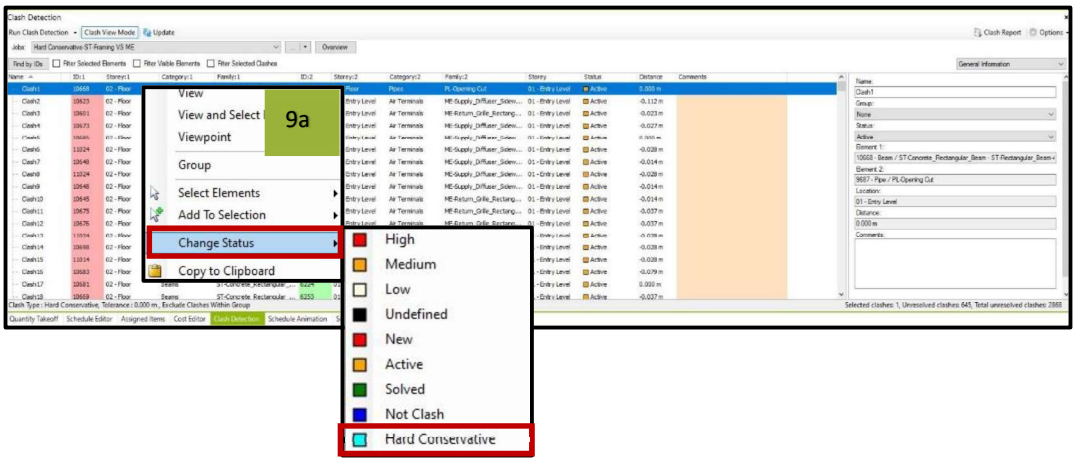
5. The **Add Clash Status** window opens where we enter the name Hard Conservative.
6. Click on the color field and choose Cyan color from the **Color** window. Click the **OK** button.
7. Click the **OK** button to close the Add clash Status window.



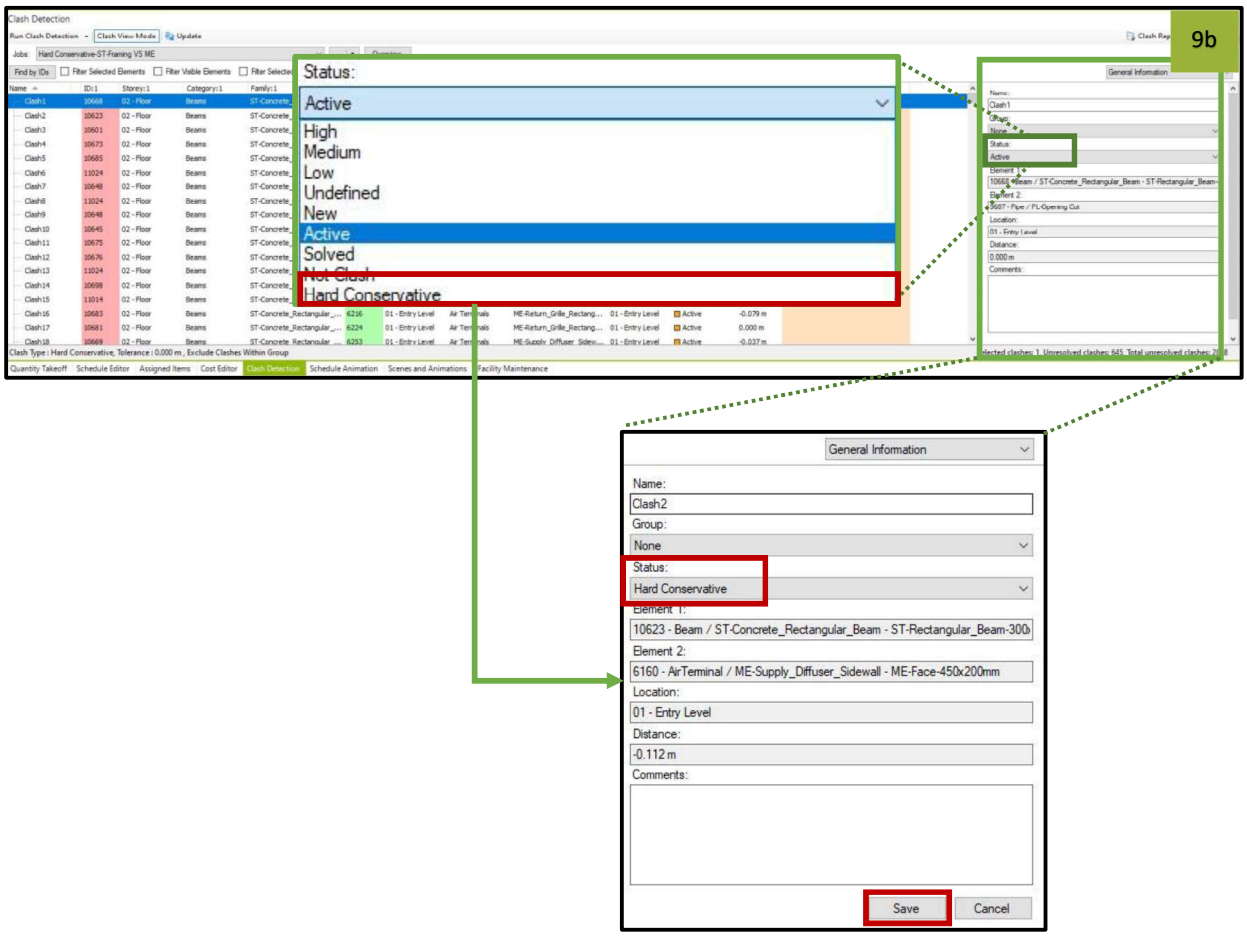
8. The new status option we have just created appears in the **Clash Status** window. → Click the **OK** button to close it.



9.a Choose the desired clash. → Right-click → Click on the **Change Status** command. → Choose option the Hard Conservative.



9.b Other option is to select desired clash. → In the **General information** window in the **Status** field we change status. → Click the **Save** button to save changes.



To change all clashes status, use **CTRL+A** keys. → Right-click → Click on the **Change Status** command. → Choose option the Hard Conservative.

Analyzing clashes from clash detection list we can define priorities of clash, is it high, medium, low or not clash. We can also create new clash status. To isolate only main clashes, filter clash detection list by status criteria (High) and send report to designers.

ADDITIONAL TIP: Distance is important parameter for defining clash detection status. Elements that have small negative clashing distance, are easily solved on construction site, so they can be determined as minor clashes. Considering this, we can sort clash list by distance criteria column and find main issues in current clash job.

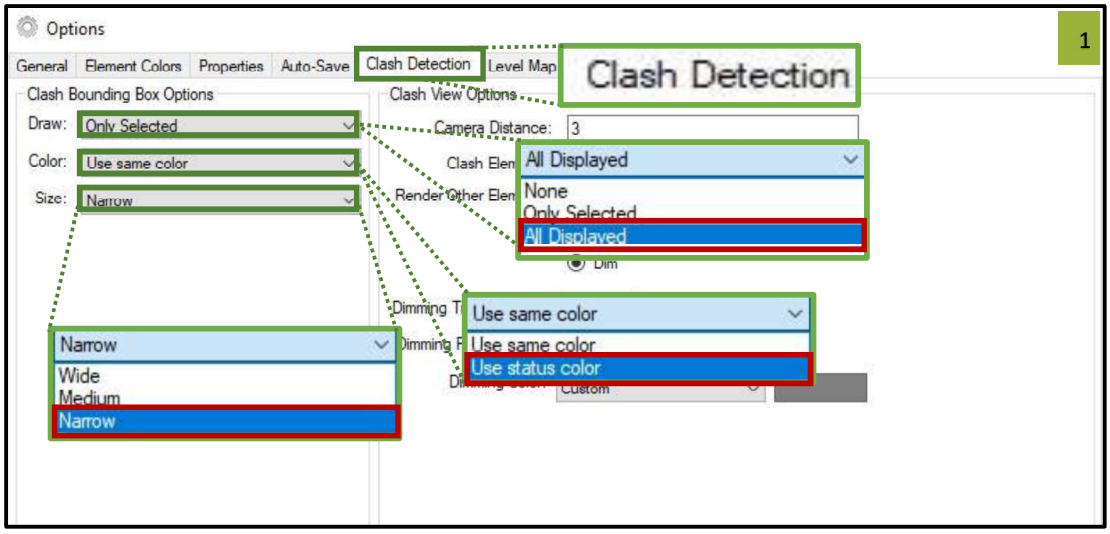
ADDITIONAL TIP: Certain tolerances allow minor overlaps that are not important. If user wants, at the start of clash detection process exclude minor clashes, add tolerance e.g. 0.05m before running clash detection in Clash detection job, and all clashes that are equal or less than 0.05m will not appear in clash detection list. This only applies for type Hard clashes.

Update Clash detection simply by clicking **Update** next to **Clash View Mode** button.

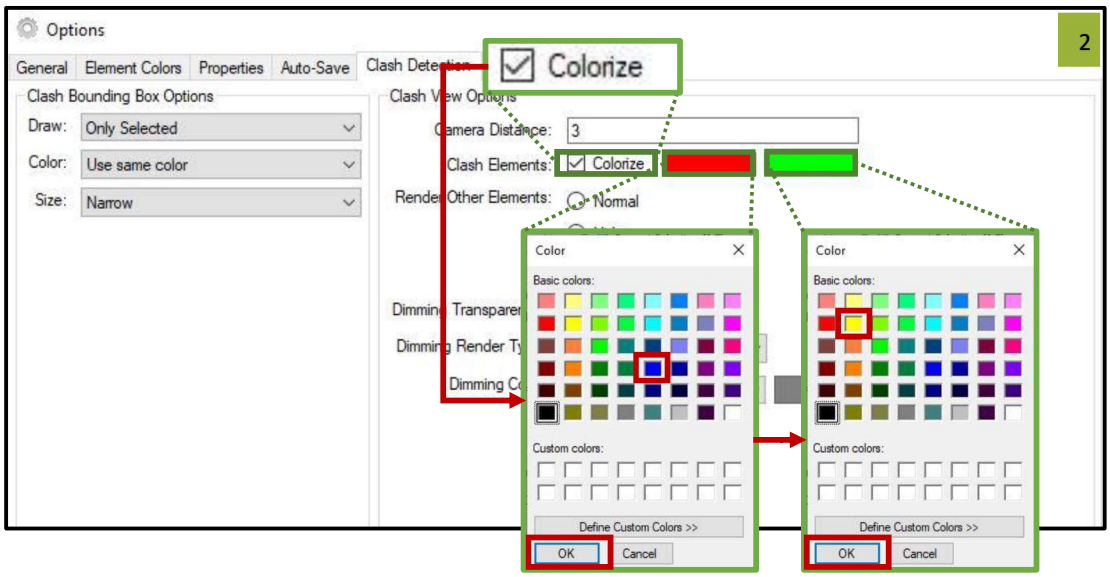
Clash status after running clash detection job for the first time is New. After updating Clash detection, all previously New clashes will automatically change status to Active/Solved. Only collisions with new elements will have status New.

Appearance of clashed and other elements

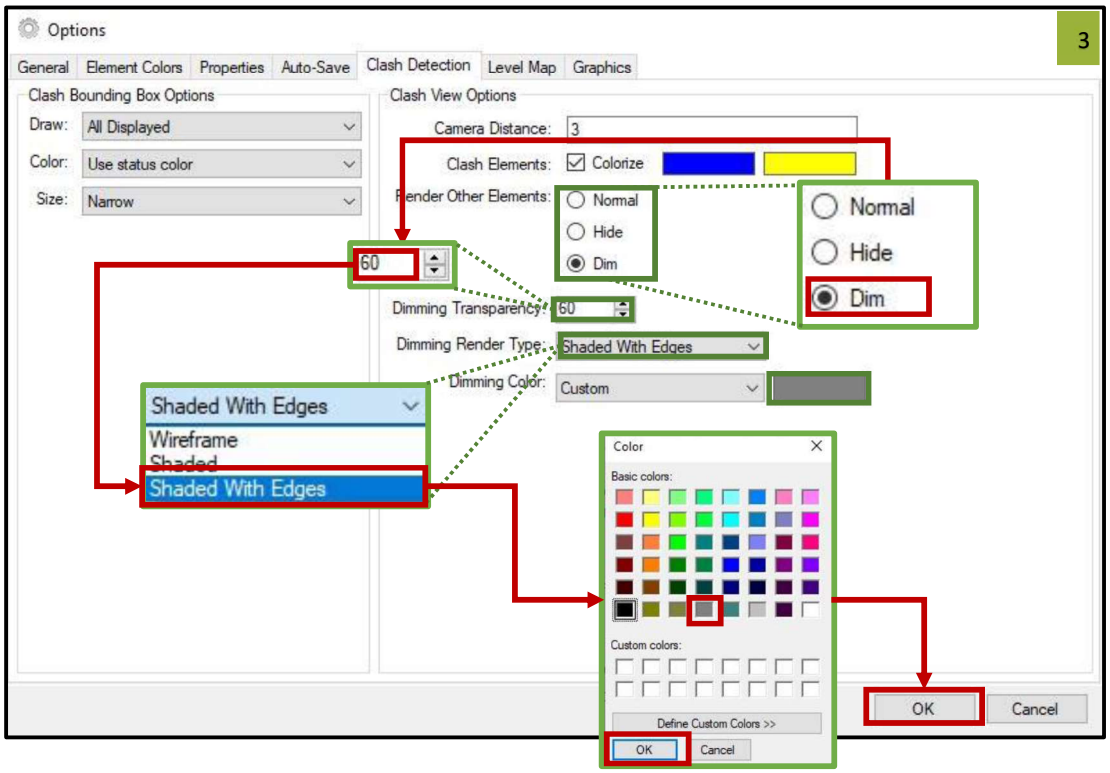
1. Click on the **Options** button. → Select the **Clash Options**. → In the **Clash Detection** tab, on the left side there are the **Clash Bounding Box Options**. → The **Draw** section, from the drop-down window choose the **All Displayed** option. → For the **Color** we choose the **Uses status color** option. The **Size** can stay **Narrow**. →



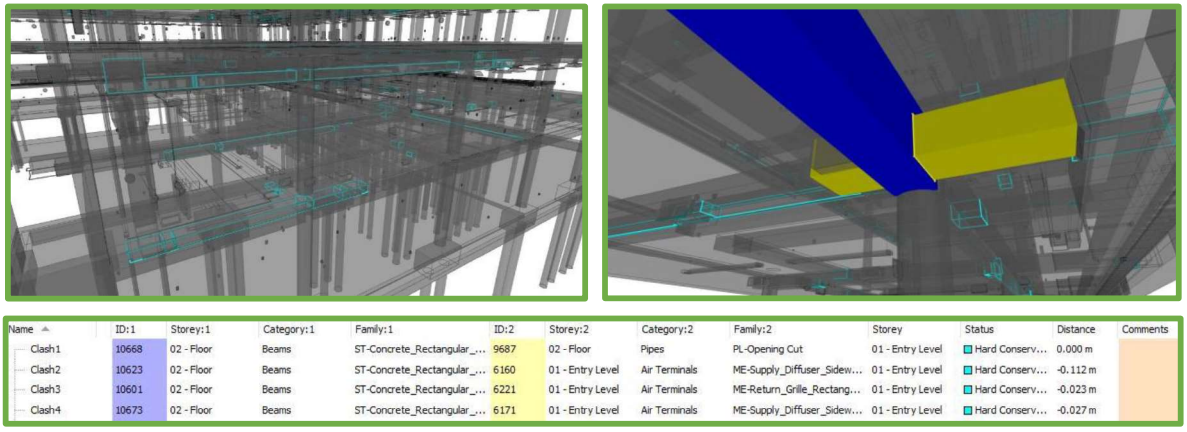
2. On the right side there are the **Clash View Options** where we set the clashed and other elements appearance. Check the checkbox **Colorize**. → When we click on the color rectangle that represents the color of the elements involved in the clash, the **Color** palette opens. Choose the blue color and click the **OK** button to close the **Color** window. → Click on the other element color rectangle, from the **Color** palette choose yellow color. Click the **OK** button to close the **Color** window. →



3. Check the **Render Other Elements** with the **DIM** option. For the **Dimming Transparency** set 60. → For the **Dimming Render Type**, from drop-down window choose the Shaded with Edges option. → The **Dimming Color** can stay gray. Click the OK button to close the Options window.



Check the main 3D viewport to see the result of the clash parameters settings we have just changed (the Clash View Mode is active).



Name	ID:1	Storey:1	Category:1	Family:1	ID:2	Storey:2	Category:2	Family:2	Storey	Status	Distance	Comments
Clash1	10668	02 - Floor	Beams	ST-Concrete_Rectangular_...	9687	02 - Floor	Pipes	PL-Opening Cut	01 - Entry Level	Hard Conserv...	0.000 m	
Clash2	10623	02 - Floor	Beams	ST-Concrete_Rectangular_...	6160	01 - Entry Level	Air Terminals	ME-Supply_Diffuser_Sidew...	01 - Entry Level	Hard Conserv...	-0.112 m	
Clash3	10601	02 - Floor	Beams	ST-Concrete_Rectangular_...	6221	01 - Entry Level	Air Terminals	ME-Return_Grille_Rectang...	01 - Entry Level	Hard Conserv...	-0.023 m	
Clash4	10673	02 - Floor	Beams	ST-Concrete_Rectangular_...	6171	01 - Entry Level	Air Terminals	ME-Supply_Diffuser_Sidew...	01 - Entry Level	Hard Conserv...	-0.027 m	

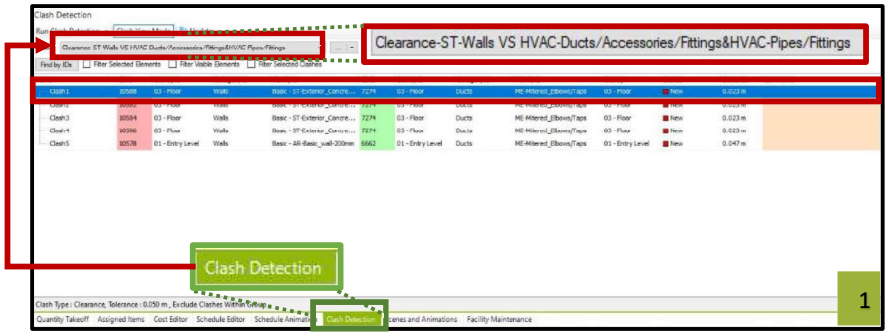
6.7.6. CLASH DETECTION GENERAL INFORMATION, VIEWPOINT AND DOCUMENTATION

At the right side of the Clash Detection palette there are three options that are related to selected clashes. These are the General Information, Linked Documents and Viewpoint.

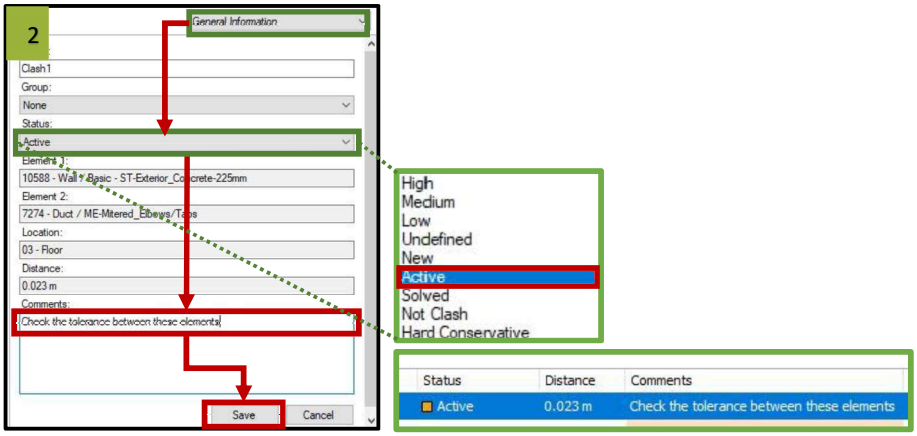
In this exercise we will use previously created clash detection job **Clearance-ST-Walls VS HVAC-Ducts/Accessories/Fittings&HVAC-Pipes/Fittings**. We are going to add comment to Clash 1, add document and create viewpoint.

Exercise inputs:
Comment: **Check the tolerance between these elements**, Clash Status is Active; Viewpoint is from current view; Document for linking user can download from Bexel User Area, file location **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 6.0\Exchange**, **Document for linking.jpg**, or use any document from local computer for this purpose.

1. The Clash Detection palette is active. The clash job, in this case **Clearance-ST-Walls VS HVAC-Ducts/Accessories/Fittings&HVAC-Pipes/Fittings**, is also active. Choose the desired collision from the list, we choose Clash 1. → Click on the **Clash View Mode** button. →

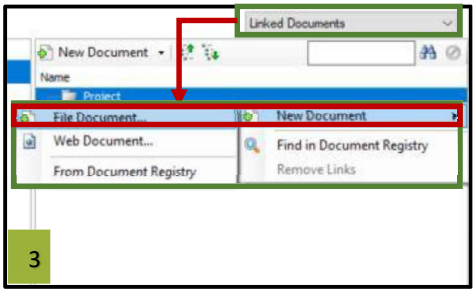


2. Select the first option from the drop-down menu on the right side of the screen, the **General Information**. → Click on the **Status** field and from drop-down menu choose the **Active** option. → In the **Comment** field enter the comment, in this case **Check the tolerance between these elements**. → Click the **Save** button to save the changes.

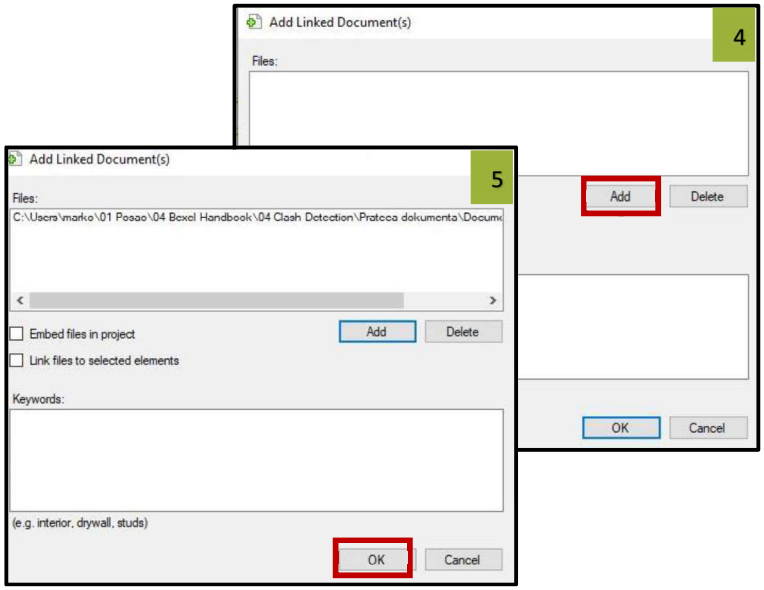


The **General Information** option contains all information from clash detection list, and additional field for adding comment for selected clash. Comment from field in General information appears in clash row Comments as well as clash status that we changed.

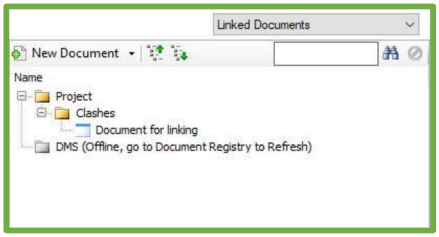
3. Select clash, in this case we select Clash 1.→ Select the second option from the drop-down menu on the right side of the screen, Linked Documents. → Right-click on **Project**. → Choose **New Document** in drop-down menu. → Choose type the **File Document**. →



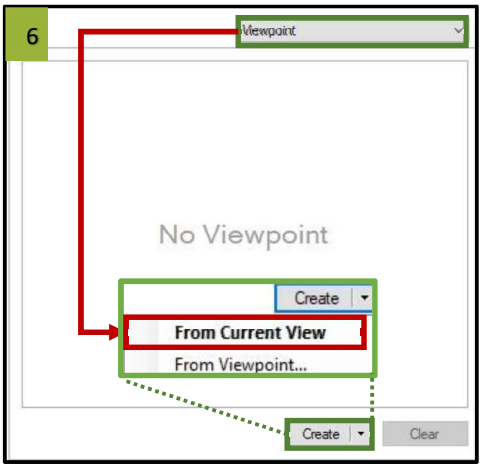
4. The **Add Linked Document(s)** window opens. → Click the **Add** button. From local computer choose the file downloaded from Bexel User Area, **Document for linking**. →
5. Click the **OK** button to close the previous window.



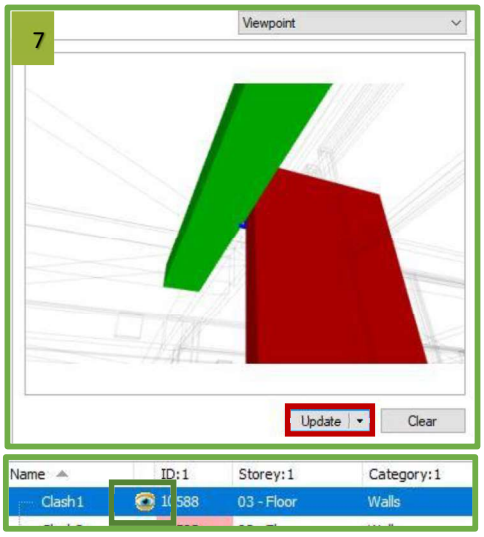
- The linked document appears.



6. Choose the desired collision from the list. → Click on the **Clash View Mode** button. → Select the last option from the drop-down menu on the right side of the screen: General Information, Linked Documents and **Viewpoint**. → Click on the **Create** button.



7. If user wants to change viewpoint for current clash, simply select clash, adjust view in viewport screen, and click **Update** button on **Viewpoint** palette.



Note: Viewpoint does not appear when we select a large number of clashes. When we select one clash, the Viewpoint activates.

ADDITIONAL TIP: Users of BEXEL CDE Enterprise platform can link documents, which are located on their BEXEL Cloud premises.

LESSON 07

BEXEL MANAGER

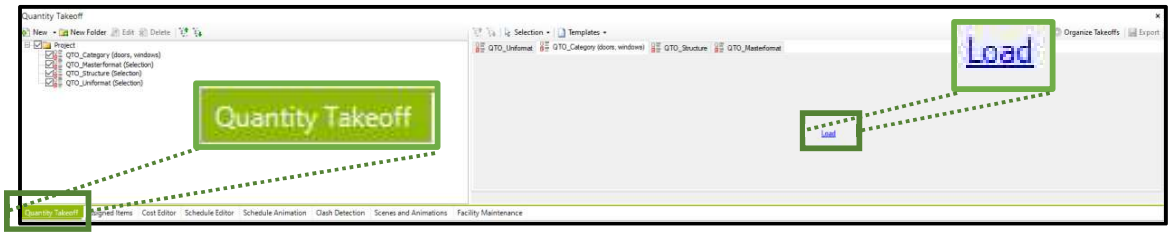
7. QUANTITY TAKEOFF

Bexel Manager has an excellent platform for calculating the quantities of individual groups of elements directly from the geometry of the 3D BIM model. Here we are talking about the Quantity Takeoff Palette which is located in the lower part of the screen by default. We can drag this palette and move it on the desired place inside the software interface.

Before we explain process of creating the Quantity Takeoff, we will describe the main functions. We are going to use **The Bexel Manager Sample Project V02 Start** for further examples and exercise.

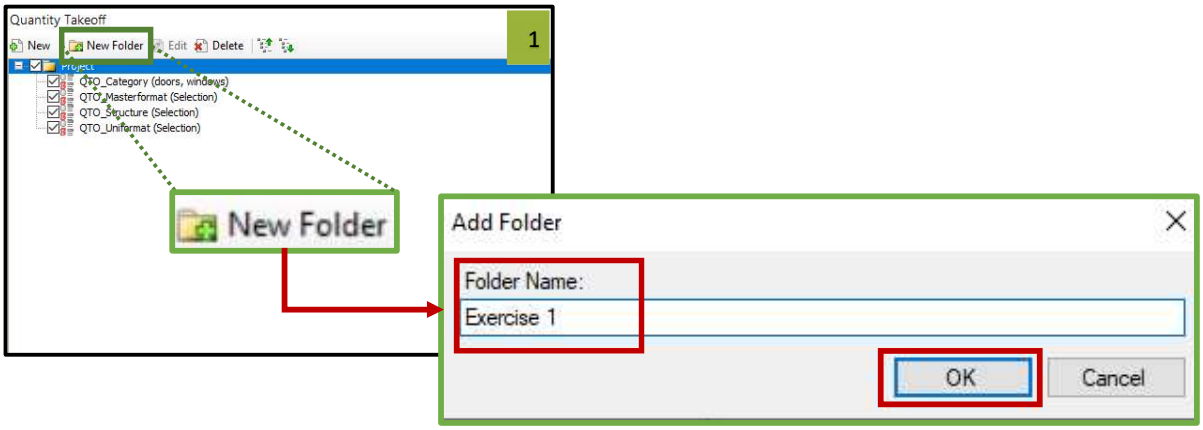
First import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf** that can be downloaded from Bexel User Area, folder **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 7.0\Exchange**.

- The Bexel Sample Project Start is opened. To activate the Quantity Takeoff palette, click the **Quantity Takeoff** tab in the bottom of the screen. On the left side of the palette's window there is list of quantities that have been already created. Right side of the palette contains the overview of created quantity takeoffs. If we mark the certain quantity (check it), the one is active in the right side of the palette. Use the **Load** button to see breakdown structure of existing quantities.



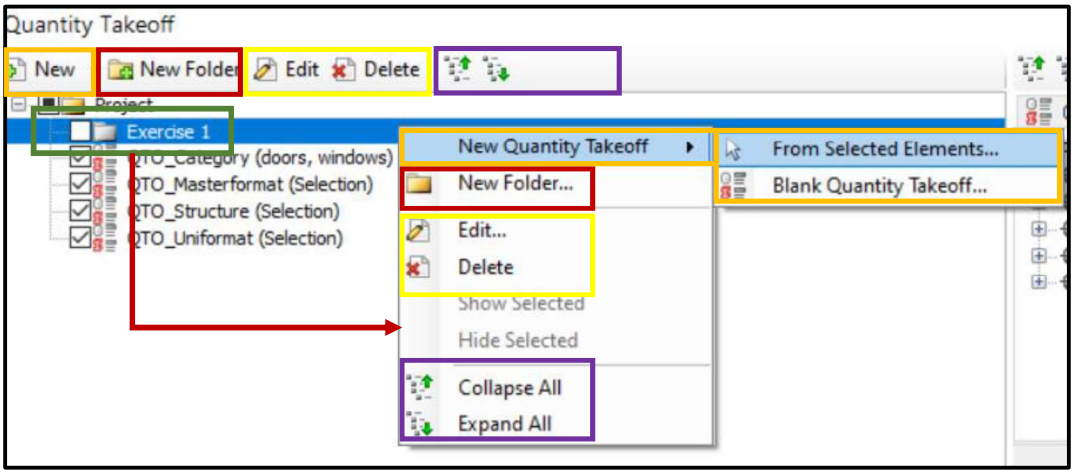
It is recommended to organize created quantities, especially if there are lots of them. We can create folders as many as we need, give them proper name which will contain belonging quantities.

1. To create the new folder, we use command the **New Folder**. Click on it and the **Add folder** window opens where we define folder's name. We will create folder named **Exercise 1**.



The new folder appears in the list on the left side of the palettes window. It is empty now and its color is gray.

NOTE: With right-click on the desired created folder or quantity takeoff, the same commands as in the palette window, will be shown. The **New** command and the **New Quantity Takeoff** for creating new quantities, The **New Folder** for creating new folder, for editing and deleting there are commands the **Edit** and the **Delete**. To collaps and expand the quantity takeoff breakdown we use commands the **Collapse All** and the **Expand All** commands.



Create Quantity Takeoff commands

Create Folder commands

Edit and Delete commands

Organize the list of created QTO

The same commands appear with right-click on the created folder or created quantity takeoff as in the Quantity Takeoff palette.

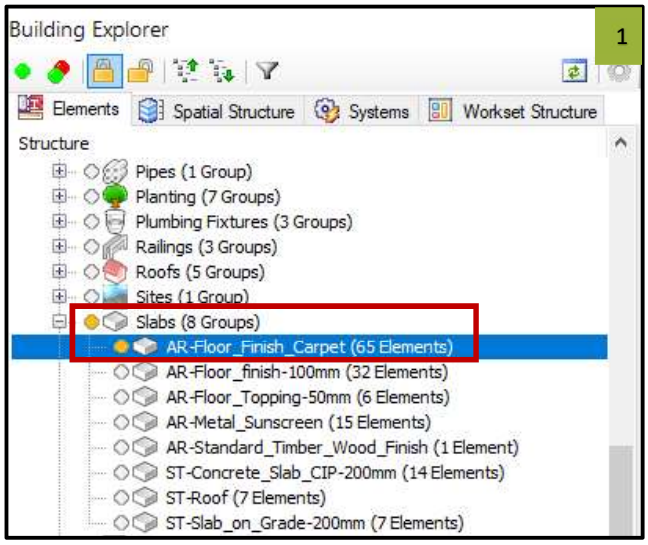
We will create several quantity takeoffs where we are going to explain how to create the quantity takeoffs in few different ways. For every example we can make the new folder where we will insert certain quantity takeoff.

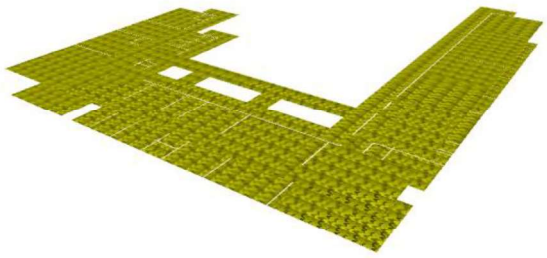
7.1. CREATING THE QUANTITY TAKEOFF BREAKDOWN STRUCTURE

7.1.1. CREATE QTO FROM SELECTED ELEMENTS

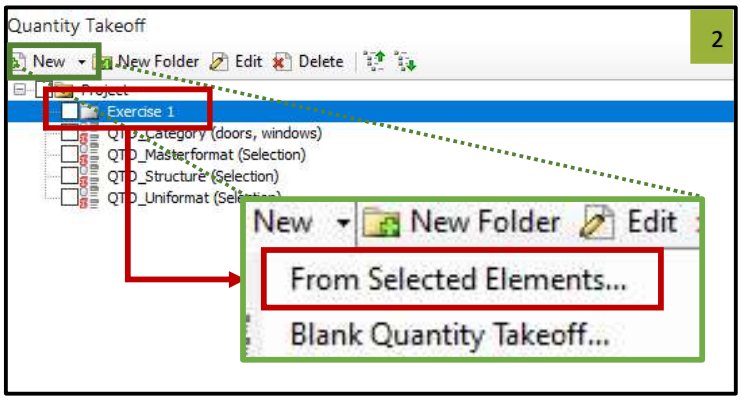
In this exercise we will make QTO for Carpeting. We want to know how much carpet we need for our project. Also, we want to create it in the folder **Exercise 1.**

1. First, we need to select desired elements, in this case Carpets. We can use family from the Slab category, **AR-Floor_Finish_Carpet** or use certain selection set to select elements before we start creating QTO. Isolate selected elements in the main 3D viewport.

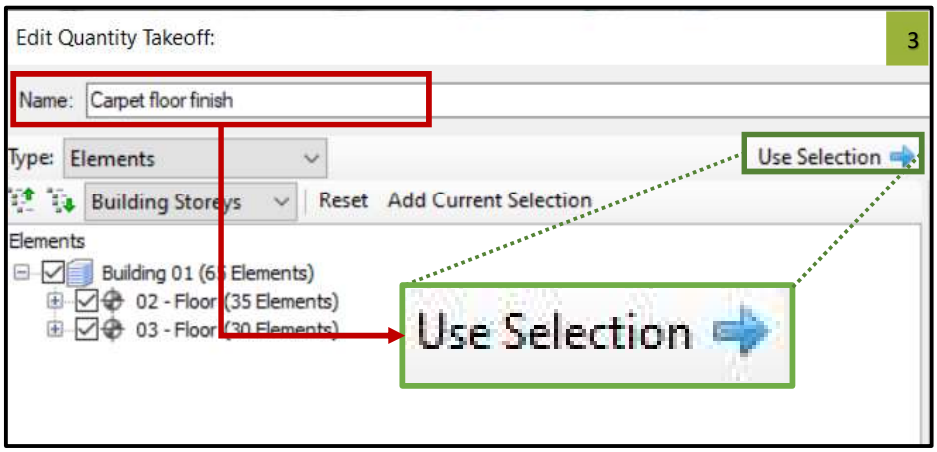




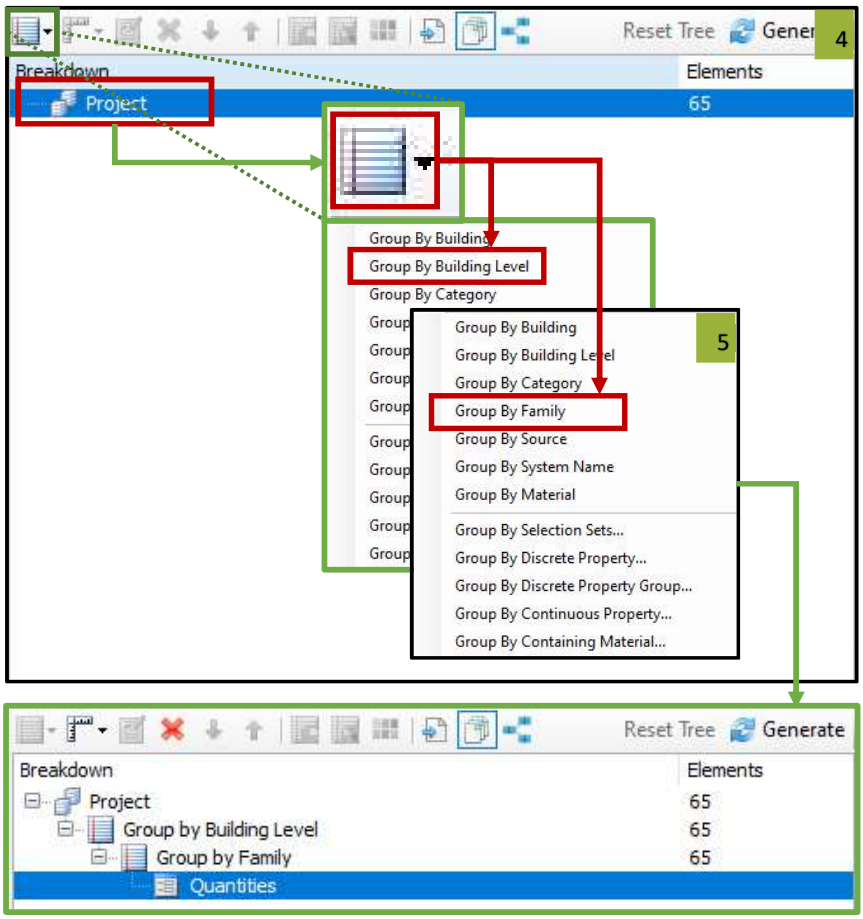
2. Activate Quantity Takeoff palette. → If we want to create the QTO in certain folder we have to select desired folder first. It is not necessary, we can organize QTO breakdown even after we have crated QTO. Select the folder Exercise 1. Click on the arrow next to the **New** button or right-click on desired folder. → Select **From selected elements** option. →



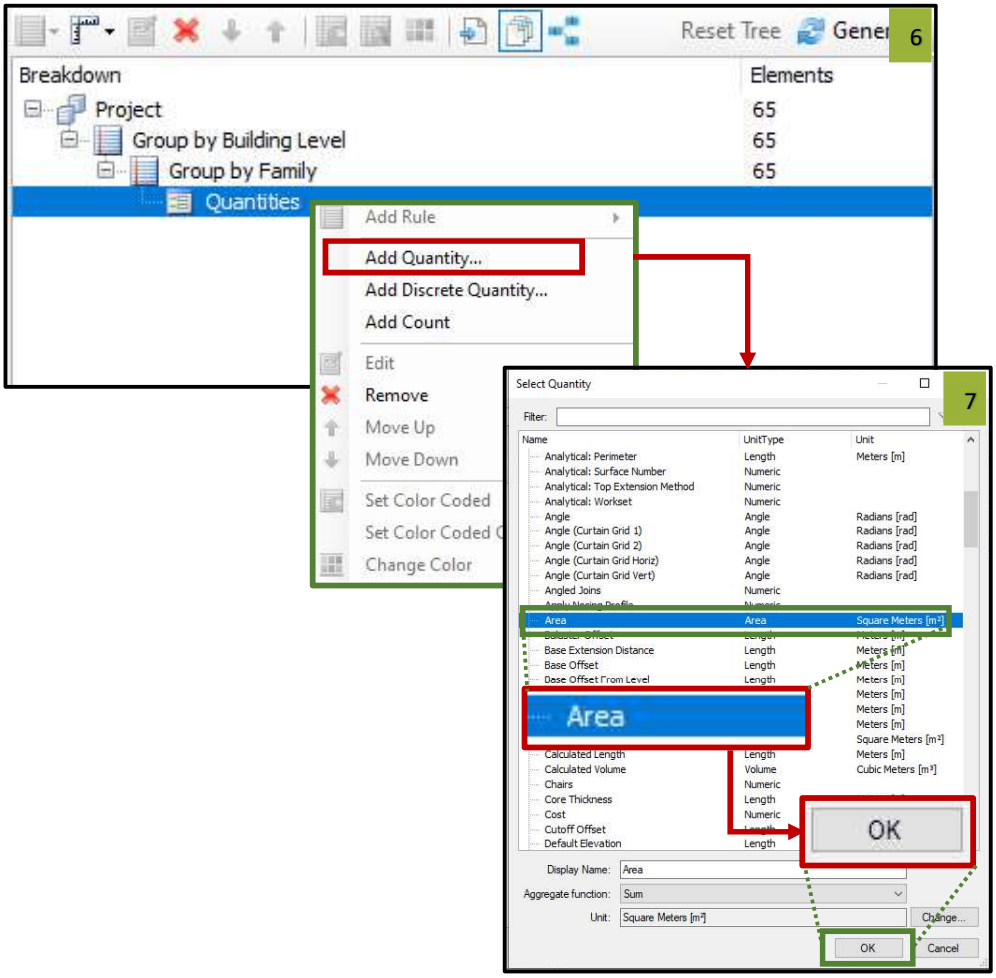
3. The Edit Quantity Takeoff window opens. → Set the name of the quantity takeoff in the **Name** field, in this case we set the name **Carpet floor finish**. → Click the Use Selection button. →



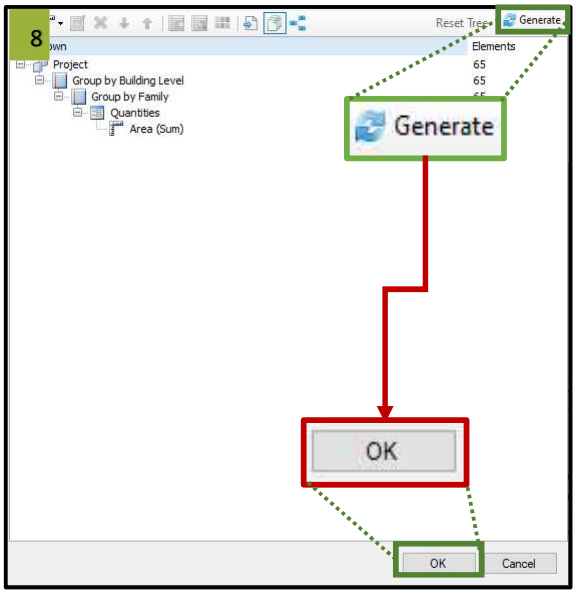
4. Define the first criteria for the quantity takeoff: → Select added elements on right side of the window. → Click on the **Add Breakdown Rule** command. → Add rule. → From drop-down list choose **Group By Building Level**. →
5. Define the second criteria for the quantity takeoff. → Select added elements on right side of the window. → Click on the **Add Breakdown Rule** command. → Add rule. → From drop-down list choose **Group By Family**. →



6. Select **Quantities**. → Right-click → Choose the **Add Quantity** command. →
7. The **Select Quantity** window opens. Choose the **Area** from the list. → Click the **OK** button. →



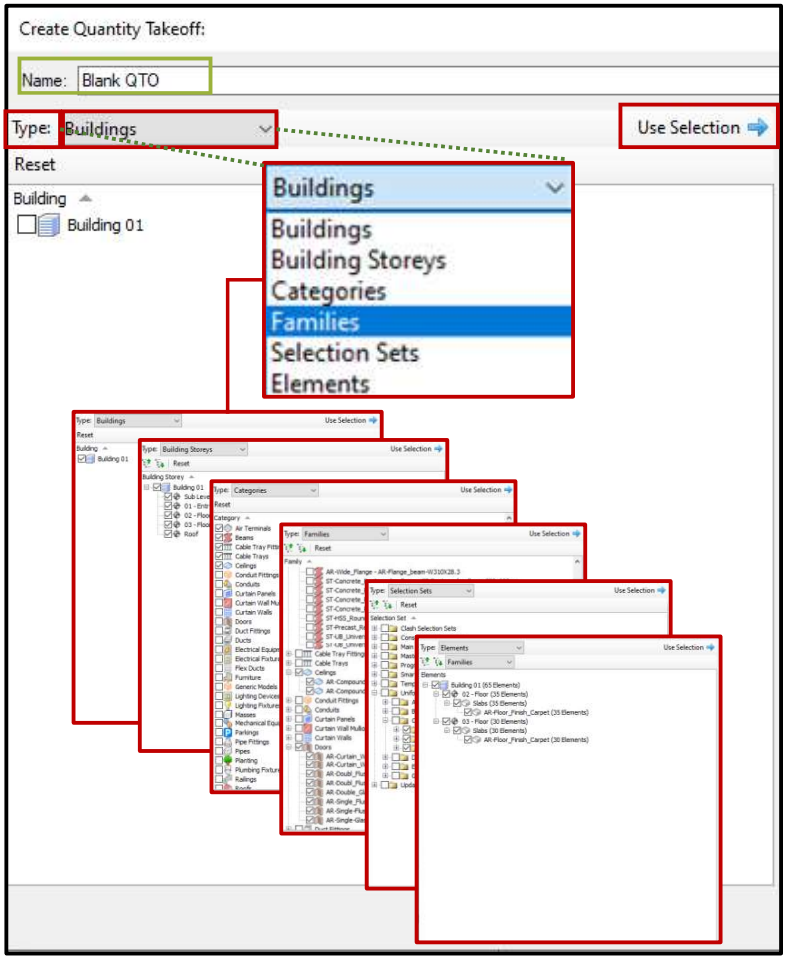
8. Click **Generate**. → Finish process by clicking the **OK** button.



Created Quantity takeoff appears on the right side of the palettes window. It presents the breakdown structure we have just created, which gives us information that this quantity takeoff breakdown is structured by Building level and Family criteria, and it shows desired area of selected elements. For each group we have Sum Area. If we expand breakdown, we can see quantity distribution by elements (element name - internal ID code).

We can organize QTO breakdown in certain folder even after we have crated QTO.

7.1.2. CREATE QUANTITY TAKEOFF COMMANDS

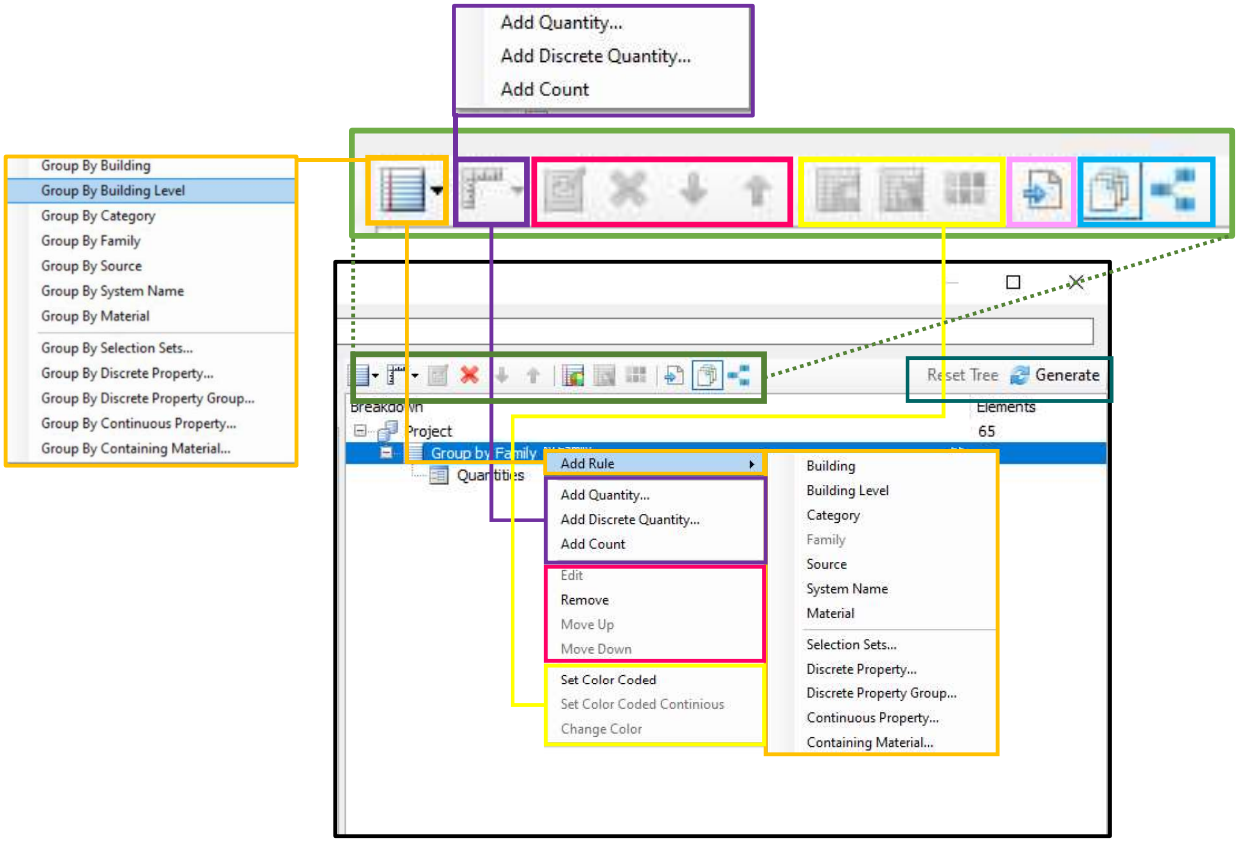


The Name commands

Choose selection options

Before we continue with further exercise and examples of creating quantity takeoff, we will explain the **Create Quantity Takeoff** and the **Edit Quantity Takeoff** windows. It opens when we click the **New** command or the **Edit** command. In the **Name** field we define the quantity takeoff name. Left part of the window is used to choose elements which we need for desired quantity calculation. There are several options for selection: by Buildings, Building Storeys, Categories, Families, Selection Sets, Elements (the Elements option is when we make the selection before we start the quantity takeoff actions). When we choose an option from drop-down window of the **Type** command, we check desired elements and click the button the **Use Selection**. Any of these options we can restore by clicking the **Reset** button.

When we have chosen desired elements, on the right side of the screen we define the rules for quantity breakdown structure, depending on desired results. Here we also add quantities we need. All these commands we can activate using commands buttons or with right-click on desired item. To add the new rule, click on the **Add Breakdown Rule** button, or find the same commands using right-click on desired item in the breakdown tree. For adding quantities, we can also use the **Add Quantity** button or use right-click on the breakdown tree and choose commands for adding quantities. To see the result of created breakdown structure we use the **Generate** command. To delete the rule or the quantity we previously select, use the **Delete** command. With the **Move UP** or the **Move down** buttons we can organize rules and quantities, if we have more than one added. Before this action click on the **Reset Tree** button.



Breakdown Rule

Import Template

Quantity commands

Elements Multiposition commands

Edit and organize QTO commands

Generate and Reset tree commands

Color coding

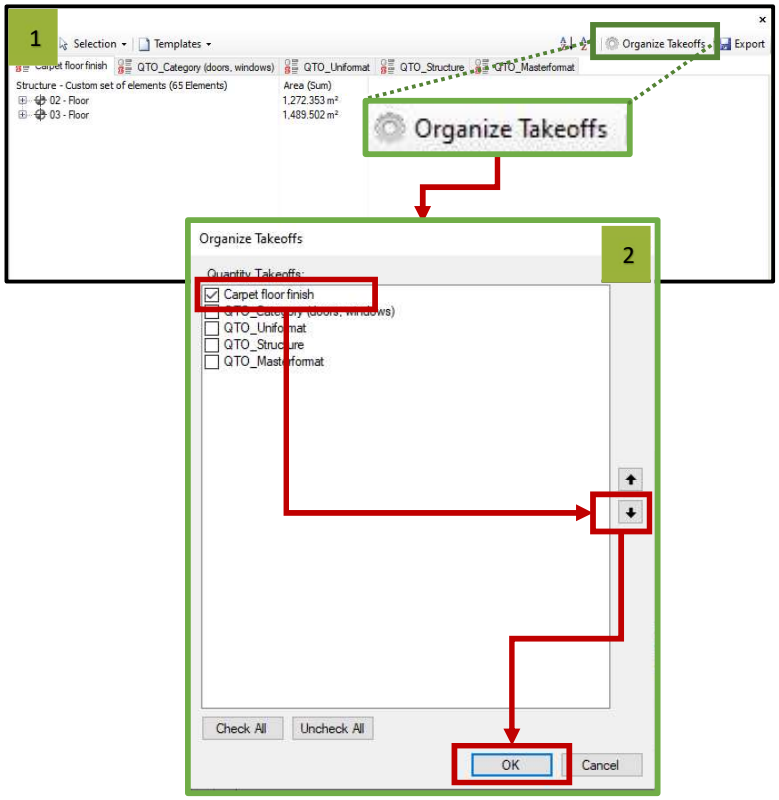
Position of the Quantity Takeoff commands in the QTO Window.

NOTE: Selection sets we have created, or any other Type we use in quantity takeoff jobs, we can use for many other activities and calculation. So, it is important from beginning that all data are correct (Family name, Selection sets, Building levels etc.) in order to easy creating quantity calculations.

7.1.3. ORGANIZE TAKEOFFS

As we mentioned earlier, the right side of the Quantity Takeoff palette contains the overview of created quantity takeoffs. In the right corner there is the command the Organize Takeoff where we can organize the order of created quantity takeoff tabs:

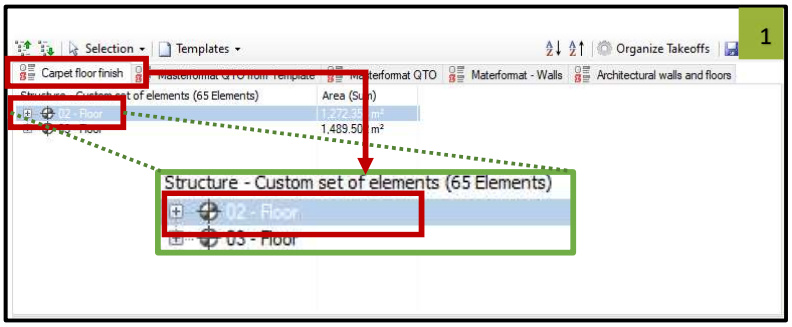
1. Click the **Organize Takeoff** button. →
2. Select desired QTO we want to move. → Click on the **Arrow** command to move it up or down. We can mark or unmark Quantities if we don't want to have them in the tabs of the QTO palette. Click the **OK** button to finish process.



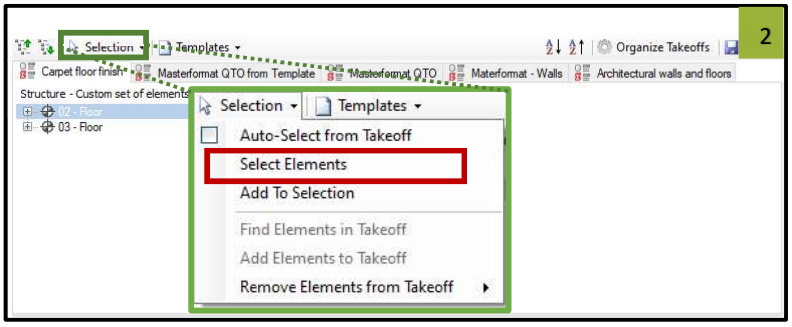
7.1.4. SELECT ELEMENTS FROM QTO

User can select any element or group of elements and isolate it in the viewport with the purpose of reviewing the group which has the selected value of the attribute more precisely. We can select the elements on the 2nd floor from the QTO we have already created *Carpet floor* finish and isolate selected elements in the main 3D viewport:

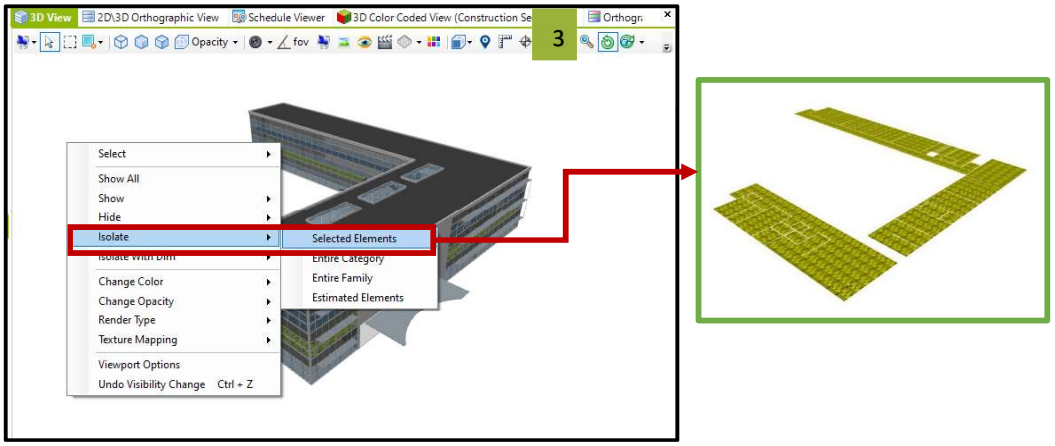
1. Click on the Carpet floor finish QTO in the right side of the Quantity Takeoff palettes window. → Select the 02-Floor in the breakdown structure of certain QTO. →



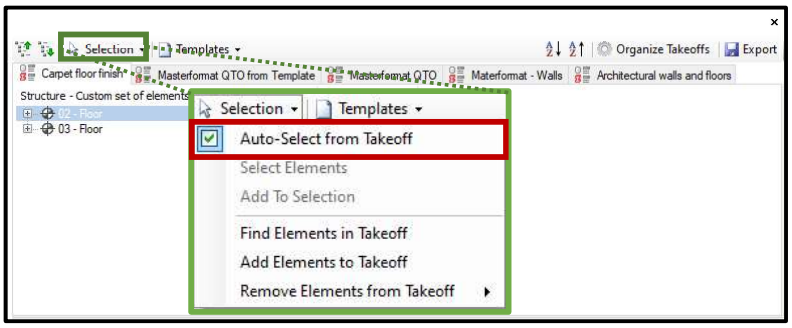
2. Click on the **Selection** button. → From drop-down list choose the **Select elements**. →



3. Right-click on viewport screen. → Choose **Isolate**. → From drop-down list choose **Selected elements**. By double-clicking on mouse scroll button user can zoom selected elements in viewport screen.



NOTE: If User wants to activate auto select option click on **Select** button and mark the **Auto-Select from Takeoff** option from drop-down list. When we click on the element or element group in the quantity takeoff content window, certain elements will be automatically selected those in the main viewport.

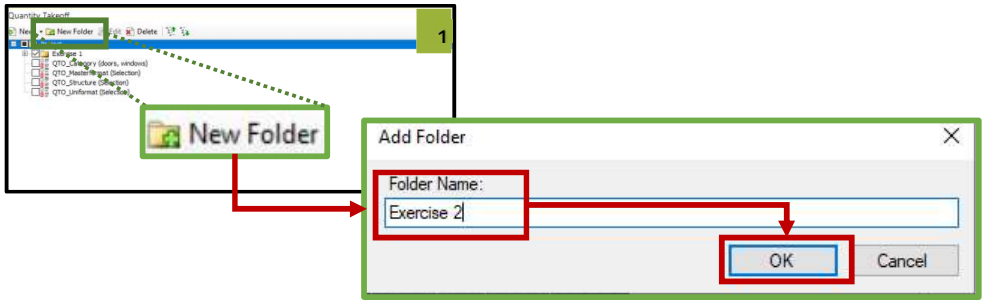


7.1.5. CREATE QUANTITY TAKEOFF BY VARIOUS CRITERIA

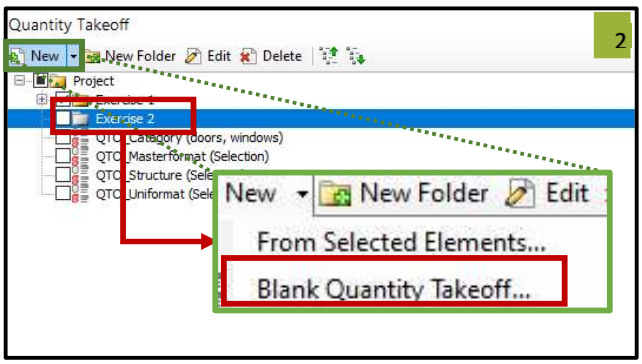
In this exercise we will make QTO for architectural walls and floors, we don't want to use structural elements. We want to know the area of these architectural elements. Also, we want to create it in the folder **Exercise 2.** We are going to use smart selection set which have been imported in the Bexel Semple Project Start, folder **Clash Selection Sets/AR.** The Unit we need is m^2.

Import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf** that can be downloaded from Bexel User Area, folder **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 7.0\Exchange**.

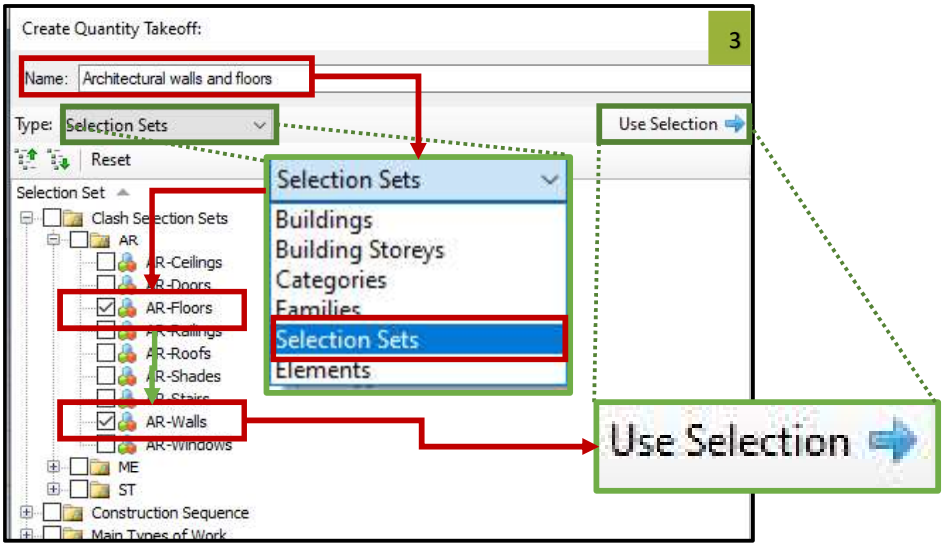
1. The Quantity Takeoff palette is active. First, create the new folder we are going to call **Exercise 2.** For this action use the **New folder** button.



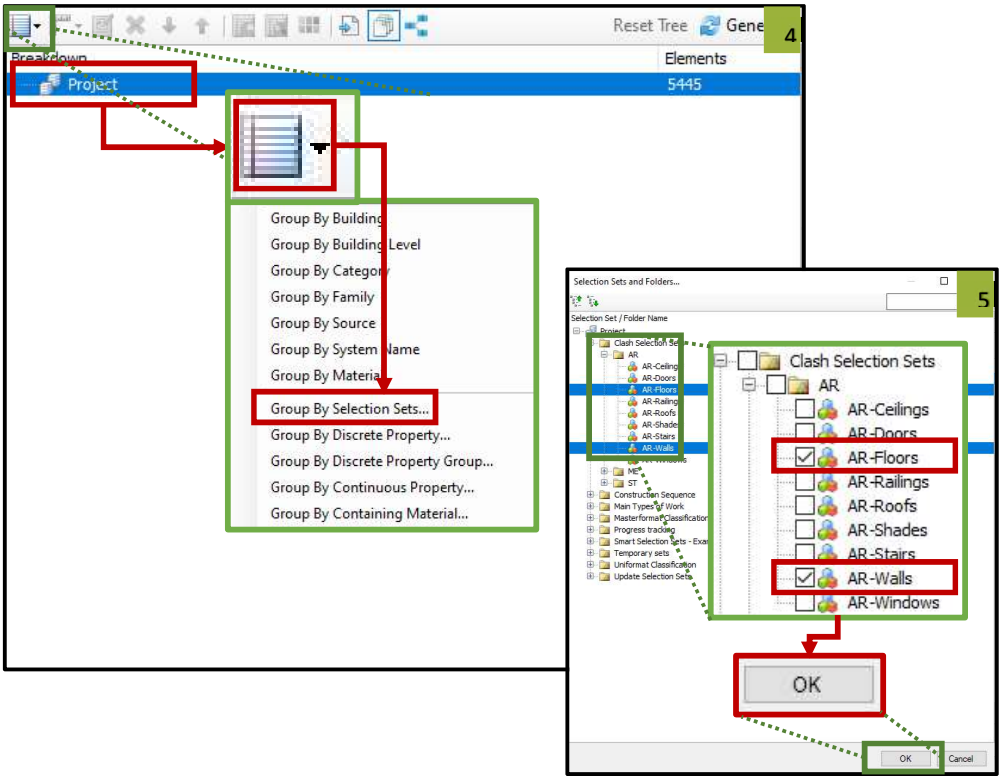
2. If we want to create the QTO in certain folder we have to select desired folder first. It is not necessary, we can organize QTO breakdown even after we have crated QTO. Select the folder Exercise 2. Click on the arrow next to the **New** button or right-click on desired folder. → Select the **Blank Quantity Takeoff** option. →



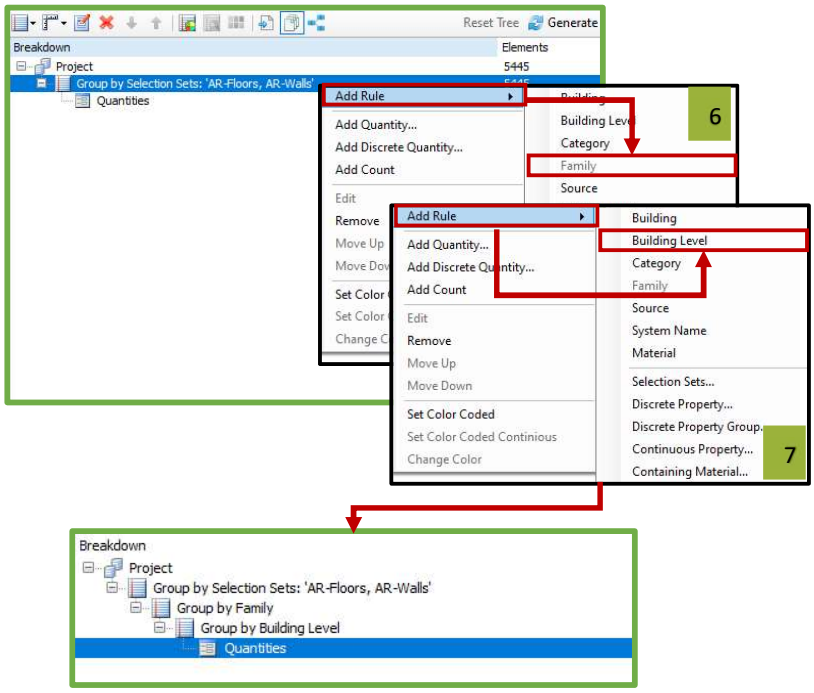
3. Set the name of the quantity takeoff in the **Name** field, in this case we set the name **Architectural walls and floors**. → In the **Type** field, choose **Selection Sets** and check the Selection Set folder **Clash Selection Sets/AR/ AR-Floors and AR -Walls.** → Click on the **Use Selection** button. →



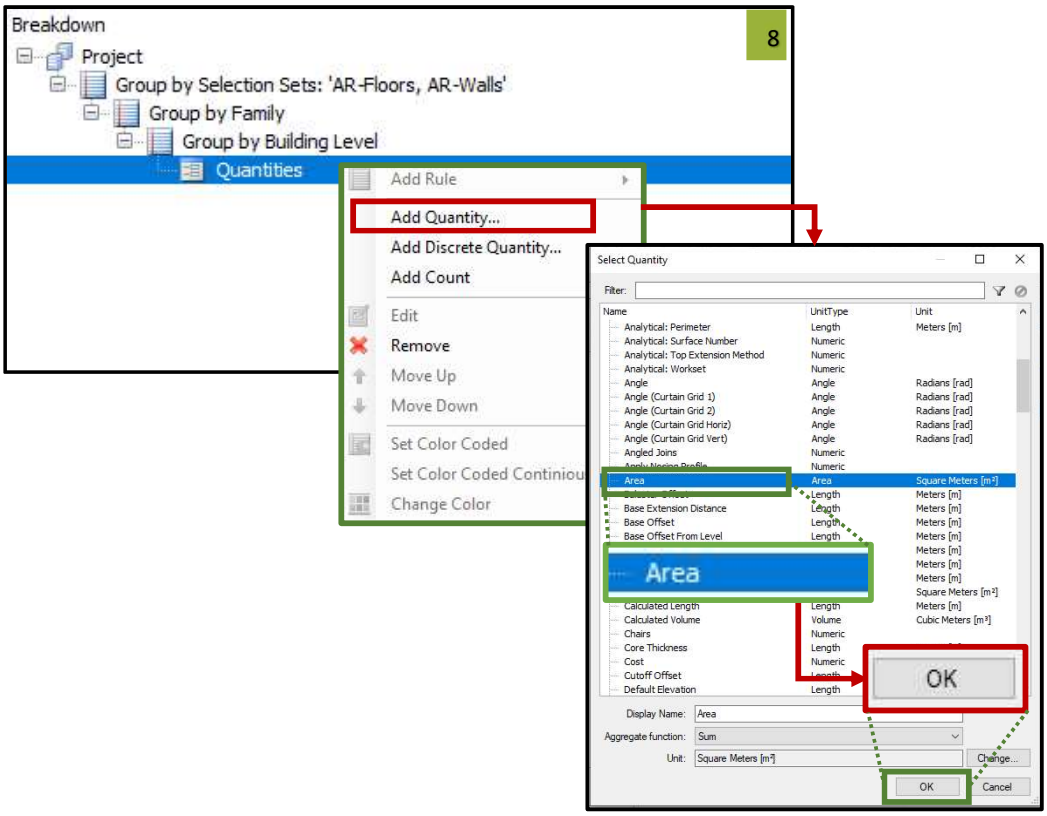
4. Define the first criteria for the quantity takeoff: → Select added elements on right side of the window. → Click on the **Add Breakdown Rule** command. → Add rule. → From drop-down list choose **Group By Selection Sets**. →
5. From Selection Set list select selection sets **AR-Floors** and **AR-Walls** from the folder **AR** (press **CTRL** button for multiple selection). → Click **OK** button. →



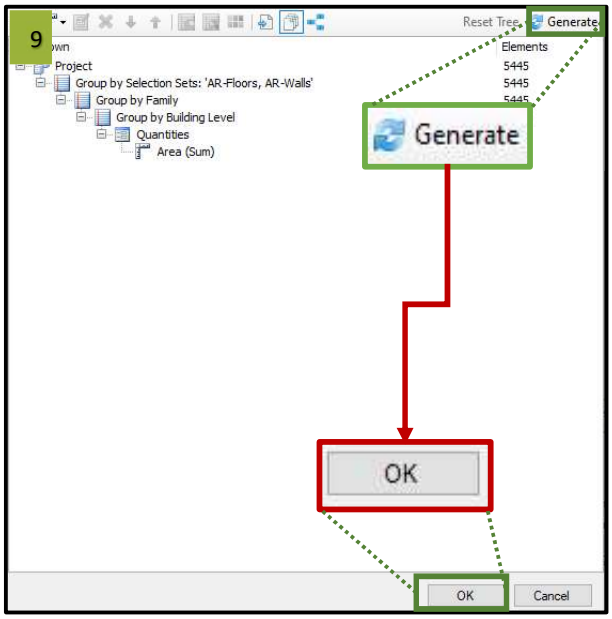
6. Define the second criteria for the quantity takeoff: → Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Family**. →
7. Define the third criteria for the quantity takeoff: → Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Building Level**.



8. Select **Quantities**. → Right-click → Choose the **Add Quantity** command. → The **Select Quantity** window will open, select **Area**. → Click **OK** button. →



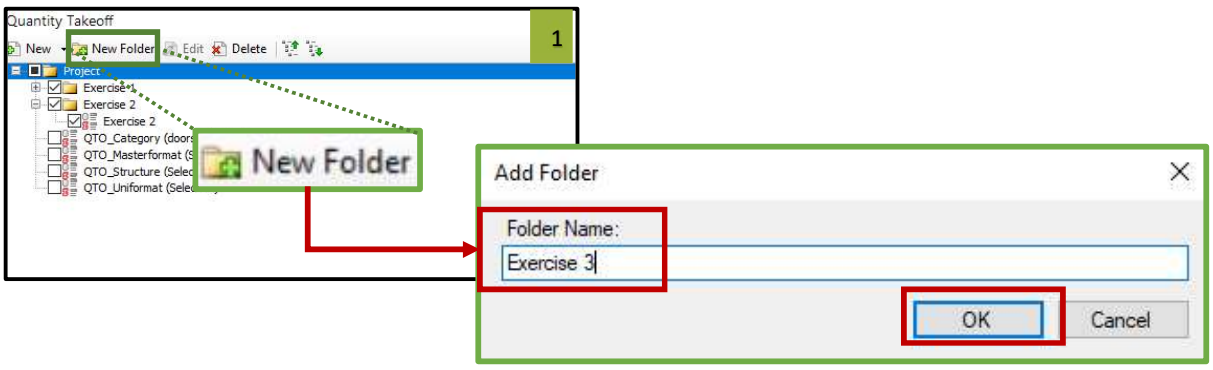
9. Click **Generate**. → Finish process by clicking the **OK** button.



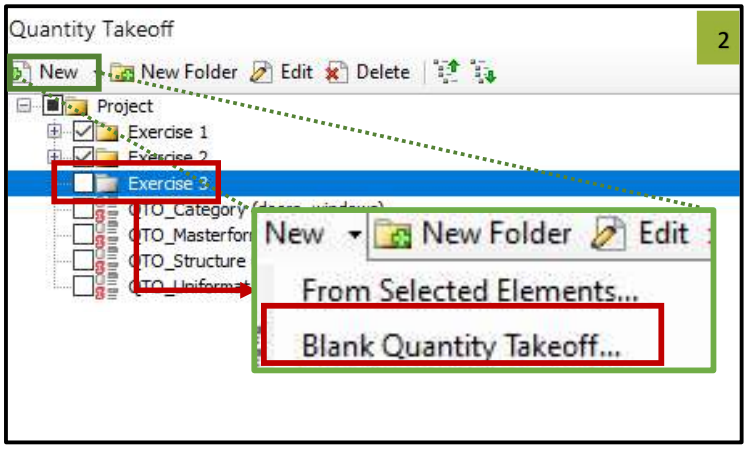
7.1.6. CREATE BREAKDOWN STRUCTURE USING ELEMENT ATTRIBUTES

In this exercise we will make QTO for architectural walls and floors, we don't want to use structural elements. We want to know the area of these architectural elements. Also, we want to create it in the folder **Exercise 2.** We are going to use smart selection set which have been already created in the Bexel Manager Semple Project, folder **Clash Selection Sets/AR.**
Import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf** that can be downloaded from Bexel User Area, folder **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 7.0\Exchange**.
Discrete property usage allows us creation of many Quantity Takeoffs where we use different element attributes. Now we can create the Quantity Takeoff for all walls, where we want to create quantity takeoff breakdown structure by property Masterformat, and sort by family. We want to know the area and length of these elements.

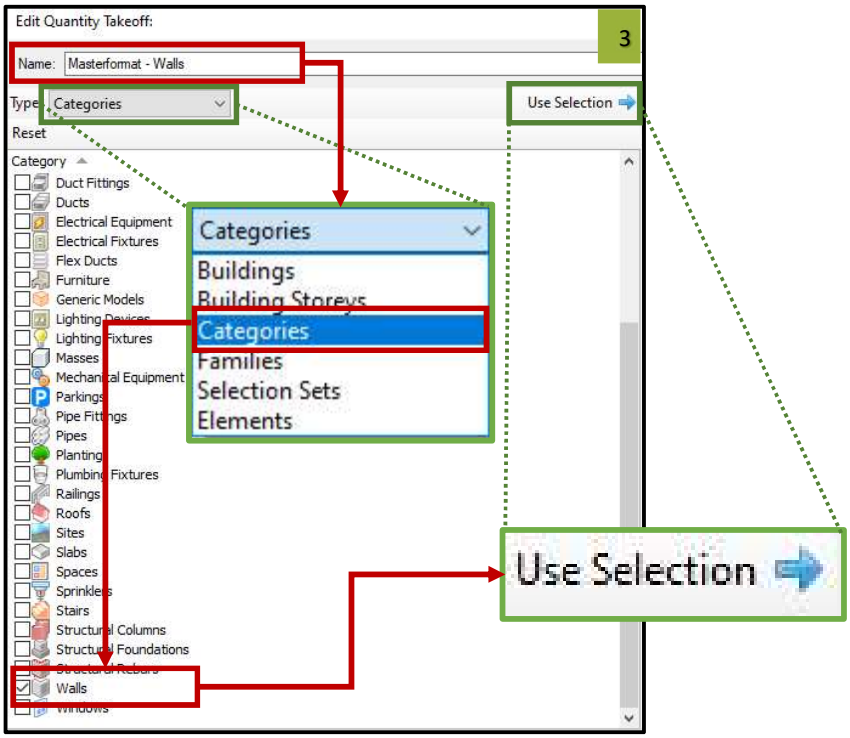
1. The Quantity Takeoff palette is active. Create the new folder with the name **Exercise 3.** For this action use the **New folder** button. →



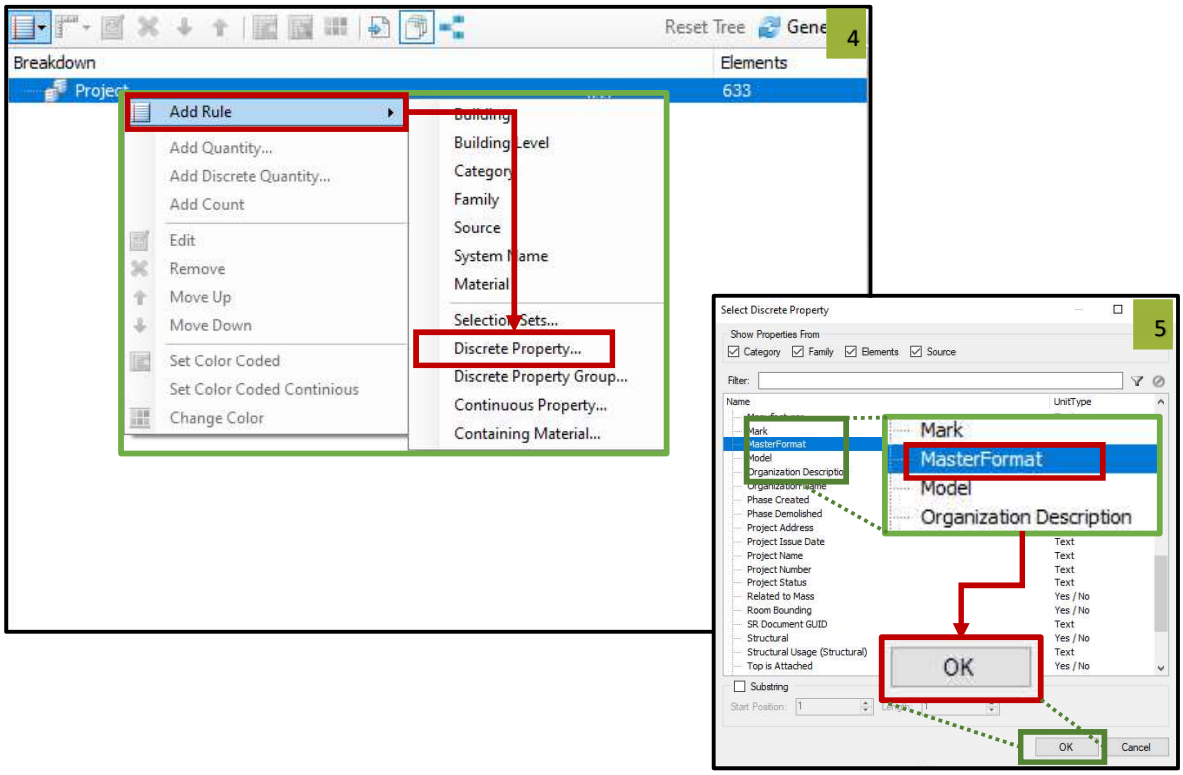
2. Click on the arrow next to the **New** button. → Select the **Blank Quantity Takeoff** option. →



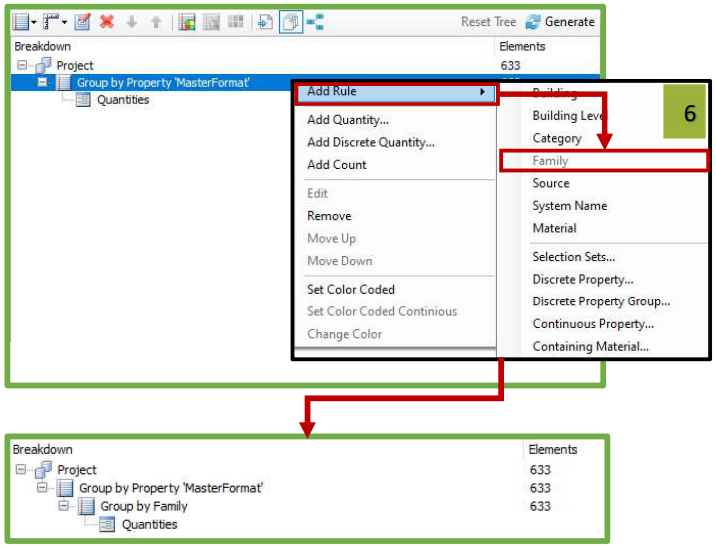
3. Set the name of the quantity takeoff in the **Name** field, **Masterformat - Walls.** → In the **Type** field, choose **Categories**. → Check the box for the desired **Category** in window below, we will check the **Walls**. → Click on the **Use Selection** button. →



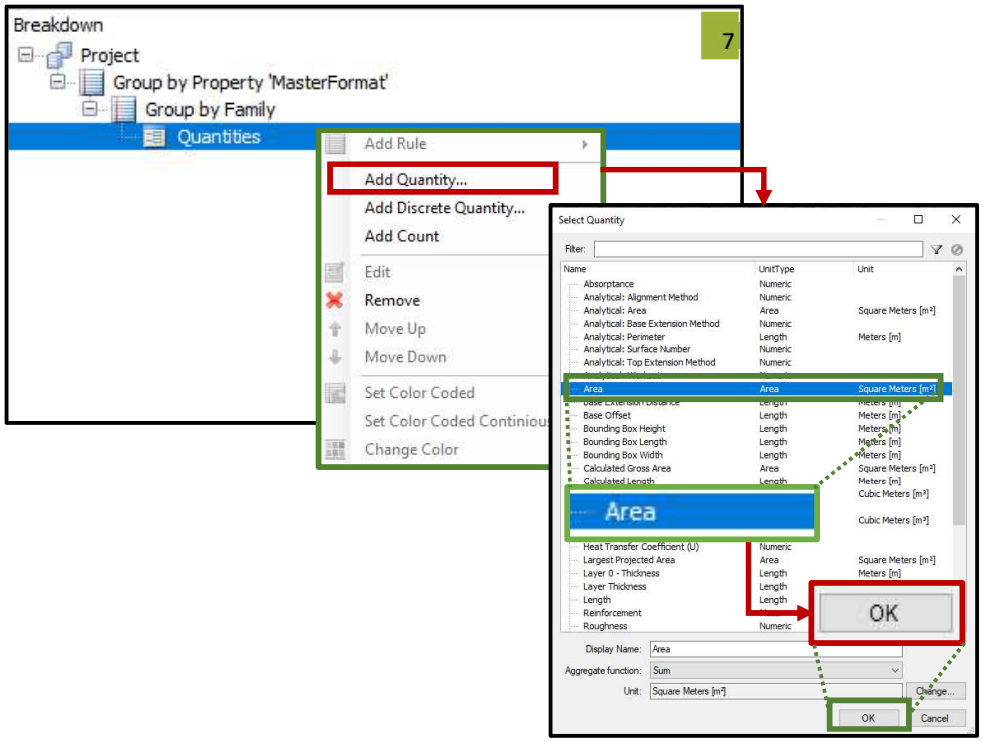
4. Define the first criteria for the quantity takeoff: → Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Discrete Property**. →
5. From Discrete Property list choose **MasterFormat**. → Click OK button. →



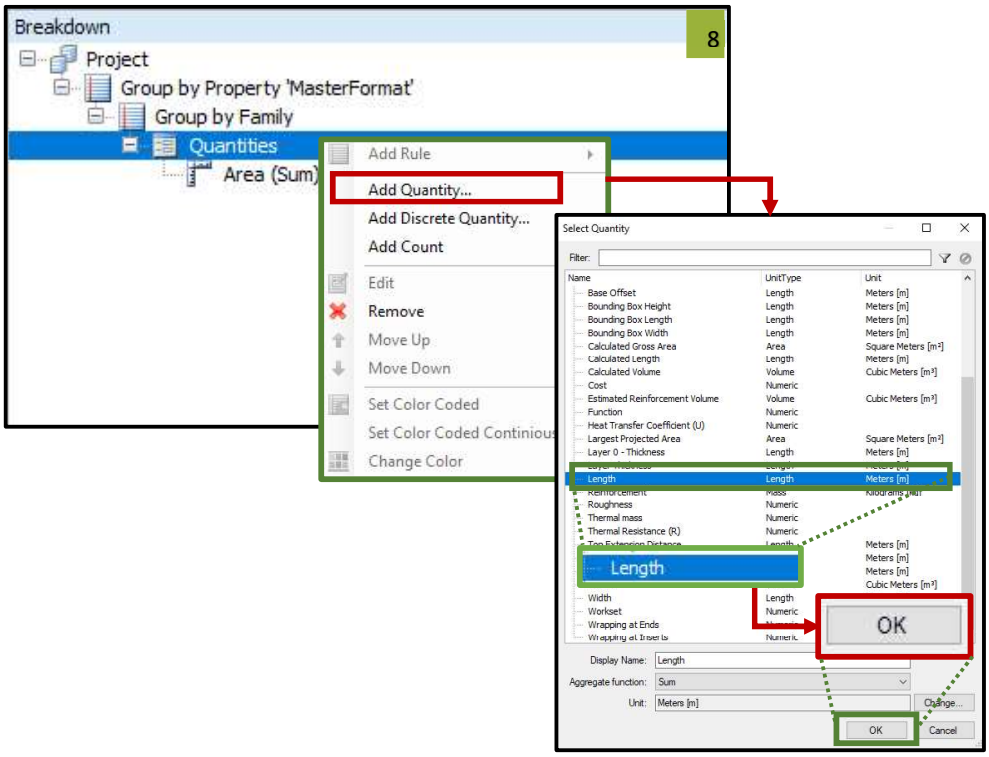
6. Define the second criteria for the quantity takeoff: → Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Family**. →



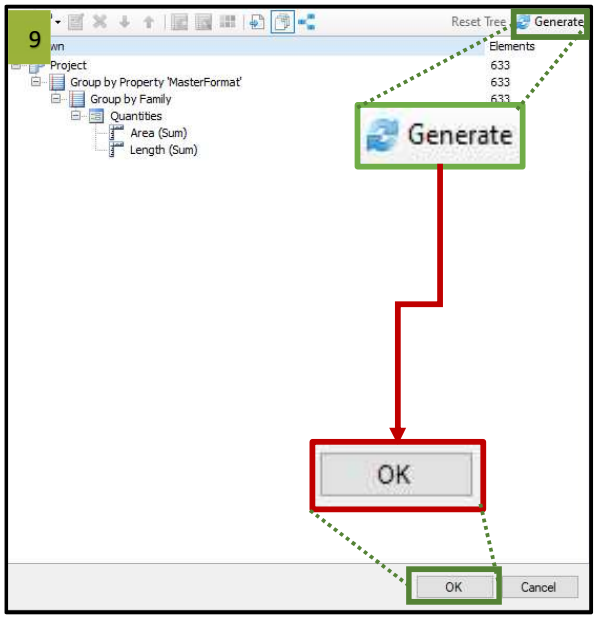
7. Select **Quantities**. → Right-click → Choose the **Add Quantity** command. → The **Select Quantity** window will open, select **Area**. → Click **OK** button. →



8. Repeat process to add **Length**: select **Quantities**. → Right-click → Choose the **Add Quantity** command, select **Length**. → Click **OK** button. →



9. Click **Generate**. → Finish process by clicking the **OK** button.

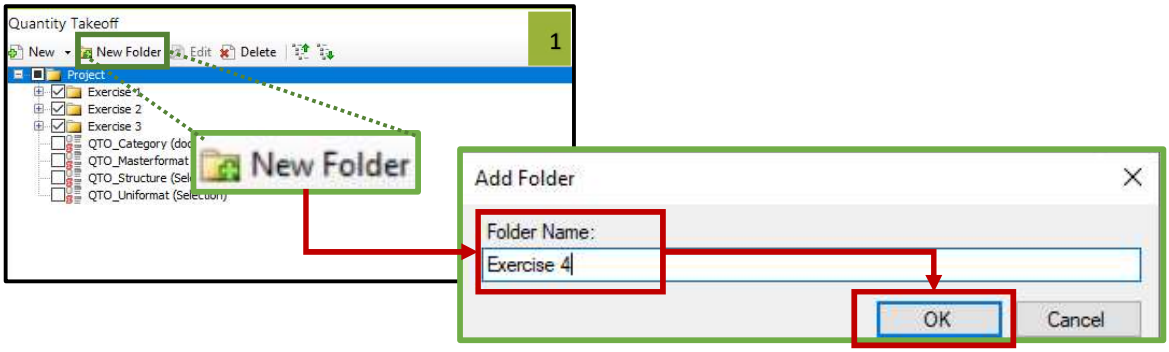


7.1.7. CREATE QUANTITY TAKEOFF WITH ELEMENT MULTIPOSITION

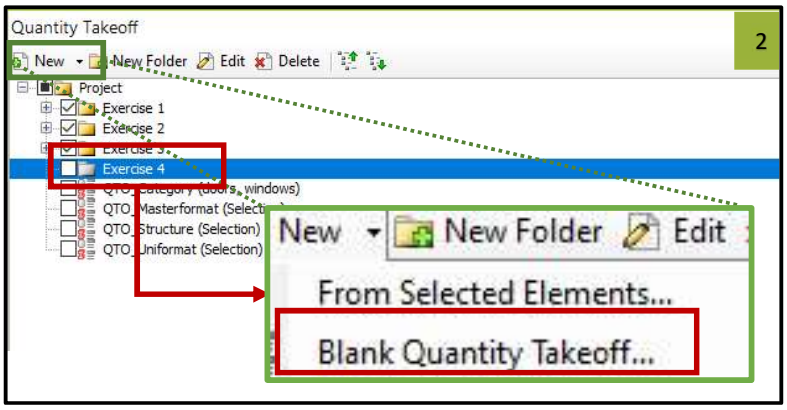
In this exercise we will explain how to create quantity takeoff from smart selection set **MasterFormat Classification**. We want to create quantity breakdown structure to look the same as in the selection set breakdown. We will set quantities: area and volume. For this exercise, we will create the folder **Exercise 4**.

Import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf** that can be downloaded from Bexel User Area, folder **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 7.0\Exchange**.

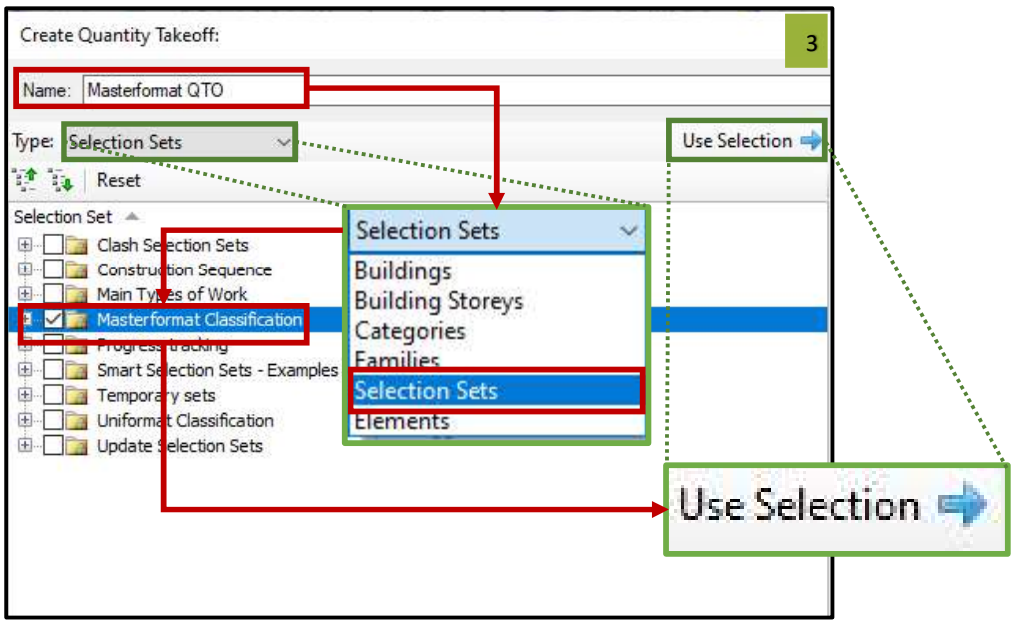
1. The Quantity Takeoff palette is active. First, create the new folder the **Exercise 4.** For this action use the **New folder** button.



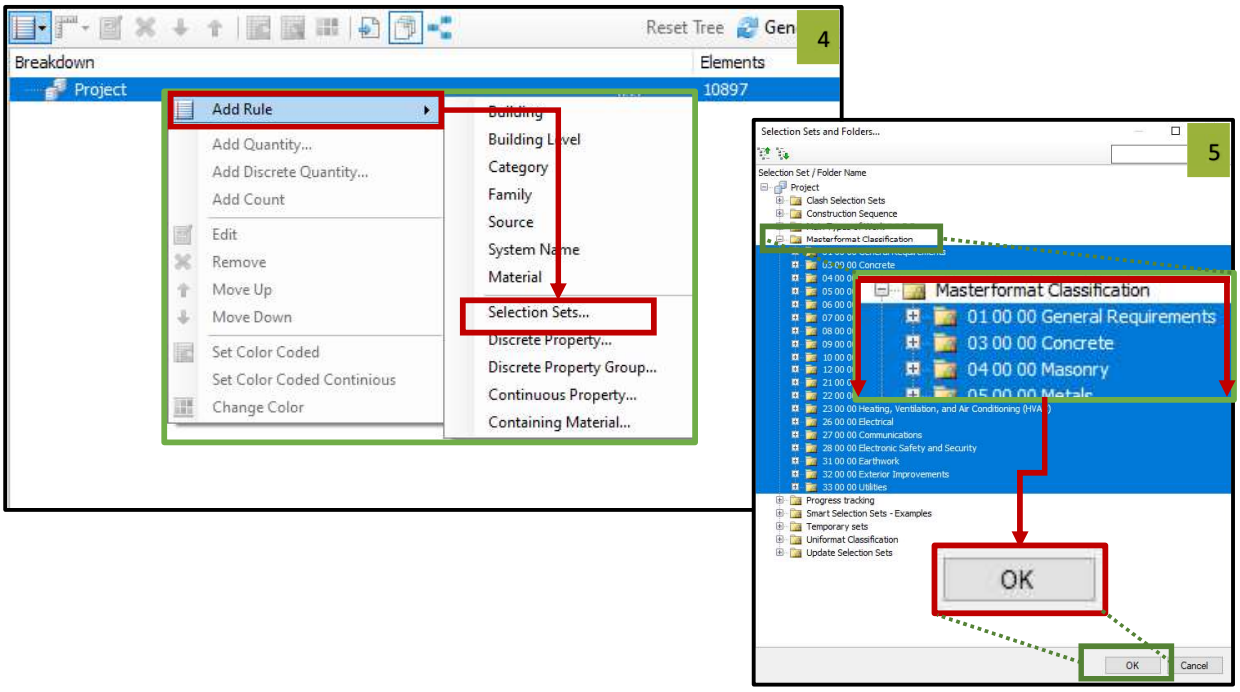
2. Click on the arrow next to the **New** button. → Select the **Blank Quantity Takeoff** option. →



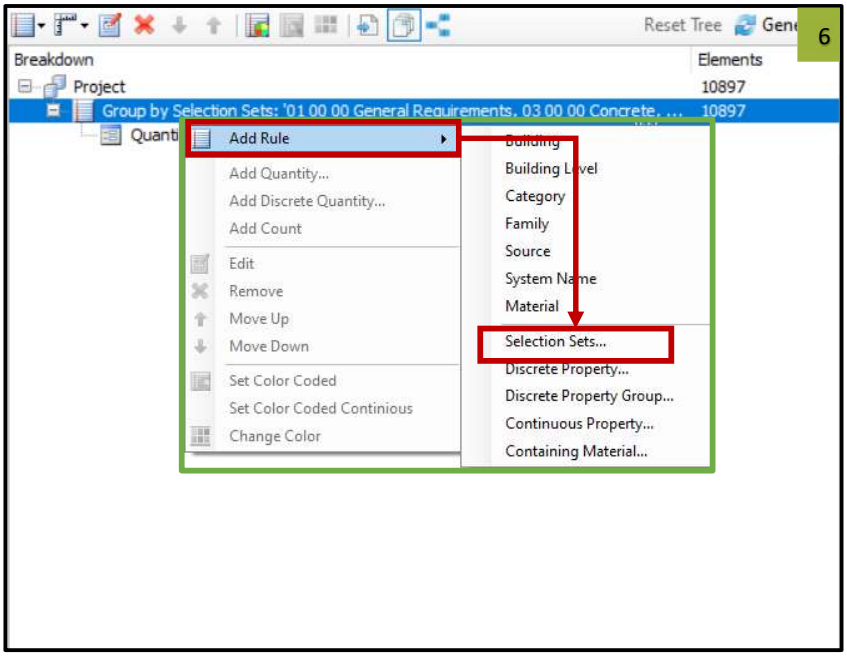
3. Set the name of the quantity takeoff in the **Name** field, **Masterformat QTO**. → In the **Type** field, choose **Selection Sets** and check **Masterformat Classification**. → Click on the **Use Selection** button. →



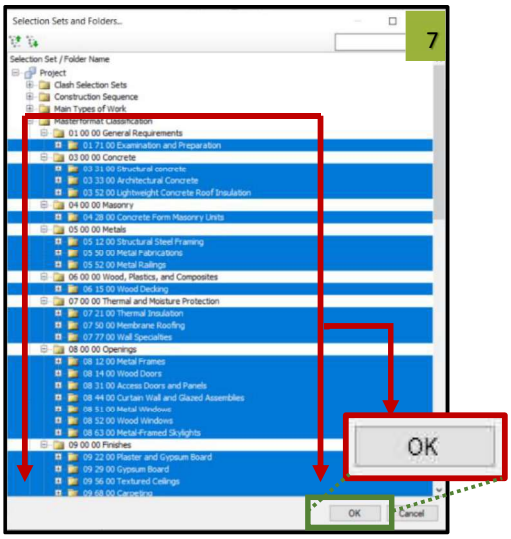
4. Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Selection Sets**. →
5. From Selection Set list select all Selection Set folders under the folder **Masterformat Classification** (press **CTRL** button for multiple selection). → Click **OK** button. →



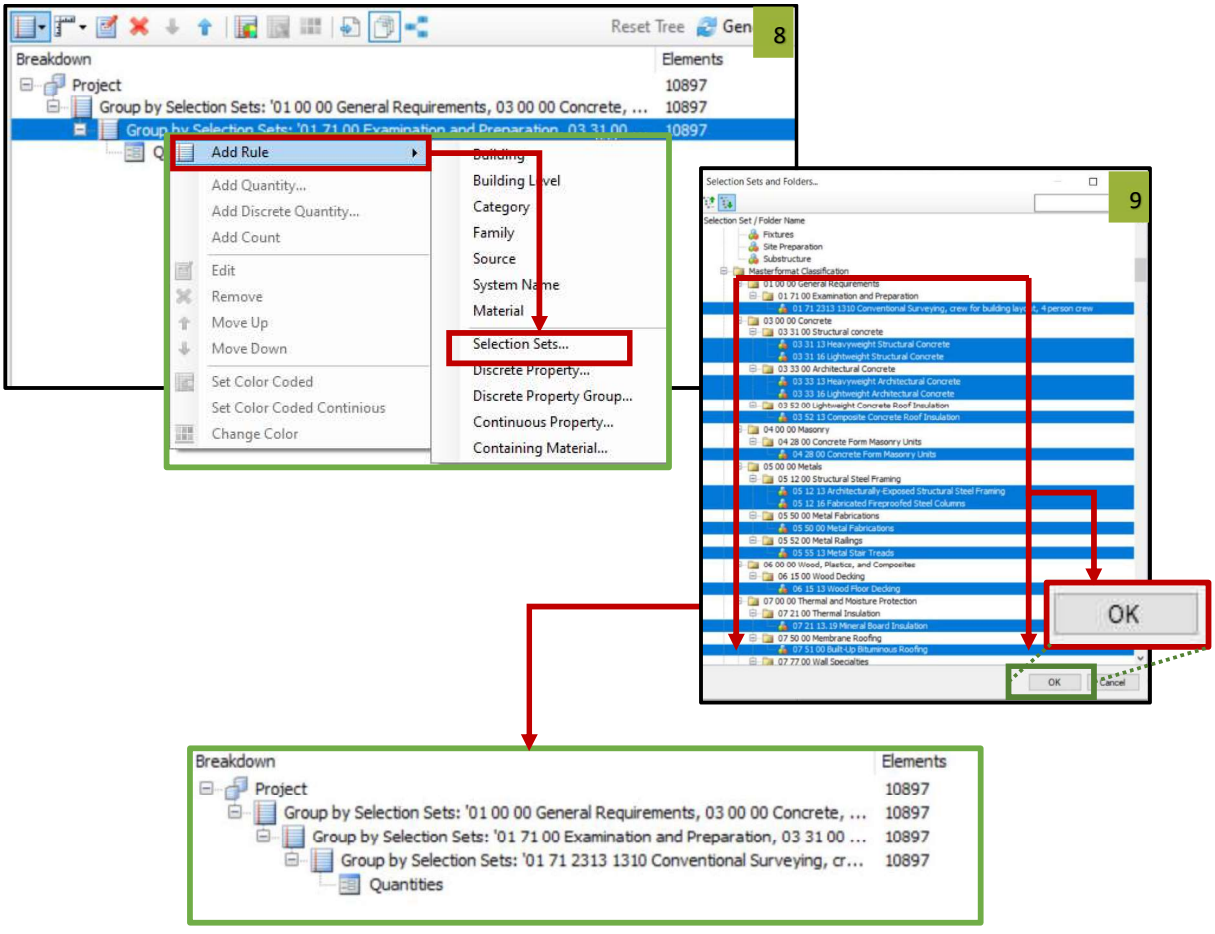
6. Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Selection Sets**. →



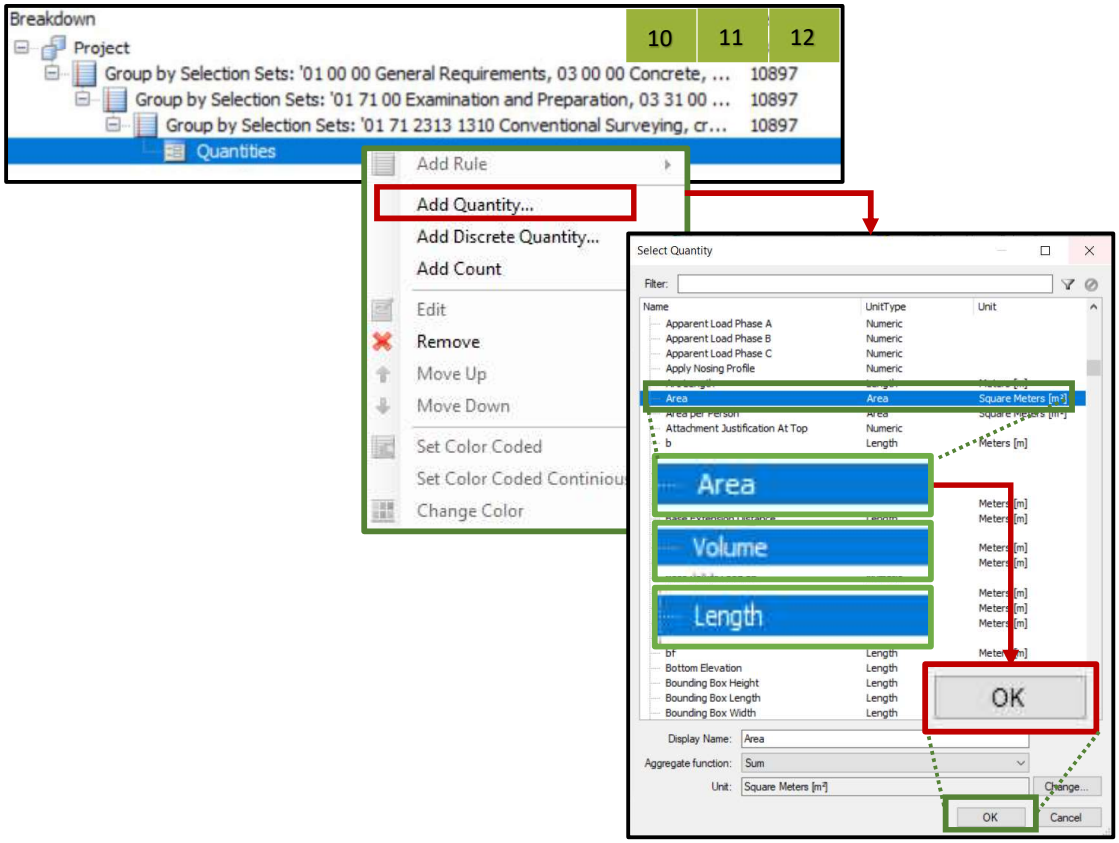
7. From Selection Set list select all Selection Set folders under previously selected folders. → Click **OK** button. →



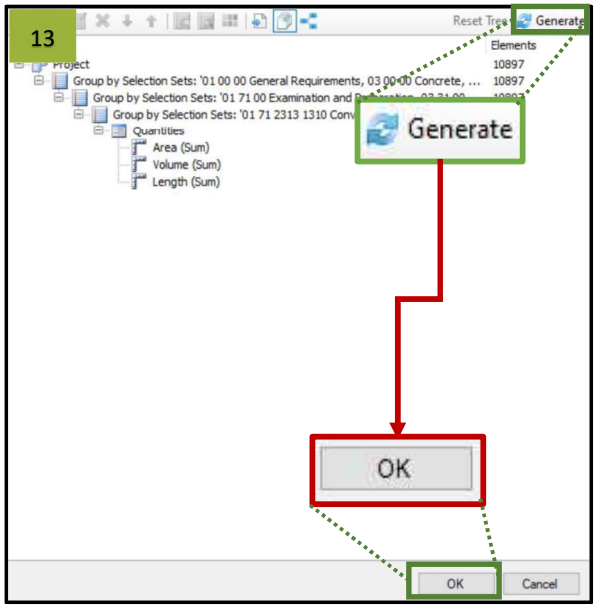
8. Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Selection Sets**. →
9. From Selection Set list select all Selection Sets under previously selected folders. → Click OK button.



10. Select **Quantities**. → Right-click → Choose the **Add Quantity** command. → The **Select Quantity** window will open, select **Area**. →
11. Select **Quantities**. → Right-click → Choose the **Add Quantity** command. → The **Select Quantity** window will open, select **Volume**.→
12. Select **Quantities**. → Right-click → Choose the **Add Quantity** command. → The **Select Quantity** window will open, select **Length**. →



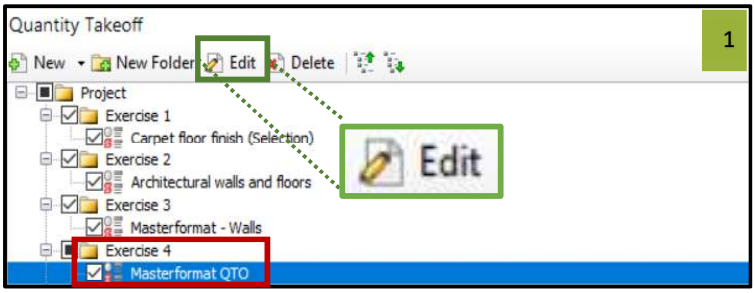
13. Click **Generate**. → Finish process by clicking the **OK** button.



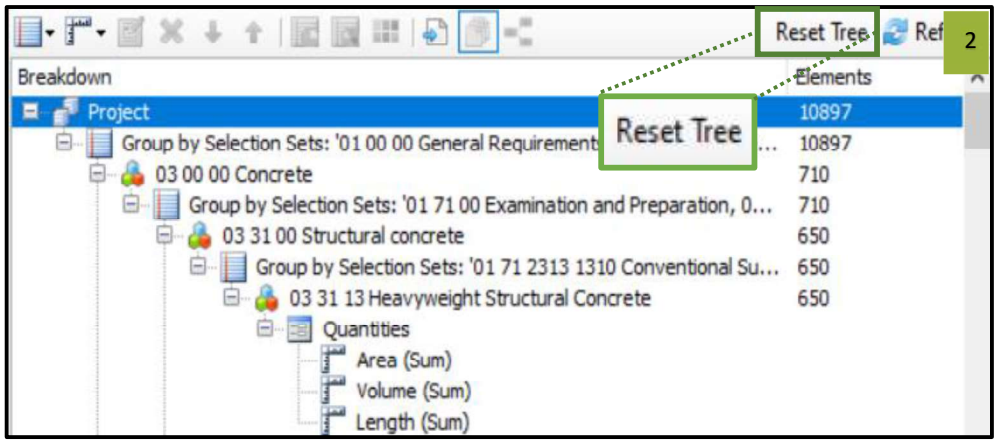
- Created Takeoff contains groups named Multiple Selection Sets. These elements are not distributed in Quantity takeoff by desired breakdown. So, before generating quantity breakdown, we should activate option **Enable Elements Multiposition** and disable **Display Elements Distributed in Multiple Positions** in **Quantity Takeoff Editor**.

7.1.8. EDITING QTO AND MULTIPOSITION COMMANDS

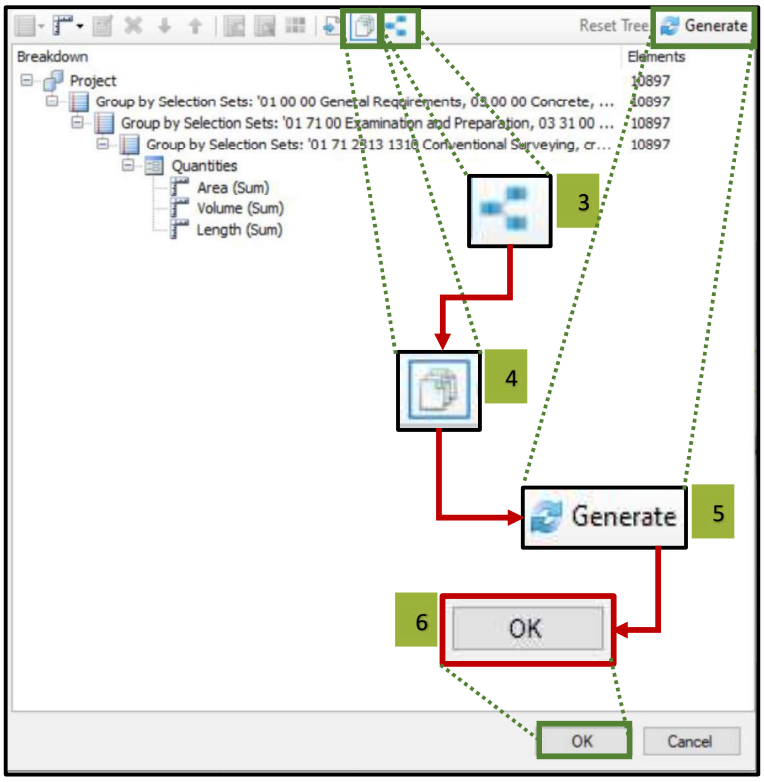
1. Select previously created QTO **Masterformat QTO**. → Click **Edit** button. →



2. The **Edit Quantity Takeoff** window opens. Click **Reset Tree** option. →

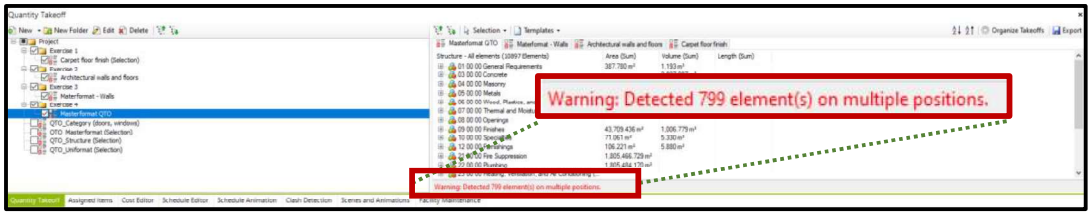


3. Click on **Enable Elements Multiposition** button. →
4. Disable **Display Elements Distributed in Multiple Positions**. →
5. Click **Generate**. →
6. Finish process by clicking the **OK** button.



NOTE: Option **Display Elements Distributed in Multiple Positions** is active by default. If this option is enabled, all positions in QTO structure, which have elements distributed in multiple positions, will be organized under groups Multiple Selection Sets and breakdown structure within it.

- Software warns us if there are multipositioned elements in created quantity takeoff breakdown structure. Be careful in this situation to avoid double quantities and possible mistakes.



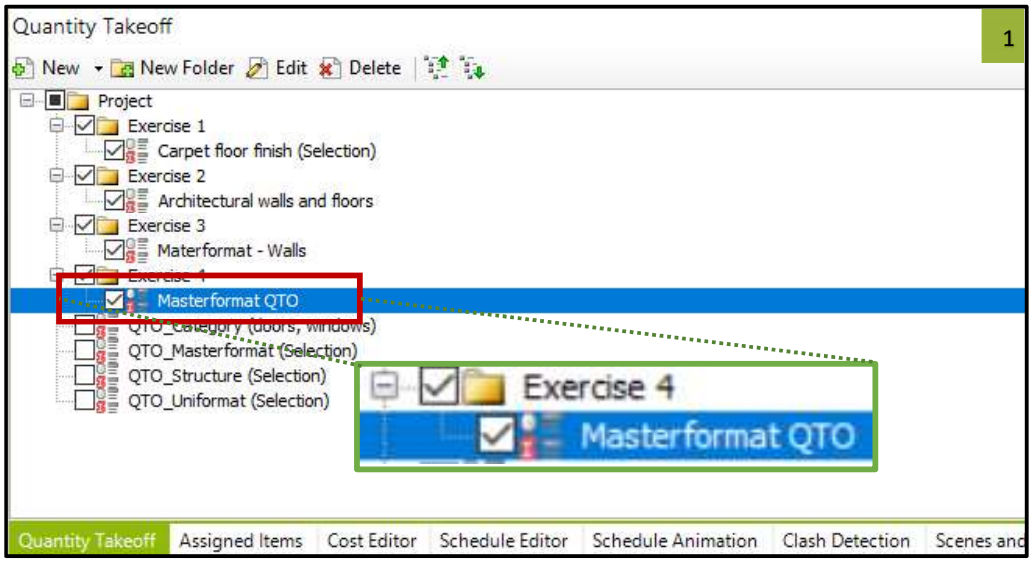
Warning about how many elements are detected on multiple positions in quantity takeoff breakdown structure.

7.2. QUANTITY TAKEOFF TEMPLATES

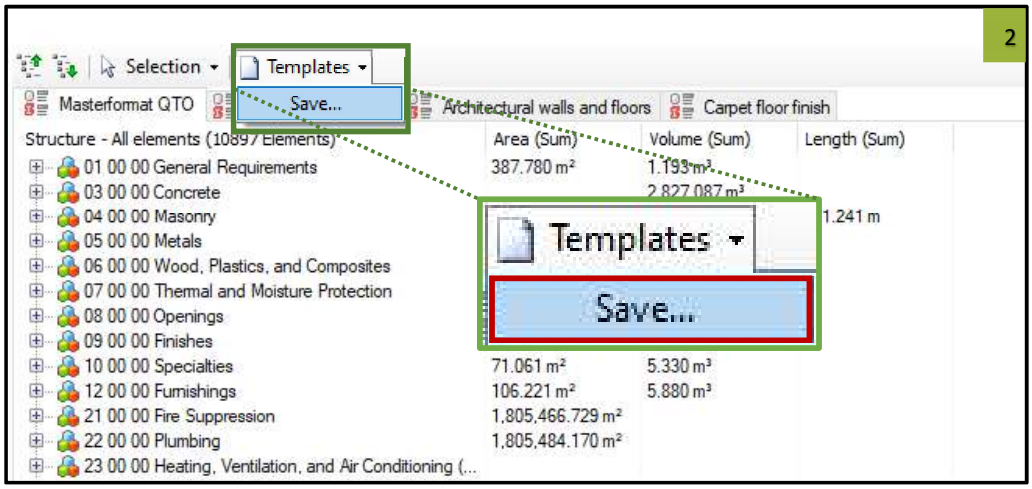
Once created quantity takeoff rules could be exchanged and used for further project or shared with other users as Quantity Takeoff Template.

Now we can create the Quantity Takeoff Template from quantity takeoff we have already created. We are going to use **Masterformat QTO** as example for creating the Template file.

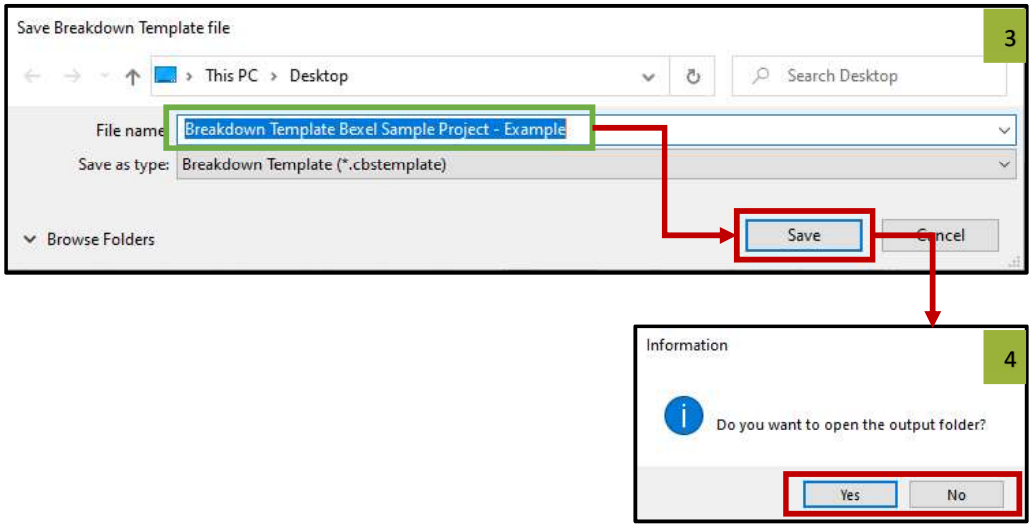
1. Check the **Quantity takeoff** from the list. →



2. Click on the **Templates** button. → Click the **Save** option. →



3. The **Save Breakdown Template file** window opens. Choose desired location on local computer and in the **File name** field enter the name of the Template, name it **Breakdown Template Bexel Sample Project – Example**. →
4. The **Information** window opens where we can open the output folder for the Template we have just created.

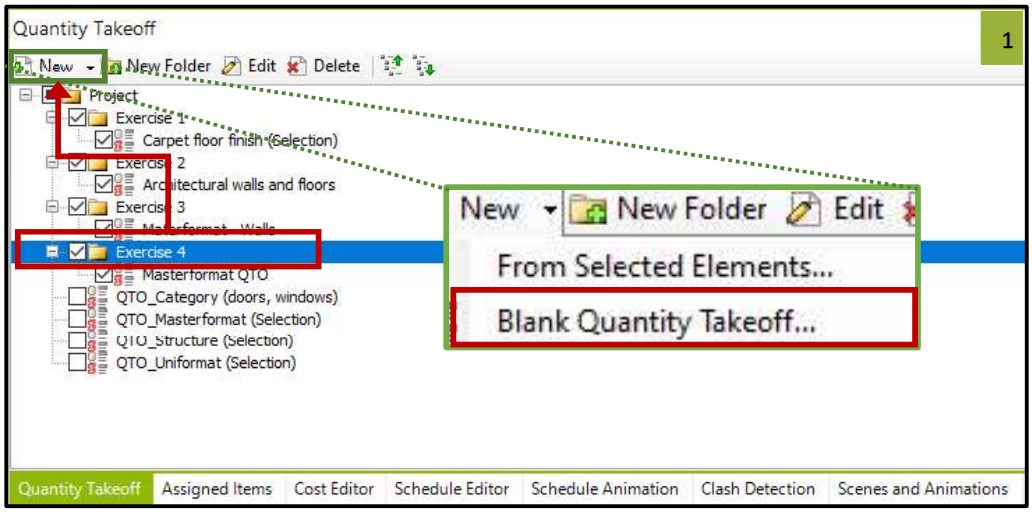


As we have created the Quantity Takeoff Template, we will explain the process of importing the certain file.

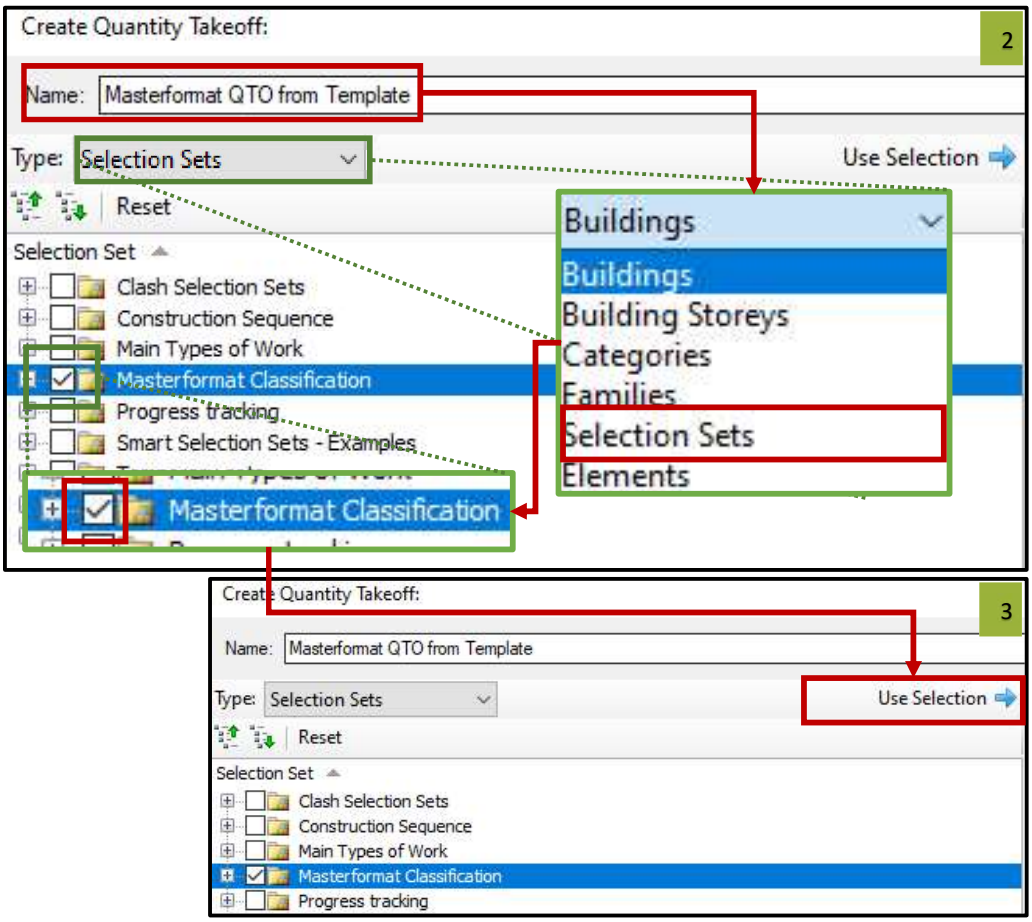
For this exercise we need the template file we have already created, **Breakdown Template Bexel Sample Project - Example.cbstemplate**, which is located on local computer. The New quantity Takeoff we will create from this template file and locate it in the folder **Exercise 4**.

We can download this template file from Bexel User Area which is located within the folder **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 7.0\Exchange**.

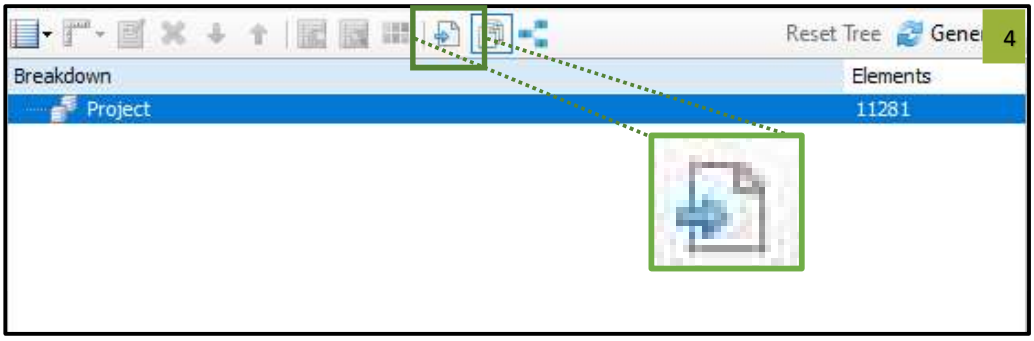
1. Activate Quantity Takeoff palette. → Select the folder **Exercise 4**. → Click on the arrow next to the **New** button. → Select the **Blank Quantity Takeoff** option. →



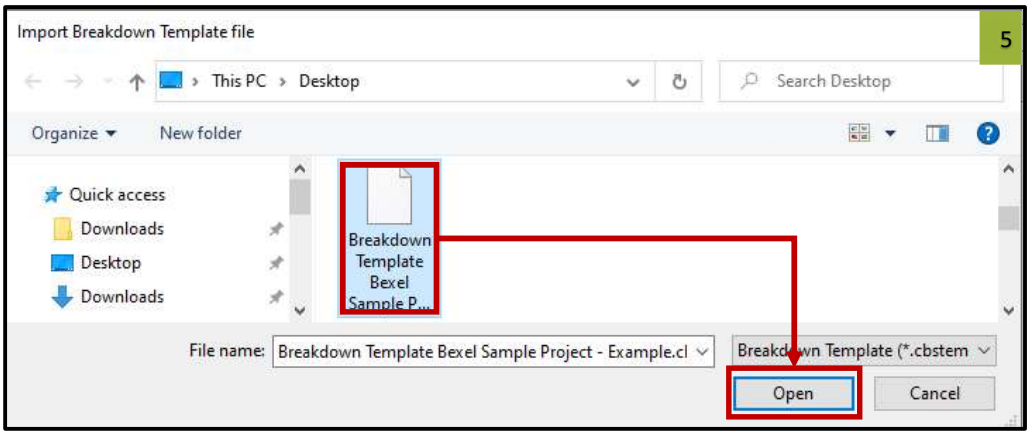
2. The **Create Quantity Takeoff** Window opens. → Set the name of the quantity takeoff in the **Name** field, **Masterformat QTO from Template**. → In the **Type** field, choose **Selection Sets**, check the Masterformat Classification selection set. →
3. Click on the **Use Selection** button. →



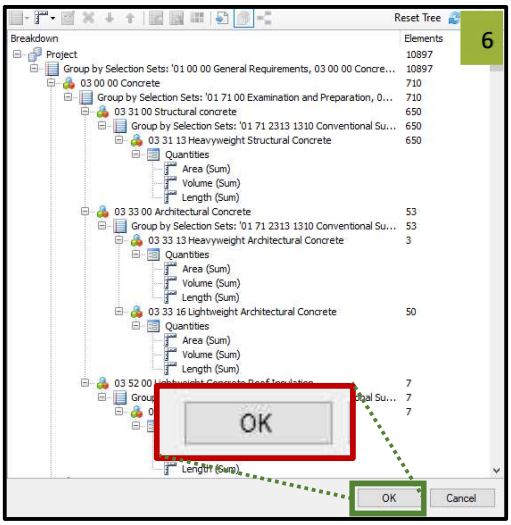
4. Click on the **Import QTO from Template** button. →



5. The **Import Breakdown Template file** window opens. From the local computer we choose the template file we previously created **Breakdown Template Bexel Sample Project - Example.cbstemplate**. Click the **Open** button. →



6. The template QTO is imported now. Finish process by clicking the **OK** button.



NOTE: Please notice that the created QTO, **Masterformat QTO from Template**, is the same as the one we used for creating template **Masterformat QTO**. The difference is only that in the last one we didn't activate the **Enable Elements Multiposition** and disable the **Display Elements Distributed in Multiple Positions** in **the Quantity Takeoff Editor**.

7.3. CREATING COLOR CODED QUANTITY TAKEOFF BREAKDOWN

We can create Color Coded Quantity Takeoff. We use color coded QTO when we want to see all items from QTO in different colors. This is very useful for better visualization of certain QTO items.

The Color Coded command can be used within the process of creating the new Quantity Takeoff or when we edit existing Quantity takeoff.

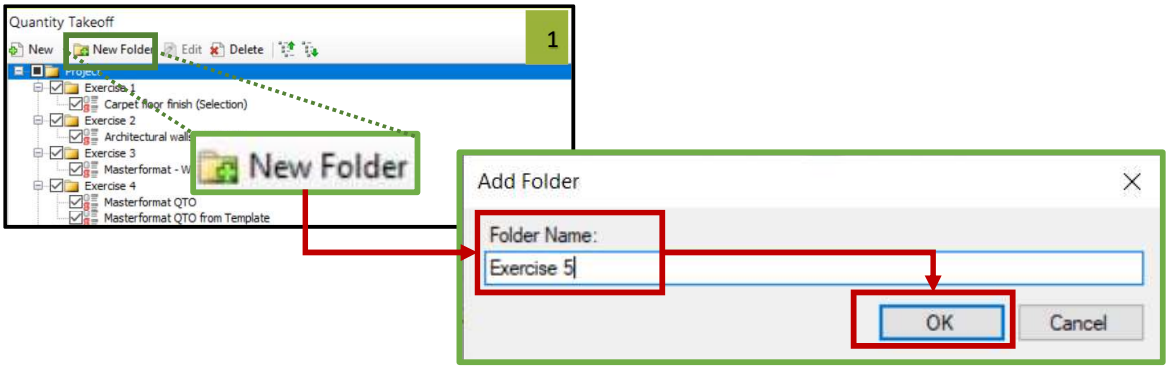
7.3.1. CREATE COLOR CODED QUANTITY TAKEOFF FOR GROUP OF ELEMENTS DIVIDED BY CERTAIN RANGE

Now we will create breakdown structure for group of elements divided by certain range where we will use Color Coded rules for created Quantity Takeoff.

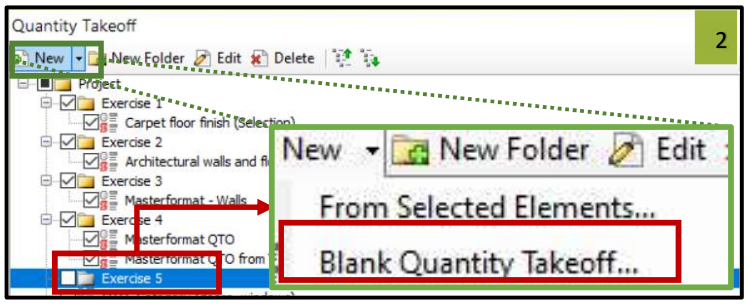
For additional analysis, when we should create breakdown structure for example by certain range, we can use the Continuous Property.

In this exercise we will make QTO for architectural rooms, where we want to know the Name and exact area of every room but also, we should group them in rooms which have the area less and greater than 100m^2. We want to create it in the folder **Exercise 5.** The Unit we need is m^2.

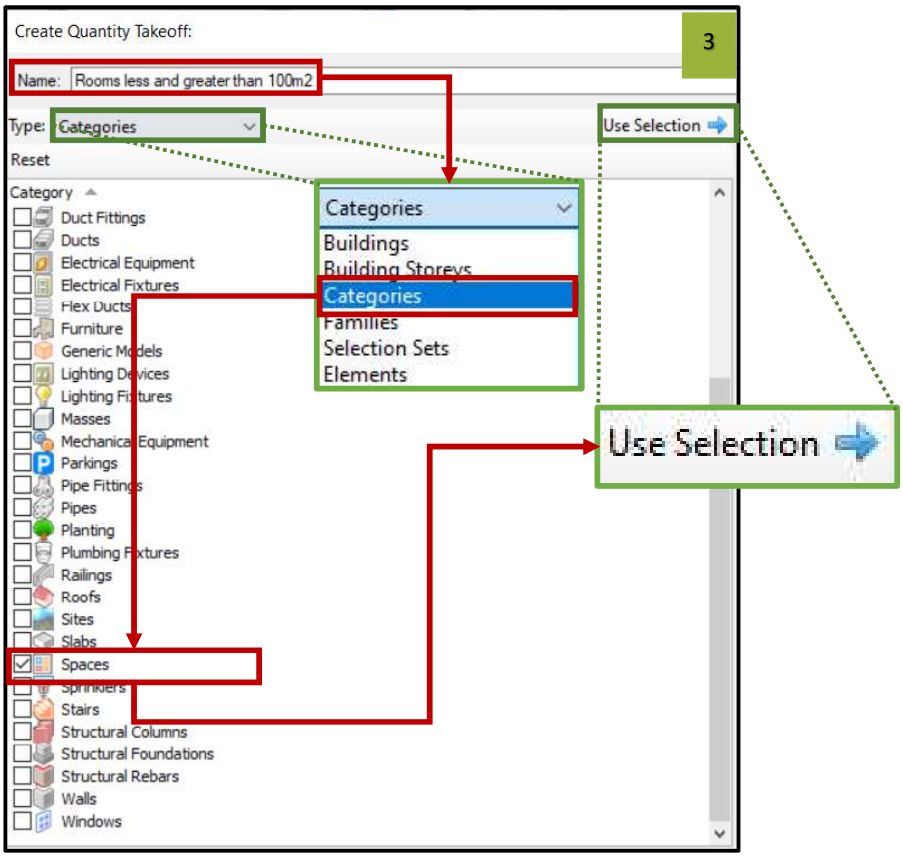
1. The Quantity Takeoff palette is active. First, create the new folder we are going to call **Exercise 5.** For this action use the **New folder** button.



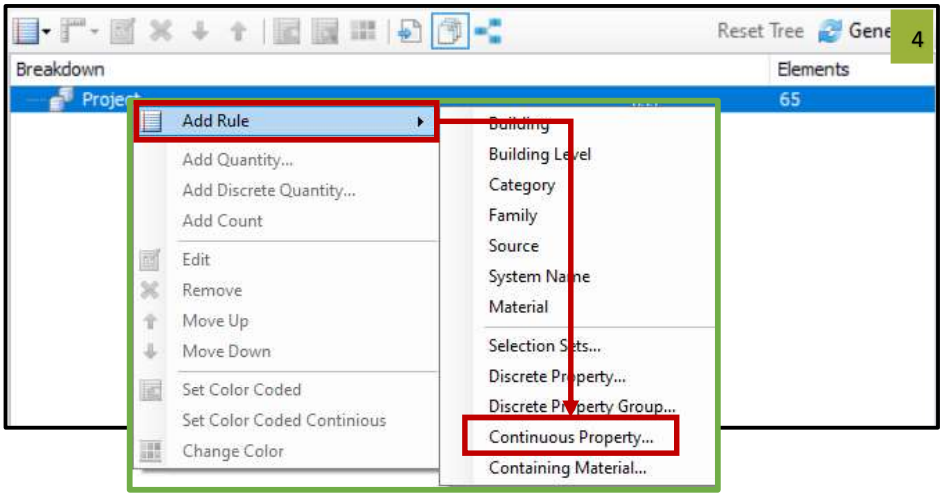
2. Click on the arrow next to the **New** button. → Select the **Blank Quantity Takeoff** option. →



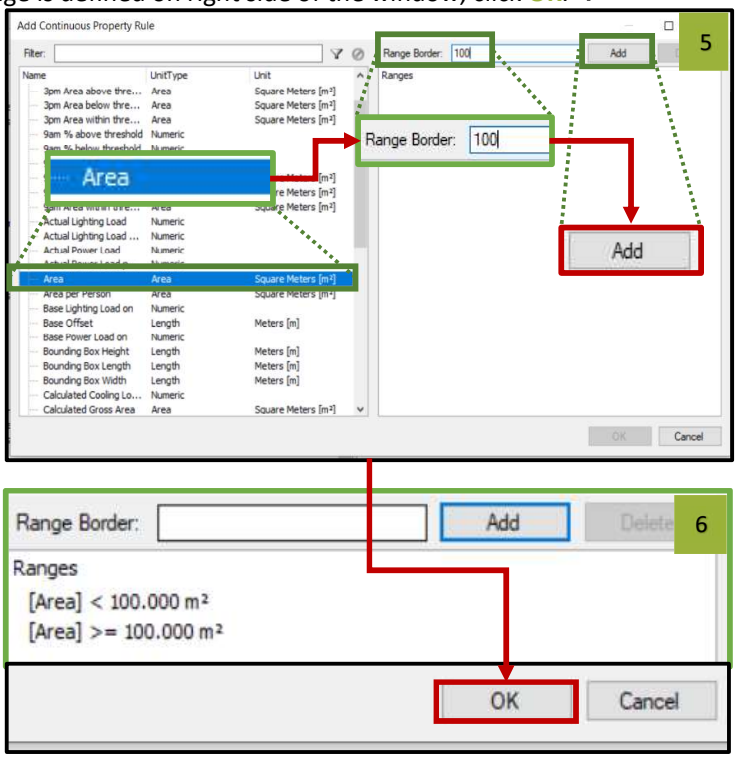
3. Set the Name of the quantity takeoff in the **Name** field, in this case we set the name **Rooms less and greater than 100m2**. → In the **Type** field, choose **Categories** and check **Spaces**. → Click on the **Use Selection** button. →



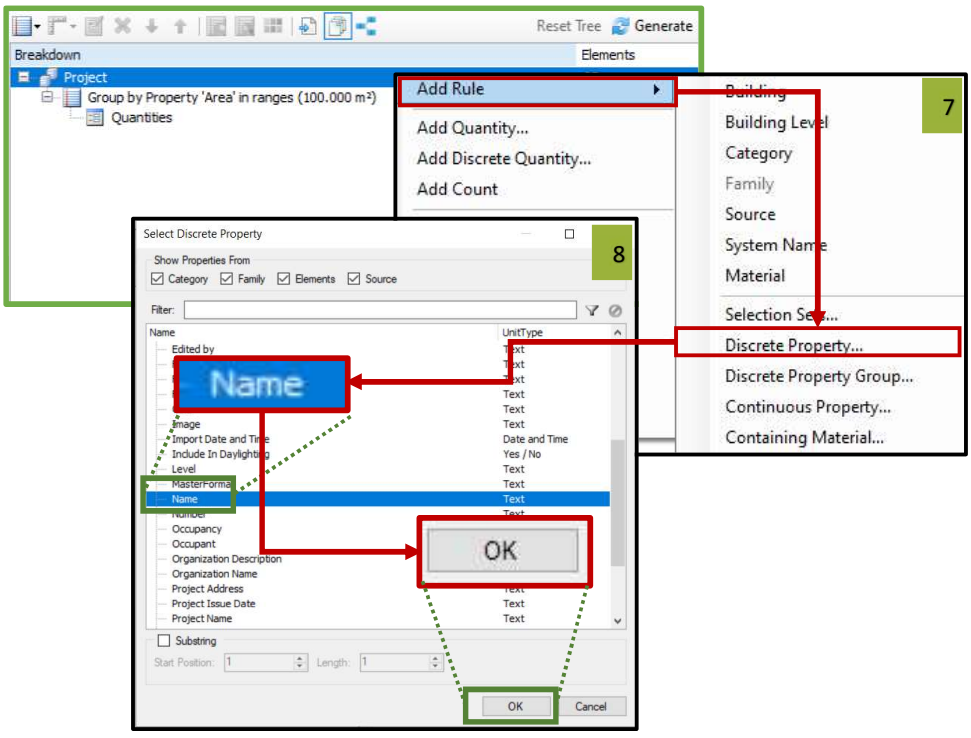
4. Define the first criteria for the quantity takeoff: → Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Continuous Property**. →



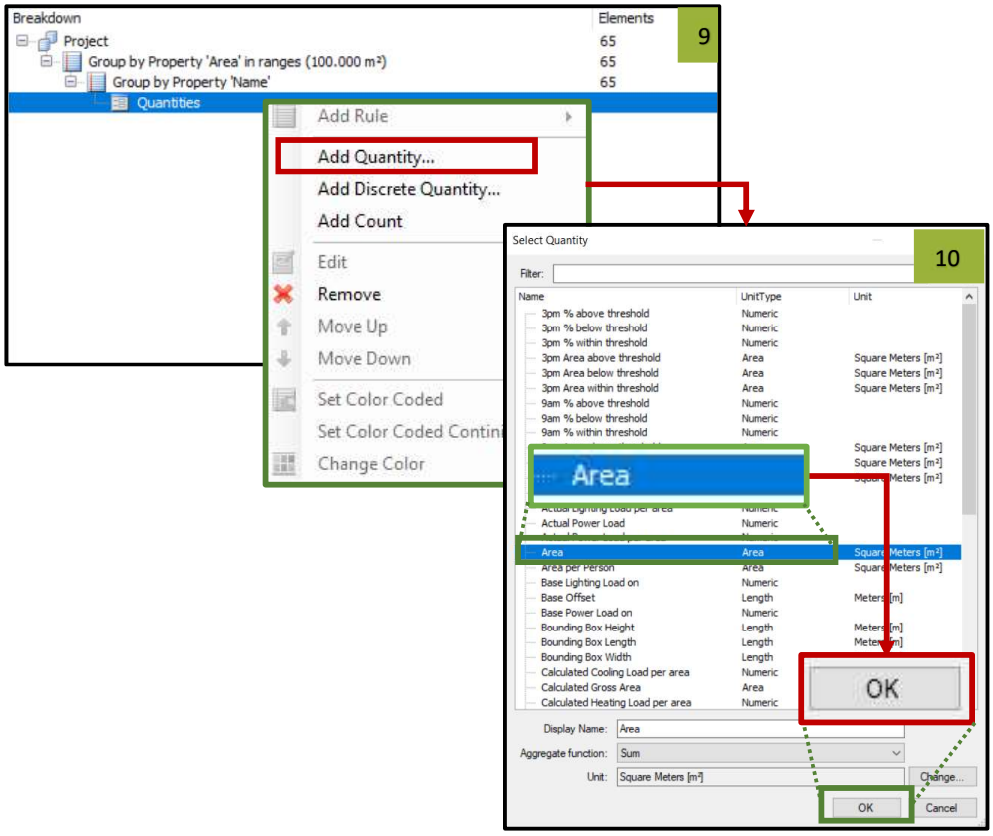
5. The Add Continuous Property Rule window opens. → From left side of Continuous Property List choose **Area**. → In field **Range Border** type **100**. → Click **Add**. →
6. When the Range is defined on right side of the window, click **OK**. →



7. Define the second criteria for the quantity takeoff. → Select added elements on right side of the window. → Right-click. → Add rule. → From drop-down list choose **Discrete Property**. →
8. From Discrete Property list choose **Name**. → Click **OK** button. →

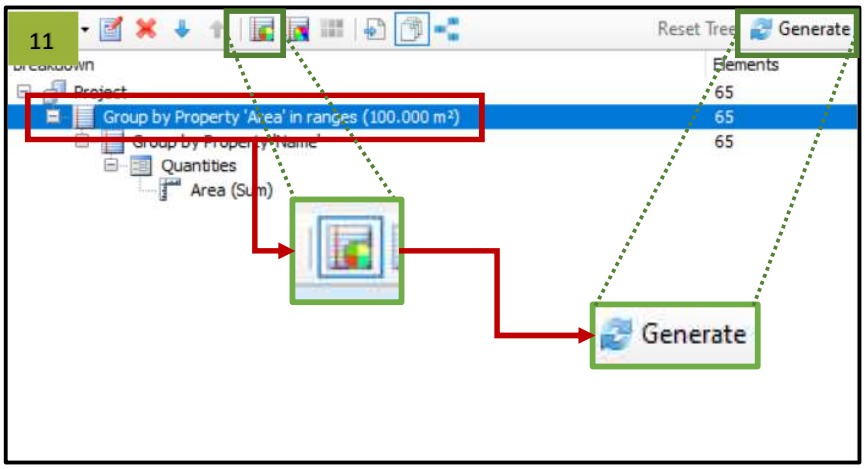


9. Select **Quantities**. → Right-click → Choose the **Add Count**. → Add another quantity. → Select **Quantities**. → Right-click → Choose the **Add Quantity** command. →
10. The **Select Quantity** window opens, select **Area**. → Click the **OK** button.

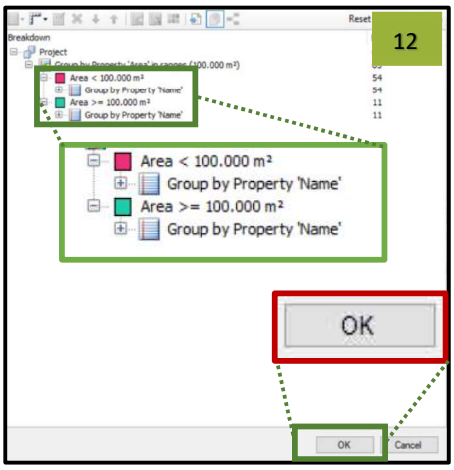


Set Color Coded Rule

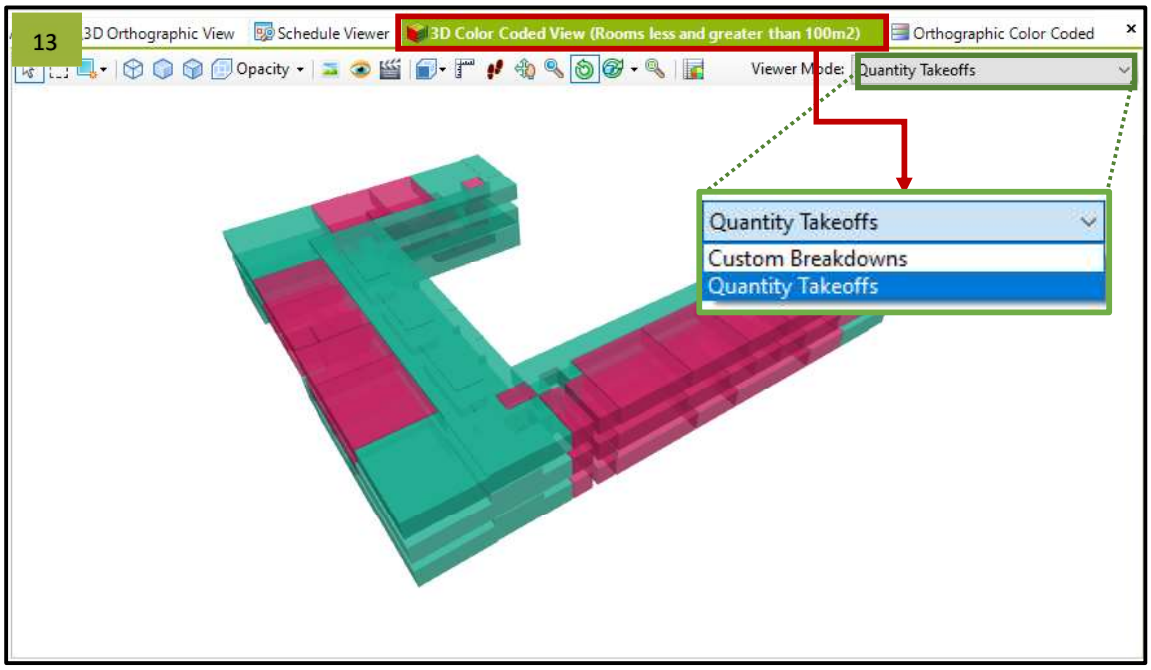
11. Select the condition on which we want to apply the Color Coded Rule command. In this case we can set the rule on the group of elements which has area greater and less then 100m2, so select it. → In the toolbar choose the **Set Color Coding Rule**. → Click **Generate**. →



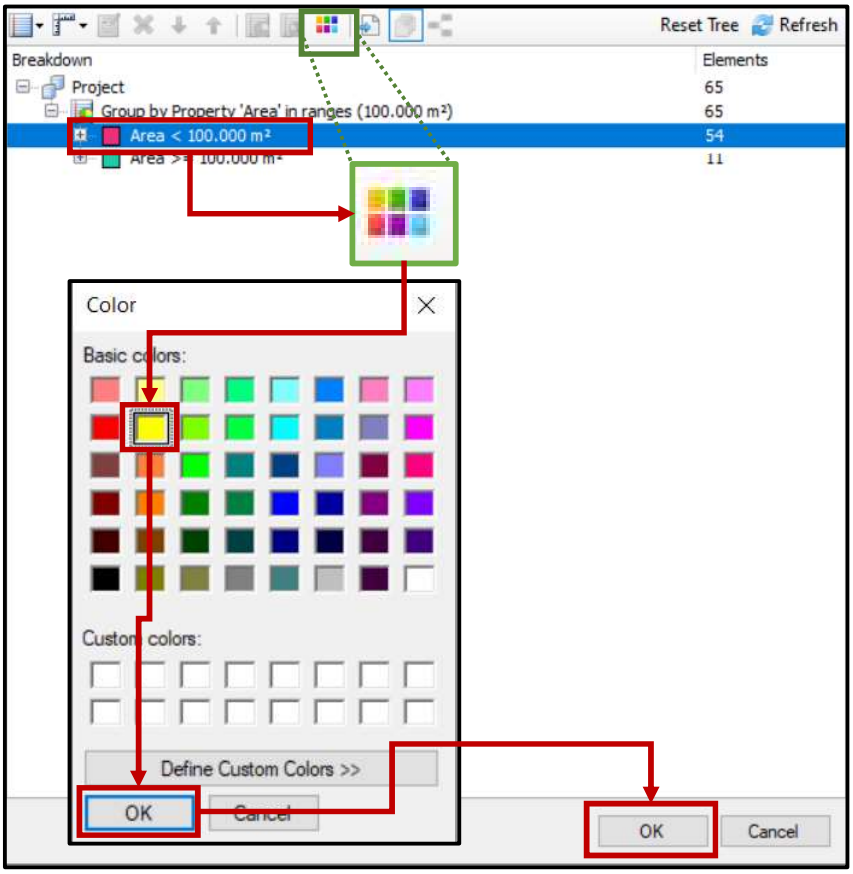
12. Finish process by clicking the **OK** button.



13. Activate **3D Color Coded View** tab, which we can find above the main Viewport window. → Select the **Quantity Takeoff** from **Viewer mode**, located in the right corner.



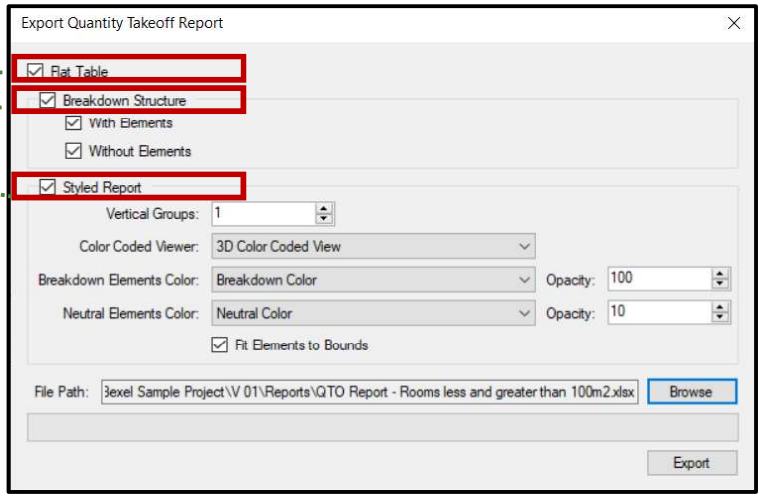
- If User wants to change generated color, in **Quantity Takeoff Editor** select position which should be changed. → Select **Choose color**. → Choose color from **palette**. → Finish process by clicking the **OK** button.



7.4. EXPORT QUANTITY TAKEOFF REPORTS

Created Quantity Takeoff can be automatically exported as report in XSLX file format. There are several options for exporting QTO Report contents:

- Flat Table
- Breakdown Structure
- Styled Report



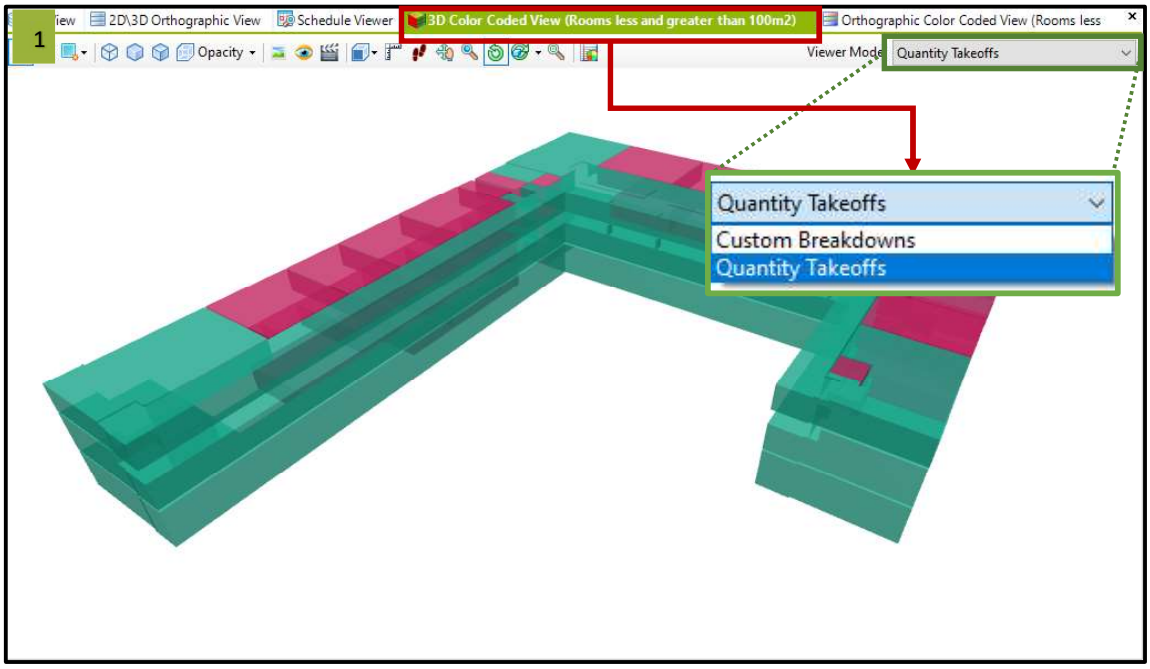
We can check/uncheck options we use for QTO reporting, which depends what we want to show in created Report.

Exported XLSX file Report can contain several sheets, such as:

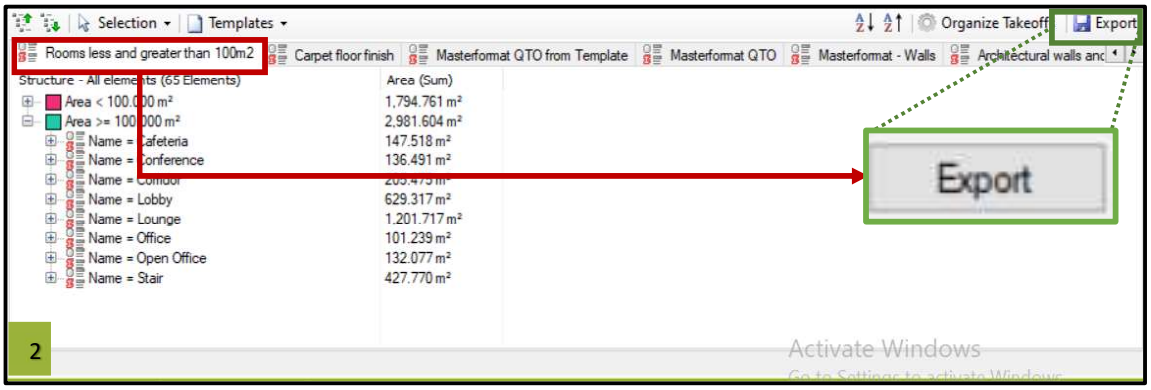
- **Flat_Table sheet**: a simple flat table with all items from Quantity Takeoff;
- **Breakdown_Structure sheet**: contains elements from Takeoff divided into different groups which we previously defined by Takeoff creation.
  - In **Export Quantity Takeoff Report** window, **Breakdown Structure** field contains additional two options: report with or without elements. By checking both options, two Breakdown structure sheets will be created. If there is no need for element IDs in Breakdown structure, uncheck option **With Elements**.
- **Styled_Report sheet**: contains report divided by breakdown groups on vertical level with automatically created pictures from viewport screen.
  - We are able to define presentation of breakdown elements and neutral elements in created report using options the **Breakdown** or **Selection** color for **Breakdown Elements Color**. Also, there are **Neutral**, **Invisible** or **Breakdown color** options for **Neutral Elements Color**.
  - Viewpoint for QTO report pictures should be set in **3D Color Coded View**, **View Mode: Quantity Takeoff**.
  - Disable option **Fit Elements to Bounds** if we want consistent viewpoint for created pictures.

We can create report for one Quantity Takeoff we have already created, **Rooms less and greater than 100m2**. We will create report which will have Flat Table, Breakdown Structure and Styled Report sheet.

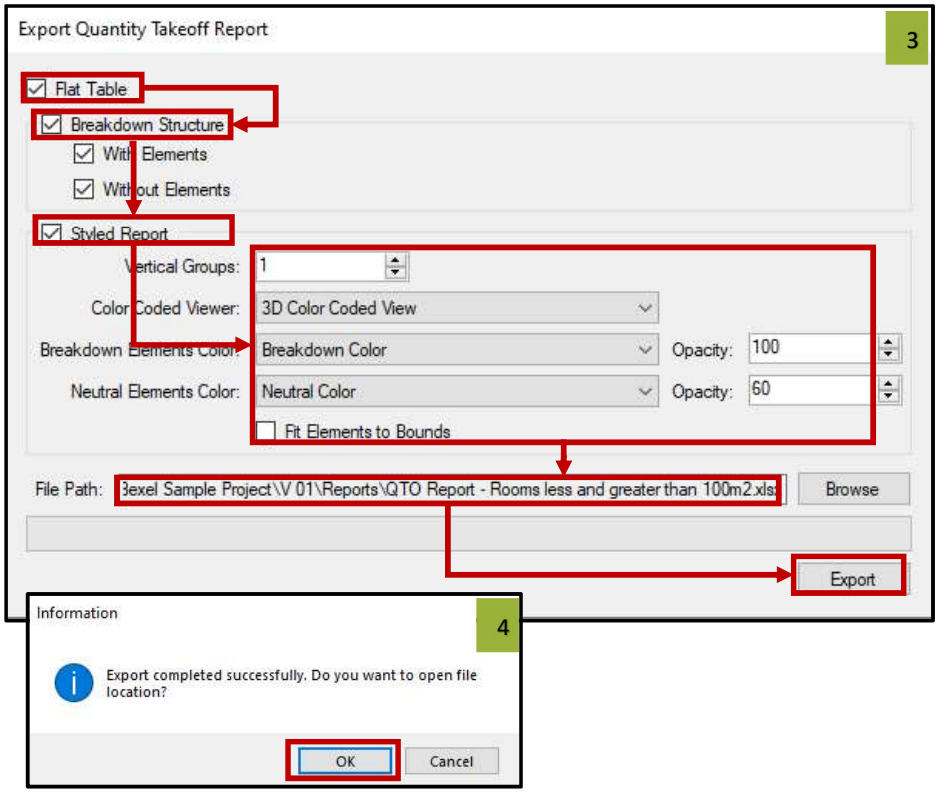
1. First, we should set Viewpoint for QTO report pictures because we want to create styled report. Activate **3D Color Coded View** tab, which user can find above the main Viewport window. → Select the **Quantity Takeoff** from **Viewer mode**, located in the right corner. Set the desired position of the object.



2. Set active the quantity takeoff we want to export, in this case we select the **Rooms less and greater than 100m2.** → Click on the **Export** button. →



3. The **Export Quantity Takeoff Report** window opens. → Define the appearance and content of the report. Check all options, the **Flat Table**, the **Breakdown Structure**, The **Styled Report**. → Set the **Vertical Groups** as 1. Set the **Color Coded Viewer** as the **3D Color Coded View**. For the **Breakdown Elements Color** use the **Breakdown Color** option, for the **Neutral Elements Color** we use **Neutral Color** option. Change the **Opacity** of neutral elements on 60. Uncheck the **Fit Elements to Bounds**. Define the storage location on local computer. → Click the **Export** button.
4. The **Information** window opens where we can choose if we want to open file location.



The Report is created now, the document **QTO Report - Rooms less and greater than 100m2.**
The same report we can download from Bexel User Area, **QTO Report - Rooms less and greater than 100m2.xlsx** file location is **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 7.0\Exchange**.

LESSON 08

BEXEL MANAGER

8. CREATING 4D AND 5D BIM MODELS IN BEXEL MANAGER ENVIRONMENT

Creating a 4D and a 5D BIM model can be done in Bexel Manager in various ways with the help of Schedule and Cost Editor for the creation of a classification optimal for your project. 4D/5D simulations could be done in several ways which include manual cost and schedule creation, cost and schedule import and linking to model elements, automatic cost and schedule creation as well as combination of these workflows. This document will cover in detail all functionalities of the software and all workflows available in software package. Training files and information are organized through chapters that cover different aspects of 4D/5D creation process.

For more detailed information about advanced integrated workflow which enables user to fully utilize advantages of smart cost and smart scheduling engine on various types of sample projects, user is able to try series of advanced training documents labeled "The Next Generation of Project Planning" available on **Bexel User Area** under **Materials** category, **Demo/Sample Projects**. These documents contain detailed instructions on integrated Open BIM workflow for creation of 4D/5D simulations through 5 general steps using only available information in BIM model elements using high level of automation. Documents are accompanied by free sample models and all needed training files. User is guided through series of training steps that lead to creation of fully integrated 5D BIM analyses at the end of the process.

8.1 CREATING, IMPORTING AND EDITING NEW COST CLASSIFICATION

In this chapter we will describe the process of creating a **Cost Classification** in various ways and linking it with elements of the BIM model. Training material below is organized in such manner to enable user to experience all functionalities of the software through practical training examples.

8.1.1 CREATING NEW COST CLASSIFICATION

Cost Classification in Bexel Manager could be created through four different workflows:

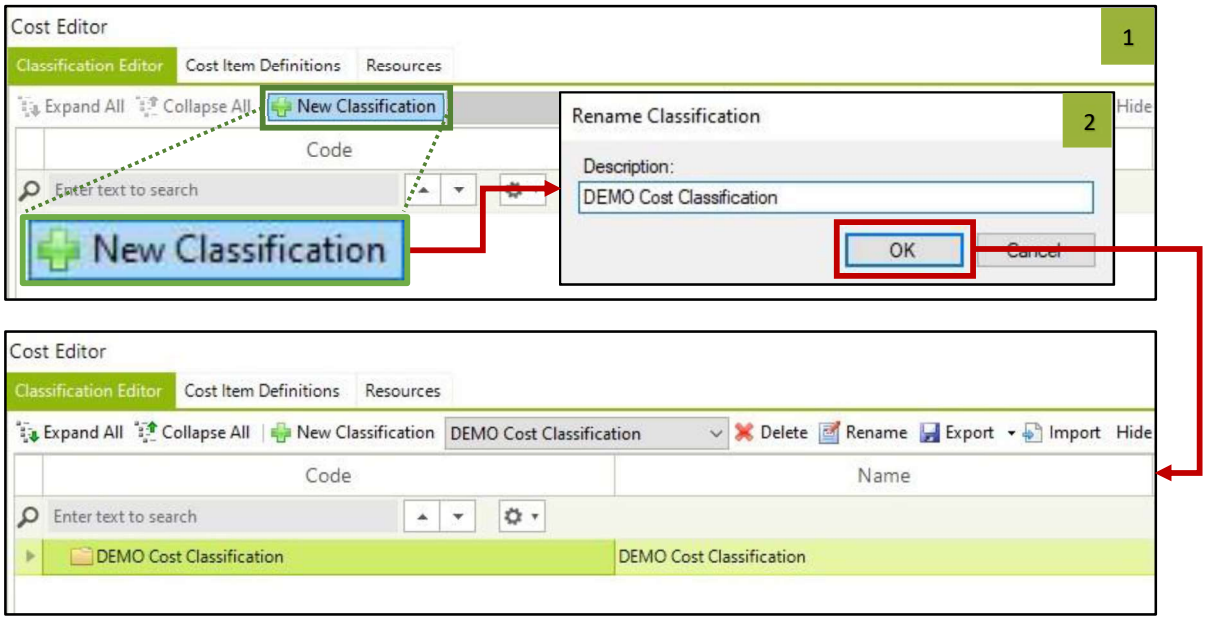
- **Workflow 01** - It could be created from scratch by creation of blank Cost Classification in Bexel Manager and manual creation of Classification and Cost Items
- **Workflow 02** - Cost Classification is created in Excel spreadsheet and imported into Bexel Manager. Classification and Cost items creation is manual in this case.
- **Workflow 03** - Cost Classification is created automatically based on previously defined QTO. In this case complete Cost Classification with all Classification and Cost Items is created and could be further adjusted.
- **Workflow 04** - Cost Classification is created automatically based on previously defined CBS. In this case complete Cost Classification with all Classification and Cost Items is created and could be further adjusted.

Different workflows could be used depending on available information, user preferences or typical needs of a project. Workflows 03 and 04 are considered as more advanced uses of software since they enable high level of automation of **Cost Classification** creation process but first two workflows allow for easier integration of existing Cost databases and coding standards.

Workflow 01_Creation of blank Cost Classification

User is able to create basic (blank) **Cost Classification** following these steps:

1. Go to **Cost Editor** tab and click **New Classification** button. →
2. Type name of new classification **DEMO Cost Classification** → Click **OK**. → Master Classification item named after created Cost Classification.



User has created blank **Cost Classification** that has to be enriched by manual creation of **Classification Items** and **Cost Items** in Bexel Manager software. Procedure for further development of **Cost Classification** will be explained in corresponding chapters.

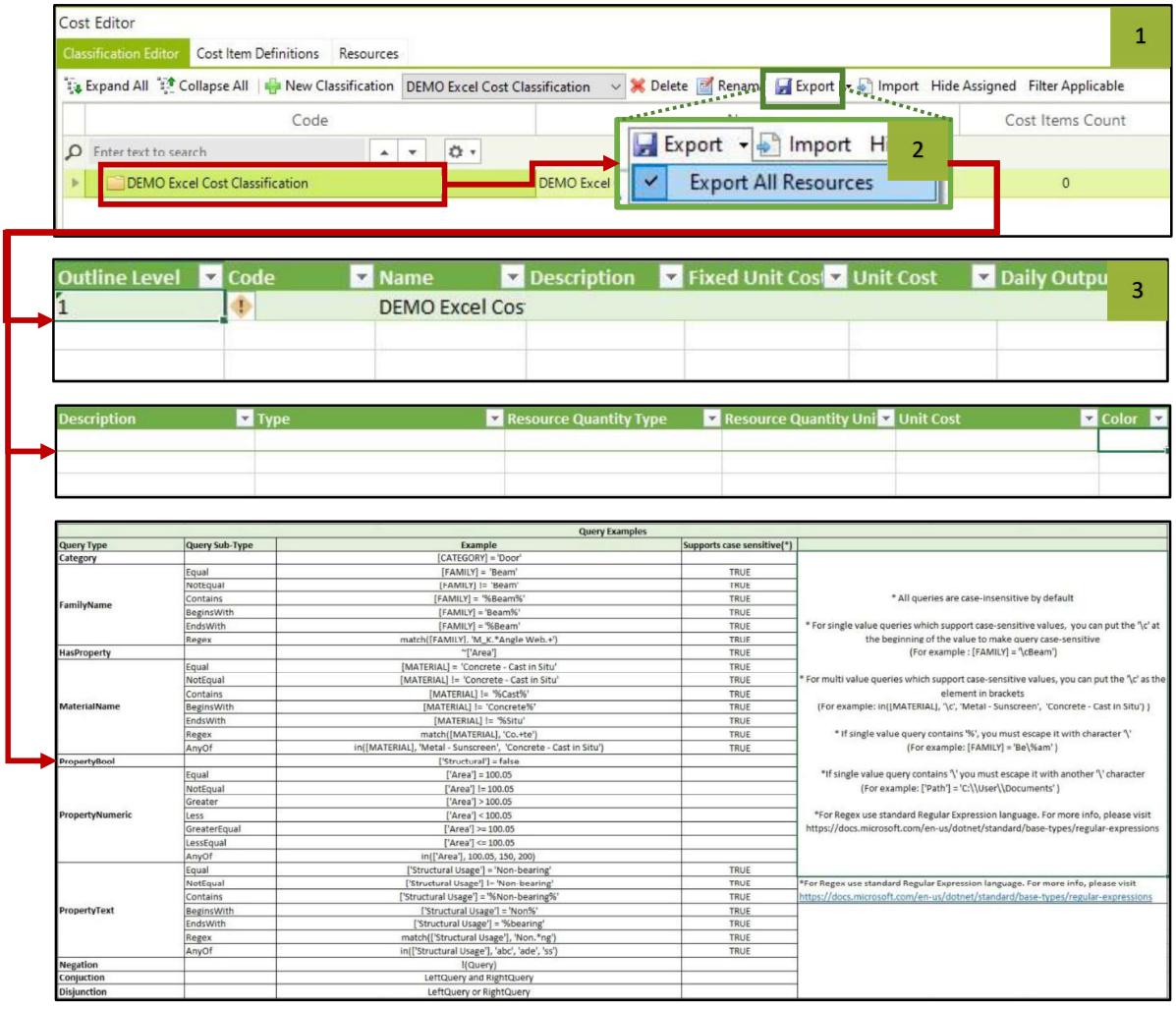
Workflow 02_Creation of blank Cost Classification in properly formatted Excel spreadsheet

The easiest way to establish appropriate cost structure in Excel that could be imported into Bexel Manager is to create blank Cost Classification in Bexel Manager and then export it to Excel. In this way user can get properly formatted Excel file that could be enriched with information and then imported back to software. To execute this workflow follow procedure explained below:

Workflow 02_Creation of blank Cost Classification in properly formatted Excel spreadsheet

The easiest way to establish appropriate cost structure in Excel that could be imported into Bexel Manager is to create blank Cost Classification in Bexel Manager and then export it to Excel. In this way user can get properly formatted Excel file that could be enriched with information and then imported back to software. To execute this workflow, follow procedure explained below:

1. Open **Cost Editor** tab. → Create (blank) **Cost Classification** following procedure explained in **Chapter 8.1.1 (Workflow 01)** and name it **DEMO Excel Cost Classification**. →
2. Export created blank **Cost Classification** following procedure explained in **Chapter 8.1.3 (Workflow 02)**
3. Open exported Excel file and analyze three containing sheets: **Classification** in which user will define **Classification Items** and **Cost Items**. → Sheet **Resources** in which user will define resources. → And sheet **Help** with detailed rules for proper Classification and Cost Item definition.

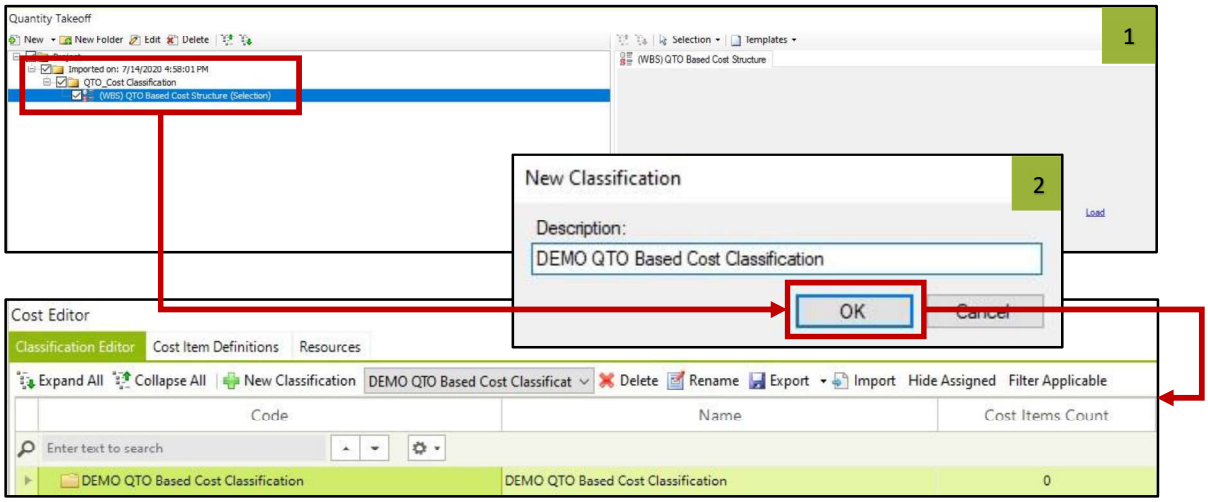


User has created blank **Cost Classification** that has to be enriched by manual creation of **Classification Items** and **Cost Items** in Excel. Procedure for further development of **Cost Classification** will be explained in corresponding chapters.

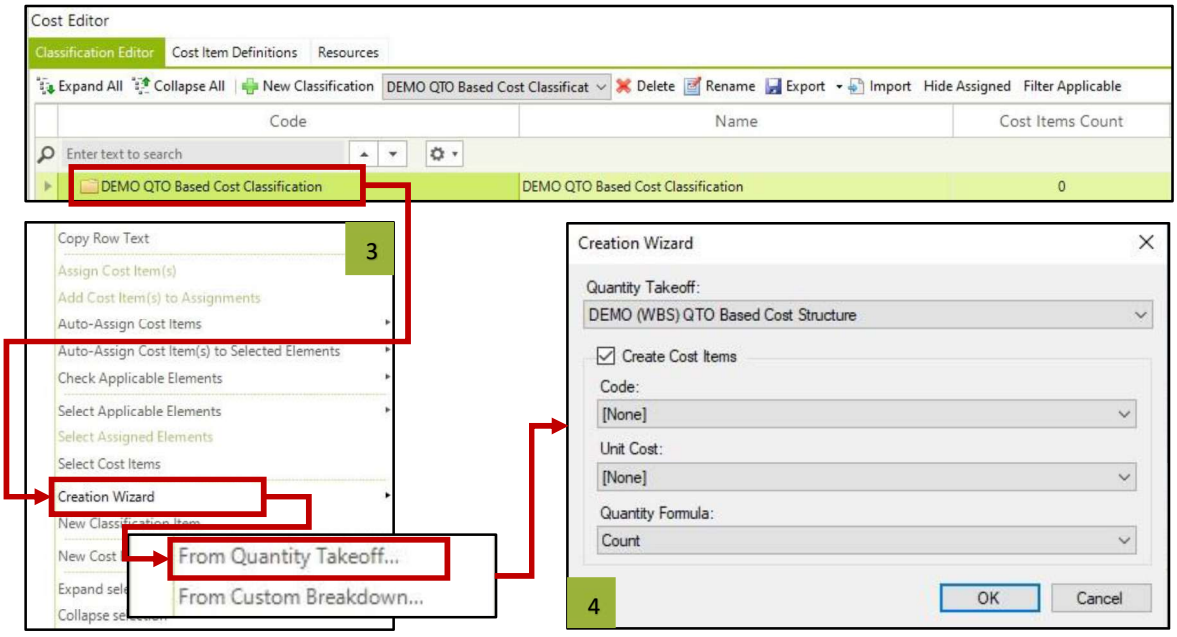
Workflow 03_Creation of Cost Classification based on predefined QTO (Creation Wizard)

Unique feature of Bexel Manager is Smart Cost engine (Creation Wizard) which allows user to create complete **Cost Classification** based on set of project organization rules defined within **QTO (Quantity Takeoff)** or **CBS (Custom Breakdown Structure)**. This could be exercised following this sequence (for **QTO** example):

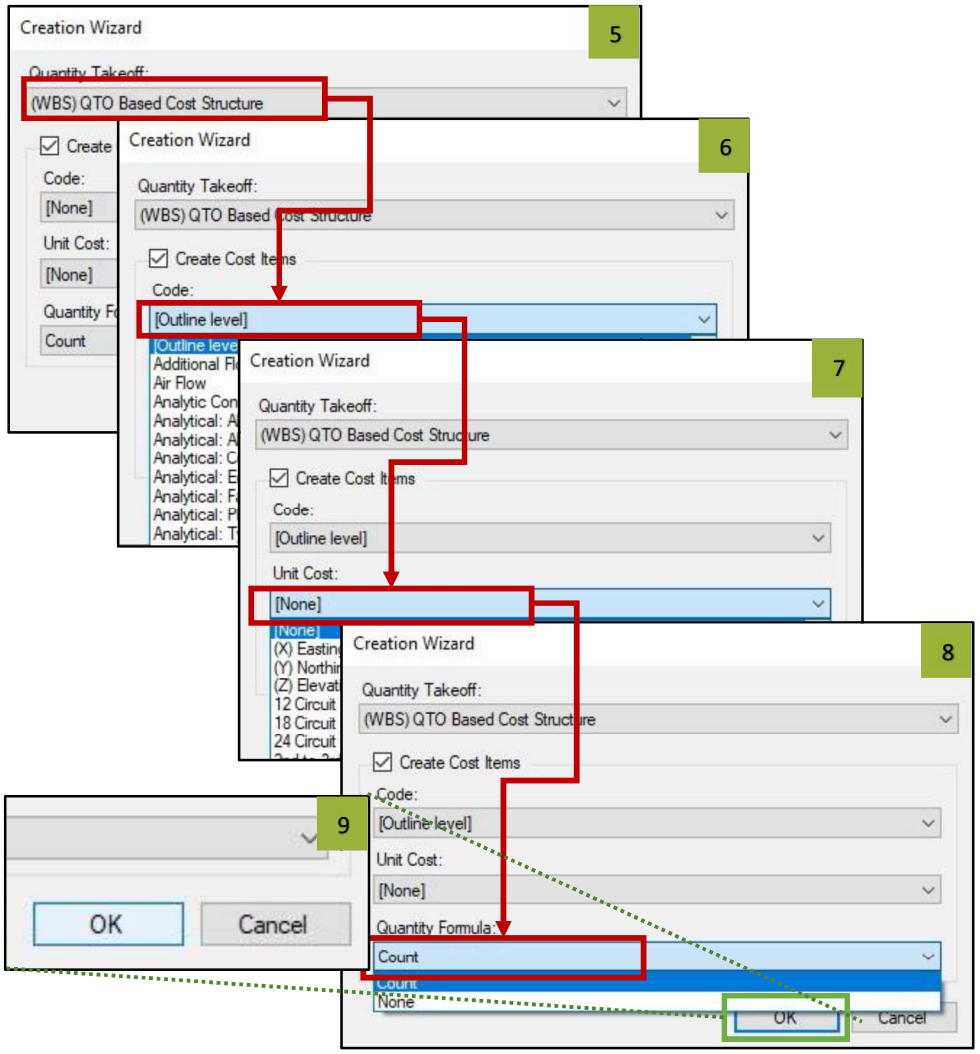
1. First import predefined **QTO** file with accompanying selection sets contained in exchange folder of **Chapter 8.1.1** named **(WBS) QTO Based Cost Structure.bxf** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.1)** →
2. Open **Cost Editor** tab. → Create (blank) **Cost Classification** following procedure explained in **Chapter 8.1.1 (Workflow 01)** and name it **DEMO QTO Based Cost Classification**. →



3. Select blank **Classification item** of newly created classification → **Right-click** on it and chose **Creation Wizard** command. →
4. Select option **From Quantity Takeoff.** → **Creation Wizard** window will open.



5. Within **Creation Wizard** user defines which QTO will serve as a basis for new classification. In our sample select QTO named **(WBS) QTO Based Cost Structure** which was imported in first step. →
6. Then in a field **Code** user defines which property software will read as Cost Item Code. If there is no any codification specified within BIM model elements, like in our sample case, user should choose **Outline level** which will automatically number Cost Items according to hirerarchy within **QTO** used for **Cost Classification** creation. →
7. Field **Unit Cost** allows user to automatically link price section of cost classification with element parameter price if this parameter is defined in BIM model, otherwise it could be defined later within **Cost Item definition** so for now just leave it as **None**. →
8. And finally, user defines **Quantity formula** for Cost Items which could be any of Quantity/Count formulas added during **WBS QTO** creation, in this case the most practical is **Count** as it covers the most future Cost Items quantity calculation formulas. →
9. Complete Cost classification creation process by checking **Create Cost Items** field and clicking **OK**.

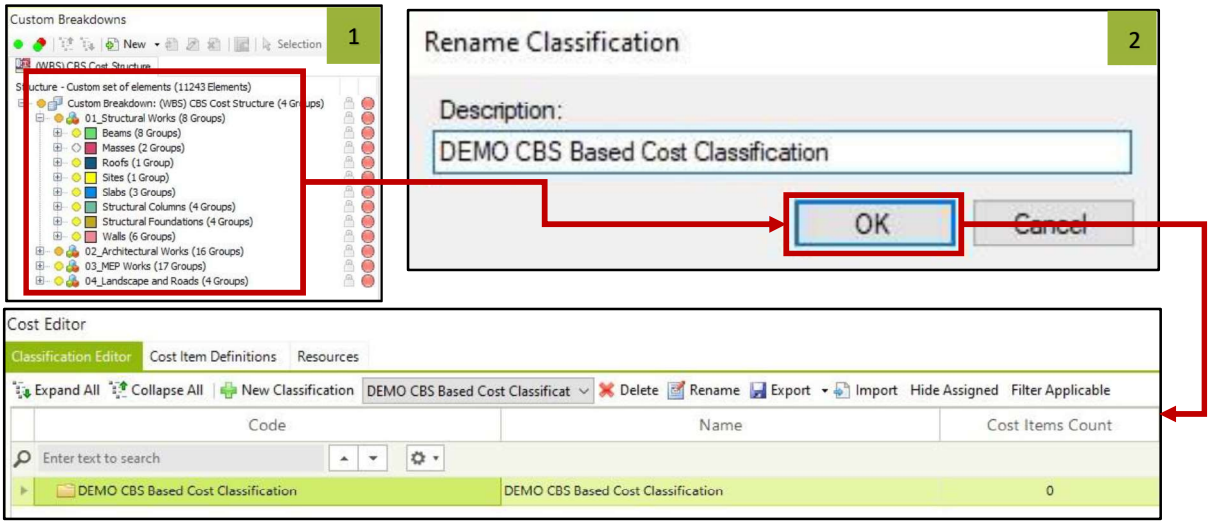


At the end of the process, there is a basic **Cost classification** structure defined, with **Classification Items** and **Cost Items** created based on information from **QTO** imported in first step.

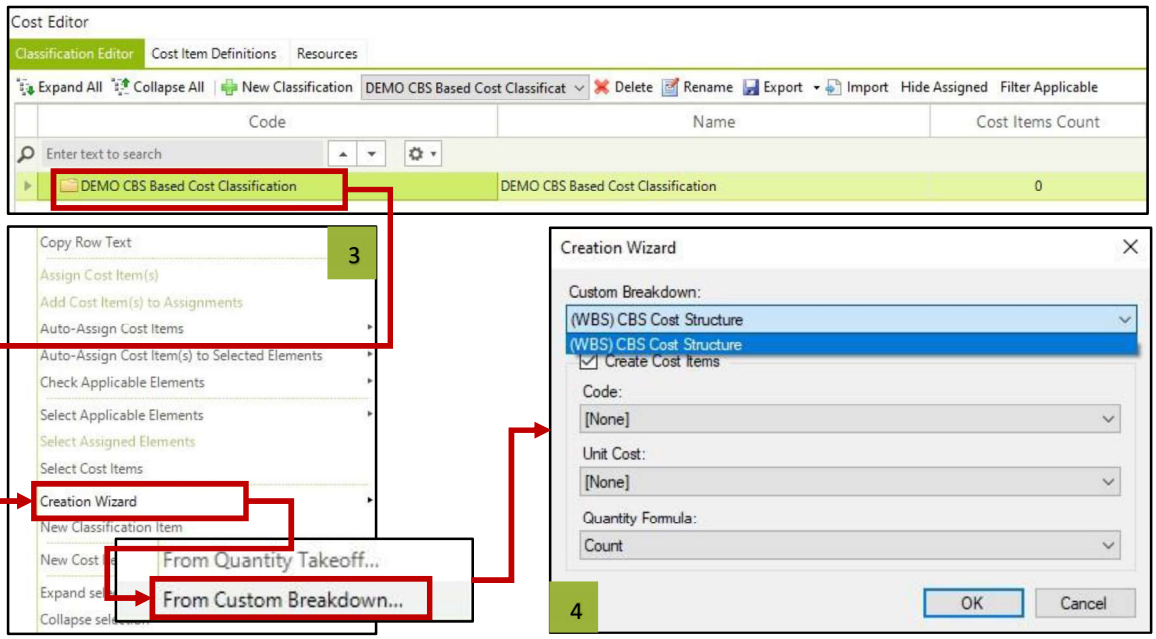
Workflow 04_Creation of Cost Classification based on predefined CBS (Creation Wizard)

Creation of Cost Classification based on predefined CBS could be exercised following this sequence:

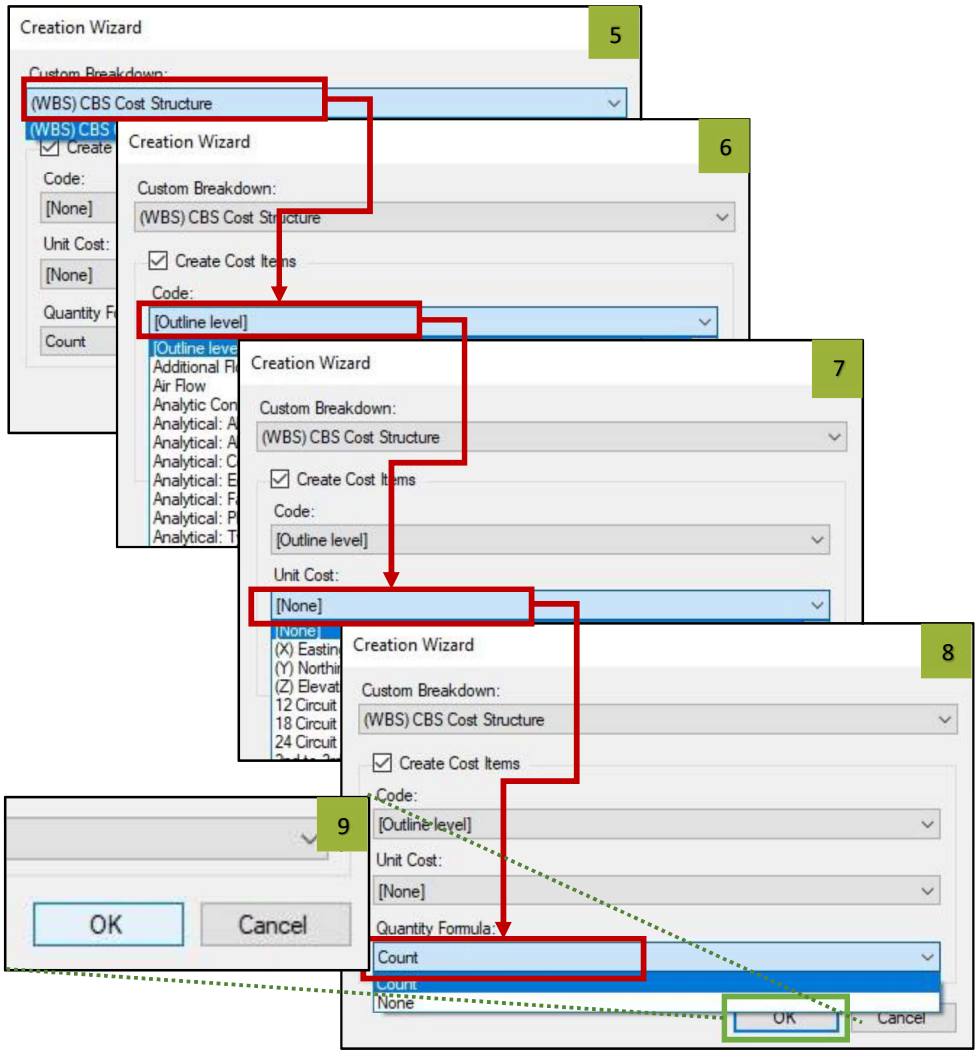
1. First import predefined CBS file with accompanying selection sets contained in exchange folder of **Chapter 8.1.1** named **(WBS) CBS Cost Structure.bxf** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.1)** →
2. Open **Cost Editor** tab. → Create (blank) **Cost Classification** following procedure explained in **Chapter 8.1.1 (Workflow 01)** and name it **DEMO CBS Based Cost Classification**. →



3. Select blank **Classification item** of newly created classification → **Right-click** on it and chose **Creation Wizard** command. →
4. Select option **From Custom Breakdown.** → **Creation Wizard** window will open.



5. Within **Creation Wizard** user defines which CBS will serve as a basis for new classification. In our sample select QTO named **(WBS) CBS Based Cost Structure** which was imported in first step. →
6. Then in a field **Code** user defines which property software will read as Cost Item Code. If there is no any codification specified within BIM model elements, like in our sample case, user should choose **Outline level** which will automatically number Cost Items according to hirerarchy within **CBS** used for **Cost Classification** creation. →
7. Field **Unit Cost** allows user to automatically link price section of cost classification with element parameter price if this parameter is defined in BIM model, otherwise it could be defined later within **Cost Item definition** so for now just leave it as **None**. →
8. And finally, user defines **Quantity formula** for Cost Items which in case of CBS could be only **Count** as CBS does not have any other Quantity formula defined within it. →
9. Complete Cost classification creation process by checking **Create Cost Items** field and clicking **OK**.

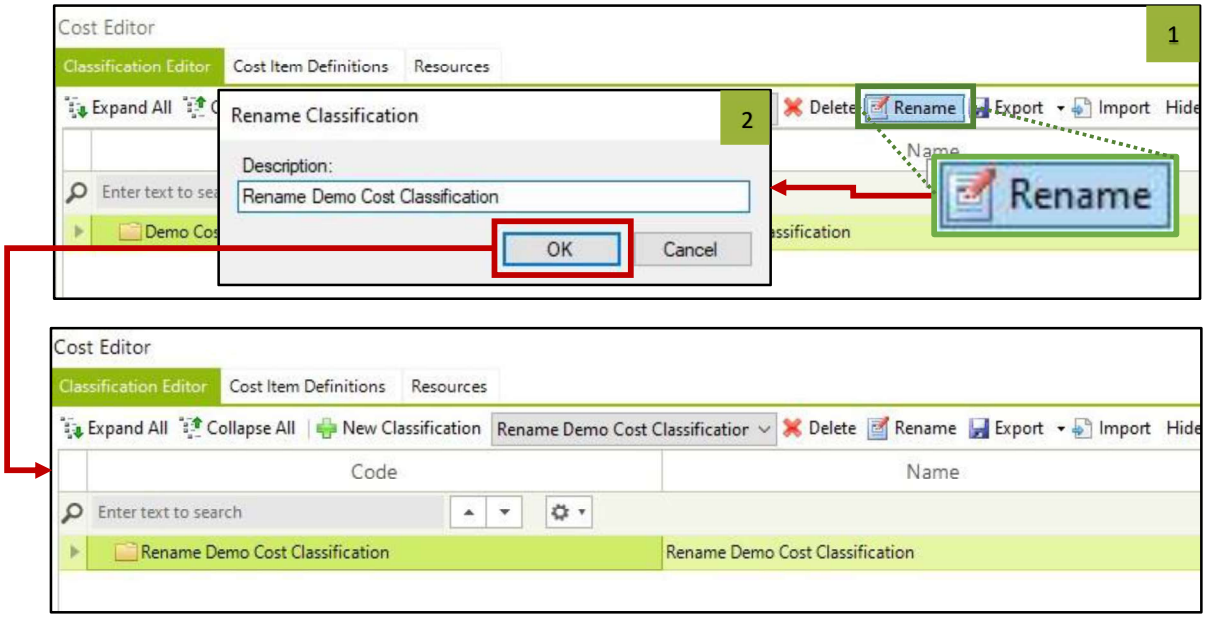


At the end of the process, there is a basic **Cost Classification** structure defined, with **Classification Items** and **Cost Items** created based on information from **CBS** imported in first step.

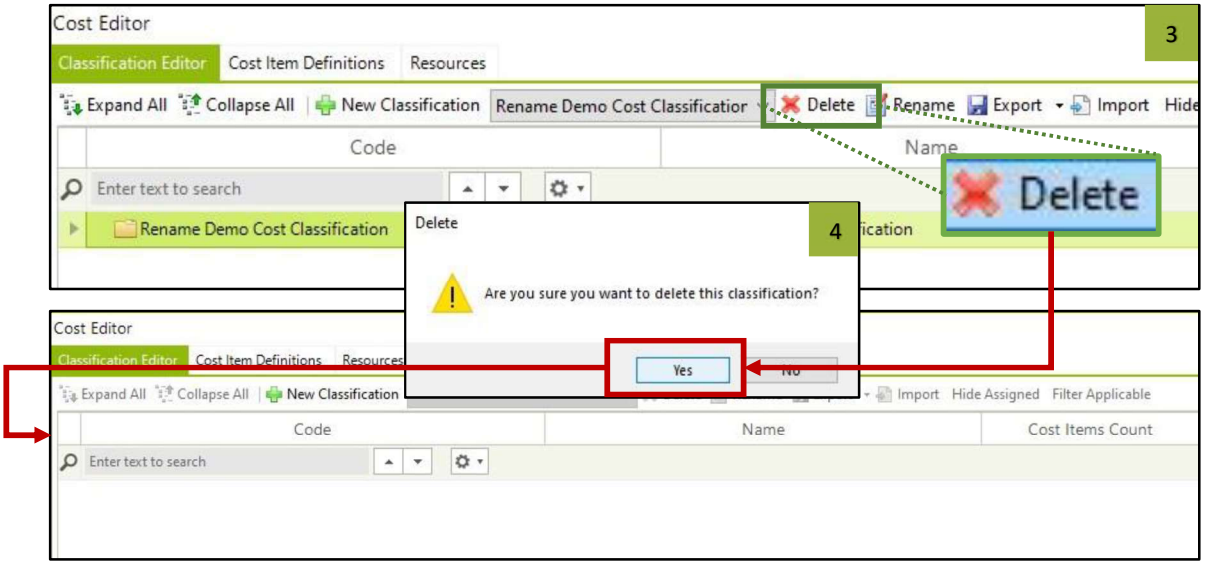
8.1.2. RENAMING AND DELETING COST CLASSIFICATION

User is able to create basic (blank) **Cost Classification** following these steps:

1. In **Cost Editor** tab, click **Rename** button. → **Rename Classification** window opens. →
2. Change name of created Cost Classification and click **OK** to complete action.



3. To delete **Cost Classification,** go to **Cost Editor** tab, click **Delete** button. →
4. **Delete** notification window opens. → Click **Yes** to confirm and complete action.



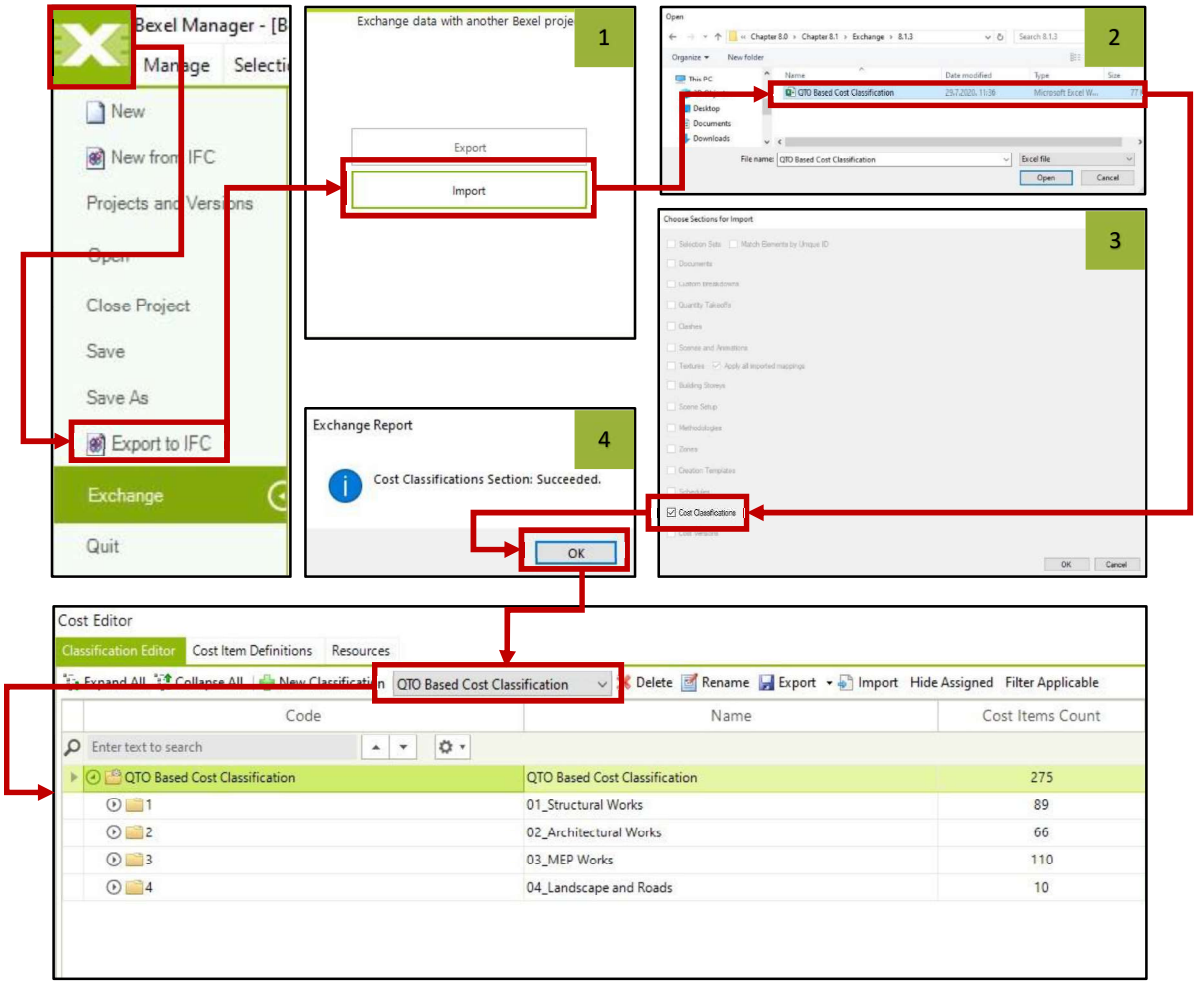
8.1.3. COST CLASSIFICATION IMPORT AND EXPORT

Besides creating **Cost Classification** in Bexel Manager, software allows for import and export of Classification. It could be done in two main workflows explained below:

Workflow 01_Bexel Manager Exchange (Import and Export)

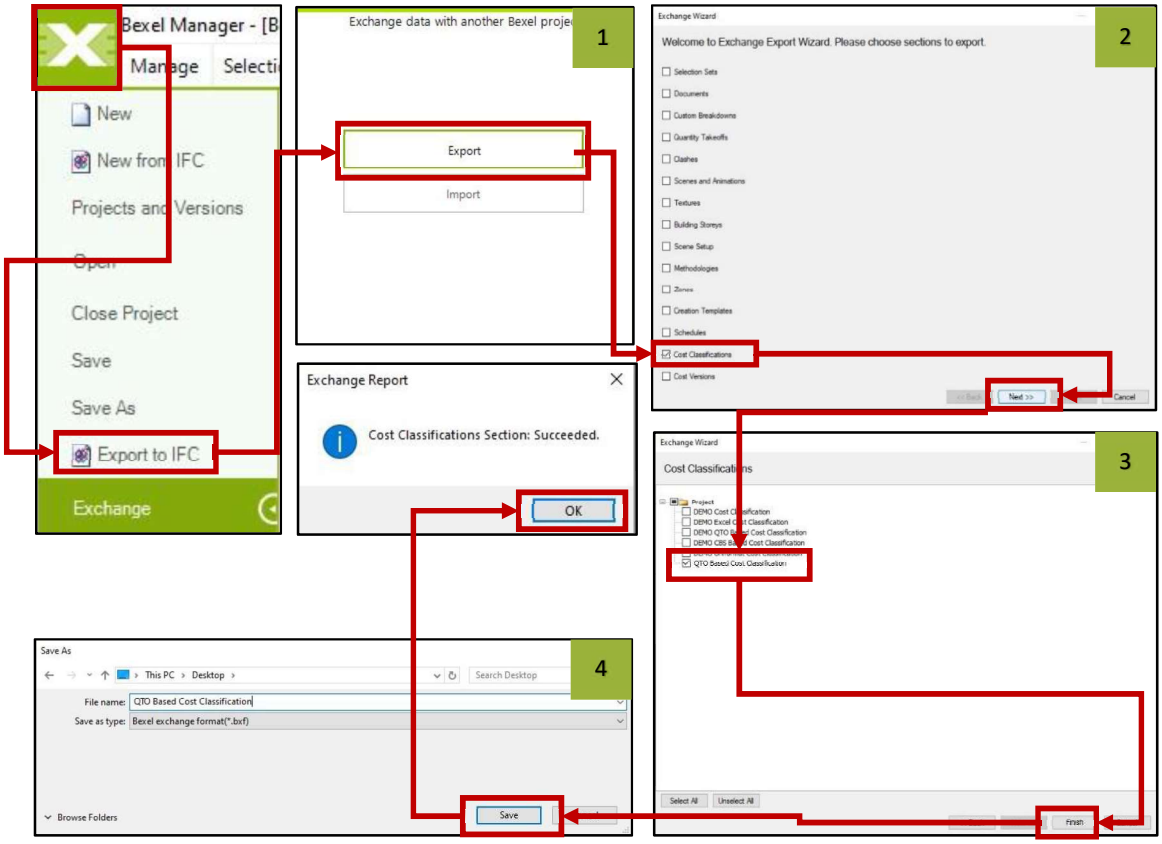
For Import user has to navigate to training materials exchange folder **8.1.3.** and find file named **QTO Based Cost Classification.bxf.** Follow steps below to import it to training model:

1. Click **Bexel Manager** icon. → Click **Exchange**. → Select the **Import** option. →
2. Navigate to folder **8.1.3.** of training materials in **Lessons**. **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.3)** → Select file **QTO Based Cost Classification.bxf** → Click **Open**. →
3. Check **Cost Classifications** checkbox in Import sections window. → Click **OK** to complete action. →
4. Click **OK** to Exchange Report window. → Now user can explore imported **Cost Classification** within Cost Editor by simple setting imported Cost Classification named **QTO Based Cost Classification** active in drop-down menu in **Cost Editor** window.



Exporting **Cost Classification** via Bexel exchange is simple following these steps:

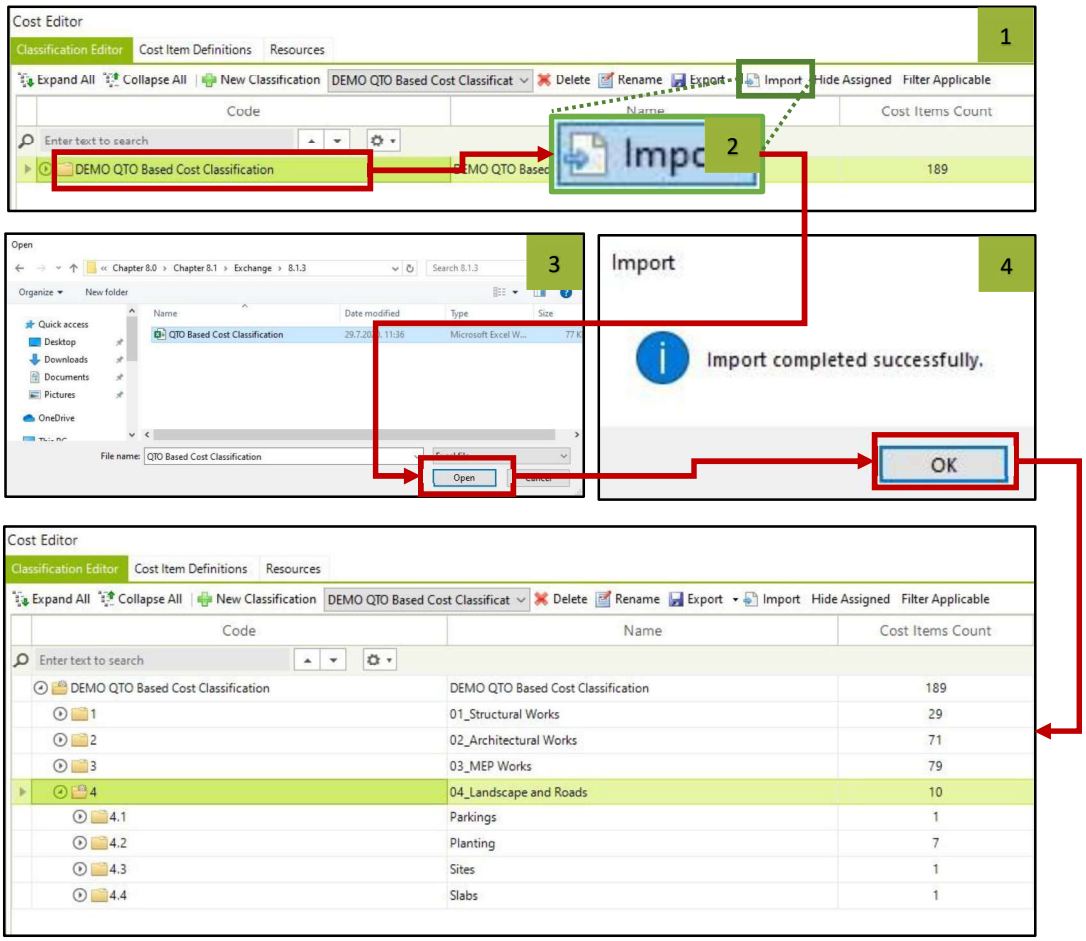
1. Click **Bexel Manager** icon. → Click **Exchange**. → Select the **Export** option. →
2. **Exchange Wizard** window will open. → Check **Cost Classification** checkbox. → Click **Next**. →
3. Select **Cost Classification** that should be exported (in this case it is previously imported **QTO Based Cost Classification**). → Click **Finish** to complete action. →
4. Choose location and define name of exported file **QTO Based Cost Classification Export**. → Click **Save**. → Click **OK** to **Exchange Report** window.



Workflow 02_Import and Export Cost Classification in Excel format

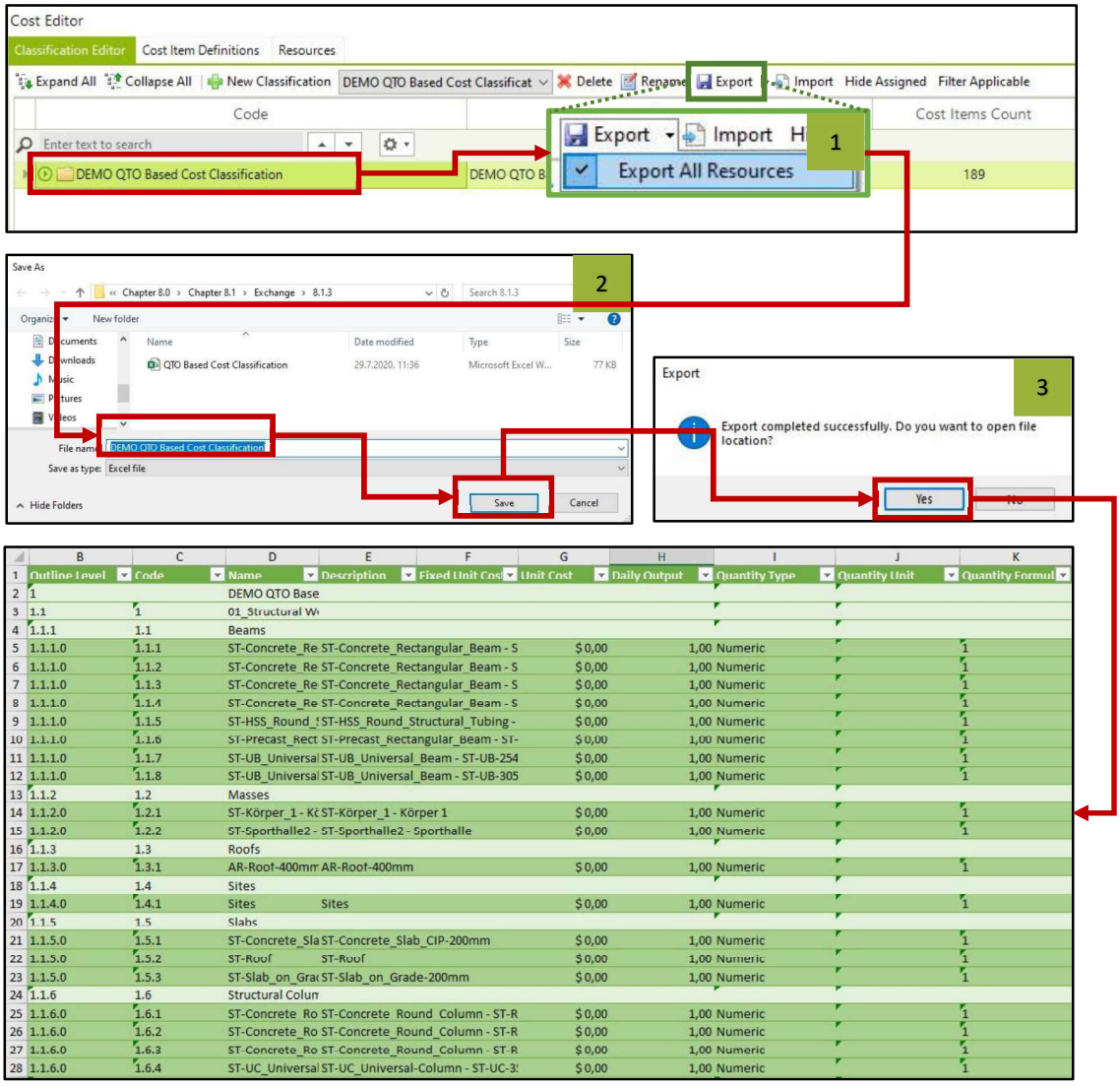
For this workflow import user has to navigate to training materials exchange folder **8.1.3.** and find file named **QTO Based Cost Classification.xml.** Follow steps below to import it to training model:

1. Open **Cost Editor** tab. → Create (blank) **Cost Classification** following procedure explained in **Chapter 8.1.1 (workflow 01)** and name it **DEMO QTO Based Cost Classification**. →
2. On the command line within Cost Editor tab click **Import** button. → **Open** window will pop-out. →
3. Navigate to folder **8.1.3.** of training materials in **Exchange Files**. **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.3)** → Select file **Uniformat Cost Classification.xml** → Click **Open**. →
4. Click **OK** on import report notification to complete action. → Now user is able to analyze and modify imported **Cost Classification**.



Export is similar to previously described action:

1. Within **Cost Editor** tab, set Cost Classification that has to be exported as active. → On the command line within **Cost Editor** tab click **Export** button. →
2. **Save As** window will pop-out. → Define location in which Excel file will be saved and define name of the file **DEMO QTO Based Cost Classification**. → Click **Save**. →
3. Click **Yes** on export report notification to complete action. → Location folder will open.



	B	C	D	E	F	G	H	I	J	K
1	Outline Level	Code	Name	Description	Fixed Unit Cost	Unit Cost	Daily Output	Quantity Type	Quantity Unit	Quantity Formul
2	1		DEMO QTO Base							
3	1.1	1	01_Structural W							
4	1.1.1	1.1	Beams							
5	1.1.1.0	1.1.1	ST-Concrete_Re	ST-Concrete_Rectangular_Beam - S		$0,00	1,00	Numeric		1
6	1.1.1.0	1.1.2	ST-Concrete_Re	ST-Concrete_Rectangular_Beam - S		$0,00	1,00	Numeric		1
7	1.1.1.0	1.1.3	ST-Concrete_Re	ST-Concrete_Rectangular_Beam - S		$0,00	1,00	Numeric		1
8	1.1.1.0	1.1.4	ST-Concrete_Re	ST-Concrete_Rectangular_Beam - S		$0,00	1,00	Numeric		1
9	1.1.1.0	1.1.5	ST-HSS_Round_S	ST-HSS_Round_Structural_Tubing -		$0,00	1,00	Numeric		1
10	1.1.1.0	1.1.6	ST-Precast_Rect	ST-Precast_Rectangular_Beam - ST-		$0,00	1,00	Numeric		1
11	1.1.1.0	1.1.7	ST-UB_Universal	ST-UB_Universal_Beam - ST-UB-254		$0,00	1,00	Numeric		1
12	1.1.1.0	1.1.8	ST-UB_Universal	ST-UB_Universal_Beam - ST-UB-305		$0,00	1,00	Numeric		1
13	1.1.2	1.2	Masses							
14	1.1.2.0	1.2.1	ST-Körper_1 - Kö	ST-Körper_1 - Körper 1		$0,00	1,00	Numeric		1
15	1.1.2.0	1.2.2	ST-Sporthalle2 -	ST-Sporthalle2 - Sporthalle		$0,00	1,00	Numeric		1
16	1.1.3	1.3	Roofs							
17	1.1.3.0	1.3.1	AR-Roof-400mm	AR-Roof-400mm		$0,00	1,00	Numeric		1
18	1.1.4	1.4	Sites							
19	1.1.4.0	1.4.1	Sites	Sites		$0,00	1,00	Numeric		1
20	1.1.5	1.5	Slabs							
21	1.1.5.0	1.5.1	ST-Concrete_Sla	ST-Concrete_Slab_CIP-200mm		$0,00	1,00	Numeric		1
22	1.1.5.0	1.5.2	ST-Roof	ST-Roof		$0,00	1,00	Numeric		1
23	1.1.5.0	1.5.3	ST-Slab_on_Grad	ST-Slab_on_Grade-200mm		$0,00	1,00	Numeric		1
24	1.1.6	1.6	Structural Colun							
25	1.1.6.0	1.6.1	ST-Concrete_Ro	ST-Concrete_Round_Column - ST-R		$0,00	1,00	Numeric		1
26	1.1.6.0	1.6.2	ST-Concrete_Ro	ST-Concrete_Round_Column - ST-R		$0,00	1,00	Numeric		1
27	1.1.6.0	1.6.3	ST-Concrete_Ro	ST-Concrete_Round_Column - ST-R		$0,00	1,00	Numeric		1
28	1.1.6.0	1.6.4	ST-UC_Universal	ST-UC_Universal-Column - ST-UC-3		$0,00	1,00	Numeric		1

8.1.4. CLASSIFICATION ITEM CREATION

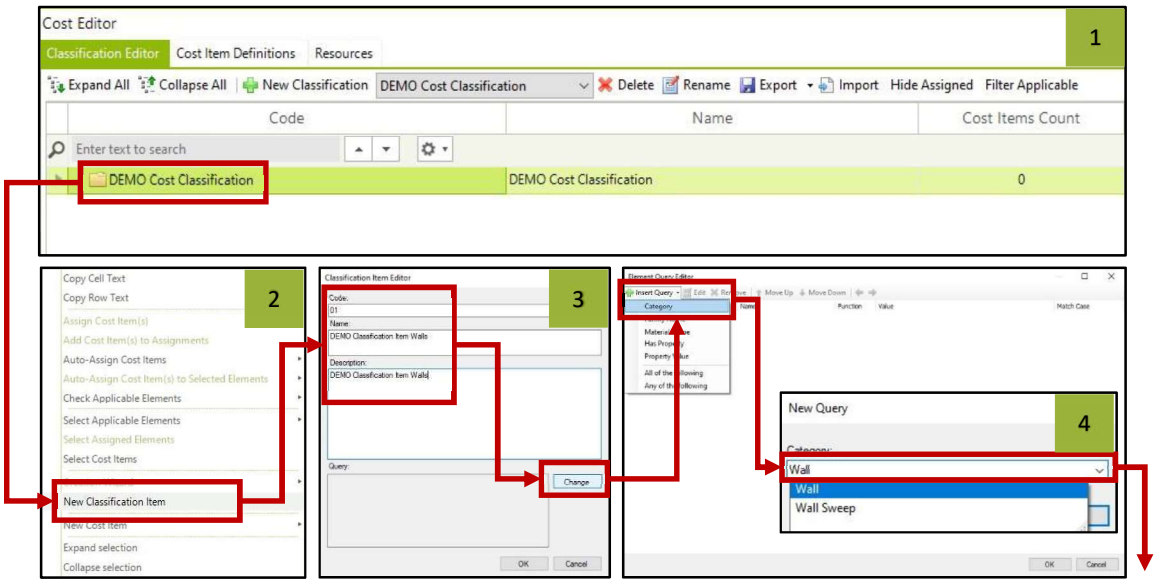
Classification Item could be created in two ways, directly in Bexel Manager interface as well as within Excel spreadsheet and then imported back to Bexel Manager.

Workflow 01_Classification Item creation in Bexel Manager

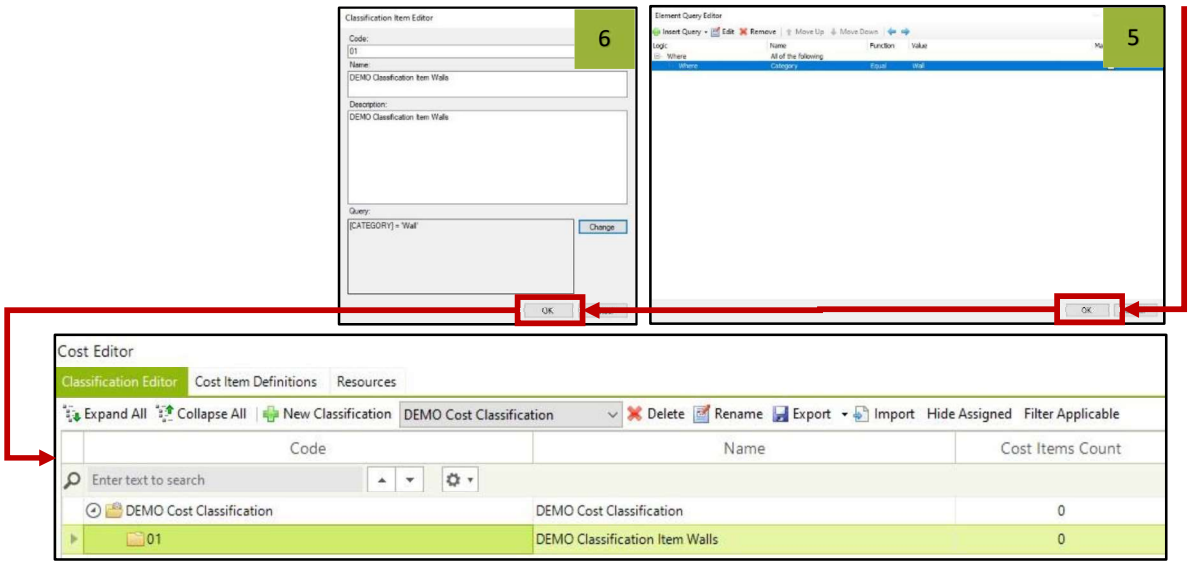
In this training example we will create Classification Item that "filters" only elements with category parameter **Wall**. To create new **Classification Item** in Bexel Manager, follow these steps:

Open **Cost Editor** tab. → Create (blank) **Cost Classification** following procedure explained in **Chapter 8.1.1 (Workflow 01)** and name it **DEMO Cost Classification**.

1. Right-click Master parent of newly created Cost Classification. →
2. Select **New Classification Item** command. → **Classification Item Editor** Window opens. →
3. In **Classification Item Editor** Window define **Code: 01**, define **Name: DEMO Classification Item Walls**, for **Description:** field just repeat definition for name. → Next to **Query:** field, click button **Change** → **Element Query Editor** will open. →
4. Click **Insert Query** command, select **Category** and type **wall** and select when it appears in drop-down menu. → Click **OK** to complete action. →



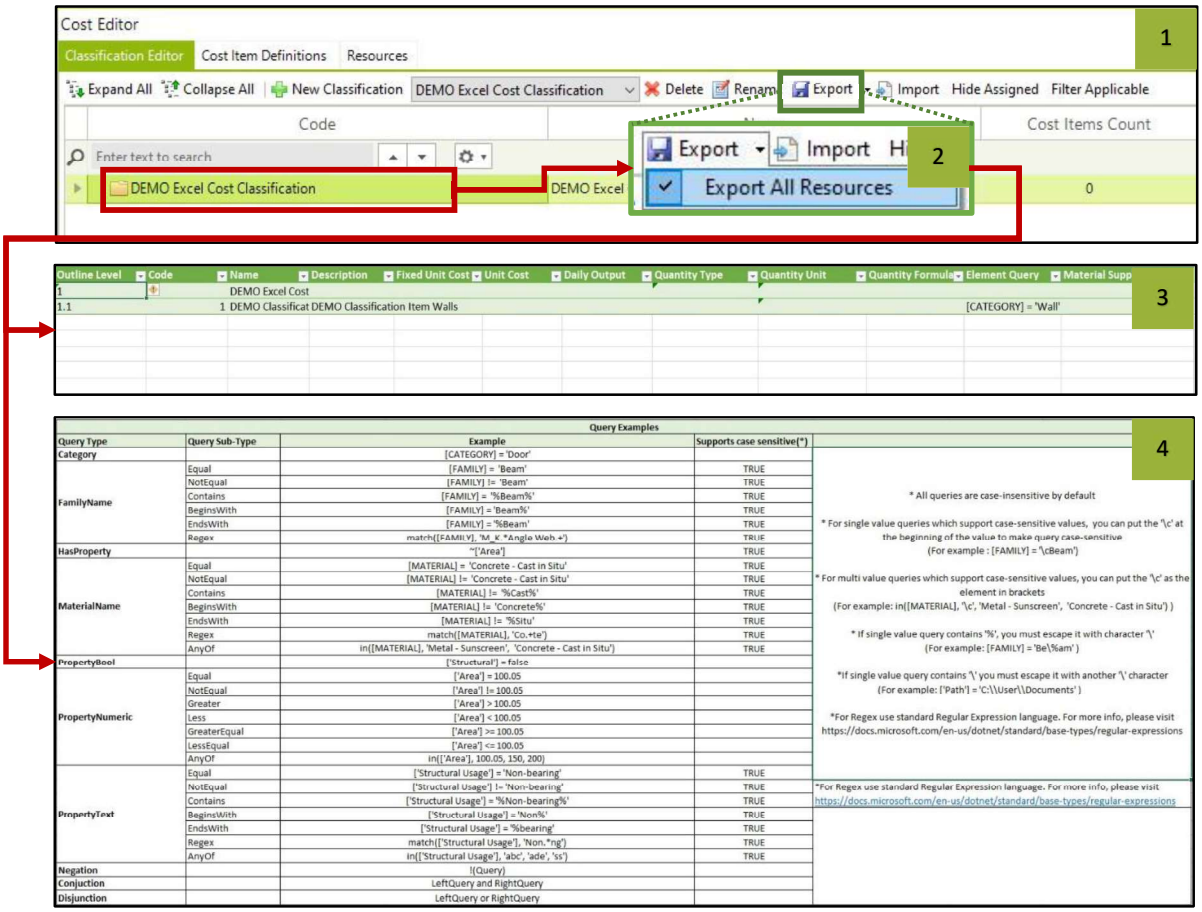
4. In **Element Query Editor** window new rule will appear that defines only elements with category parameter **Wall** could be included. (User is able to add additional rules, to modify existing, to **negate** rules, to choose if Query will require **All of the following** rules to be respected or **Any of the following** rules) → Click **OK** to close **Element Query Editor**. →
5. Now all parameters of our **Classification Item** are defined and user should just click **OK** to complete **Classification Item** creation process. → New "folder" with parameters previously set will appear in **Cost Classification**.



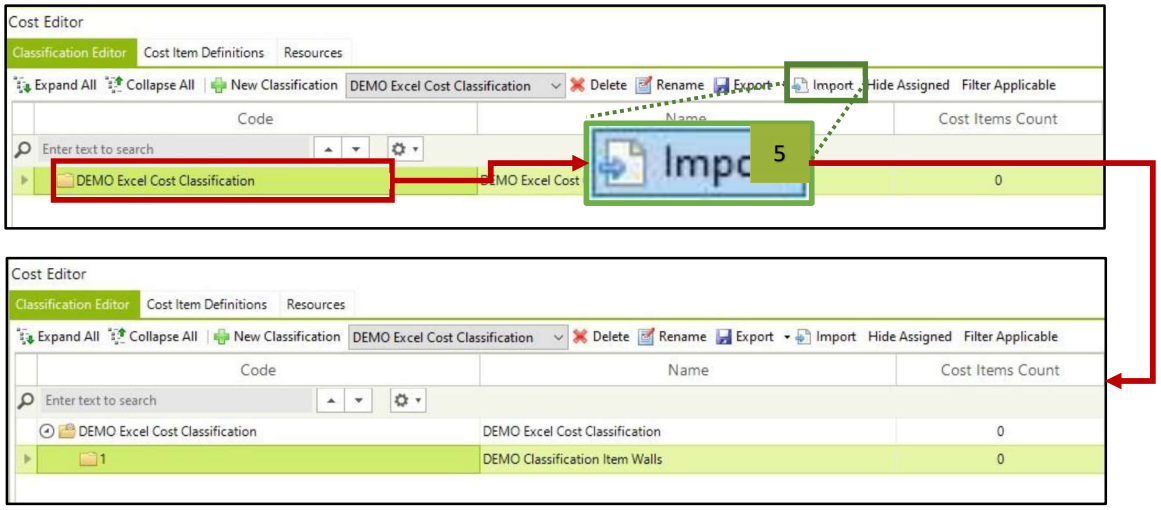
Workflow 02_Classification Item creation in Excel file

To create new Classification Item in properly formatted Excel table, follow these steps:

1. Open **Cost Editor** tab. → Create (blank) **Cost Classification** following procedure explained in **Chapter 8.1.1 (Workflow 01)** and name it **DEMO Excel Cost Classification**. →
2. Export created blank **Cost Classification** following procedure explained in **Chapter 8.1.3 (Workflow 02)** → Now user has blank properly formatted **Cost Classification** Excel spreadsheet for creation of **Classification item**. →
3. Open exported blank **Cost Classification Excel file**. → In the new row under master parent task define fields in following columns: **Outline Level: 1.1**; **Code: 01**; **Name: DEMO Classification Item Walls**; **Description:** for training purpose you can just repeat the same description as in the name field; and the last field that has to be defined is **Element Query:**. Here type string **[CATEGORY] = 'Wall'** which means that software will allow only elements containing this category parameter to be applicable for newly created **Classification Item**. →
4. Detailed instructions and examples of different strings could be explored in **Help** sheet of exported **Excel spreadsheet** if user wants to exercise different **Element Query** commands.



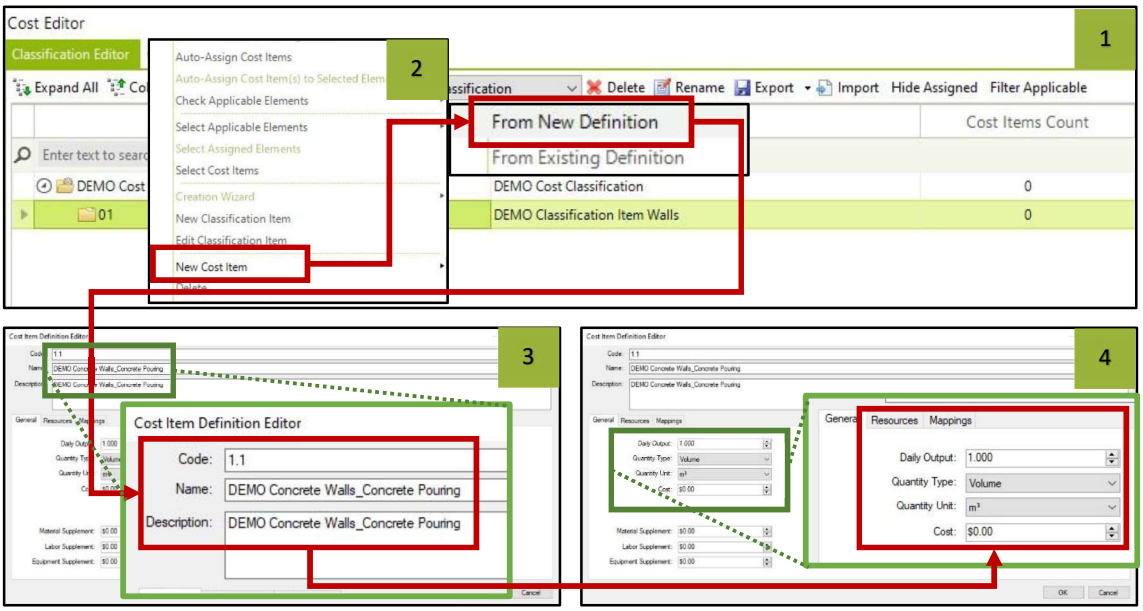
5. Save modified Excel file. → Import it back to **Bexel Manager** following procedure explained in **Chapter 8.1.3 (Workflow 02)** to analyze newly created **Classification Item**.



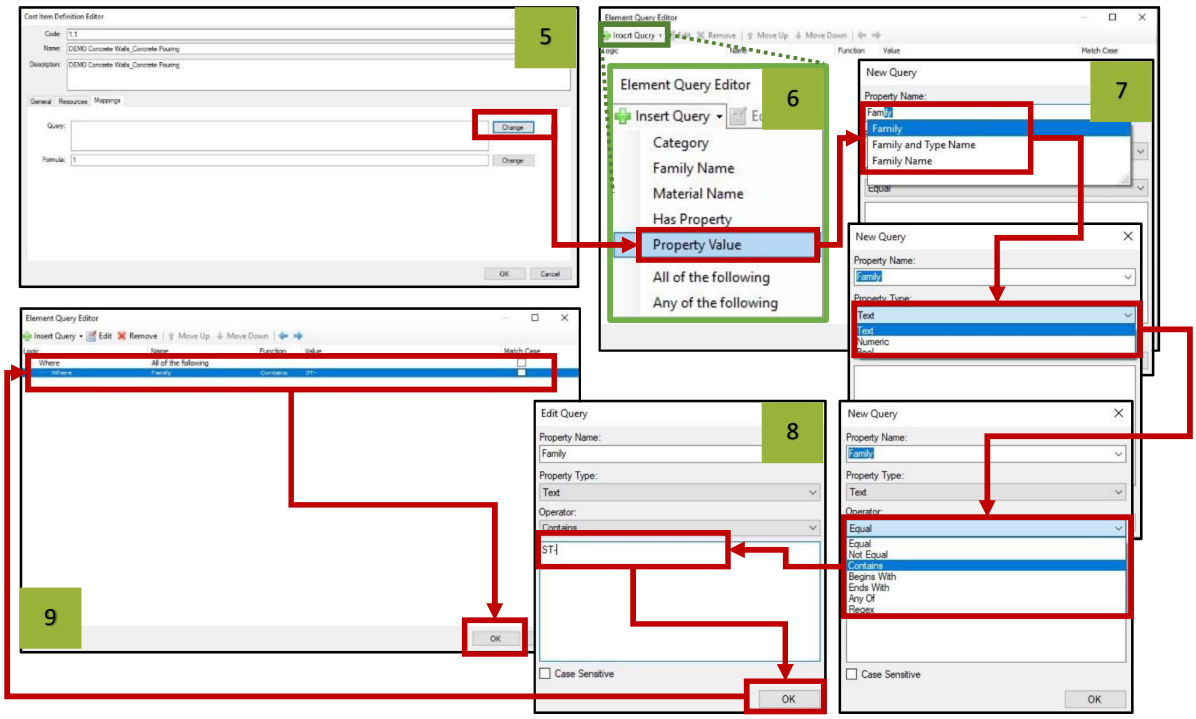
Workflow 01_Cost Item creation in Bexel Manager

In this training example we will create Cost Item that "filters" only elements which contain letter string **ST-** in its **Family** name. We will create it within **Classification Item** that already contains **Element Query** that "filters" elements with defined category **Wall**. We will be able to see how **Element Query** works and how combination of **Element Queries** defines structure of **Cost Classification**. To create new **Classification Item** in Bexel Manager follow these steps:

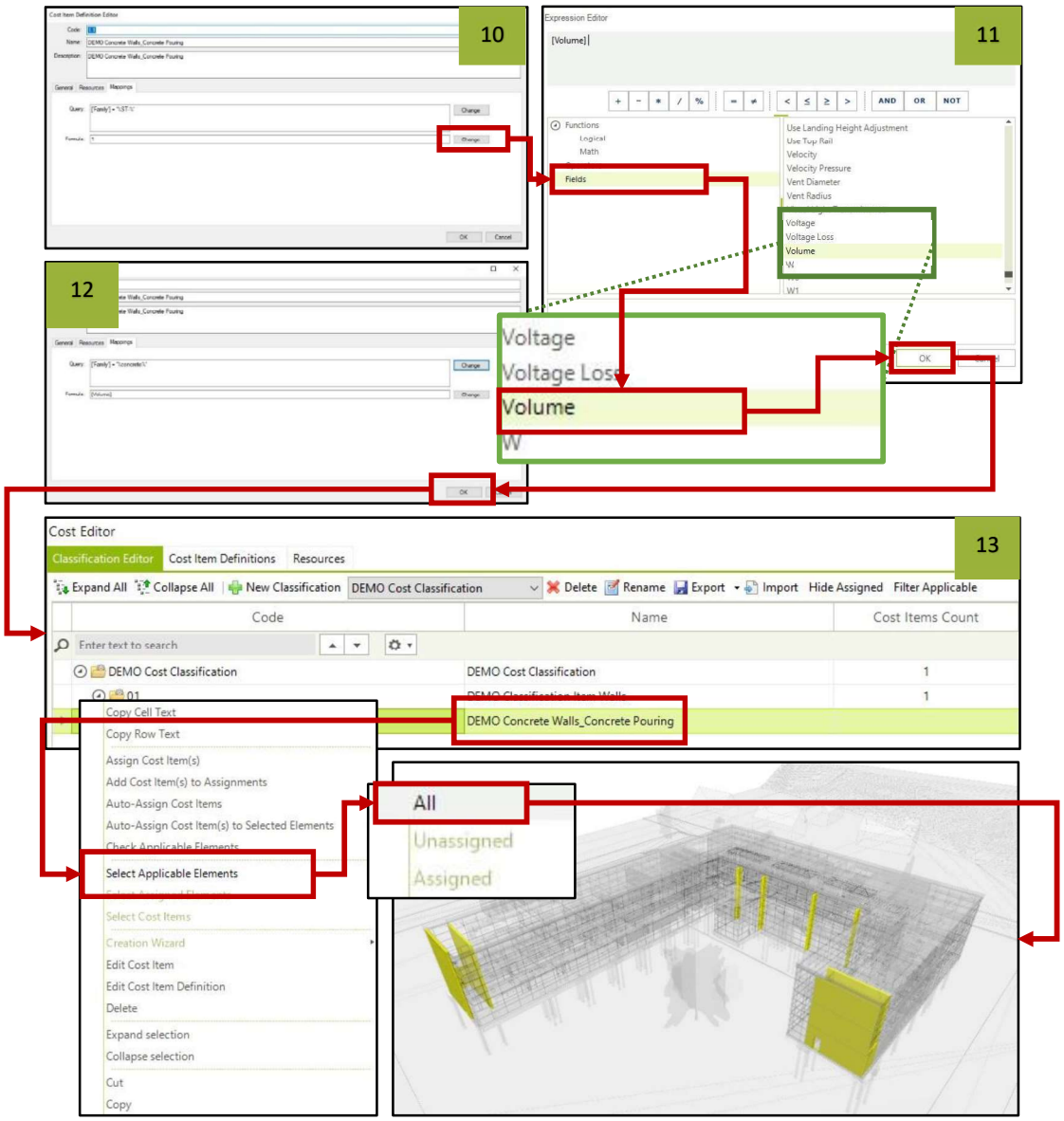
1. Open **Cost Editor** tab. → Following procedure explained in **Chapter 8.1.3 (Workflow 01)** import exercise **Cost Classification** file named **DEMO Cost Classification** navigating through training material exchange folder of **Chapter 8.1.5.**
   (PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.5) →
2. Within **Cost Editor** tab **right-click** Classification Item named **DEMO Classification Item Walls** → Select **New Cost Item**. → Click **From New Definition** command. →
3. **Cost Item Definition Editor** will open. → In the upper side of window define following fields: **Code: 1.1**; **Name: DEMO Concrete Walls_Concrete Pouring**; **Description:** for training purpose you can just repeat the same description as in the name field. →
4. Within **General** tab define following fields by choosing from drop-down menu: **Quantity Type: Volume**; **Quantity Unit: m³**. (since our example represents work measured in volume) → Leave other fields within **General** tab with default values for now. →



5. Go to **Mappings** tab. → Next to **Query:** field click **Change** button. → **Element Query Editor** window opens. →
6. In the upper-left corner click button **Insert Query**. → Select **Property Value** command. → **New Query** window opens. →
7. Within **New Query** window define following fields by choosing from drop-down menu or typing: **Property Name:** type **Family**; **Property Type:** choose **Text**; **Operator:** choose **Contains**. (by defining this sequence we will filter all elements that have textual property family which contains text defined in the last field) →
8. Within field at the bottom of window type text **ST-**. (In our sample model all structural elements have family name defined with this prefix) → Click **OK** to confirm. →
9. Within **Element Query Editor** new rule that user has just defined will appear. (User is able to add additional rules, to modify existing, to **negate** rules, to choose if **Query** will require **All of the following** rules to be respected or **Any of the following** rules)→ Click **OK** To complete action. →



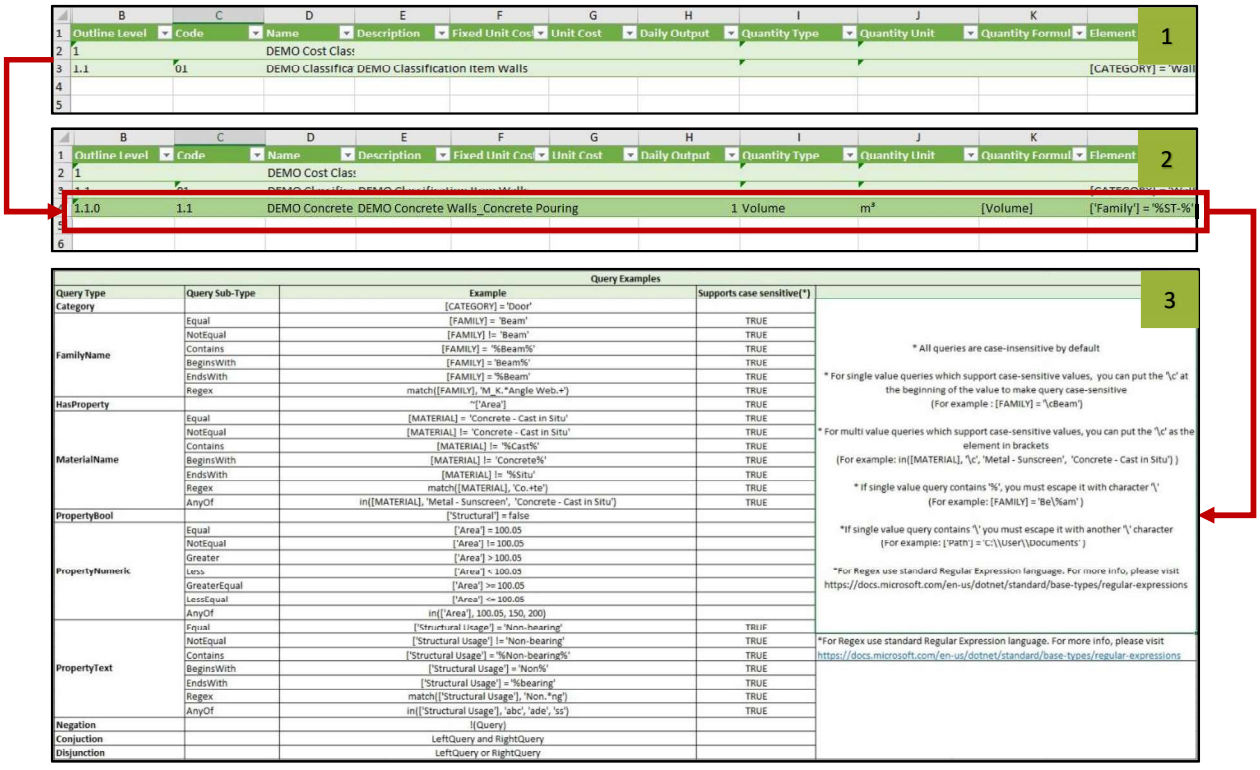
10. In **Cost Item Definition Editor** click **Change** button next to **Formula:** field. → **Expression Editor** opens. →
11. In **Expression Editor** user is able to define formula for quantity calculation of created **Cost Item** using model element properties (**Fields**) and mathematical functions. → In our example quantity formula will be simple, since we only need volume of elements, so user just have to click **Fields**, and to find **Volume** within properties list and **double-click** it. → Formula **[Volume]** will appear in **expression field**. → User is also able to type directly into **expression field** value **[Volume]** and software will recognize it as element property for **Volume**. → Click **OK** to confirm. →
12. Click **OK** in **Cost Item Definition Editor** to complete creation of **Cost Item**. →
13. After **Cost Item** is created user is able to check which elements are applicable to defined element Query parameters. → **Right-click** created **Cost Item**. →Choose **Select Applicable Elements**. → select **All** command. → In 3D view user is able to see selected elements applicable to created **Cost Item**. (In our example case, already created **Classification Item** filters only elements with category **Wall** and then **Cost Item** within it, that user has just created, further filters it to elements with **family** name that contains **ST-**. So final applicable elements are **Walls** with **Family** name containing **ST-**).



Workflow 02_Cost Item creation in Excel file

To create new Cost Item in properly formatted Excel spreadsheet, follow these steps:

1. Open prepared exercise **Cost Classification in** Excel file format named **DEMO Excel Cost Classification.xml**. User is able to find it within Exchange folder in **Chapter 8.1.5**. **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.5)** →
2. In the new row under already created **Classification Item** named **DEMO Classification Item Walls** define fields in following columns by typing these values: **Outline Level: 1.1.0**; **Code: 1.1**; **Name: DEMO Concrete Walls_Concrete Pouring**; **Description:** for training purpose you can just repeat the same description as in the name field; **Daily Output: 1**; **Quantity type: Volume**; **Quantity unit: m³**; **Quantity Formula: [Volume]**; **Element Query:**. Here type string **['Family'] = '%ST-%'** which means that software will allow only elements containing string **ST-** in Family property to be applicable for newly created **Cost Item**. →
3. Detailed instructions and examples of different strings could be explored in **Help** sheet of exported **Excel spreadsheet** if user wants to exercise different **Element Query** or **Quantity Type** commands.



	B	C	D	E	F	G	H	I	J	K	
1	Outline Level	Code	Name	Description	Fixed Unit Cost	Unit Cost	Daily Output	Quantity Type	Quantity Unit	Quantity Formul	Element
2	1		DEMO Cost Class								
3	1.1	01	DEMO Classifica	DEMO Classification Item Walls							[CATEGORY] = 'Wall
4											
5											

1

	B	C	D	E	F	G	H	I	J	K	
1	Outline Level	Code	Name	Description	Fixed Unit Cost	Unit Cost	Daily Output	Quantity Type	Quantity Unit	Quantity Formul	Element
2	1		DEMO Cost Class								
3											
4	1.1.0	1.1	DEMO Concrete	DEMO Concrete Walls_Concrete Pouring			1	Volume	m³	[Volume]	['Family'] = '%ST-%'
5											
6											

2

Query Examples

Query Type	Query Sub-Type	Example	Supports case sensitive(*)
Category		[CATEGORY] = 'Door'	
FamilyName	Equal	[FAMILY] = 'Beam'	TRUE
	NotEqual	[FAMILY] != 'Beam'	TRUE
	Contains	[FAMILY] = '%Beam%'	TRUE
	BeginsWith	[FAMILY] = 'Beam%'	TRUE
	EndsWith	[FAMILY] = '%Beam'	TRUE
	Regex	match([FAMILY], 'M_K.*Angle Web.+')	TRUE
HasProperty		"['Area']	TRUE
MaterialName	Equal	[MATERIAL] = 'Concrete - Cast in Situ'	TRUE
	NotEqual	[MATERIAL] != 'Concrete - Cast in Situ'	TRUE
	Contains	[MATERIAL] != '%Cast%'	TRUE
	BeginsWith	[MATERIAL] != 'Concrete%'	TRUE
	EndsWith	[MATERIAL] != '%Situ'	TRUE
	Regex	match([MATERIAL], 'Co.+te')	TRUE
	AnyOf	in([MATERIAL], 'Metal - Sunscreen', 'Concrete - Cast in Situ')	TRUE
PropertyBool		['Structural'] = false	
PropertyNumeric	Equal	['Area'] = 100.05	
	NotEqual	['Area'] != 100.05	
	Greater	['Area'] > 100.05	
	Less	['Area'] < 100.05	
	GreaterEqual	['Area'] >= 100.05	
	LessEqual	['Area'] <= 100.05	
	AnyOf	in(['Area'], 100.05, 150, 200)	
PropertyText	Equal	['Structural Usage'] = 'Non-bearing'	TRUE
	NotEqual	['Structural Usage'] != 'Non-bearing'	TRUE
	Contains	['Structural Usage'] = '%Non-bearing%'	TRUE
	BeginsWith	['Structural Usage'] = 'Non%'	TRUE
	EndsWith	['Structural Usage'] = '%bearing'	TRUE
	Regex	match(['Structural Usage'], 'Non.*ng')	TRUE
	AnyOf	in(['Structural Usage'], 'abc', 'ade', 'ss')	TRUE
Negation		!(Query)	
Conjuction		LeftQuery and RightQuery	
Disjunction		LeftQuery or RightQuery	

* All queries are case-insensitive by default

* For single value queries which support case-sensitive values, you can put the '\c' at the beginning of the value to make query case-sensitive
(For example : [FAMILY] = '\cBeam')

* For multi value queries which support case-sensitive values, you can put the '\c' as the element in brackets
(For example: in[[MATERIAL], '\c', 'Metal - Sunscreen', 'Concrete - Cast in Situ'])

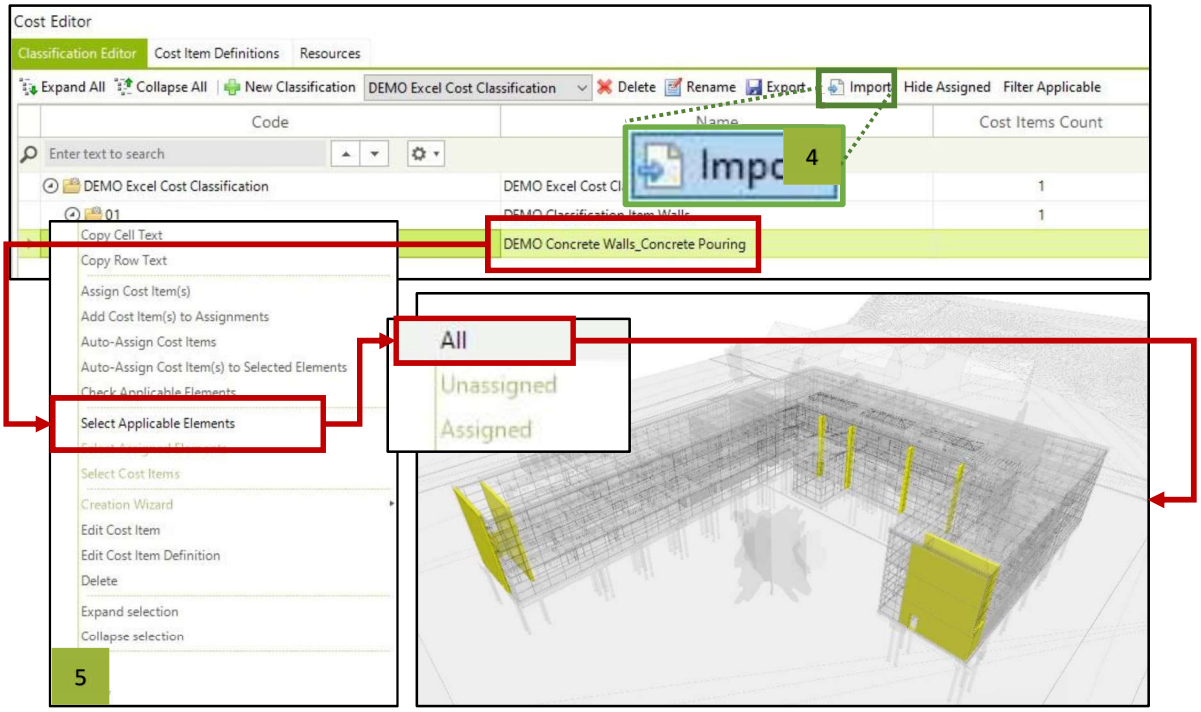
* If single value query contains '%', you must escape it with character '\'
(For example: [FAMILY] = 'Be\%am')

*If single value query contains '\' you must escape it with another '\' character
(For example: ['Path'] = 'C:\\User\\Documents')

*For Regex use standard Regular Expression language. For more info, please visit
https://docs.microsoft.com/en-us/dotnet/standard/base-types/regular-expressions

3

4. **Save** modified Excel file. → **Import** it back to **Bexel Manager** following procedure explained in **Chapter 8.1.3 (Workflow 02)** to analyze newly created **Classification Item**.
5. After **Cost Item** is created user is able to check which elements are applicable to defined element Query parameters. → **Right-click** created **Cost Item**. →Choose **Select Applicable Elements**. → select **All** command. → In 3D view user is able to see selected elements applicable to created **Cost Item**. (In our example case, already created **Classification Item** filters only elements with category **Wall** and then **Cost Item** within it, that user has just created, further filters it to elements with **Family** name that contains **ST-**. So final applicable elements are **Walls** with **Family** name containing **ST-**).

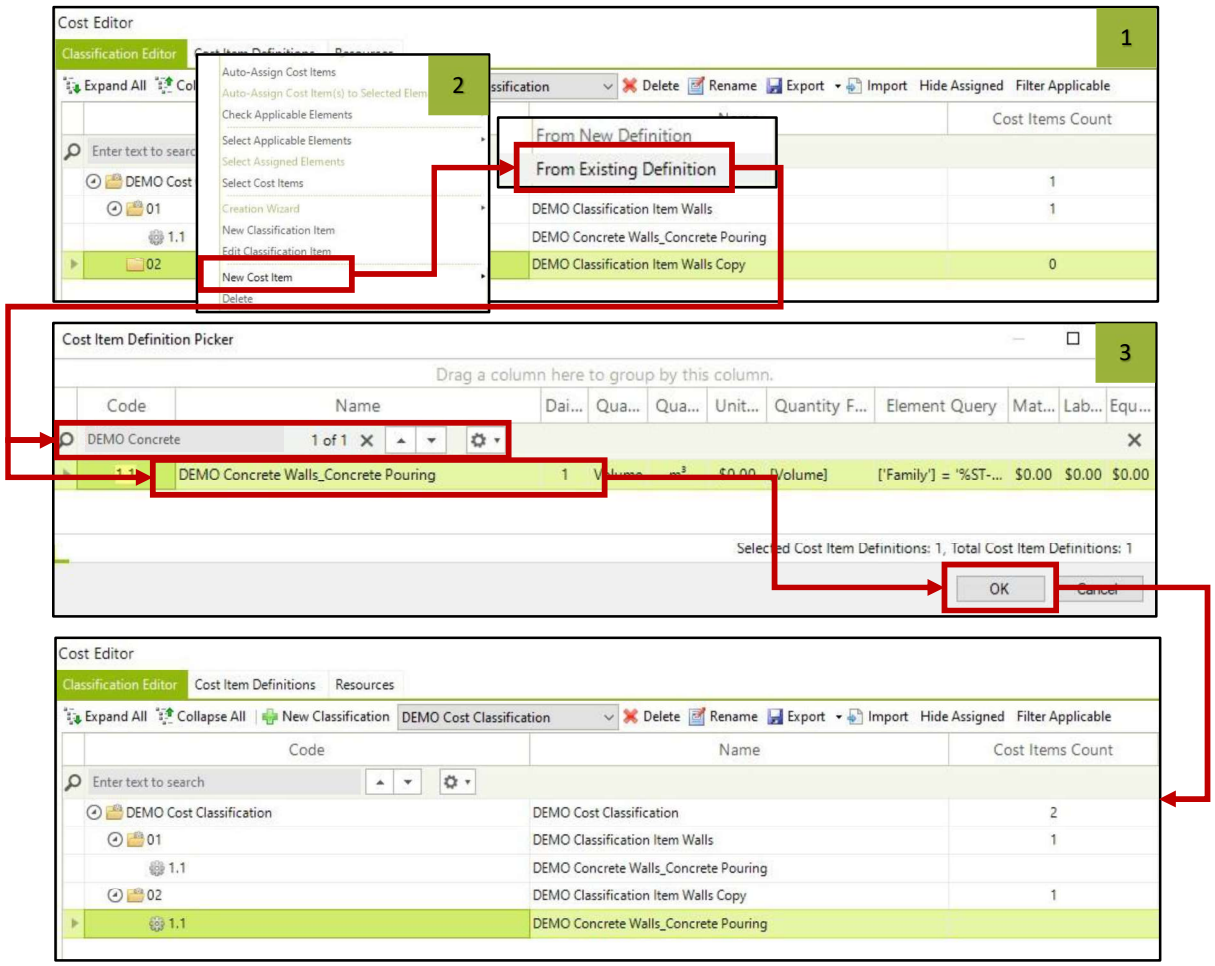


8.1.5. COPY, PASTE AND DELETE COST ITEM IN BEXEL MANAGER

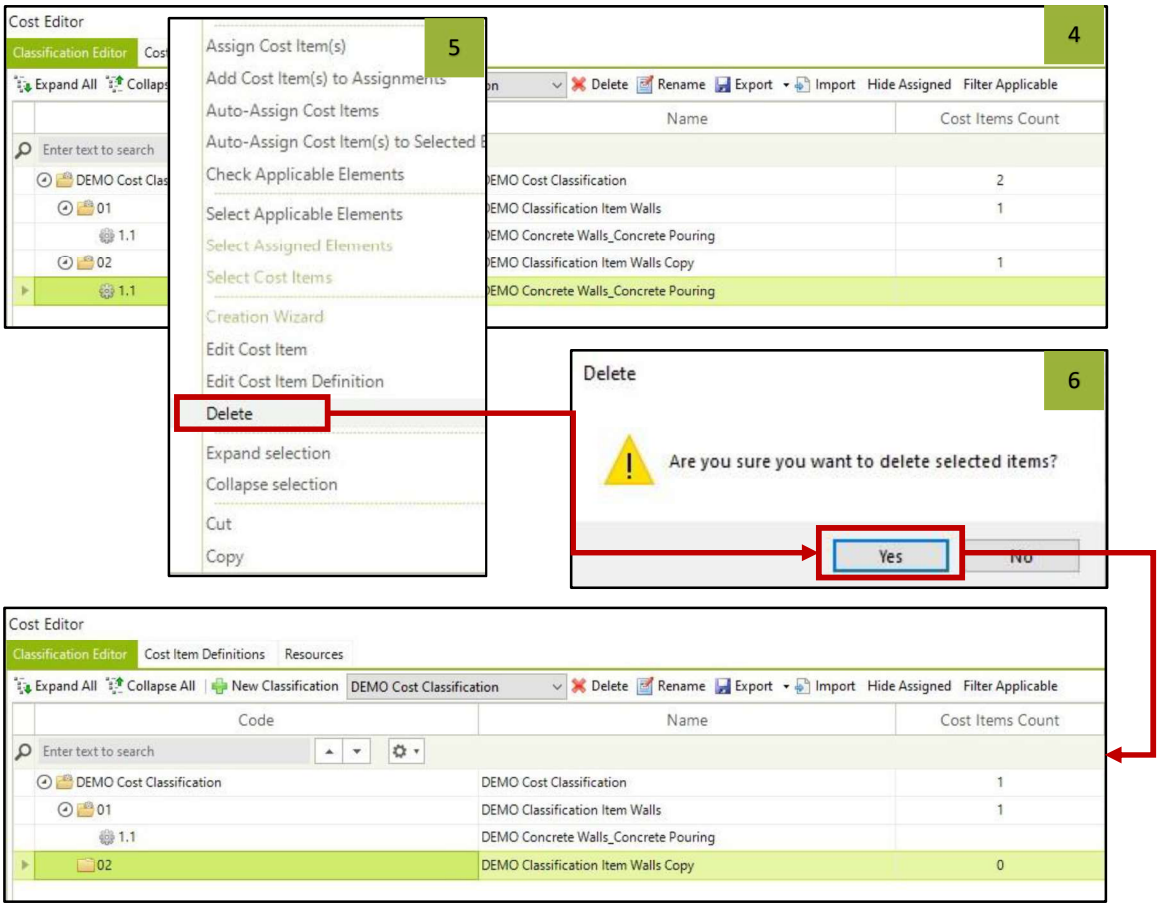
User is able to copy **Cost Items** in Bexel Manager software or within Excel spreadsheet. Copying within Excel is simple copy row and copy action within Bexel manager will be explained below.

You can create copy of an existing Cost Item following these steps:

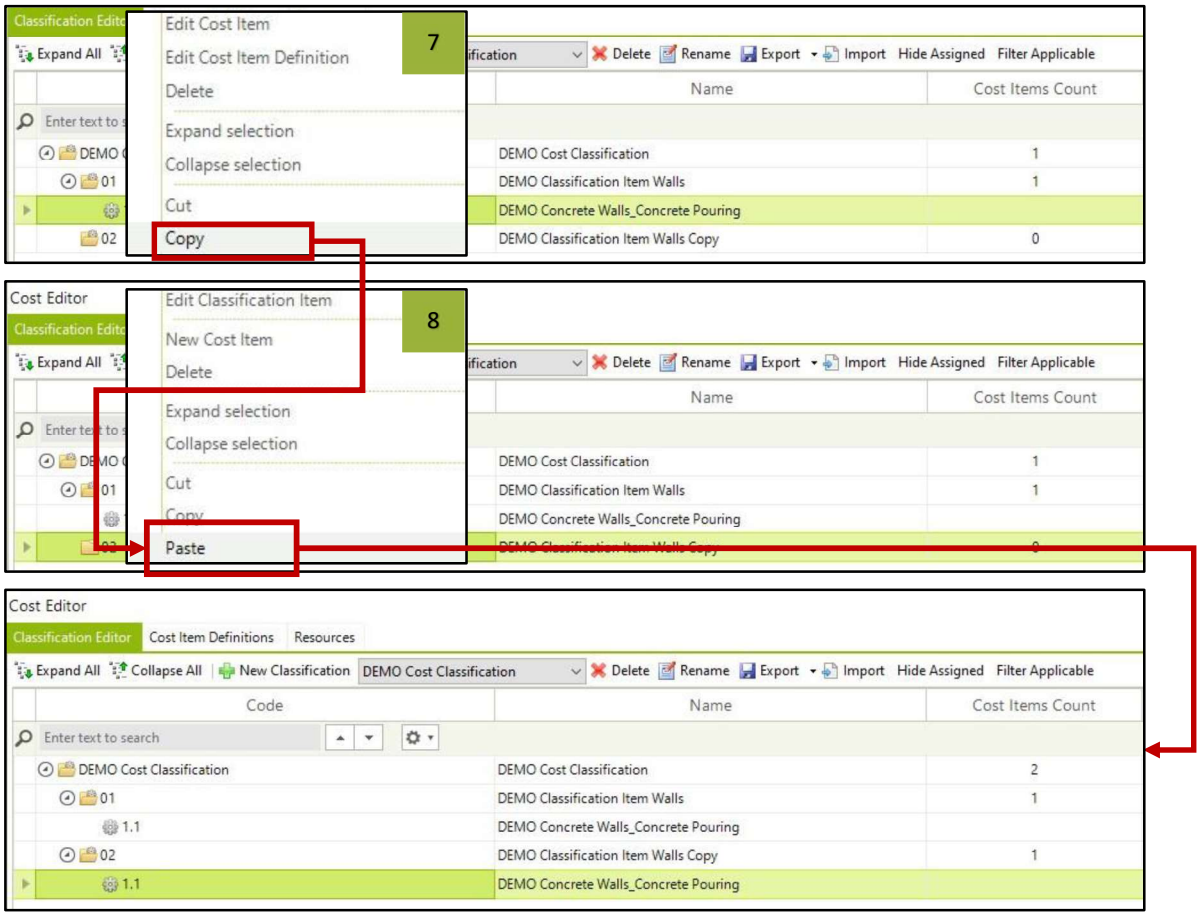
1. Open **Cost Editor** tab. → Following procedure explained in **Chapter 8.1.3 (Workflow 01)** import exercise Cost Classification named **DEMO Cost Classification** navigating through training material exchange folder of **Chapter 8.1.6.**
   (PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.6) →
2. Within **Cost Editor** tab **right-click** **Classification Item** named **02 DEMO Classification Item Walls Copy** → Select **New Cost Item**. → Click **From Existing Definition** command. →
3. **Cost Item Definition Picker** window will open. → In the upper-left side of window user is able to search for existing **Cost Item** to copy by simply typing part of the name like **DEMO Concrete** in our example and click **Enter**. → Click **Cost Item** that has to be copied. → Click **OK** to complete action. →



4. For deleting **Right-click** newly created **Cost Item**. →
5. Select command **Delete**. →
6. Click **Yes** to confirm Action. →



7. Another way to copy **Cost Item** is to do it the same way as with **Classification Item**. → **Right-click** **Cost Item** that should be copied**.** → Select **Copy** command. →
8. **Right-click** destination **Classification Item.** (in our case it is **02 DEMO Classification Item Walls Copy**) → Select **Paste** to complete action.



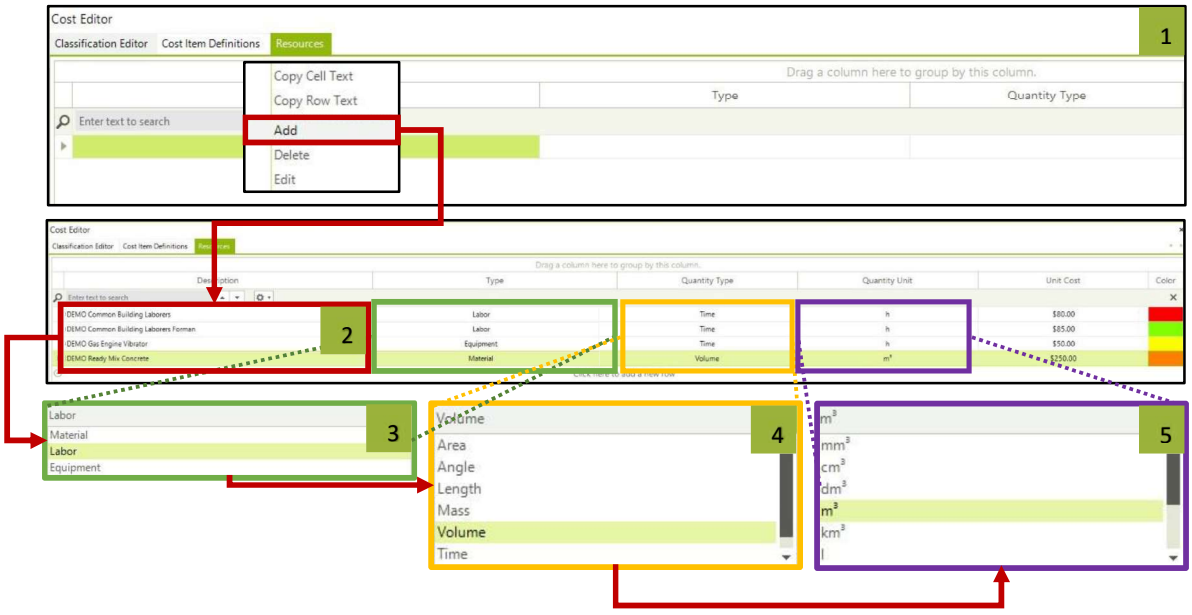
8.1.6. RESOURCES CREATION

Resources could be created in two general ways in the same manner as previously described **Cost Items**, directly in Bexel Manager interface as well as within Excel spreadsheet and with import back to Bexel Manager.

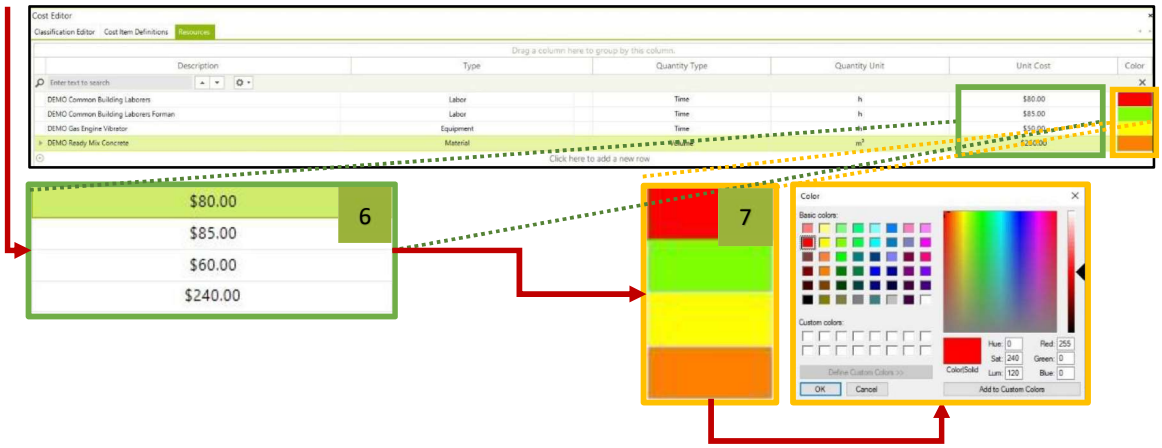
Workflow 01_Resource creation in Bexel Manager

In this training example we will create Resource for created Cost Item available in training Exchange file for this chapter (**Chapter 8.1.7**):

1. Following procedure explained in **Chapter 8.1.3 (Workflow 01)** import exercise Cost Classification named **DEMO Cost Classification** navigating through training material exchange folder of **Chapter 8.1.7**. **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.7)** → Open **Cost Editor** window. → Go to **Resources** tab. → **Right-Click** any row and click **Add** to automatically create new (blank) **resource**. (in our example repeat this action 4 times to create 4 blank resources) →
2. User is defining resources for our example **Cost Item** named **DEMO Concrete Walls_Concrete Pouring** so created resources should include everything needed for execution of this type of work. → First define **resource** name in field **Description** for all 4 newly created resources following this order: **DEMO Common Building Laborers**; **DEMO Common Building Laborers Forman**; **DEMO Gas Engine Vibrator**; **DEMO Ready Mix Concrete**. →
3. After description is defined, user defines **Type** of resource. → In our example user selects from drop-down menu following this order: **Labor** for first two resources, **Equipment** for third and **Material** for the last one. →
4. In the next step user defines **Quantity Type** for every resource. → First three resources (Labor and Equipment) are automatically measured in **time** so user doesn't have to define this field and for **Material** resources user defines adequate calculation type, in our example case **Volume**.→
5. In the next step user defines **Quantity Unit** for every resource. → Except for **Material** resources, all other resources are measured in **time** units (most commonly hours **h**) and **Material** resources are measured in units suitable for material type, in our example case that would be **m³** for **Ready Mix Concrete**. →



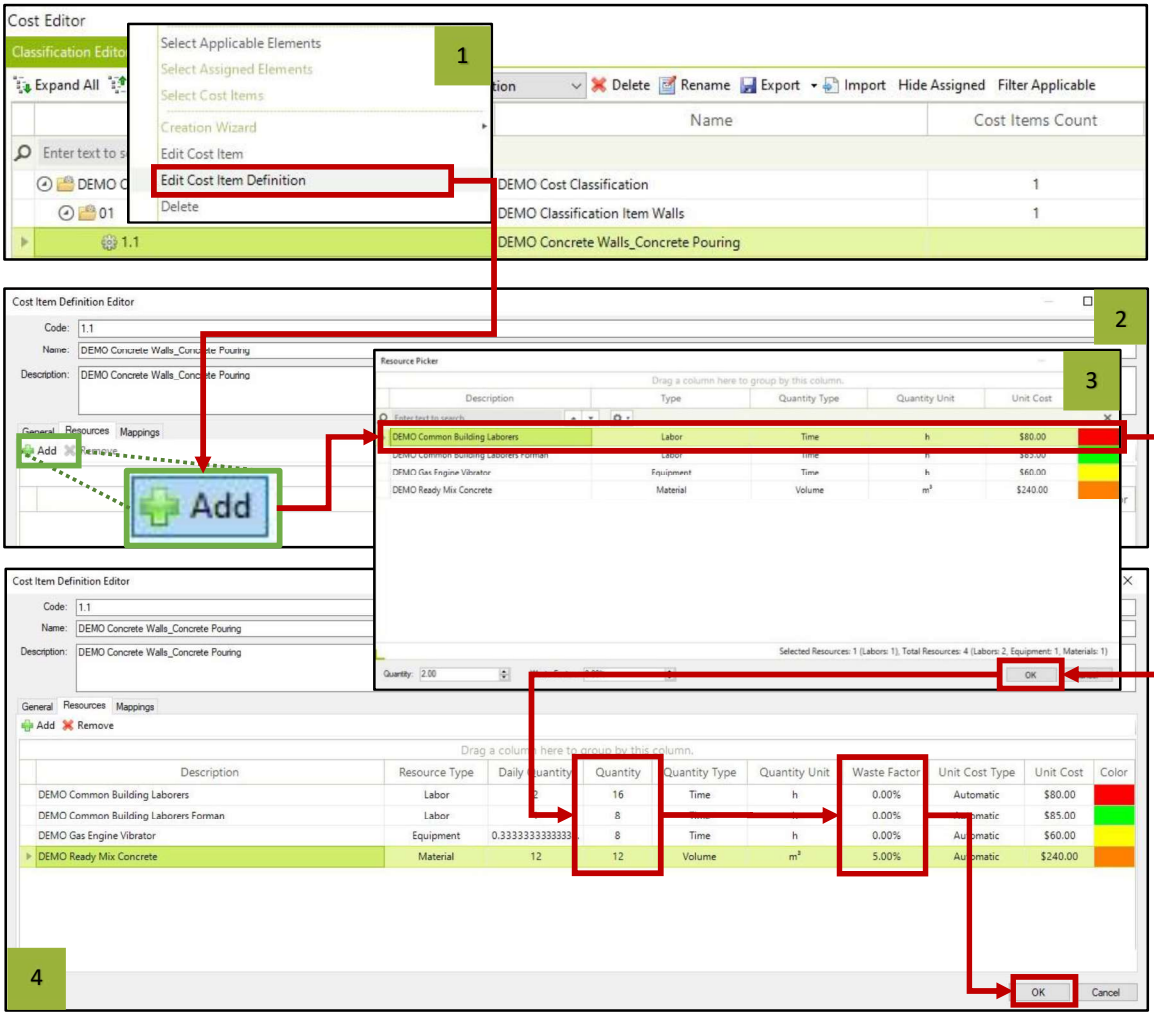
6. After basic parameters of resource are defined user defines **Unit Cost**. →In training example user could define proposed informative prices (**80$**; **85$**; **60$**;**240$**) by simple typing the amount but it is also possible to use prices from its own cost database.
7. And the last parameter that user defines regarding resources is **Color**. → Defined color represents identification of marked resource in software analytics (charts). → User can follow proposed color coding from training material or pick different colors by **Double-clicking** color field.



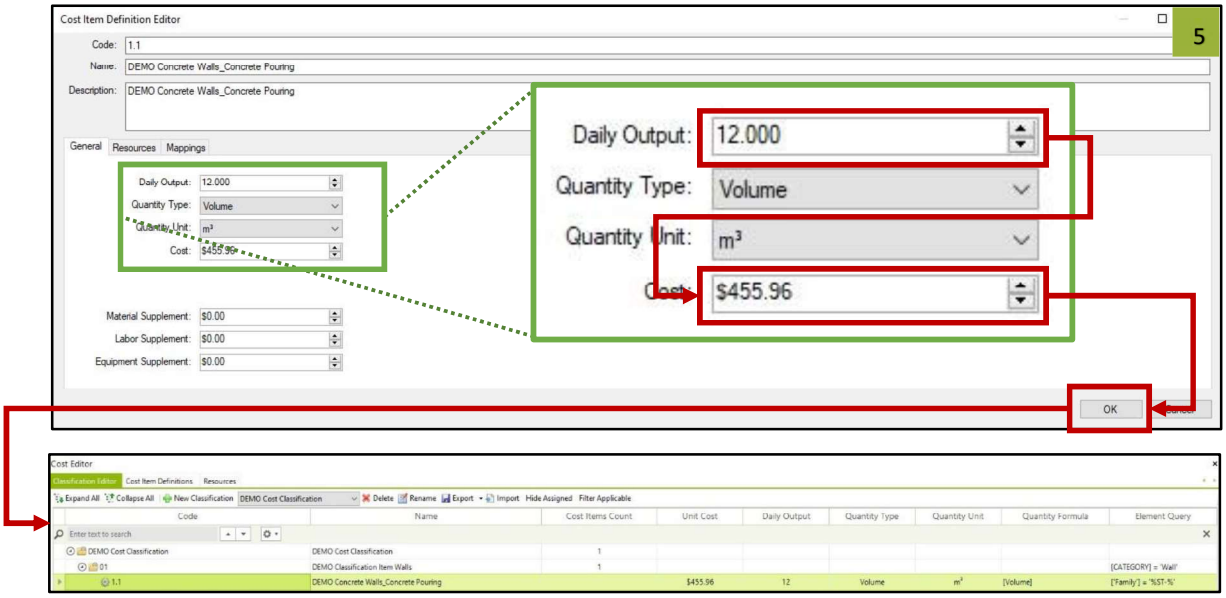
NOTE: **Resource Items** could be deleted, edited or copied by simple Right-click → Delete/Edit/Copy command.

After all resources are defined user is able to link them to Cost Items. In our example user will assign created resources to existing Cost Item named **DEMO Concrete Walls_Concrete Pouring** following these steps:

1. Open **Cost Editor** window. → Go to **Classification Editor** tab. → **Right-click** **Cost item** named **DEMO Concrete Walls_Concrete Pouring**. → Select **Edit Cost Item Definition**. → **Cost Item Definition Editor** window opens. →
2. In **Cost Item Definition Editor** window go to **Resources** tab. → Click **Add** button. →
3. In **Resource Picker** choose **resources** to add. → Click **OK** to complete action. → Repeat this action for every **resource** or simply select all **resources** at once. →
4. After all defined **resources** are added to **Cost Item Definition**, user defines **Quantity** of resources and **Waste Factor**. (In our example case user defines **8** hours a day for **Common Building Laborers Forman and equipment** and **16** hours (two man) for **Common Building Laborers** as well as **12 m³** of concrete which is expected quantity to be executed with defined resources in one working day (8 working hours).) → For the **Waste Factor**, user should define it only for concrete and set it at **5%**.→ Click **OK** to complete. →



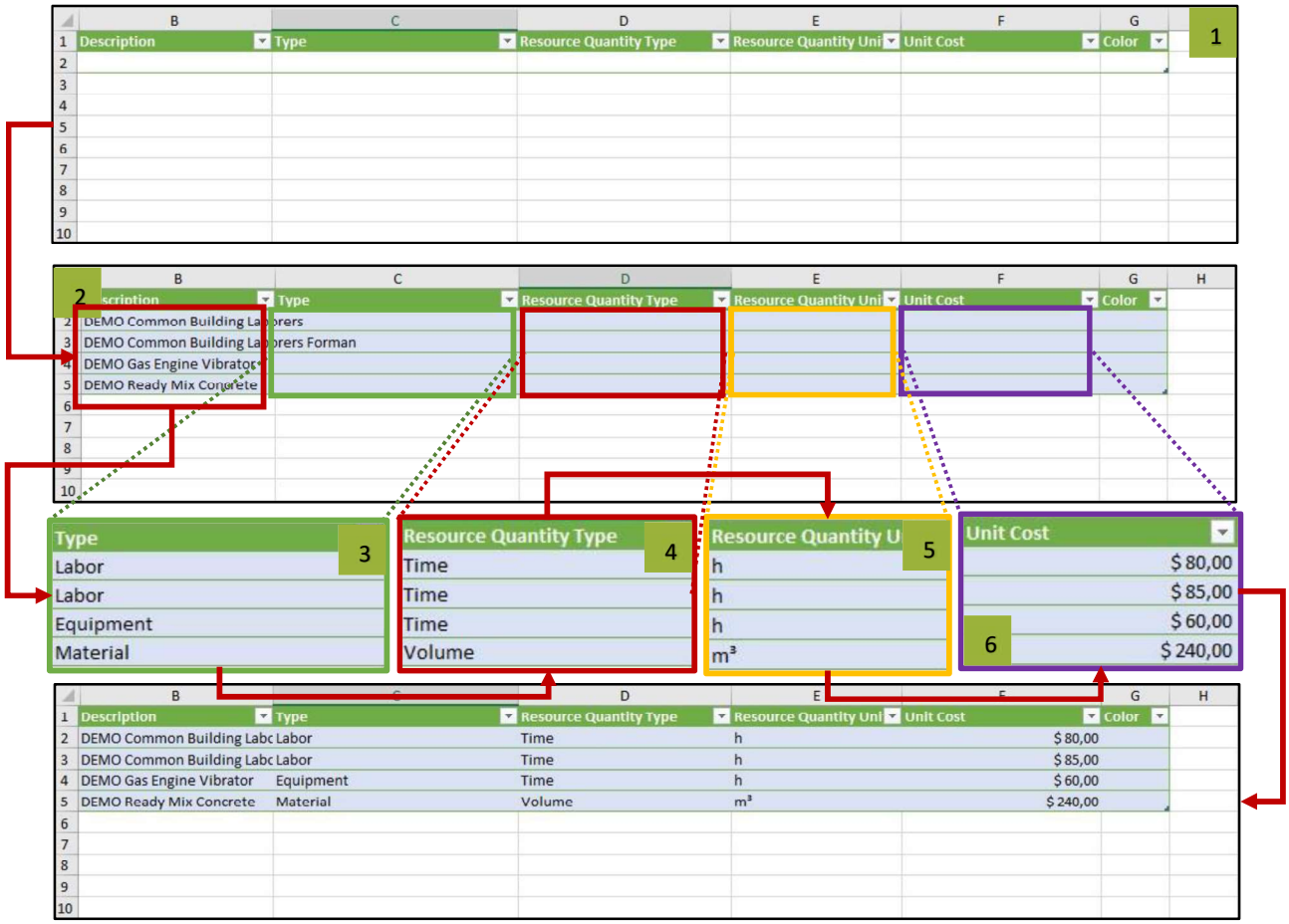
5. After resources are defined within **Resources** tab, user only needs to define **Daily Output:** in **General** tab of **Cost Item Definition Editor**. → Define value at **12** (the same amount specified for materials quantity within **Resources** tab. → Software automatically calculated final **Cost:** based on defined resource parameters. → Click OK to close **Cost Item Definition Editor** and confirm changes. → User is now able to see that **Cost Item** has **Unit Cost** parameter defined based on created assigned resources.



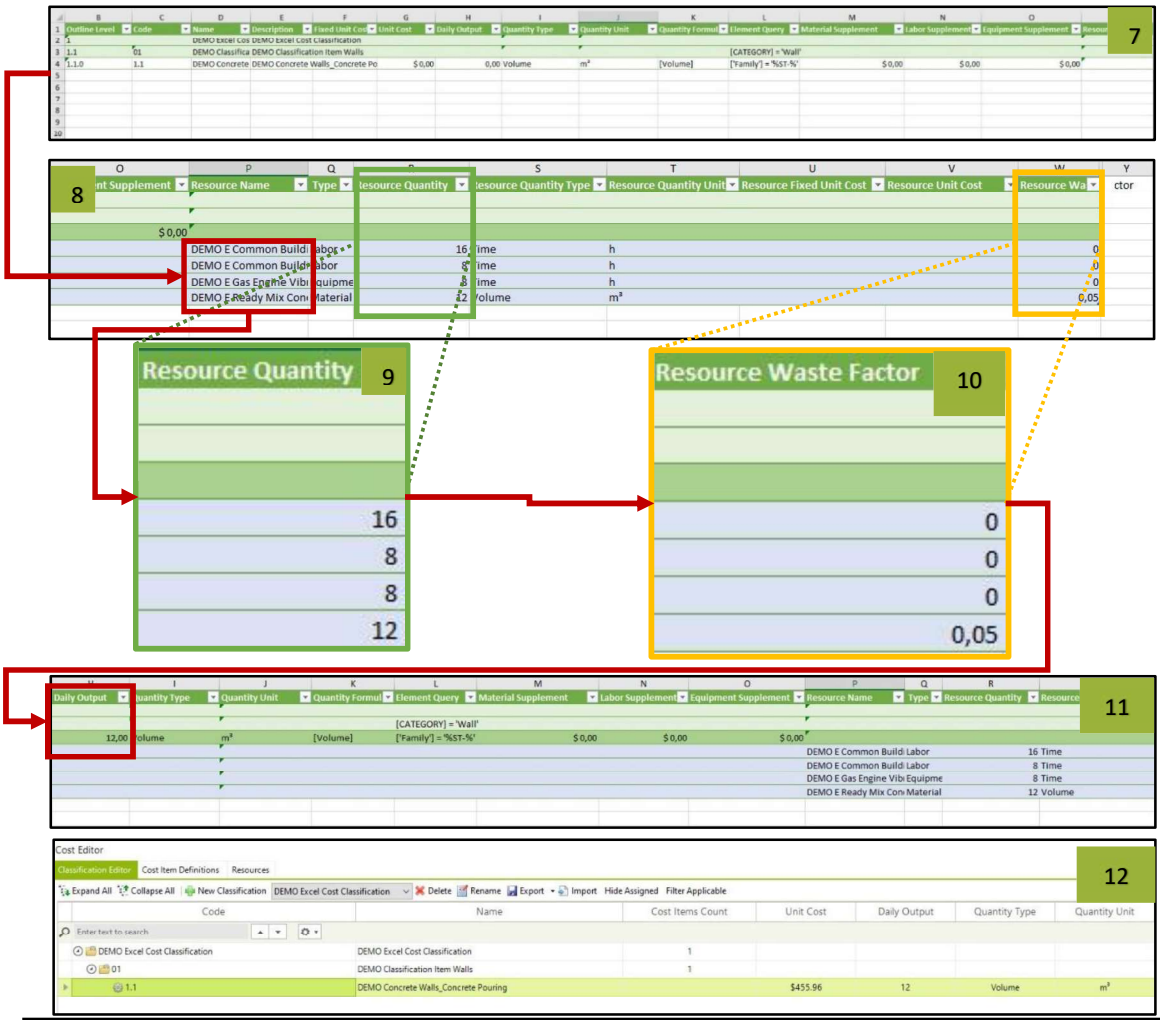
Workflow 02_Resource creation in Excel spreadsheet

As in all previously explained workflows in Cost Editor, resources could also be created and modified within properly formatted Excel spreadsheet and imported back to Bexel Manager. This feature is important for integration of existing cost databases into Bexel Manager with no need for complete recreation of existing database but only re-formatting and import. For resources creation in Excel spreadsheet follow this procedure:

1. Open exported exercise **Cost Classification** Excel file named **DEMO Excel Cost Classification**. User is able to find it within Exchange folder in **Chapter 8.1.7**.
   (PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.7) →
2. Go to **Resources** sheet → Define four **resources** by simple typing names in field **Description** for all 4 newly created resources following this order: **DEMO E Common Building Laborers**; **DEMO E Common Building Laborers Forman**; **DEMO E Gas Engine Vibrator**; **DEMO E Ready Mix Concrete**. →
3. In row **Type** define parameters in following order: **Labor**; **Labor**; **Equipment**; **Material.** →
4. **Resource Quantity Type**: **Time**; **Time**; **Time**; **Volume**. →
5. **Resource Quantity unit**: **h**; **h**; **h**; **m³**.→
6. **Unit Cost**: **$ 80,00**; **$ 85,00**; **$ 60,00**; **$ 240,00**. → After all above mentioned parameters are defined, resources are completed and could be assigned to Cost Item. →



7. To assign **Resources** to **Cost Item** go to **Classification** sheet. →
8. Under row with **Cost Item** named **DEMO Concrete Walls_Concrete Pouring** within column **Resource Name** type **DEMO E Common Building Laborers**; **DEMO E Common Building Laborers Forman**; **DEMO E Gas Engine Vibrator**; **DEMO E Ready Mix Concrete** in order to assign resources. (Spreadsheet will automatically link it to **Resource Items** created in **Resources** sheet and fill parameters **Resource Quantity Type** and **Resource Quantity Unit**.) →
9. Now user has to define parameter **Resource Quantity**: **16**; **8**; **8**; **12**. →
10. And to define **Waste Factor** for **Material** at **0,05** (which is equal to **5%**). For other resources just type **0**. →
11. To Complete action user only has to define parameter **Daily Output** at **12** in row **1.1 DEMO Concrete Walls_Concrete Pouring**, to save Excel table and import it back to Bexel Manager according to procedure explained in **Chapter 8.1.3.**
12. After import is completed **Cost Item** has **Unit Cost** parameter defined based on created assigned resources.

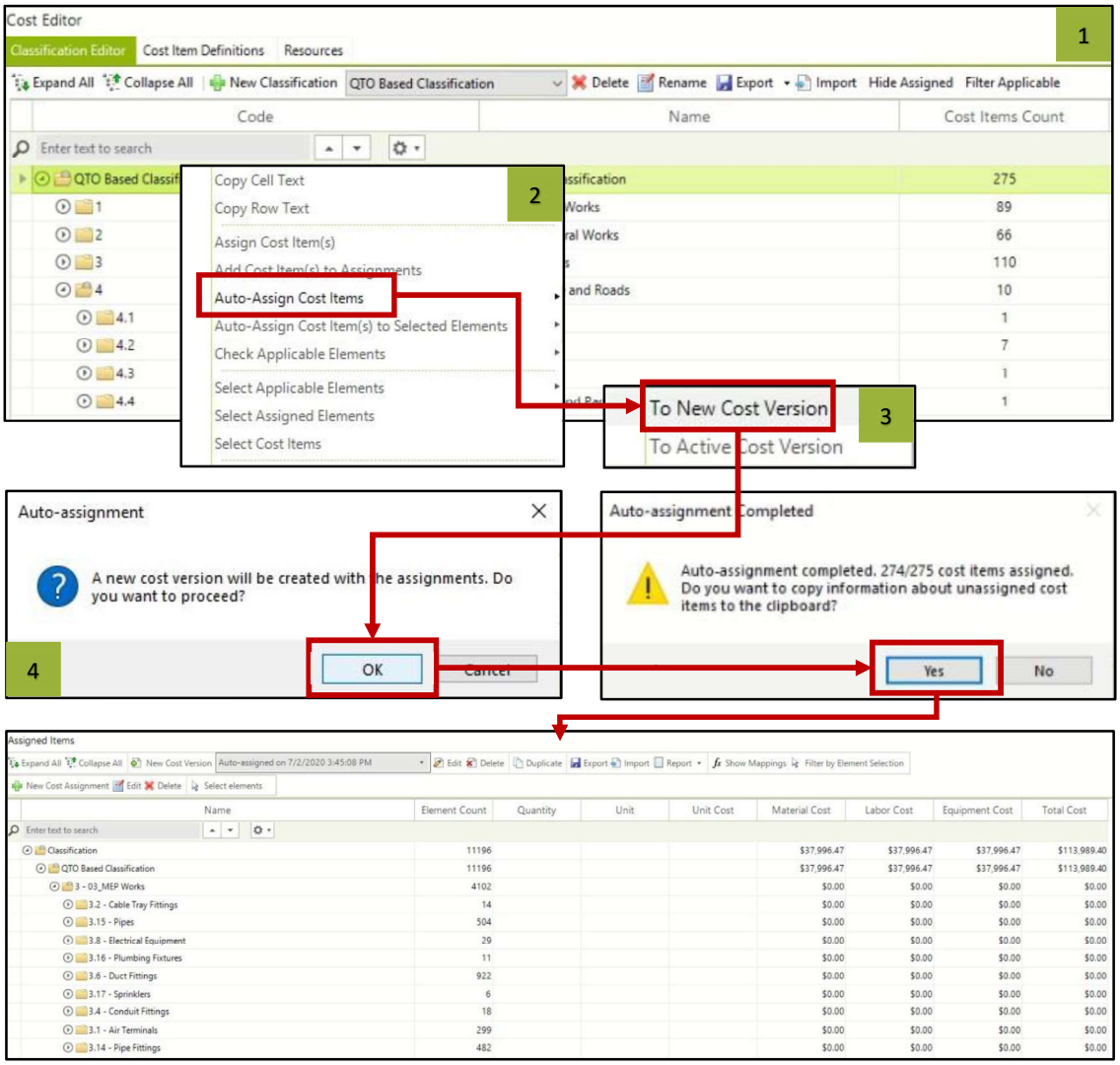


NOTE: If during Excel Cost Classification import software identifies that incoming file has resources with the same name and parameters as existing resources created within software, it will automatically duplicate and rename incoming resources which may lead to problems in resource assignment for Cost Items within imported Excel spreadsheet and user will be forced to repeat resource assignment for these Cost Items since resource names are automatically changed in order to prevent project inconsistencies.

8.1.7. LINKING COST ITEMS TO BIM MODEL ELEMENTS (AUTO-ASSIGN PROCESS)

After **Cost Classification** is defined, user is able to assign **Cost Classification** to BIM model elements automatically following these steps:

1. Import Cost Classification named **QTO Based Cost Classification** from folder **8.1.8** of training materials following procedure explained in **Chapter 8.1.3 (Workflow 01)**. **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.1\Exchange\8.1.8)** →
2. **Right-click** on the parent **Classification** folder and choose option **Auto Assign Cost Items**. →
3. Further on choose option **To New Cost Version** →
4. Finish the process by clicking on the **OK** button and clicking **Yes** on the notification window.



After this step is complete, we already have fully functional project Cost database with all **Cost Items** defined, with resources, materials and prices defined that could be constantly updated throughout the project and could serve as a basis for budget control and certification.

8.2. NEW SCHEDULE

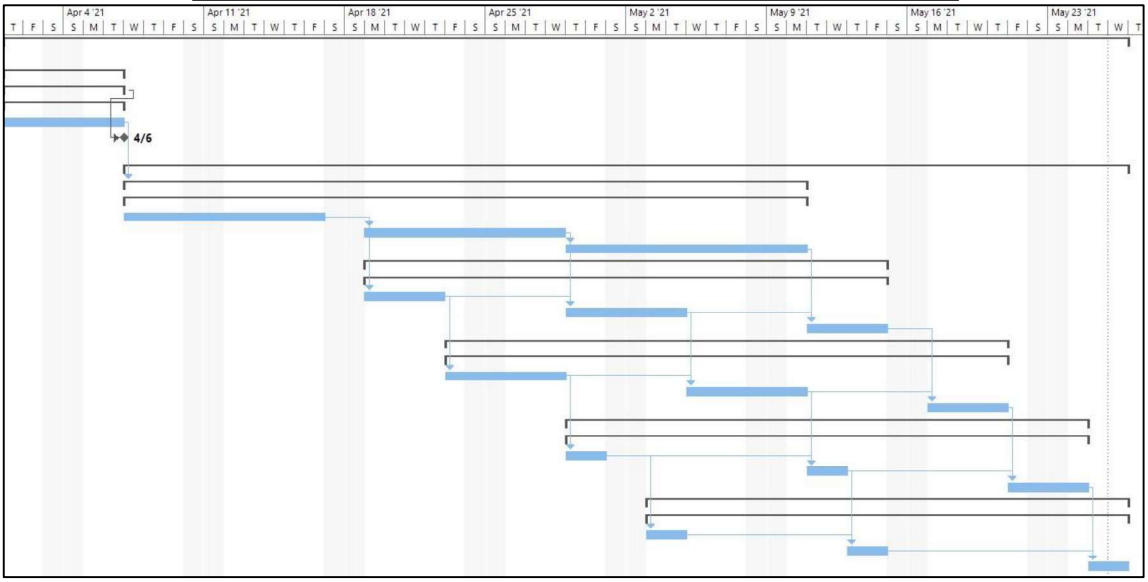
8.2.1. CREATING A NEW SCHEDULE

This chapter explains how to create New Schedule using Bexel Manager Software. We will create new schedule and its tasks where there will be defined tasks duration and relations between them.

Exercise inputs

- Project start date: the 1st of April, 2021;
- Project finish date: the 10th of April, 2022;
- Default task duration: 40 working hours;
- Calendar: Default Calendar;
- Tasks and relations:

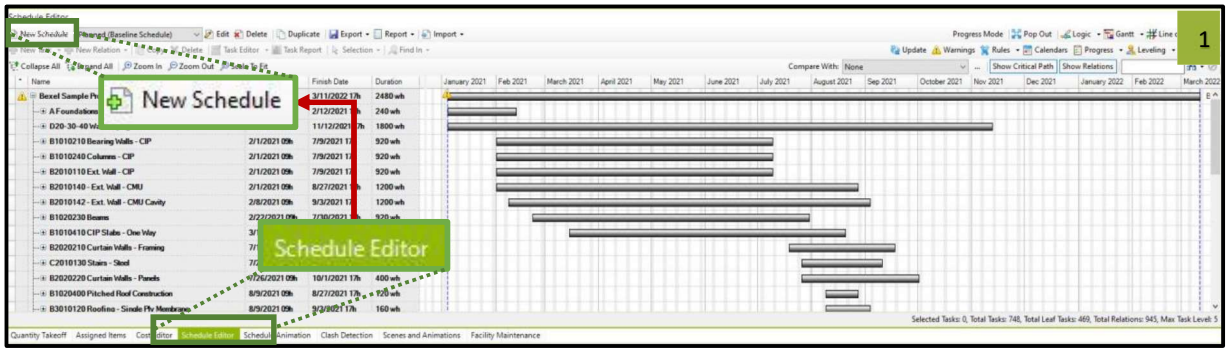
	Task Name	Duration	Start	Finish	Predecessors
1	**Bexel Sample Project : V02**	**40 days**	**Thu 4/1/21 8:00 AM**	**Wed 5/26/21 5:00 PM**	
2	**Site Preparation**	**4 days**	**Thu 4/1/21 8:00 AM**	**Tue 4/6/21 5:00 PM**	
3	**Site Preparation**	**4 days**	**Thu 4/1/21 8:00 AM**	**Tue 4/6/21 5:00 PM**	
4	**Sub Level**	**4 days**	**Thu 4/1/21 8:00 AM**	**Tue 4/6/21 5:00 PM**	
5	Exterior Areas	4 days	Thu 4/1/21 8:00 AM	Tue 4/6/21 5:00 PM	
6	Milestone - End of the Site Preparation works	0 days	Tue 4/6/21 5:00 PM	Tue 4/6/21 5:00 PM	3
7	**Structural Foundation**	**36 days**	**Wed 4/7/21 8:00 AM**	**Wed 5/26/21 5:00 PM**	
8	**Foundation Piles**	**24 days**	**Wed 4/7/21 8:00 AM**	**Mon 5/10/21 5:00 PM**	5
9	**Sub Level**	**24 days**	**Wed 4/7/21 8:00 AM**	**Mon 5/10/21 5:00 PM**	
10	Phase 1	8 days	Wed 4/7/21 8:00 AM	Fri 4/16/21 5:00 PM	
11	Phase 2	8 days	Mon 4/19/21 8:00 AM	Wed 4/28/21 5:00 PM	10
12	Phase 3	8 days	Thu 4/29/21 8:00 AM	Mon 5/10/21 5:00 PM	11
13	**Formwork**	**20 days**	**Mon 4/19/21 8:00 AM**	**Fri 5/14/21 5:00 PM**	
14	**Sub Level**	**20 days**	**Mon 4/19/21 8:00 AM**	**Fri 5/14/21 5:00 PM**	
15	Phase 1	4 days	Mon 4/19/21 8:00 AM	Thu 4/22/21 5:00 PM	10
16	Phase 2	4 days	Thu 4/29/21 8:00 AM	Tue 5/4/21 5:00 PM	11,15
17	Phase 3	4 days	Tue 5/11/21 8:00 AM	Fri 5/14/21 5:00 PM	12,16
18	**Reinforcement**	**20 days**	**Fri 4/23/21 8:00 AM**	**Thu 5/20/21 5:00 PM**	
19	**Sub Level**	**20 days**	**Fri 4/23/21 8:00 AM**	**Thu 5/20/21 5:00 PM**	
20	Phase 1	4 days	Fri 4/23/21 8:00 AM	Wed 4/28/21 5:00 PM	15
21	Phase 2	4 days	Wed 5/5/21 8:00 AM	Mon 5/10/21 5:00 PM	16,20
22	Phase 3	4 days	Mon 5/17/21 8:00 AM	Thu 5/20/21 5:00 PM	17,21
23	**Concrete pouring**	**18 days**	**Thu 4/29/21 8:00 AM**	**Mon 5/24/21 5:00 PM**	
24	**Sub Level**	**18 days**	**Thu 4/29/21 8:00 AM**	**Mon 5/24/21 5:00 PM**	
25	Phase 1	2 days	Thu 4/29/21 8:00 AM	Fri 4/30/21 5:00 PM	20
26	Phase 2	2 days	Tue 5/11/21 8:00 AM	Wed 5/12/21 5:00 PM	21,25
27	Phase 3	2 days	Fri 5/21/21 8:00 AM	Mon 5/24/21 5:00 PM	22,26
28	**Concrete finishing**	**18 days**	**Mon 5/3/21 8:00 AM**	**Wed 5/26/21 5:00 PM**	
29	**Sub Level**	**18 days**	**Mon 5/3/21 8:00 AM**	**Wed 5/26/21 5:00 PM**	
30	Phase 1	2 days	Mon 5/3/21 8:00 AM	Tue 5/4/21 5:00 PM	25
31	Phase 2	2 days	Thu 5/13/21 8:00 AM	Fri 5/14/21 5:00 PM	26,30
32	Phase 3	2 days	Tue 5/25/21 8:00 AM	Wed 5/26/21 5:00 PM	27,31



Tasks and relations for this exercise can be downloaded from Bexel User Area, **PATH Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.2\Exchange**, file **Exercise inputs - New Schedule 01.jpg**.

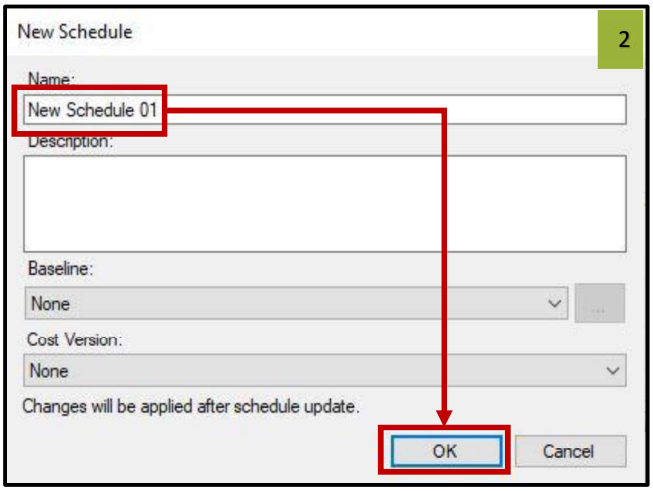
8.2.1.1. Create New Schedule

1. Activate the **Schedule Editor** tab. → Click on the **New Schedule** command within the **Schedule Editor**. →

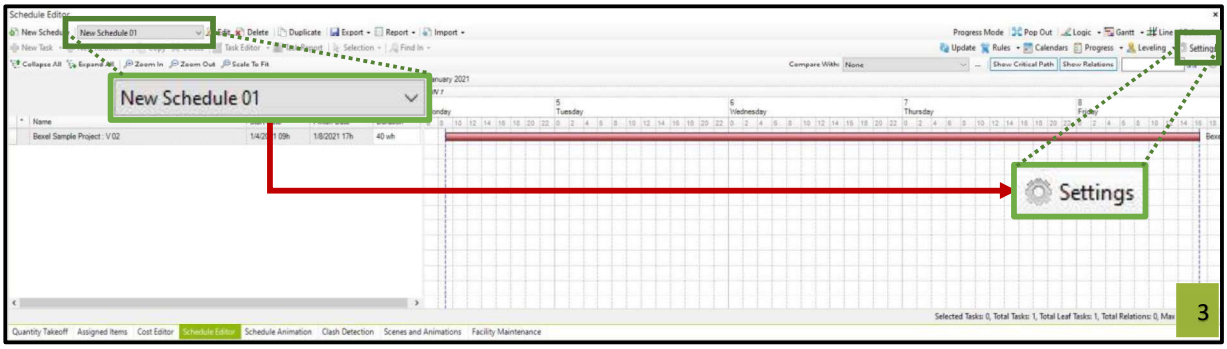


In the **New Schedule** window define the basic information about the schedule. Besides the name which is mandatory, it is also important to properly define Cost version for a specific schedule. This is especially important in case of schedule creation through **Creation Wizard** since schedule methodology is based on **Cost version** structure.

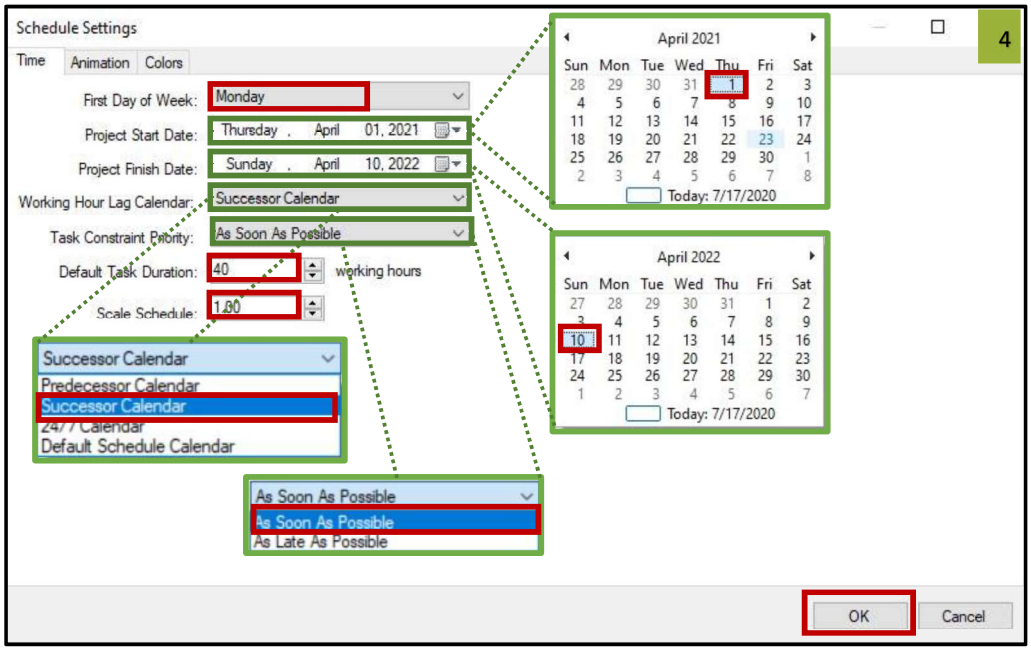
2. The **New Schedule** window opens where we set the schedule **name** **New Schedule 01**. In this exercise we create schedule manually, without using Creation wizard, so we won't set Cost version now. → Click the **OK** button to close the **New Schedule** window.



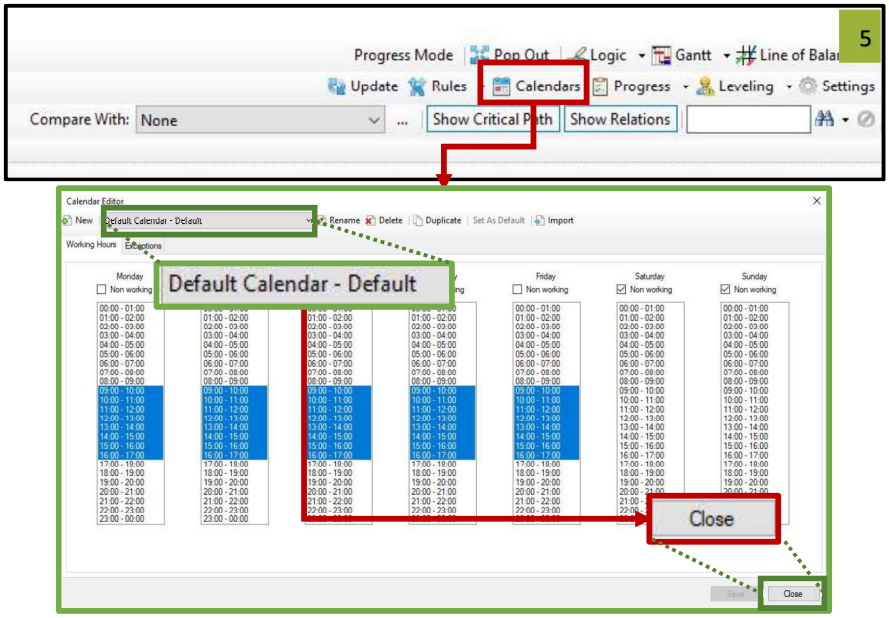
3. Set the created schedule active. Click the **Settings** button in the right upper side of the **Schedule Editor** palette. →



4. The **Schedule Settings** window opens. Here we set the main schedule characteristics. Set the **First Day of Week** Monday. The Project starts on the 01st of the April, 2021, click on the arrow next to the **Project Start Date** and in calendar window choose the start date. The Project Finish date is 10th April, click on the arrow next to the **Project Finish Date** and in calendar window choose desired date. For the **Working Hour Lag Calendar**, we choose the **Successor Calendar**. For the **Task Constraint Priority**, we choose the **As Soon As Possible** option. **Default Task Duration** is 40 working hours. The **Scale Schedule** factor stays 1. → Click the **OK** button to close the **Schedule Settings** window.

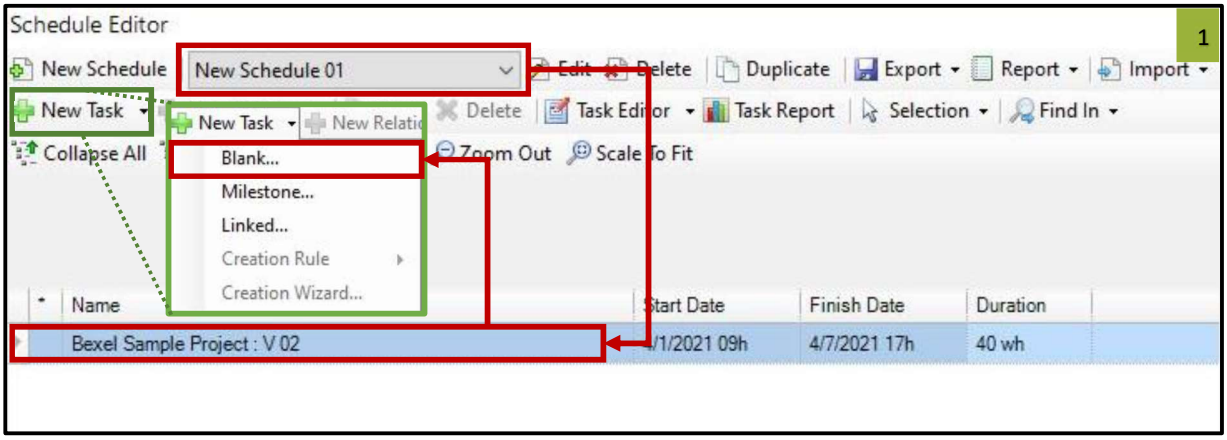


5. Click the **Calendars** button to set the actual Calendar for created schedule. → The **Calendar Editor** window opens where we can create new calendar, import or edit existing calendar. Also, we can set calendar exceptions. We use Default calendar, choose the **Default Calendar-Default**. → Click the **Close** button to close the window.

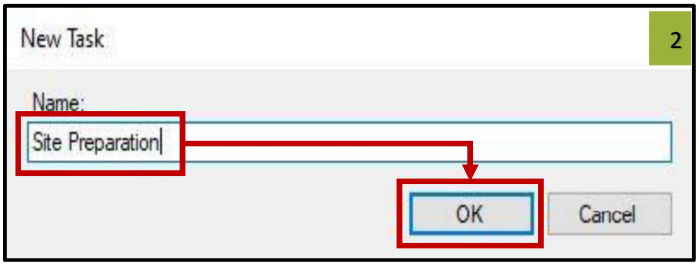


8.2.1.2. Create New Task

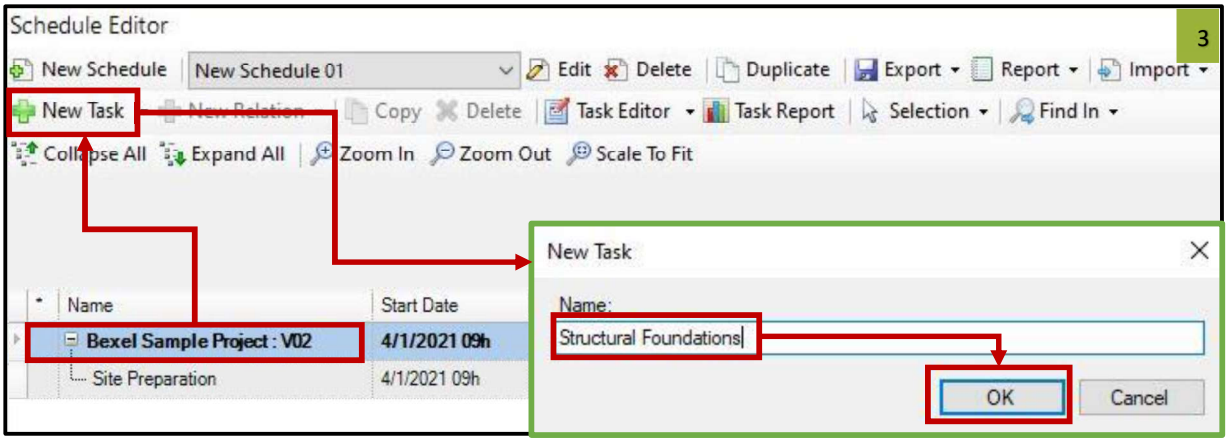
1. The **New Schedule 01** is active. To create new task, select the main task that exists in the task field. Click on the arrow next to the **New Task** button and from the drop-down list choose the **Blank** option. → The **Blank New Task** command we can activate also with the click on the **New Task** button. →



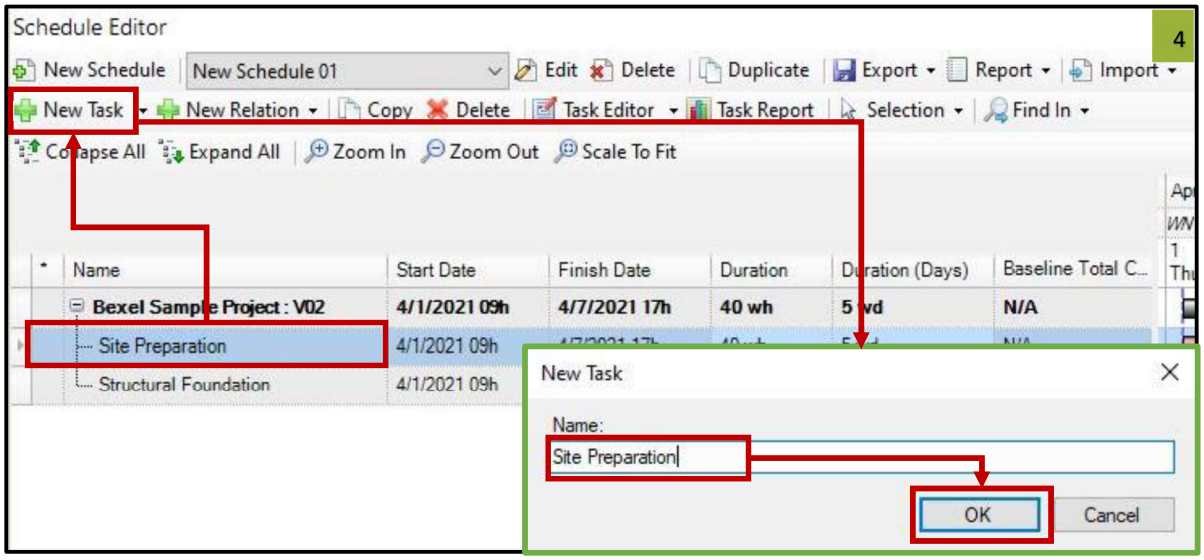
2. The **New Task** window opens where we enter the **Task Name**, here we enter task name **Site Preparation**. → Click the **OK** button to close the window. →



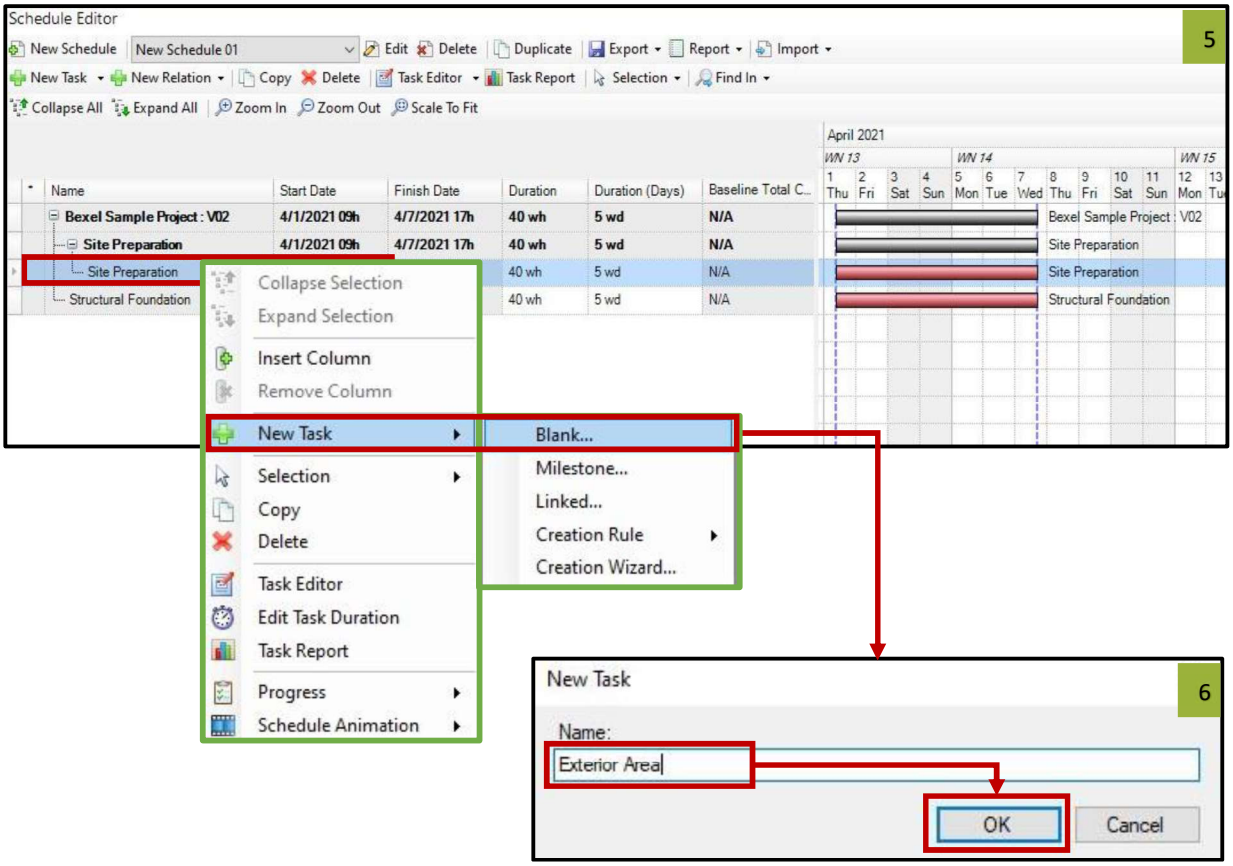
3. Selection in the task field is the same, click on the **New Task** button and enter the task name in the **Name** field within the **New Task** window. → Enter the task **Name** **Structural Foundations**. → Click the **OK** button to close the window. →



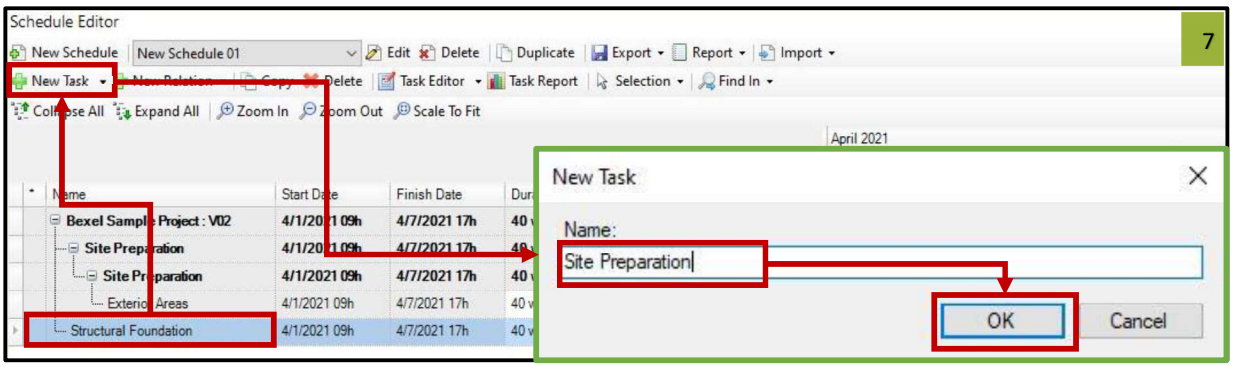
4. Now we are going to create sub-tasks within the **Site Preparation** task. → Select the **Site Preparation** task. → Click on the **New Task** button and enter the new task name within the **New Task** window. → We enter the **Name** **Site Preparation**. → Click the **OK** button to close the window.



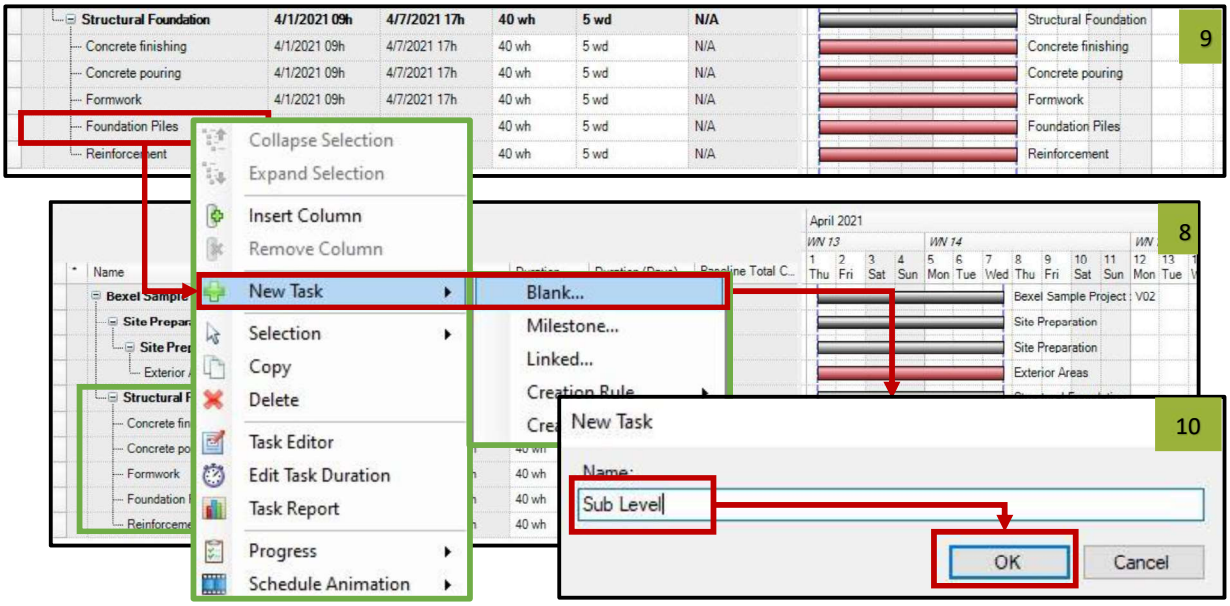
5. Select the previously created sub-task, **Site Preparation** and instead of click on the **New Task** button, do the **right-click** on the selected task. → The command many opens, click on the **New Task** command and choose the **Blank** option. →
6. The **New Task** window opens where we enter the new task **Name** **Exterior Areas**. → Click the **OK** button to close the window. →



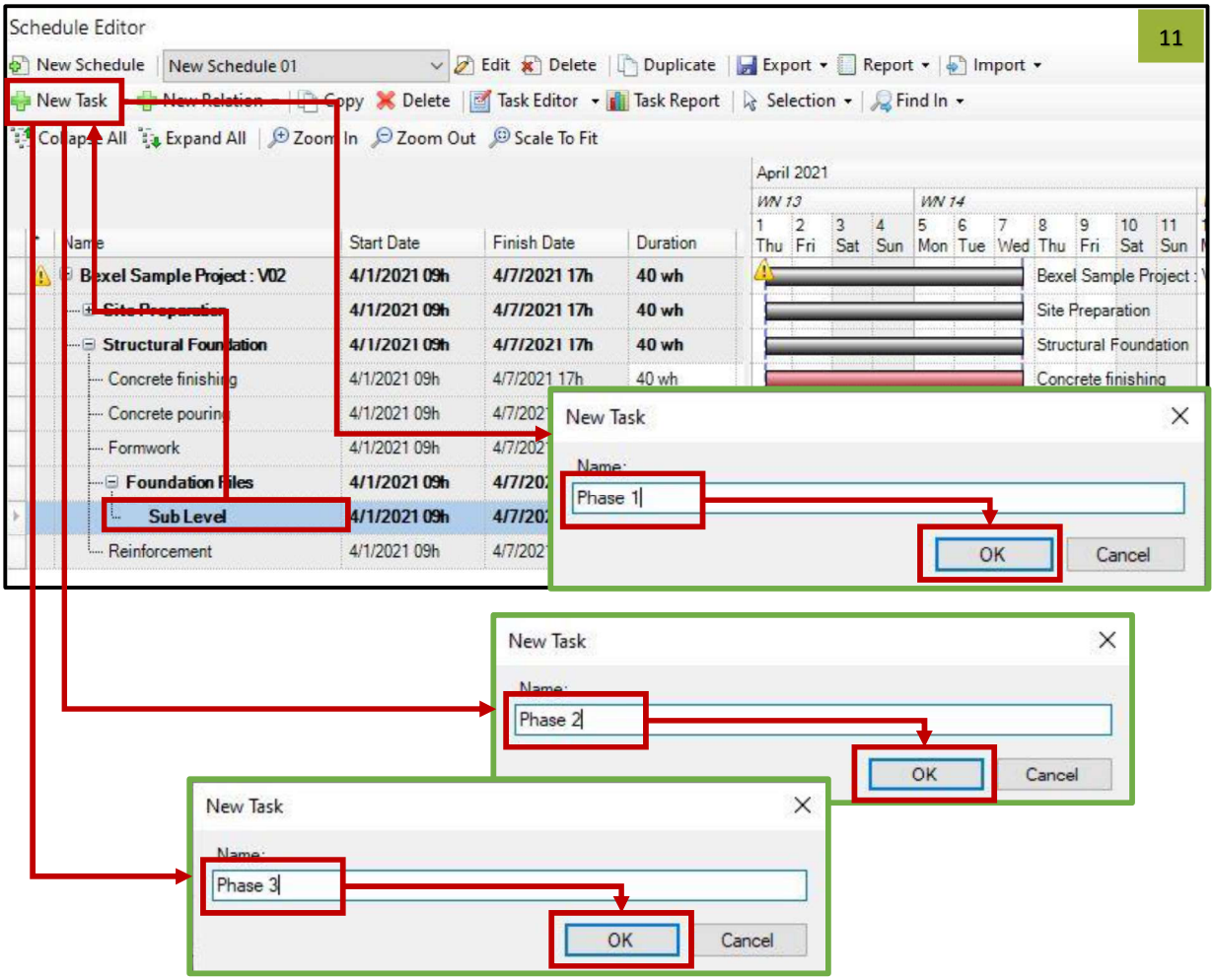
7. Now we are going to create sub-tasks within the **Structural Foundation**. → Select **Structural Foundation** task. → Click the **New Task** button. Enter the new task **Name** within the **New Task** window. Enter the name **Foundation Piles**. → Click the **OK** button to close the window. →



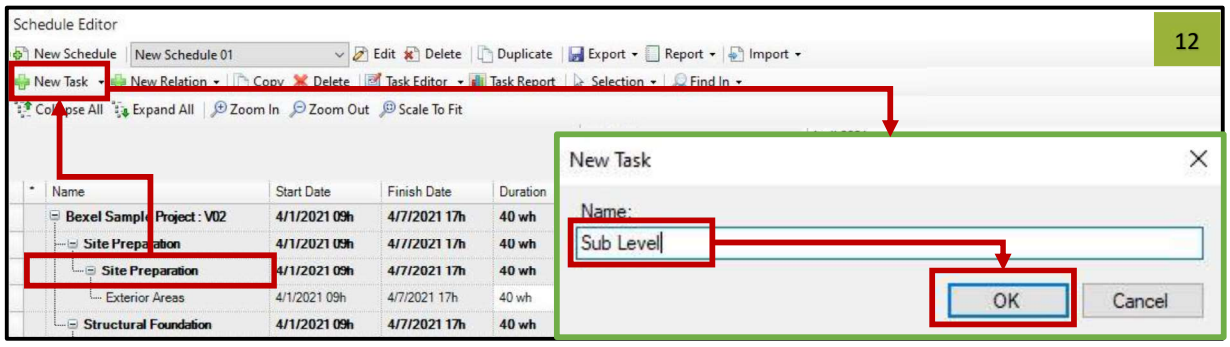
8. Do the same steps to create few more tasks within **Structural Foundations**, such as **Formwork, Reinforcement, Concrete pouring, Concrete finishing**. →
9. Add new sub-task within **Foundation piles** with **right-click** on it. → Command many appears, click on the **New Task** command and choose the **Blank** option. →
10. Enter the new task **Name** **Sub Level** within the **New Task** window. → Click the **OK** button to close the window. →



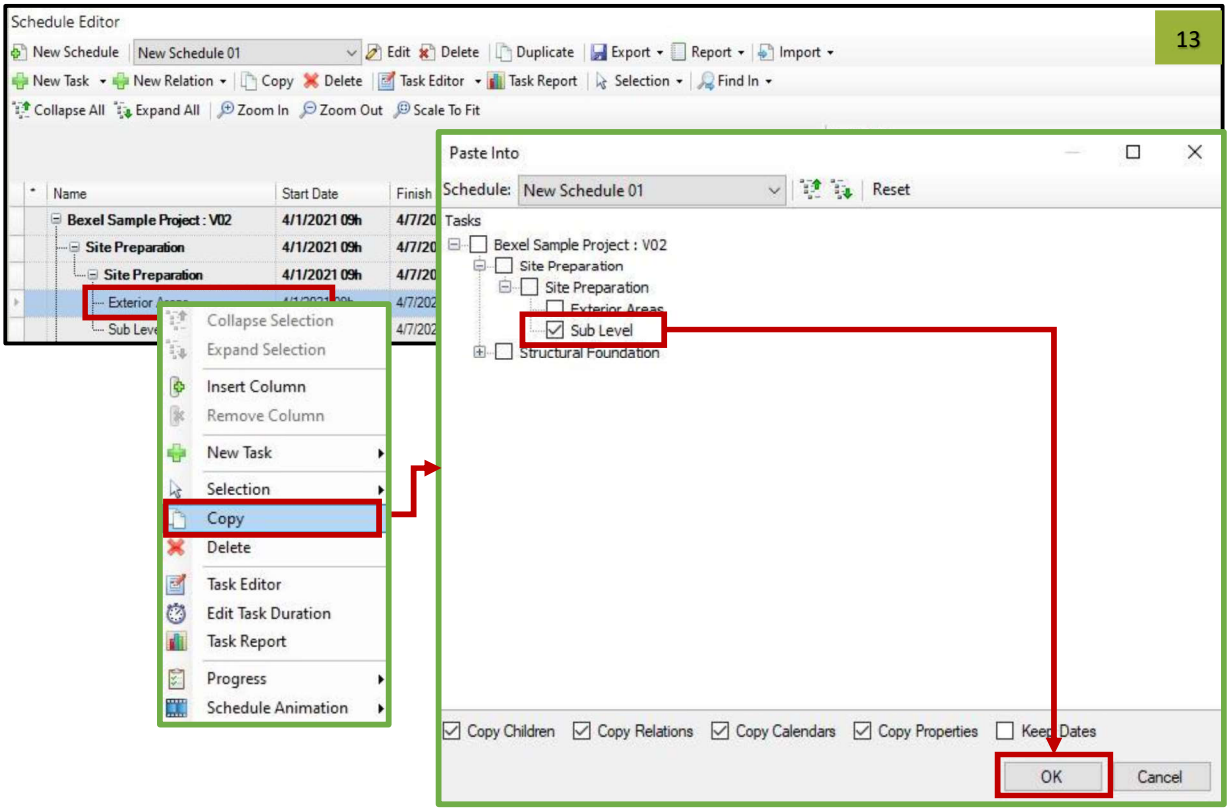
11. Select the previously created task **Sub Level**, click the **New Task** button and define the name for leaf task **Phase 1** within the **New Task** window. → Click the **OK** button to close the window. → Click the **New Task** button again to add new leaf task **Phase 2** within **Sub Level** task (all within **Concrete finishing** task). → In the **New Task** window enter the new task **Name** **Phase 2** and click the **OK** button to close the window. →



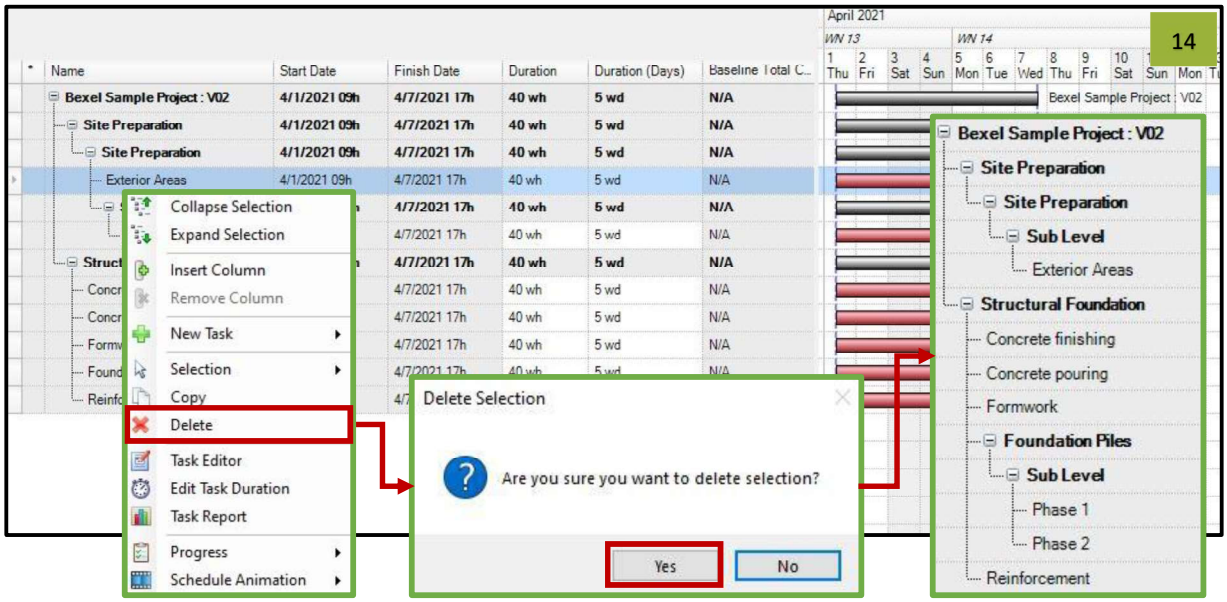
12. Now we will go back on the **Site Preparation** tasks where we will add new task **Sub Level**. → Select the **Site Preparation** task and click the **New Task** button. → Enter the new task **Name** **Sub Level** within the **New Task** window. → Click the **OK** button to close the window. →



13. **Copy Task:** Copy the **Existing Areas** task as leaf task within the **Sub Level** task. → **Right-click** on the **Exterior Areas**, click on the **Copy** command. → The **Paste Into** window opens where we choose the place where to paste copied task. Check the **Sub Level** task within the **Site Preparation**. → Click **OK** to close the window. →



14. **Delete Task:** To delete previously copied task **Exterior Areas**, do the right-click on it and choose the **Delete** command. → The software warns us if we are sure that we want to delete selection. Click the **Yes** button to delete selection.

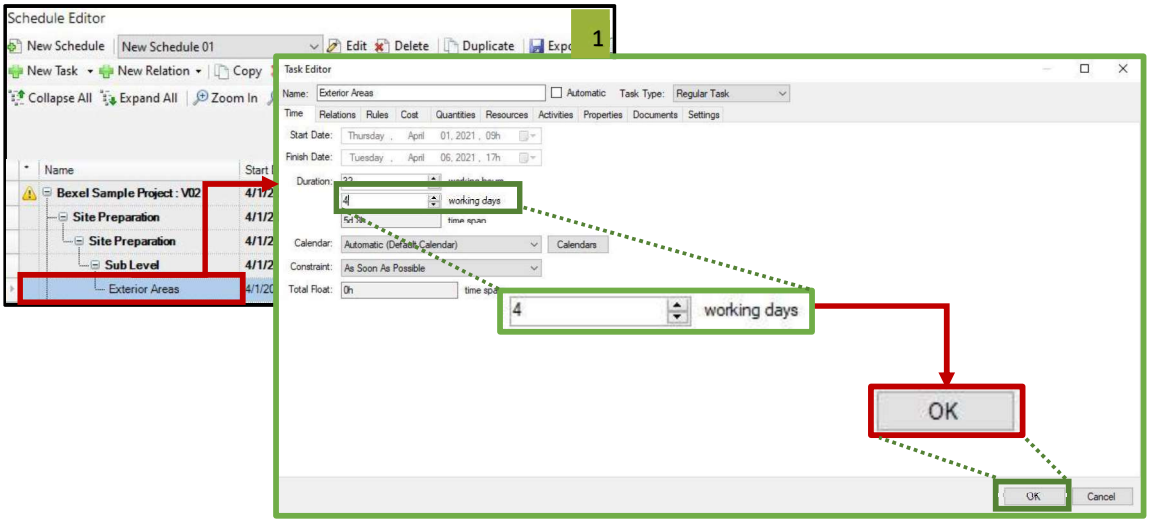


NOTE: When we create new task, first we select the existing task within the new one should appear.

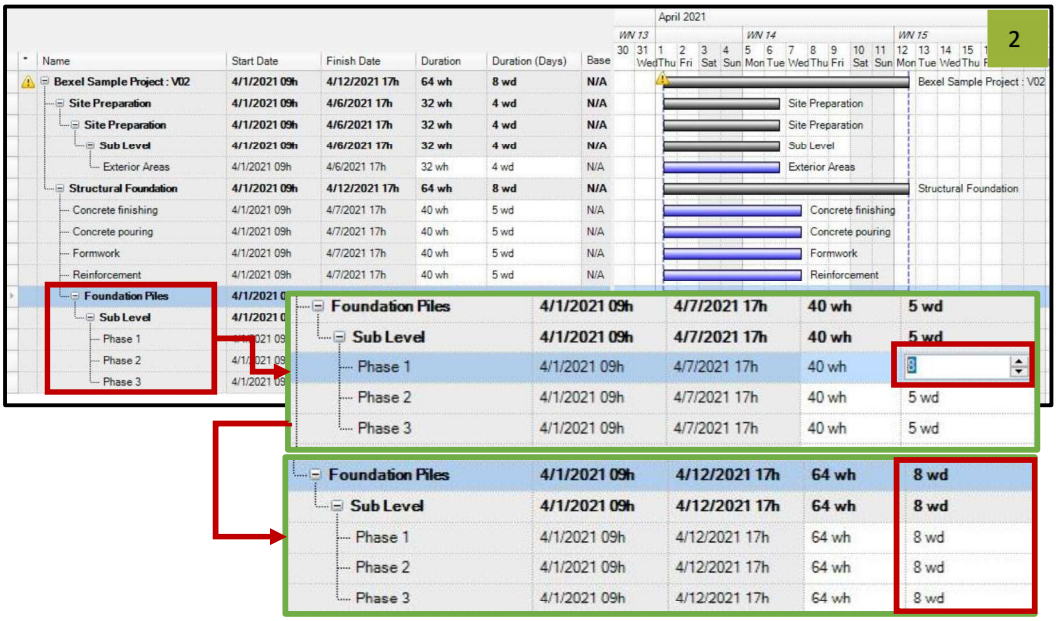
WARNING: Deleting the task is an irreversible act.

8.2.1.3. Task Duration and Task Relations

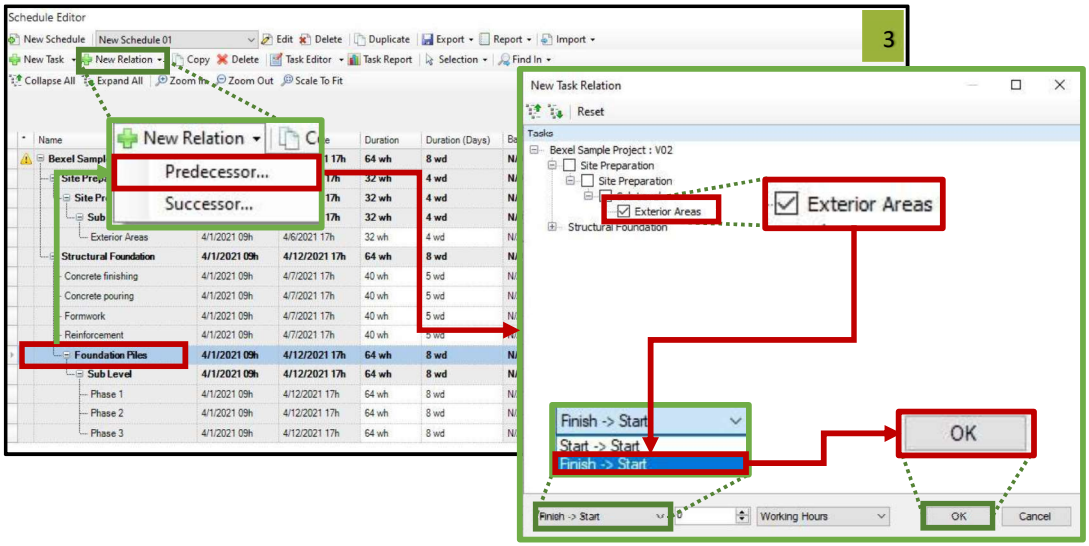
1. There are several ways to change Task Duration. One of them is **double click** on the task that should be changed, in this case we will click on the **Exterior Areas** task. → The **Task Editor** window opens. The **Time** card is active. → In the **Working Days** field change task duration to 4 working days. → Click the **OK** button to close the **Task Editor**. →



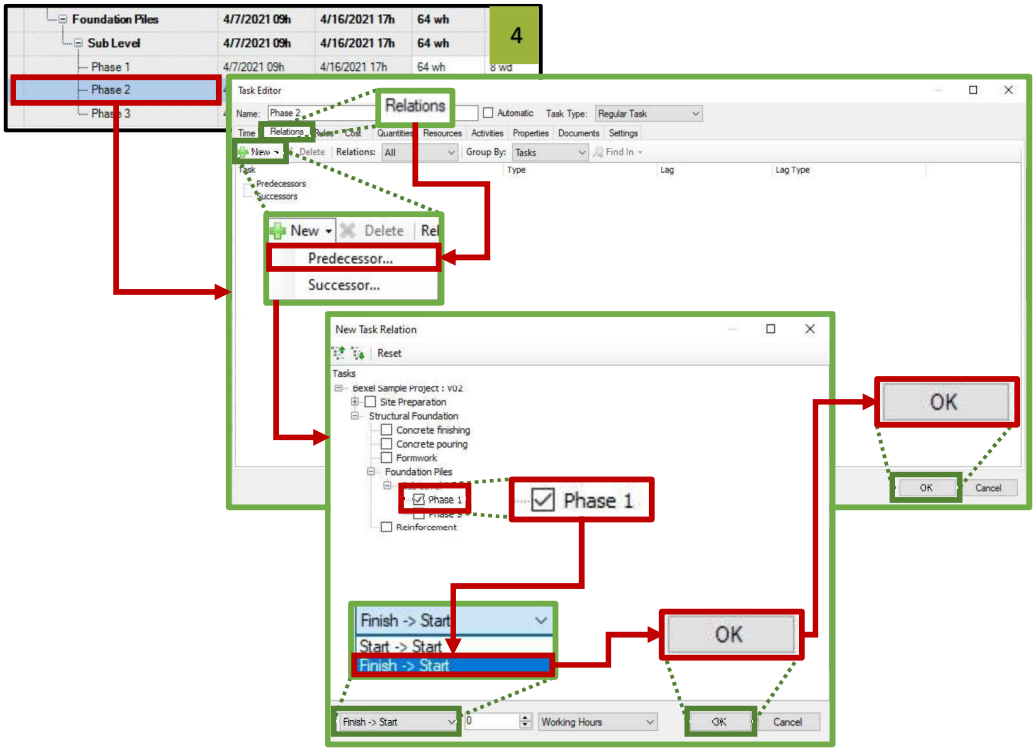
2. Next task is **Foundation Piles** where we should set duration 8 working days for each phase of this task. Here we change duration with **double click** in the **Duration (Days)** field and enter the desired value for phase duration. → **Double click** on the existing value for leaf task **Phase 1**, enter the value 8 (wd), press the **Enter** key on the keyboard. → Repeat this action for **Phase 2** and **Phase 3** leaf tasks within parent task **Foundation Piles**. →



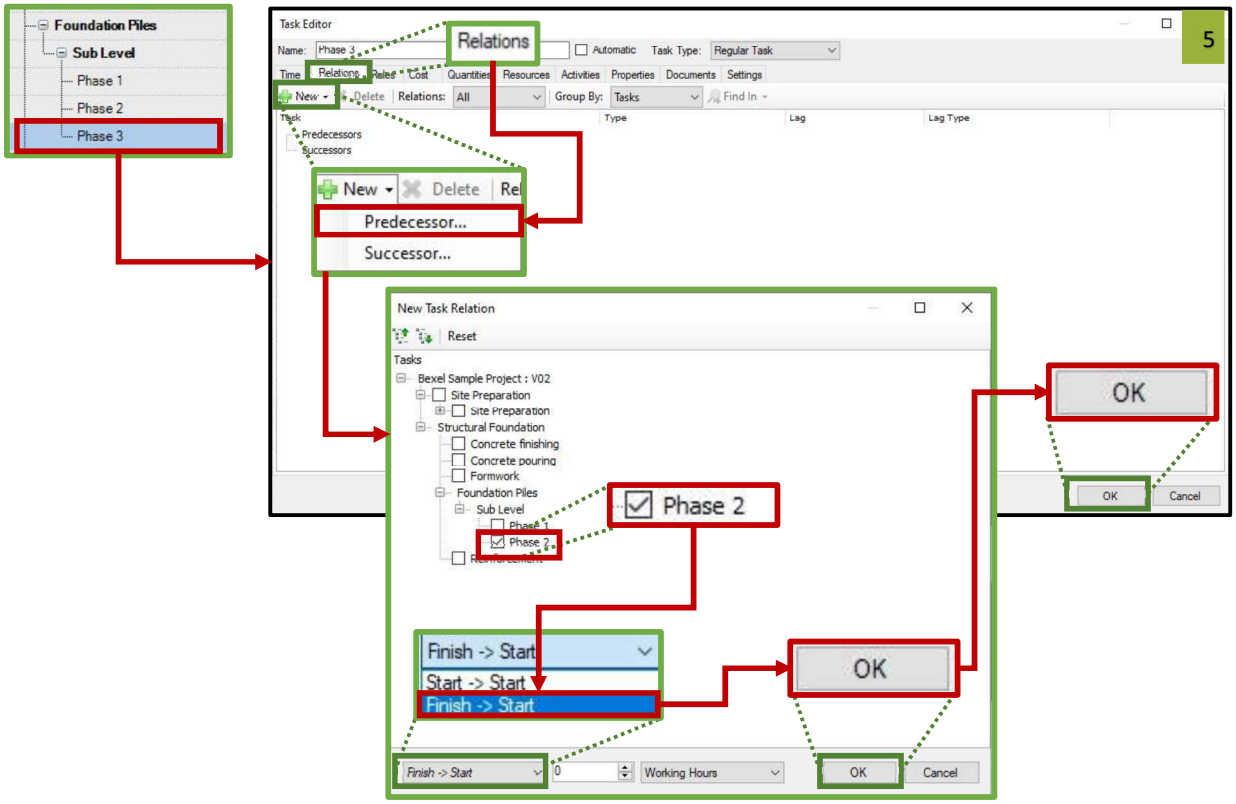
3. **Relations** between **Foundation Piles** tasks activities: Select **Foundation Piles** task. → Click on the **New Relation** button and from the drop-down list choose the **Predecessor** option. → We will set predecessor activity **Exterior Areas**, with relation Finish->Start. The **New Task** window opens, in the tasks tree check the **Exterior Areas** task which is within parent task **Site Preparation**. → In the bottom of the window choose relation **Finish->Start**. → Click the **OK** button to close the **New Task Relation** window. →

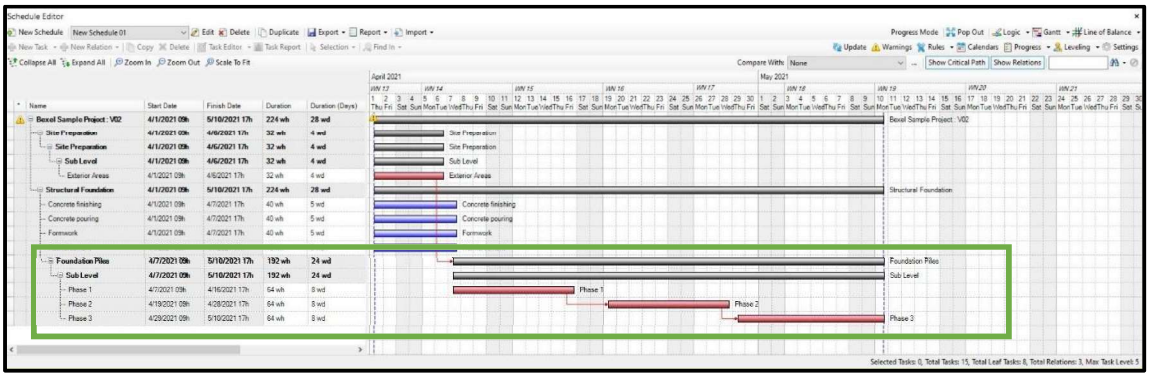


4. **Double click** on the **Phase 2** leaf task within **Foundation Piles** parent task. → The **Task Editor** window opens. → Select the **Relations** card. → Click on the **New** button and from the drop-down list choose the **Predecessor** option. → The **New Task Relation** window opens. Here we set the predecessor activity for the **Phase 2**, which is **Phase 1/Foundation Piles**. → Check the **Phase 1** leaf task. → Choose the **Finish->Start** relation. → Click the **OK** button to close the **New Task Relation** window. → Click the **OK** button to close the **Task Editor** window. →

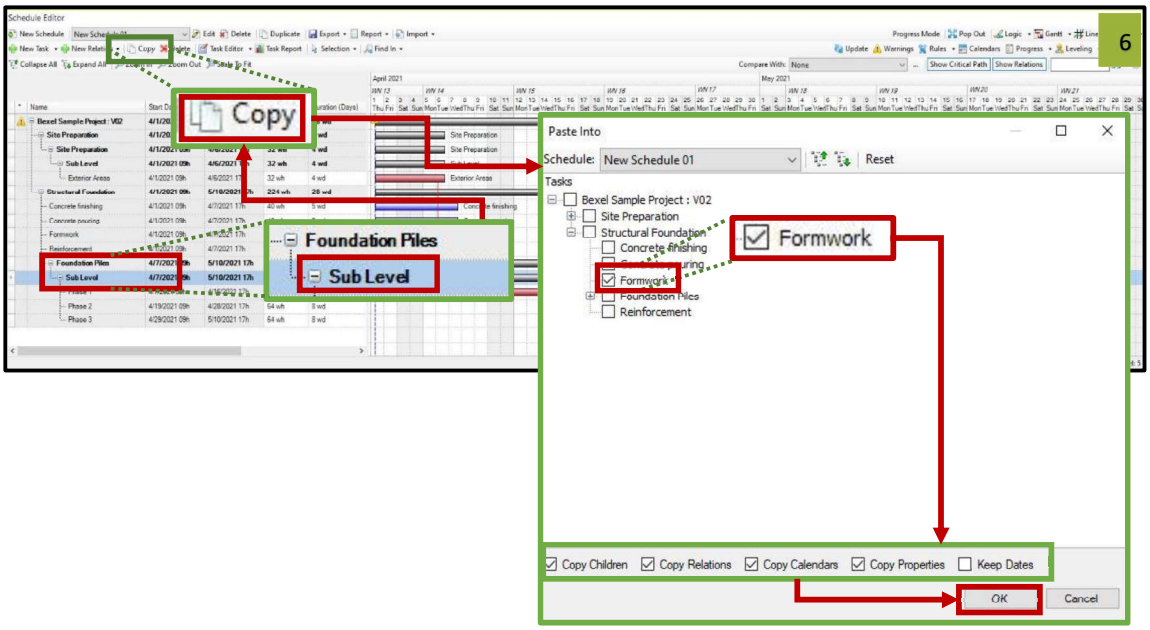


5. **Double click** on the **Phase 3** leaf task within **Foundation Piles** parent task. → The **Task Editor** window opens. → Select the **Relations** card. Click on the **New** button and from the drop-down list choose the **Predecessor** option. → The **New Task Relation** window opens. Here we set the predecessor activity for the **Phase 3**, which is **Phase 2/Foundation Piles**. → Check the **Phase 2** leaf task. → Choose the **Finish->Start** relation. → Click the **OK** button to close the **New Task Relation** window. → Click the **OK** button to close the **Task Editor** window. →

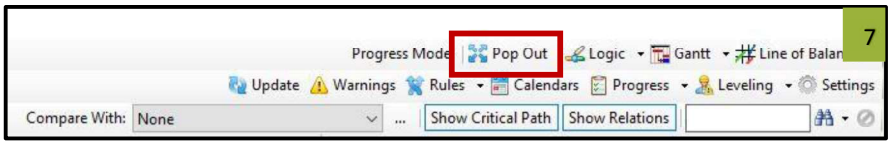




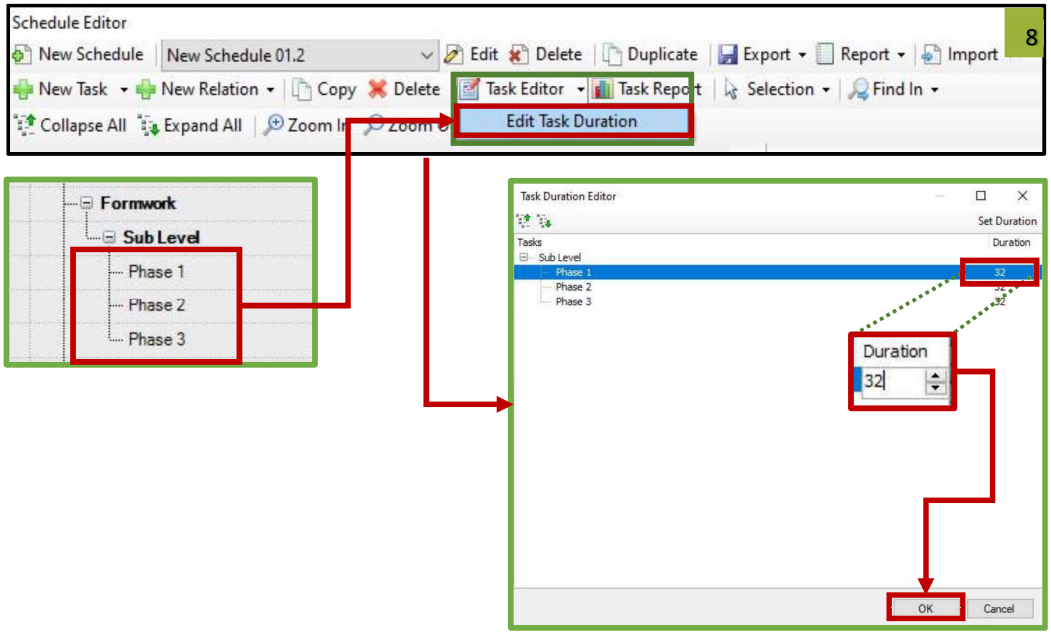
6. In the next step we will use created leaf tasks we created within **Foundation Piles** and copy them to the task **Formwork**, which does not have sub-tasks yet. → Select **Sub Level,** task within **Foundation Piles**. → Click the **Copy** button. → The **Paste Into** window opens. → Check the task where we want to copy previous selection. In this case we check the Formwork task. → There are options in the bottom of the **Paste Into** window, check them: **Copy Children**, **Copy Relations**, **Copy Calendars**, **Copy Properties**. This way we will copy children tasks and their relations. → Click the **OK** button to close the **Paste Into** window.



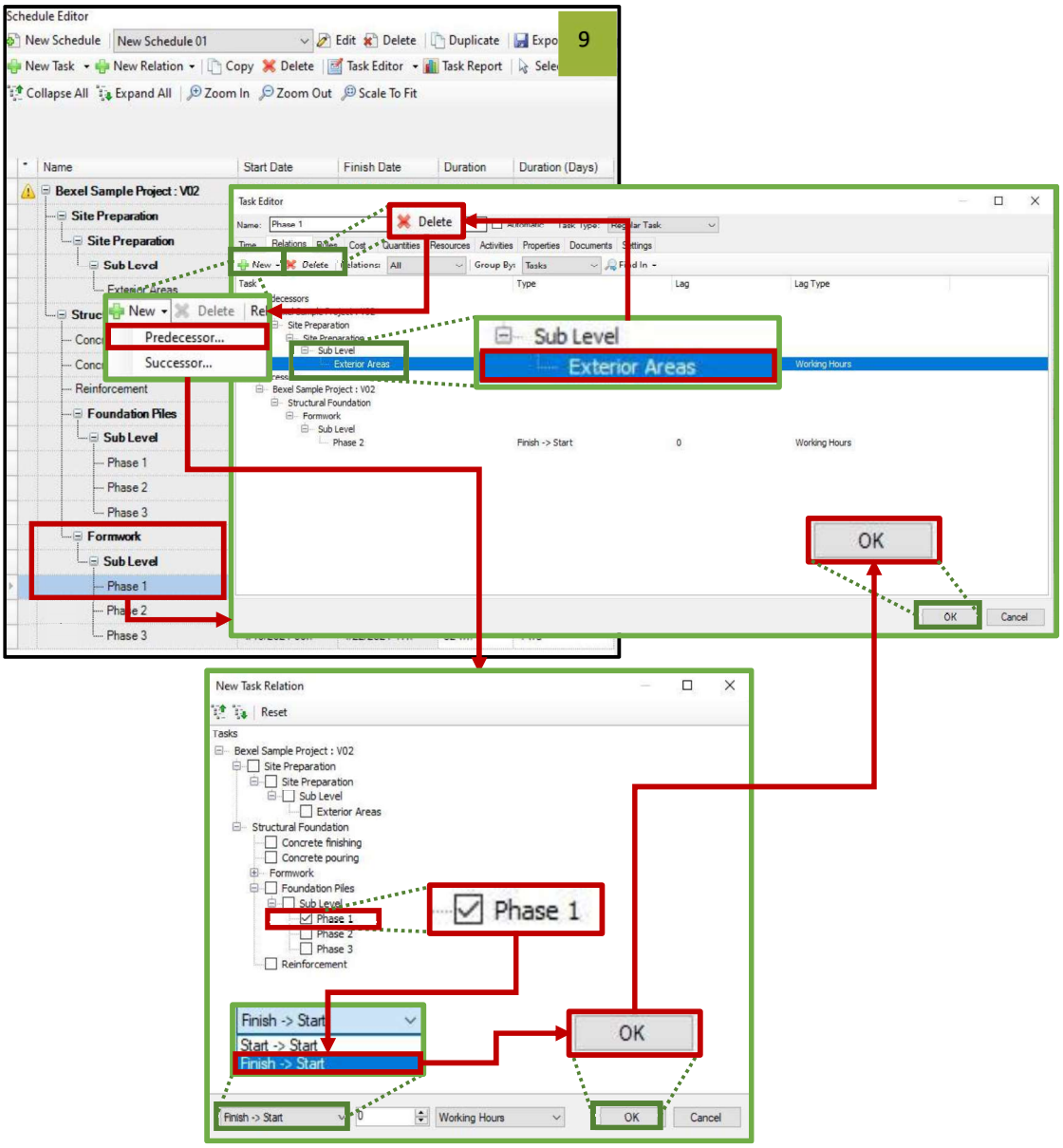
7. For easier work we can pop out the **Schedule Editor** palette by clicking on the **Pop Out** button that is placed in the upper right part of the Schedule editor palette window.



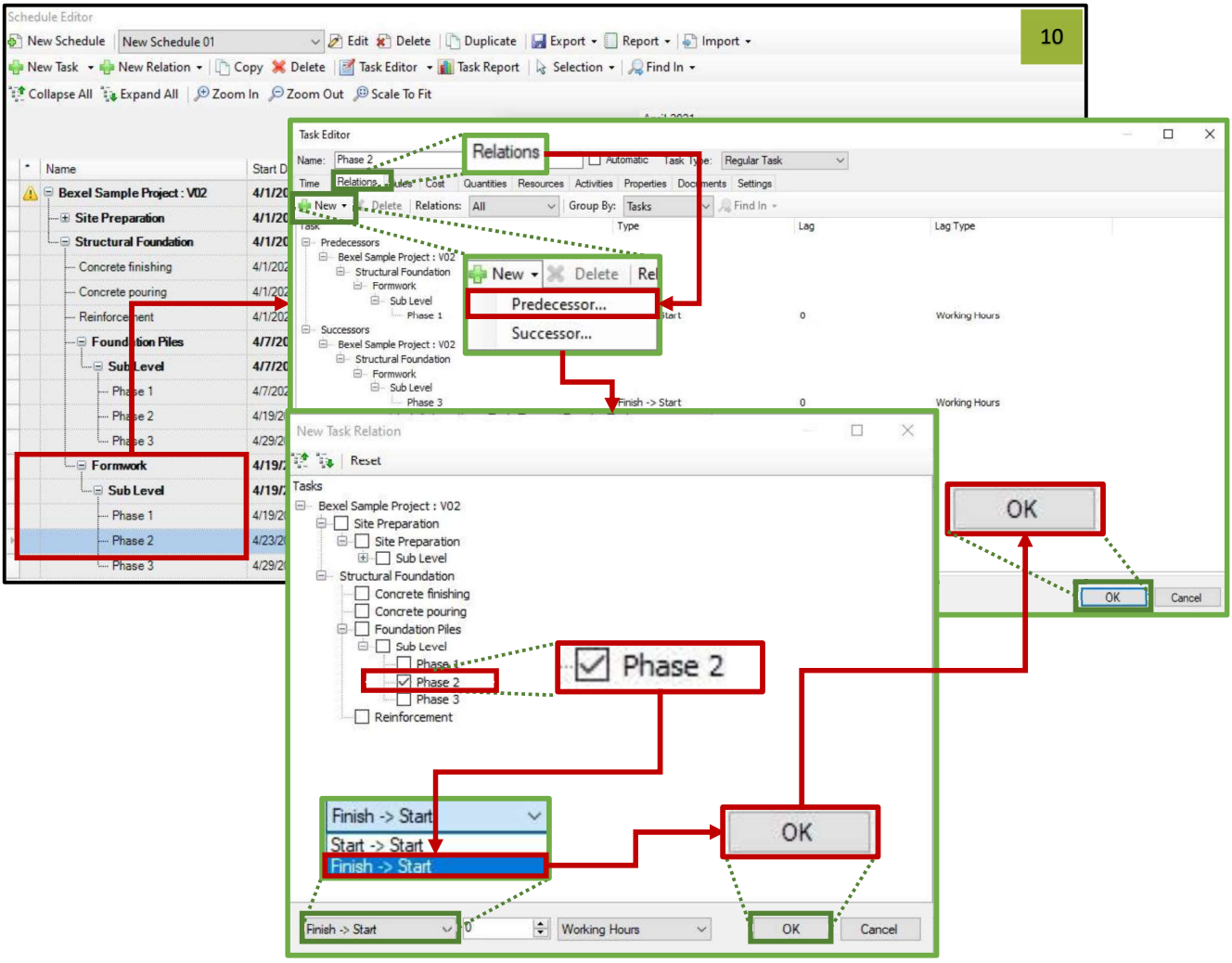
8. After we have copied tasks to the **task Formwork**, we are going to check duration and relations of copied leaf tasks and set the desired characteristics. To change leaf task duration within the **Formwork**, select desired task. In this case we select three tasks **Phase 1, Phase 2 and Phase 3** (use CTRL key for group selection)**.** → Click the **arrow** next to the **Task Editor** button. Choose the **Edit Task Duration** option. → The **Task Duration Editor** window opens where we change task duration with double click on the duration value. Enter the value 32 working hours (it is 4 working days). Do the same for all three tasks. → Click the **OK** button to close the window.



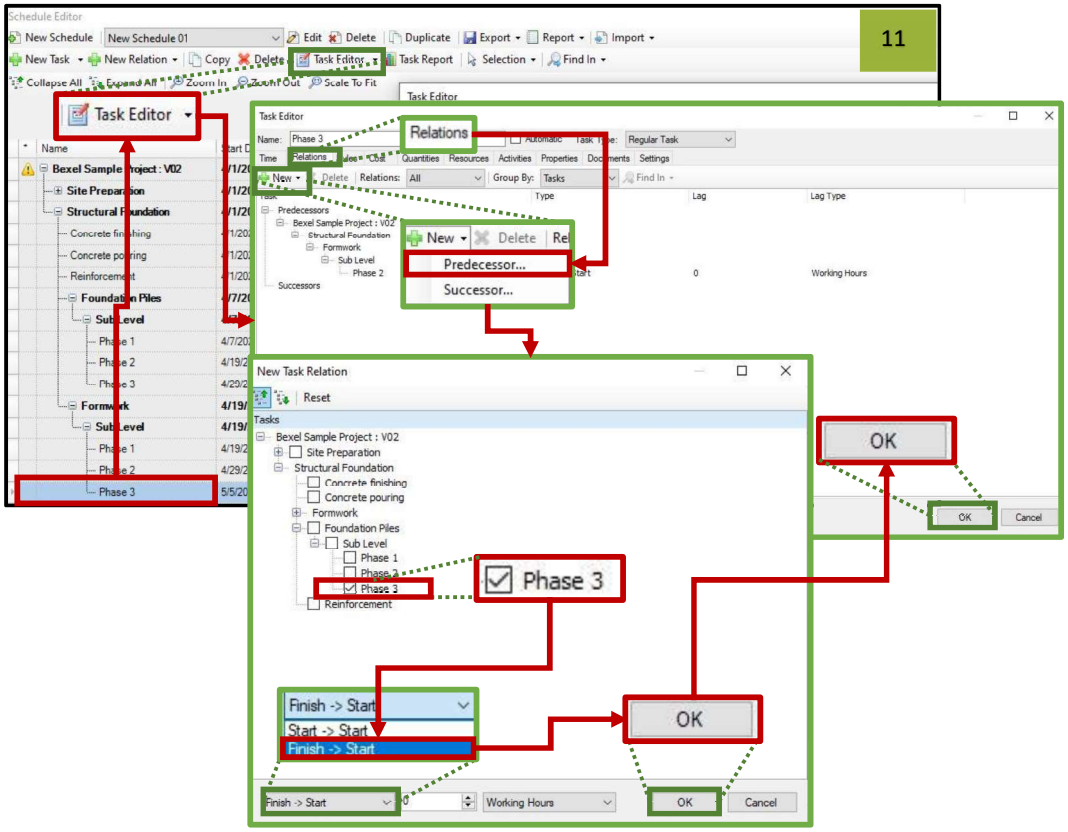
9. **Double click** on the leaf task **Phase 1** within parent task **Formwork**. → The **Task Editor** window opens. → Click on the **Relation** card. Here we see existing relations that we transfer with copied tasks earlier. → Remove existing relation: Select existing predecessor activity Exterior Areas. Click the **Delete** button. → Add new predecessor activity by clicking on the **New** button. From drop-down list choose the **Predecessor** option. → The **New Task Relation** window opens where we set new predecessor activity. Check **Phase 1/Foundation Piles**. → Choose the **Finish->Start** relation. → Click the **OK** button to close the **New Task Relation** window. → Click the **OK** button to close the **Task Editor** window. →



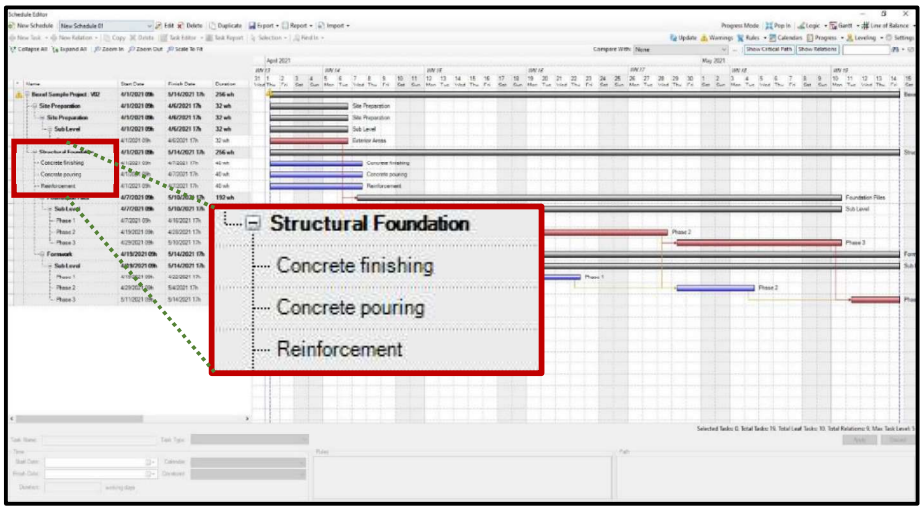
10. **Double click** on the leaf task **Phase 2** within parent task **Formwork**. → The **Task Editor** window opens. → Click on the **Relation** card. Here we see existing relations that we transfer with copied tasks earlier. We should add new predecessor activity by clicking on the **New** button. → From drop-down list choose the **Predecessor** option. → The **New Task Relation** window opens where we set new predecessor activity. Check **Phase 2/Foundation Piles**. → Choose the **Finish->Start** relation. → Click the **OK** button to close the **New Task Relation** window. → Click the **OK** button to close the **Task Editor** window. →



11. Select the leaf task **Phase 3** within parent task **Formwork**. → Click the **Task Editor** button. → The **Task Editor** window opens. → Click on the **Relation** card. Here we see existing relations that we transfer with copied tasks earlier. → We should add new predecessor activity by clicking on the **New** button. From drop-down list choose the **Predecessor** option. → The **New Task Relation** window opens where we set new predecessor activity. Check **Phase 2/Foundation Piles**. → Choose the **Finish->Start** relation. → Click the **OK** button to close the **New Task Relation** window. → Click the **OK** button to close the **Task Editor** window. →

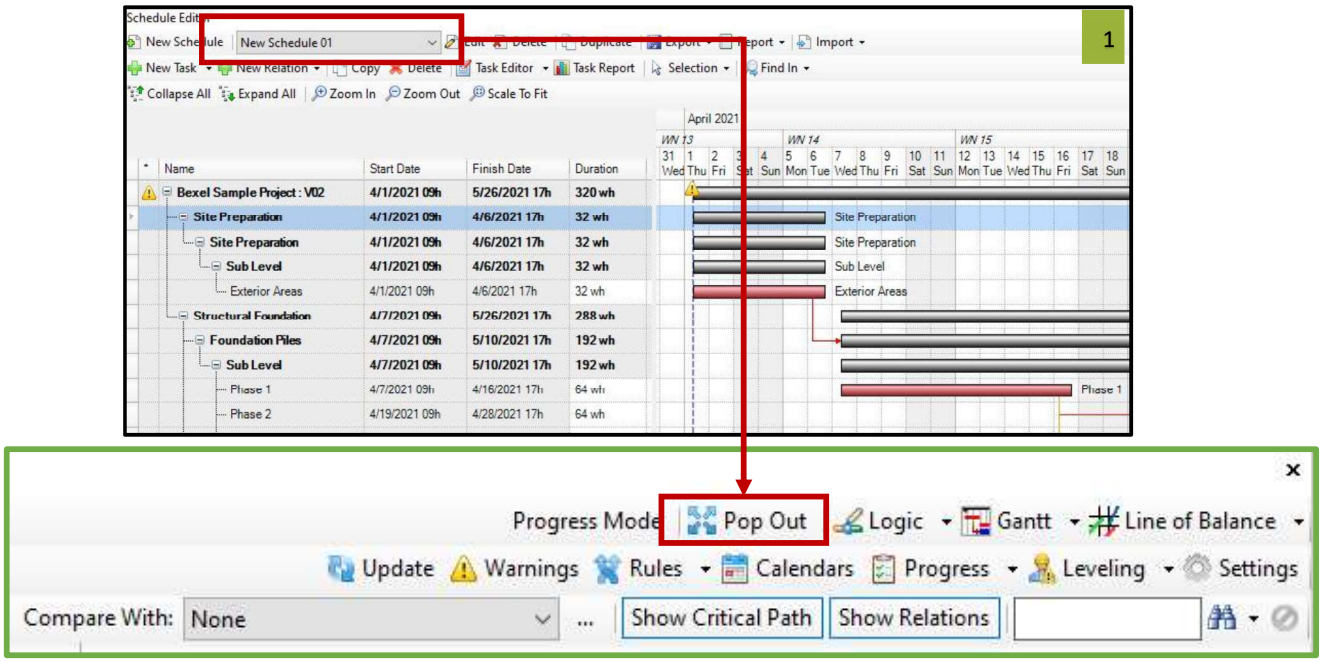


For further exercise we can create sub-tasks and their relations within **Structural Foundation** tasks we have created in the **Chapter 8.2.1.2**. Follow the exercise inputs for the tasks naming and relations between schedule activities.

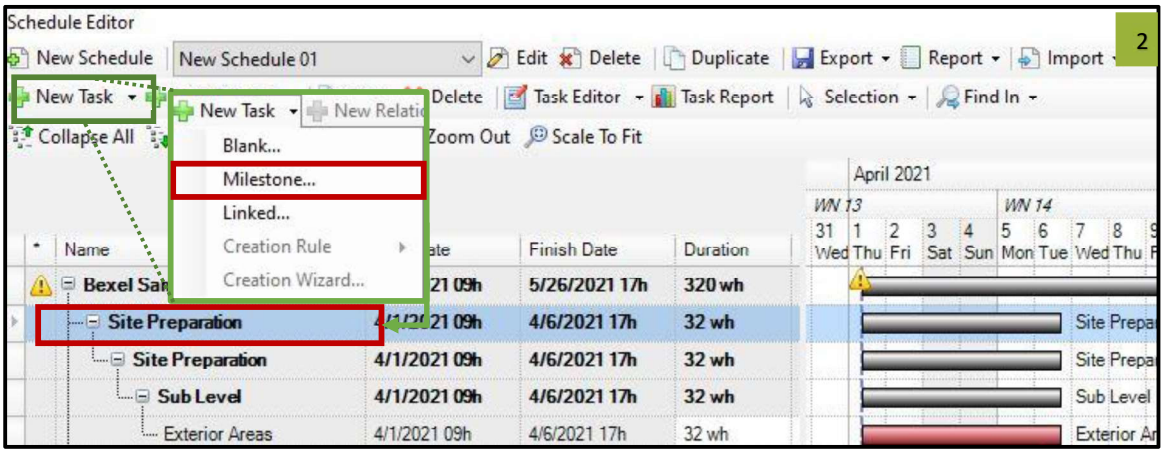


8.2.1.4. Create Milestone

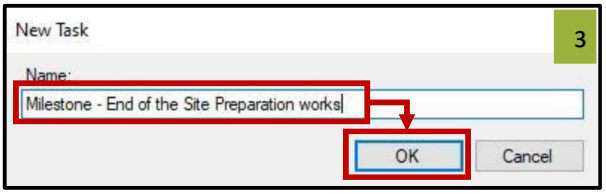
1. The **New Schedule 01** is active. → Pop out **Schedule Editor** by clicking on the **Pop Out** button.



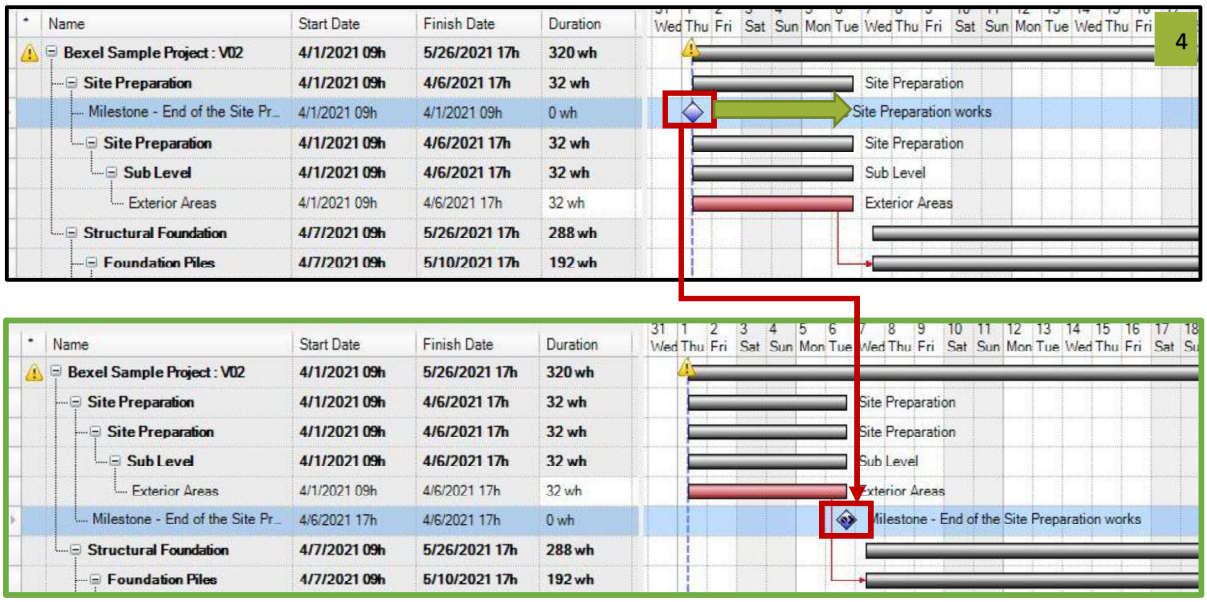
2. Select task in the task field where the new task Milestone should appear. Select the **Site Preparation** parent task. → Click on the arrow next to the **New Task** button and from the drop-down list choose the **Milestone** option. →



3. The **New Task** window opens where we enter the Milestone **Name**, here we enter task name **Milestone – End of the Site Preparation works**. → Click the **OK** button to close the window. →

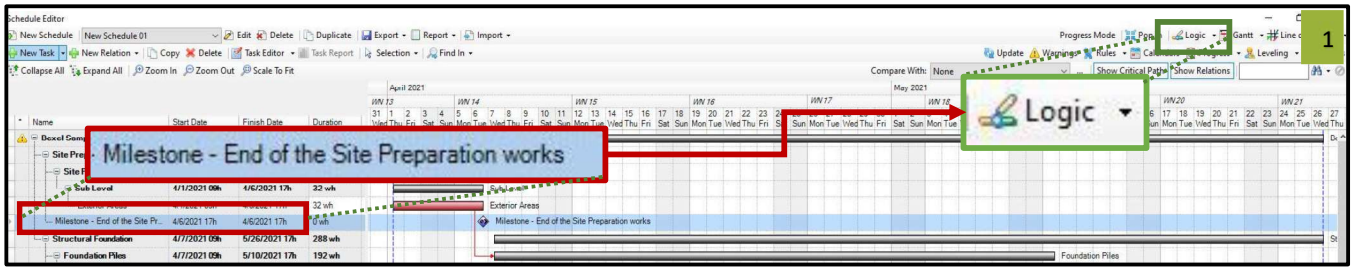


4. Created Milestone appears in the tasks list. → Schedule Gant view is active. **Drag** the created Milestone using left mouse click, **move** it on the right until the end of the Site Preparation Gant line and **drop** it there. This way we have manually moved desired activity directly in the schedule Gant view. →



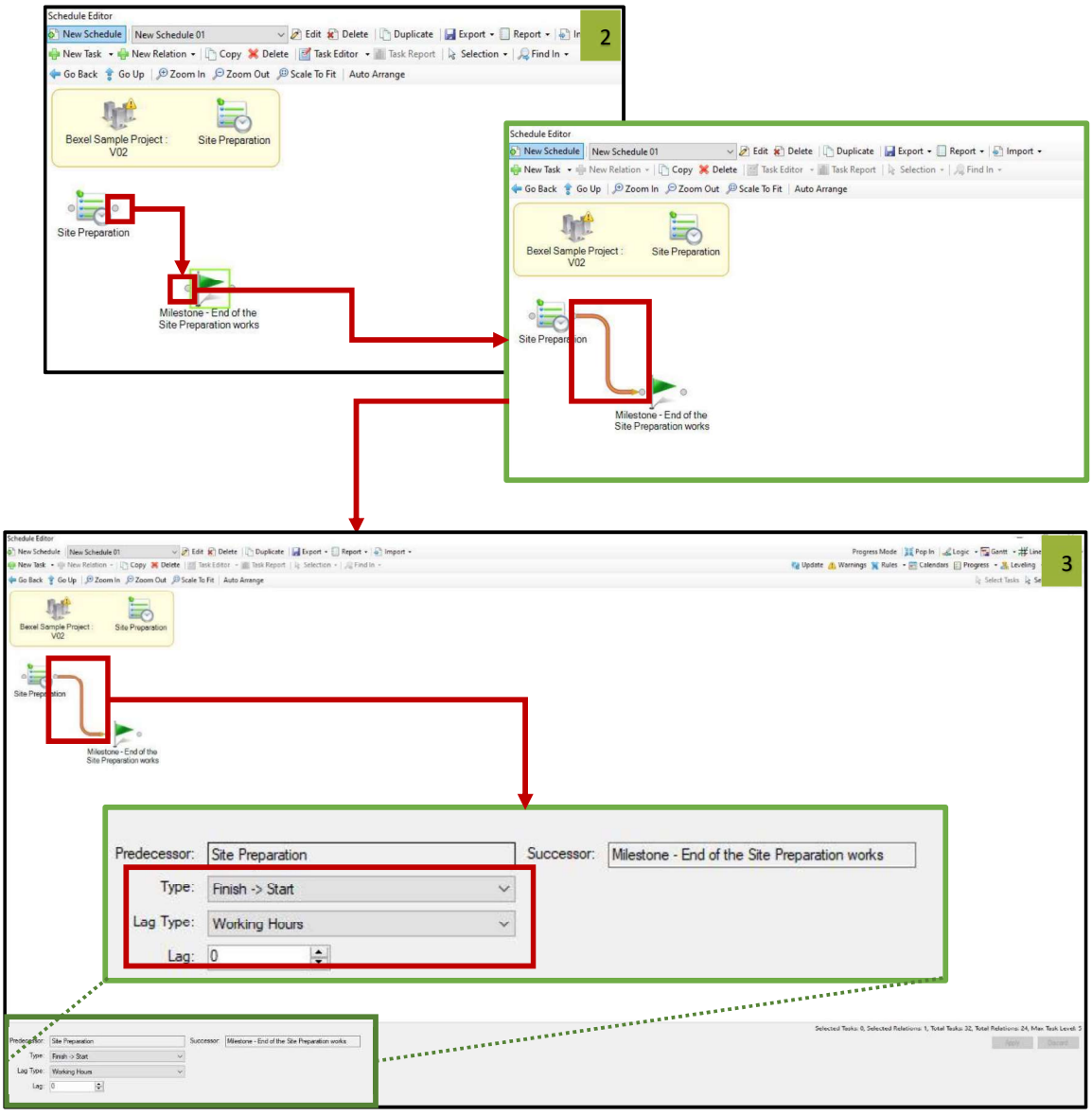
3.2.1.5. Schedule Logic Type

1. Select created Milestone in the tasks list. Click on the **Logic** button to activate Logic schedule type of view. Here we will set relation between tasks directly in the Logic view. →



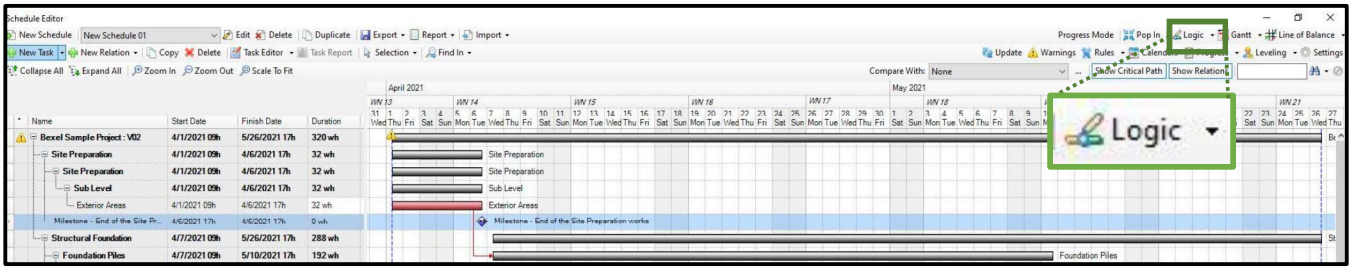
2. To create Finish -> Start relation between **Site preparation** works and created milestone, **click** on the small circle on the right side of the **Site Preparation** task, **drag** move it to the right, just next to the **Milestone – End of the Site Preparation works** and **drop** it there. → The relation line appears between these two tasks. →
3. When we select this relation, in the bottom of the Schedule Editor window, the main information about selection appears. →

   Here we can also change characteristics of selected data, such as relation type, Lag Type and Lag. To apply changes, click the Apply button.

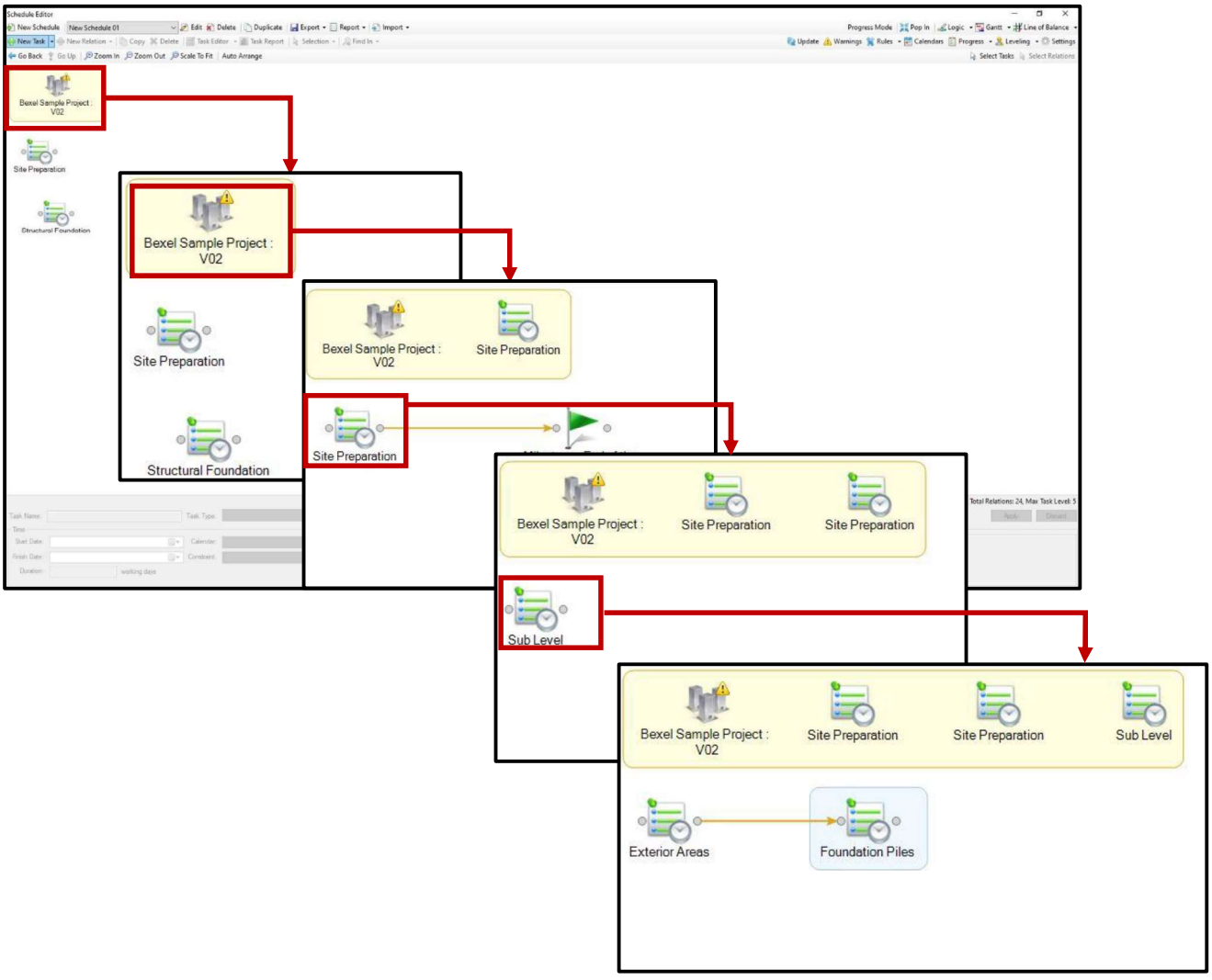


Schedule Logic Type Overview

The **Schedule Editor** palette pops out. Schedule Logic Type activates with click on the **Logic** button. We can create and edit tasks and relations between activities using the same commands as in Gant schedule type.



With **double click** on the certain task, the sub-tasks within it appears below. We will go to leaf task of **Site Preparation** parent task. **Double click** on the **Bexel Sample Project: V02**. **Double click** on the **Site Preparation Task**. **Double click** on the **Site Preparation** sub-task. **Double click** on the **Sub Level** sub-task.

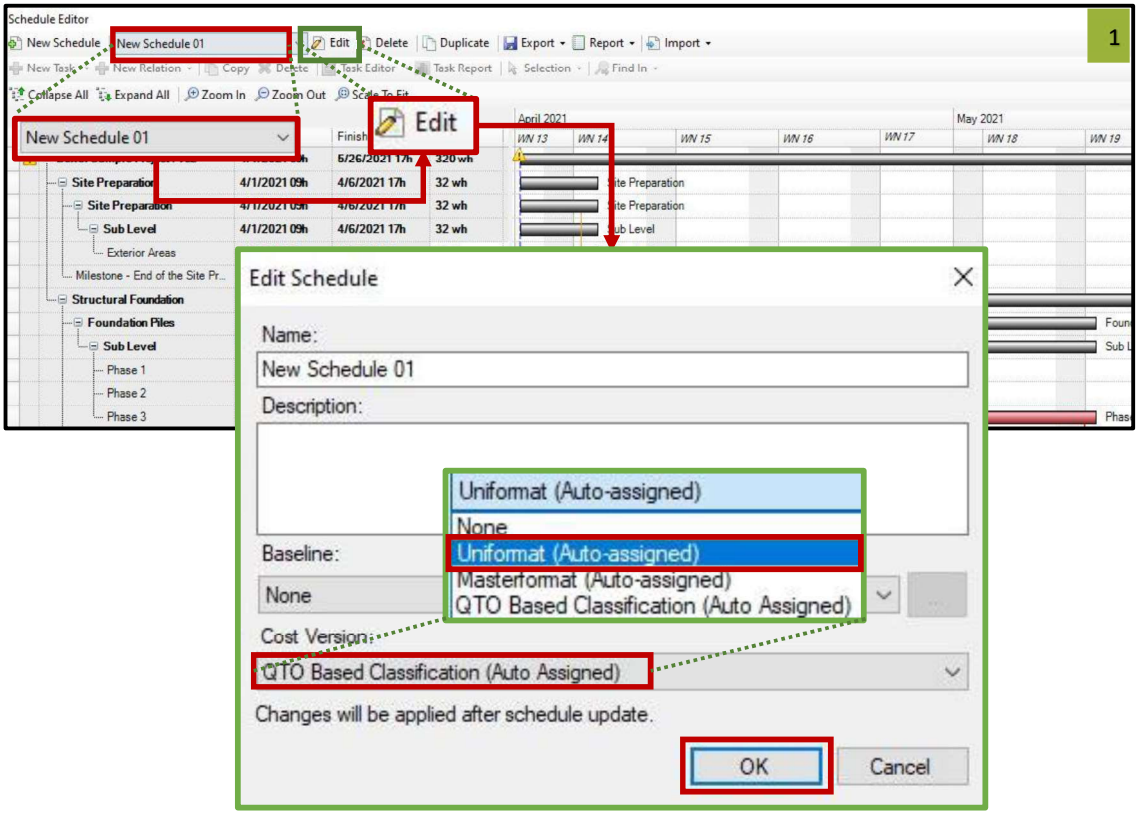


8.2.2. EDITING BASIC INFORMATION ABOUT THE SCHEDULE

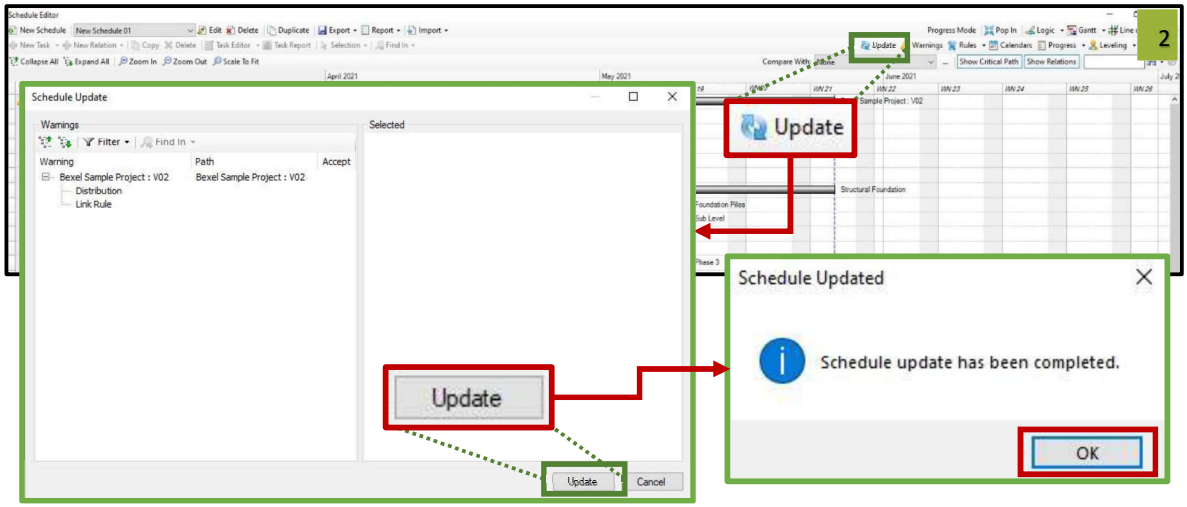
If we need to edit basic schedule information, we use the **Edit** command that is located in the upper part of the **Schedule Editor** palette.

In this exercise we will set Cost Version for the schedule we have previously created.

1. Set the **New Schedule 01** active. → Click the **Edit** button. → The **Edit Schedule** window opens. Here we can change Schedule Name, we can add Description and Cost Version. In the **Cost Version** field choose desired cost version. Here we choose **Uniformat (Auto-assigned)**. → Click **OK** button to close the **Edit Schedule** window. →

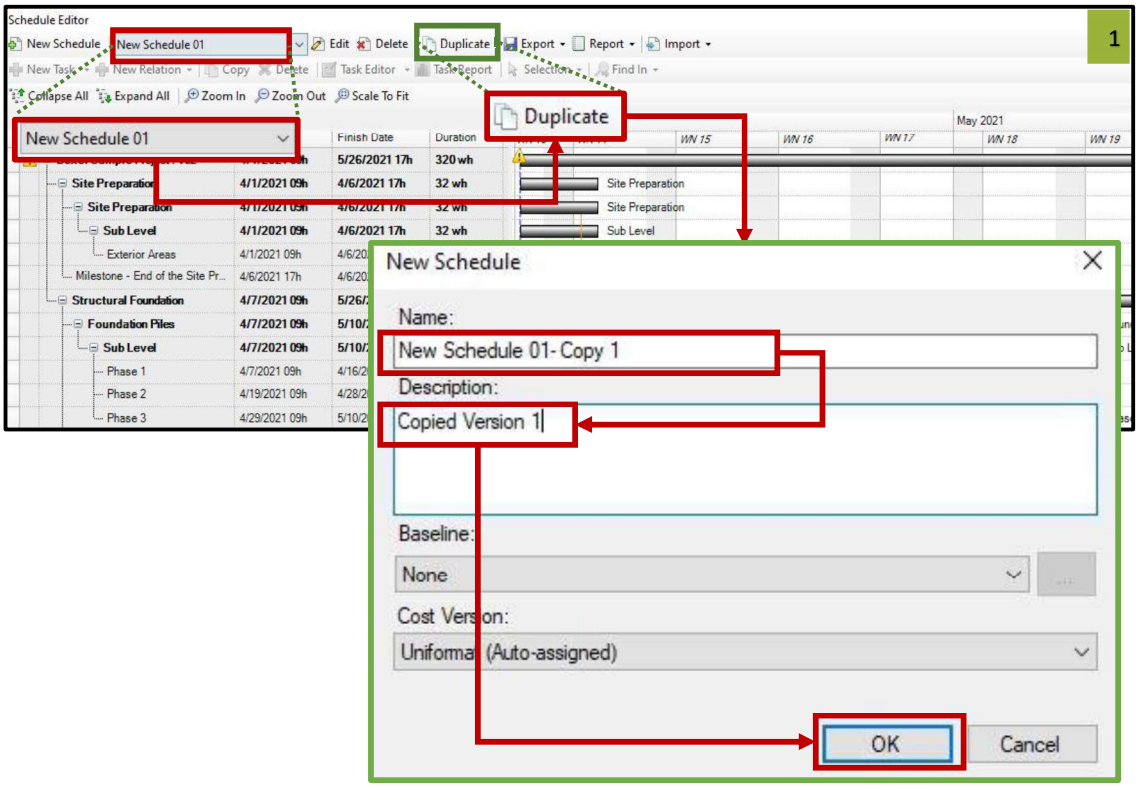


2. Update schedule by clicking on the **Update** button. → The **Schedule Update** window opens. → Click the **Update** button. → The Software informs us that the update has been completed. Click the **OK** button to finish the update process.

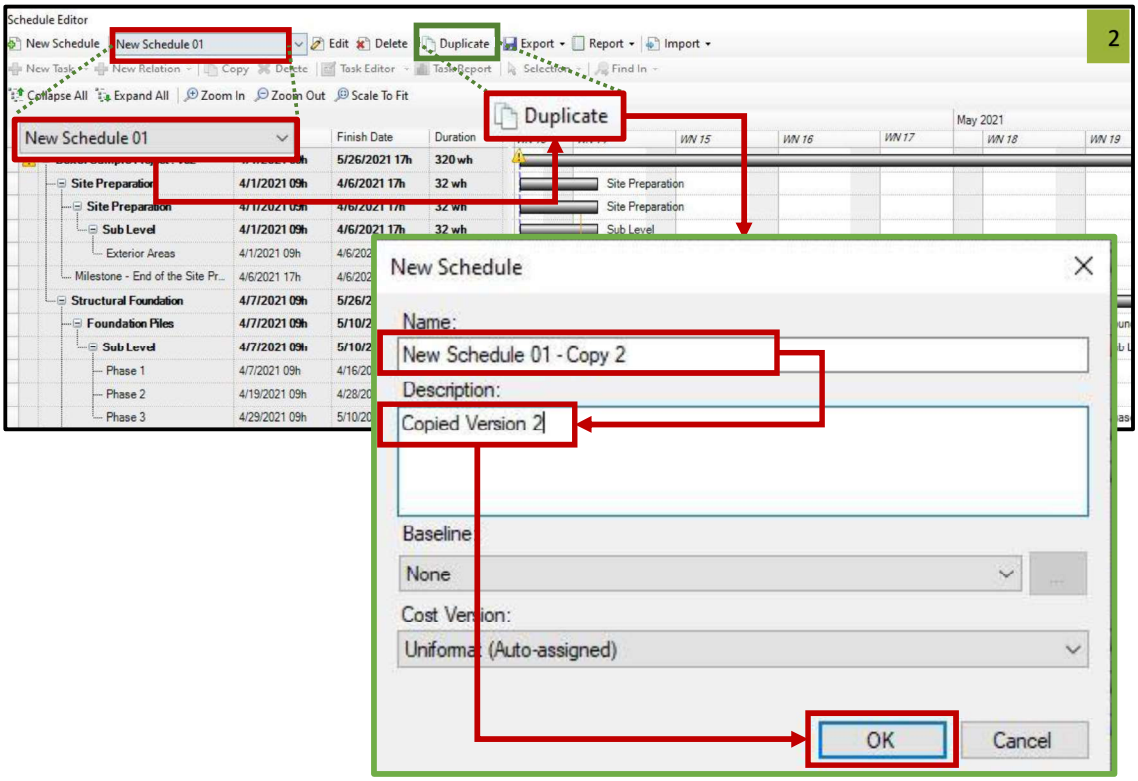


8.2.3. COPYING SCHEDULE

1. In the drop-down menu choose the schedule we want to copy. In this exercise we will copy previously created **New Schedule 01**. Select this schedule in the schedule list. Click the **Duplicate** button. → **New Schedule** window opens where we define the name of the schedule which we will create by copying the previously chosen schedule. Enter the **New Schedule Name** **New Schedule 01 – Copy 1**. Enter the **Description**, **Copied Version 1**. → Click the **OK** button to close the New Schedule window. →



2. We can create one more copy of existing schedule. Select **New Schedule 01.** → Click the **Duplicate** button. → A **New Schedule** window opens where we define the name of the schedule which we will create by copying the chosen schedule. → Enter the **New Schedule Name** **New Schedule 01 – Copy 2.** → Enter the **Description**, **Copied Version 1**. → Click the **OK** button to close the New Schedule window.



NOTE: Within the Schedule Editor the process of comparing two schedules is possible. In the drop-down menu next to the New Schedule command choose first schedule and in the drop-down menu next to the Compare with command choose the second schedule. The software compares two schedules and represents that in the Gantt view

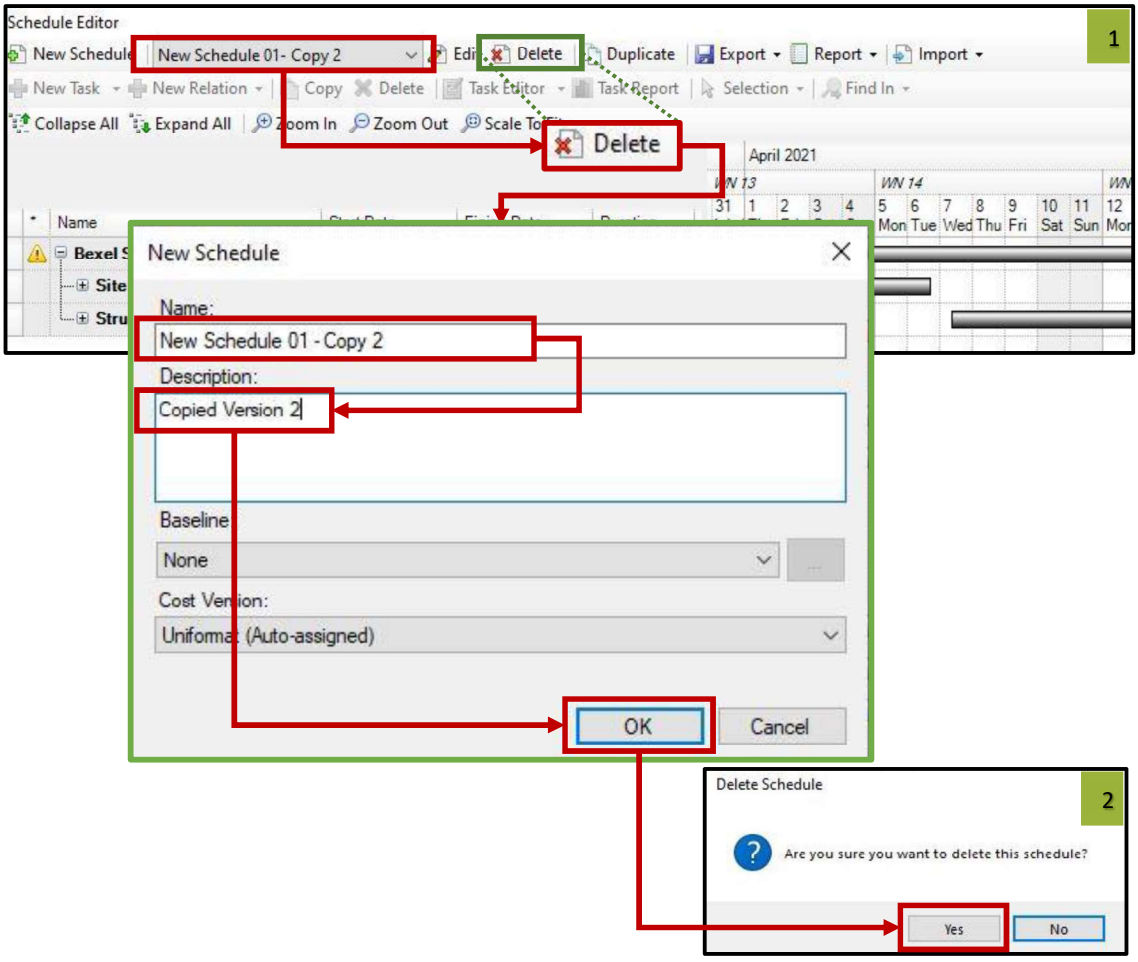
ADDITIONAL TIP: During project execution, it is advisable to create copies of construction schedule on regular basis (months quarters, semesters) in order to track changes and delays on the project. In this way project manager is able to control project dynamics and easily calculate delays from baseline schedule, but as well delays from previous month or quarter.

Besides **Gantt** view, construction schedules in Bexel Manager could be analyzed also in a **LOB (Line of Ballance)**, flowline schedule view mode and **Logic** mode by simple switch on the command line. The same schedule could be optimized and perfected through a different view mode which allows for great flexibility and advanced planning process to be applied.

8.2.4. DELETING SCHEDULES

We will delete previously created schedule **Schedule 01 – Copy 2.**

1. Select desired schedule that should be deleted, Schedule 01 – Copy 2. → Click on the **Delete** button. → The software asks us if we are sure that we want to delete selected schedule. → Click the **Yes** button to delete it.



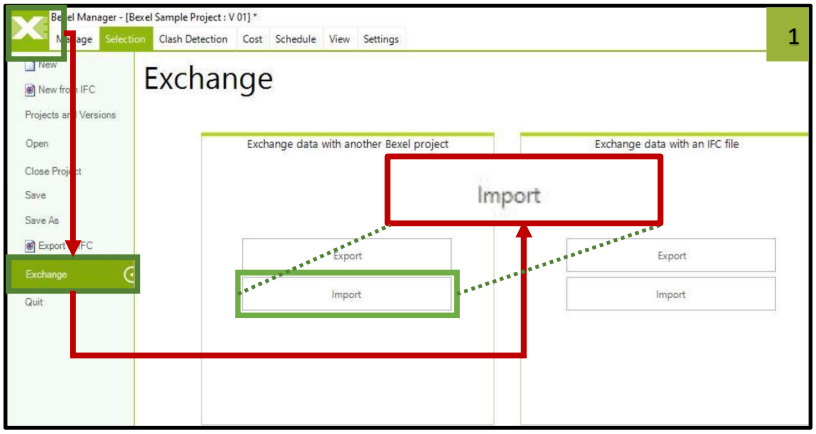
WARNING: Deleting the schedule is an irreversible act.

8.2.5. CREATING NEW SCHEDULE WITH SELECTION SET BASED ON CREATION RULES DEFINITION

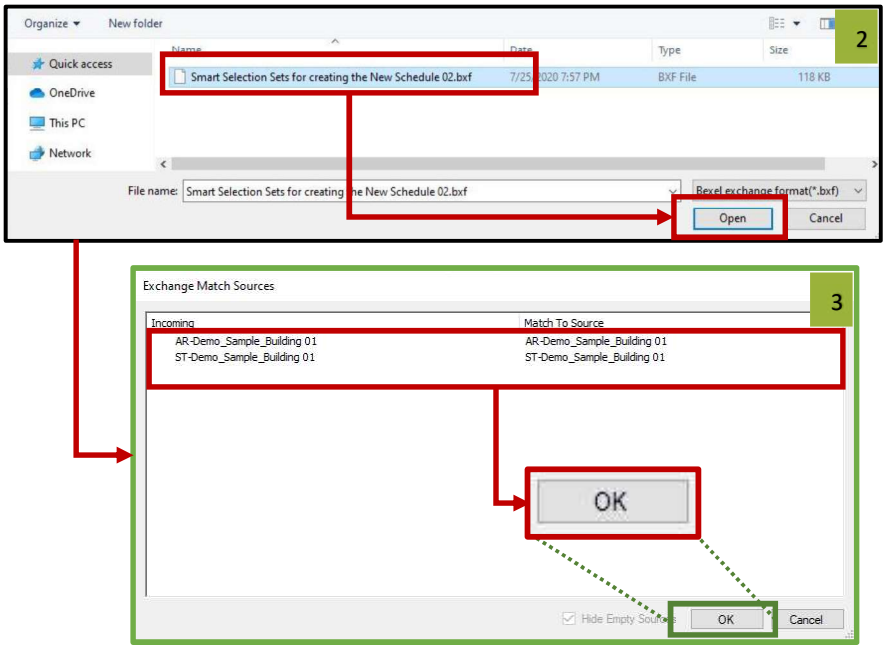
For this exercise we will use predefined Smart Selection Sets that can be downloaded from Bexel Use Area, located within folder **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.2\Exchange**, file name **Smart Selection Sets for creating the New Schedule 02.bxf**.

Import Selections Sets

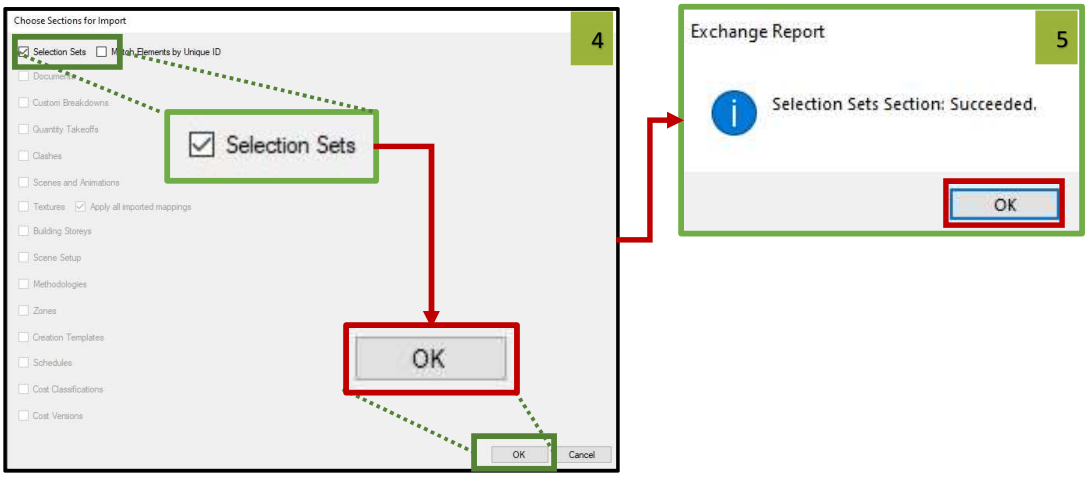
1. Create selection sets defining your schedule structure. We are going to import Selections sets using Exchange command. → Click ok the Bexel Manager button in the upper left corner within the software interface. → Click the **Exchange** command. In the **Exchange data with another Bexel project** field choose the **Import** option. →



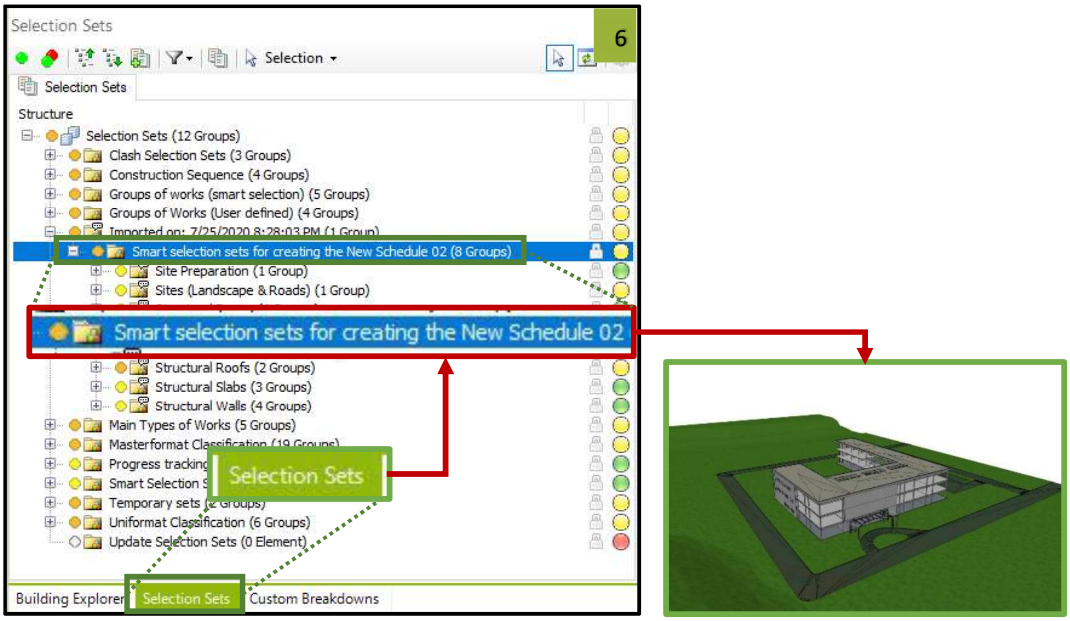
2. From the local computer choose the file **Smart Selection Sets for creating the New Schedule 02.bxf** we have previously downloaded from Bexel User Area. → Click the **Open** button. →
3. Match sources within the **Exchange Match Sources** window. → Click the **OK** button. →



4. The **Choose Sections for Import** window opens. →Check the **Selection Sets** option. → Click the **OK** button to close the window. →
5. Software informs us which section has been imported. Close the **Exchange Report** by click on the **OK** button. →

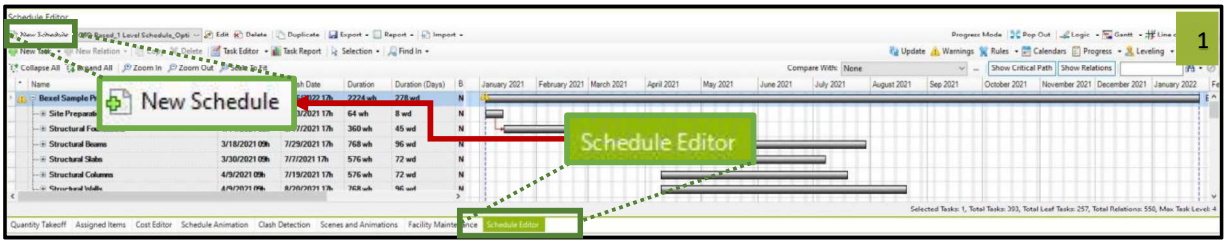


6. We have imported selection sets we will use for creating new schedule.

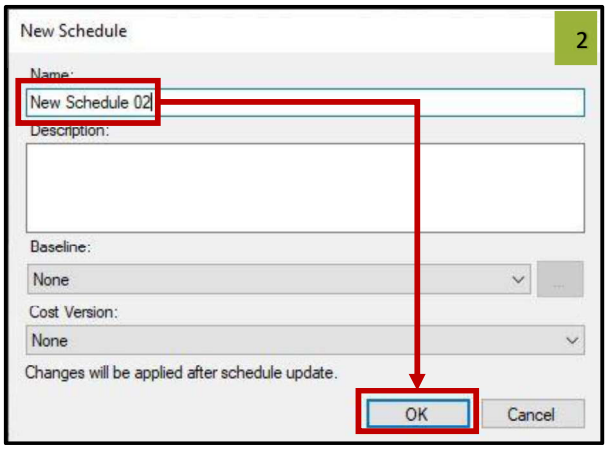


Creating New Schedule

1. Activate the **Schedule Editor** tab. → Click on the **New Schedule** command within the **Schedule Editor**. →

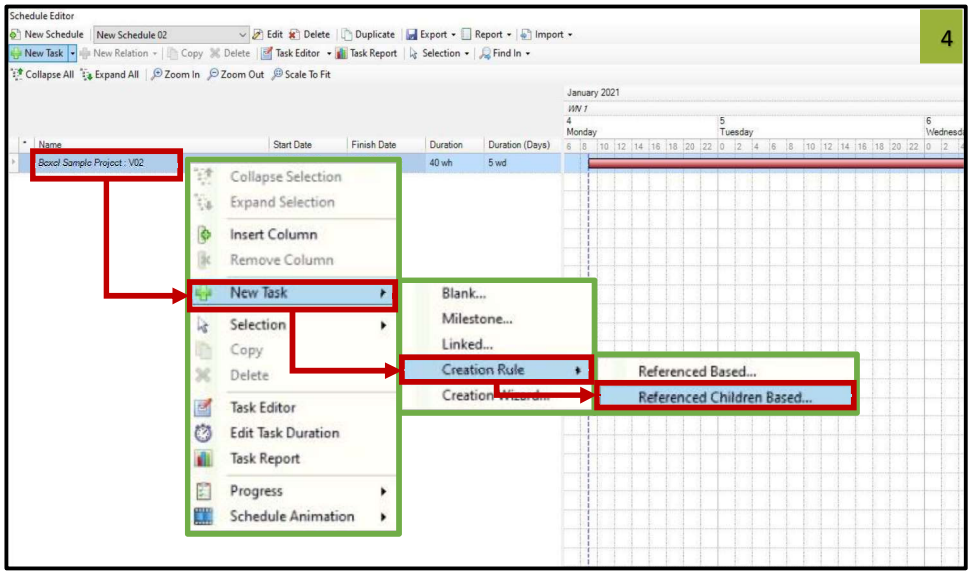


2. The **New Schedule** window opens where we set the schedule **name** **New Schedule 02**. In this exercise we create schedule manually, without using Creation wizard, so we won't set Cost version now. → Click the **OK** button to close the **New Schedule** window.

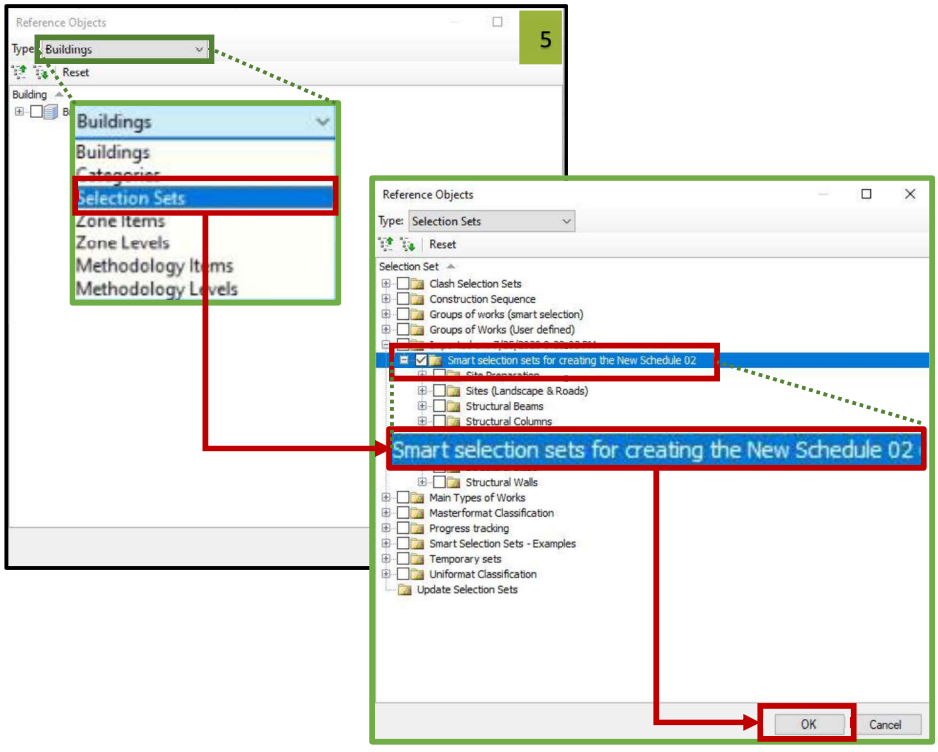


3. Set the created schedule active. Pop out the Schedule Editor palette by clicking on the Pop-Up button.

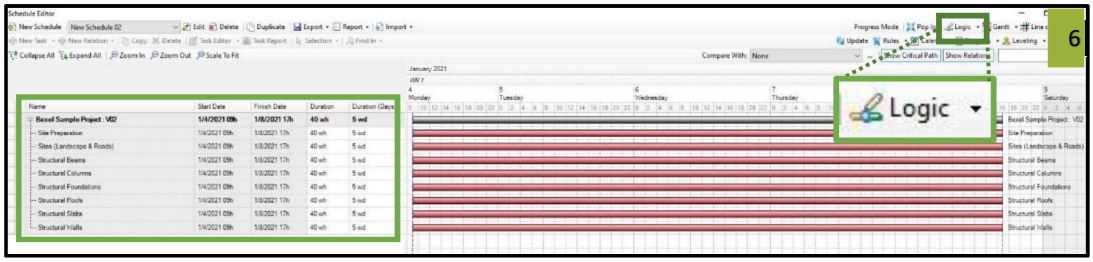
4. Right-click on master parent **task** of created schedule. → Select command **New Task**. → Choose, **Creation rule**, **Referenced Children based**. →



5. The Reference Objects window opens where in the Type field we choose the **Selection Sets** option from drop-down menu. → Select group of selection sets representing construction sequence we have previously imported, **Smart Selection Sets for creating the New Schedule 02**. → Finish schedule creation process by clocking **OK**. →



6. We have new schedule created with tasks corresponding to selection set structure with no relations defined between tasks. → Change schedule view to **Logic.** Here we will define relations between created tasks.

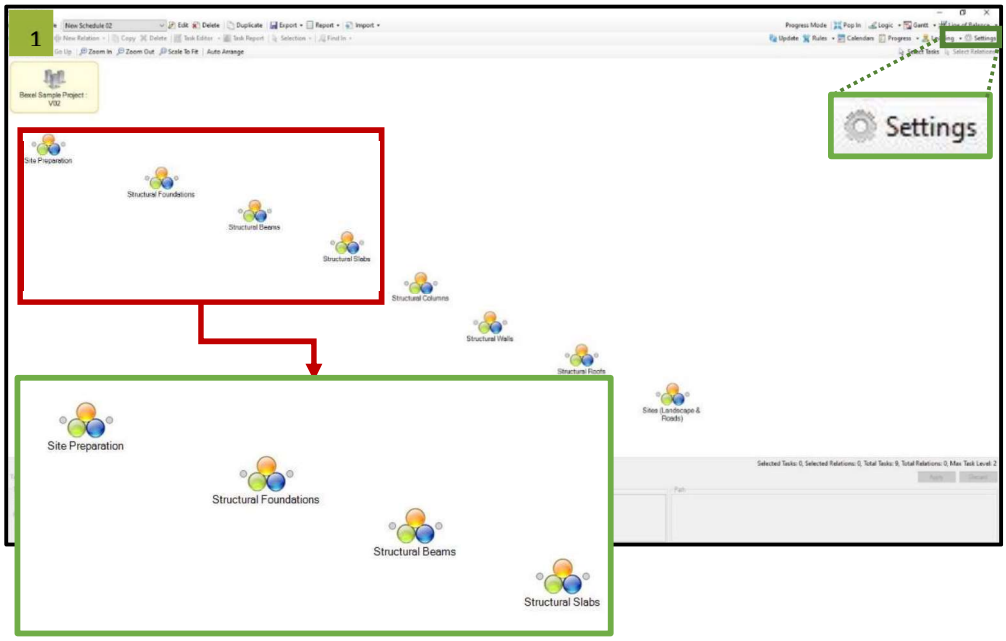


Task Duration and Task Relations

Exercise inputs

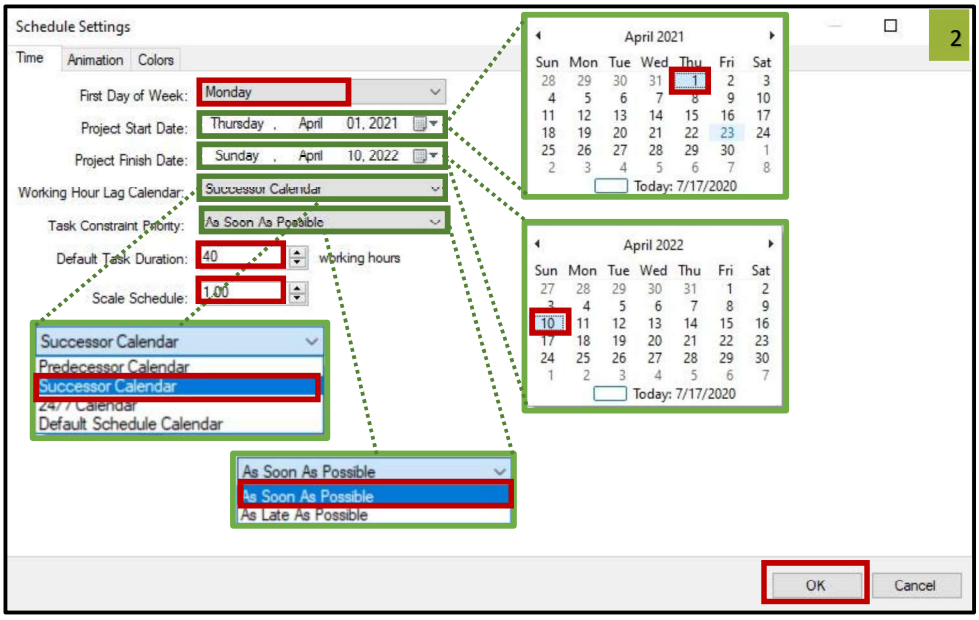
- Project start date: the 1st of April, 2021;
- Project finish date: the 10th of April, 2022;
- Default task duration: 40 working hours;
- Calendar: Default Calendar;
- Tasks duration and relations:
  The Site Preparation starts first, task duration is 8 days,
  The Structural Foundations starts when Site Preparation is finished, task duration is 45 days,
  The Structural Beams starts after the Structural foundations are finished., task duration is 96 days,
  The Structural Slabs starts 8 days after the Structural Beams, task duration is 72 days.
  In this exercise we are going to set task duration and relations for further tasks: Site Preparation, Structural Foundations, Structural Beams and Structural Slabs.

1. We have created tasks. The **New Schedule 02** is active. The **Logic** schedule view is active. → Organize tasks by simply drag and move left or right, up and down, and drop it in desired place within the **Schedule Editor** main field. → Set the **Project Start** and **Project Finish** Date by click on the **Settings** button in the upper right corner of the **Schedule Editor** palette. →

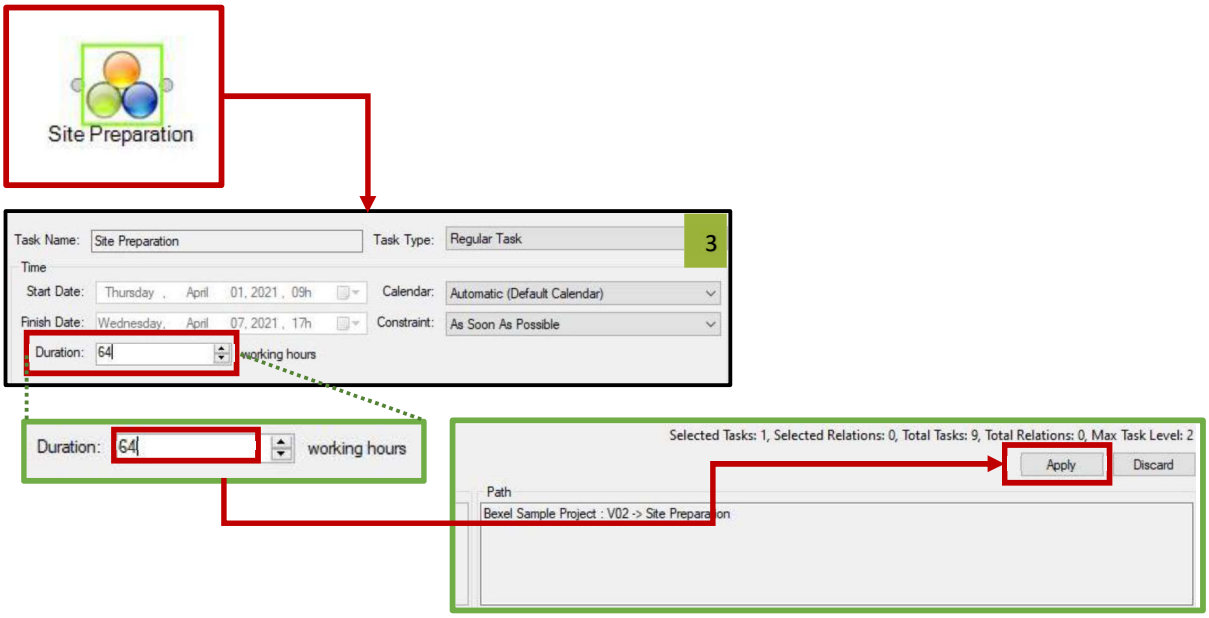


2. The **Schedule Settings** window opens. → Here we set the main schedule characteristics. Set the **First Day of Week** Monday. The Project starts on the 01st of the April, 2021, click on the arrow next to the **Project Start Date** and in calendar window choose the start date. The Project Finish date is 10th April, click on the arrow next to the **Project Finish Date** and in calendar window choose desired date. For the **Working Hour Lag Calendar**, we choose the **Successor Calendar**. For the **Task Constraint Priority**, we choose the **As Soon As Possible** option. **Default**

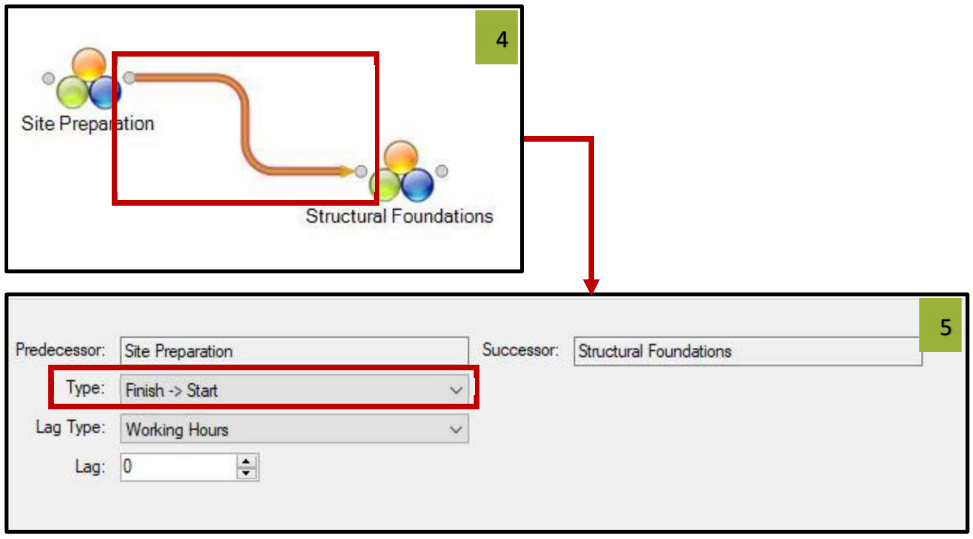
Task Duration is 40 working hours. The **Scale Schedule** factor stays 1. → Click the **OK** button to close the **Schedule Settings** window.



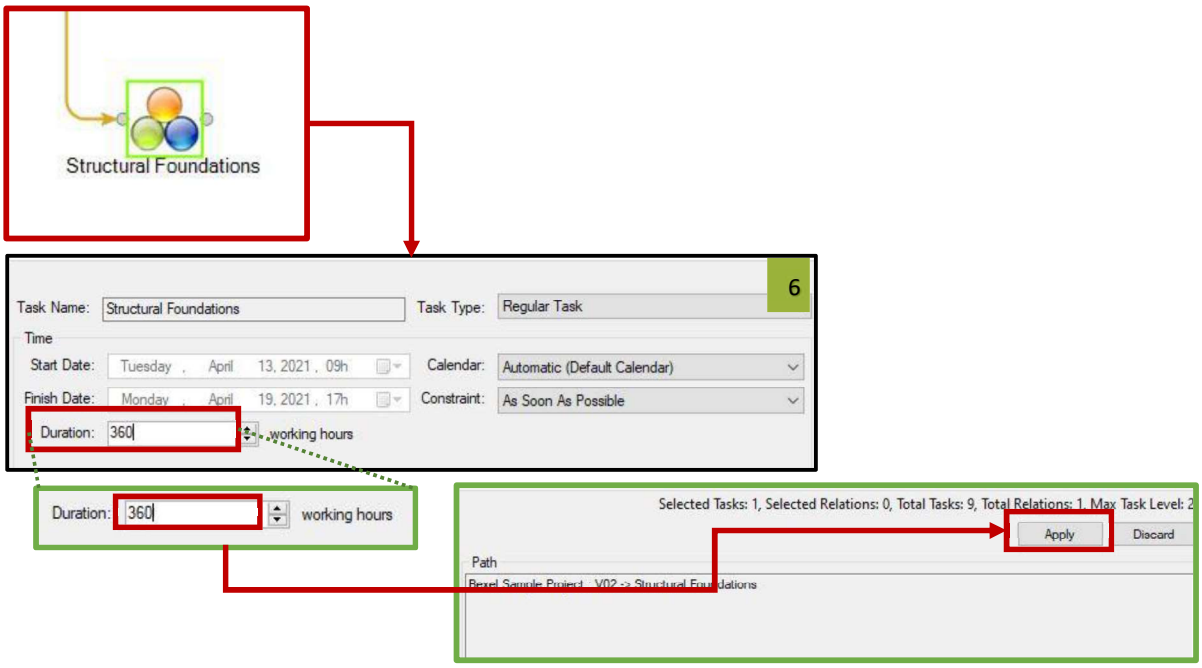
3. Select the **Site Preparation** task. → In the buttom of the **Schedule Editor** window, which is poped out, in the **Duration** field enter this task duration which is 64 working hours. → Click the **Apply** button in the right buttom side of the Schedule Editor palette. →



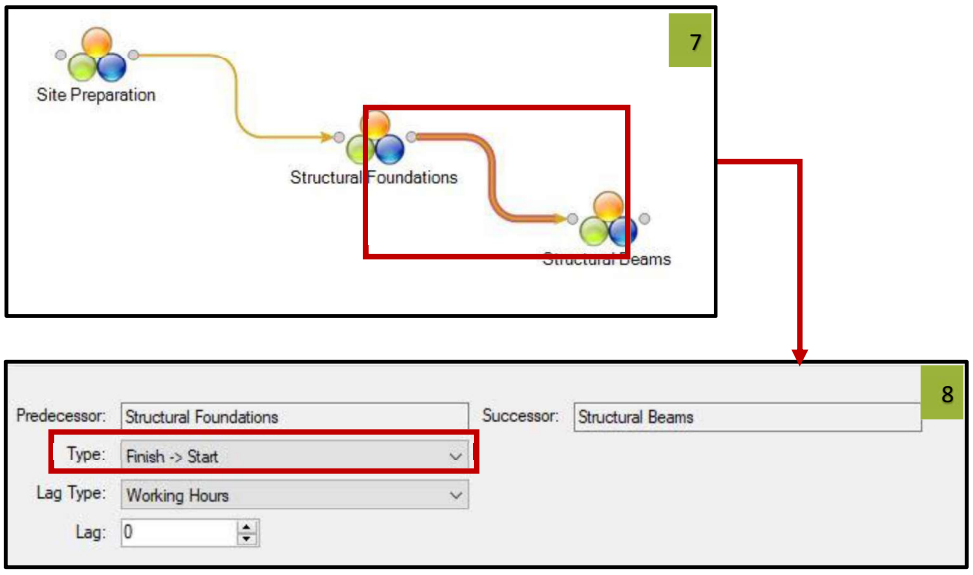
4. **Click** on the small circle on the right side of the **Site Preparation** task, **drag** and move it to the right, just next to the **Structural Foundation** task and **drop** it there. → The relation line appears between these two tasks. →
5. Select created relation line. In the bottom of the palette's window, the commands and characteristic of selection activate where we see that the **Type** of this relation is **Finish->Start** by default. We need this relation so we will not change it. →



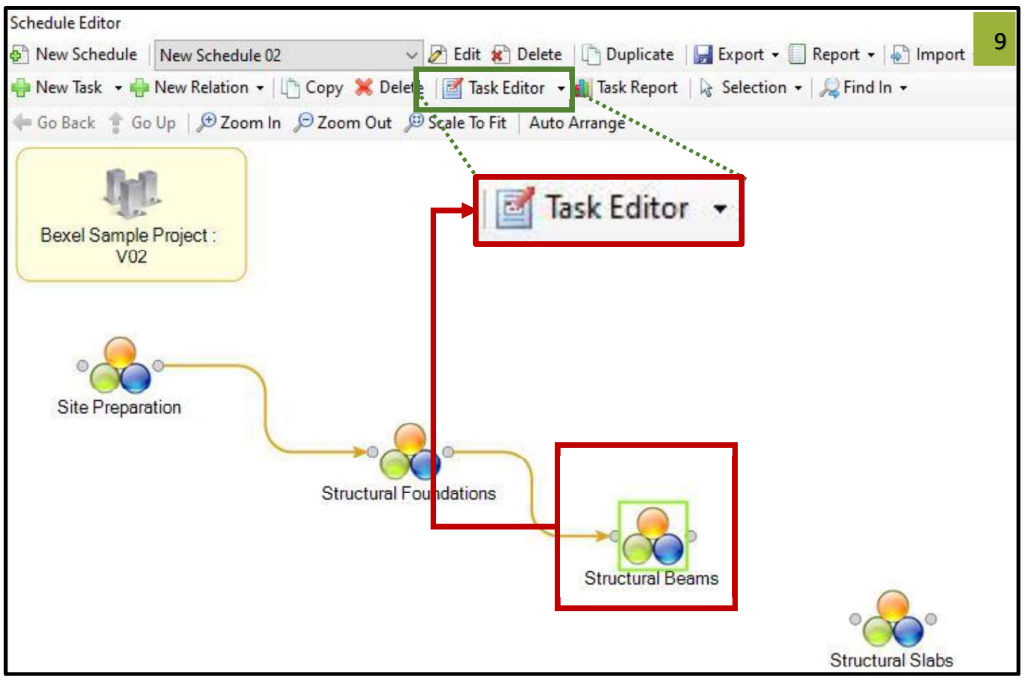
6. Select the **Structural Foundation** task. In the **Duration** field in the bottom of the **Schedule Editor** enter the task duration 45 workung days (360wh). → Click the **Apply** button in the right buttom side of the Schedule Editor palette. →



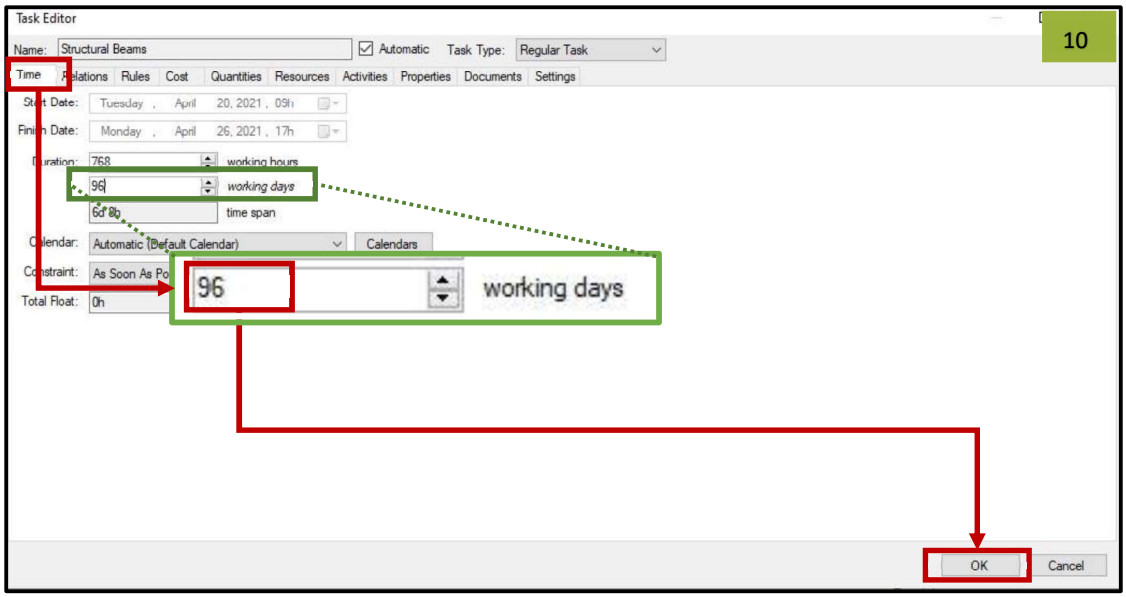
7. **Click** on the small circle on the right side of the **Structural Foundations** task, **drag** and move it to the right, just next to the **Structural beams** task and **drop** it there. → The relation line appears between these two tasks. →
8. Select created relation line. In the bottom of the palette's window, the commands and characteristic of selection activate where we see that the **Type** of this relation is **Finish->Start** by default. We need this relation so we will not change it. →



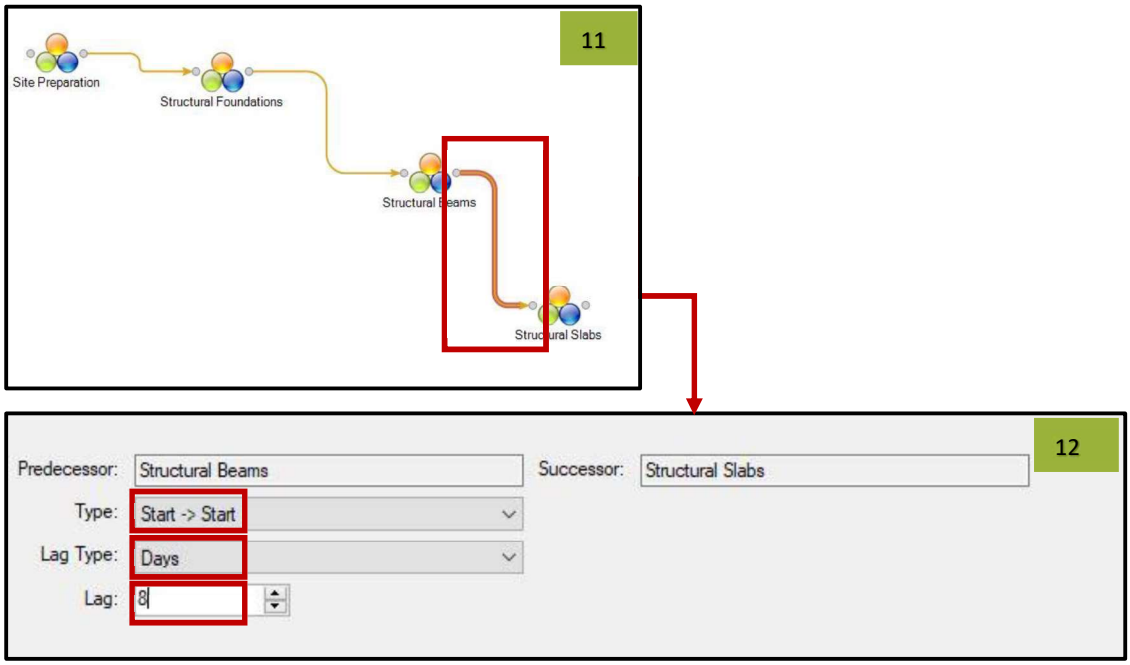
9. Select the **Structural Beams** task. → Click the **Task Editor** button. →



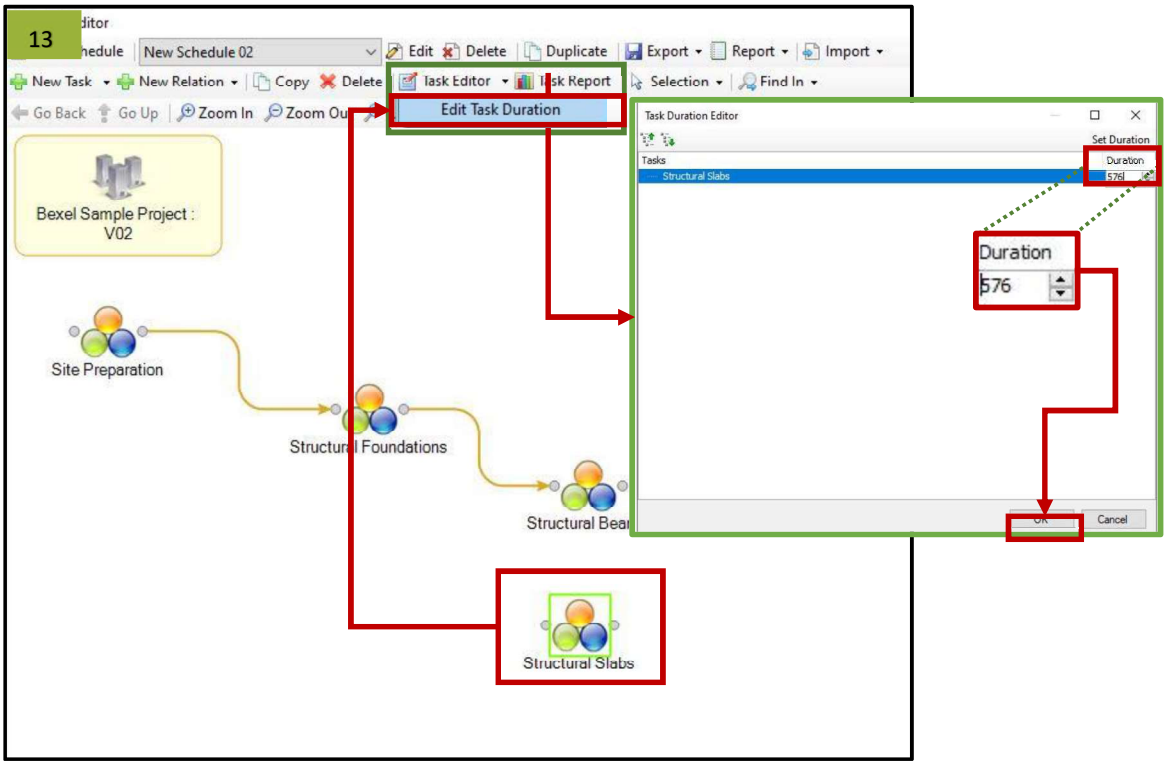
10. The **Task Editor** window opens where we enter the task duration in the **Duration** field within the Time card. We enter 96 working days for this task duration. → Click the **OK** button to close the Task Editor window. →



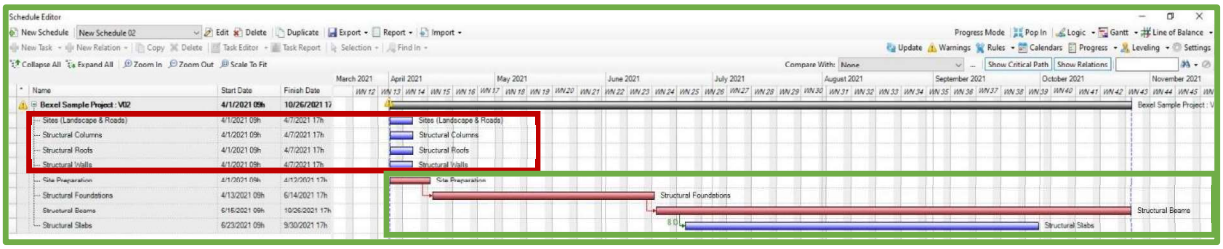
11. **Click** on the small circle on the right side of the **Structural Beams** task, **drag** and move it to the right, just next to the **Structural slabs** task and **drop** it there. → The relation line appears between these two tasks. →
12. Select created relation line. In the bottom of the palette's window, the commands and characteristic of selection activate where we see that the **Type** of this relation is **Finish->Start** by default. → Change the relation **Type** to **Start->Start** relation. → Change the **Lag Type** into **Days** and enter the **Lag** value 8. →



13. Selelct the **Structural Slabs** task. → Click on the **arrow** next to the **Edit Task** button. → Choose the **Edit Task Duration** button. → The **Task Duration Editor** window opens where we enter the new task duration within the **Duration** field, duration is 576 working hours. →



Click on the **Gant** mode button to check how the created schedule looks like. For further exercise try to create new relations fot the rest of tasks we have not defined the task's characteristics yet.



NOTE: Even though classic manual creation process (typical for traditional panning tools) is available in Bexel Manager, it is highly recommended to primarily use advantages of software automation which in case of Bexel Manger could be applied in a range from fully integrated intelligent planning process to a partial automation that will significantly improve traditional planning process and reduce workload on planner.

8.3. CREATING ZONES AND METHODOLOGIES

After **Cost Classification** on the project is defined, user is now moving to the most complex project management task, smart scheduling, because it has to take into account construction process technology, organization of construction site, contractor's resources and time-frame defined by investor.

First action in preparation for project scheduling is definition of spatial distribution of works. All activities on the project should be organized within certain spatial units (zones) that are defined along horizontal and vertical axis.

8.3.1. HORIZONTAL SPATIAL DISTRIBUTION OF WORKS

Horizontal spatial distribution implies subdivision of project along horizontal axis into logical spatial units of different hierarchy from **Construction Blocks**, to **Buildings** and **Construction Sequence (Building Phases)** as the smallest.

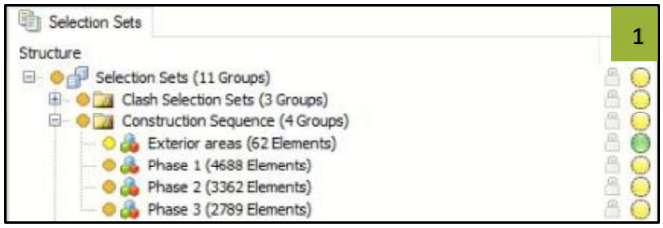
Defining Construction Blocks and Buildings in construction scheduling is necessary on large-scale projects. Due to immense investments and complex logistics, such projects need to be carefully planned and build in blocks composed of few buildings and accompanying landscape and roads. In Bexel Manager it could be done simply by sorting model elements in selection sets for each Building Block.

In our example model we will use only **Construction Sequence (Building Phases)** as horizontal spatial distribution since project consists of only one building.

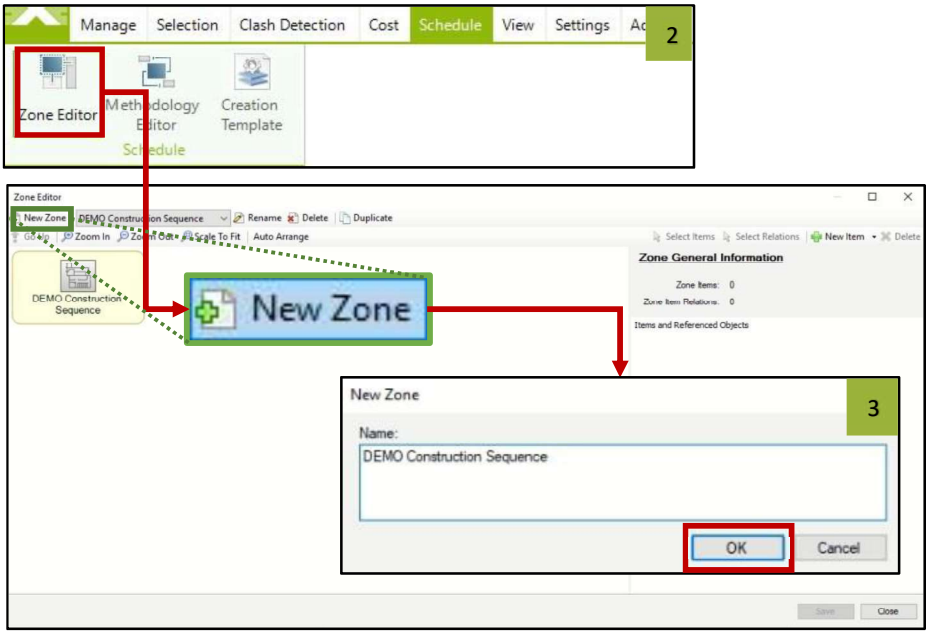
Construction Sequence (Construction Phases) zone

Defining **Construction Sequence (Construction Phases)** zone in Bexel Manager is simple and it could be done based on user-created selection sets or parameter defined within model elements. In training materials there are prepared selection sets named **Construction Sequence** that should be used in training process. This spatial distribution could be re-created by user by creating four different selection sets in which user is linking elements of every building on the project in such way to make sub-division of building into roughly equal spatial zones. Depending on particular building design, it could be divided into one or more equal zones.

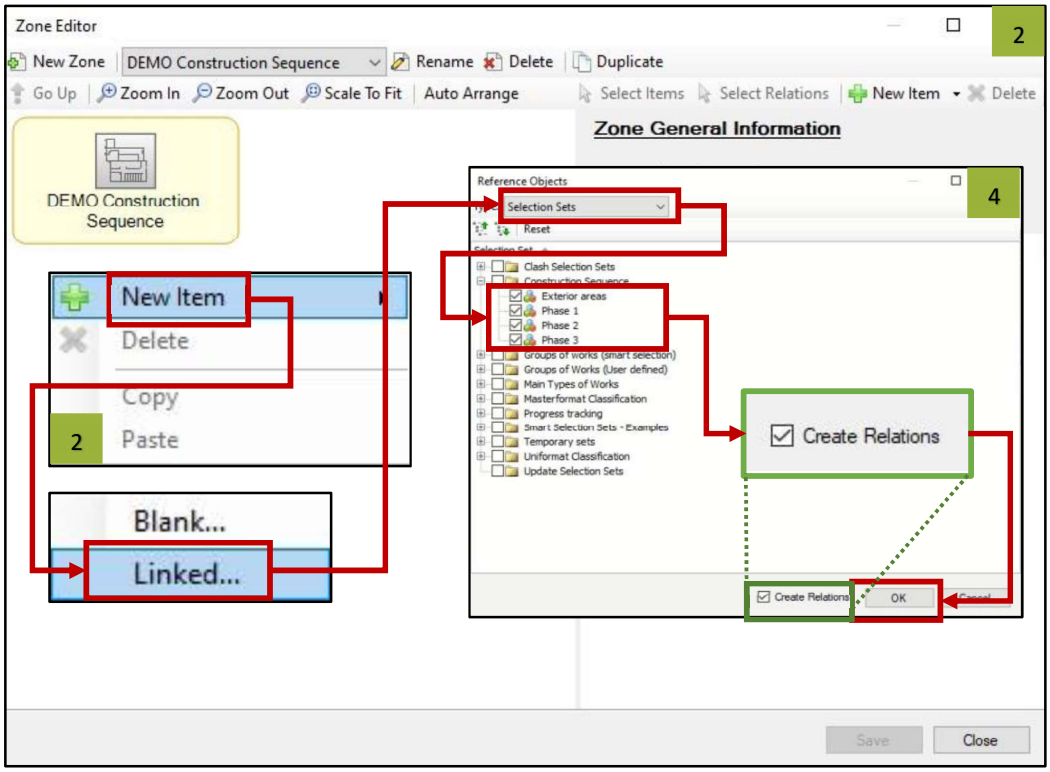
1. Following procedure explained in **Chapter 8.2.5** import exercise **Selection Sets** file named **Construction Sequence Selection Sets.bxf** navigating through training material exchange folder of **Chapter 8.3.1.** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.3\Exchange\8.3.1)** →



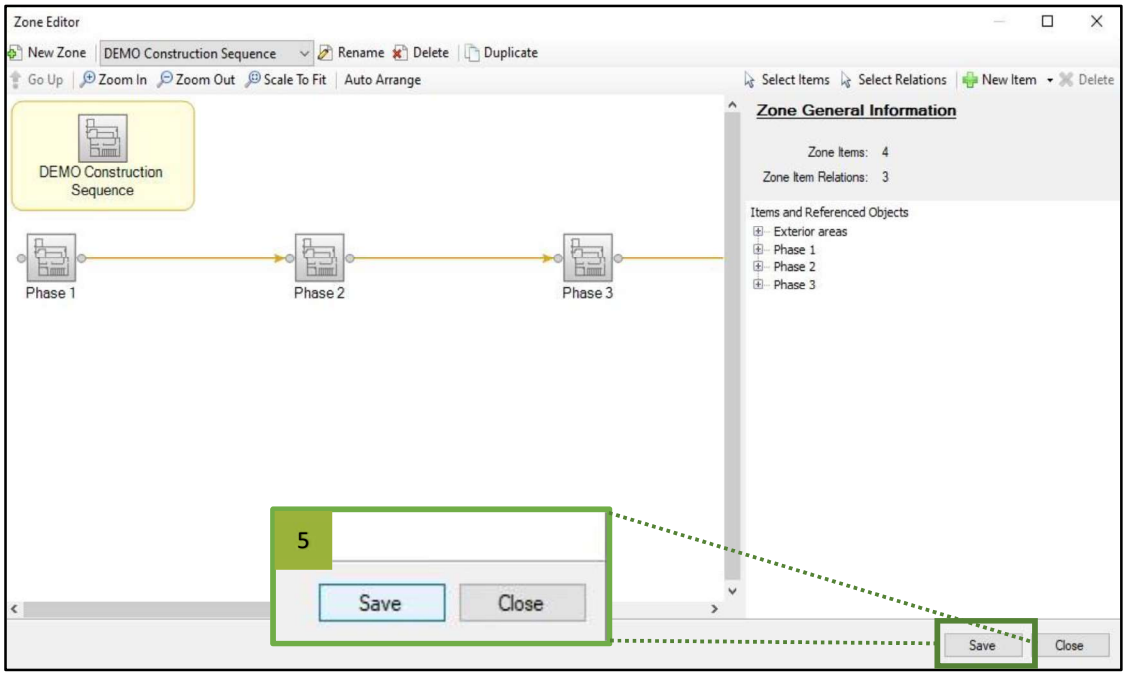
2. Activate the **Schedule** tab. → Click on the **Zone Editor** command. → In the **Zone Editor** window click on the **New Zone** command and in the **New Zone** window define the name of the zone. (In this case name it **DEMO Construction Sequence**.) →
3. Right-click within **Zone Editor** area → Select **New Item** and click option **Linked**. →



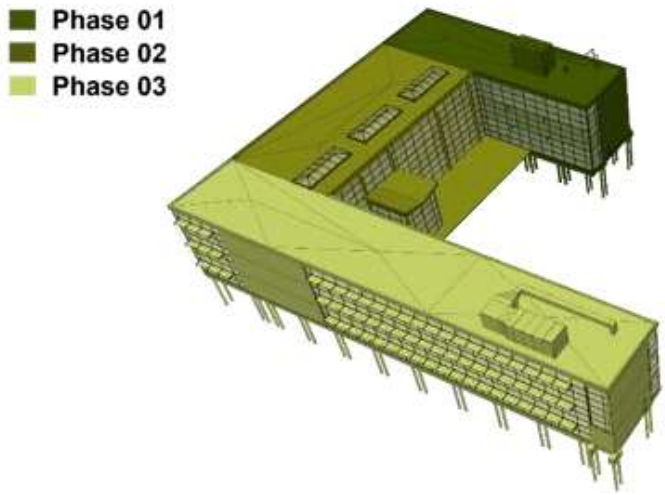
4. In the **Reference Objects** window choose option **Selection Sets**. → Find selection set of construction zone in selection set hierarchy (tree) (in sample model its **Construction Sequence** folder). → Check the **Create Relations box** to create relations between the items. → Click **OK** to complete action.



5. Click on the **Save** button to save the **Zone** in the **Zone Editor** window. After creating zones, user is now able to define and fine-tune relations between them.



In case of Building Phases, the most logical construction sequence is to define Finish-Start relationship between different zones from first to the last and defining Exterior works as a Phase that precedes or follows other phases that are within building itself.

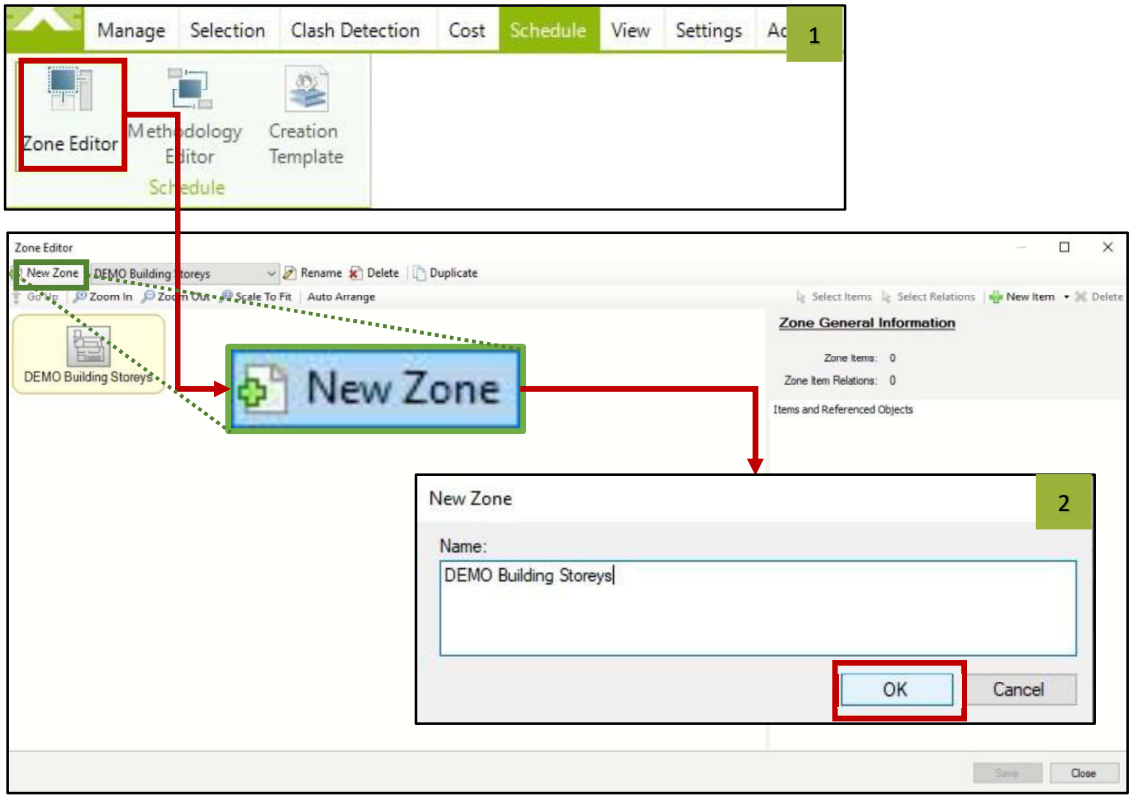


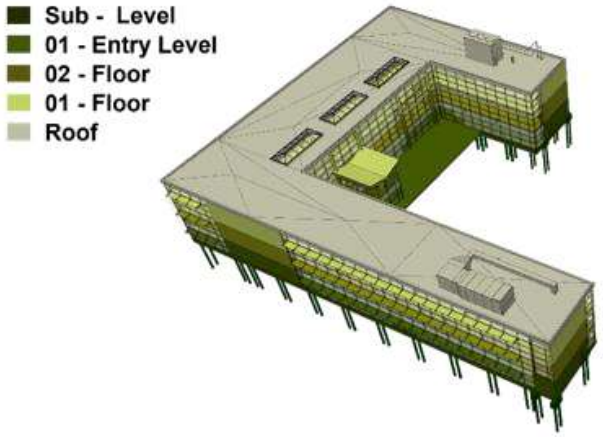
8.3.2. VERTICAL SPATIAL DISTRIBUTION

Vertical spatial distribution implies subdivision of project along vertical axis into logical order. Within construction industry it always implies division by levels or storeys, so in this case user should only follow building storeys (levels) of the project and define logical construction sequence from the lowest to the highest.

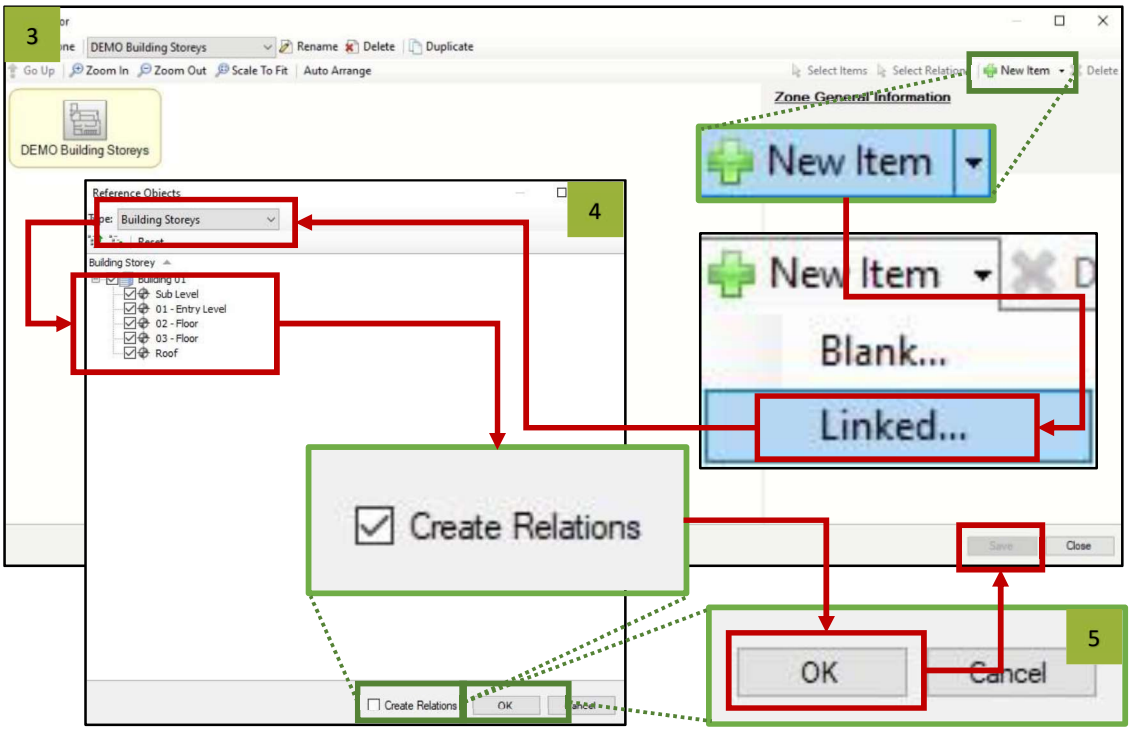
User is able to define Construction Level/Storeys Zone in similar way as for construction phases:

1. Activate the **Schedule** tab. → Click on the **Zone Editor** command. →
2. In the **Zone Editor** window click on the **New Zone** command and in the **New Zone** window define name of newly created zone **DEMO Building Storeys**. → Click **OK** to complete action.

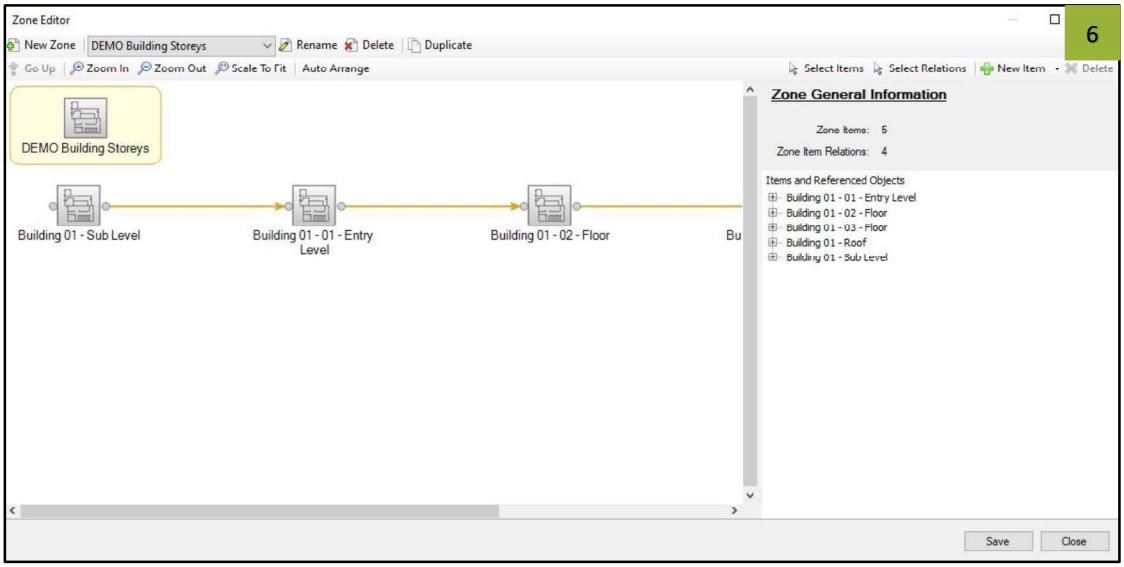




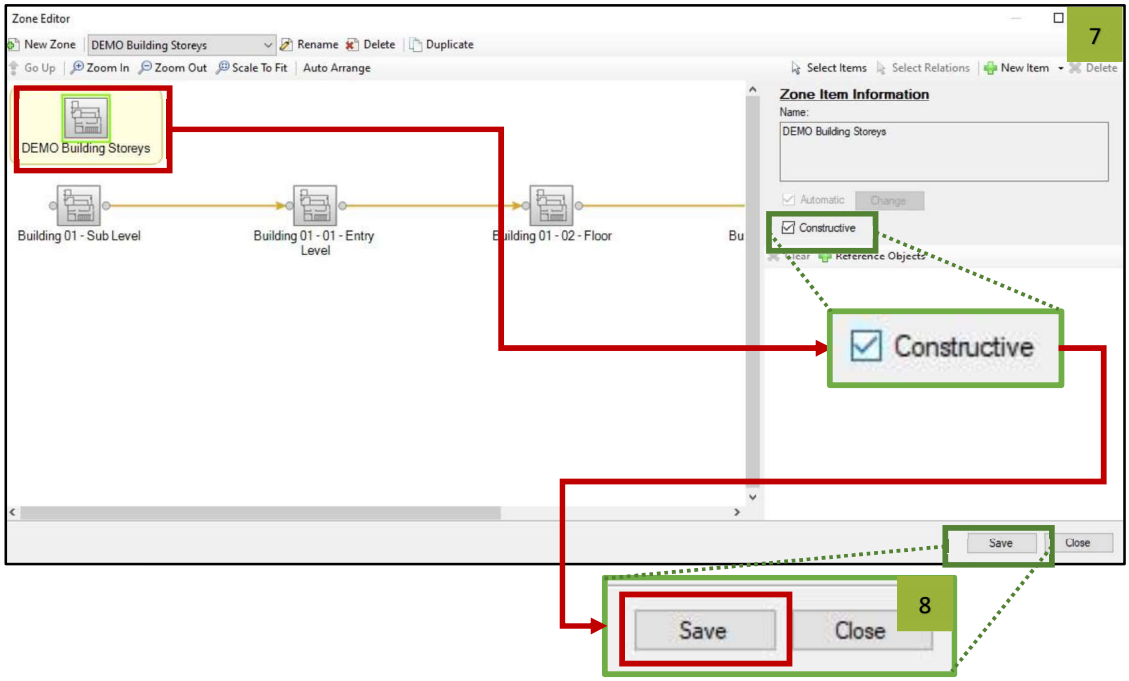
3. On the upper-right side of the **Zone Editor**, click on the arrow beside the **New Item** button and select the option **Linked**.→
4. In the **Reference Objects** window choose option **Building Storeys**. → Check checkbox for Building 01 to select all storeys. → Check the **Create Relations box** to create automatically relations between the levels. →
5. Finish the process by clicking on the **OK** button and then click on the **Save** button to save the **Zone** in the **Zone Editor** window.



6. After creating levels sequence all levels are sorted in a right order and connected properly since user has renamed them in previous step. User is now able to define and fine-tune relations between them by clicking the relationship arrow and changing parameters.



7. Select Parent task named **DEMO Building Storeys** within **Zone Editor**. → Check **Constructive** checkbox to make all building storeys applicable to backward constructive relations. →
8. Click **Save** to complete **Building Storeys** zone.

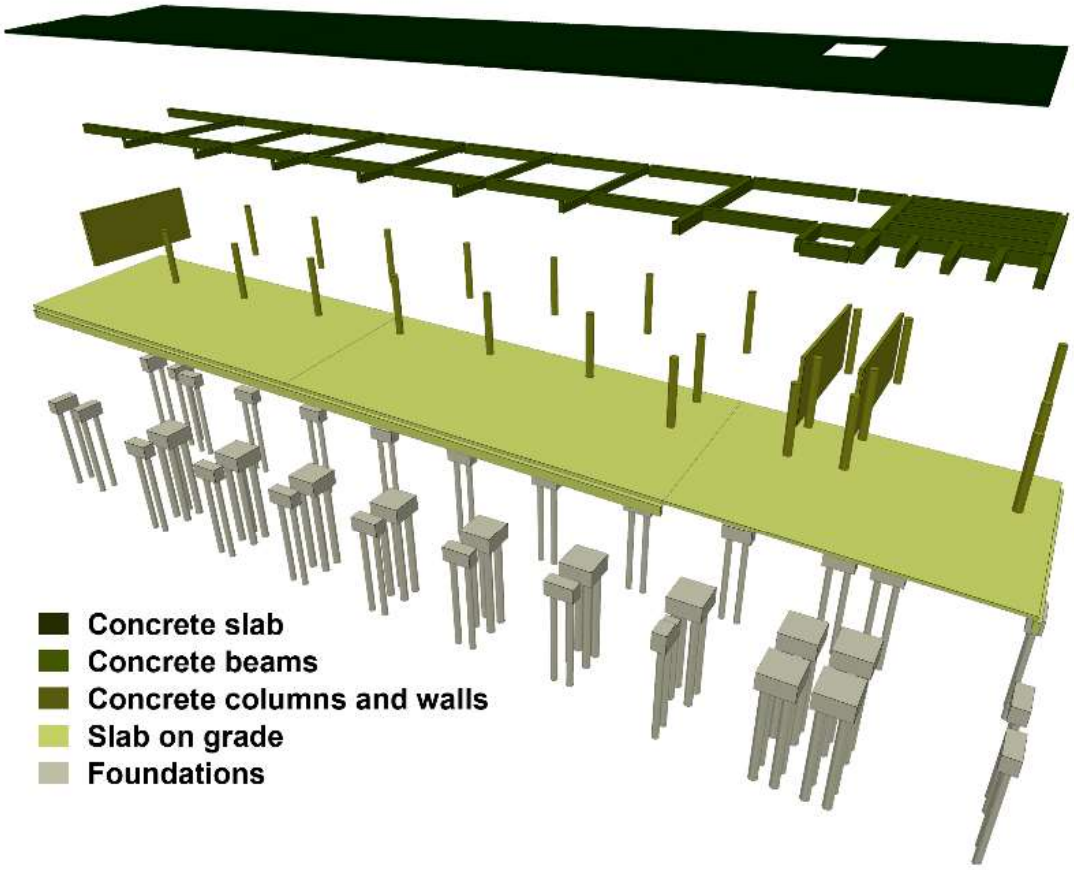


ADDITIONAL TIP: By defining construction levels/storeys as Constructive by clicking **Constructive** checkbox in Zone Item Information window, user defines that computer algorithm should apply backward relations between storeys marked as **Constructive**. Backward relations allow certain tasks to be related to works that are certain number of storeys above or below (depending on defined constructive offset). For example, user is able to define that curtain walls installation on a high-rise building should start only after concrete works are completed 4 storey above by defining constructive offset of -4 levels for these two activities. These backward relationships will work only if the storeys in Levels/Storeys zone are marked as Constructive and final schedule will be properly generated.

With this final zone definition, our spatial works distribution is completely defined for whole project and we can now focus on second essential process in schedule definition which is order or sequence of construction works or construction **Methodology.**

8.3.3 CONSTRUCTION METHODOLOGY

To simplify it, construction sequence for groups of works is nothing more than definition of relations and sequence of execution of different types of works in construction as defined in project Cost classification structure. This “sequence” is more or less typical for any construction process with slight modifications depending on type of building, construction technology or specific conditions on site, but majority of construction works do follow certain universal rules. For example, construction sequence relationships will always be clear between site preparation and foundations, foundations and superstructure, columns and beams, beams and slabs and so on. In fact, there is no need to define such a logic relation every time on every project on every task in the project. It is time-consuming work that blurs bigger picture on schedule parameters. That’s why new intelligent scheduling engine offers opportunity to define this construction sequence or rules once, and to be able to re-use it and additionally modify it on other projects.

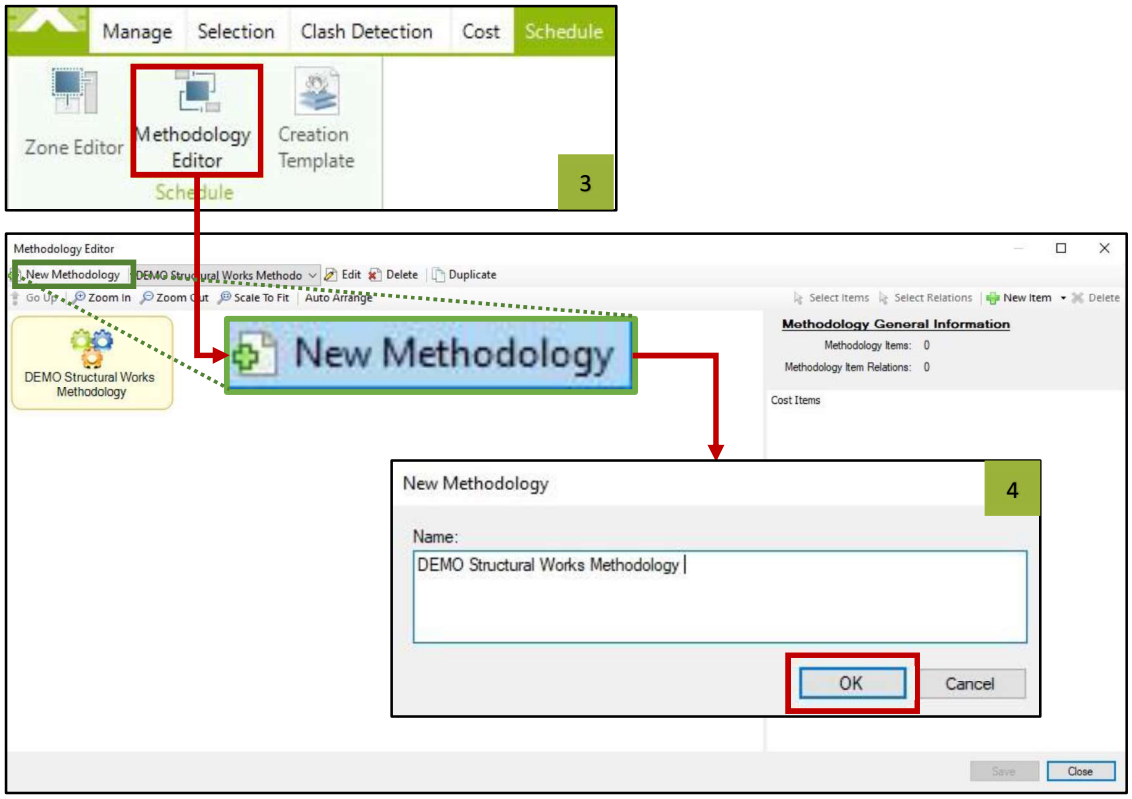


In our sample we should just simply create **Methodology Items** or groups of works and link it with the sections already defined in our **Cost Classification** and define relationships between them.

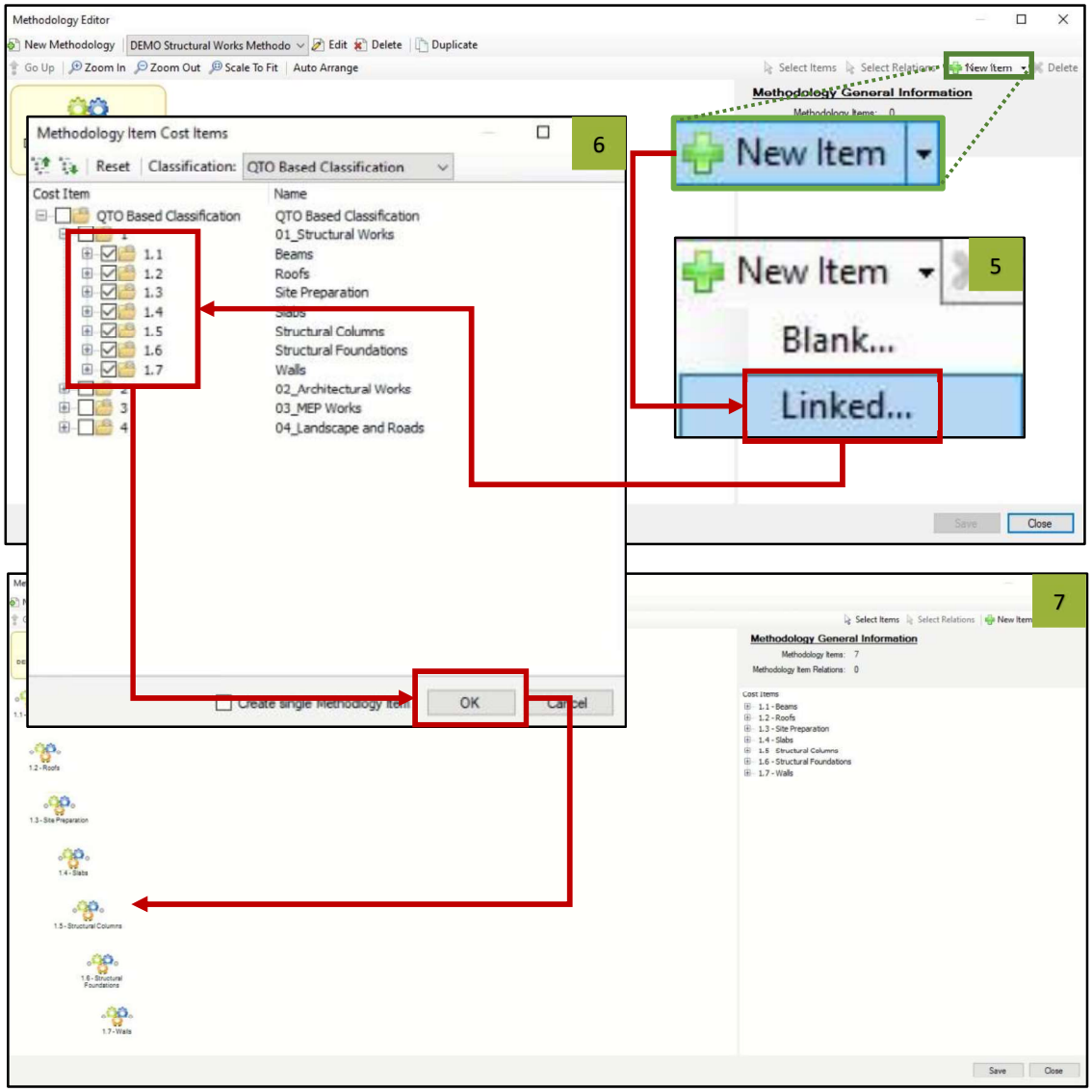
For training purposes, we will focus on one group of works, **Structural Works** only in our example since it is the most intuitive and easy to understand to practice the process but all the steps mentioned could be used later for creation of more complex Methodologies. After training is complete user will be able to further exercise creation of more complex Methodologies that include all groups of works on the project using available training material and exchange files included.

User should create **Methodology** items for all chapters in **Structural Works** of imported **Cost Classification** and link it to corresponding chapter in Cost classification like this:

1. Following procedure explained in **Chapter 8.1.3** import exercise **Cost Classification** file named **QTO Based Cost Classification.bxf** navigating through training material exchange folder of **Chapter 8.3.3.** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.3\Exchange\8.3.3)** →
2. **Auto-assign** imported **Cost Classification** to model elements following procedure explained in **Chapter 8.1.8.** →
3. Activate the **Schedule** tab, which is placed in the left upper corner of the screen. → Click on the **Methodology Editor** command. →
4. In the **Methodology Editor** window click on the **New Methodology** command and in the **New Methodology** window define the name **DEMO Structural Works Methodology** and the **Cost Classification** of the methodology (in this case it should be **QTO Based Classification**) → Finish the process by clicking on the **OK** button. →



5. On the upper right side of the **Methodology Editor**, click on the arrow beside the **New Item** button and select the option **Linked**.→
6. In the **Methodology Item Cost Items** window choose a classification or a Cost Items to be linked (in this case it would be all categories of **chapter** 1 **Structural Works**. → Finish the process by clicking on the **OK** button. →
7. Now there are **Methodology Items** created and only relationships between them have to be defined by user.

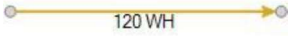


Defining relations in Methodology

Defining relations within Methodology editor is the same as in zone editor and it includes typical types of relations used in construction planning process.

Types of **relations** between methodology and zone items are:

- Finish → Start,
- Start → Start,
- Start → Finish,
- Finish → Finish.

After defining type of relation user is able to define **lag** between activities if needed like in any other planning process. 

Besides these basic options, Bexel Manager intelligent planning also has some specific options that allow user to properly structure schedule.

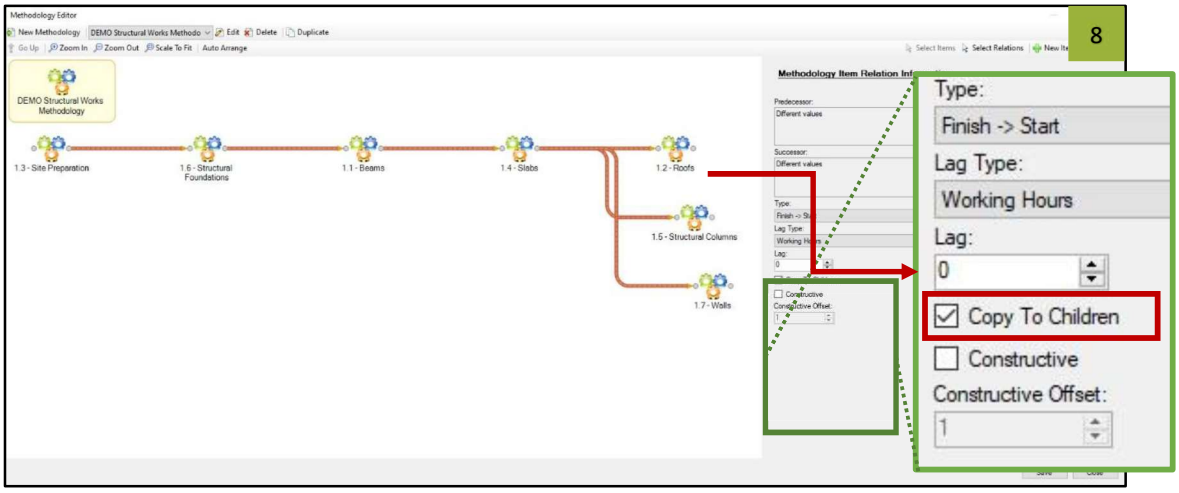
One of these specific commands is **Copy to children** functionality which if checked, defines that relations will be copied from parent tasks to leaf tasks. That means that if you define relation between two groups of works, let's say as Finish-start relation that means that second group of works will start only after first is completed, but if you check **Copy to children** functionality, that means that relation will be copied to tasks in lower hierarchy, which means that second group of works will start after first group is completed in first construction zone on the lowest floor and not after it is completed on the whole project. In this way you can have complex automatically generated schedule with numerous relations defined only with few clicks in in methodology

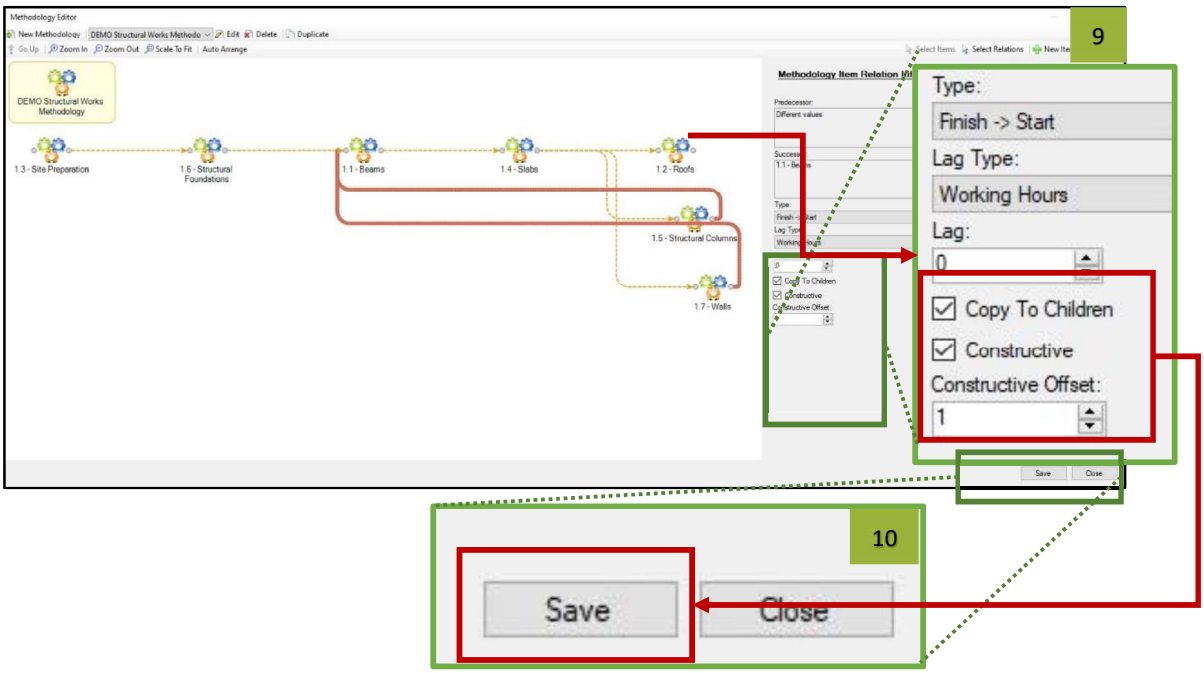
Another important functionality that is a part of **Copy to children** relation is an option to label certain relation as **Constructive** and define **Constructive Offset.** This means that due to the nature of certain works some activities cannot start before some other activity is completed even though that activity is within different construction zone or level. (For example, this relation prevents floor slab on a second floor to be executed before beams on a first floor are completed. In BIM modeling and computer logic, beams of the first floor and slab on the second floor are in the different spatial zones due to model division by levels and therefore should be independent during schedule generation, but in reality, these elements are dependent in execution, so this relation moves dependence of elements between different model levels. In this case, **Constructive Offset** will be set as **1** in finish start relation between beams and slabs which means slab execution can start only after beams in previous level are completed which means that relation between construction zones (in this case levels) has an offset and establishes relation between different zones which is not the case in regular **Copy to children** relation.

NOTE: When using **Constructive offset** function between groups of works, the same option has to be checked on relations between construction zones in zone editor where this relation will be applied. In our example above, that means that **Constructive offset** would have to be checked in all relations related to building Storeys.

After creating **Methodology Items**, user is able to define relations. The process of defining relationships between zone items and between methodology items is done in the same way so user can follow the same procedure of dragging links between tasks:

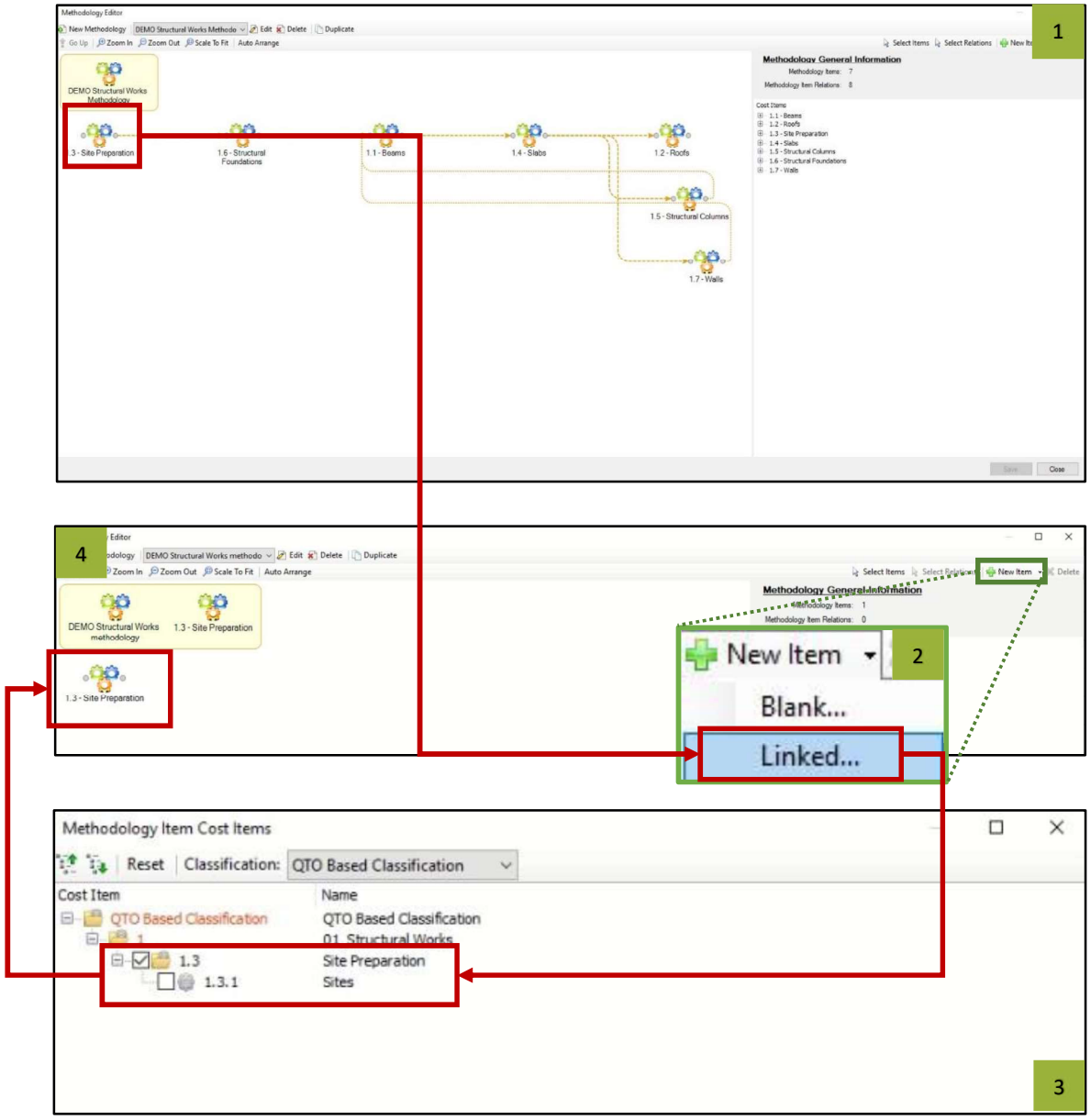
8. Connect created tasks in this order: **1.3 - Site Preparation** → **1.6 - Structural Foundations** → **1.1 – Beams** → **1.4 – Slabs** → **1.2 – Roofs**; **1.5 - Structural Columns**; **1.7 – Walls** →Define relationships as Finish-start and check Copy to children checkbox. →
9. Create backward relations from **1.5 - Structural Columns** → **1.1 – Beams** and from **1.7 – Walls** → **1.1 – Beams**. → Define it as Finish-start. → Check **Copy to children**. → Check **Constructive** relationship and define **Constructive Offset** at **1** which means that created relation will be applied between elements one storey above. →
10. Click **Save** to apply all changes to active methodology.



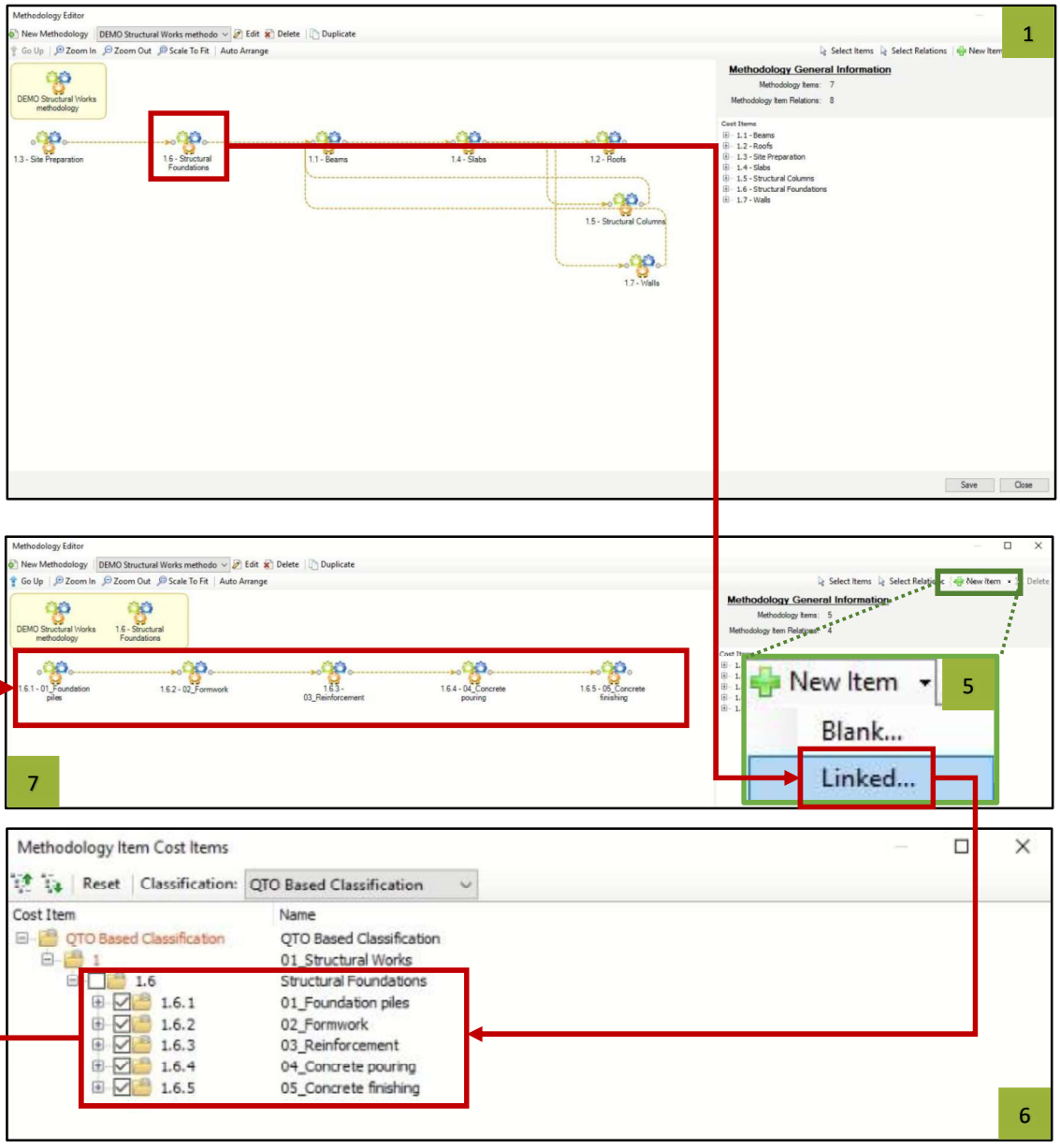


Now we have defined first level of Methodology, which means that our working sequence is defined for main element categories, but if user wants to create more detailed schedule with more precise structure, second level of methodology should be developed and that could be easily done within Methodology editor following these steps:

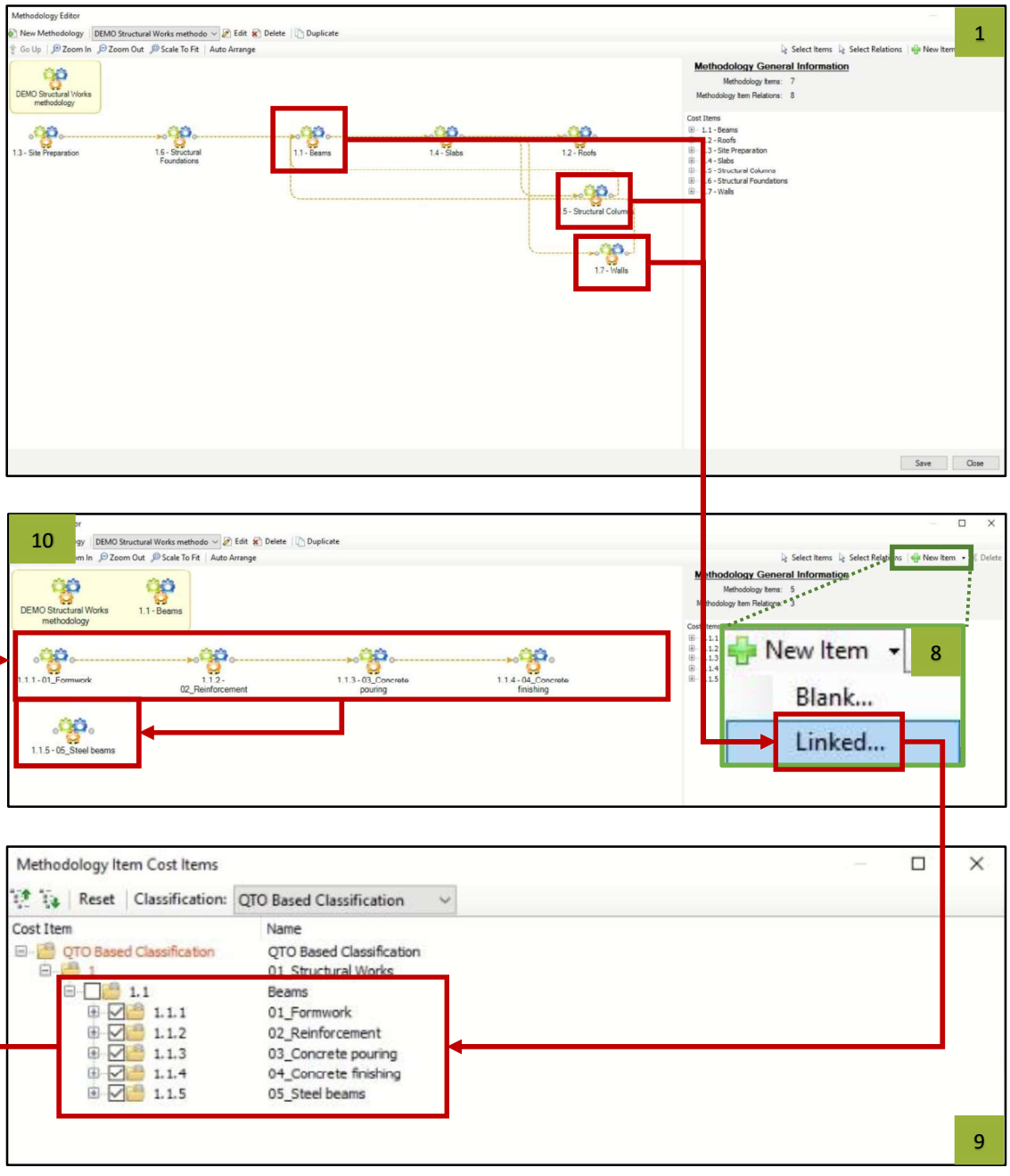
1. Double-click **Methodology item** in Methodology editor to enter second level methodology window. → First enter **1.3 - Site Preparation** task and then following tasks. →
2. Within second level methodology window click **New Item** button. → click **Linked...** →
3. Select only Cost Item **1.3.1 - Site Preparation** since there are no additional sub-categories within this group of works. → In such a simple task, user only needs to repeat the same linked item as in level 1 methodology. →
4. There will be newly created methodology item on second level.



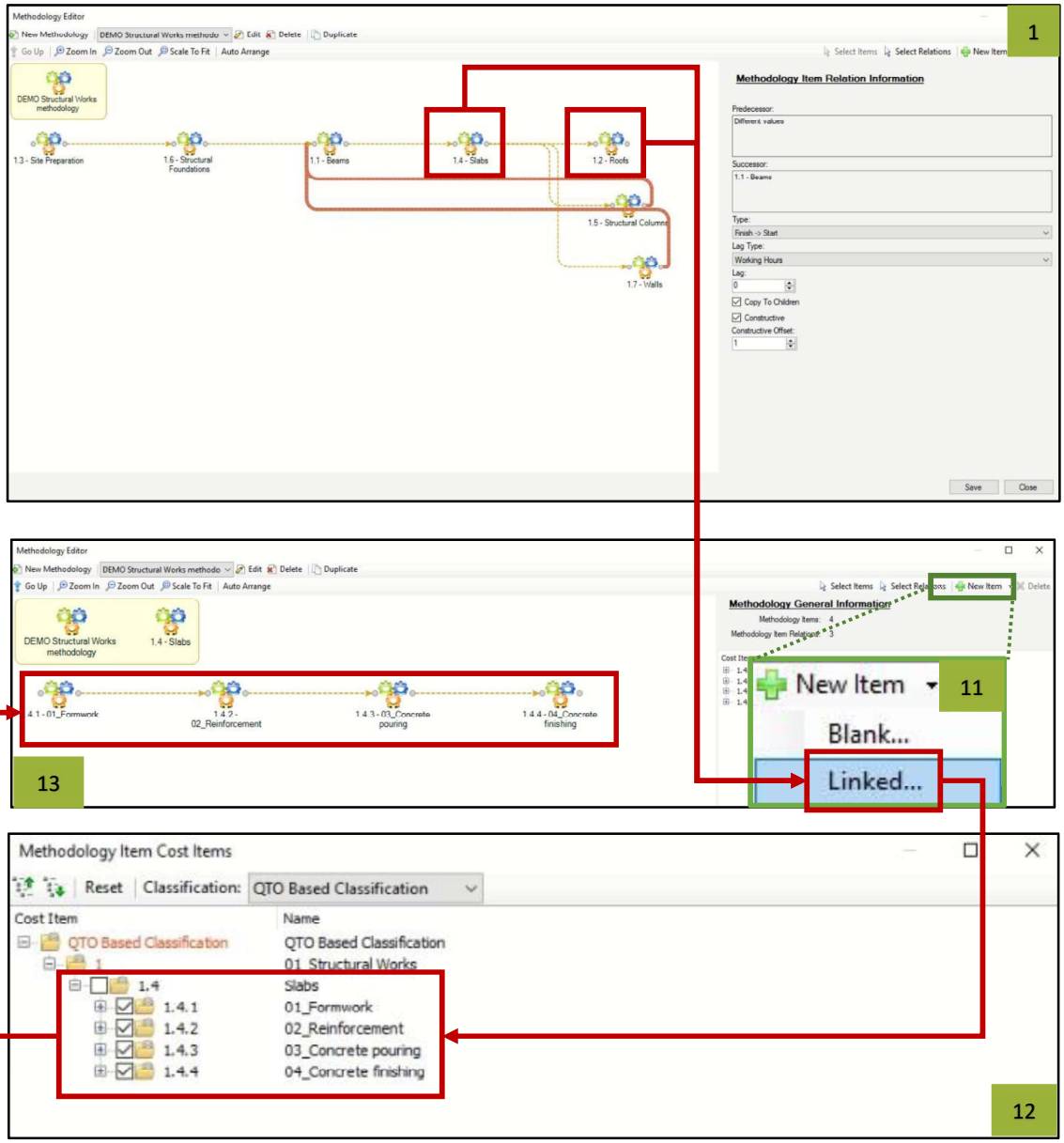
5. Double-click **Methodology Item** **1.6 – Structural Foundations**. → Within second level methodology window click **New Item** button. → click **Linked...** →
6. Select all sub-categories and click **OK** to complete action. → Now we have methodology items for second level within Foundation Works. →
7. User has to define relationships between newly created tasks. It should be defined in logical sequence **Foundation Piles → Formwork → Reinforcement → Concrete Pouring → Concrete Finishing** → Define relations between tasks as **Finish-Start** and check **Copy to Children** checkbox. →



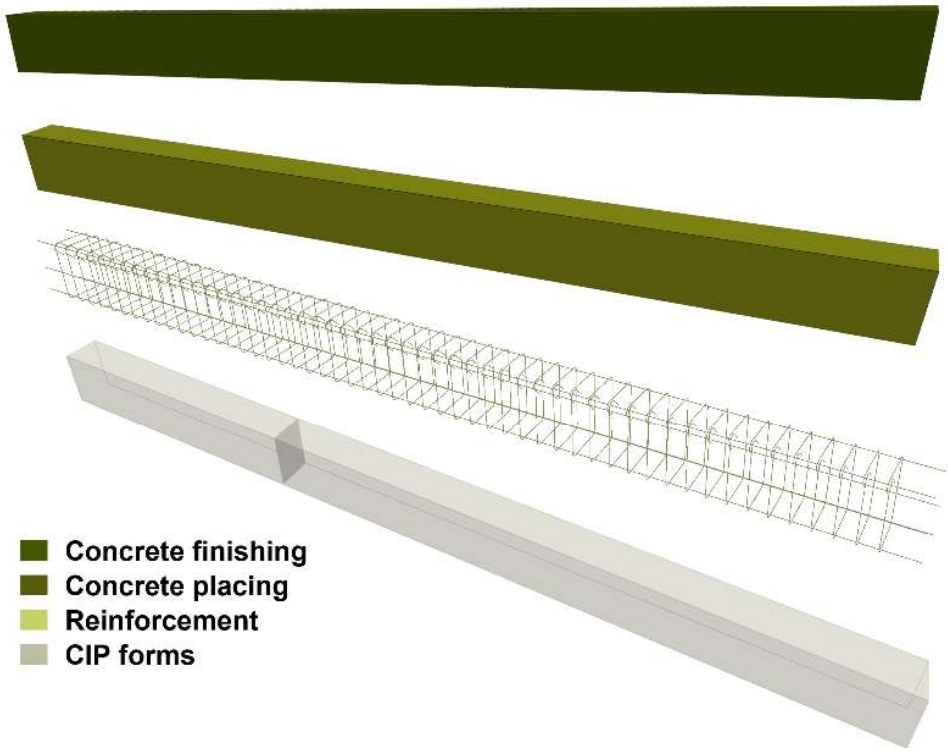
8. Double-click **Methodology Item** **1.1 – Beams**. → Within second level methodology window click **New Item** button. → click **Linked...** →
9. Select all sub-categories and click **OK** to complete action. → Now we have methodology items for second level within Beams group of works. →
10. User has to define relationships between newly created tasks. It should be defined in logical sequence **Formwork → Reinforcement → Concrete Pouring → Concrete Finishing**. → Define relations between first four tasks as **Finish-Start** and check **Copy to Children** checkbox. → Leave final task **Steel Beams** unconnected since it should not be directly related to concrete works within methodology and should be independent. (Use the same work sequence for **1.5 - Structural Columns** and **1.7 – Walls** categories as well due to similar structure of works)→ Double-click **Methodology Item** **1.4 – Slabs**. → Within second level methodology window click **New Item** button. → click **Linked...** → Select all sub-categories and click **OK** to complete action. →



11. Now we have methodology items for second level within Slabs group of works. →
12. User needs to define relationships between newly created tasks. It should be defined in logical sequence **Formwork → Reinforcement → Concrete Pouring → Concrete Finishing →** Define relations between tasks as **Finish-Start** and check **Copy to Children** checkbox. (Use the same work sequence for **1.2 Roof** category as well due to similar structure of works) →



ADDITIONAL TIP: Sample Methodologies, based on standard model categories specific for IFC based files, Revit, ArchiCAD and other authoring tools could be found on **Bexel User Area.**



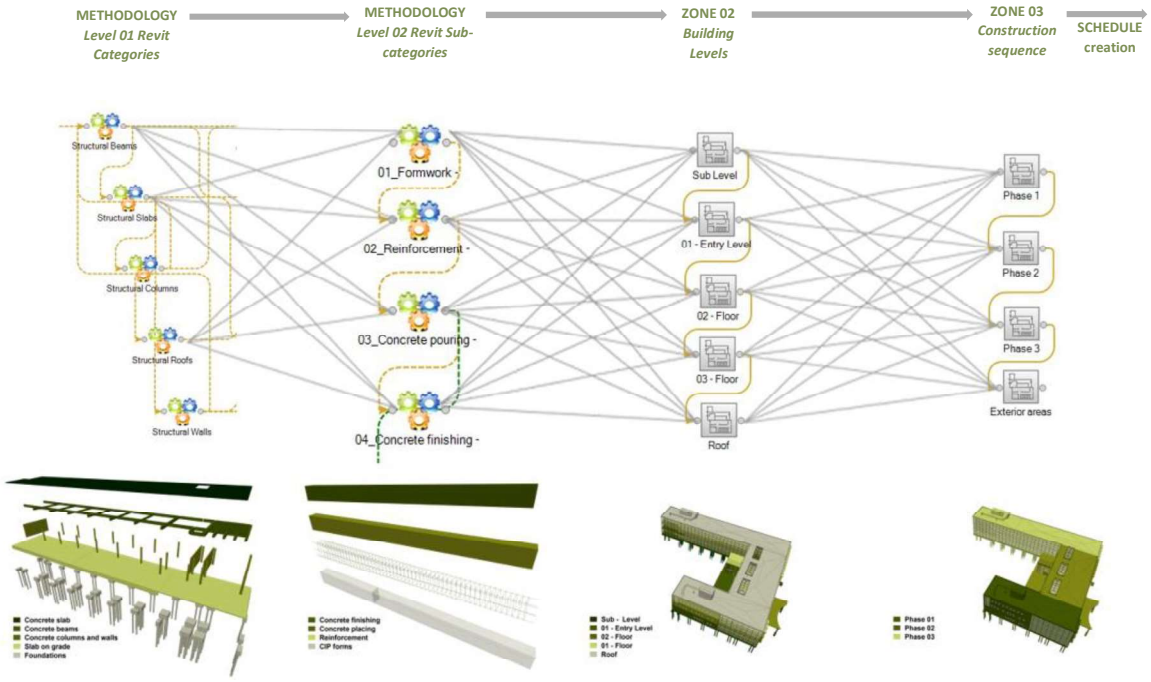
User can repeat this process for any other group of work on the project and develop complex creation methodologies tailored according to project needs. As an example of fully developed, complex, two-level construction methodology created for all groups of works user can check Methodology named **QTO Based LOB Methodology** within **Bexel Manager Sample Project V02 Complete** file.

After all spatial zones and construction Methodology are created, all needed elements are here and just need to be combined into **Creation Template** which is final template document that will be used as a basis for automatic schedule creation.

8.4. CREATION TEMPLATE

Creation template is based on previously created **Methodologies** and **Construction Zones**. Smart planning engine combines creation rules specified in **Methodology** and **Zones** and automatically generates schedule based on planner's defined logic.

This is schematic map of **Creation Template** generation process:

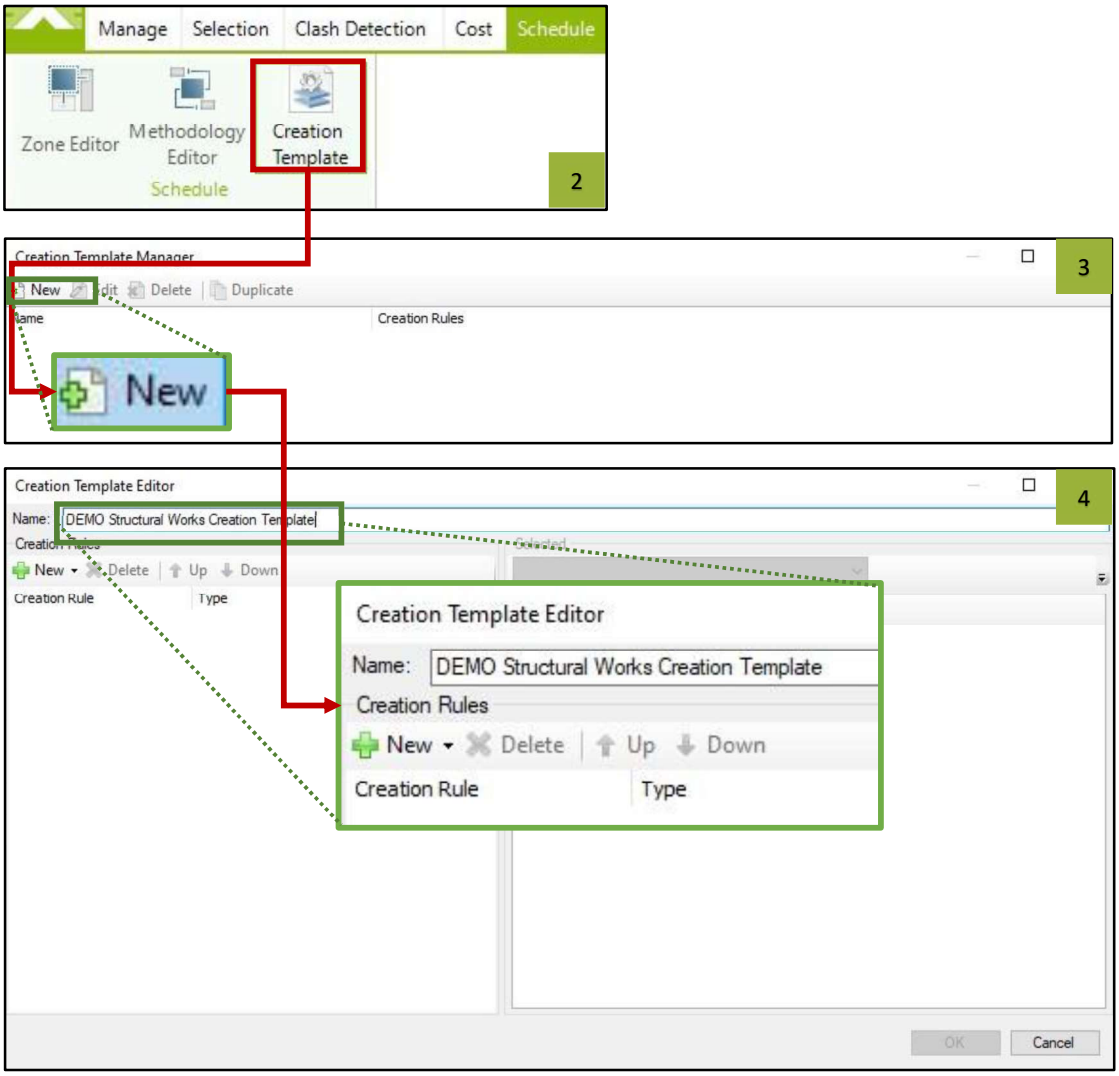


Zones and **Methodologies** should be established in a proper way in order to generate schedule with a proper structure. The first step in Creation template is zones distribution by Building blocks (for complex projects) and Building (if the project has only one building this level is not required) → the next level is Methodology Level 01 → it is followed by Methodology Level 02 (this level is optional and simpler schedules could be created without second level Methodology) → after methodology is defined Creation template requires spatial distribution rules. It is defined by vertical spatial distribution (Building Storeys) first → and then horizontal spatial distribution, Construction sequence (Building phases). User only has to put Zones and Methodologies in right order and doesn't have to define any relations between them, scheduling engine will automatically integrate creation rules defined by user.

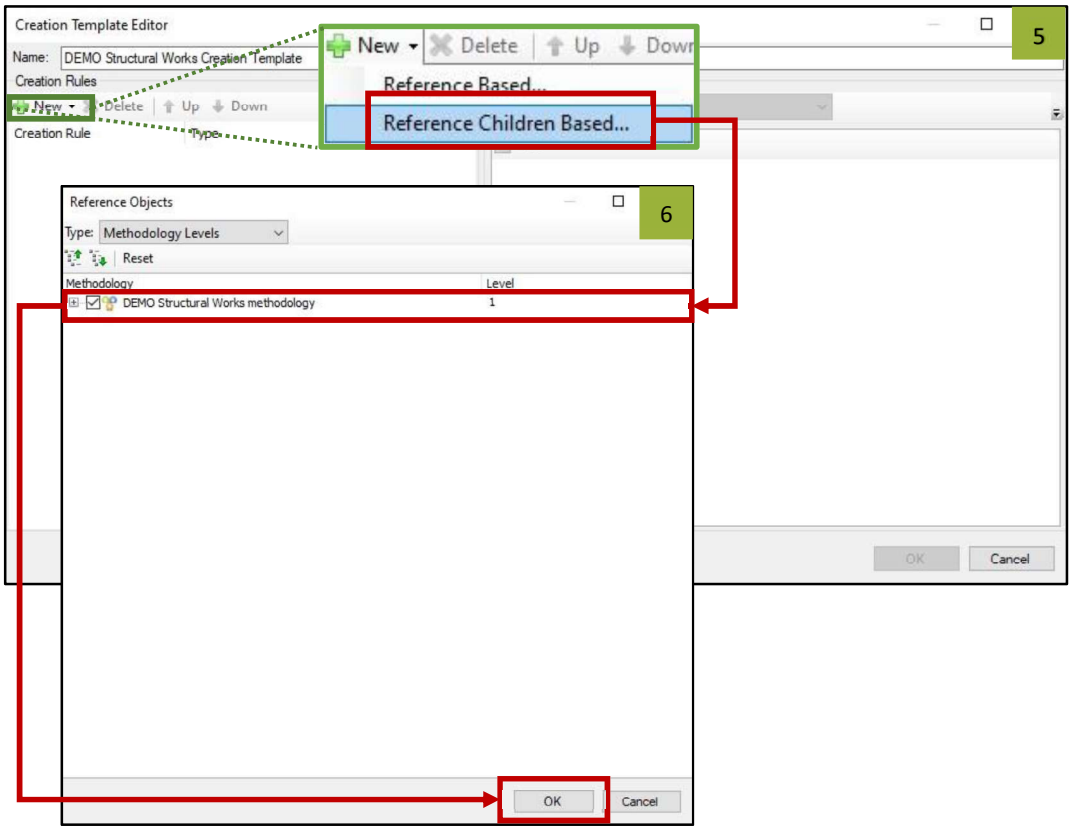
8.4.1. TEMPATE GENERATION

To exercise this workflow in the software, follow these steps:

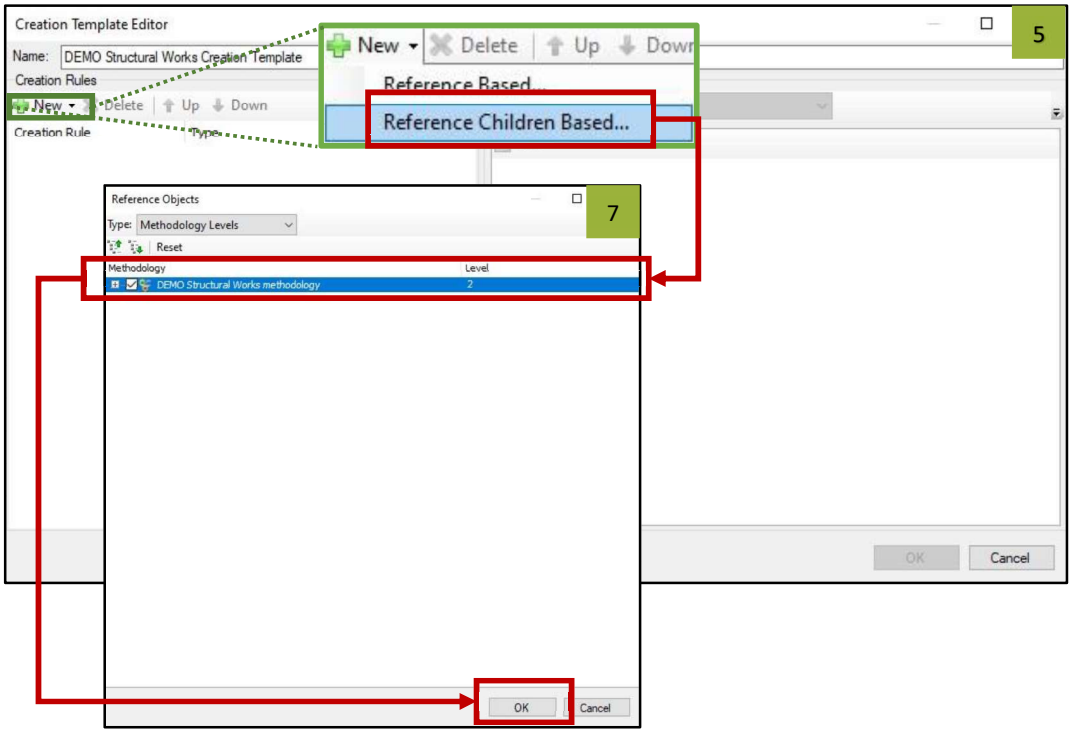
1. Following procedure explained in **Chapter 8.2.5** import prepared **Exchange** file containing defined Cost Classification, Zones and methodologies for Creation Template assembly. File is named **Creation Template Assembly.bxf** navigating through training material exchange folder of **Chapter 8.4.1.** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.4\Exchange\8.4.1)** →
2. Activate the **Schedule** tab. → Click on the **Creation Template** command. →
3. In the **Creation Template Manager** window click on the **New** command →
4. **Creation Template Editor** window will open. → Define the name of the template **DEMO Structural Works Creation Template**. →



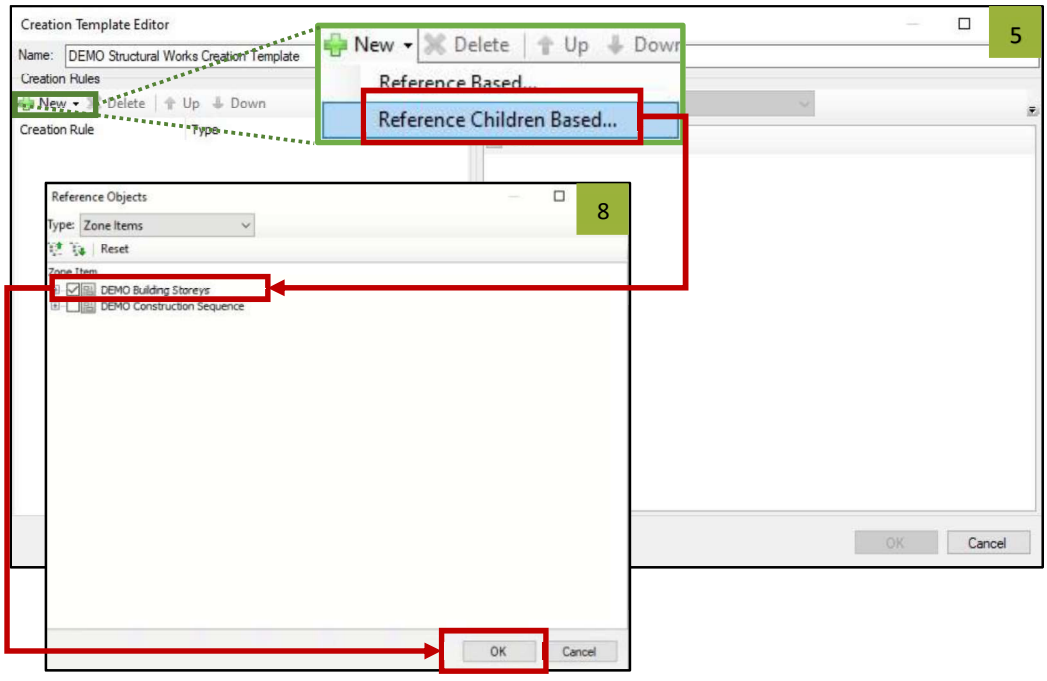
5. Click on the **New** button and chose option **Reference Children Based**. →
6. The **Reference Objects** window opens where user defines the items which will compose the template. → Select **Methodology Levels** from drop-down menu. → The template should be composed in above mentioned order with **Methodology Level 01 first** named **DEMO Structural Works methodology** → In column **Level** select **1**. (For simple projects schedule could be created with only first level methodology.) → Click **OK** to complete action. →



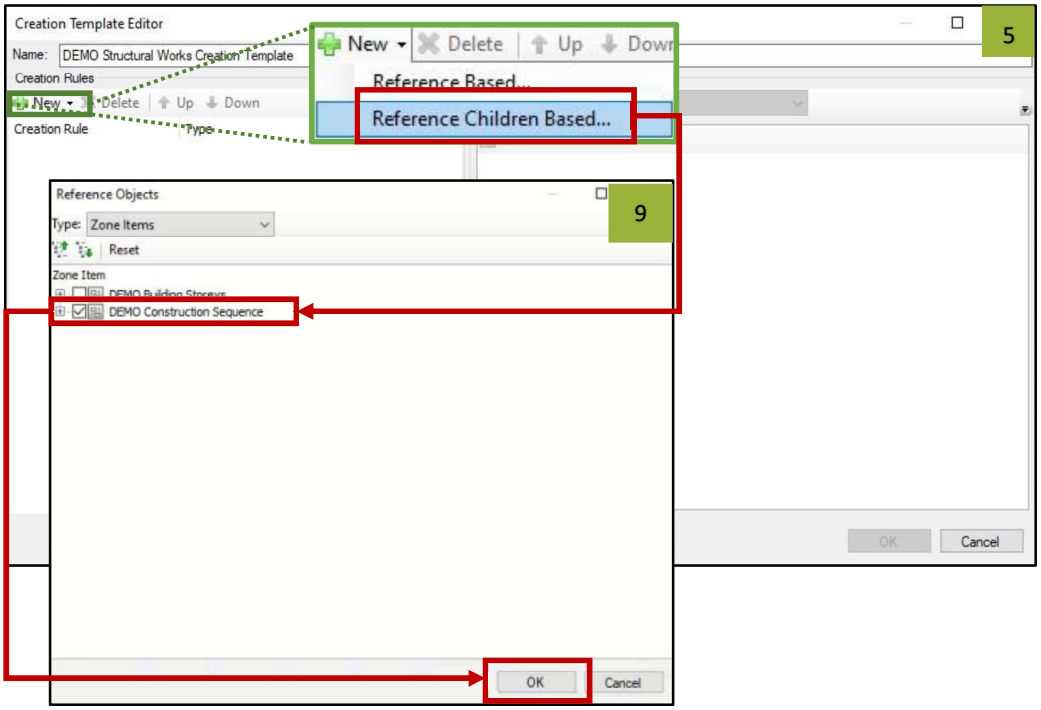
7. First level is followed by **Methodology Level 02**. → Repeat procedure from step 5. → Select **Methodology Levels** from drop-down menu. → Select methodology previously created named **DEMO Structural Works Methodology** → In column **Level** select **2**. →



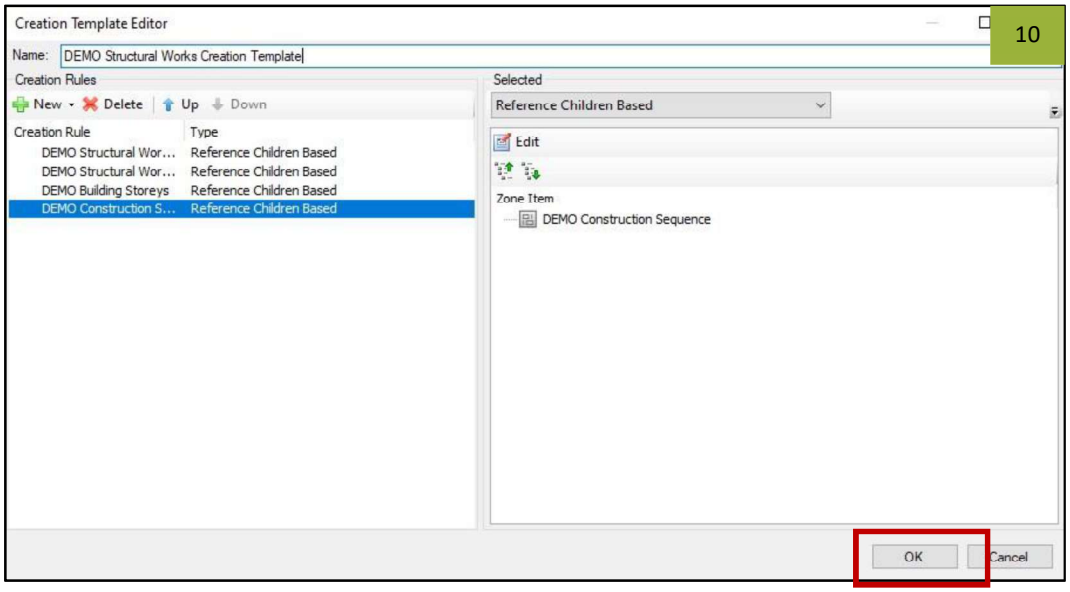
8. Further spatial distribution of the project is through **Building Storeys**. → Repeat procedure from step 5. → Select **Zone Items** from drop-down menu. → Select zone previously created named **DEMO Building Storeys**.→ Click **OK** to complete action. →



9. Final part of Creation Template is **Construction Sequence**. → Repeat procedure from step 5. → Select **Zone Items** from drop-down menu. → Select zone previously created named **DEMO Construction Sequence**.→ Click **OK** to complete action. →



10. Now **Creation Template** is completed and ready for automatic schedule creation.



NOTE: The Creation Template can be edited, copied or deleted after creation.

By creating **Creation Template** all preparation works for automatic schedule creation are completed and user is now able for the final step, automatic schedule creation.

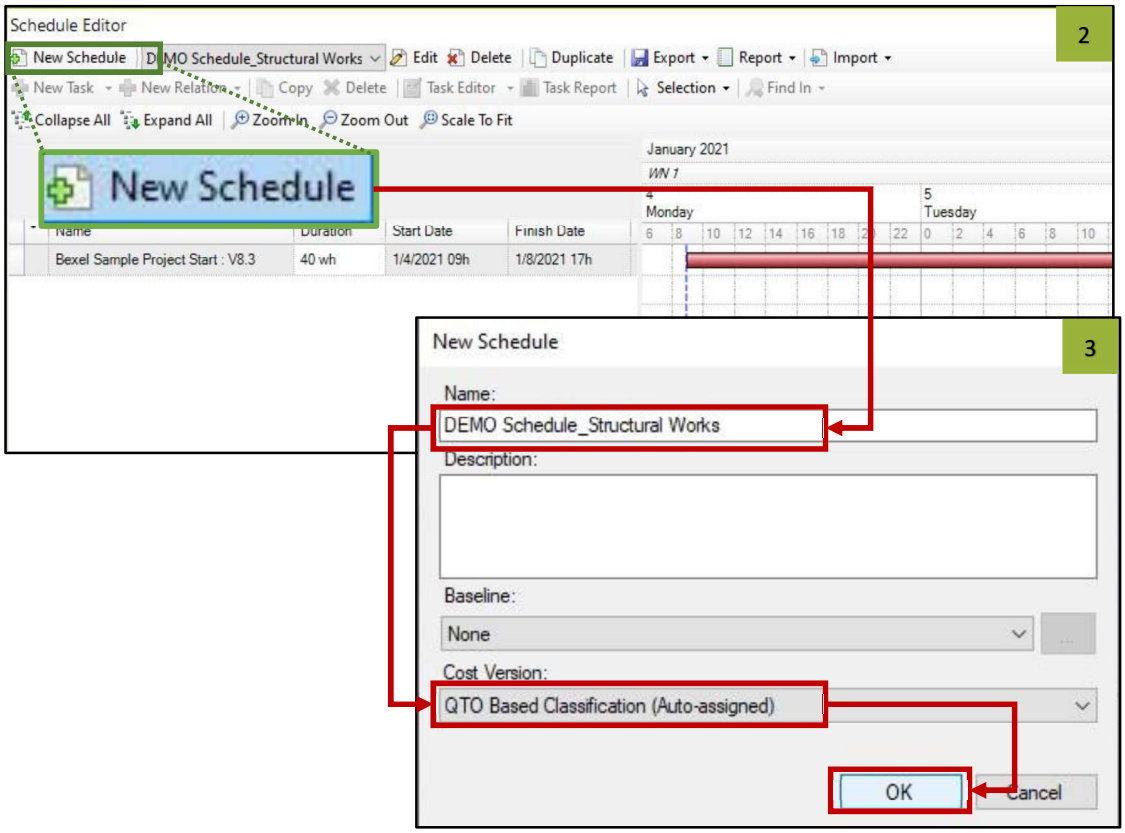
8.5. SMART SCHEDULING

In this chapter the focus will be on creation of simplified schedule based on creation **Methodology** defined in **Chapter 8.3.3**, focused only to one group of works, Structural works. After training process with this simplified schedule is complete, user is able to generate more complex schedules using exchange file named **DEMO Complete Works Creation Template.bxf** available in folder **8.5.1** of training materials following the same procedure.

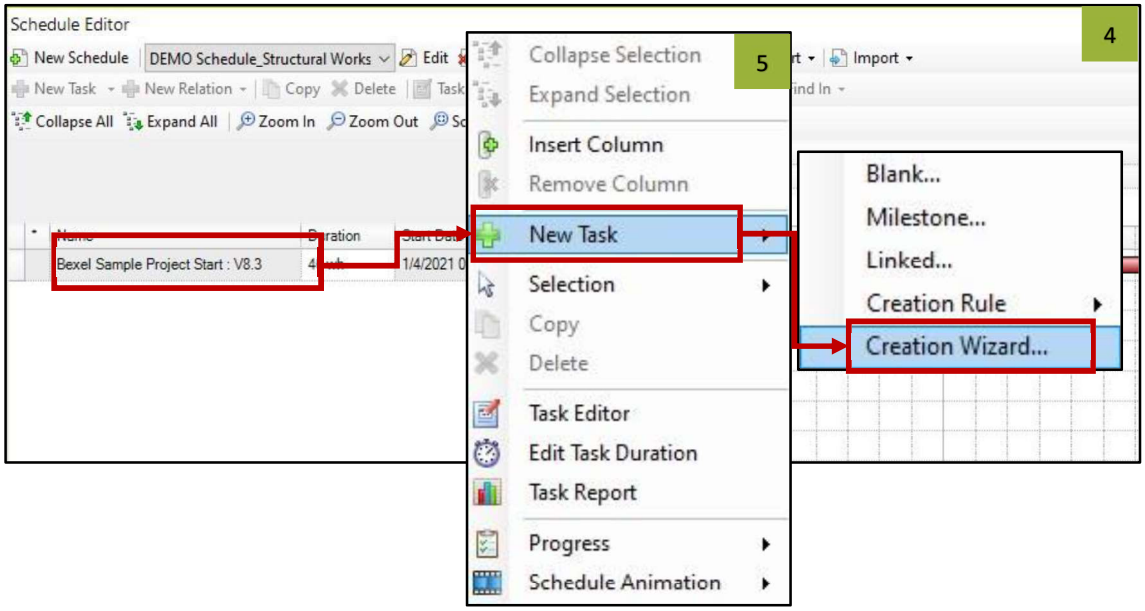
8.5.1. AUTOMATIC SCHEDULE CREATION

With all spatial **Zones** and construction **Methodology** combined in **Creation Template**, process of automatic schedule generation is virtually only few clicks away:

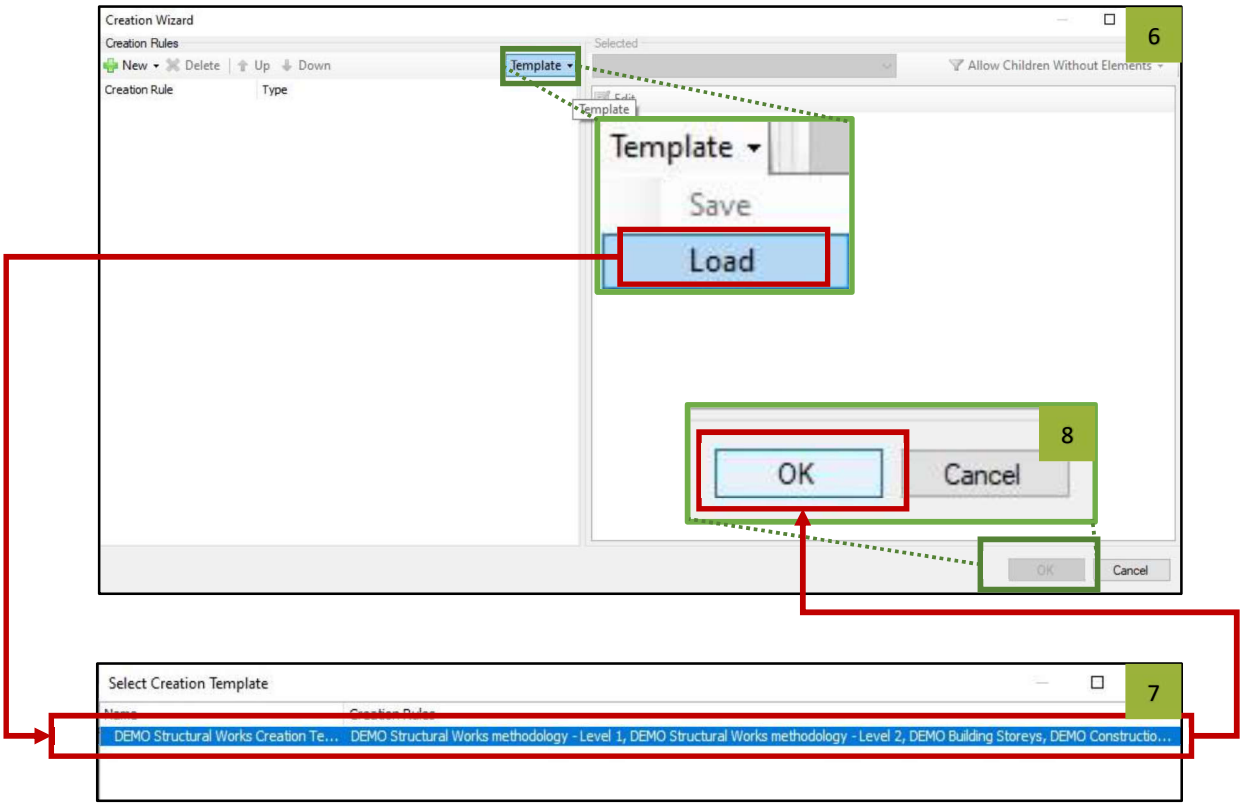
1. Following procedure explained in **Chapter 8.2.5** import prepared **Exchange** file containing defined Creation Template with all accompanying documents. File is named **DEMO Structural Works Creation Template.bxf** navigating through training material exchange folder of **Chapter 8.5.1.** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.5\Exchange\8.5.1)** →
2. In the **Schedule Editor** create a new blank schedule by simple clicking **New Schedule** command →
3. Define name **DEMO Schedule_Structural Works** and choose **Cost Version** that new **Schedule** refers to (In our case it is the one created by **Auto-assign** process of imported **Cost Classification**.) →



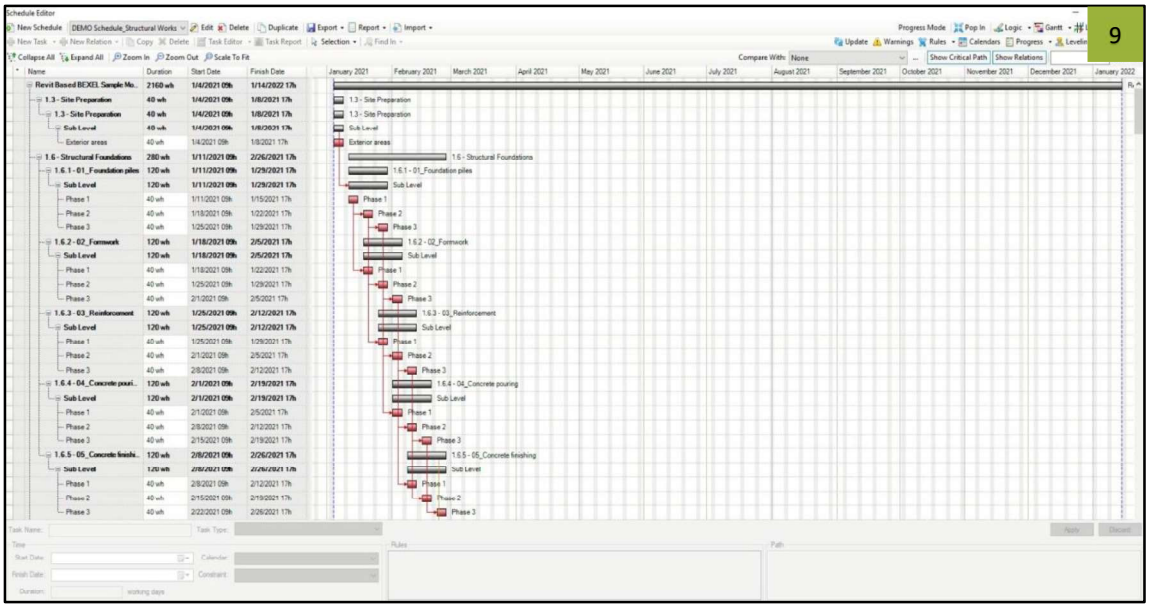
4. In schedule tasks list **right-click** on the first line of active blank schedule (blank parent task). →
5. Select the command **New Task** and chose option **Creation Wizard**. → **Creation Wizard** window will open. →

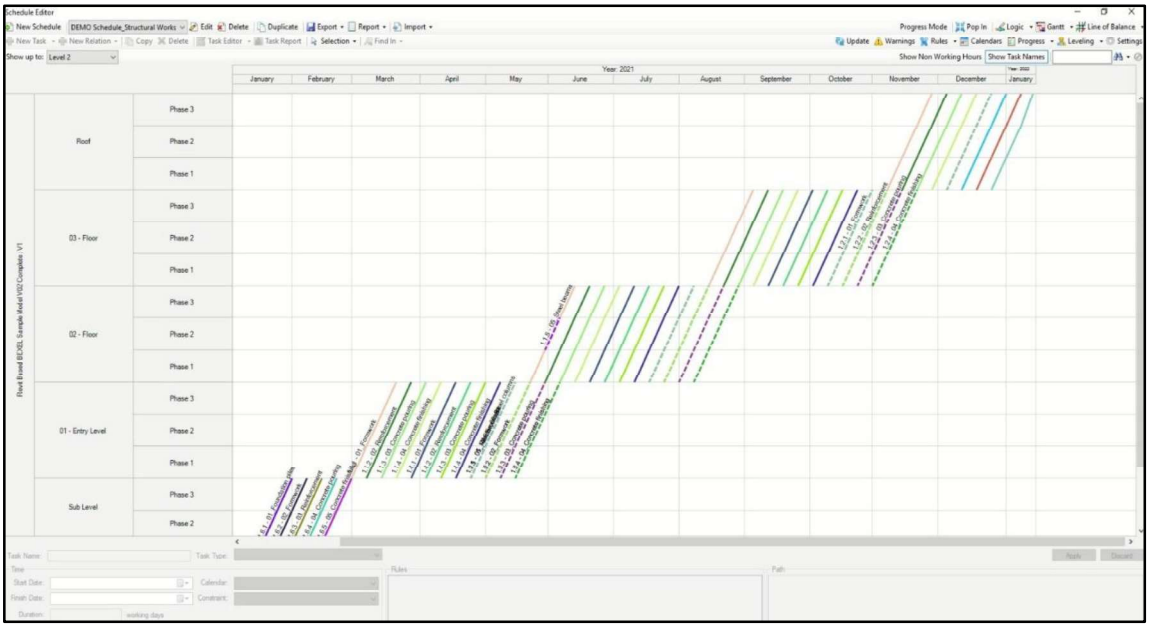


6. In the **Creation Wizard** window click on the **Template** command and chose option **Load**. →
7. In the **Select Creation Template** window choose a template named **DEMO Structural Works Creation Template** →
8. Click on the **OK** button to initiate schedule creation. →



9. The schedule is created and can be seen in the **Schedule Editor**. → It could be analyzed in Gannt chart, LOB (Line of Balance) diagram as well as series of analytical charts within Task Report.





Newly created schedule has all tasks set with unformal duration of 40 working hours and could be further adjusted according to project needs.

8.5.2. BASIC SCHEDULE OPTIMIZATION

Schedule is structured according to rules defined in **Construction Zones** and **Methodology** created by user. All the tasks have default duration value set during creation process and this could be easily adjusted by user.

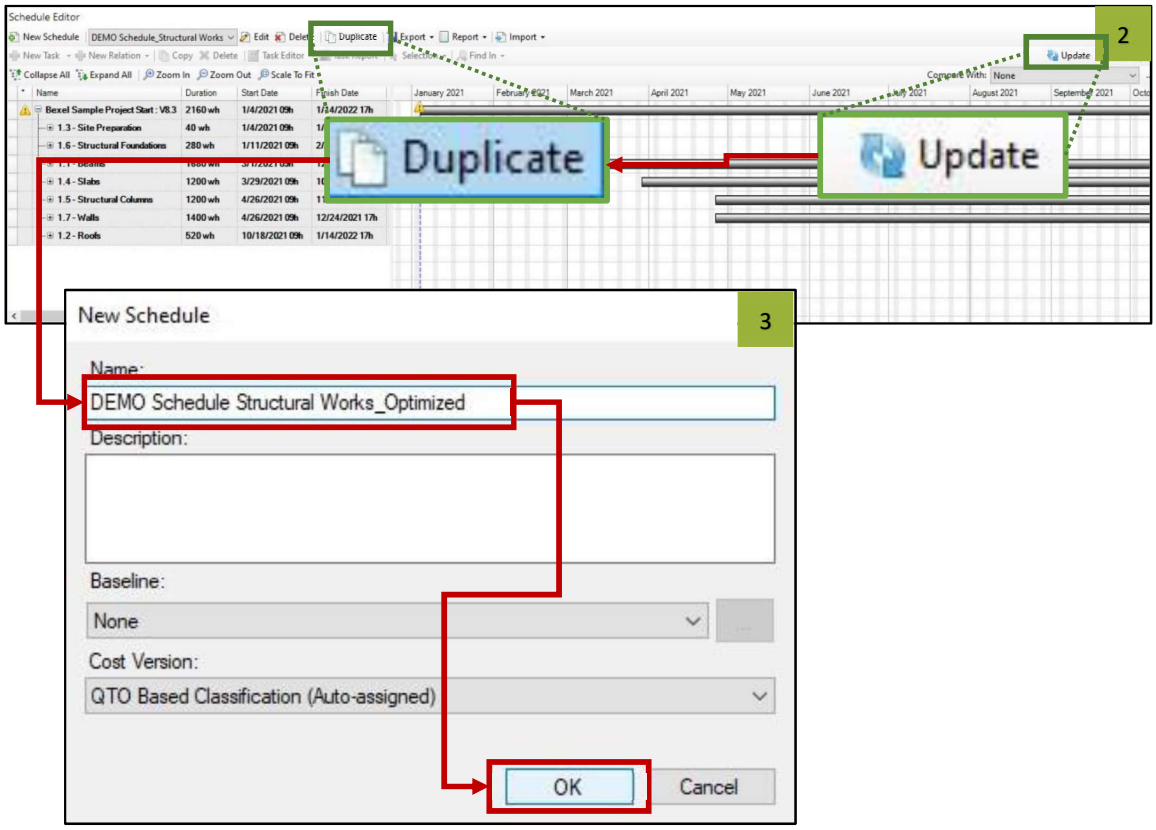
Generally, construction phases are dimensioned in such way to achieve even distribution of available **resources** throughout construction execution period, so task duration should be more or less uniformal, but, of course, some works are faster than others so some level of **fine-tuning** is necessary.

Some of the most common adjustments could be, reduction in duration for some repetitive structural works tasks, like **formwork**, **reinforcement**, and even more significant reduction for **concrete pouring** which has to be done in a very short period of time due to nature of material.

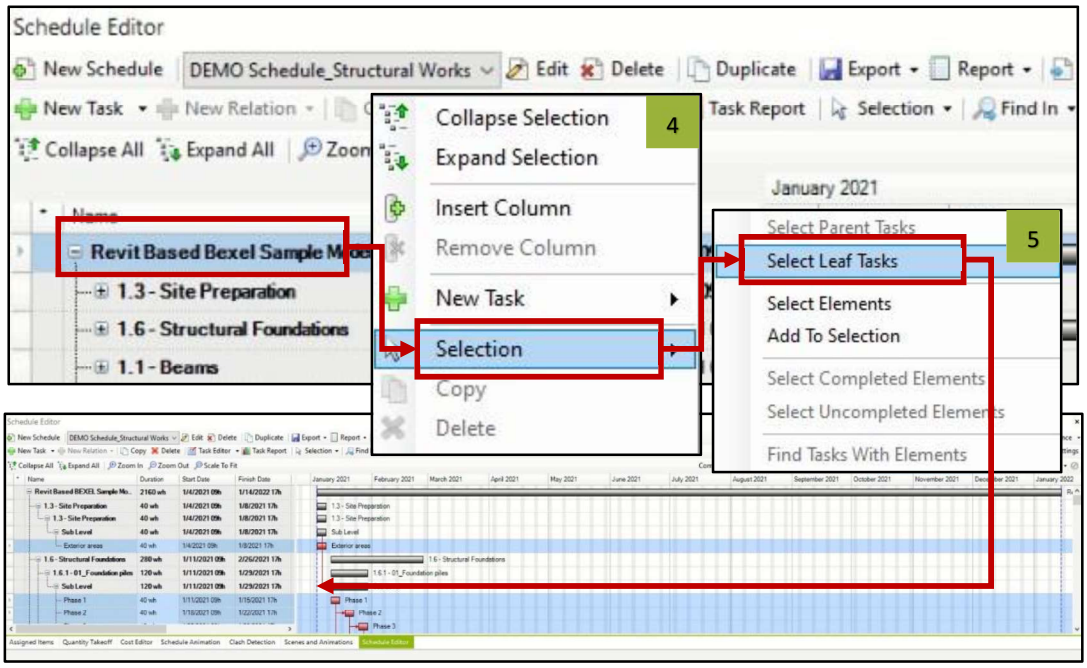
On the other hand, some complex labor intensive tasks with a lot of elements to be installed like **Curtain walls**, or **HVAC ducts** installation could be extended to reduce needed **resources** for these tasks, but all of these are just general recommendations and it is project managers choice to adjust automatically generated schedule according to its needs and specifics of the project.

As a part of an exercise user can follow these steps to optimize schedule **DEMO Schedule_Structural Works** created in previous chapter:

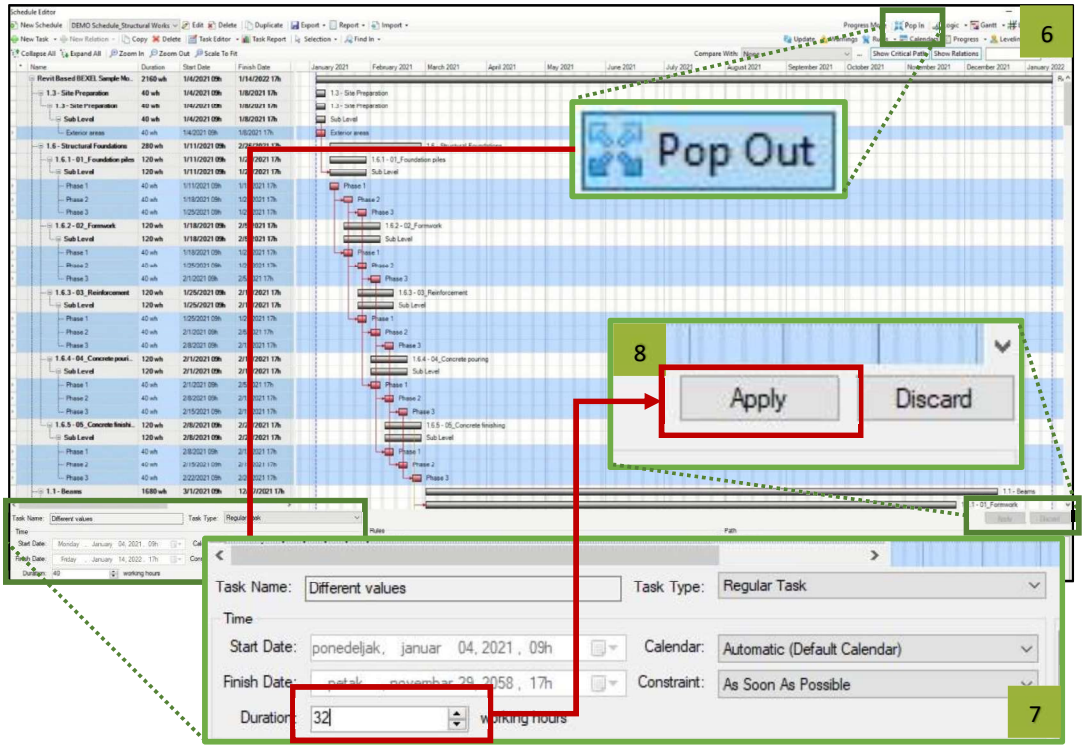
1. Following procedure explained in **Chapter 8.2.5** import prepared **Exchange** file containing project schedule (created in **Chapter 8.5.1**) with all accompanying documents. File is named **DEMO Schedule_Structural Works.bxf** navigating through training material exchange folder of **Chapter 8.5.2.** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.5\Exchange\8.5.2)** →
2. In the **Schedule Editor** window click **Update** button to link imported schedule with model elements. → Click button **Duplicate** to make a copy of previously created schedule **DEMO Schedule Structural Works** →
3. Name copy of the schedule **DEMO Schedule Structural Works_Optimized.** → Click **OK** to complete action. (In this way user can assess differences between automatically generated schedule and newly optimized version.) →



4. Right-click Parent task. → Click **Selection**. →
5. Click **Select Leaf Tasks**. → All tasks within schedule are selected now. →

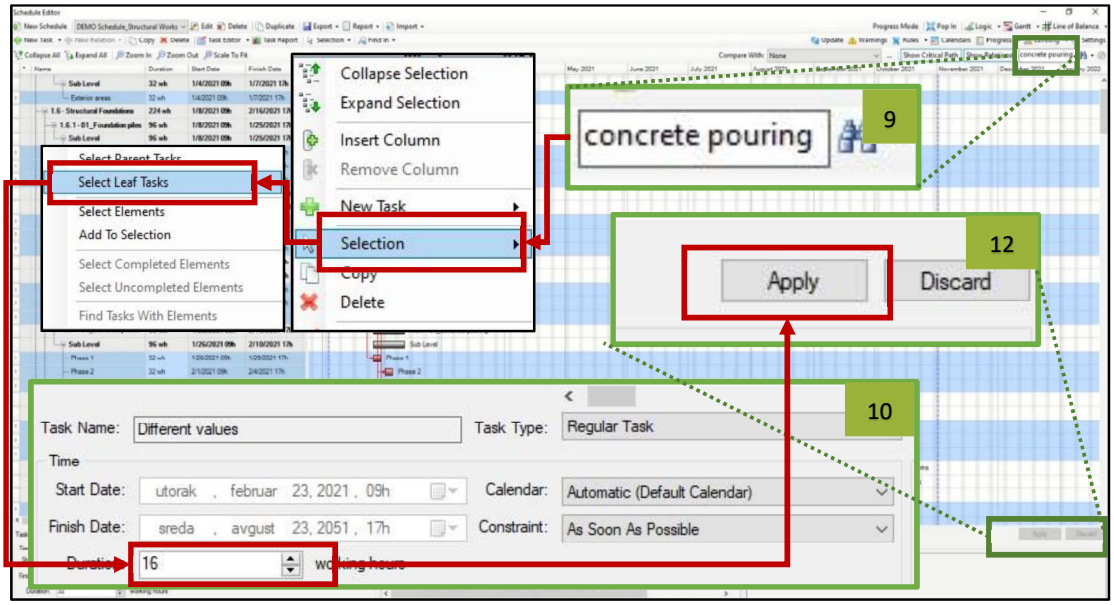


6. In the upper-left corner of **Schedule Editor** window click **Pop Out** button to expand schedule view and get direct **Task Editor** ribbon. →
7. In **Task Editor** ribbon in field **Duration** user can see duration of all selected tasks, in this case set to default 40 working hours defined by scheduling engine during schedule creation. → Change this duration to 32 working hours to optimize works. →
8. Hit **Enter** and then click **Apply** command to complete tasks adjustment. →

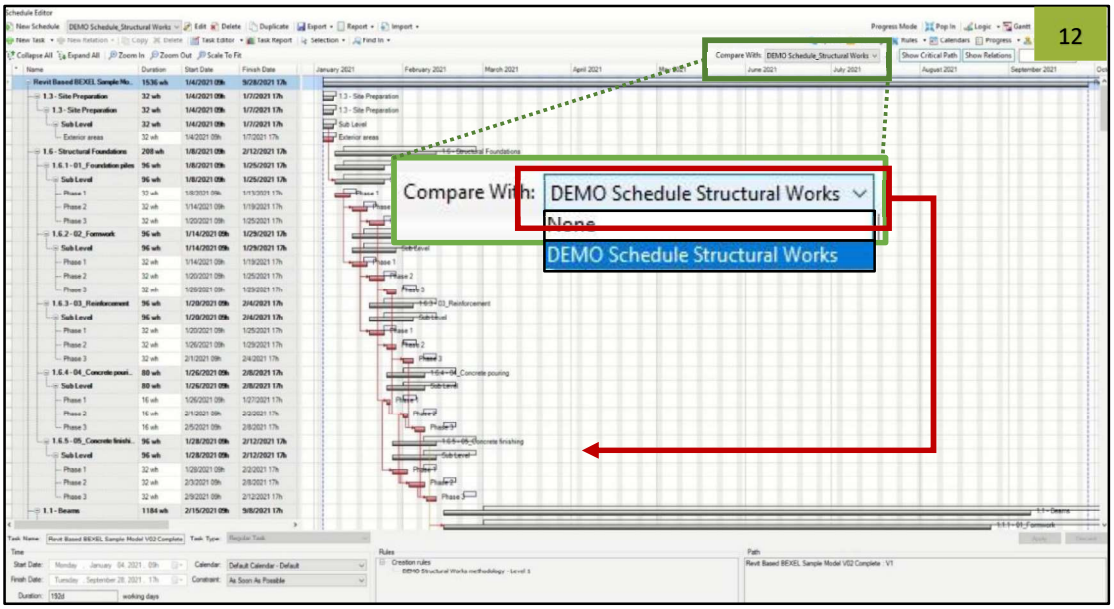


In a **Filter** field, upper-right corner of Schedule Editor window type **Concrete Pouring**. → Software will filter and select all task with this name. →

9. **Right-click** any of the selected tasks. → Click **Selection**. → Click **Select Leaf Tasks**. → All leaf tasks under **Concrete Pouring** are selected now. →
10. In **Task Editor** ribbon in field **Duration** user can see duration of all selected tasks, in this case it is 32 working hours defined in previous step. → Change this duration to 16 working hours to optimize works
11. Hit **Enter** and then click **Apply** command to complete tasks adjustment. → Repeat this process for **Concrete Finishing**.



12. At the end go back to Gannt chart view. → Click drop-down menu in **Compare With:** field and select schedule that was automatically created named **DEMO Schedule Structural works** to set it as a baseline schedule for comparison. → Now user is able to see differences between two schedules and assess results of optimization process. → This feature could be also used for Planned vs. Real comparisons during project execution.

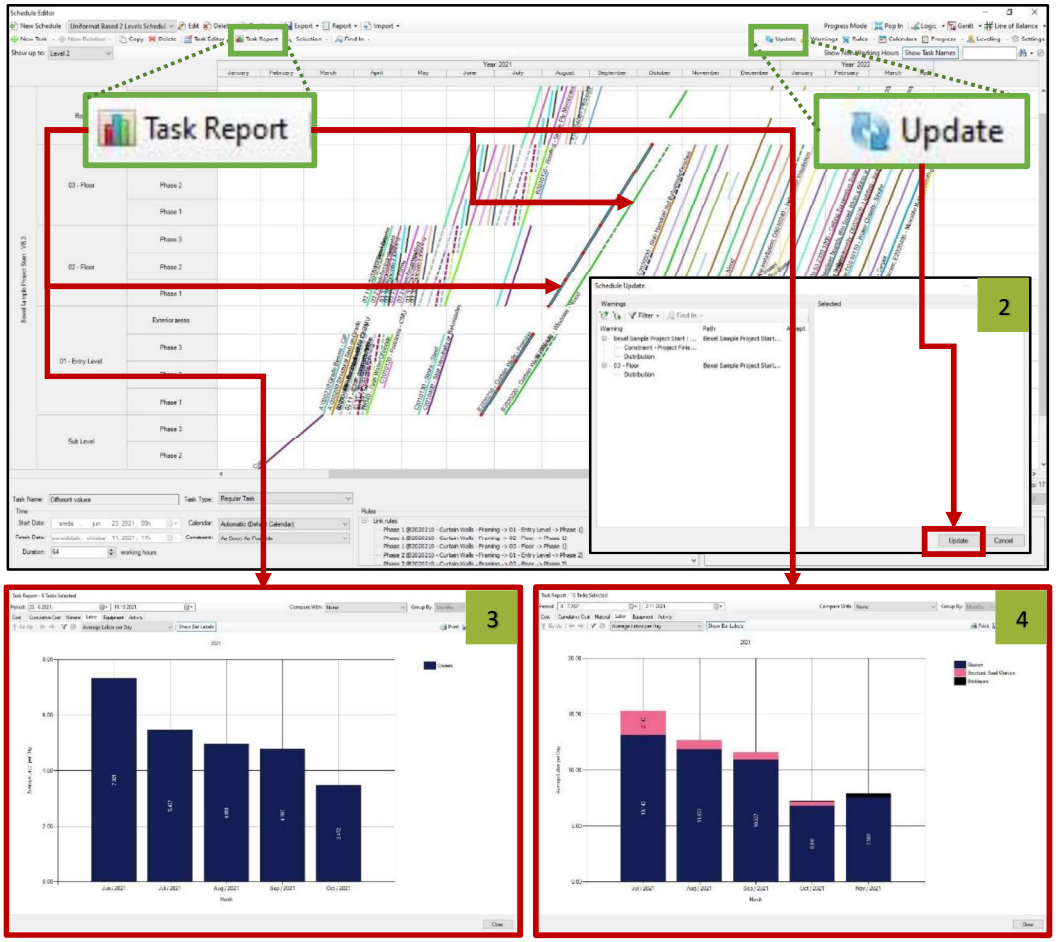


8.5.3. RESOURCE LEVELING

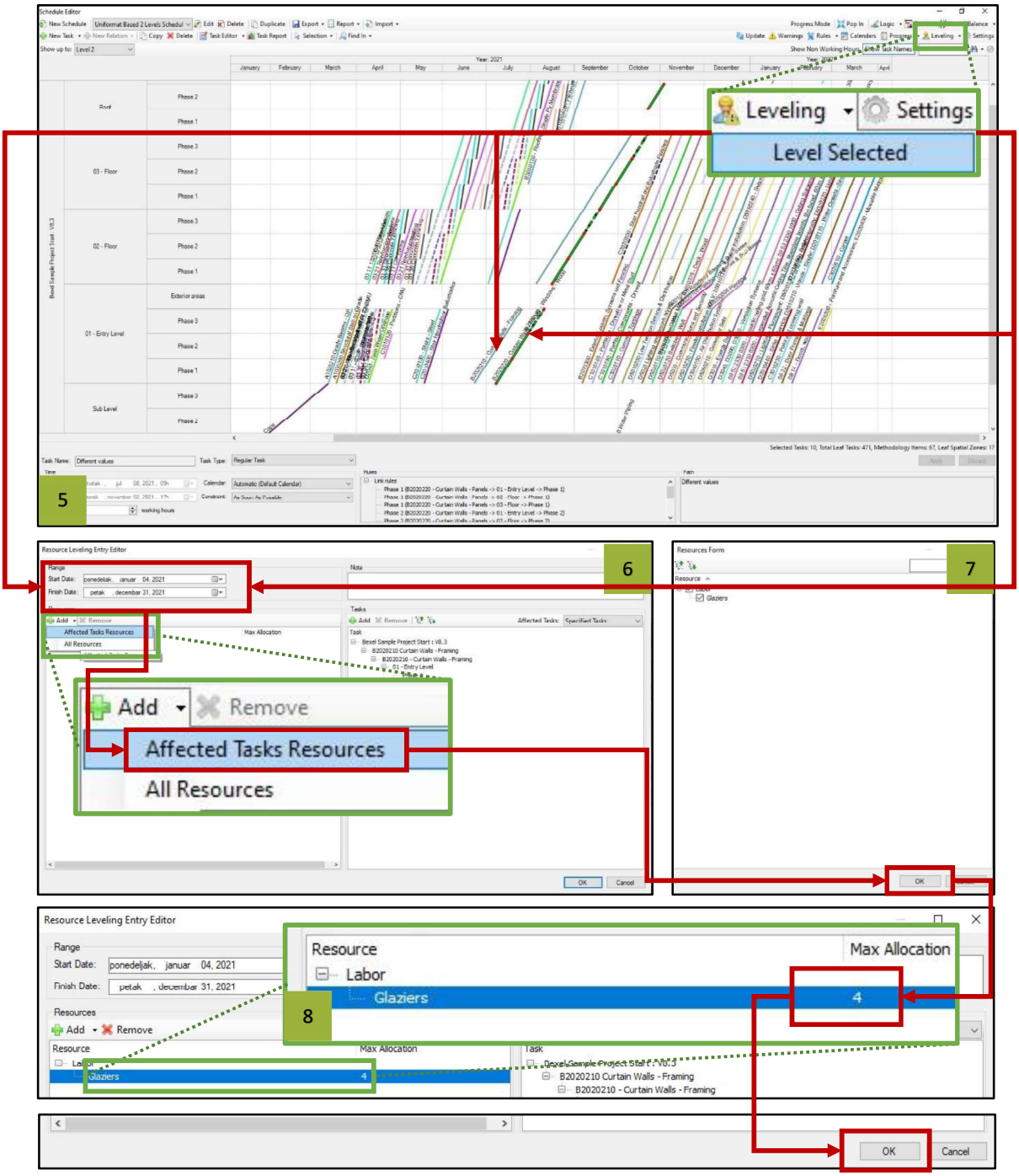
Besides manual fine-tuning explained in **Chapter 8.5.2**, for detailed schedules with defined resources Bexel Manager allows user to automatically adjust schedule in order to achieve optimal resource use.

This workflow could be exercised only on schedules with defined resources within integrated Cost Classification, so for training purpose user should navigate to exchange files folder **8.5.3** to import prepared schedule and start exercising following steps:

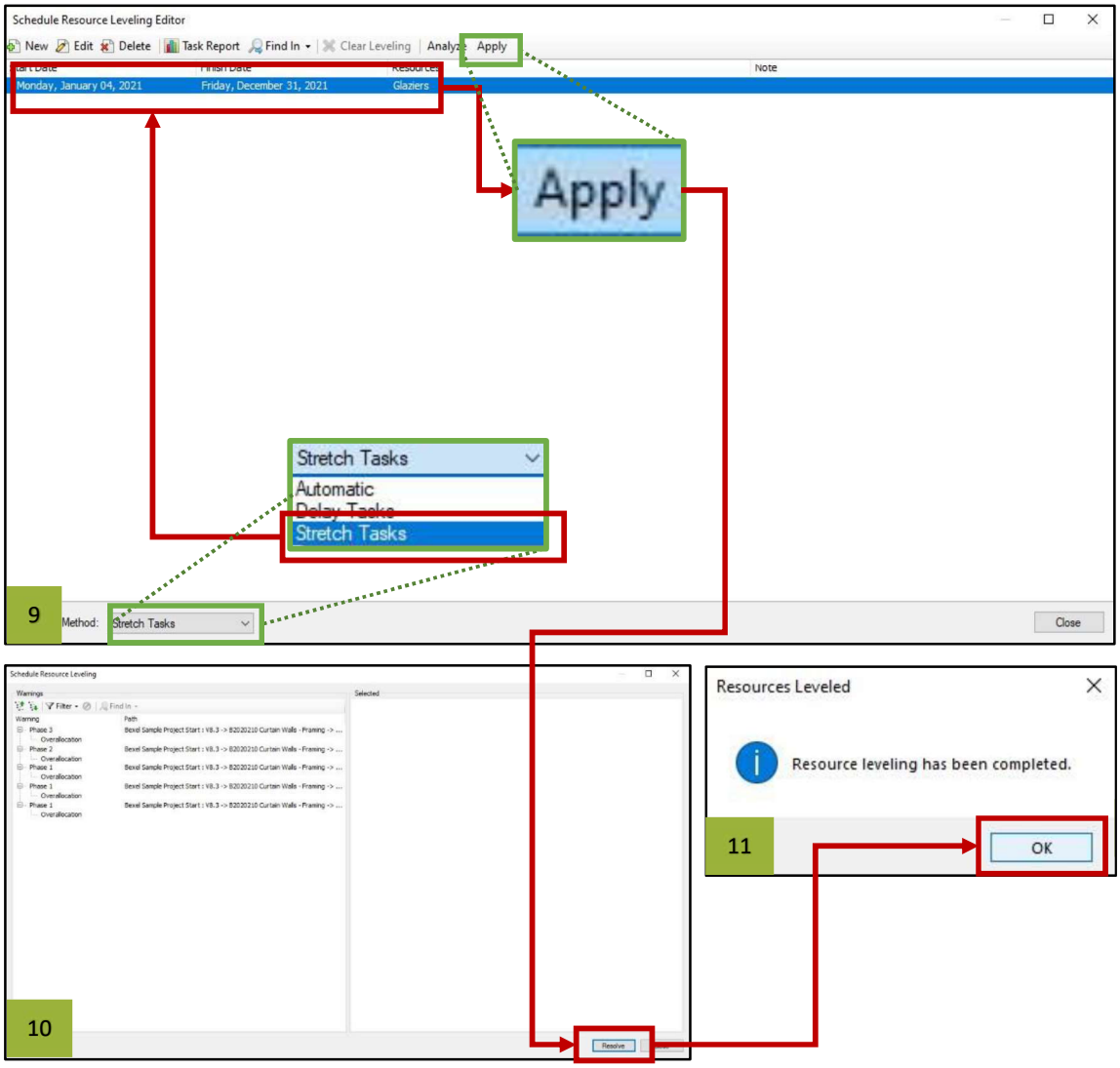
1. Following procedure explained in **Chapter 8.2.5** import prepared **Exchange** file containing project schedule with defined resources with all accompanying documents. File is named **Uniformat Based 2 Levels Schedule.bxf** and user can find it navigating through training material exchange folder of **Chapter 8.5.3.** **(PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.5\Exchange\8.5.3)** →
2. In the **Schedule Editor** window click **Update** button to link imported schedule with model elements. → **Schedule Update** window will open displaying **Warnings** about parts of the schedule that will be updated. User can choose which parts of the schedule should be updated. → In this case just click **Confirm** to complete update. →
3. Go to **Line of Balance** view. →**Double-click** Activity line of activity **B2020210 Curtain Walls – Framing.** → Click **Task Report** button. → Go to **Labor** tab. → Check how number of **Glaziers** on this activity varies from 7 to 3 from month to month. →
4. Repeat process for activity **B2020220 Curtain Walls - Panels.** → Check how number of **Glaziers** on this activity varies from 13 to 6 from month to month. → Our goal is to balance this resource.



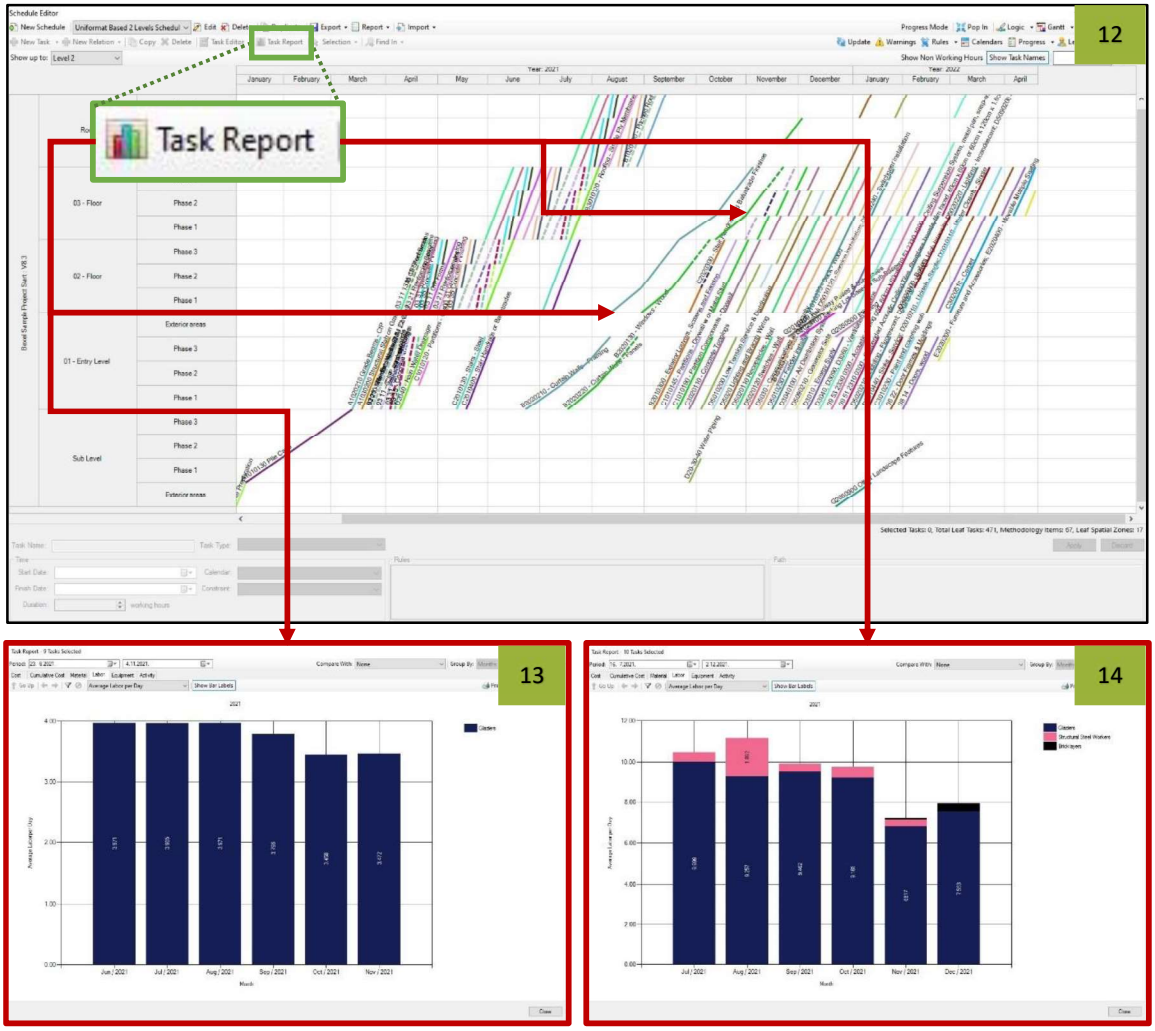
5. **Double-click** Activity line of activity **B2020210 Curtain Walls – Framing.** → Click arrow next to **Leveling** button. → **Level Selected**. → **Resource leveling Entry** window opens. →
6. Click **Add** command. → Select **Affected tasks Resources**. →
7. In **Resources Form** check **Glaziers** and click **OK** to complete action. →
8. **Resource leveling Entry Editor** opens. → Here user defines **Start** and **End Date** in **Range** field (in our example just leave default value for entire project) and **Maximum Allocation** number for selected resource (in our case **Glazier** laborers). → Since our chart showed variations between 7 and 3 workers per month the optimum maximum number would be **4** workers per month. → Click **OK** to complete action. →



9. In **Schedule Resource Leveling Editor** window newly, created **Resource Leveling** log appears. → Select it. → In **Method** drop-down menu choose **Stretch task** command. → Click **Apply** button. →
10. Software will display **Warnings** about changes that resource leveling algorithm will apply to schedule. → Click **Resolve** to confirm changes. →
11. Click **OK** in notification window to complete action. → Repeat steps **5** to **11** for activity **B2020220 Curtain Walls – Panels** as well only specifying **Max Allocation** at **10** instead of **4**.



12. Go to **Line of Balance** schedule view. → Flow lines for activities affected by Resource leveling are stretched in certain segments. →
13. **Double-click** Activity line of activity **B2020210 Curtain Walls – Framing.** → Click **Task Report** button. → Go to **Labor** tab. → Check how number of **Glaziers** on this activity is now leveled at approximately 4 per months. →
14. Repeat process for activity **B2020220 Curtain Walls - Panels.** → Check how number of **Glaziers** on this activity is now leveled at approximately 10 per months. → Our goal is achieved, resources are now much more balanced for these two activities which leads to optimal resource use, higher efficiency and lower costs on the project.



Using extensive analytics and automated resource leveling planner is able to perfect project schedule and significantly improve construction process on site.

8.6. SCHEDULE ANIMATION

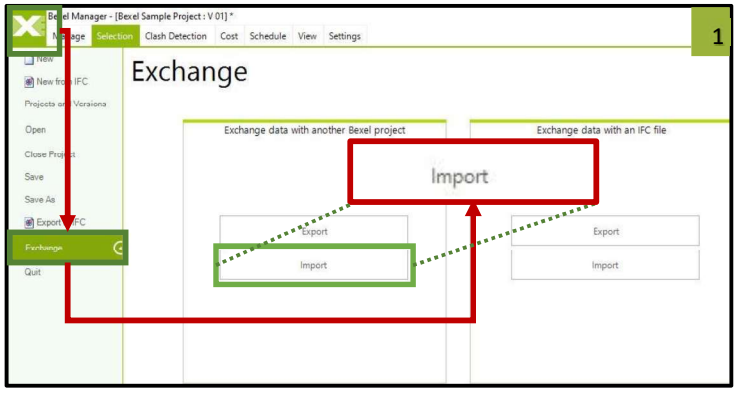
In this exercise we will create Schedule Animation where we use the schedule which has been already created. We will go through Animation settings and some specific options that are usually used in Animations.

For these exercises we need **Bexel Sample Project - Exercise (Schedule Animation).bxf** file that can be downloaded from Bexel Use Area **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.6\Exchange**.

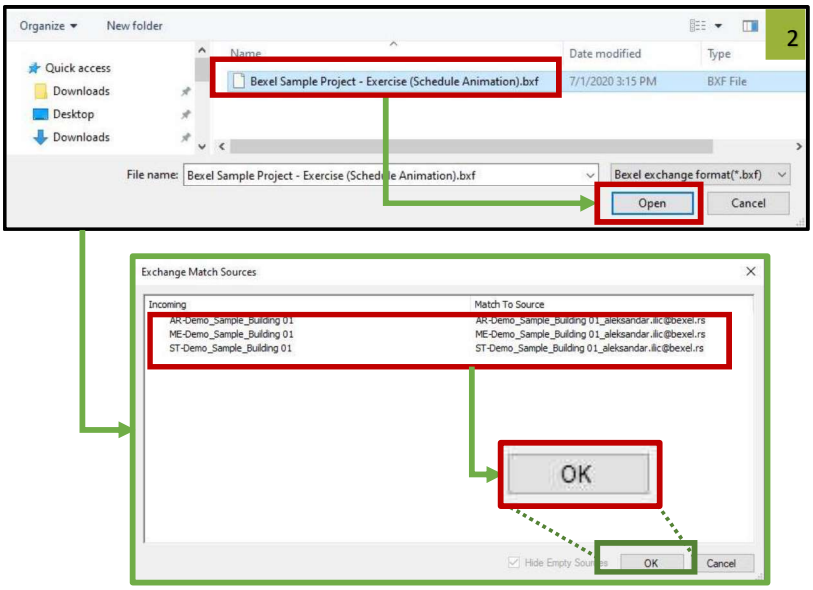
8.6.1. SCHEDULE ANIMATION – DISPLAY TYPE: TASK

Exchange schedule from another Bexel project

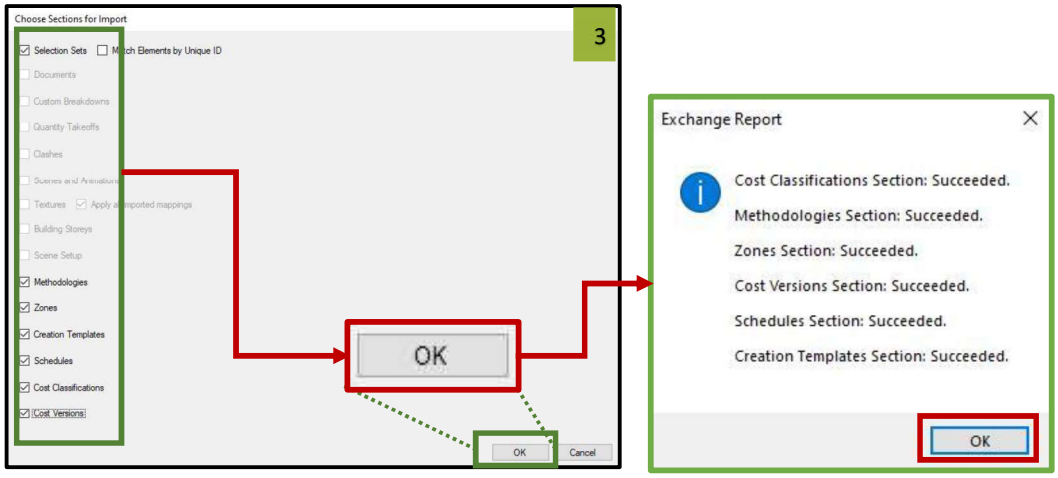
1. Open the **Bexel Manager Sample Project V02 Start**. Click the Bexel Manager button in the left upper corner of the Bexel Manager window. → Click the **Exchange** button and from Exchange data with another Bexel Project choose the **Import** option. →



2. From the local computer choose the file that is previously downloaded for this exercise, **Bexel Sample Project - Exercise (Schedule Animation).bcf.** Click the **Open** button. → The **Exchange Match Source** window opens where we match incoming source with existing source. Set the sources with the same name. → Click the **OK** button. →

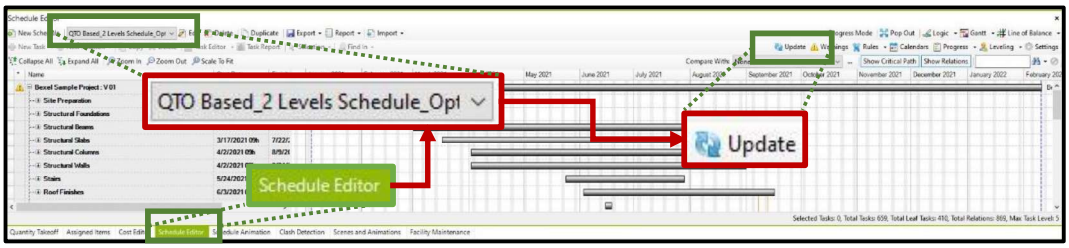


3. In the **Choose Selection from Import** window check all offered options. → Click the **OK** button. → The **Exchange Report** window appears with information about imported data. → Click the **OK** button. →



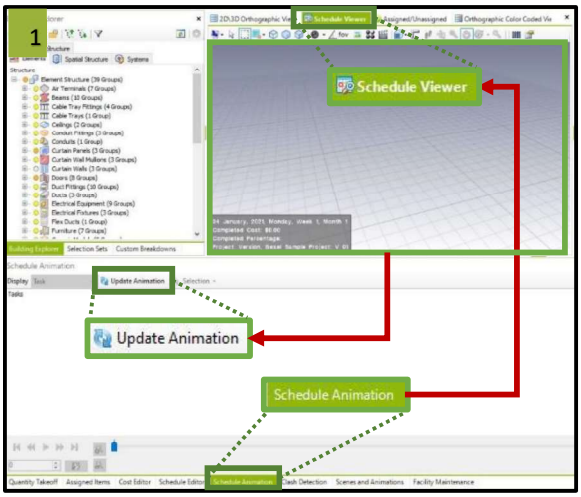
Imported schedule review

Activate the **Schedule Editor** palette by click on the same named button which is located in the button of the Bexel Manager window by default. → The **QTO Based_2 Levels Schedule_Optimized** is the schedule that has just been imported. It appears in the schedule list. → Set it active. → Click the **Update** button to update schedule.

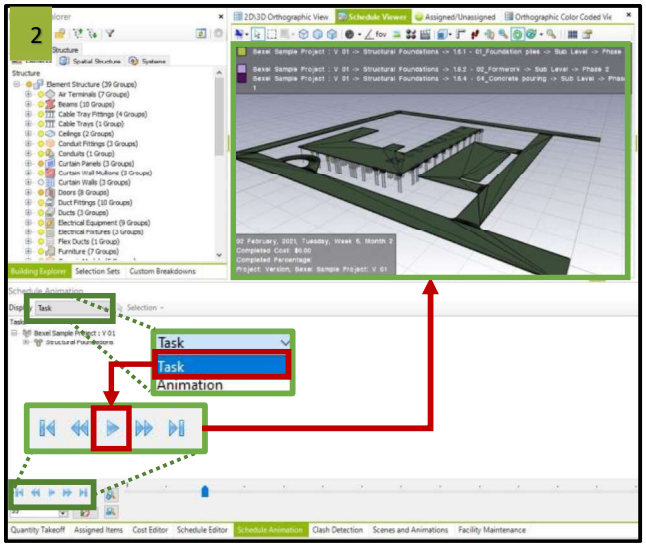


Schedule Animation

1. To create schedule base Animation, activate the **Schedule Animation** palette in the button of the Bexel Manager window. → Set the Schedule Viewer active. Click the **Update Animation** button. →



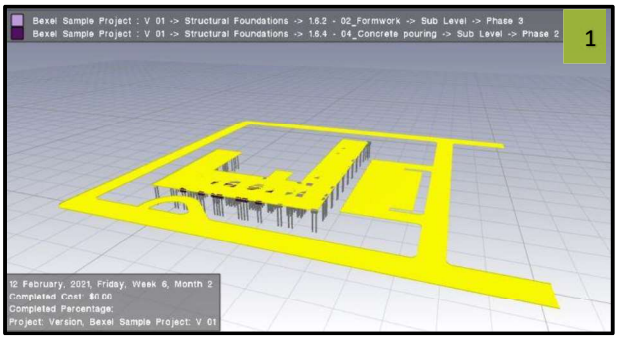
2. Now, the Animation is active. In the Display field choose the **Task** option. → After we click the **Play** button, the animation starts in the **Schedule Viewer** field.



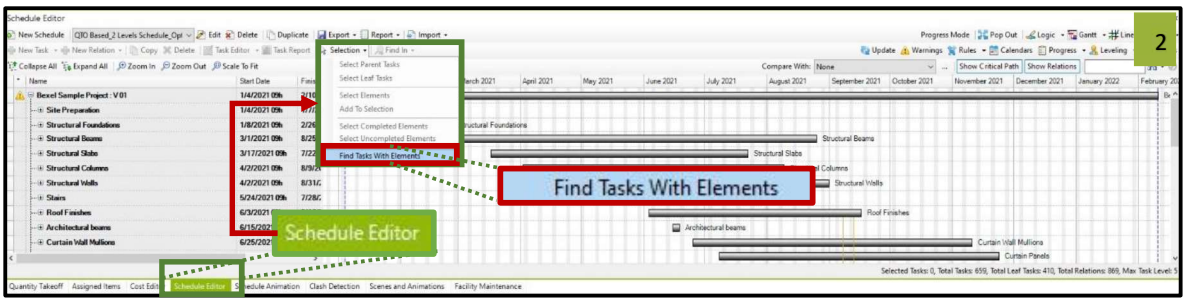
Schedule Task Editor - Change the element type of work

After Animation starts, after few seconds, we notice that site preparation elements appear but they should be temporary placed in the animation.

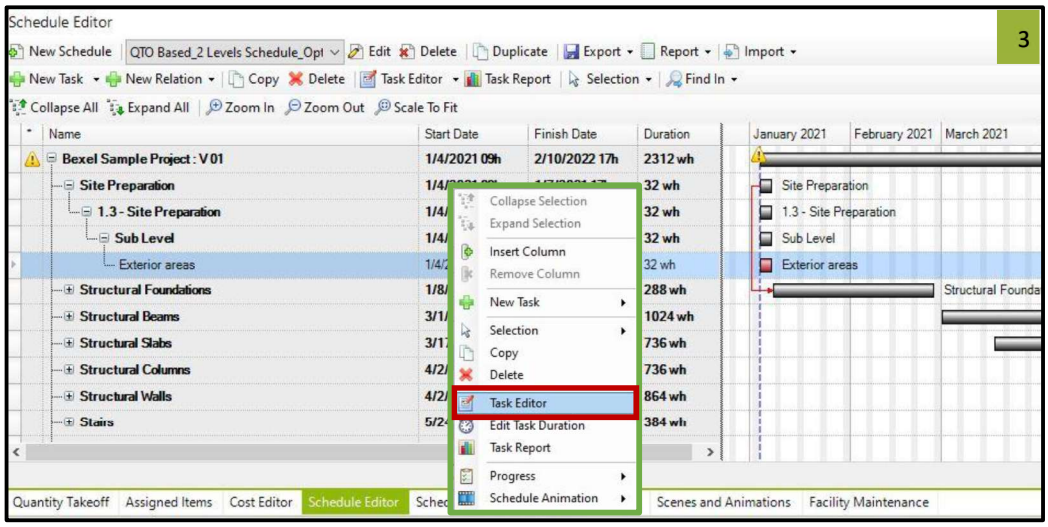
1. Select these two elements in the **Schedule Viewer** field (Source IDs are 1566356, 1566742). →



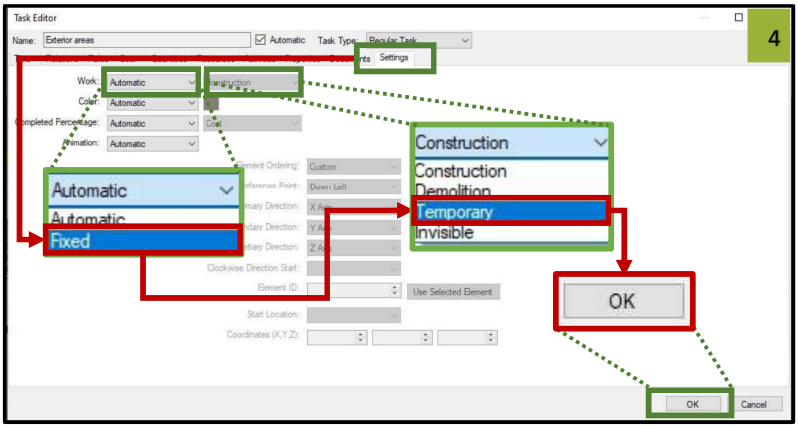
2. Go back to the **Schedule Editor** palette. → Click the **Selection** button. → Click the **Find Task With Elements** option. Leaf task the **Exterior area** is marked blue. We found selected elements in Schedule. →



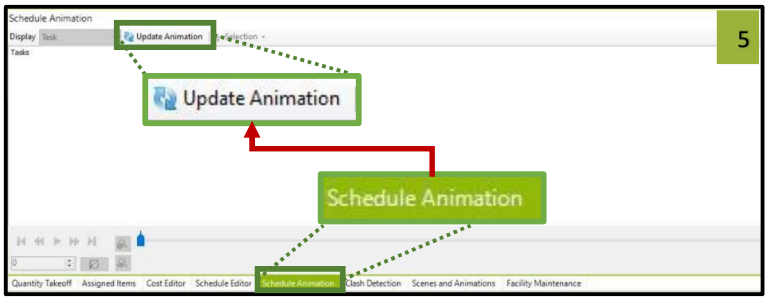
3. **Right-click** on selected leaf task **Exterior areas**. → Click the **Task Editor** command. →



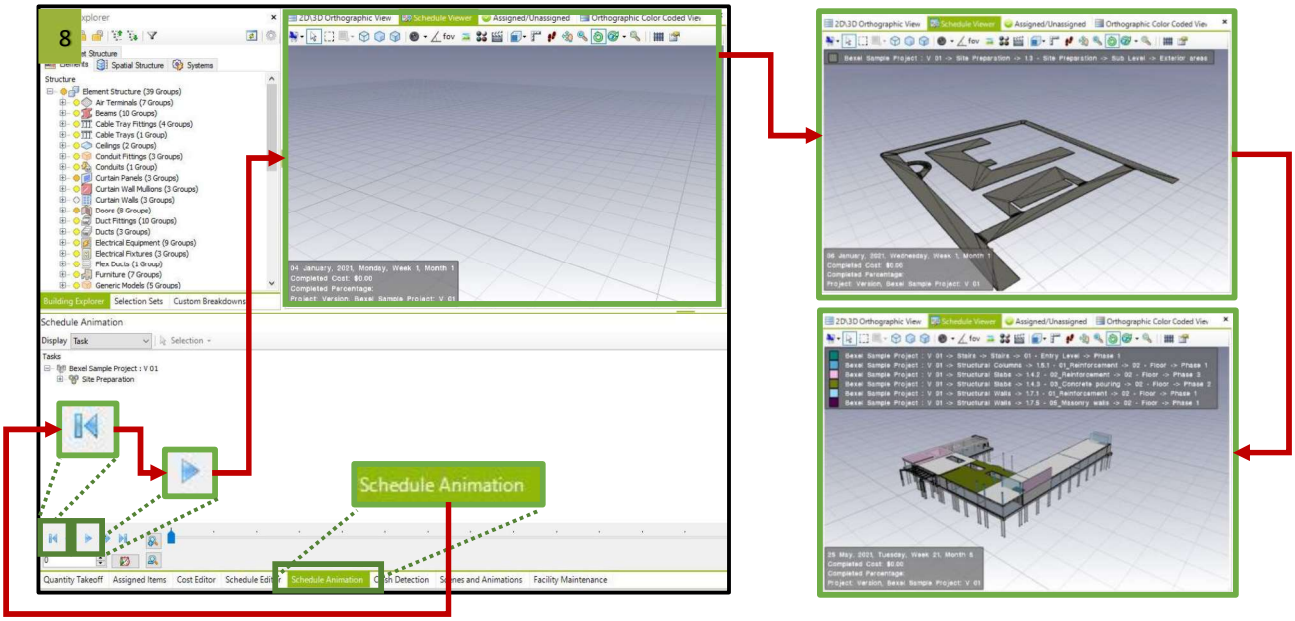
4. The **Task Editor** window opens. → Choose the **Settings** card. → In the **Work** field choose the **Fixed** option instead of Automatic. → Then choose the **Temporary** option instead of the Construction. → Click the **OK** button to close the **Task Editor** window. →



5. Go back to **Schedule Animation** palette. → Click the **Update Animation** button to update animation because we made changes in the schedule. →



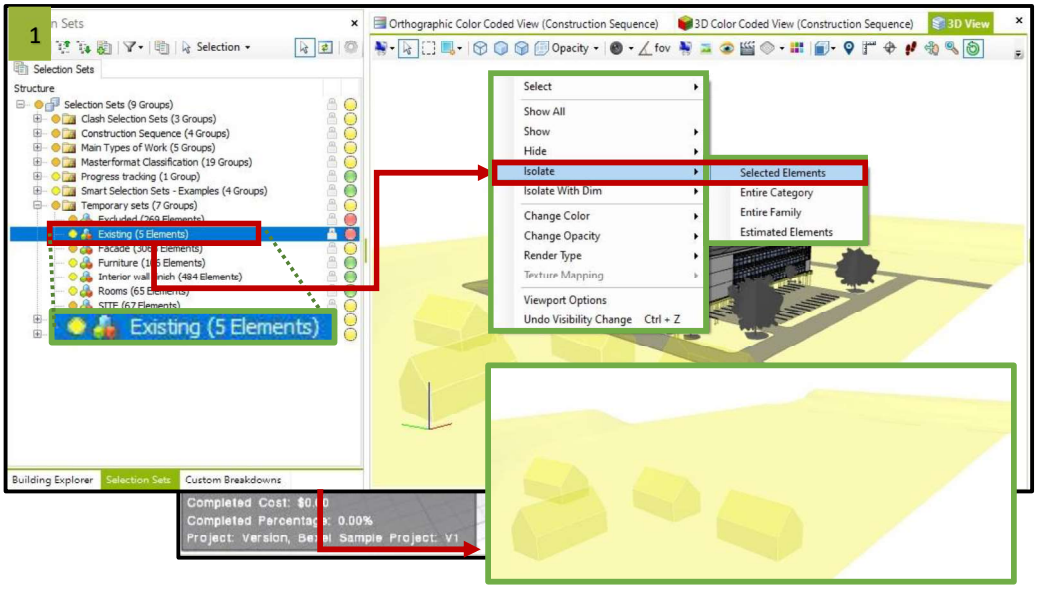
6. Click the **Jump to Start** command to play the Animation from the start. → Click the **Play** button. We can notice that the site preparation elements are shown temporary now, after we changed parameters of this task in schedule.



Neutral schedule elements

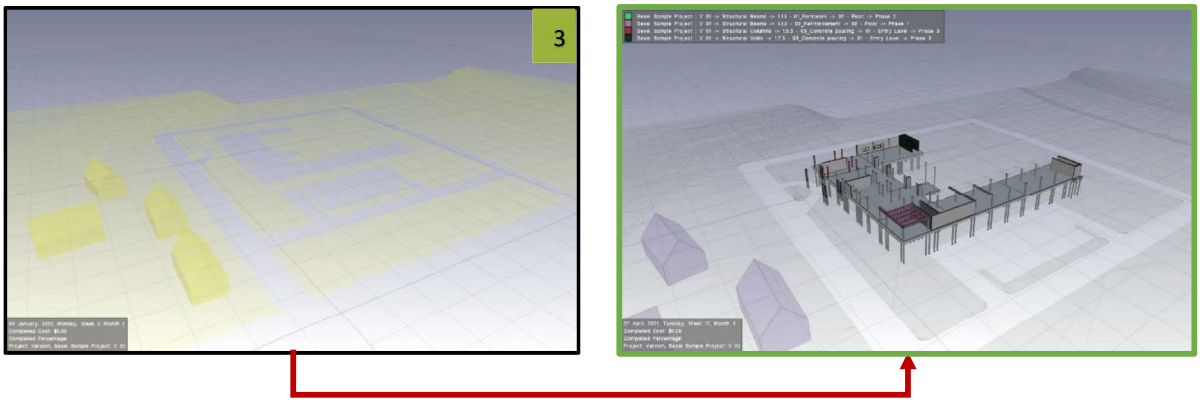
We can also set neutral schedule elements that are not actually included in the schedule. In this case we will set the site elements such as ground and existing objects on the site.
Go to 3D View, in the Building Explorer palette turn all elements on. Here we can manually select these elements that are shown in the viewport.
We can also select elements using predefined Selection sets that can be downloaded from Bexel User Area within folder **Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 8.0\Chapter 8.6\Exchange**, document **Exercise - Selection Sets for Import.bxf.**
First import predefined selection sets according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Selection Sets for Import.bxf**.

1. Go to **Selection Sets** palette and find selection set **Existing** within **Temporary sets** folder. → Click on **Existing** selection set. → In the 3D View field, we can isolate selected elements. → **Right-click** in the 3D viewport. Click the **Isolate** command, choose the **Selected elements** option. →



2. Selection is still active. Go to **Schedule Viewer**. → **Right-click** in the display field. Click the **Neutral Schedule Elements** command and choose the **Add Selected Elements** option. →

3. Selected elements appear in the **Schedule Viewer** field and they will be shown during whole animation.

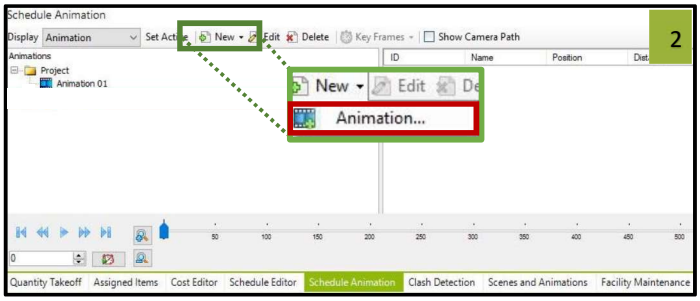


8.6.2. SCHEDULE ANIMATION – DISPLAY TYPE: ANIMATION

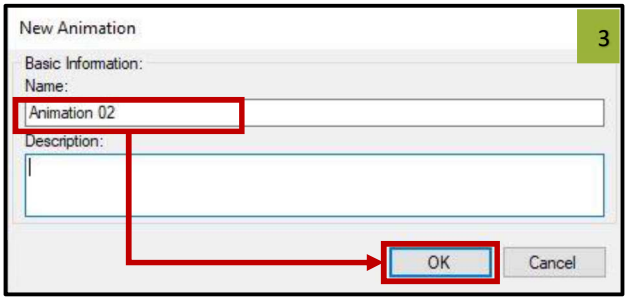
In this chapter we will create animation with orbiting camera.

1. Set the **Schedule Animation** palette active. → Choose the **Animation** option for the **Display** field. →

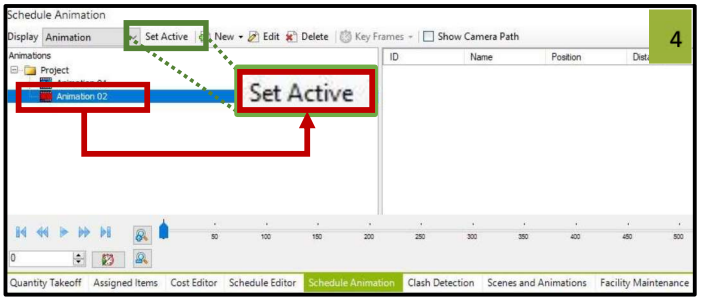
2. Click on the **New** button and from the drop-down list choose the **Animation** option. →



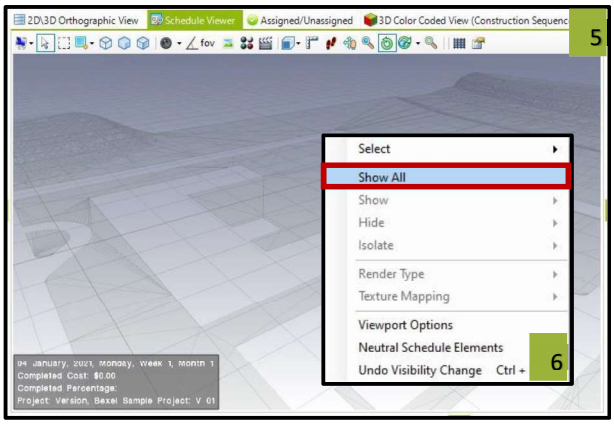
3. The **New Animation** window opens where we set the Basic Information. Here we define the Animation **Name**. We set the **Name** **Animation 02**. → Click the **OK** button to close the **New Animation** window. →



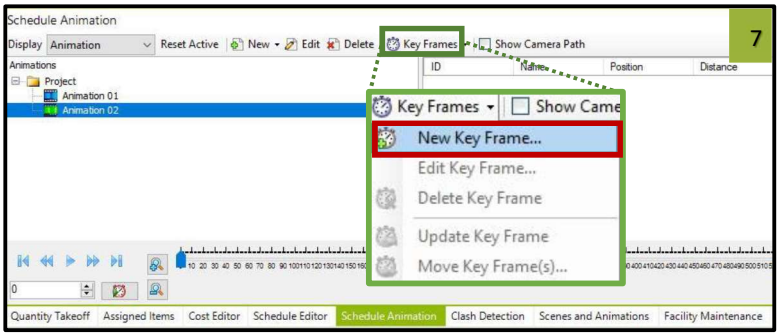
4. Select created animation in the animation list below and click on the button **Set Active** to make selected animation active. →



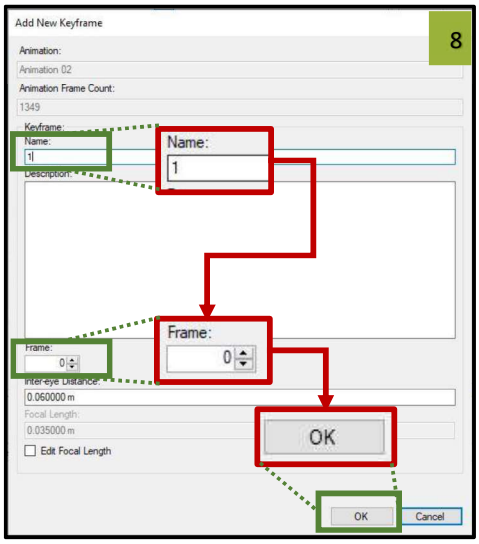
5. In the **Schedule Viewer** we set desired camera position. This is the camera position for the initial frame. →
6. **Right-click** on the **Schedule Viewer** field, click on the **Show All** command to be sure that all elements the animation contains are shown. →



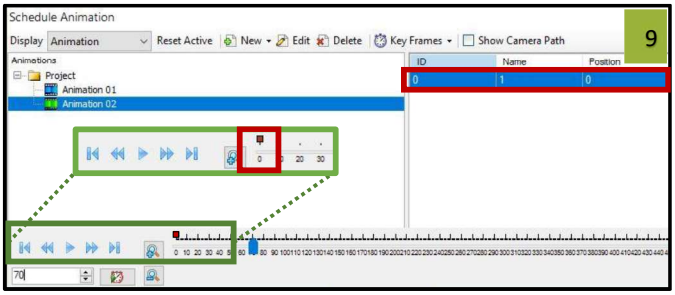
7. Click the **Key Frames** button. From the drop-down list choose the **New Key Frame** option. →



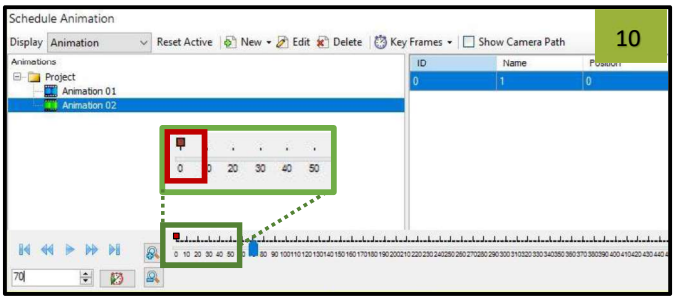
8. The **Add New Keyframe** window opens where we can enter the Keyframe **Name**. Here we enter the suggested name, **1**. → In the **Frame** field we can set the Frame to which the new keyframe refers. The value is 0. → Click the **OK** button to close the **Add New Keyframe** window. →



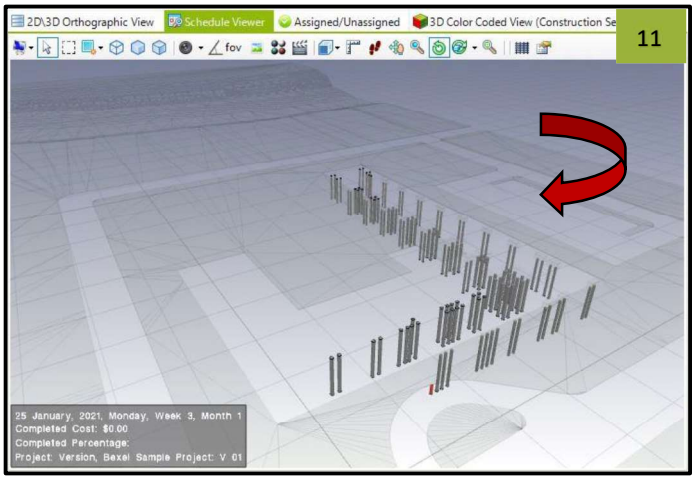
9. In the Keyframes field created keyframe **1** appears. We can notice that it also appears in the bottom of the **Schedule Animation** palette, in the frame ruler, where it is shown as colored square. This way we have created initial Keyframe. →



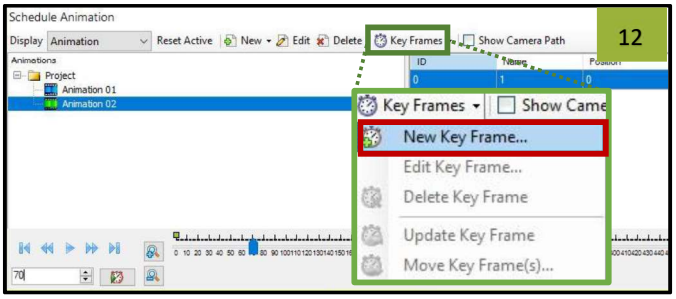
10. Go to **Schedule Animation** palette and move frames slider on the 70th frame. Here we will create the new Keyframe. →



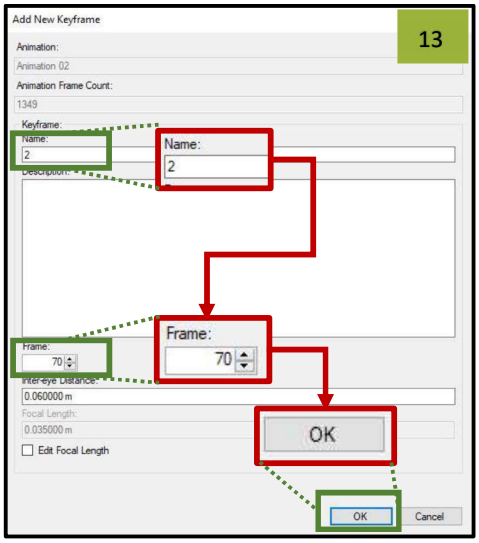
11. In the **Schedule Viewer** rotate the camera on the left. This is the new camera position which hasn't been applied to any keyframe. →



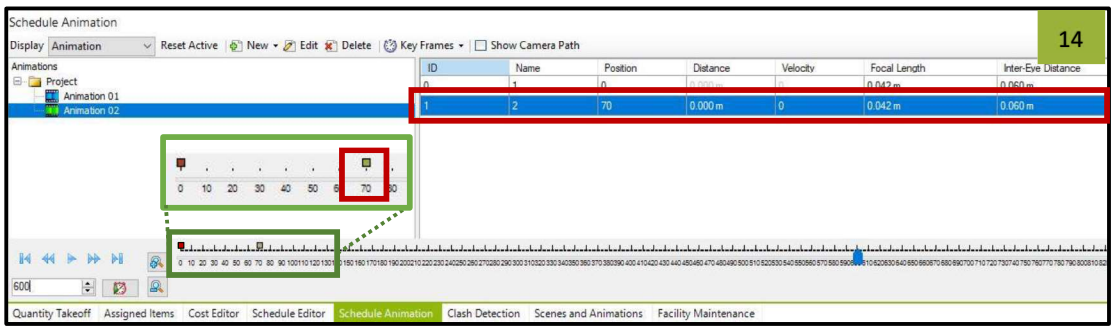
12. In the **Schedule Animation** palette do the **Right-click** in the field with the frames. → Choose the **New Key Frame** command (other option to create the new keyframe is by clicking on the **New Key Frame** button as we did before). →



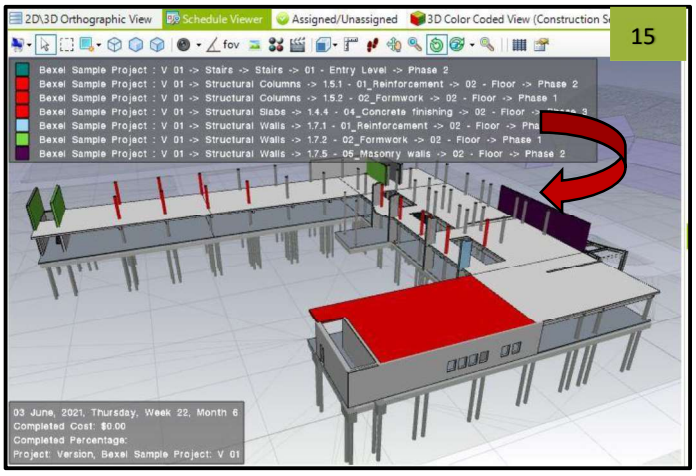
13. The **Add New Keyframe** window opens. → Set the **Name** **2**. We see that the value in the frame field is 70, as we set its position earlier in the keyframe ruler. → Click the **OK** button to close the **Add New Keyframe** window. →



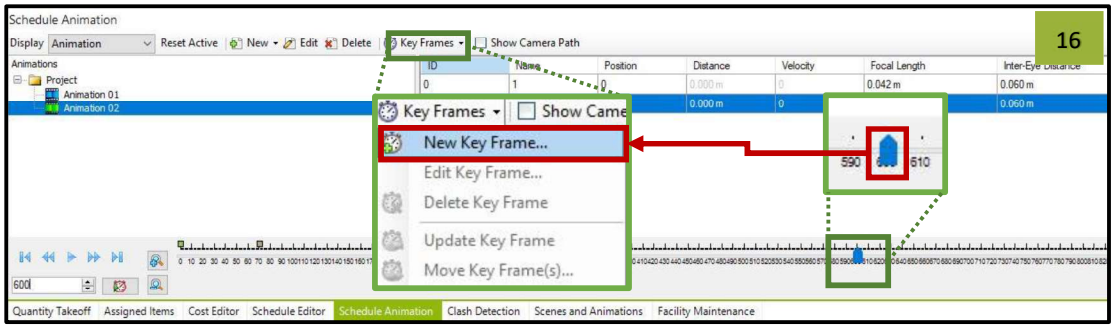
14. In the Keyframe field the created keyframe **2** appears, such as new colored square that appears above the certain frame in the frame line. →



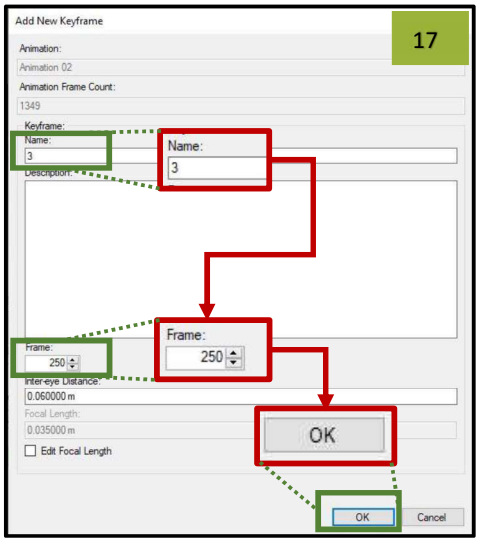
15. In the **Schedule Viewer** rotate the camera on the left again. This is the new camera position which hasn't been applied to any keyframe yet. →



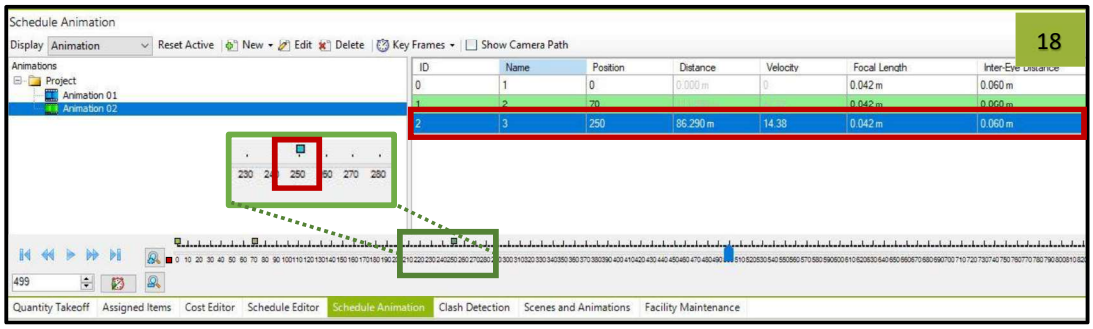
16. Go to **Schedule Animation** palette and move frame slider on the 600th frame. But we will create the new Keyframe on the 250th frame. → Do the **Right-click** in the field with the frames. → Choose the **New Key Frame** command. →



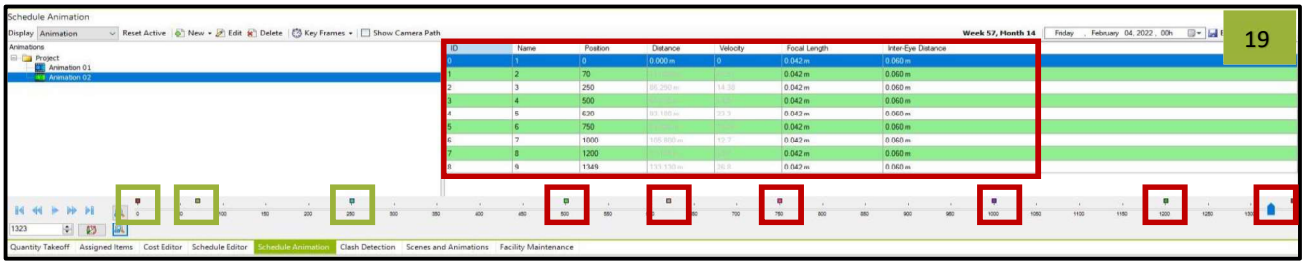
17. The **Add New Keyframe** window opens. → Set the **Name** **3**. → Enter the value in the frame field 250. → Click the **OK** button to close the **Add** New **Keyframe** window. →



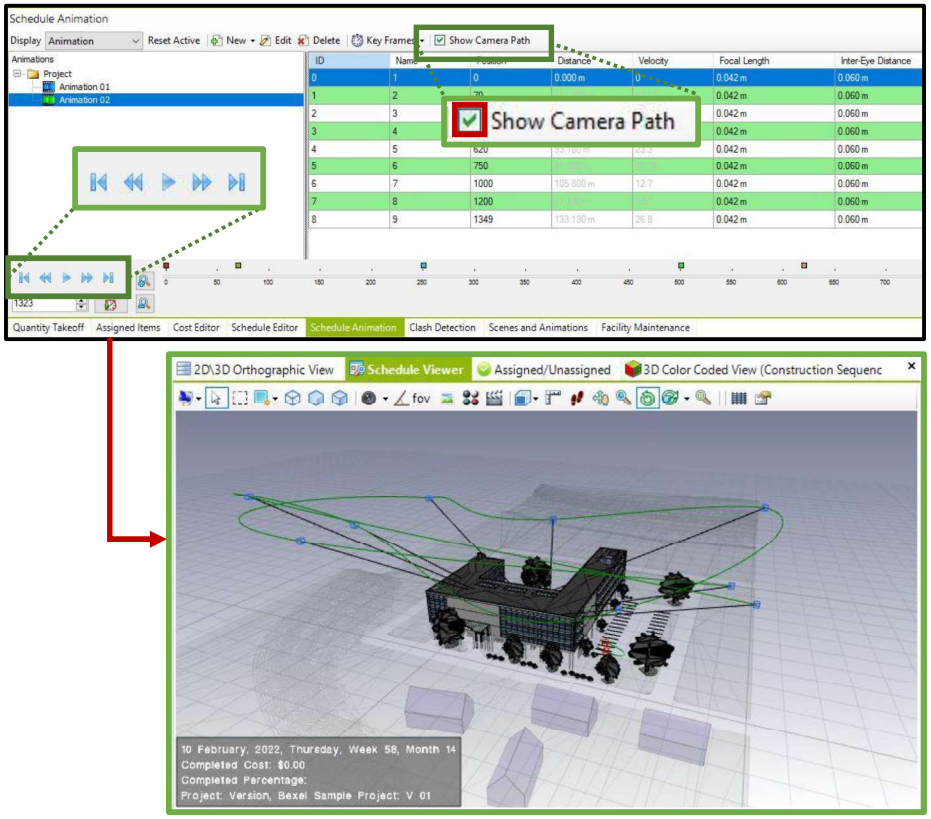
18. In the Keyframe field the created keyframe **3** appears, such as the new colored square appears above the frame ruler. →



19. We have just explained how to create first three keyframes. There are several keyframes more until the end of animation. Try to add new keyframes, defining position of the camera and referring frames.



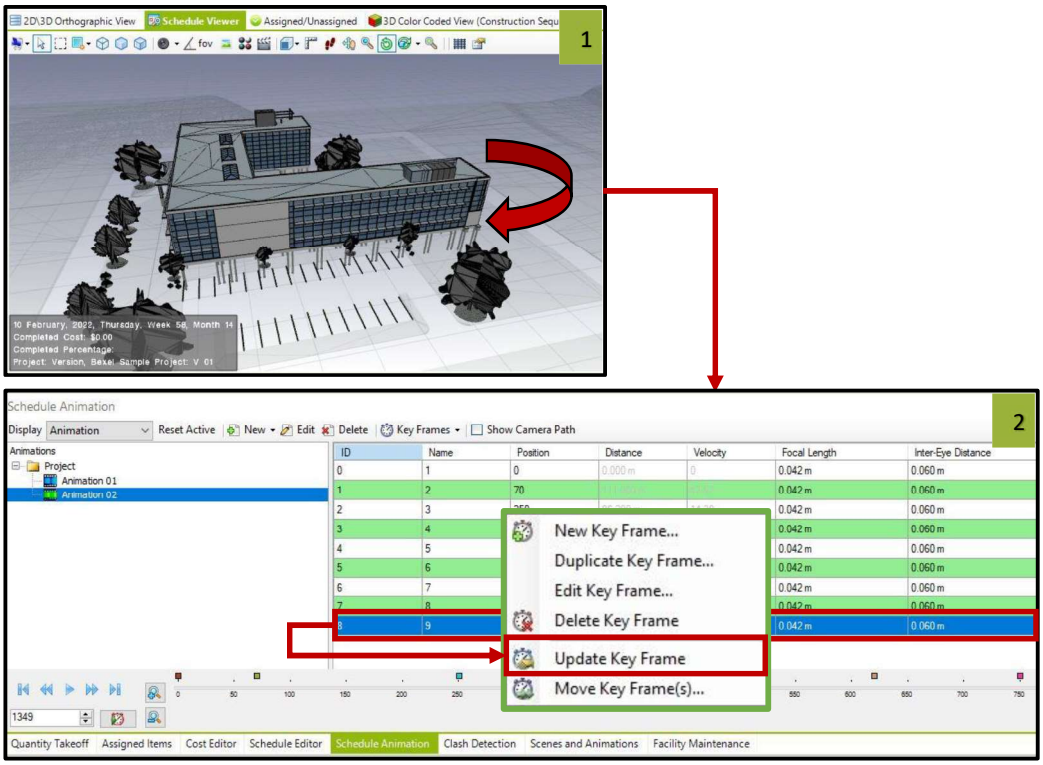
- If we want to see the camera path, check the **Show Camera Path** option.
  Any time you want to check how created animation looks like click the **Play/Pause** button.



NOTE: We can change camera position even after we set the camera for the first time. Any of created Key frame and its characteristics can be edited.

If we want to change camera position for the certain keyframe, do the following steps:

1. In the **Schedule Viewer** set the new camera position. →
2. Go to the **Schedule animation** Palette. → Select certain keyframe from the list that should be updated with new camera position. → **Right-click** in the keyframe list and choose the **Update Key Frame** command.



Other option is to click on the **Key Frame** button and from the drop-down list choose the **Update Key Frame** option.
Third option for this action is **right-click** on the keyframe square in the frame ruler where we choose the **Update Key Frame** option.

We can also **move** frames directly in the frame ruler by drag and move it left or right.

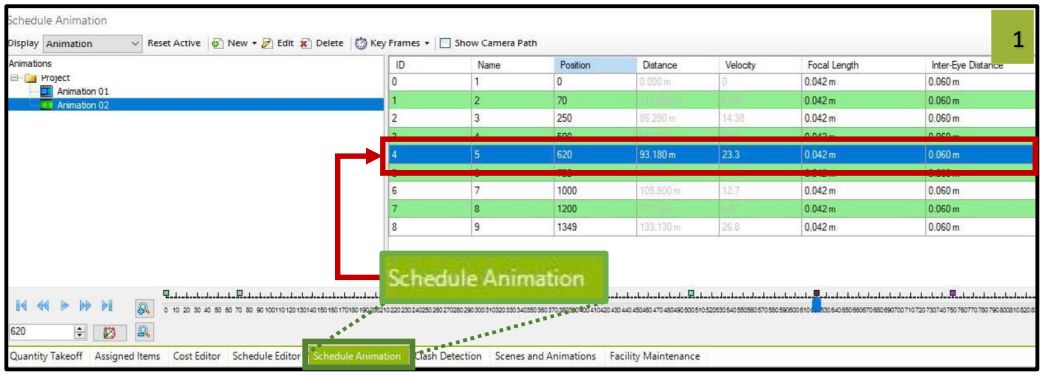
If we need to **edit** created key frame, select it in the frame list and choose the **Edit Key Frame** option.
If we want to **delete** created key frame, select it and choose the **Delete Key Frame** option.

Change element opacity

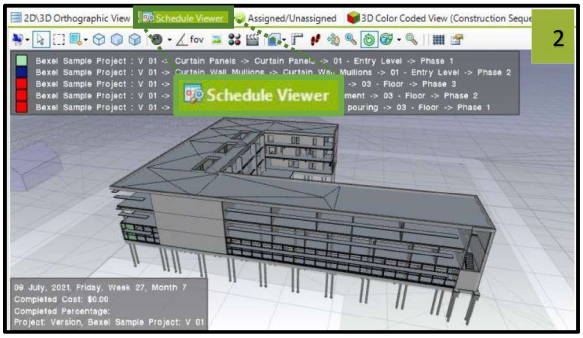
If we want to have elements that will stay transparent after they appears in animation, there is an option in Bexel Manager to set certain element category transparent.

In this exercise, we will set the slabs with opacity 60.

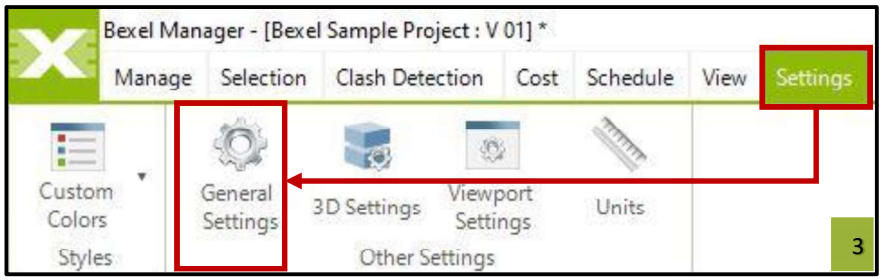
1. We choose 4th frame camera position to follow what happens after we make opacity changes. In the **Schedule Animation** palette double click on the certain key frame in the key frame list. Here, we do double click on the 4th keyframe, we made it on the 620th animation frame. →



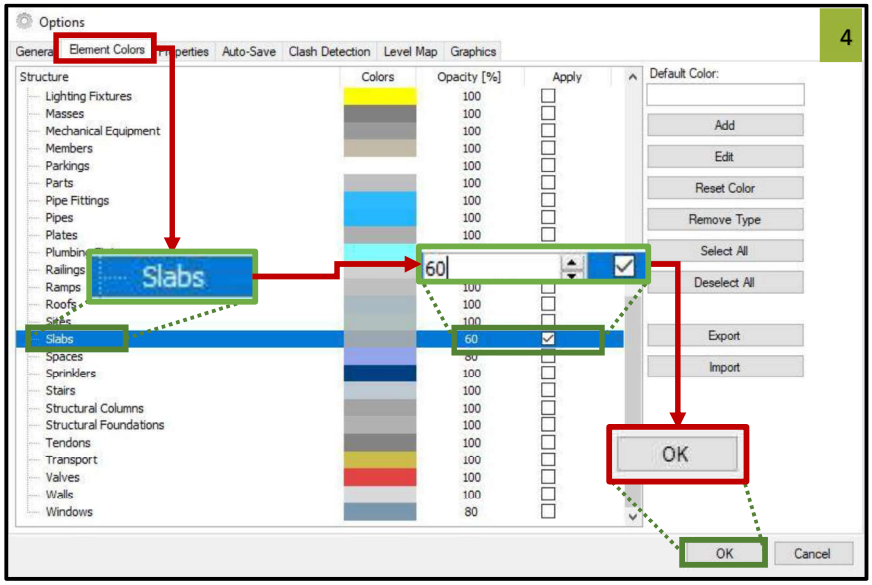
2. Set the **Schedule Viewer** active. →



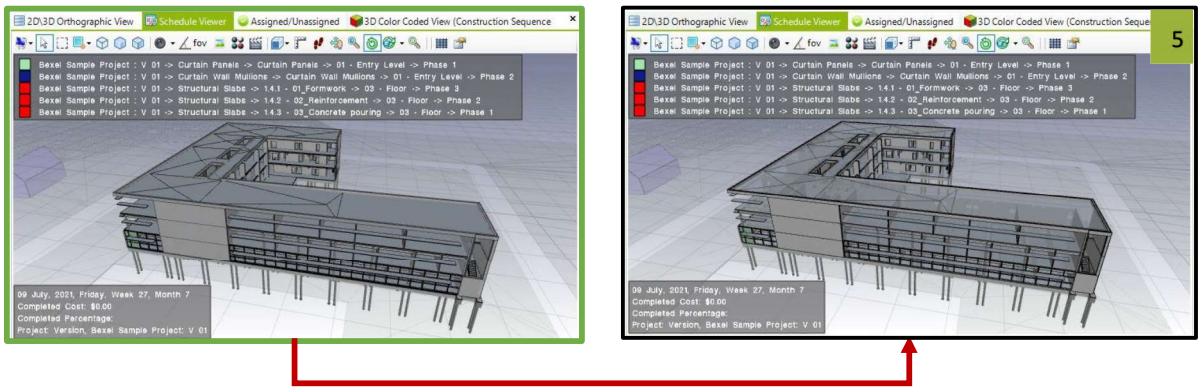
3. Click on the **Settings** tab in the upper part of the Bexel Manager window. → Choose the **General Settings** button. Click on it. →



4. The **Options** window opens. → Choose the **Element Colors** card. In the Structure list find the Slabs and select it. → Click in the **opacity** field for this category and change opacity from 100 to 60%. Check the **Apply** box next to it. → Click the **OK** button to close the **Options** window. →



5. In the **Schedule Viewer** field, we notice that the Slabs are transparent now and we can easier follow what happens with elements inside the object as animation goes on.



If we want to change back the slab's opacity, do the same procedure as we explained above.

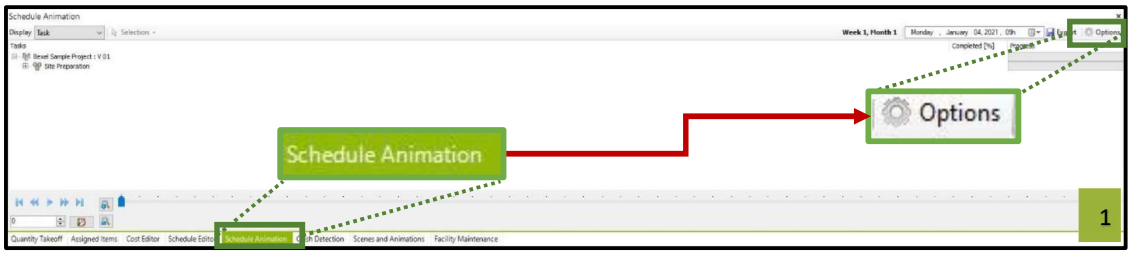
8.6.3. SCHEDULE ANIMATION SETTINGS

In this exercise we will go through Schedule Animation settings.

The exercise inputs:
Schedule animation characteristics

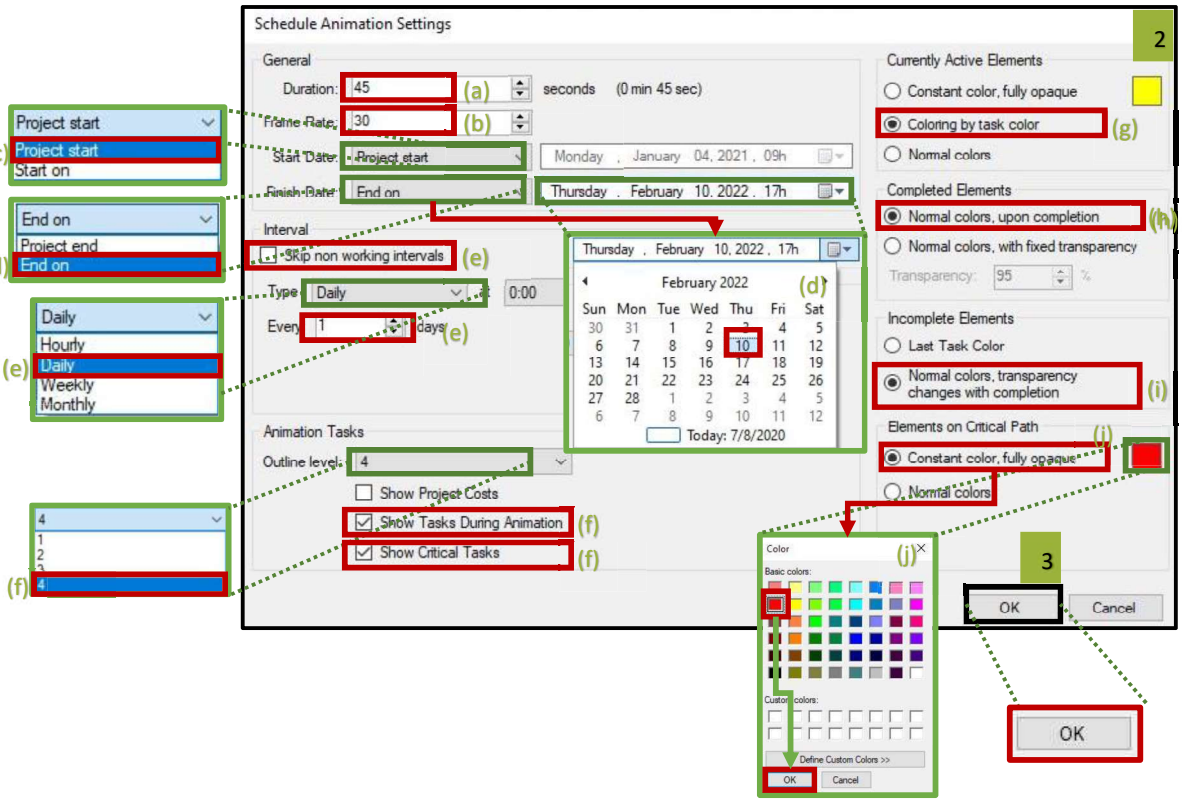
a) Animation duration is 45 seconds;
b) Frame rate is 30;
c) Start Date: Project start;
d) Finish Date: February 10, 2022;
e) Interval: don't skip non-working intervals, daily type, every day;
f) Animation Tasks: outline level is 4, don't show costs, show tasks during animation, show critical tasks;
g) Currently active elements are colored by task color;
h) Completed elements are with normal colors, upon completion;
i) Incomplete elements are with normal colors, transparency changes with completion;
j) Elements on critical path have constant color, red color, fully opaque.

1. For the purpose of editing the settings of the schedule animation, activate the **Options** command which is placed in the upper right corner of the **Schedule Animation** tab. →

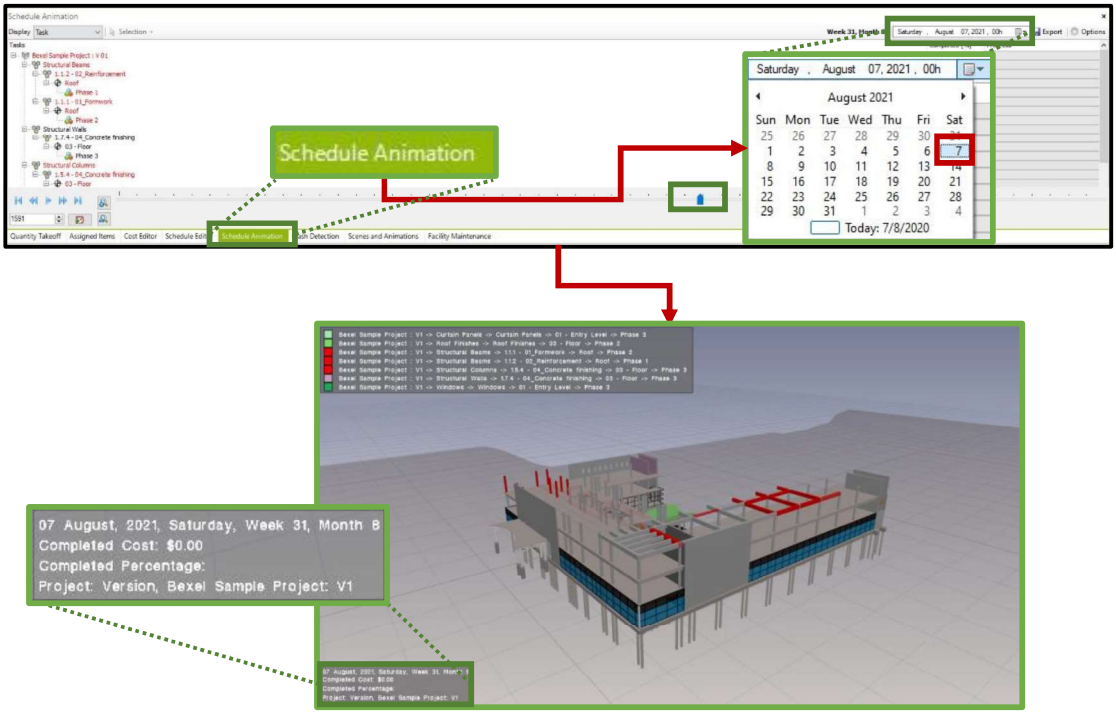


2. The **Schedule Animation Settings** window opens. →
   a) In the **Duration** field set animation duration 45 seconds. →
   b) Set the **Frame Rate** 30. →
   c) For the **Start Date** from drop-down window choose the **Project Start** option. →
   d) For the **Finish Date** choose the **End on** option. Click on the arrow in the field next to the **Finish date** and from the calendar choose the 10th February 2022. →
   e) Uncheck option the **Skip non working intervals**. For the **Interval Type**, from drop-down list choose the **Daily** option, set it on **Every 1** day. →
   f) The **Outline level** for Animation Tasks should be **4**, choose it from drop-down list. Uncheck the **Show Project Costs** option. Check options the **Show Tasks During Animation** and the **Show Critical Tasks**. →
   g) For the **Currently Active Elements** choose the **Coloring by task color** option. →
   h) For completed elements choose the **Normal colors, upon completion**. →
   i) Incomplete elements should be set as the **Normal color, transparency changes with completion**. →
   j) For the elements on critical path choose the **Constant color**, **fully opaque** option. Click on the colored square, in the **Color** window choose red color (j). Click the **OK** button to close the **Color** window. →

3. Click the **OK** button to close the **Schedule Animation Settings** window. The changed Schedule Animation settings are applied.



- In the **Schedule Animation** palette, we can set the certain date to see the status of the project animation for that day. Click on the calendar in the right upper corner of the **Schedule Animation** palette. Choose the date 07th August 2021. Set the **Schedule Viewer** active. We can see the completed works until that day.

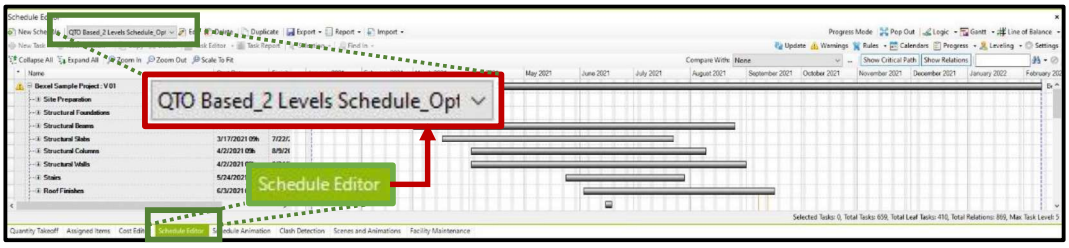


8.6.4. SCHEDULE ANIMATION EXPORT

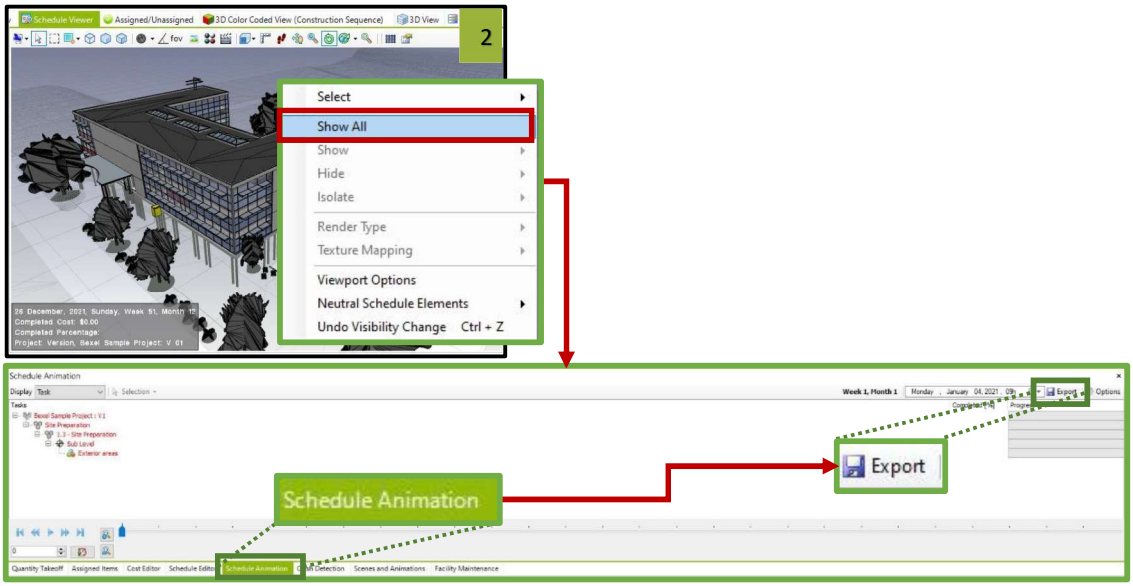
The animation can be exported like a video or in the different image files format like for example PNG, JPG, GIF and BMP. To export the animation, follow the steps below.
The exercise inputs:
We will export the Task Schedule Animation.
Export Schedule Animation characteristic

a) The Export type is video;
b) The Video Width is 1920; The Video Height is 1080;
c) The scale is 1;
d) Aspect ratio is locked;
e) Codec is x264;
f) The Quality is 70;
g) Export custom frames;
h) Export animation from 4th January 2021 to 10th February 2022;
i) Override Visual settings;
j) Override Background Color in gray;
k) Draw Grid and Axes.

1. Activate the **Schedule Editor** palette by click on the same named button which is located in the button of the Bexel Manager window by default. **Set active** schedule **QTO Based_2 Levels Schedule Optimized**. →

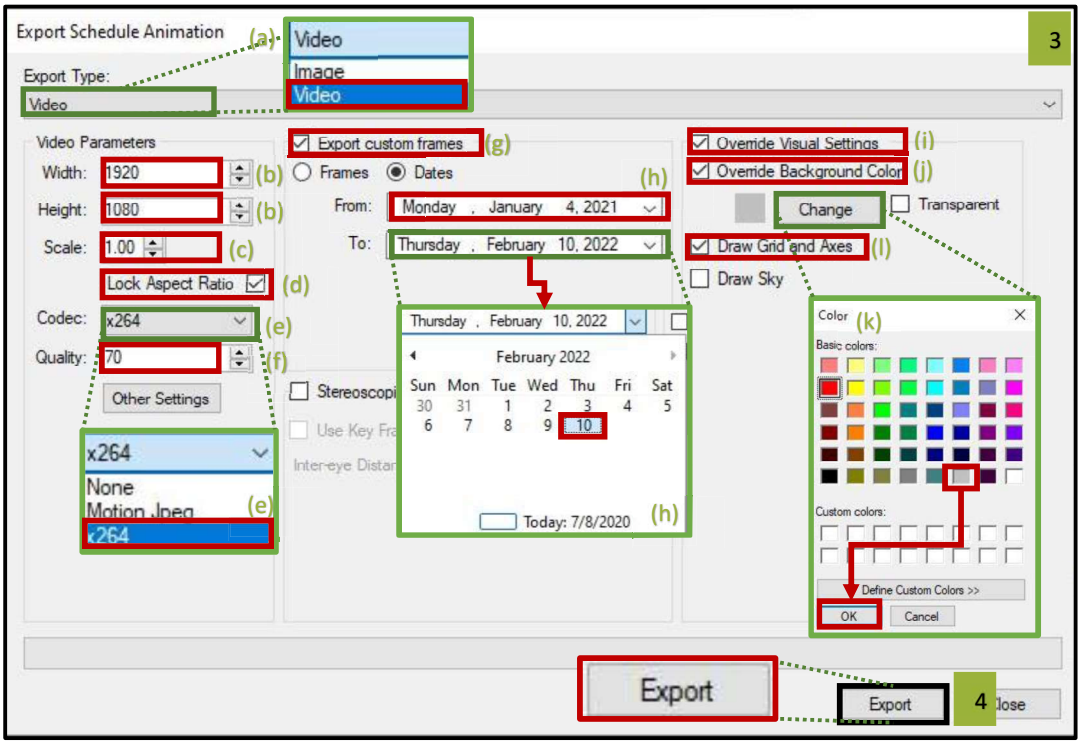


2. Set the camera position in the **Schedule Viewer** field. → **Right-click** on the presentation field. Click on the **Show All** command. → The **Schedule Animation** palette is active. → Click on the **Export** button. →

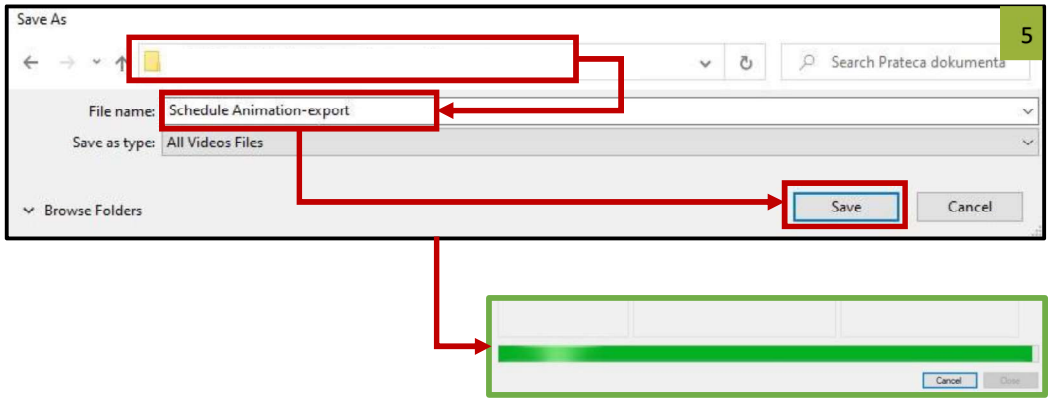


3. The **Export Schedule Animation** window opens where we set parameters for animation export. → In this case we choose export animation as video. →
   a) From drop-down list choose the **Video** option for the **Export Type**. →
   b) Set the Video parameters: The **With** is 1920, the **Height** is 1080. →
   c) The **Scale** is 1. →
   d) **Lock Aspect Ratio** checking this option. →
   e) From drop-down list choose the **Codec** x264. If we don't have installed this codec on the local computer, the software will warn us about missing codec. In this case, follow instructions to install it. →
   f) After the codec is set, enter the video **Quality** 70. →
   g) If we want to set certain video frames for export, check the box next to the **Export custom frames** command. →
   h) Now, it is allowed to enter desired **Frames** or **Dates** for video export. We choose the **Dates**. Set the dates from 4th January 2021 to 10th February 2022. →
   i) If we want to **Override Visual Settings**, check the box next to this command. →
   j) Check the **Override Background Color** option. →
   k) Click on the **Change** button. The **Color** window opens where we choose the gray color. Click the **OK** button to close the **Color** window. →
   l) Check the Draw Grid and Axes option. →

4. Click the **Export** button to start the animation video export. →



5. In the **Save As** window define the **File Name** and **location**. We can name it **Schedule Animation-export.** → Finish the process by clicking the **Save** button. Wait until the video export is finished.



6. The software informs us when the export is finished and offers us to open the exported animation location.

- Open exported animation using video player.

8.7. IMPORT AND EXPORT OF THE SCHEDULE

As mentioned before a schedule can be created and analyzed in Bexel Manager in various ways. One of them is that a user imports a schedule made in a different software, for example, MS Project or Primavera P6 as an XML. file and links the schedule with elements of the BIM model and by that a simulation of the schedule is created. To follow the process, you should download files, which will be needed in the described process the schedule **Sample Schedule for the Import,** the custom breakdown structure **Custom Breakdown Structure for the Sample Schedule** and the folder with smart selection sets **Smart Selection Sets for the Sample Schedule** containing different selection sets, which will be later on linked to the schedule. These files are located within the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.7, 8.8, 8.9\Exchange)**. This process will be divided in several steps stated below:

STEP 1: Creating a new schedule and importing a schedule as an XML. file

STEP 2: Creating a custom breakdown structure based on the structure of the schedule

STEP 3: Creating smart selection sets based on the created custom breakdown

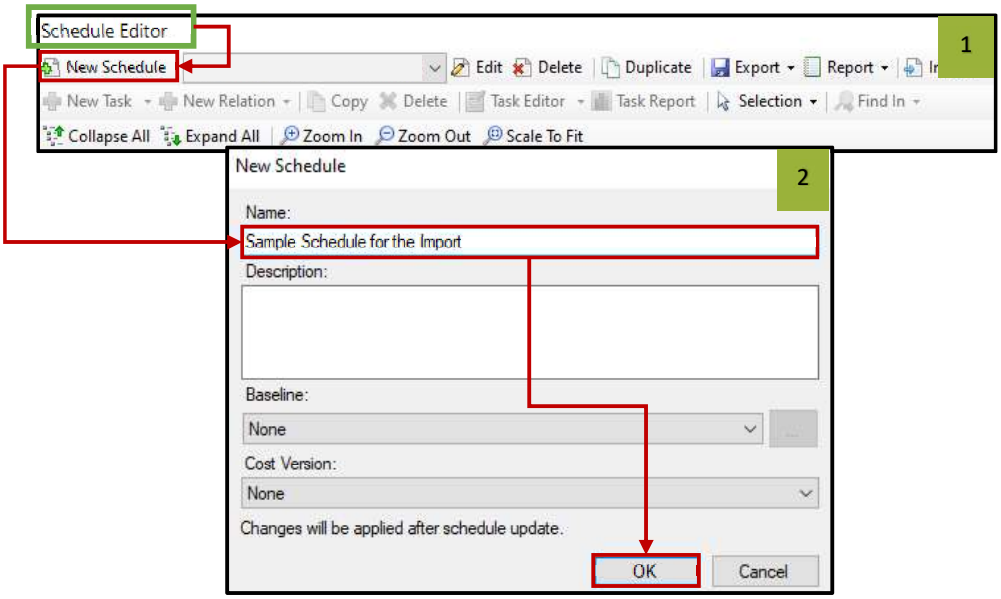
STEP 4: Editing smart selection sets

STEP 5: Linking smart selection sets with the BIM model

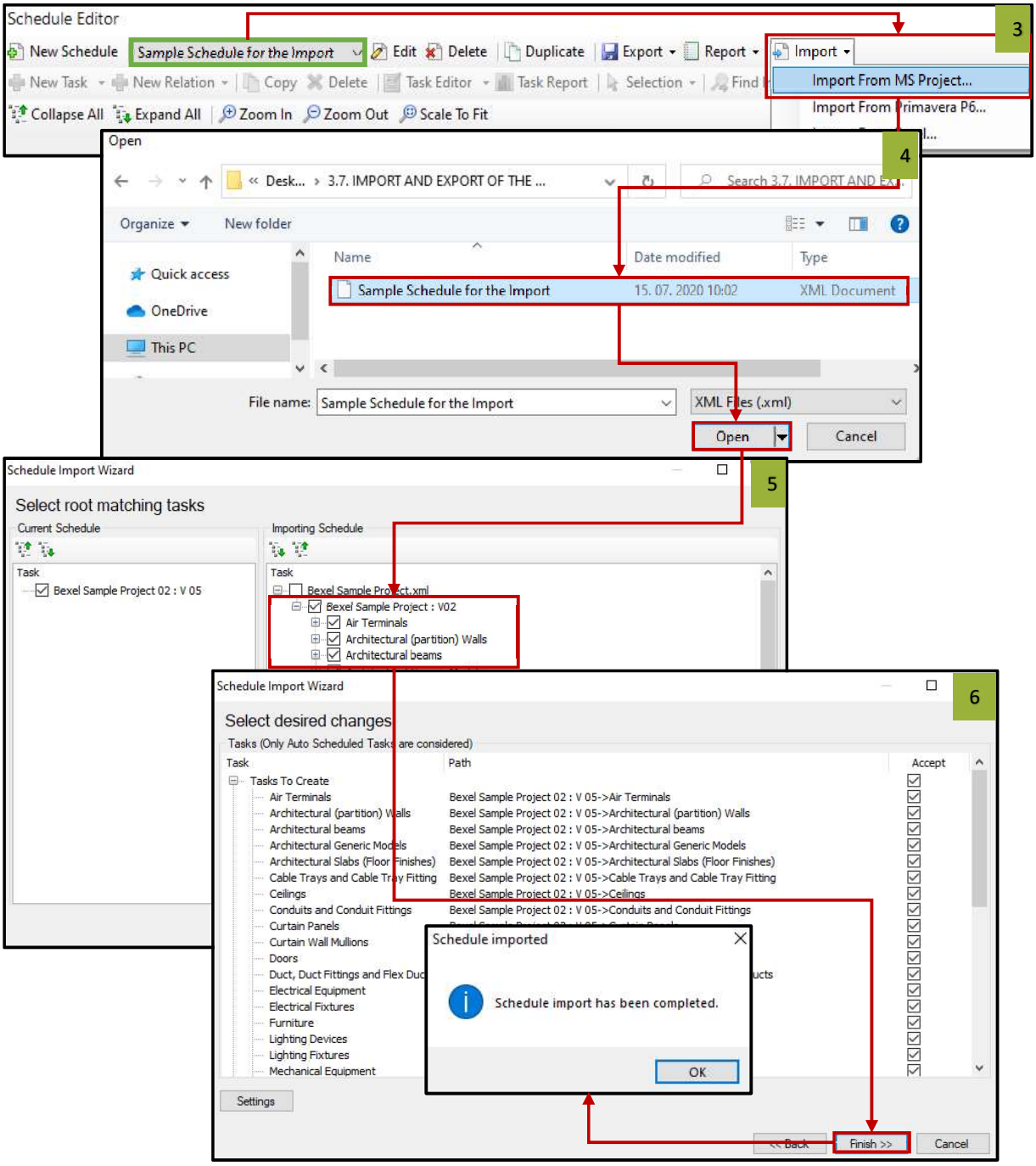
STEP 1: Creating a new schedule and importing a schedule as an XML. file

To import a schedule created in a different software, first a new schedule in Bexel Manager should be created. This process is described below.

1. Activate the **Schedule Editor** tab and click on the **New** command. →
2. Within the **New Schedule** window in the **Name** section writhe down the name of the schedule, for example, **Sample Schedule for the Import**. → At this moment we will not define the Cost version and will finish the process by clicking on the **OK** button. →

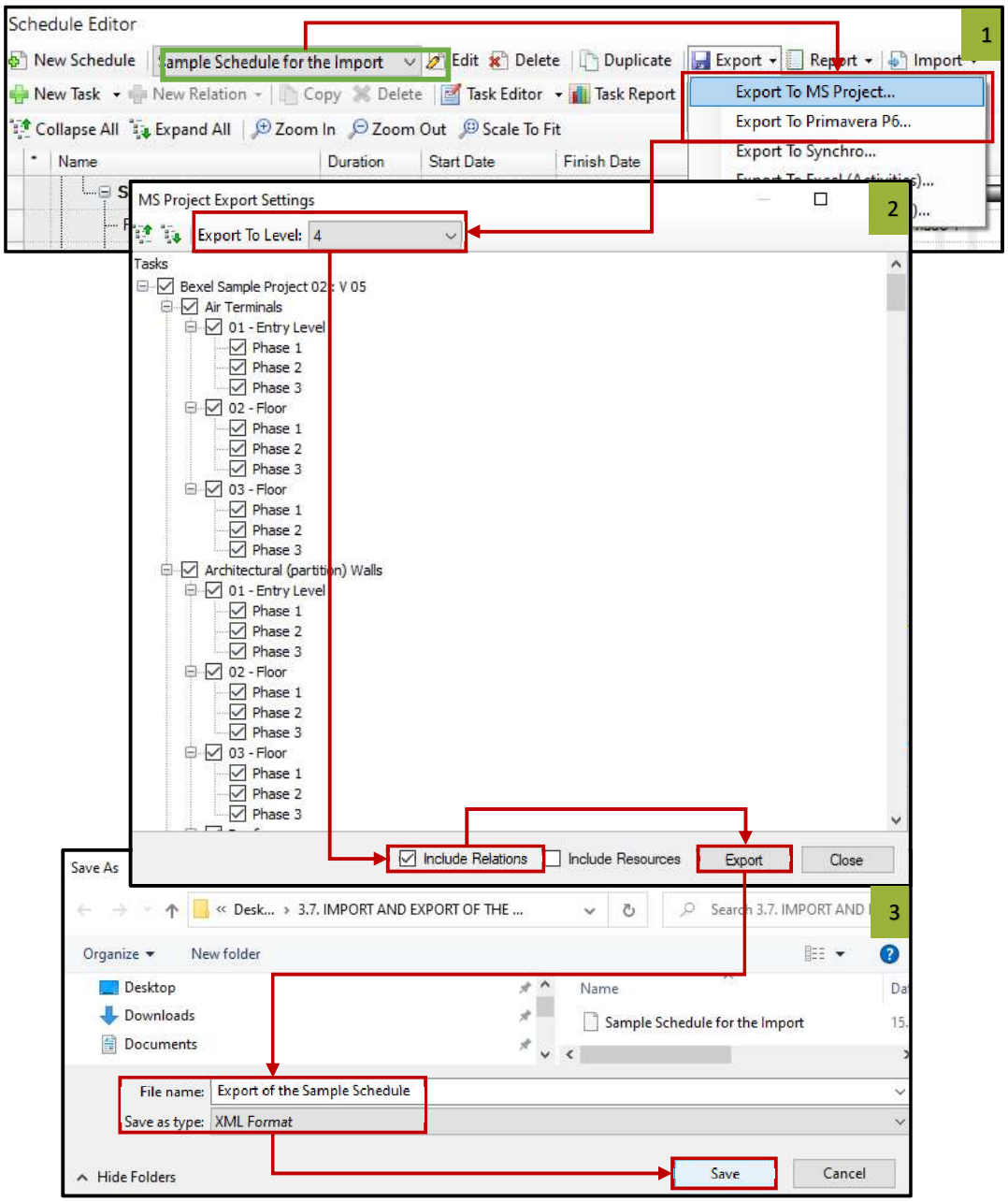


3. After a new schedule is created, check if it is active in the **drop-down** menu. → Click on the **Import From MS Project** command. →
4. Choose the file **Sample Schedule for the Import** in XML.format and click on the **Open** button within the **Open** window. →
5. In the **Schedule Import Wizard** check the **box** next to the **Bexel Sample Project : V02** and with that all tasks under the schedule should also be marked. → Click on the **Next** button. →
6. In the next step click on the **Finish** button. → The software displays a note about successfully importing the schedule.



When the schedule is successfully imported, the user can review it within the Schedule Editor tab. The imported schedule can be later on edited on several levels and then exported again to the original software. To do so, please follow the process described below.

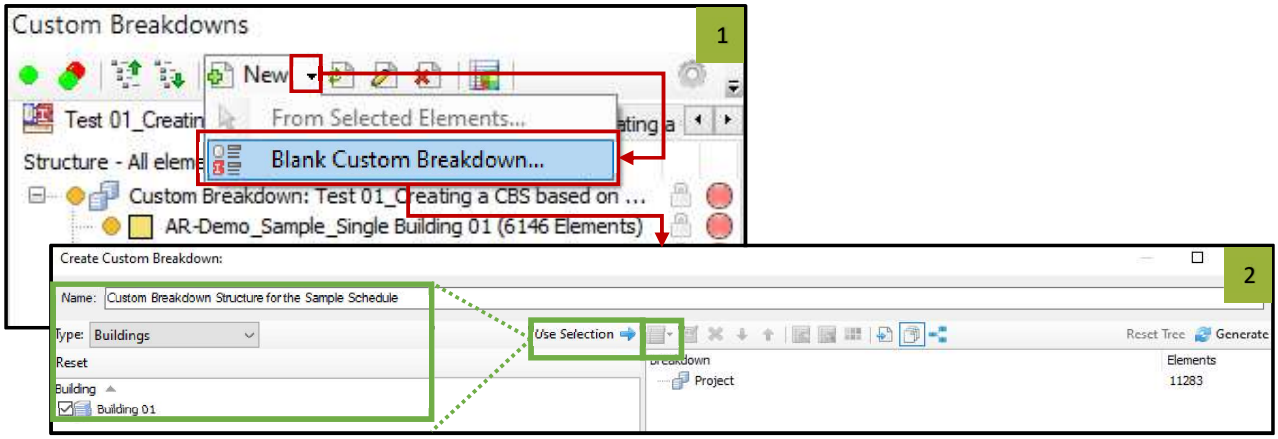
1. In the **drop-down** menu within the **Schedule Editor** choose the schedule you would like to export, for example, **Sample Schedule for the Import**. → Click on the **Export** command, where you choose the software in which the schedule will be opened, for example, **MS Project**. →
2. In the **MS Project Settings** window in the **Export to Level** drop-down menu define to which level the schedule will be exported. As we have 4 levels, we will define **4**. → Check the box in front **Include Relations** and click on the **Export** button. →
3. Within the **Save As** window define the name of the exported schedule, for example, **Export of the Sample Schedule** and the location and click on the **Save** button.



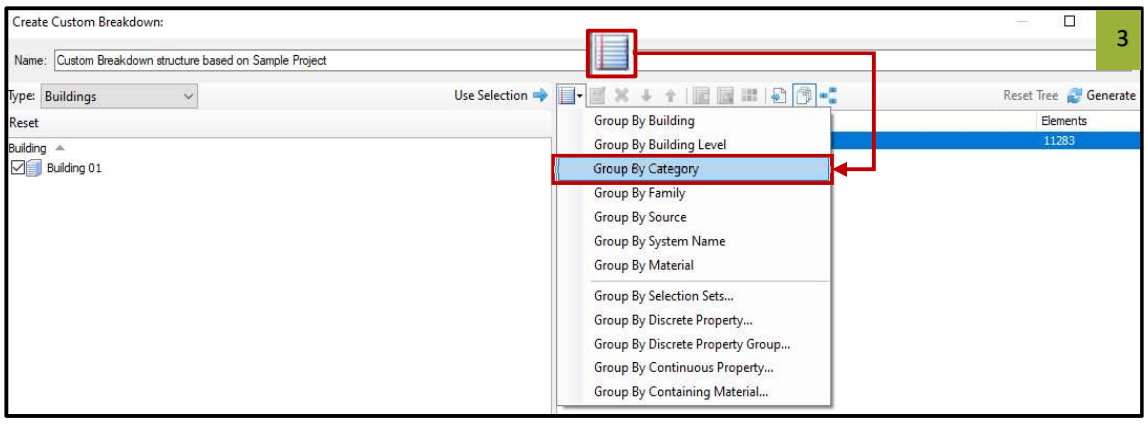
STEP 02: Creating a custom breakdown structure based on the schedule

As we have demonstrated how we can create a new schedule by importing as an XML. file, we are now moving on to the creation of the custom breakdown structure based on the schedule. Further one we will create selection sets on the basis of the created structure to link the elements of selection sets to tasks of the schedule. This step can be skipped by using the BXF. file named Custom Breakdown Structure for the Sample Schedule which is located in **Lessons\Lesson 8.0\Chapter 8.7 , 8.8 , 8.9\Exchange** folder. For more information about this topic, please review **Lesson 4**. Custom Breakdowns.

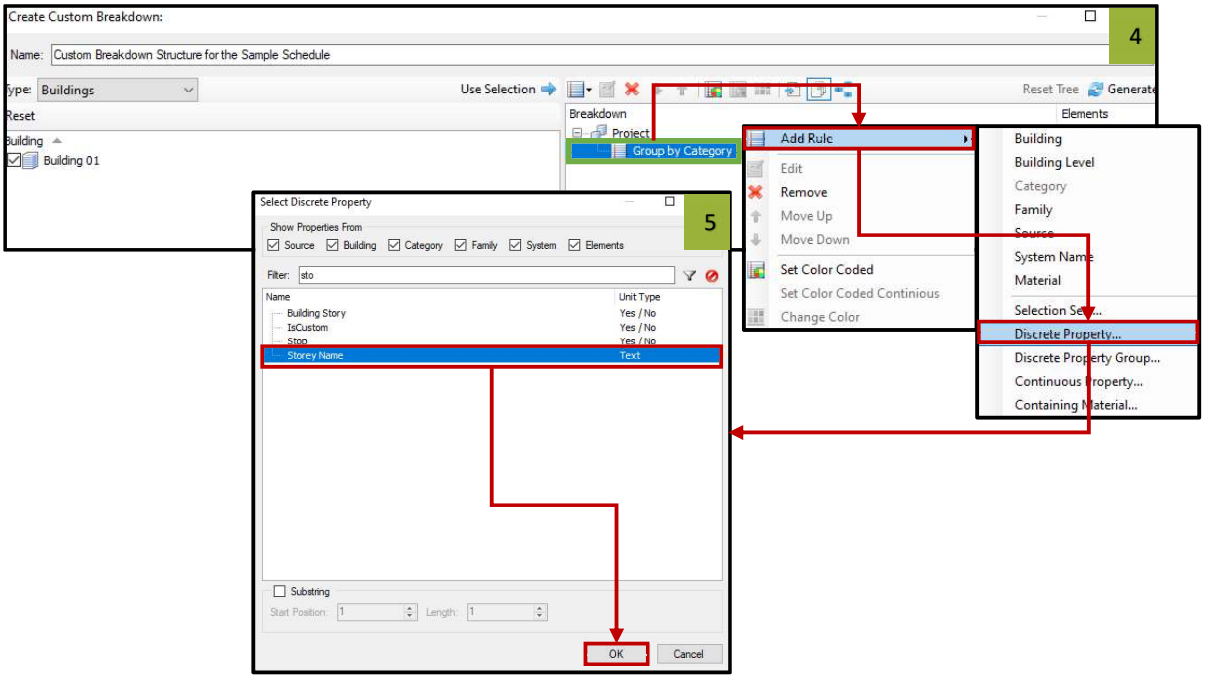
1. Activate the **Custom Breakdowns** palette, which is located on the left side of the screen. → Click on the **arrow** beside the **New command** and choose the **Blank Custom Breakdown** option. →
2. In the window **Create Custom Breakdown** define the **name** of the structure, for example, **Custom Breakdown Structure for the Sample Schedule.** → Under the **Type** choose option **Buildings** and check the **box** in front of the **Building 01**. → Click on the **Use Selection** button. →



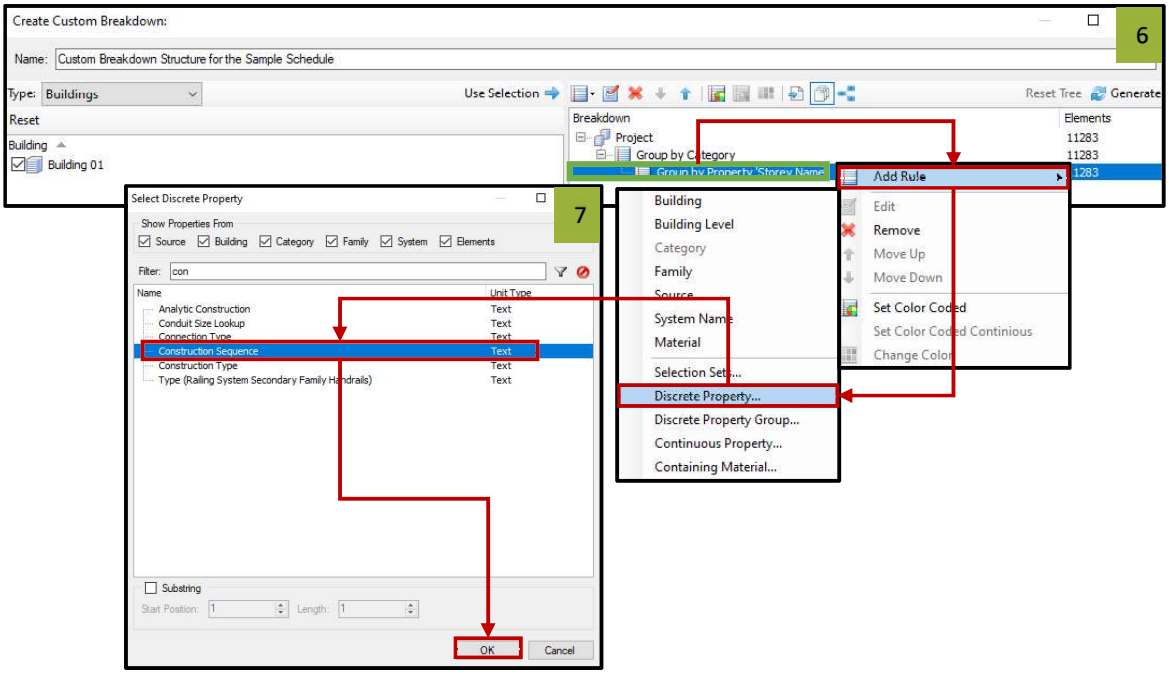
3. Click on the **Add Breakdown** command and in the drop-down menu choose **Group by Category** option. →



4. Click on the **Group by Category**, which is the first rule, with the **right-click** and choose in the drop-down menu **Add Rule** option and afterwards the **Discrete Property** option. →
5. Within the **Select Discrete Property** window in the **Filter** section enter **STO** and click on the **Filter** command. → Choose the **Storey Name** property from the list and finish the process by clicking on the **OK** button. →



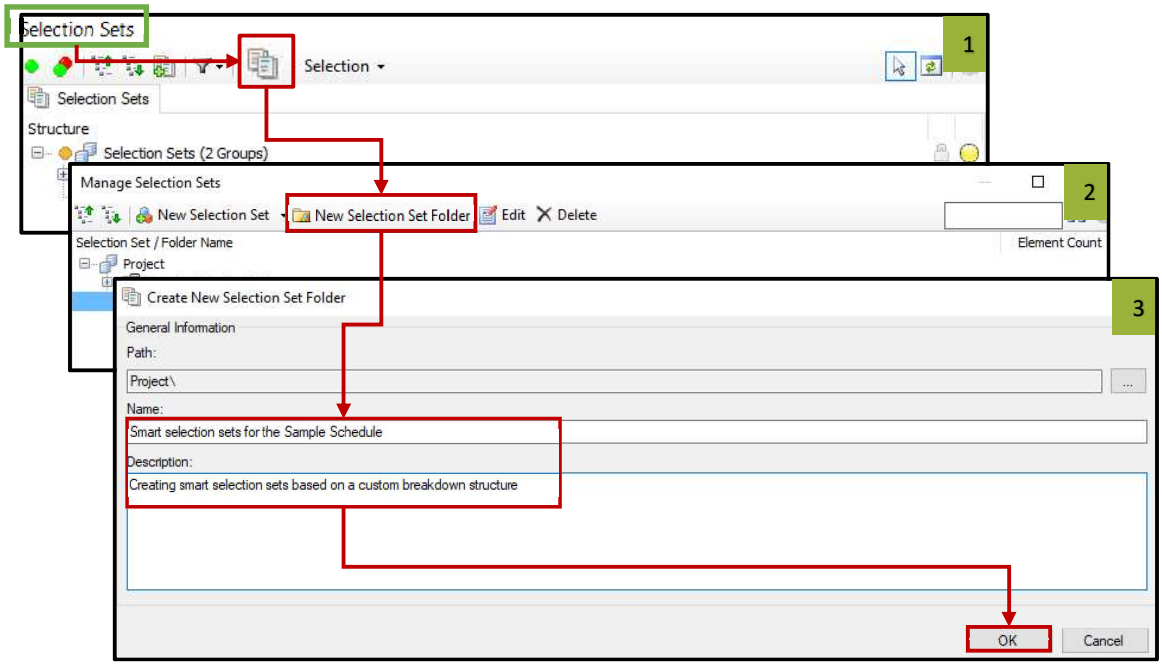
6. Click on the **Group by Property 'Storey Name'** with the **right-click** and choose in the drop-down menu **Add Rule** option and afterwards the **Discrete Property** option. →
7. Within the **Select Discrete Property** window in the **Filter** section enter **CON** and click on the **Filter** command. → Choose the **Construction Sequence** property from the list and finish the process by clicking on the **OK** button.



Step 03: Creating smart selection sets on the base of custom breakdown structure

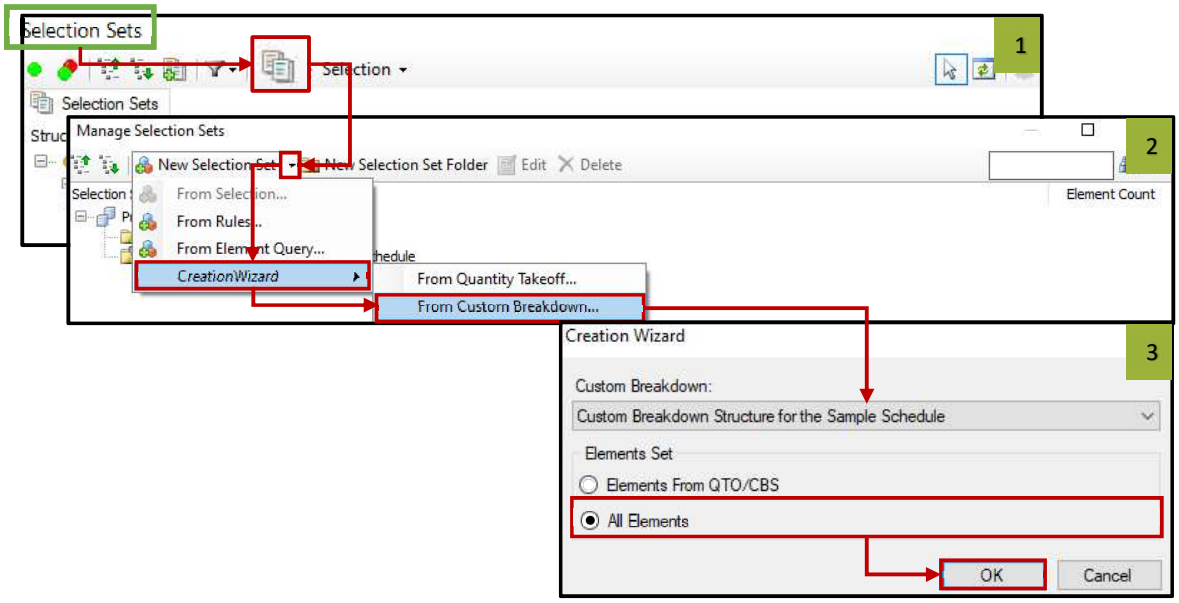
The basis for creating smart selection sets is the custom breakdown structure that was created in the previous section. To move further, the creation of smart selection set will be described in the process below. To skip this step, a file bxf **Smart selection sets for the Sample Schedule** was prepared and can be found in the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.7 , 8.8 , 8.9\Exchange)**. The folder contains structural elements which we will further on link to the schedule that was imported but first, a folder with the name Smart selection sets for the Sample Schedule will be created.

1. Activate the **Selection Sets** palette and click on the **Manage Selection Sets…** command. →
2. Within the **Manage Selection Sets** window click on the **New Selection Set Folder** command. →
3. A window Create New Selection Set Folder opens where the name of the folder is defined, for example, **Smart selection sets for the Sample Schedule**. → Add description if needed and finish the process by clicking on the **OK** button.



To create selection sets based on a custom breakdown structure, follow the process below.

1. Activate the **Selection Sets** palette and click on the **Manage Selection Sets…** command. →
2. Within the **Manage Selection Sets** window click on the **arrow** beside the **New Selection Set** command and choose in the drop-down menu the **Creation wizard** option and afterwards the **From Custom Breakdown…** option. →
3. A **Creation Wizard** window opens, where the user chooses from the list the custom breakdown, for example, **Custom Breakdown Structure for the Sample Schedule**. → In the **Elements Set** section choose the **All Elements** and click on the **OK** button.

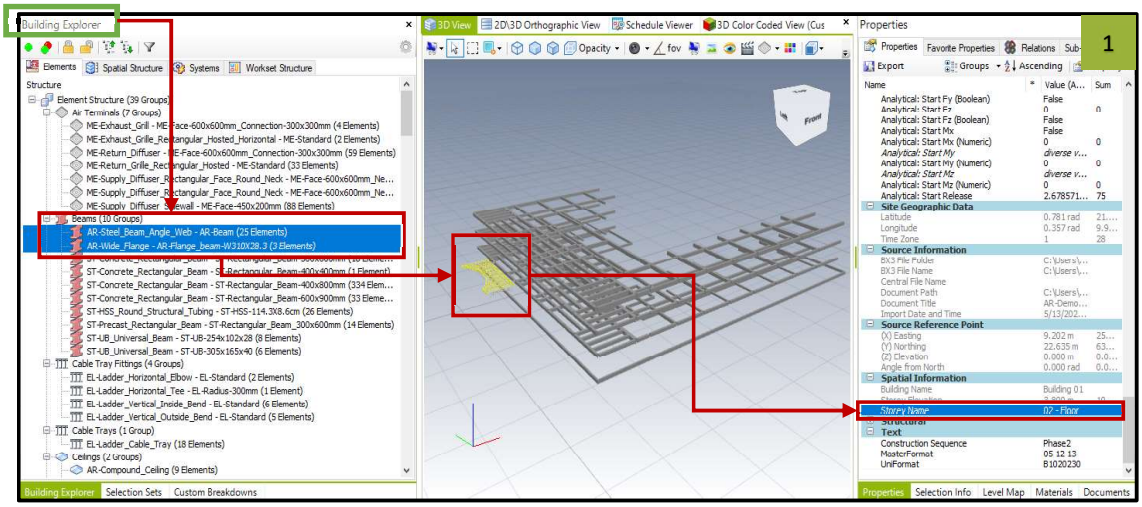


WARNING: Within the Creation Wizard window under the Elements Set two options are stated: **Elements From QTO/CBS** and **All Elements**. If the first option **Elements From QTO/CBS** is chosen, created selection sets will not be smart selection sets. If the other option**, All Elements** is marked then the software creates smart selection sets based on the chosen custom breakdown structure.

Step 04: Editing smart selection sets

After reviewing the created selection sets, we can see that some of them need to be edited. For example, a selection set Beams that was created based on the custom breakdown structure contains elements which apply to architectural and structural families. Reviewing the schedule, we can see that there are two different tasks. One task is named Structural Beams and the other is named Architectural beams. To properly link elements of the model with mentioned tasks, two selection set should be created, named as the tasks we will link them to. Before we create two selection sets, we should examine which families contain category Beams within the Building Explorer.

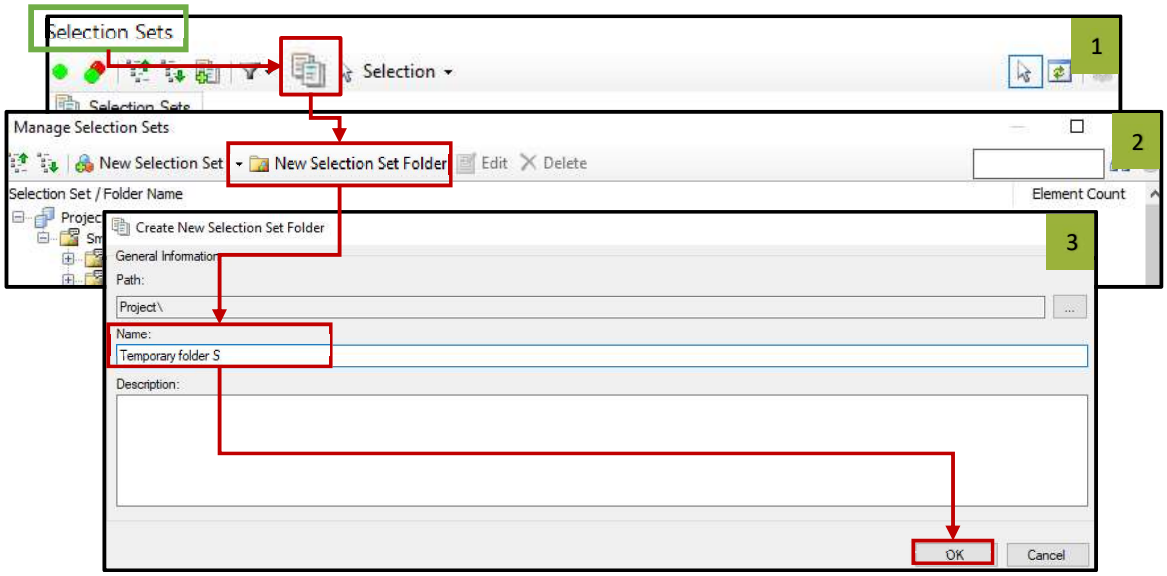
1. Activate the **Building Explorer** palette and afterwards click on the **Elements** tab. → Within the **Elements** tab choose the **Beams category** and review the families.



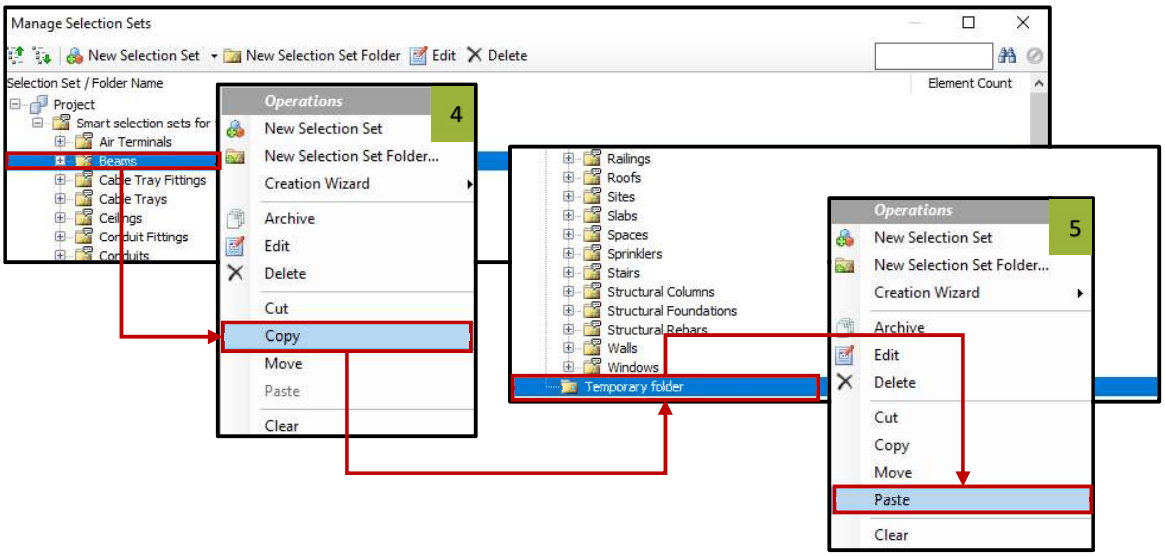
As you can see on the picture above, the Beams category contains several different families, but only two with architectural elements. Names of those families begins with AR- and are located on the 02_Floor. This information is given in the Properties palette. In practice this means that these two families should be excluded from the Structural Beams folder and added to Architectural Beams folder and linked to the task Architectural Beams → 02 Floor → Phase 2.

In the next stage we will first copy the folder Beams within the Selection Set palette, which was created on the basis of the custom breakdown structure. Afterwards we will name one folder Structural Beams and the other Architectural Beams.

1. Activate the **Selection Sets** palette. → Click on the **Manage Selection Set** command. →
2. Within the **Manage Selection Sets** window click on the **New Selection Set** Folder. →
3. Name the folder **Temporary folder** within the **Create New Selection Set Folder** window, for example, **Temporary folder**, where we will paste copied folder and finish the process by clicking on the **OK** button.

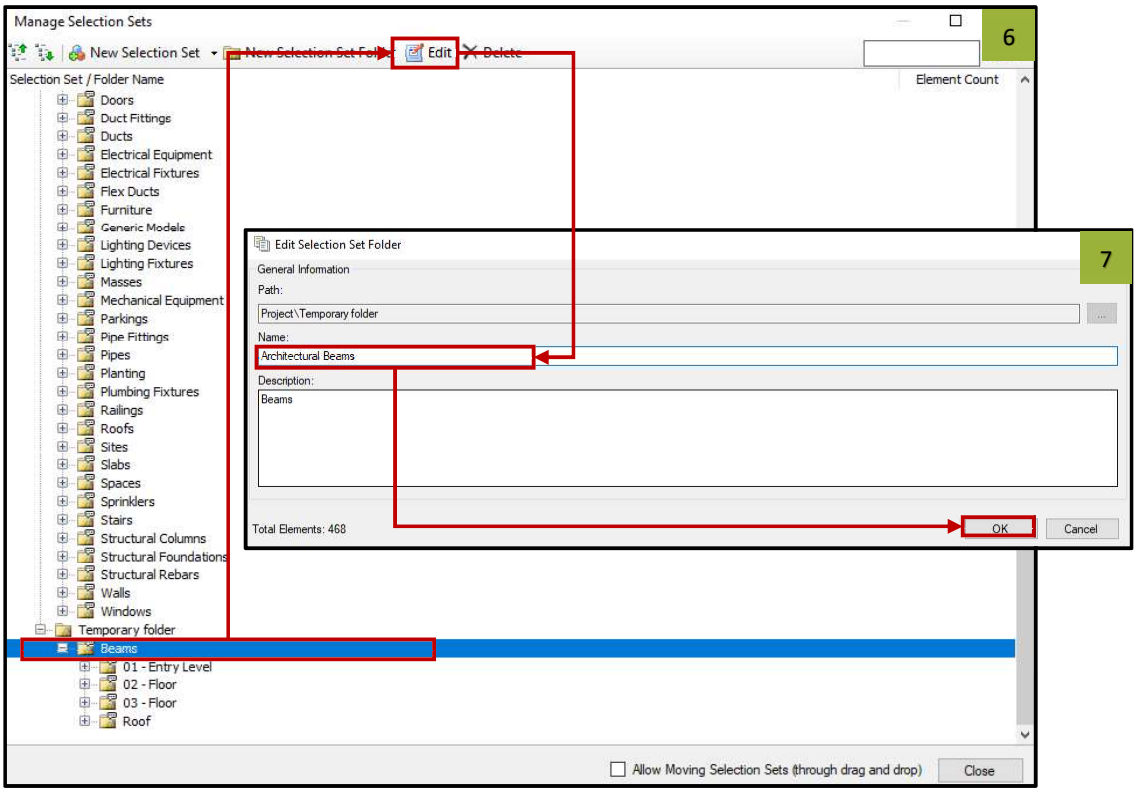


4. Within the **Manage Selection Sets** window click on the **Beams** folder, which is located in the **Smart Selection Sets** for the schedule folder, with the **right-click** and choose in the menu **Copy**. →
5. **Paste** the selection set in the **Temporary** folder.



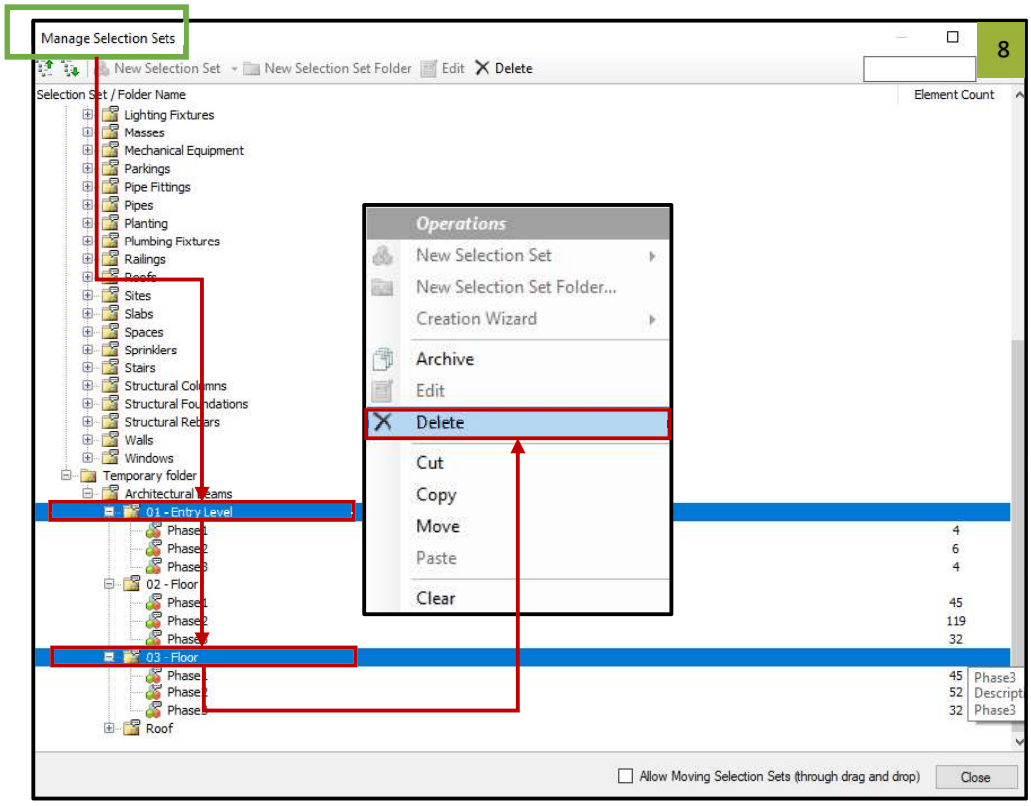
Now we will edit the folders and selection sets in the Temporary folder. First, we will rename the Beams folder into Architectural Beams, then we will delete everything within it except 02-Floor folder and Phase 2 selection set. Afterwards we will edit the selection set Phase 2 by excluding all families, which names begin with ST-. 1

6. Activate the **Manage Selection Sets** command and choose the **Beams** folder, which is located in the **Temporary folder**. →
7. Click on the **Edit** command and rename the folder into **Architectural Beams**.

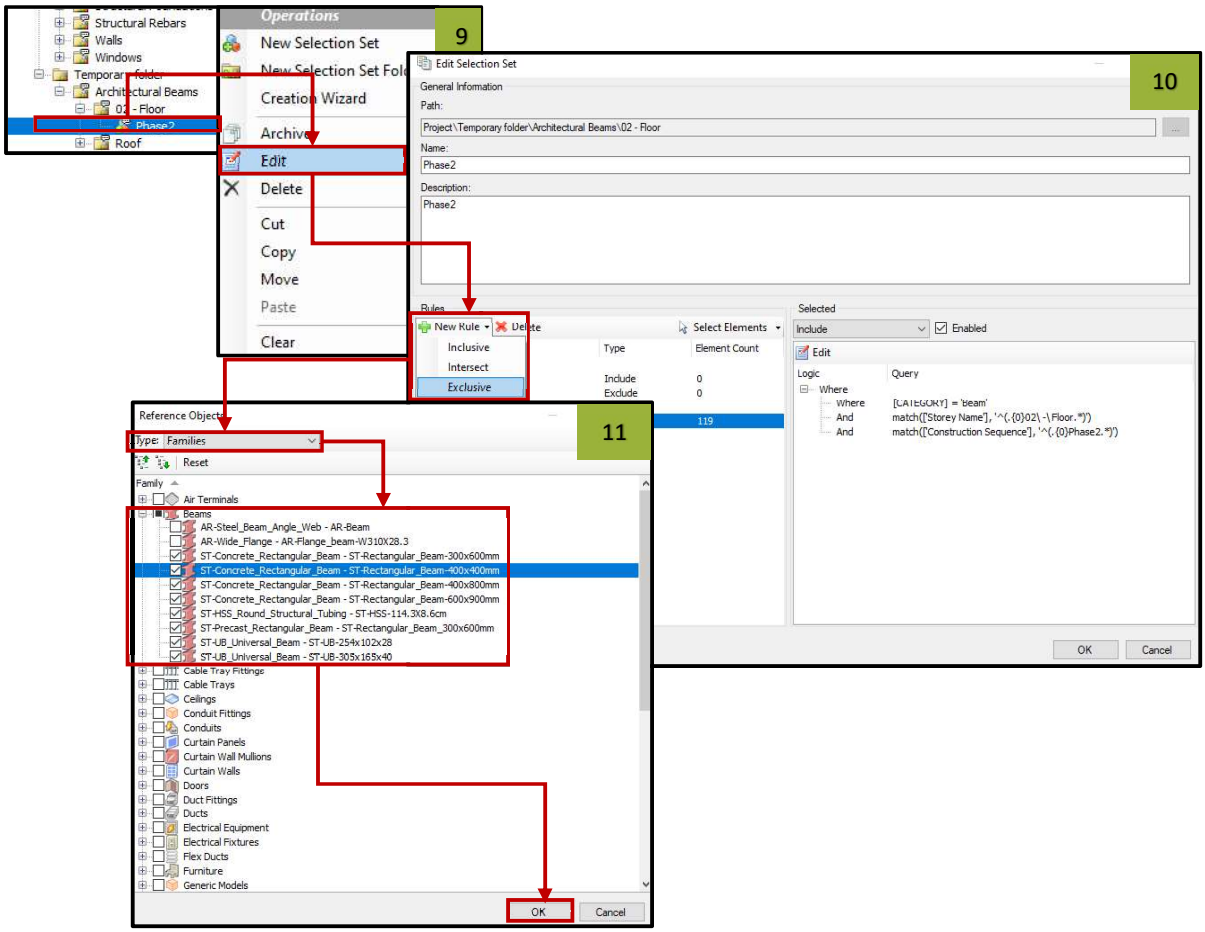


The Architectural Beams task in the schedule contains only 02 – Floor and Phase 2. To create a matching selection set and folder, we will delete everything except 02 – Floor folder and Phase 2 selection set. And afterwards all families which names begin with ST- will be excluded from the remaining Phase 2 selection set.

8. Within the **Architectural Beams** folder click on **01 – Floor**, **03 – Floor** and **Roofs** folder and afterwards also **Phase 1** and **3** selection sets within the **02 – Floor** folder with the right-click pressing **SHIFT** and the same time so they color blue and choose the **Delete** option in the menu that opens.



9. Click on the selection set **Phase 2**, which is located in the **02 – Floor** folder within the **Architectural Beams** folder with **right-click** in choose the **Edit** option.
10. In the **Edit Selection Set** window, the first rule is stated, which was created on the basis of the conditions of the custom breakdown structure. → Click on the **New Rule** command again and in the drop-down menu choose the **Exclusive** option.
11. In the **Reference Objects** window choose under the **Type** option **Family** and under **Beams** category check all families, which begin on **ST-** to exclude them for the **Architectural Beams** selection set.



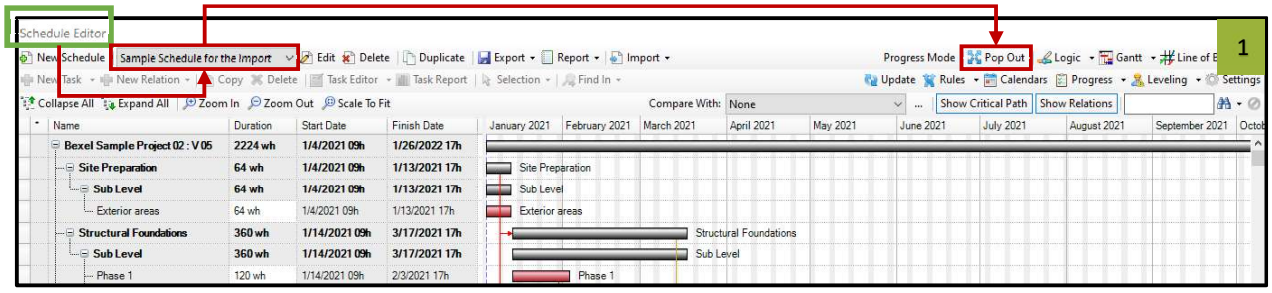
ADDITIONAL TIP: Adding new rule for excluding elements can be different. User can define, for example, under Type Element Query and afterwards that all elements which Workset name begins with ST- should be excluded from selection set. The same result can be achieved by setting different rules.

Now please repeat the process above to create a Structural Beams folder, where we will exclude from Phase 2 selection set families, which names begins with AR- within the 02 – Floor folder. Afterwards please edit selection sets for tasks from the schedule named: Site Preparation, Sites (Landscape &Roads), Structural Columns, Structural Foundations, Structural Roofs, Structural Slabs and Structural Walls. These selection sets will be linked to the schedule named Sample Schedule for the Import. But user can also edit other selection sets from folder Smart Selection Sets for the Sample schedule according to schedule tasks.

8.8. LINKING SCHEDULE TASKS WITH ELEMENTS OF BIM MODEL

In previous chapters a process of creating selection sets based on the imported schedule is described. These selection sets will be later on used for linking model with the schedule. For this purpose, a file named **Smart Selection sets for the Sample schedule_02.bxf** was created and is located in the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.7, 8.8, 8.9\Exchange)**, so the user can import it into to the model and go straight to his chapter. The process of importing a bxf. file was explained in detail in the **Importing the custom breakdown structures with the exchange command** chapter. The folder contains selection sets of the structural model which will be linked with the model. The process is described below. But first, we will activate the Schedule Editor tab and choose the schedule we would like to link with elements of the BIM model.

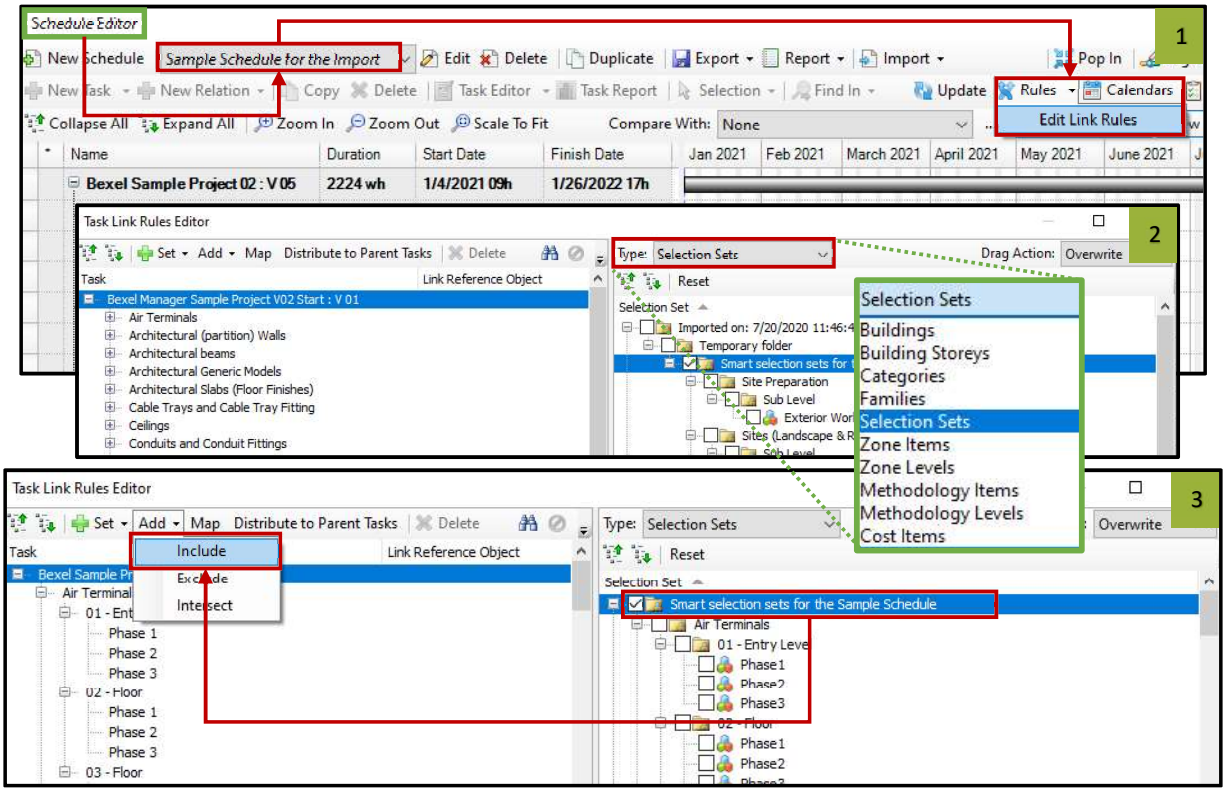
1. Activate the **Schedule Editor**. → In the drop-down menu choose a certain schedule, for example, **Sample Schedule for the Import**. → Click on the **Pop-Out** command for a better preview of the schedule.



8.8.1. MANUALLY LINKING SELECTED ELEMENTS WITH TASKS OF THE SCHEDULE

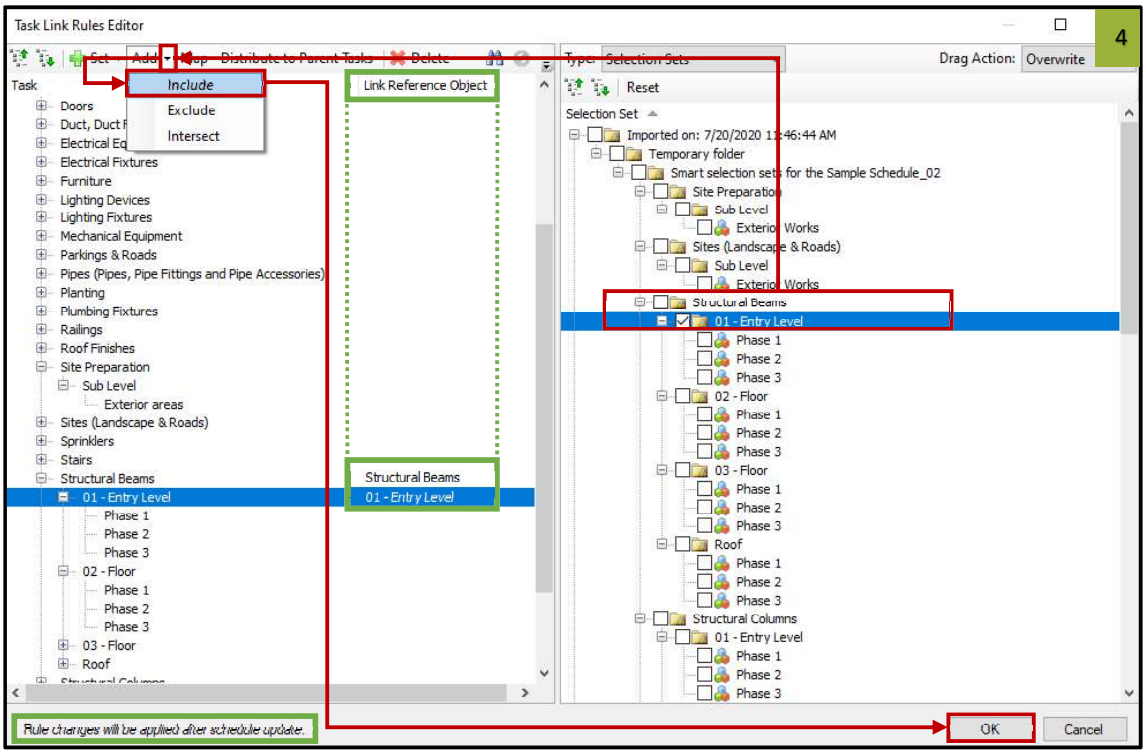
The process of linking tasks with elements of the model with the Link Rules command will be explained here. For this purpose, selection sets from the folder **Smart selection sets for the Sample schedule_02.bxf** will be used, which are located in the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.7, 8.8, 8.9\Exchange).**The process is described below.

1. Activate the **Schedule Editor** and choose **Sample Schedule for the Import** in the drop-down menu. → Click on the **arrow** next to the **Rules** command. →
2. A **Task Link Rules Editor** window opens and within it choose in the **Type** drop-down menu **Selection Sets** option. →
3. To link, for example, **Bexel Sample Project 02 Start : V 01** schedule with the **Smart selection sets for the Sample Schedule** folder, first check the **box** in front of the Smart selection sets folder and then click on the **Add** command. → In the drop-down menu choose the **Include** option. →



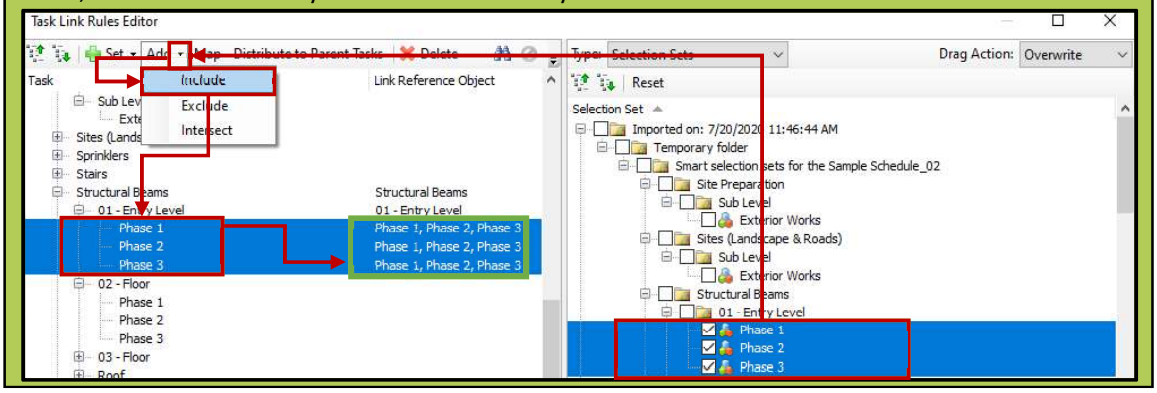
NOTE: Linking model to schedule has to be executed in a certain order. User must link parent tasks, which are tasks on the higher level and then moves to tasks on the lower level all the way to the leaf tasks, which are tasks on the lowest level. Every single task from the schedule has to be linked with either a folder or a category, family, selection set, building level, and etc. in order to make an appropriate 4D simulation.

4. Now link parent task **Structural Beams** on the left side of the **Task Link Rules Editor** widow with the **Structural Beams** folder from the list on the right side of the **Task Link Rules Editor** window. → First check the **box** before **Structural Beams** folder from the list on the right. → Click on the **arrow** next to the **Add** command and choose from the list the **Include** option. → Repeat the process described above to link, for example, **Phase 1**, **Phase 2**, **Phase 3** tasks to link them with **Phase 1**, **Phase 2**, **Phase 3** selection sets from the list on the right. → Finish the process by clicking on the **OK** button.



NOTE: In the Link Reference Object column information is displayed about which selection set, folder, category, family and etc. is linked to a certain task of the schedule. Also, in the left lower corner of the Task Link Rules Editor a note is displayed, where it is stated that all rules will be applied after the update of schedule.

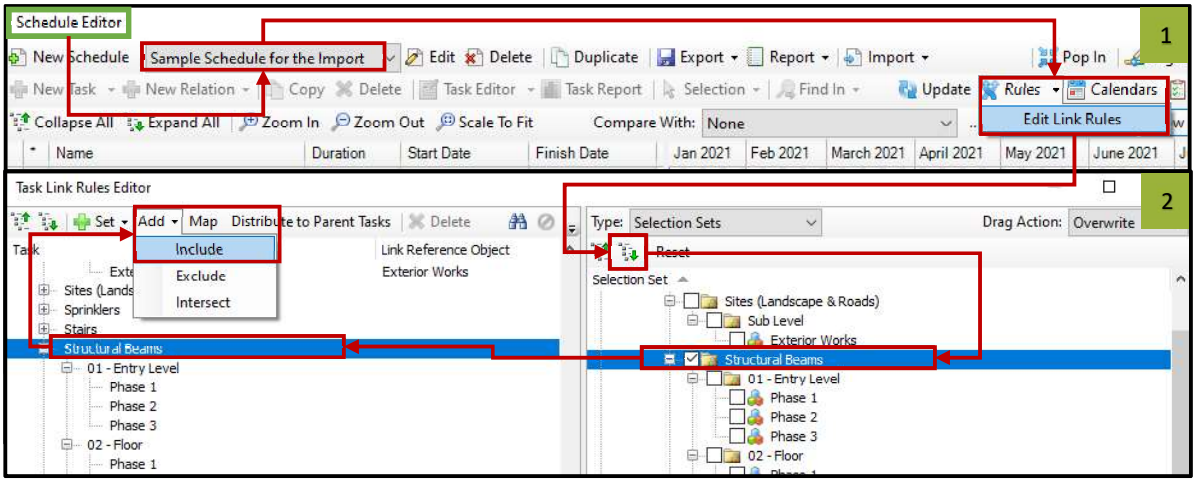
WARNING: While linking numerous leaf tasks with parent task like in the process described above, you should link tasks one by one using the Include option within the Add command. If you check, for example all three boxes in front of Phase 1, Phase 2, Phase 3 selection sets from the list on the right and afterwards choose option Include within the Add command, all three selection sets will be linked to every leaf task. For example, Phase 1, Phase 2, Phase 3 selection sets will be all together linked to the Phase 1 task, also to Phase 2 and 3 tasks, like it is demonstrated on the picture below, which unfortunately is not the correct way to link model with schedule.



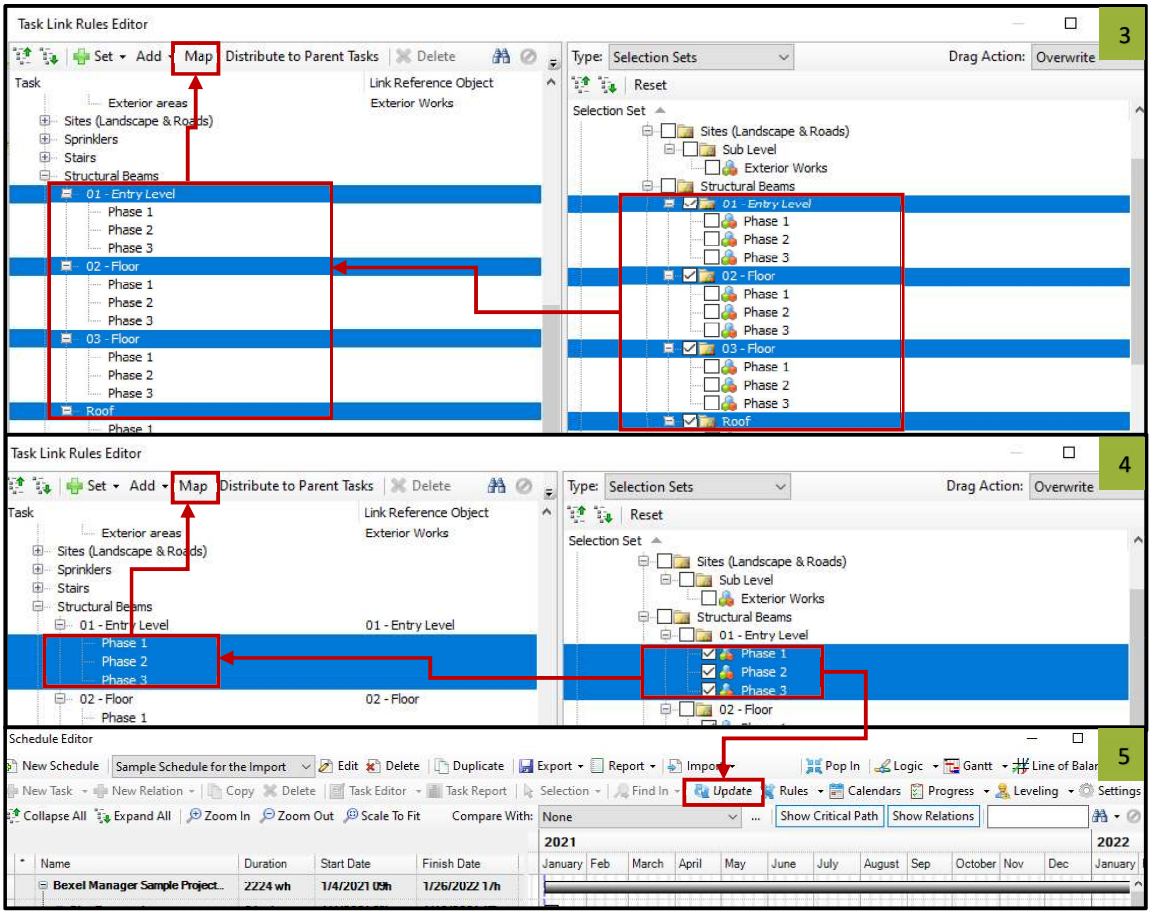
8.8.2. LINKING MULTIPLE ELEMENTS WITH MULTIPLE TASKS

A schedule for a project can contain more than thousands of tasks. To link every single task individually, it would extremally prolong the process. Now a process of linking multiple tasks with multiple sections of the model will be demonstrated.

1. Activate the **Schedule Editor** and choose **Sample Schedule for the Import** in the drop-down menu. → Click on the **arrow** next to the **Rules** command. →
2. A **Task Link Rules Editor** window opens and within it choose in the **Type** drop-down menu **Selection Sets** option. → Afterwards click on the **Expand All** command to see the full list of selection sets, also expand **Structural Beams** and **Structural Foundations** tasks. → Link the **Structural Beams** folder with **Structural Beams** task using the **Include** option within the **Add** command. →

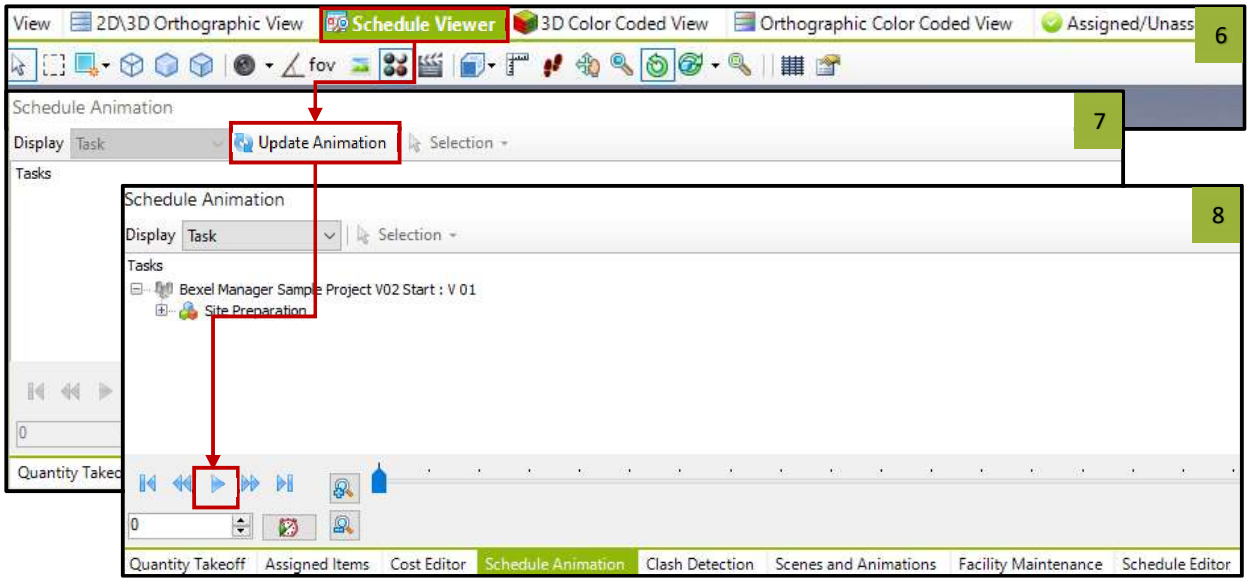


3. Now **check** the **boxes** in front **01 – Entry Level**, **02 – Floor, 03 – Floor** and **Roof** folders, located on the **right** side of the **Tasks Link Rules Editor**. → Click on the **01 – Entry Level** task and hold the **CTRL** computer key to also select **02 – Floor**, **03 – Floor** and **Roof** tasks. → After selecting the tasks click on the **Map** command. →
4. Repeat the process from **step 3** described above to select **Phase 1**, **Phase 2**, **Phase 3** selection sets within **01 - Entry Level** folder stated in the previous step. → Repeat the process for all selection sets in the folder Smart selection sets for Sample Schedule. →
5. When the process of linking is finished, schedule needs to be updated for all changes to be applied. → Close the **Task Link Rules Editor** window and click on the **Update** command within the **Schedule Editor** window.



WARNING: Names of selection sets have to be identical according to names of schedule tasks to use the Map command. Also, selection sets, for example, within 02 – Floor and 03 – Floor folders have the same names Phase 1, Phase 2, Phase 3 and cannot be linked together in one step.

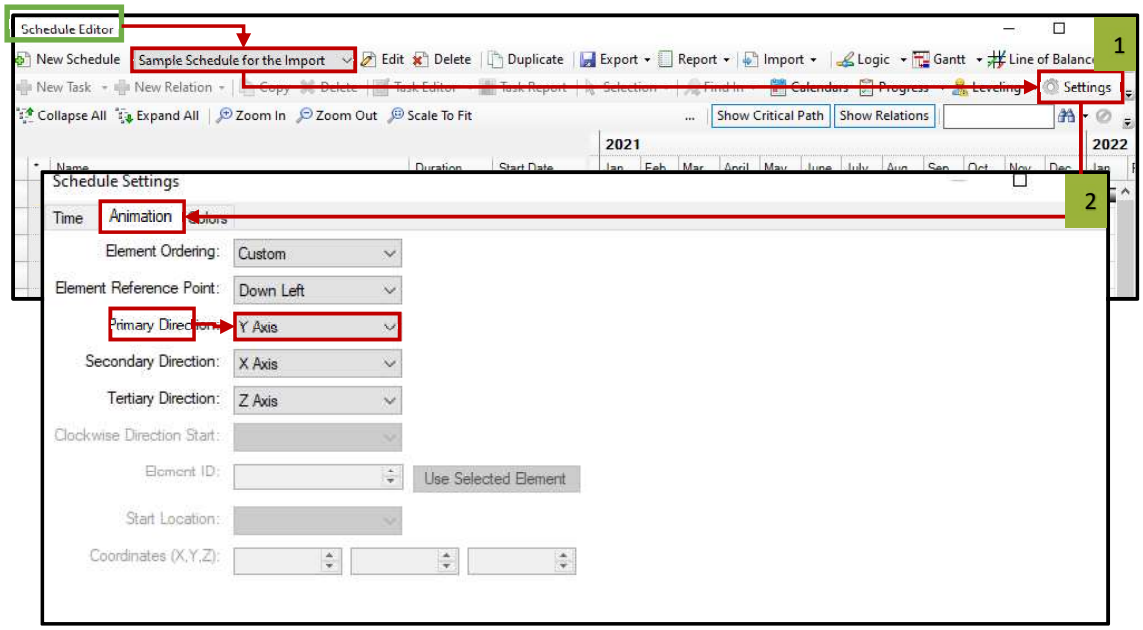
6. When the schedule is updated, activate the **Schedule Viewer** view and then the **Schedule Animation** tab. →
7. Within the **Schedule Animation** tab click on the **Update Animation** command. →
8. Afterwards click on the **Play** command. →



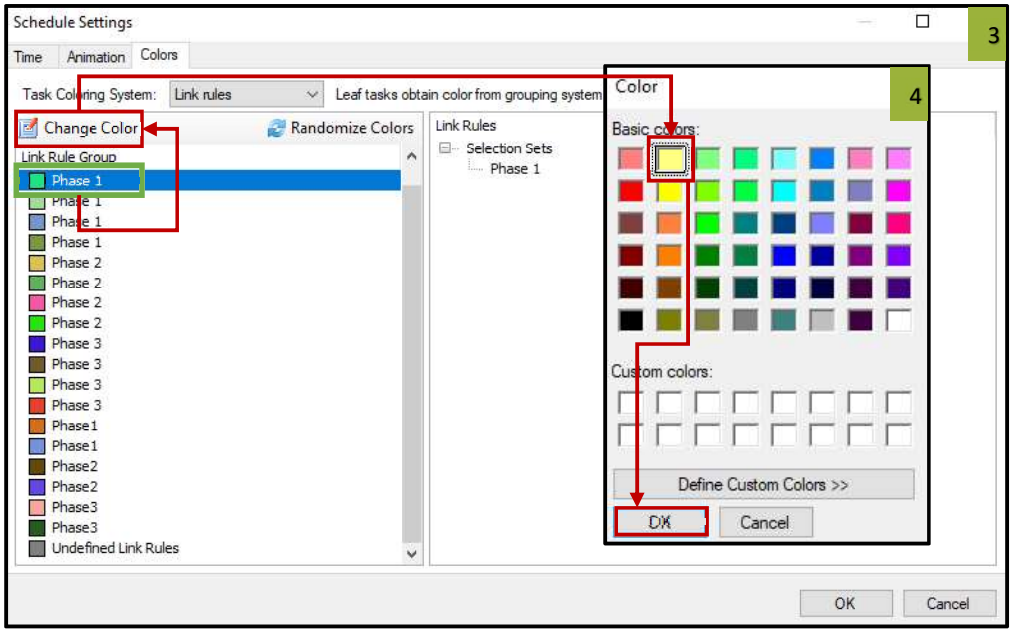
8.9. SCHEDULE SETTINGS

After reviewing the schedule animation, which is the result of linking the imported schedule with the model, the animation can be additionally modified. This can be done by activating the Settings command within the Schedule Editor tab. Schedule Settings contains three different tabs Time, Animation and Colors. To change the order of elements linked to schedule tasks during the animation, follow the process below.

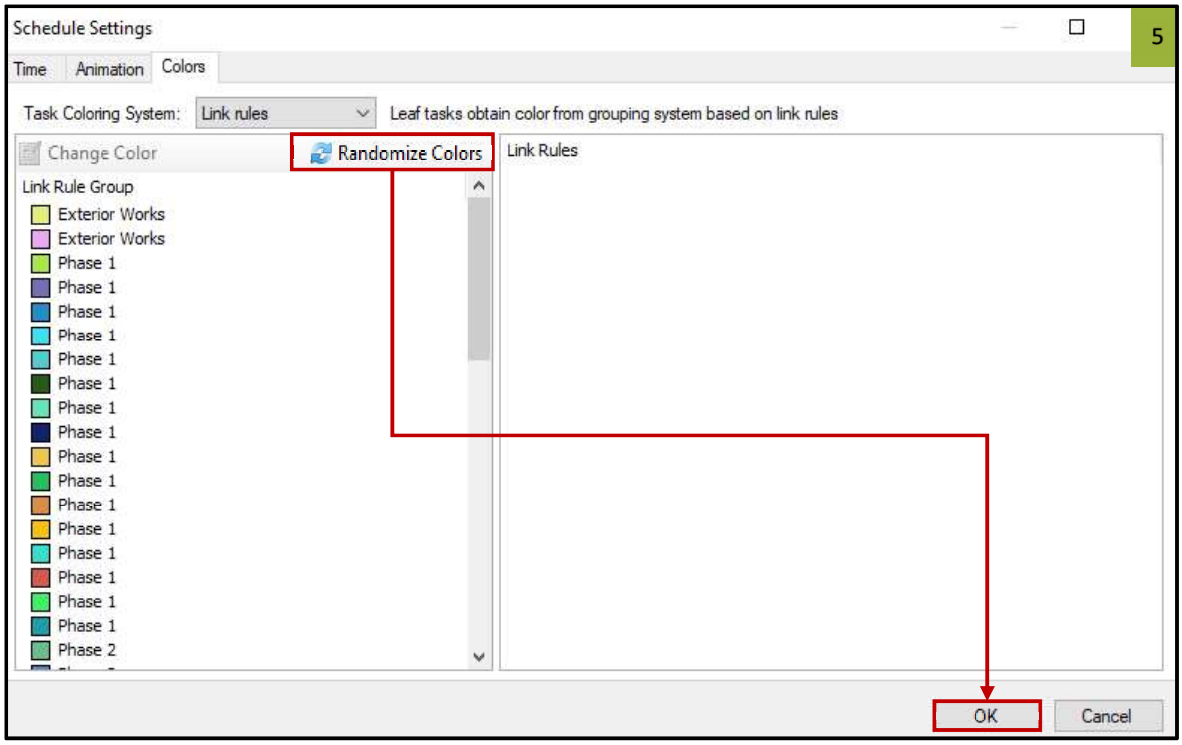
1. In the **drop-down** menu within the **Schedule Editor** review if the right schedule is chosen. → Click on the **Settings** command. →
2. Activate the **Animation** tab. → Click on the **drop-down** menu under **Primary Direction** and choose the **Y Axis** option. → All other options will be automatically changed. →



3. Activate the **Colors** tab and under **Tasks Coloring System** choose the **Link Rules** option. → To change a color of a certain task, click on, for example, **Phase 1** task and afterwards the **Change Color** command. →
4. Within the **Color** window choose a color and finish the process by clicking on the **OK** button. →



5. To change colors for all tasks appearance during the animation click on the **Randomize Colors** command. → Finish the process by clicking on the **OK** button.

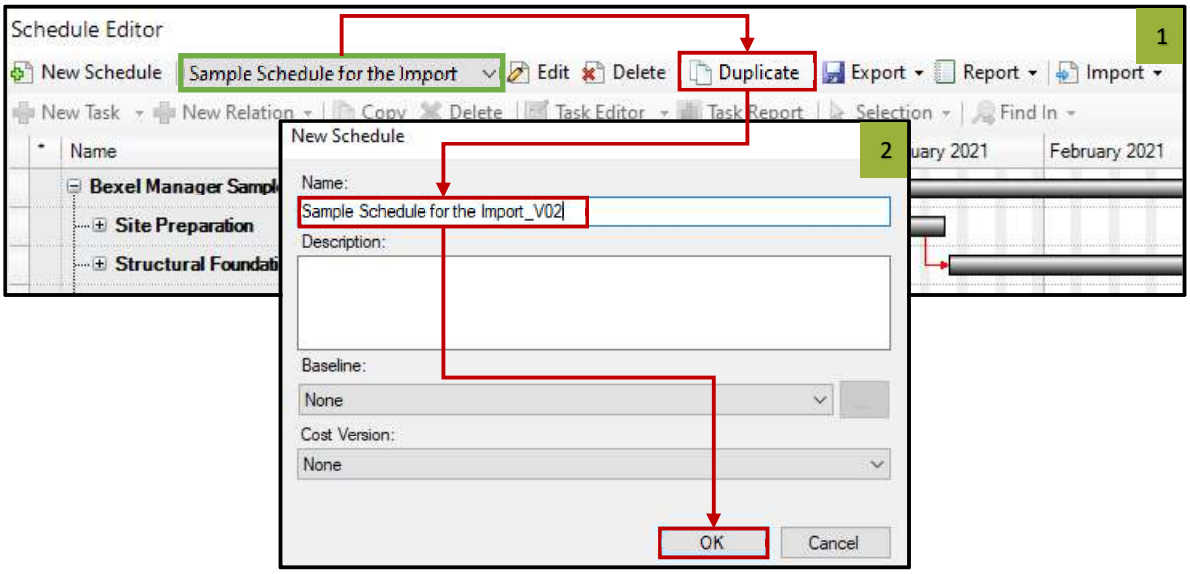


NOTE: After changes were applied, update the schedule with the Update command and afterwards activate the Schedule Animation to review how the changes affect the animation.

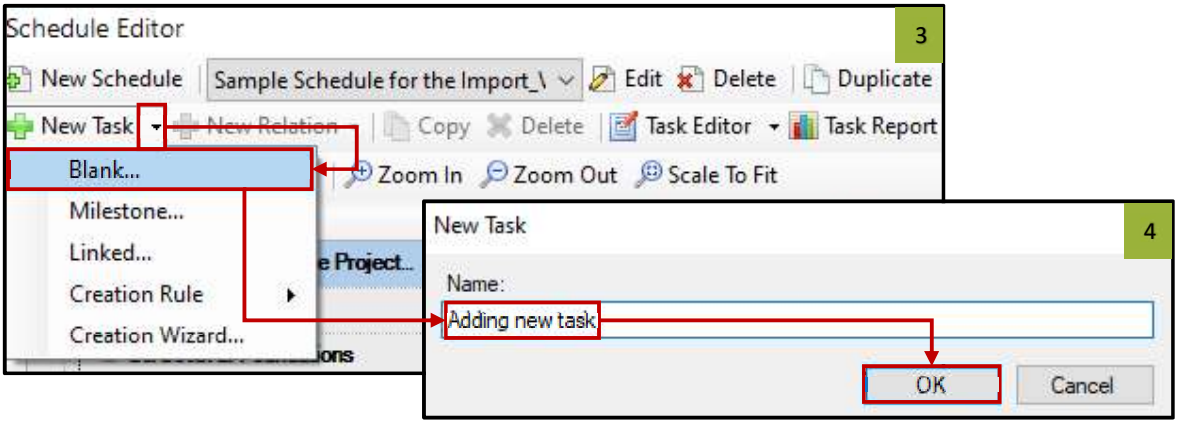
8.10. ADDING NEW TASK

As the project evolves, the schedule also changes according to development of the project. Sometimes new tasks are added or existing ones are additionally edited no matter if the schedule was created in Bexel Manager or imported from another software. Bexel Manager defers three types of tasks: Linked task, which is during the creation linked to a selection set, building storey etc. A milestone task is a task with no duration, which usually represents end of a phase. A blank task is a task where no elements are linked to it but can be added later on. Please note, to find out more about this topic, read **Chapter 8.2**. In this chapter we will add a new blank task, which will be later on used to demonstrate how to enter progress for parts of project with no geometrical appearance in the model. To create a blank task, we will first copy the schedule we were working on in previous chapters, Sample Schedule for the Import which is also located within the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.10, 8.11, 8.12\Exchange).**

1. First import the **Sample Schedule for the Import** as it was described in the **Chapter 8.7**. → Choose the schedule in the **drop-down** menu and click on the **Duplicate** command. →
2. In the **New Schedule** window under the **Name** section define the new name, for example, **Sample Schedule for the Import_V02**. →



3. To add a **Blank** activity, first select the task in the schedule under which new task will be placed, for example, **Sample Schedule for the Import**. → Click on the **arrow** next to **New Task** command and choose the **Blank…** option. →
4. Within the **New Task** window define the name of task, for example, **Adding new task** and finish the process with clicking on the **OK** button. →

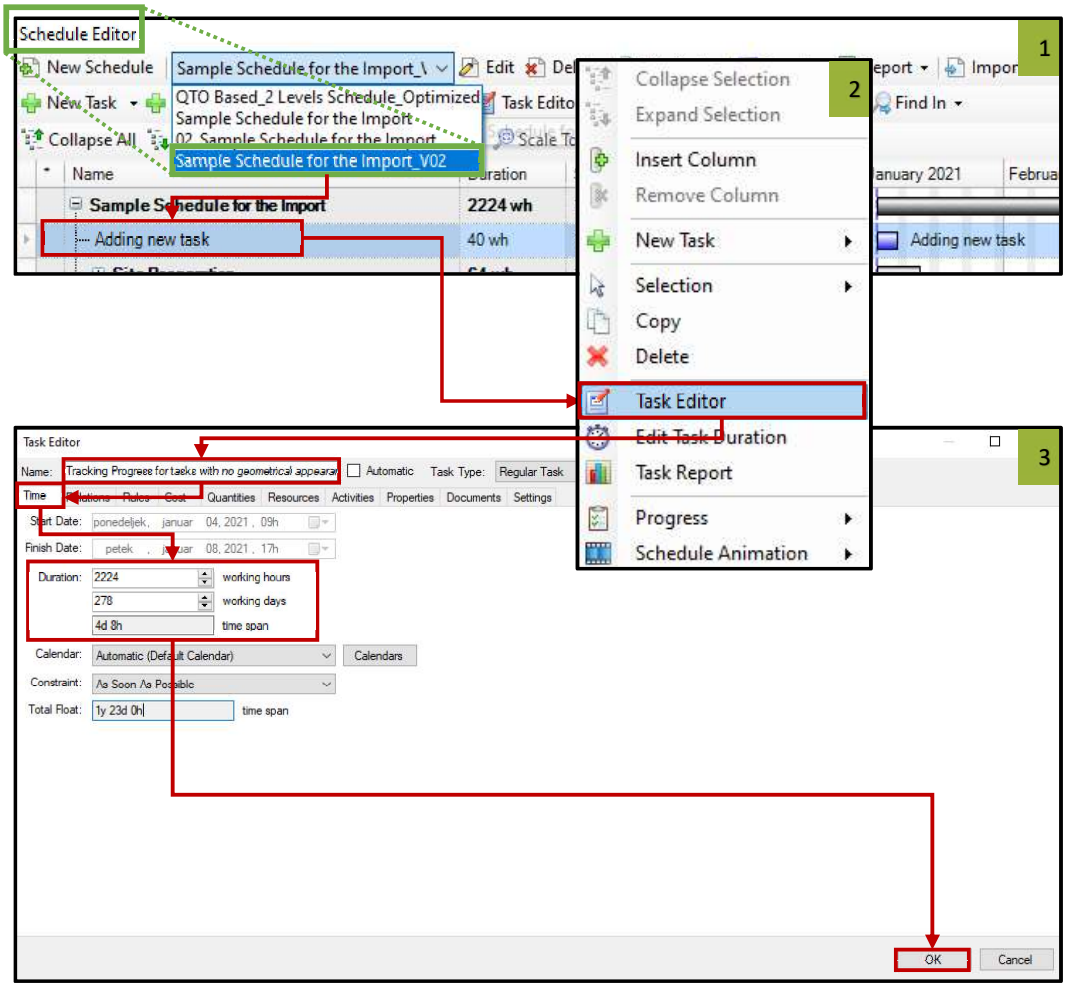


ADDITIONAL TIP: Activating the menu for new tasks can be done in a few ways. First one is to click on the arrow next to the New Task command within the Schedule Editor. The next option is to click on a task where a new task will be placed with the right-click and in the menu that opens, choose the option New Task and afterwards the type of the task. Creating Milestone or Linked type tasks is done in the same way, by choosing the right option in the drop-own menu. More information regarding this topic can be found within the **Chapter 8.2**.

8.11. EDITING A TASK

The created new blank task has no relations and the duration is set automatically for 40 working hours. It will be used to describe the process of tracking progress for activities from the schedule with no geometrical presentation, which occur during the whole project. Which also means the task will go on from beginning of the project until the end of the project. So, now we will rename this task and edit duration with the help of Task Editor command. For further information about this topic, read **Chapter 8.2**.

1. Choose the schedule task you would like to edit, for example, **Adding new task** created in the process described above. →
2. Click on the **Adding new task** with the **right-click** and in the menu, that opens choose the **Task Editor** option. →
3. Within the **Task Editor** window click on the **Time** tab and rename the task, for example, **Tracking Progress for tasks with no geometrical appearance**. → Define the duration for task within the **Duration** section, for example, **2224 wh** as the duration of the project is defined. → No other parameters will be changed so we will finish the process by clicking on the **OK** button.

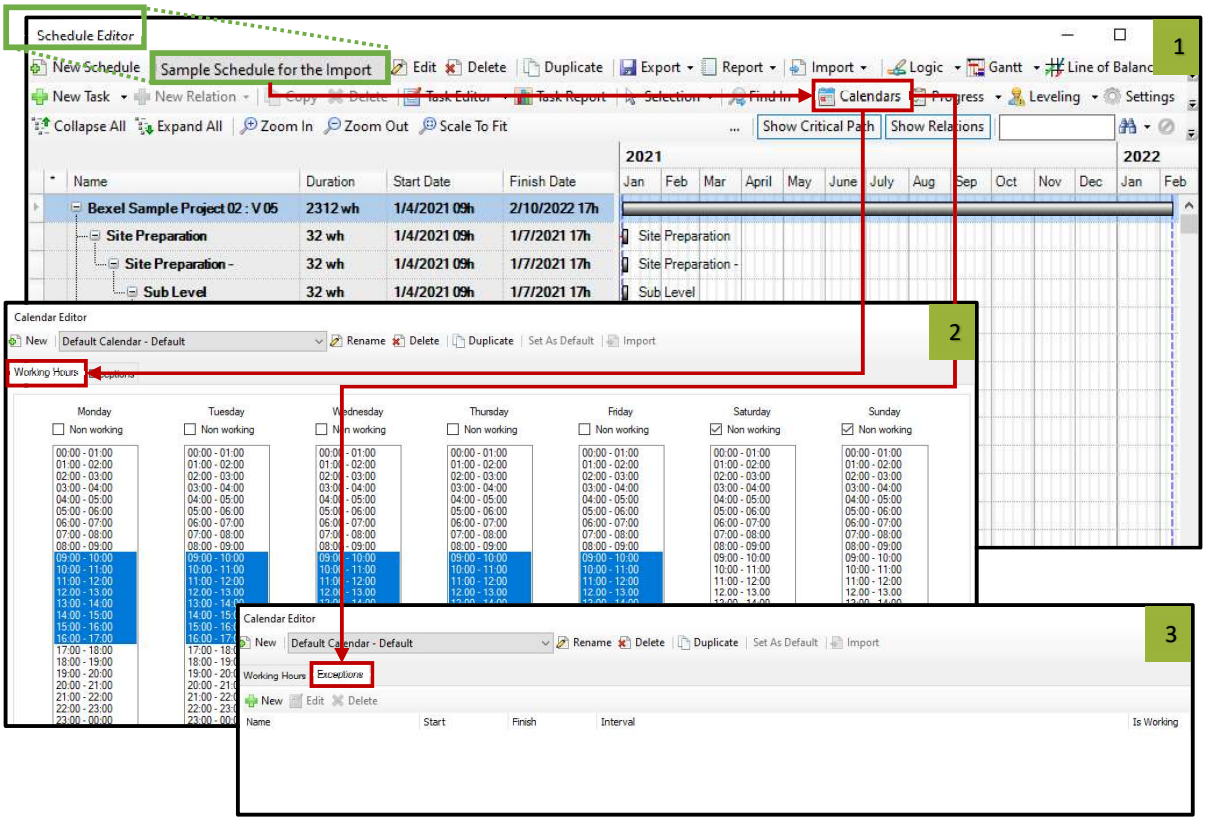


NOTE: Please note, the Task Editor can also be activated by clicking on the Task Editor command within the Schedule Editor tab.

8.12. CALENDARS

Every schedule has its own calendar regardless of the fact how it was created. Either it was created in a different software and afterwards imported in Bexel Manager or created directly in Bexel Manager in various ways. For the purpose of introducing the user with this topic any schedule can be used, for example, Sample Schedule for the Import, which was used in previous chapters and can be found within the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.10, 8.11, 8.12\Exchange)**. The process of importing a schedule as an XML. file is described in the **Chapter 8.7**. Importing a schedule. To review the calendar from the schedule Sample Schedule for the Import that was imported in the Sample model, please follow the process below.

1. Activate the **Schedule Editor** tab and in the drop-down menu beside the **New Schedule** command choose the schedule mentioned above. → Afterwards click on the **Calendars** command to activate the **Calendar Editor.**
2. Within the **Calendar Editor** activate the **Working Hours** tab, where the information about the working hours and days are displayed.
3. Within the **Exceptions** tab the user can add exception, for example, holidays on which the work on the construction site will not be performed or the duration of the working day will be different.

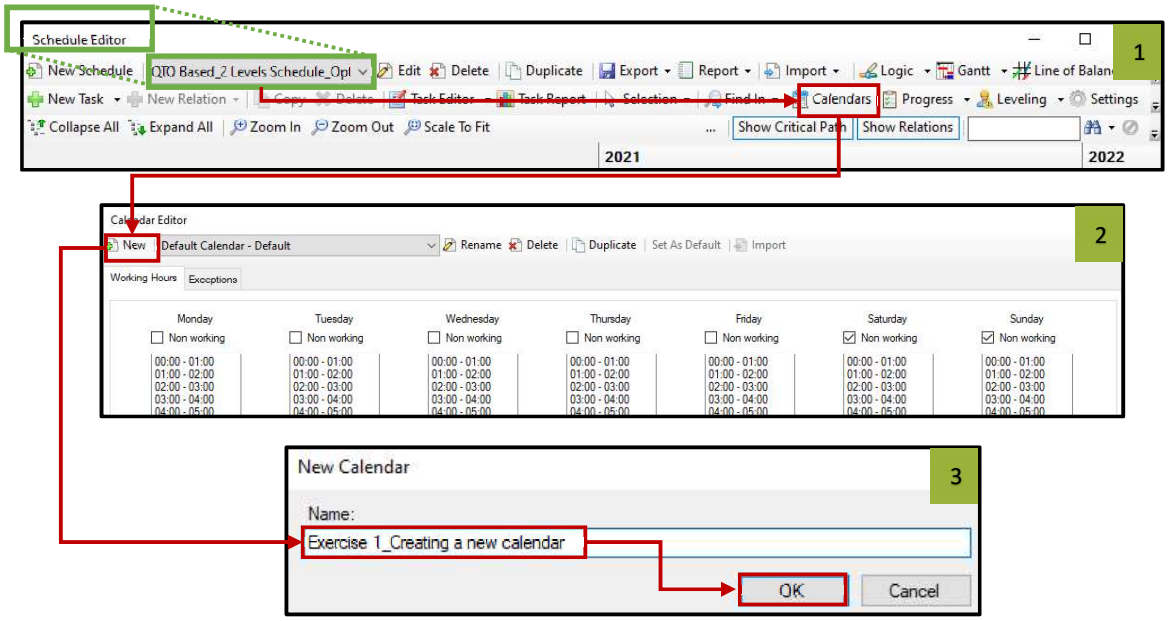


NOTE: According to the calendar above, the work on construction site is going on from 9 am until 17 pm from Monday to Friday and there are no exceptions added to this calendar. With exceptions we refer to holidays during which the work on construction site may proceed in different time frame than usual.

In this section we will create a new calendar and will define working hours from, for example, 8 am until 18 pm and days from Monday until Saturday for the imported schedule. In the next stage we will add an exception, for example, a holiday like the International Workers' Day and afterwards we will define the calendar as default.

Step 01: Creating a new calendar

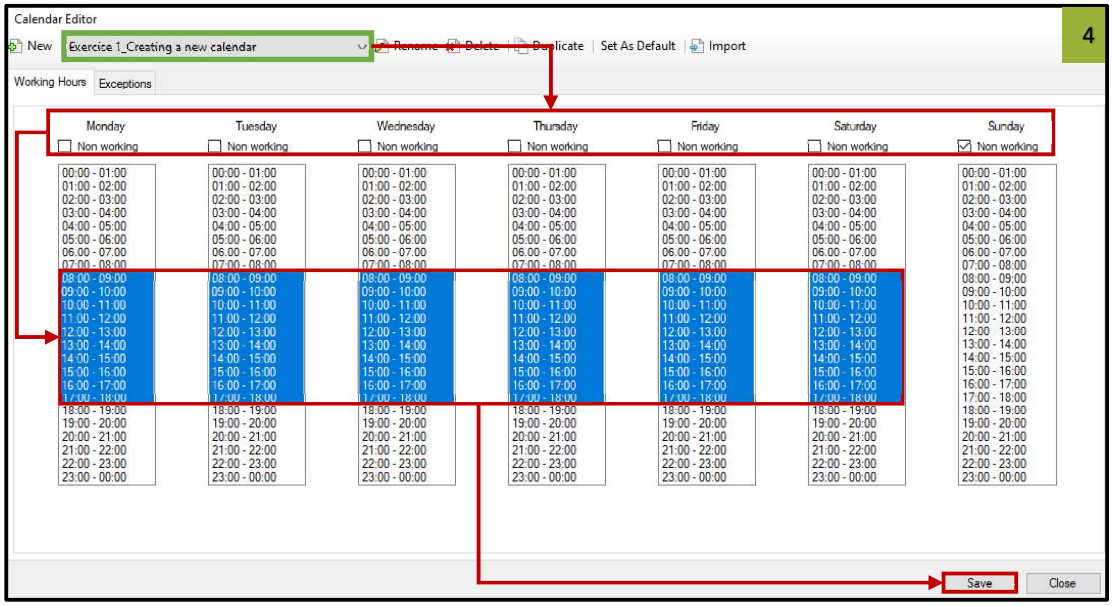
1. Activate the **Schedule Editor** tab if needed and in the **drop-down** menu beside the **New Schedule** command choose the schedule mentioned above. → Afterwards click on the **Calendars** command to activate the **Calendar Editor.**
2. Within the **Calendars** window click on the **New** command.
3. In the **New Calendar** window define the name of the calendar, for example, **Exercise 1_Creating a new calendar** and finish the process by clicking on the **OK** button.



Step 02: Defining working hours

After we have defined the name of the new calendar a Calendar Editor reopens and the new calendar is activated. In the next step, we will define the working hours and days for the working week, which will apply until the work on the construction site is done.

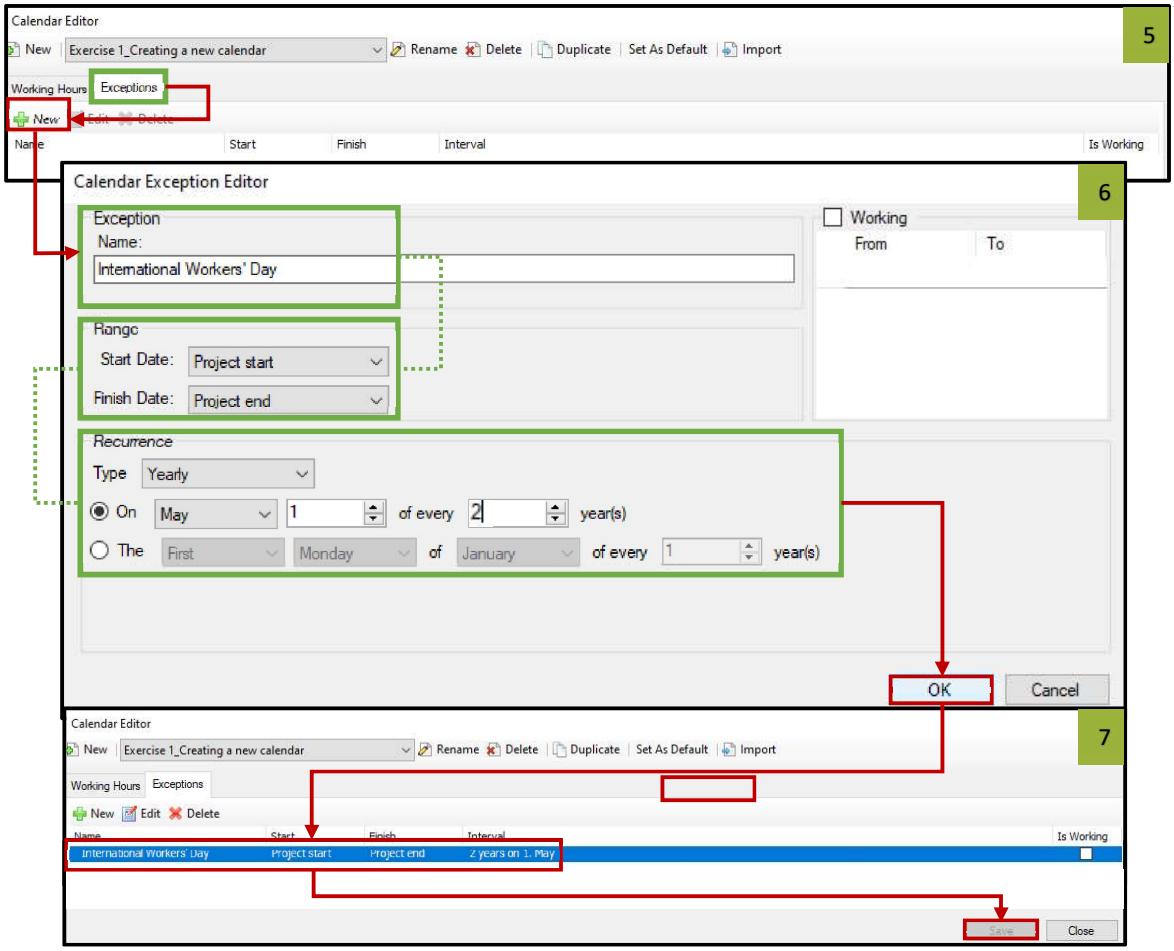
4. Click on the **08:00-09:00** row within the **column** under **Monday** and hold **Shift** and afterwards click on the **17:00-18:00** row until this period between 8 o'clock and 18 o'clock doesn't color blue. → Repeat the process for all days except Sunday, which will be the non-working day.→ When the definition of the working week is done, click on the **Save** button.



NOTE: To add hours continuously hold **CTRL** and click on working hours on which the work will be performed on the construction site.

Step 03: Adding Exceptions

5. Within the **Calendar Editor** window click on the **Exceptions** tab and afterwards on the **New** button.
6. An **Exceptions Calendar Editor** opens where we in the **Name** section define the name of the holiday, for example, the **International Workers' Day**. → In the **Range** section we will define under **Start Date** section the **Project Starts** option and in the **Finish Date** section the **Project End** option. → In the **Recurrence** section under **Type** choose the **Yearly** option and define the date, which is **1. May of every 2 year**. → Finish the process by clicking on the **OK** button.
7. Within the **Calendar Editor** under the **Exceptions** tab click on the **International Workers' Day** holiday so it colors **blue** and click on the **Save** button. → When the editing of the new calendar is finished, click on **Set As Default** command, to define the calendar for the chosen schedule.



NOTE: After creating a new calendar a user can easily duplicate, edit or delete it. This can be done within the Calendar Editor window and can also be applied to any schedule yet to be created or is already created.

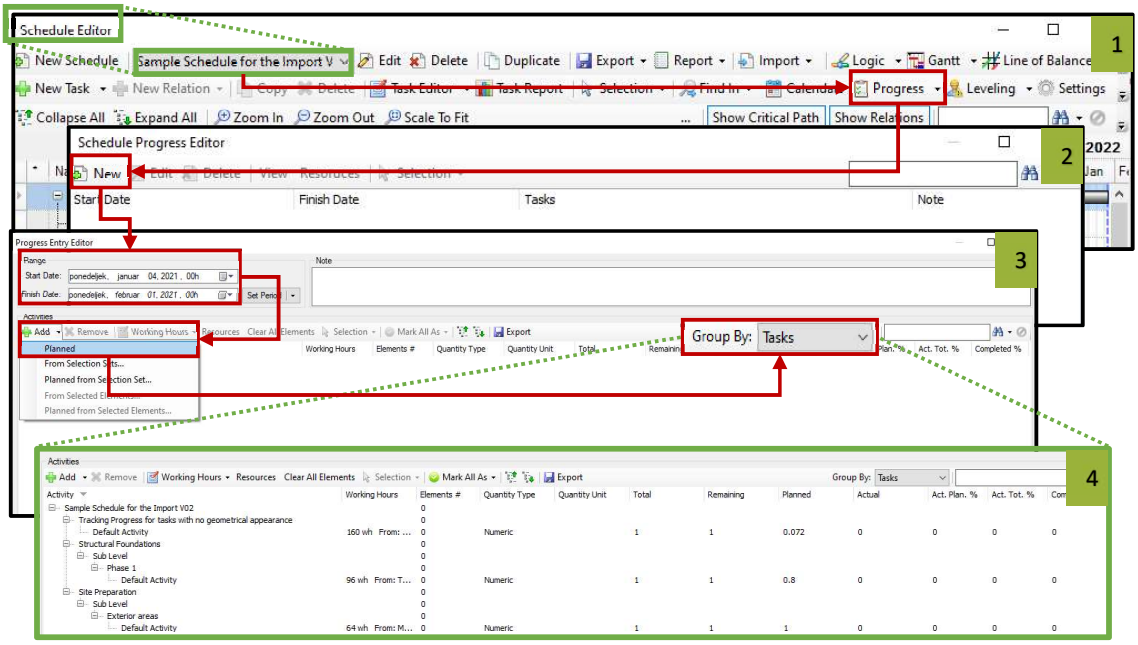
8.13. PROGRESS TRACKING

When the work on the construction site begins the process of tracking progress also starts. In Bexel Manager this is possible within the Schedule Editor tab and can be performed in various ways. Before tracking progress begins first the schedule has to be linked to model. Which is done by using the selection sets in the folder **Smart selection sets for the Sample schedule_02**. This process was described in the **Chapter 8.8**. It is also highly advised that a copy of the original schedule is done for further analysis such as, for example, Planned vs. Actual. In this chapter the **Sample Schedule for Import** and **Sample Schedule for Import_V02** will be used, which are located in **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.13, 8.14\Exchange)**. In the Sample Schedule_V02 three different tasks are planned for first month: Site Preparation, which will be completed in this period. The other one is Structural Foundations task which continuous until march and the last one is task which we have added, Tracking Progress for tasks with no geometrical appearance. For each of these tasks we will enter progress in different ways. To review if the work was done properly use the **V8.13, 8.14** besln. file which is located within the **Exchange** folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.13, 8.14\Chapter 8.13, 8.14 Complete model)**.

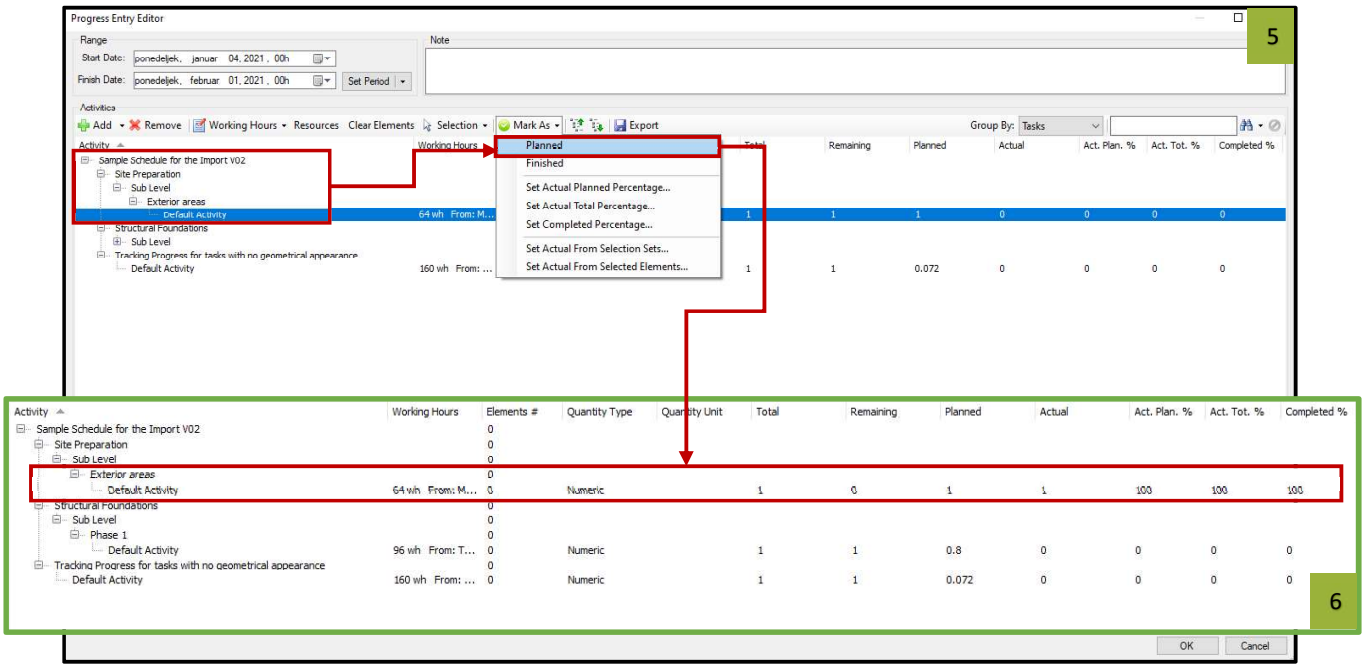
8.13.1. ENTERING PROGRESS MANUALLY

In the process described below, we will enter progress manually for a specific period, for example, the first month of the construction (from fourth of January 2021 until fourth of February 2021) for the task Site Preparation, which is planned to be also finished in this period.

1. Activate the **Sample schedule for the import_V02** within the **Schedule Editor** tab. → Click on the **Progress** command within the **Schedule Editor** tab. →
2. Within the **Schedule Progress Editor** click on the **New** command to define a period for which the progress will be entered, for example, from **January 4.** Until **February 1. 2021**. →
3. When the period is defined click on the **arrow** next to the **Add** command and choose the **Planned** option from the drop-down menu to review tasks planned in this period. →
4. On the right side of the **Progress Entry Editor** there is a **Group By** section and click on the drop-down menu to choose the **Group By Tasks** option, so the task from the schedule are displayed.



5. Choose the **Default Activity** listed under **Exterior areas** within the **Site Preparation** task. → If the activity is going on by the plan, click on the **Mark As** command and choose the **Planned** option. →
6. For this task it is planned that it will finish in the set period, so the software displays in the **Completed** column that the tasks is **100 %** completed.



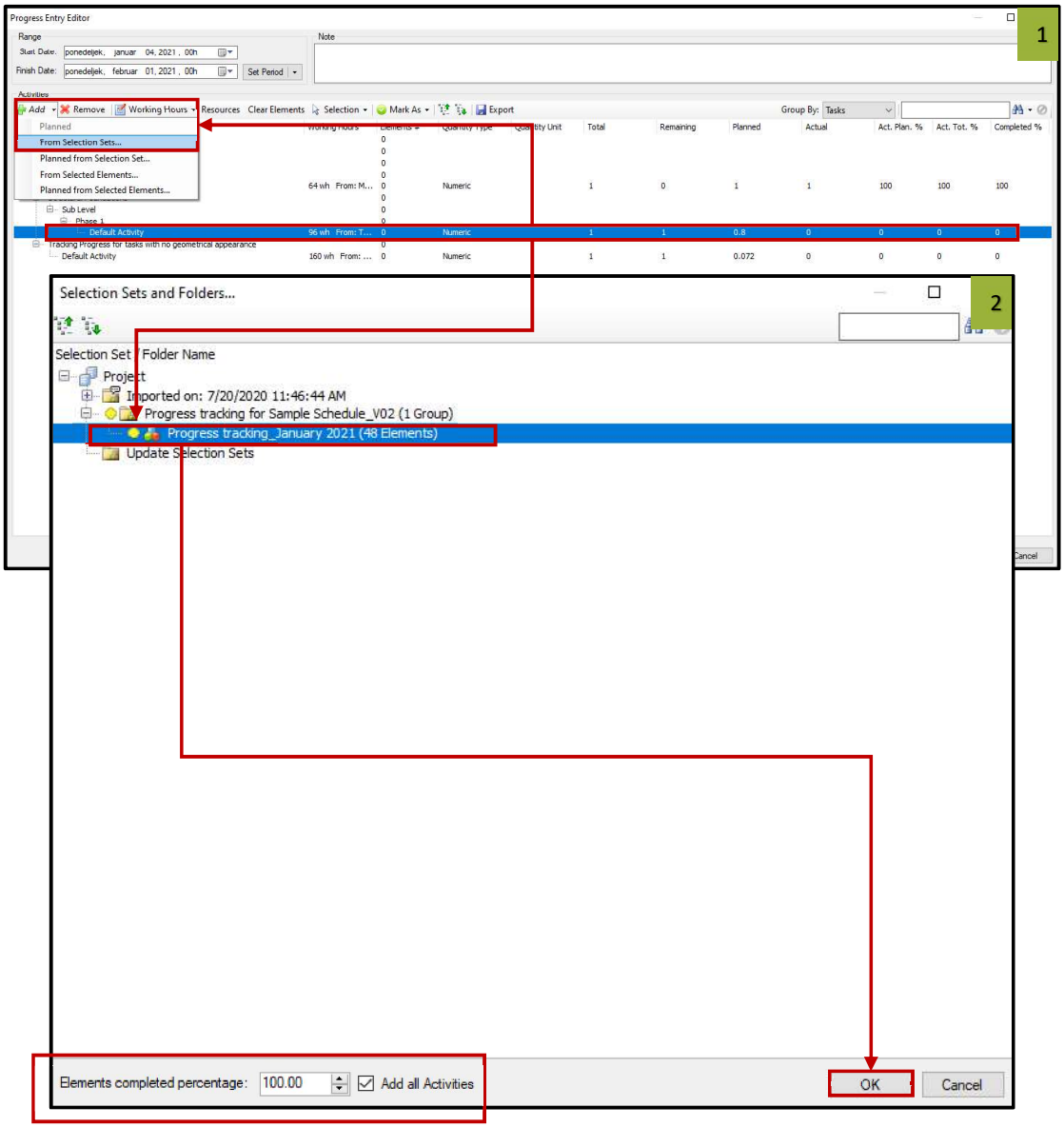
NOTE: The selected task was planned to be finished in the chosen period. If the task would not be finished according to the schedule, using this process, software displays the percentage of completed task.

8.13.2. ENTERING PROGRESS WITH SELECITON SETS

Often the process of entering progress with selection sets is used on the construction site but first a proper selection set has to be created. This process will be described for the leaf task Phase 1, which is placed under Sub Level parent task and afterwards Structural Foundations parent task. The task is planned to start on January 14. and is bound to finish on March 3., so it will not be finished in the defined period. According to calendar approximately half of the structural foundations should be finished in the first month. For the purpose of describing the process two selection sets were created **Progress tracking_Phase 1_January 2021** and **Progress tracking_Phase 2_January 2021** within the folder **Progress tracking for Sample Schedule_V02.bxf** and can be imported in to the model. Files are located in the Exchange folder **(PATH: Bexel Step By Step Workflow Guide ENG\ Lessons\Lesson 8.0\Chapters 8.13 , 8.14\Exchange).**

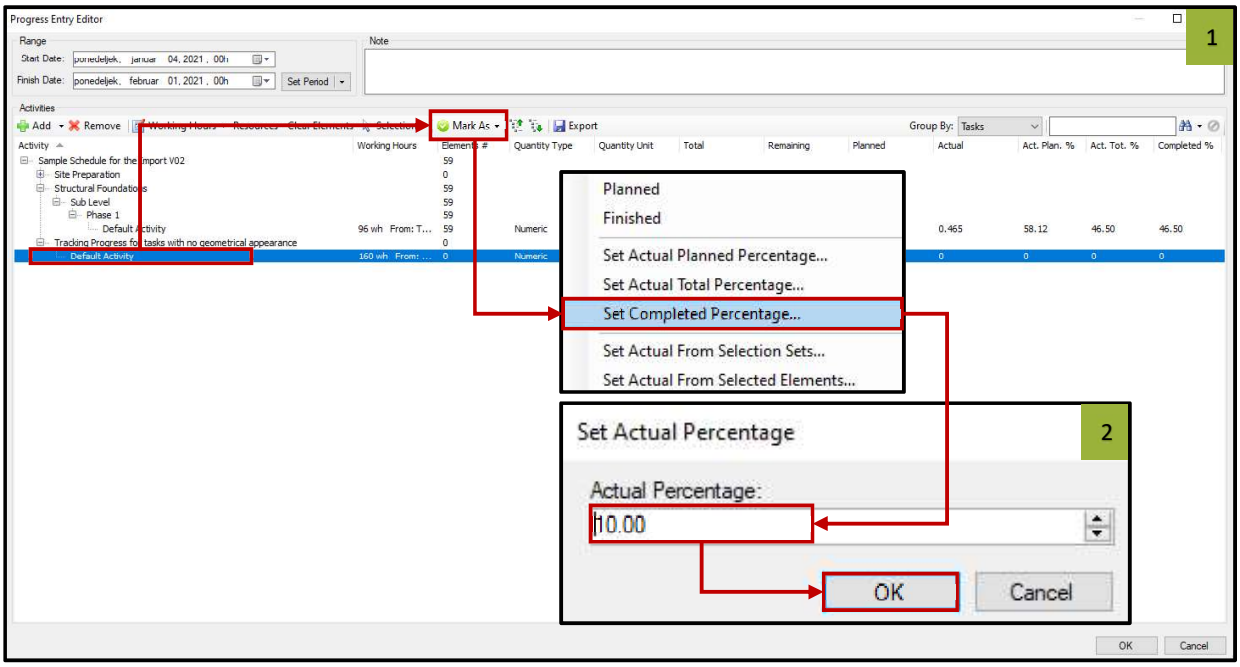
1. Activate the **Sample schedule for the import_V02** and click on the **Progress** command within the **Schedule Editor** tab. →
2. Click on the **Default Activity** placed under the **Phase 1** leaf task, which is placed under **Sub level** and **Structural Foundations** parent tasks. → Afterwards click on the **arrow** next to the **Add** command and choose **From Selection Set** option. →
3. Within the **Selection Sets and folders…** window choose the imported selection set, which contains only elements that were completed in this period and finish the process by clicking on the **OK** button.

WARNING: While entering progress with created selection sets within the Selection Sets and Folders… window there is in the lower left corner a note displayed: **Elements completed percentage**. In the window next to it user can define what percentage of created selection set was finished in the defined period. As we have created a selection set which contains only finished elements in this period the percentage is defined as 100.



Now, we will define the progress for the task we have created in the previous chapters named Tracking Progress for tasks with no geometrical appearance. This task can be used in various ways but we have defined that it represents tasks that are not linked to elements of the BIM model.

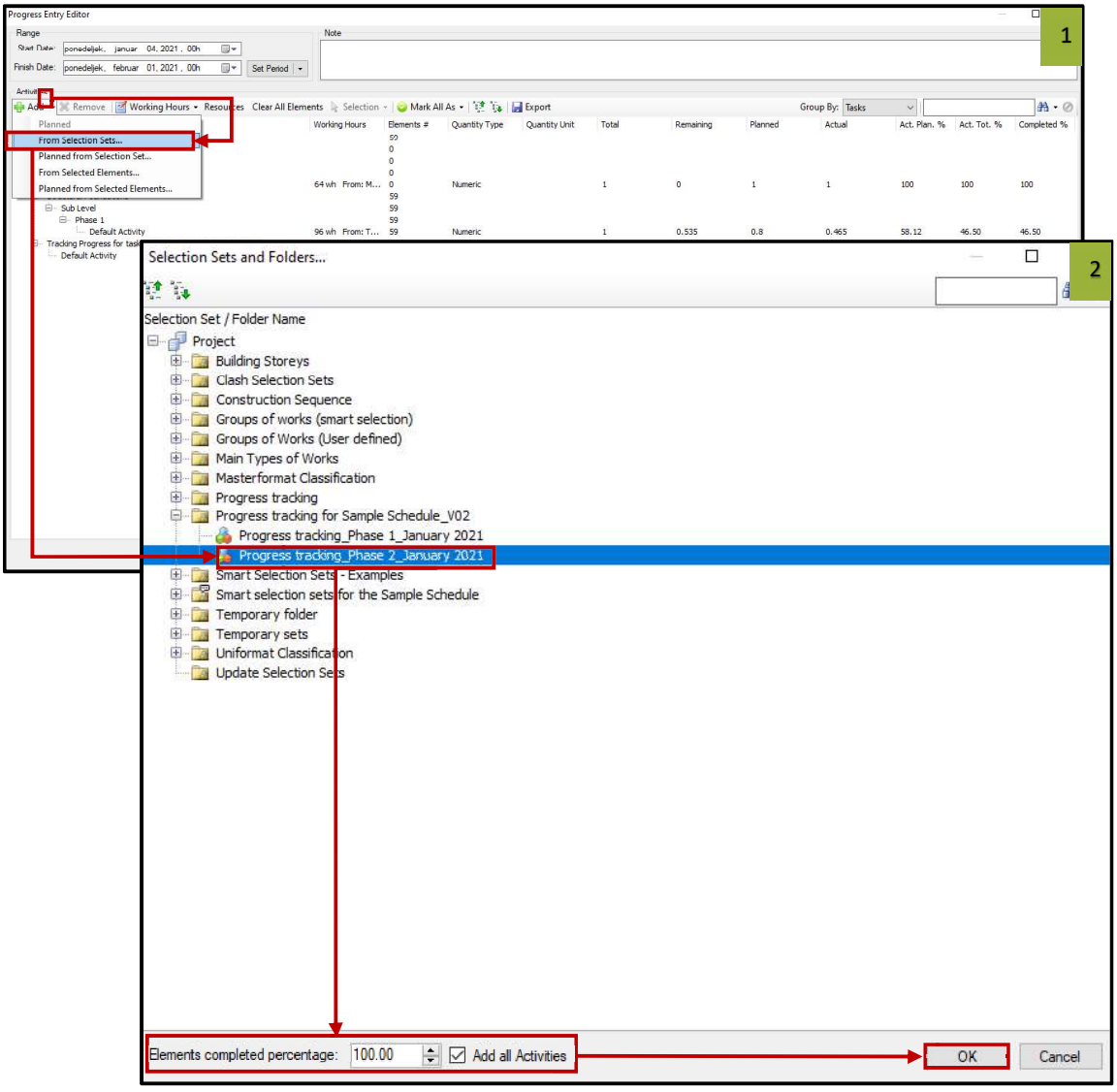
1. Activate the **Sample schedule for the import_V02** and click on the **Progress** command within the **Schedule Editor** tab. →
2. Click on the **Default** activity of the **Tracking Progress for tasks with no geometrical appearance**. → Afterwards click on the **Marked Ass** command and in the drop-down menu click on the **Set Completed Percentage** option. →
3. Within the **Set Actual Percentage** window enter a **number** in the **Actual Percentage** window, for example, **10**. →This means that 10 % of the task was finished in the defined period. → Finish the process of entering progress for this task by clicking on the **OK** button.



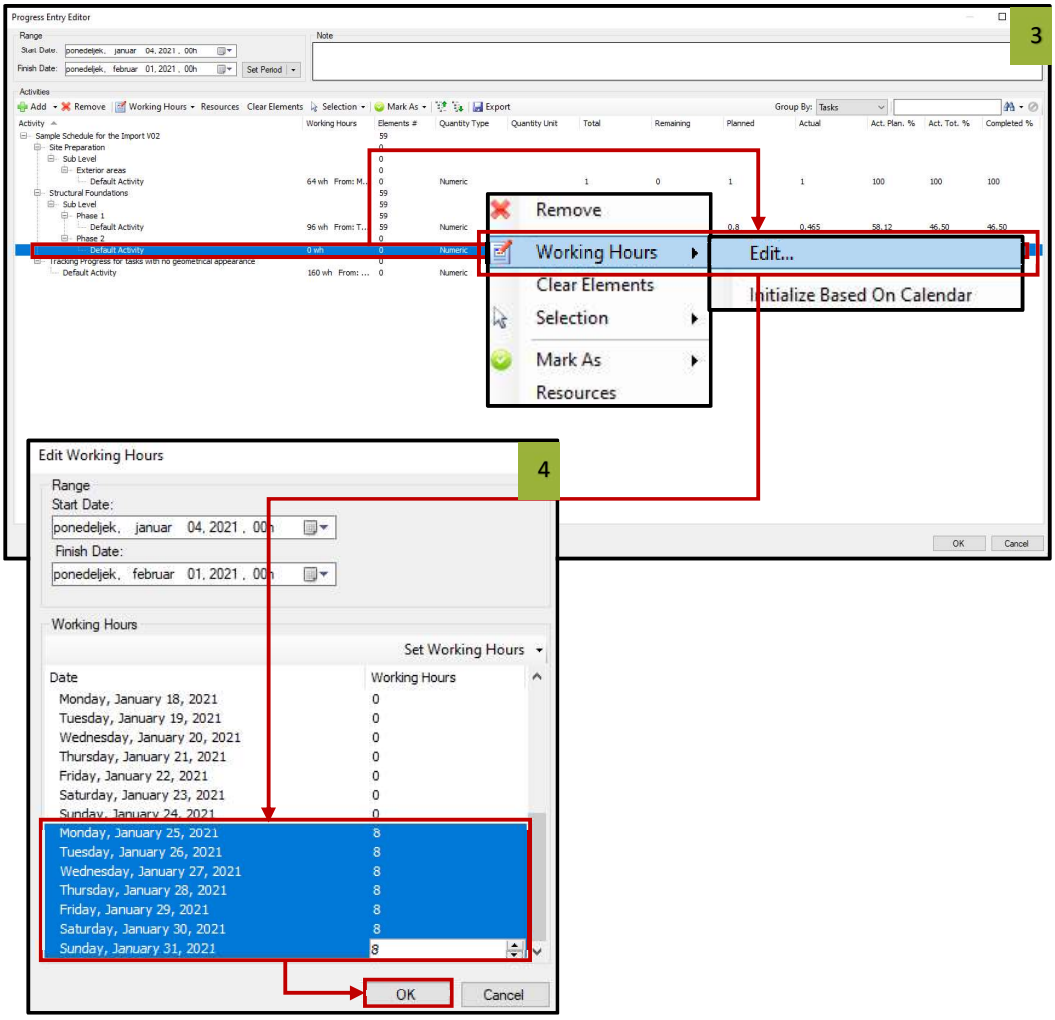
8.13.4. ENTERING PROGRESS WITH SELECTION SETS FOR TASKS THAT WERE NOT PLANNED IN A CERTAIN PERIOD

During the construction period it often occurs that tasks are not executed when they are planned. Sometimes, the tasks are running late and sometimes they are finished in the period that they were not initially planned. For example, according to our sample schedule Phase 2 task within the Sub Level task should begin on 11 February and finish on 3 March, which is not in our defined period. In the process below, it is described how to enter progress for tasks not planned in a period for which we are entering progress by entering progress for Phase 2 task.

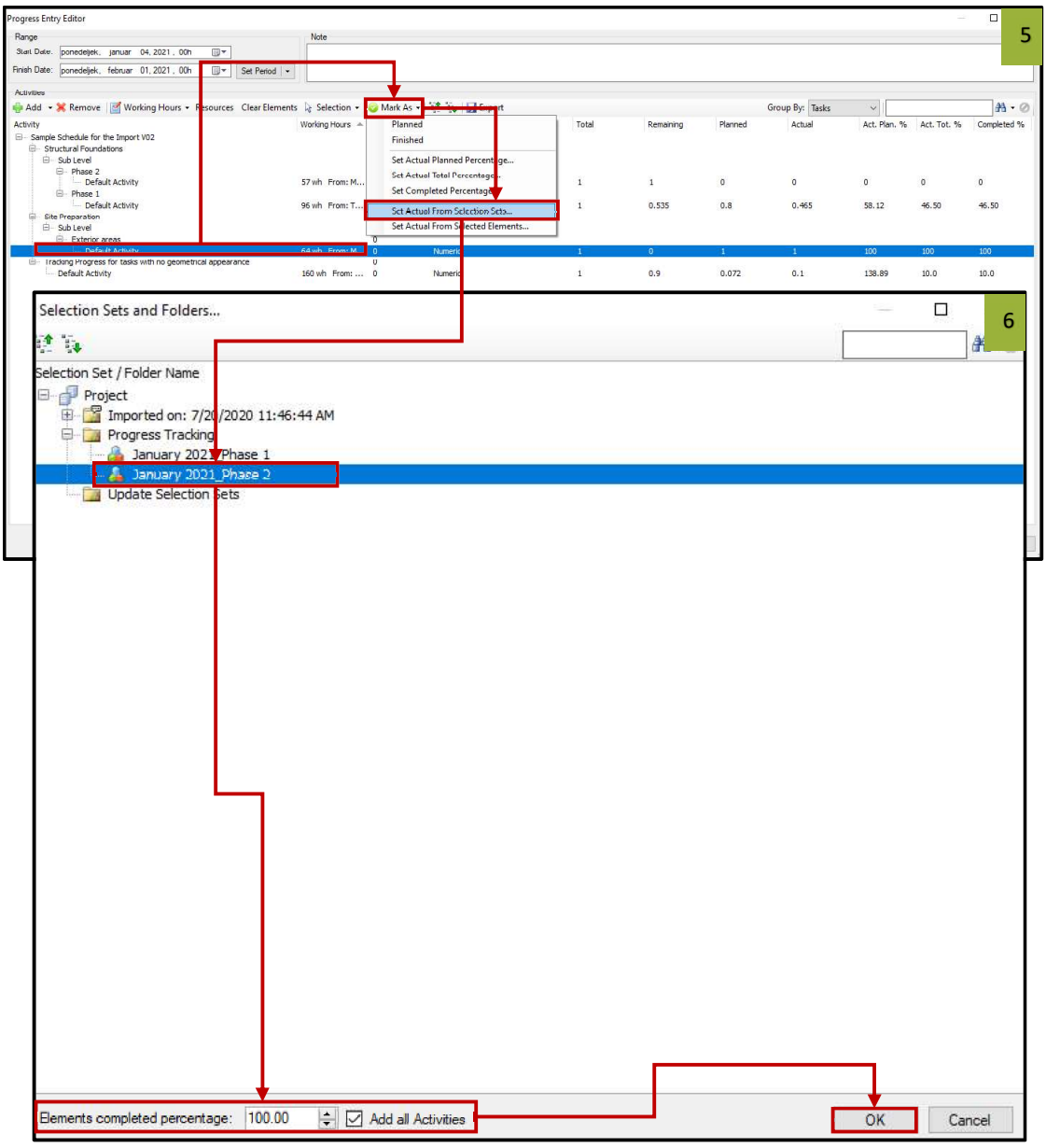
1. Activate the **Sample schedule for the import_V02** and click on the Progress command within the **Schedule Editor** tab. →
2. Click on the **arrow** next to the **Add** command within the **Progress Entry Editor** window. → In the **drop-down** menu choose the **From Selection Sets** option. →



3. Within the **Selection Sets and Folders…** window choose the **Progress tracking_Phase 2 January 2021** selection set. → In the **Elements completed percentage** enter number **100** if needed. → Finish the process by clicking on the **OK** button. →The added activity is displayed in the **Progress Entry Editor** window. → Click on it with the **right-click** and in the drop-down menu choose the **Working Hours** option and afterwards **Edit** command. →
4. An **Edit Working Hours** window opens, where in the **Range** section automatically the period, which we have defined is stated. → Click on the **0** beside, for example, **Monday, January 25**, **2021** and enter number **8**. → Which means, the duration of the working day on that date for the **Phase 2** task was **8 working hours**. → Also, working hours for other days can be edited. → Finish the process by clicking on the **OK** button. →



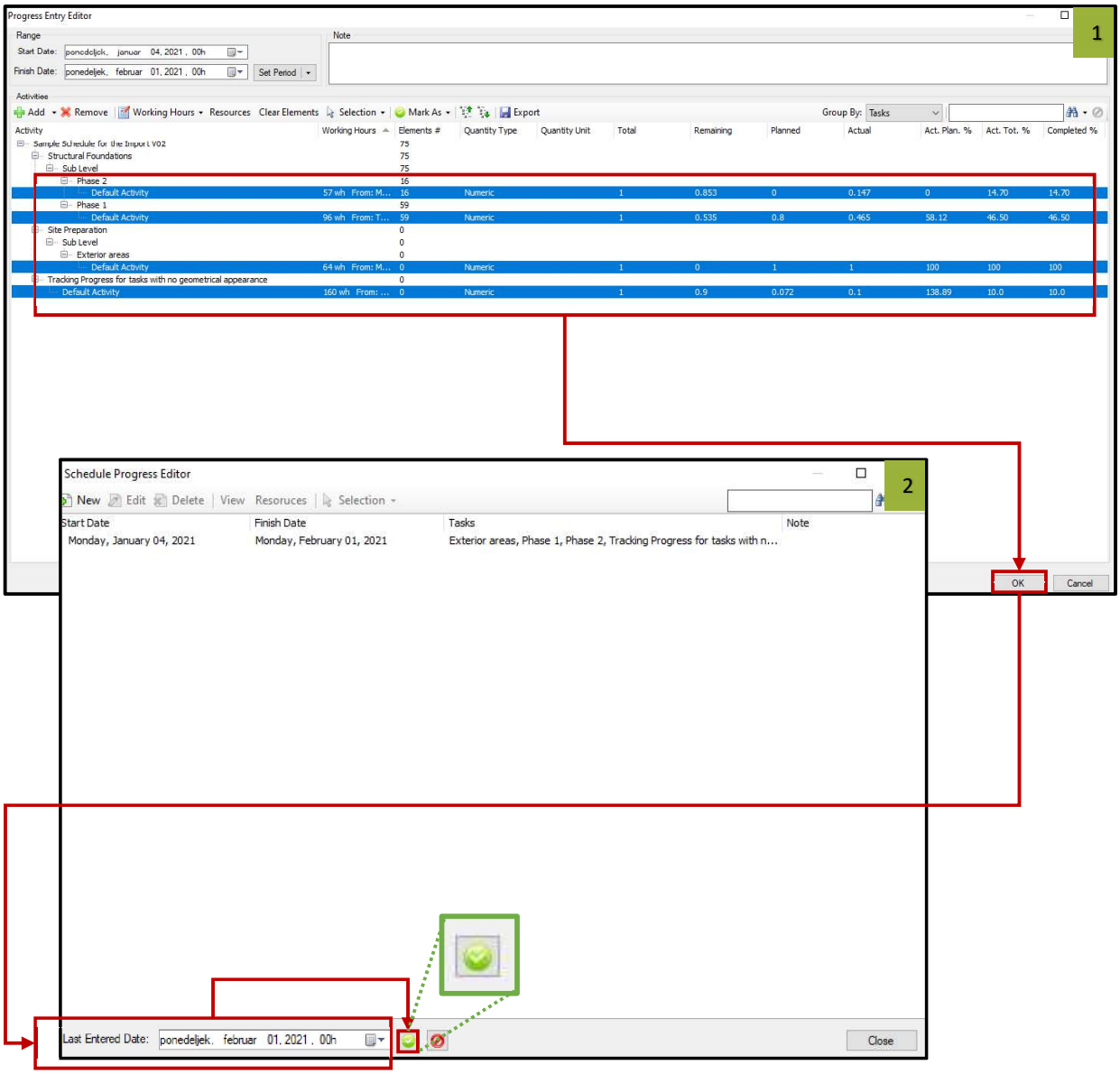
5. In the **Working Hours** column within **Progress Entry Editor** defined working hours are displayed. → Click again on the **Default Activity** and afterwards on the **Mark Ass** command. → In the **drop-down** menu choose the **Set Actual From Selection Sets**.→
6. Within the **Selection Sets and Folder…** window choose again the **January 2021_Phase 2** selection set and define the number **100** in the **Elements completed percentage** window and click **OK** to finish the process.



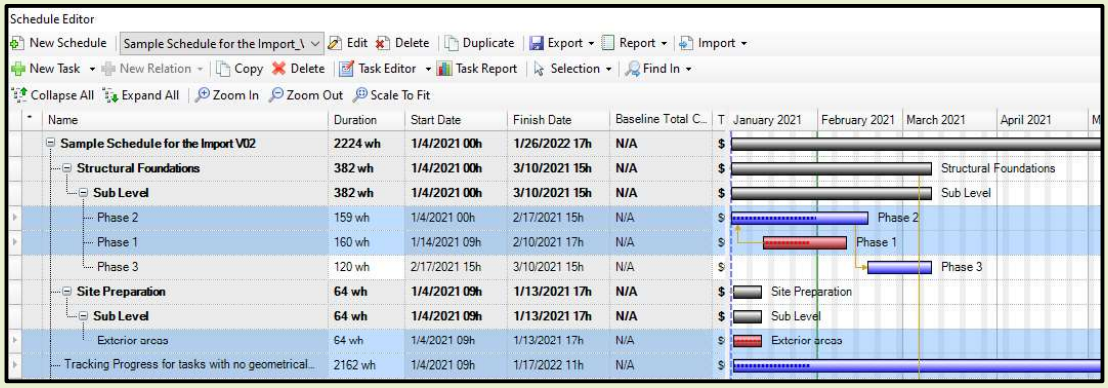
8.13.5. LAST ENTERED COMMAND

In the chapters above, we have described how to enter progress in different ways. When the progress for all tasks in the defined period is unequivocally finished, the Last Entered Date should be determined. This is a very important command within the Schedule Progress Editor, because it defines not only the last day of tracking for the last period but also defines from which day on we will track progress in the next period.

1. When the process of entering the progress for all tasks for the defined period is finished click on the **OK** button within the **Progress Entry Editor** window. →
2. The **Schedule Progress Editor** appears again and within it in the left lower corner there is a section named **Last Entered Date** and next to it a **window** where the users define the last day of the progress tracking period, for example, **February 1. 2021**. → Afterwards click on the **green circle** command which appears and **click on it**.



NOTE: When progress is entered, the changes are displayed in the schedule. Using a dotted line, the software shows the progress for each task we have entered.



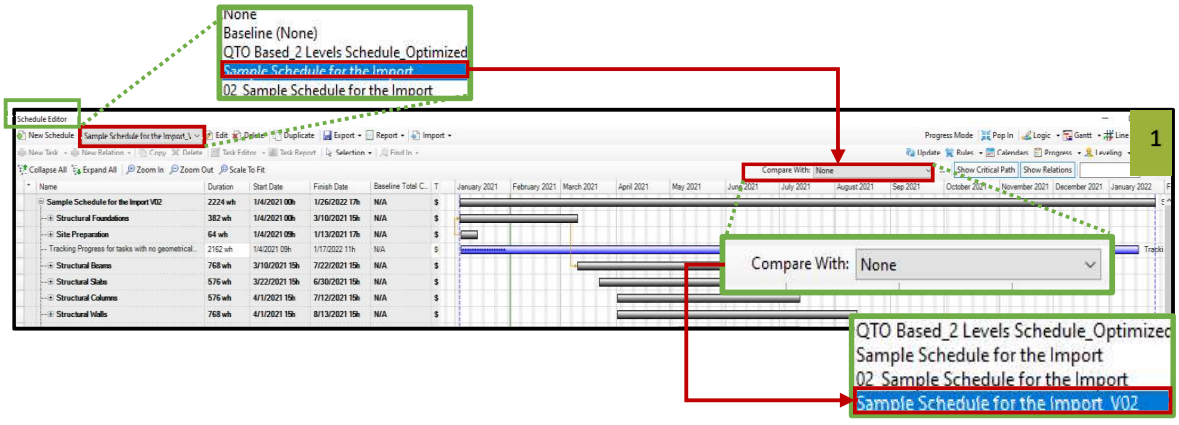
WARNING: Once the Last Entered Date for a progress tracking period is defined, no progress data for any period before the set Last Entered Date could be changed or entered anymore.

8.14. ANALYZING THE PROGRESS

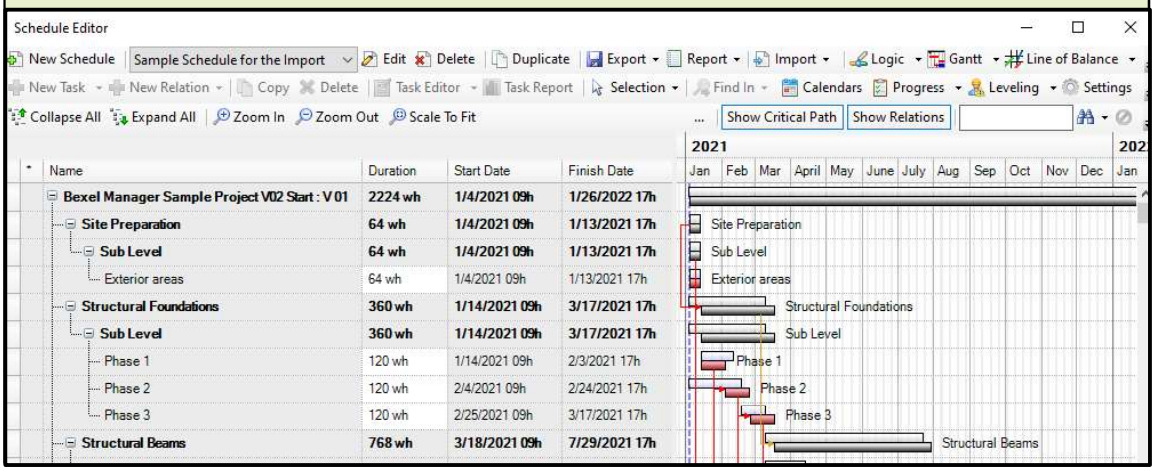
8.14.1. COMPARISON OF TWO SCHEDULES

After entering progress for a specific period, for example, the first month, user can compare the initial schedule with the schedule with entered progress to analyze in detail project performance. That is the reason why it is so important to duplicate the initial schedule before entering progress. Comparison of two schedules is possible within the Schedule Editor with the Compare With command and is described in the process below.

1. Within the **Schedule Editor** tab choose in the drop-down menu the schedule you would like to review in **Gantt** chart, for example, **Sample Schedule for Import**. → Afterwards click on the drop-down menu next to the **Compare With** command, where the schedule for the comparison is chosen, for example, **Sample Schedule for Import_V02**.



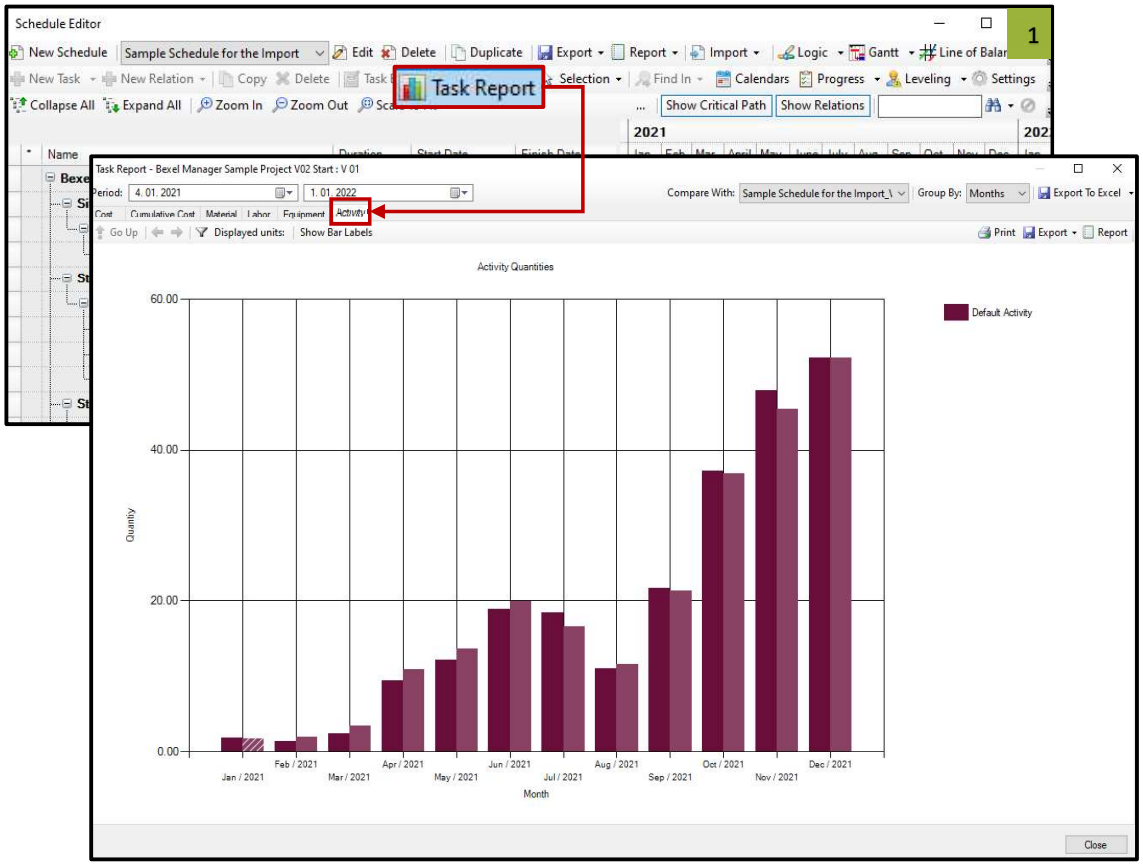
NOTE: On the picture below, the comparison of two schedules is displayed for each of the tasks. The differences begin within the Structural Foundations task, for which in previous chapter was defined that the Phase 2 task begins earlier then it was planned.



8.14.2. TASK REPORT

Further one we can analyze and compare both schedules by activating the Task Report command within the Schedule Editor tab.

1. Click on the **Task Report** command and choose within the **Task Report** window the **Activities** tab.



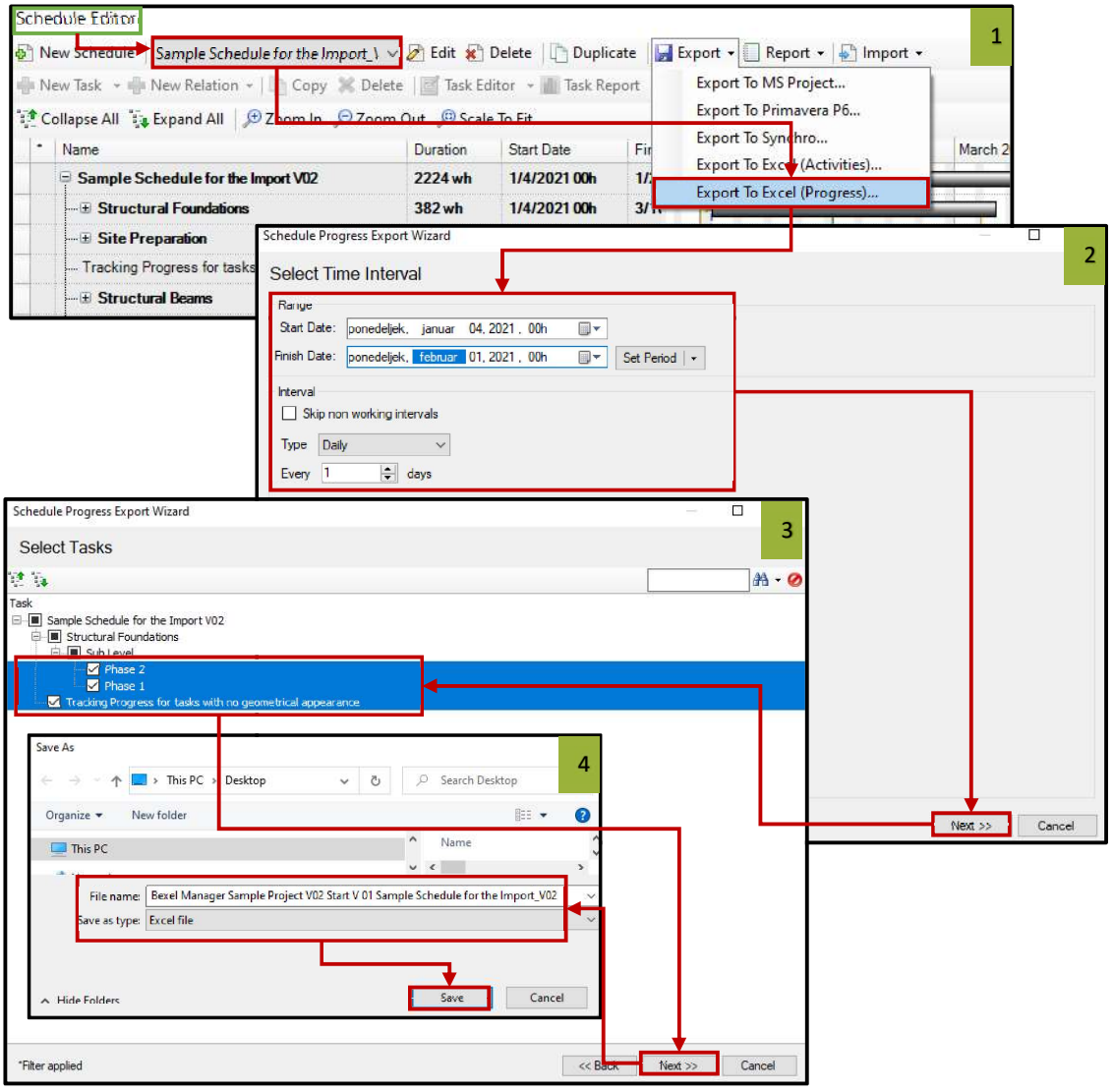
This schedule does not contain Material, Labor or Cost in other case the comparison of those items for each month could be possible, by activating the Cost, Material, Labor and Equipment tab.

ADDITIONAL TIP: For a more detailed analysis additional columns can be added to the schedule within the Gantt chart. Click on a specific column of the schedule with the right-click and choose the Insert column option. A drop-down menu is displayed where we can choose the information which will be displayed within the inserted column.

8.14.3. REPORTING PROGRESS

In this chapter the use of the command Export to Excel (Progress)… will be explained, which enables the user to export data regarding entered progress in excel format. Afterwards the user can also add additional information in the spreadsheet within the Excel, for example, percentage of finished task for a specific period. The process is described below.

1. Within the **Schedule Editor** tab activate the schedule where you have entered the progress, for example, **Sample Schedule for the Import_V02**. → Afterwards click on the **Export** command and in the drop-down menu choose the **Export To Excel (Progress)…** command.



2. Under the **Select Time Interval Range** within the **Schedule Progress Export Wizard** define the **Start Date**, for example, January 4 2020 and **Finish Date**, for example, February 1. → Under **Interval** section define the **Type,** for example, **Daily** and click on the **Next** command.
3. Within the **Select Tasks** section select the tasks that will be exported to the excel file and click on the **Next** command.
4. Define the **File name** and the **location**, where it will be saved within the **Save As** window.

ADDITIONAL TIP: The user can enter various data in the excel file which was previously exported from Bexel Manager. After the file has been changed by entering new data, for example, progress for a certain task and afterwards saved, it can be imported to Bexel Manager again, where the software will recalculate and enter the progress into the schedule based on imported data.

NOTE: Besides Bexel Manger reporting engine and predefined report templates in Excel format containing all essential data and progress analyses (Progress percentage, Earned Value analysis, Monthly certificate, Cumulative Cost data, etc.) accompanied by detailed comparison charts, progress information could be also exported to Microsoft Power Bi platform.

LESSON 09

BEXEL MANAGER

9. FACILITY MAINTENANCE

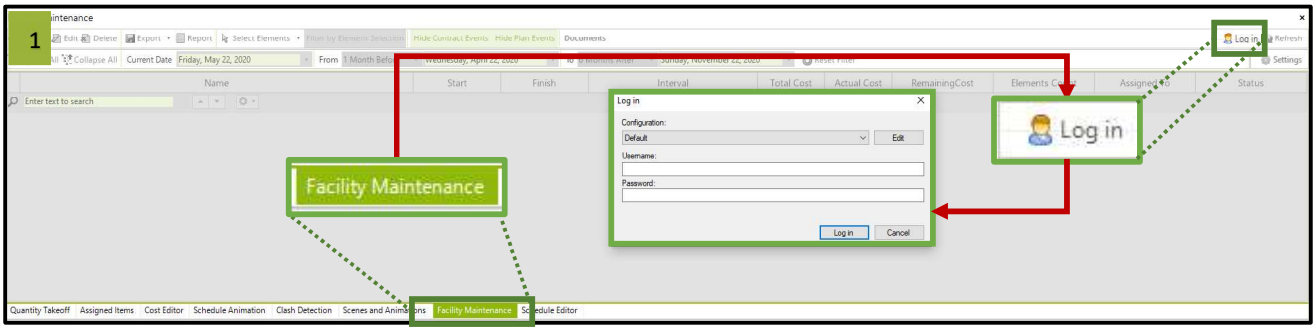
In this Lesson we are going to describe the process of creating a 6D BIM model. 6D BIM model contains all related documentation which is linked to 3D BIM model elements and it also contains FM plans for related building. When we define Contracts and facility maintenance activities, we can create desired facility maintenance reports.

The example of the folder structure and files for further exercises can be downloaded from Bexel User Area, download **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 9.0\Exchange**. Save files to local computer and use them for further exercise.

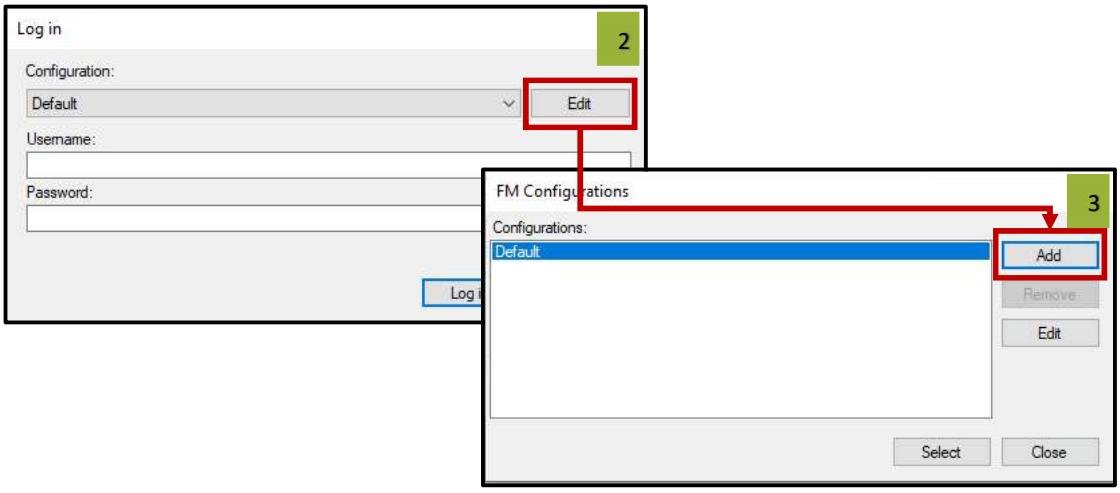
9.1. LOGGING TO FM MODULE AND SETTING UP FM

Activate Bexel Manager and open the project **Bexel Manager Sample Project V02 Start**. Go to **Facility Maintenance** palette and click on it. Before we start using FM module, we have to log in first. The FM part of the project is accessible only to those users who have login credentials.

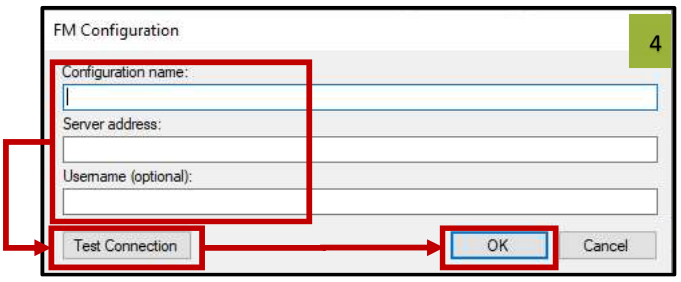
1. The Facility Maintenance palette is active. → After we click on **Log in** command which is located in the upper right corner of the Facility Maintenance palette, the **Log in** window appears where we should enter the data to access the corresponding server. →



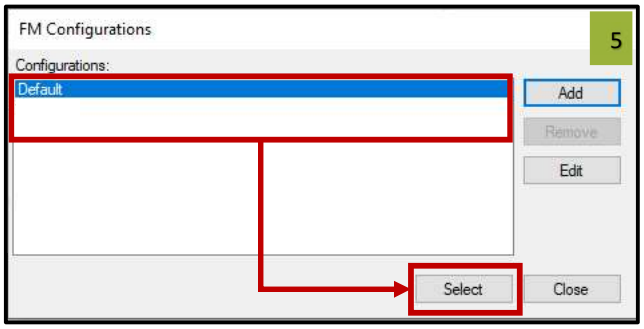
2. If we haven't set the FM parameters yet, in the Log in window choose **Edit** button. →
3. An FM Configuration window opens where we click the **Add** command. →



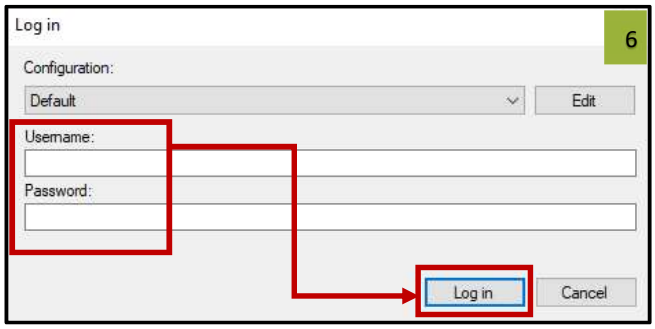
4. New configuration window opens where we set all relevant parameters such as the **Configuration name**, the **Server address** and the **User Name** is optional. → In order to check if everything is accurately done, click the **Test Connection** before clicking the **OK** button



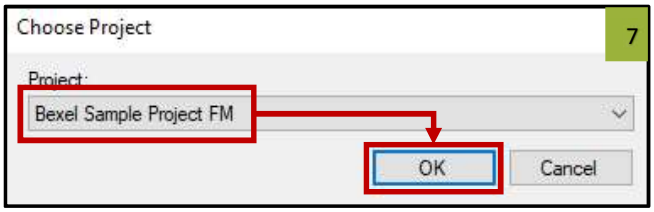
5. In the previous window select desired configuration and click the **Select** button. →



6. Log in window appears again where we enter login credentials **Username** and **Password**. → Click the **OK** button. →



7. New window opens where we can choose the project. From the drop-down field choose desired Project and click the **OK** button. For this exercise we have created project named **Bexel Sample project FM**.



NOTE: If we want to access to Bexel Manager FM module, we have to set the FM parameters and to log in with login credentials.

FM palette is activated and we can see our project in the main palette's field. When we create FM plans, they will be listed under our project, currently the list is empty.

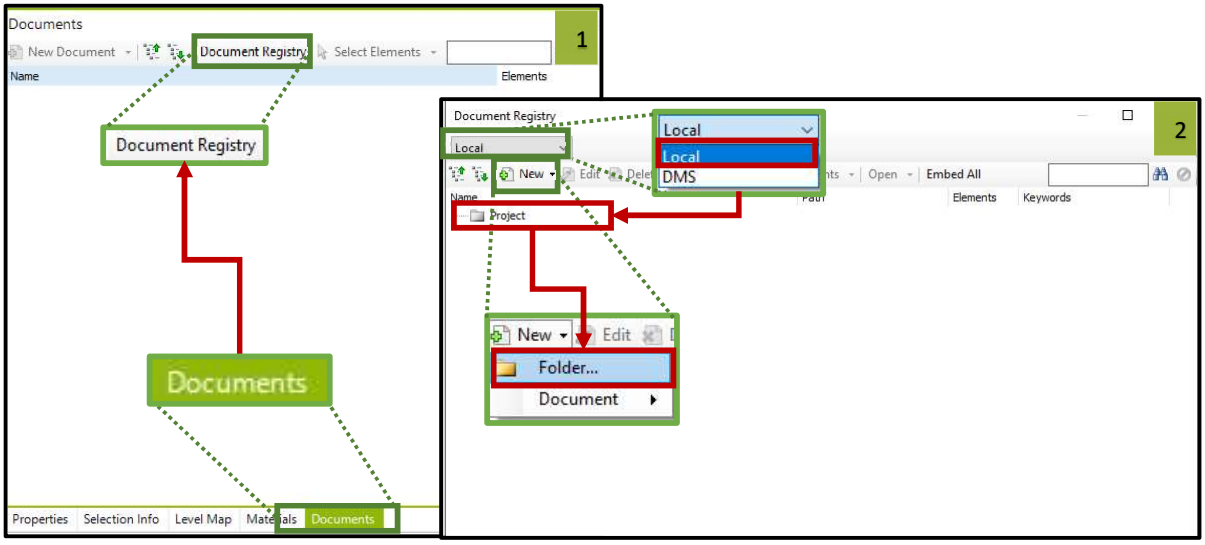
Following chapters describe how to create the Document Registry. We will organize some documents that are going to be used for further steps in the process of creating 6D BIM model. After that, we will link documents to appropriate elements of the 3D model, create Contracts, Plans, Entries and reports.

9.2. DOCUMENT REGISTRY AND ITS USAGE

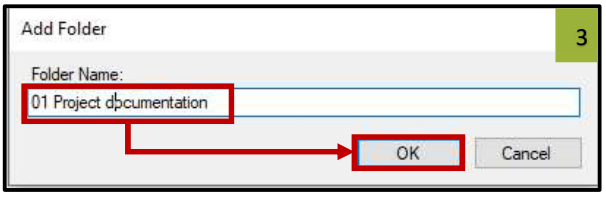
NOTE: We can add documents to our project. Documents can be stored on the local computer or on Document Management System (DMS). If we want to create Document Registry on our local computer it is not necessary to be logged in into FM module. If we want to create Document Registry on DMS, the software will ask for login credentials, or just log into FM module before we start creating it.

Create the New Folder

1. Go to Documents palette and click on the **Document Registry** command. →
2. Document Registry window opens where we choose location for documents storage, the **Local** or the **DMS**. → From the drop-down window we choose the **Local** option. → When we click on the arrow next to the **New** command, we choose the **Folder** option for creating a new folder. That way we can create as many folders as we want. Created folder is located within the one that was marked before the command **New** was selected. →



3. The Add Folder window appears. After we enter the folder's name, in this case we enter the name **01 Project documentation,** click the **OK** button and the **New** folder is created. Now we have created new folder in our Document registry which is located on the local computer.

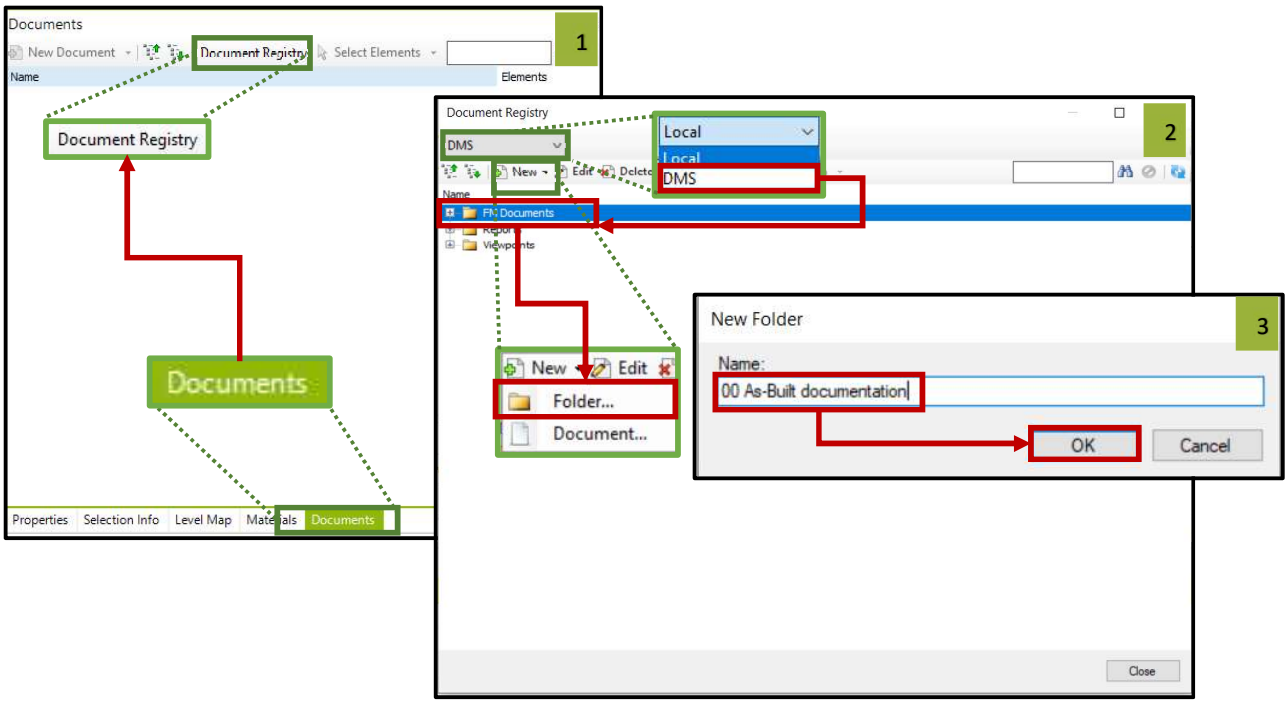


When we want to add document to any folder we have created, go to **Document Registry** again.

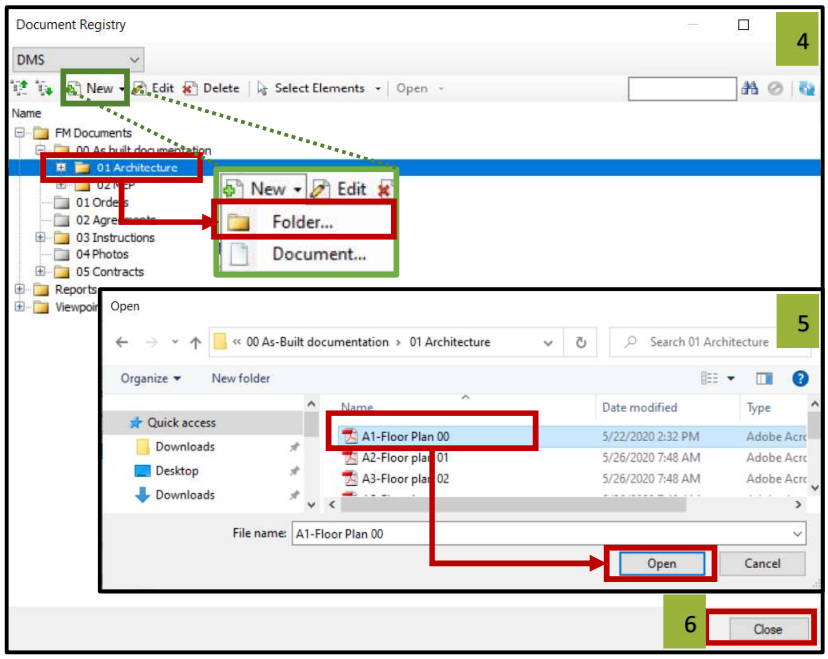
Adding documents to the Document Registry

Now we can create the folder and add document on DMS. We will create folder **00 As-Built documentation** and subfolder **01 Architecture**. After that we will add documents to certain folders.

1. Go to the **Documents** palette, click the **Document Registry** button. → Choose the **DMS** option from drop-down window. If we are logged out, the software will ask us for Log in credentials and choose the project. →
2. In the Document Registry window, mark desired folder where we want to add document, **FM Documents.** → Click on the arrow next to the **New** button. → Choose the **Folder** option for creating a new folder. →
3. The Add Folder window appears. Enter the folder's name, **00 As-Built documentation,** click the **OK** button and the new folder is created. → Now, select the created folder and repeat procedure for the sub folder **01 Architecture** which should be created within previous one.



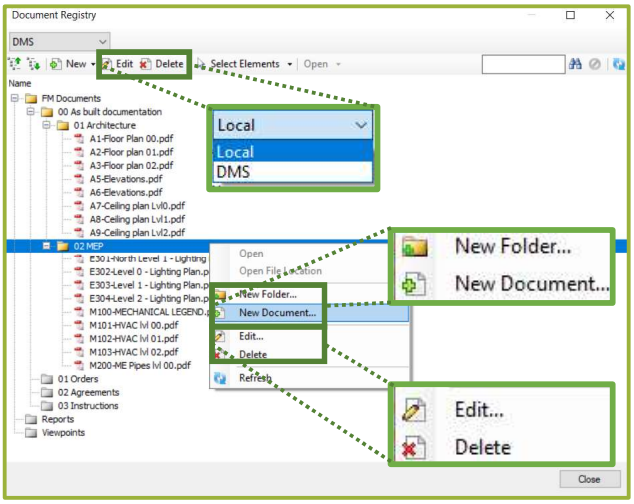
4. The Document Registry window is still opened. Select the folder where we want to add the new document, **00 As-Built documentation/01 Architecture**. → From drop-down window choose the **Document** option, then click on the **File Document**. →
5. The Open window activates where we select the document that we want to add from the local computer. → After we choose desired document, in this case we can use **A1-Floor Plan 00.pdf** and click the **Open** button. →
6. Close the Document Registry by clicking the **Close** button.



In this way we have added document to desired folder which is located on DMS.

Adding documents to Document registry which are located in the Local part of it, we are going to explain in next chapter because it is connected with linking documents to appropriate 3D BIM model elements.

Folders and documents could be also added into Document registry using the **right-click** on the desired folder where we choose the **New Folder** or the **New Document** option. Added folders and documents we can edit or delete with the buttons the **Edit** and the **Delete**.



9.3. LINKING DOCUMENTS TO RELATED 3D BIM MODEL ELEMENTS

In this chapter we are going to explain how to link documents to 3D model elements. Documents we use for linking can be from local computer, Document registry or we can use Web documents. The linked documents can be embedded.

NOTE: The documents we connect with 3D model elements are links which means that the additional documentation is not integrated into the model. This way we actually add links to model elements and user can access to the documentation depending on the connection reliability. There is also an option to embed documents to a model but in that case the size of the model grows as we add more documentation. If the data is embedded, we can access to it regardless of the internet accessibility.

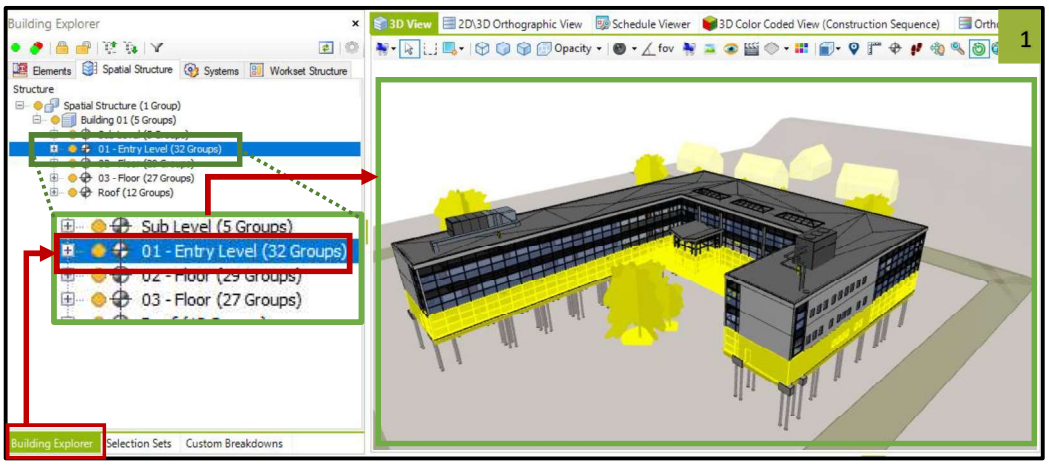
WARNING: If the linked documents are embedded into the project, the size of the project grows up.

We will link some of the As built drawings to the model elements in few different ways.

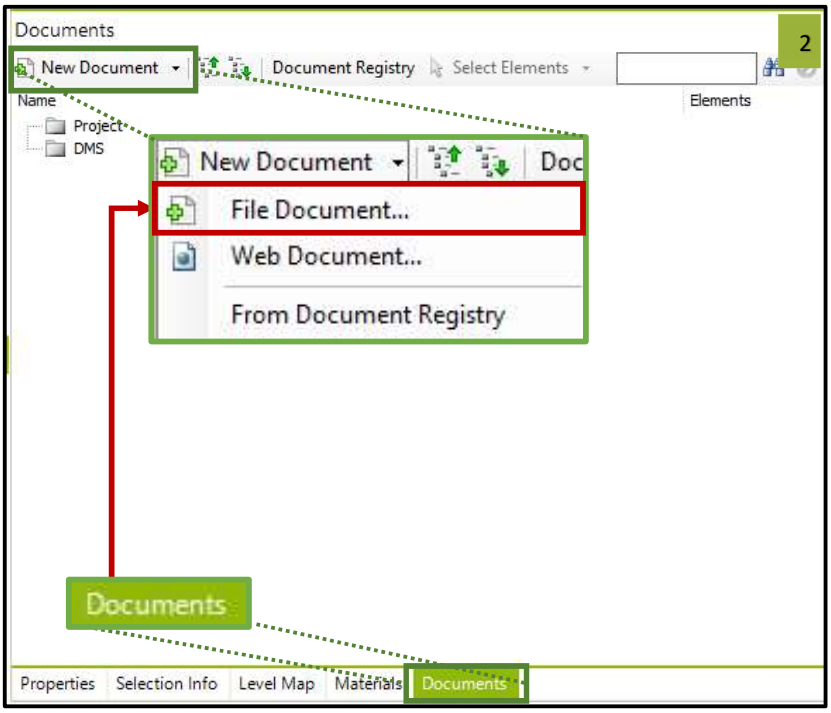
Linking documents from the local computer

For this exercise we will use the elements which are located on the entry level and As-built documentation related to this level, folder structure: FM Documents/00 As-Built documentation/01 Architecture, document **A1-Floor Plan 00.pdf**. Folder Structure with documents examples can be downloaded from Bexel User Area.
Downloading **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 9.0\Exchange**, **Folder Structure Example.rar**. Save folder structure to local computer and use it for further exercise.

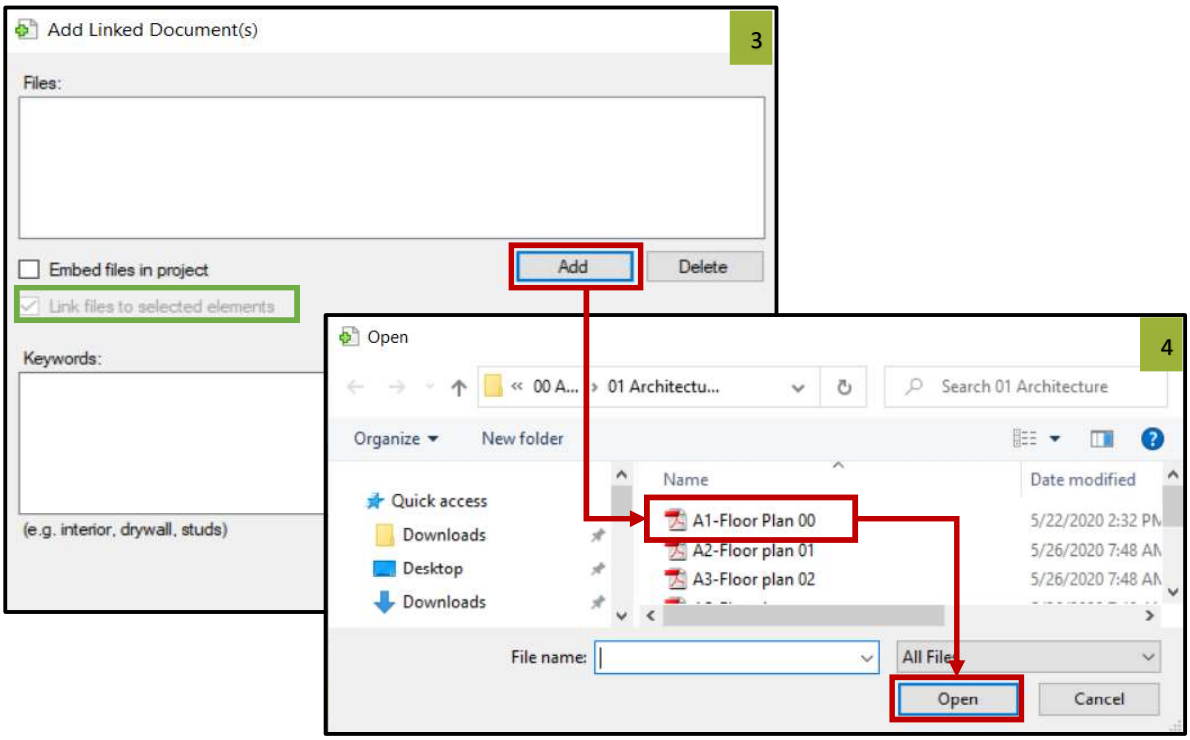
1. Go to **Spatial structure** and select **01-Entry** Level. All elements on this level are selected in the main viewport. →



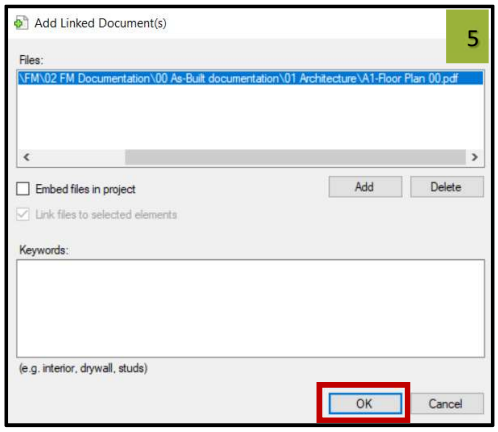
2. Selection is active. → In the Documents palette click on the arrow next to the **New Document** command. → Choose the **File Document** option. →



3. The **Add Linked Document(s)** window opens. Click on the **Add** button. →
4. Choose the file from the local computer which we want to link to selected elements and click the **Open** button. Pay attention that option the **Link files to selected elements** has been already checked because the selection is active. →



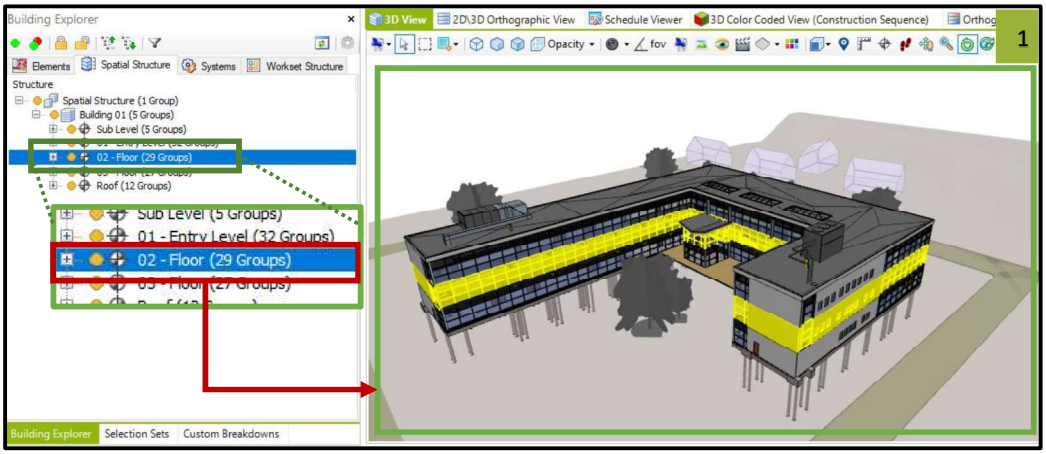
5. Click the **OK** button to finish the command.



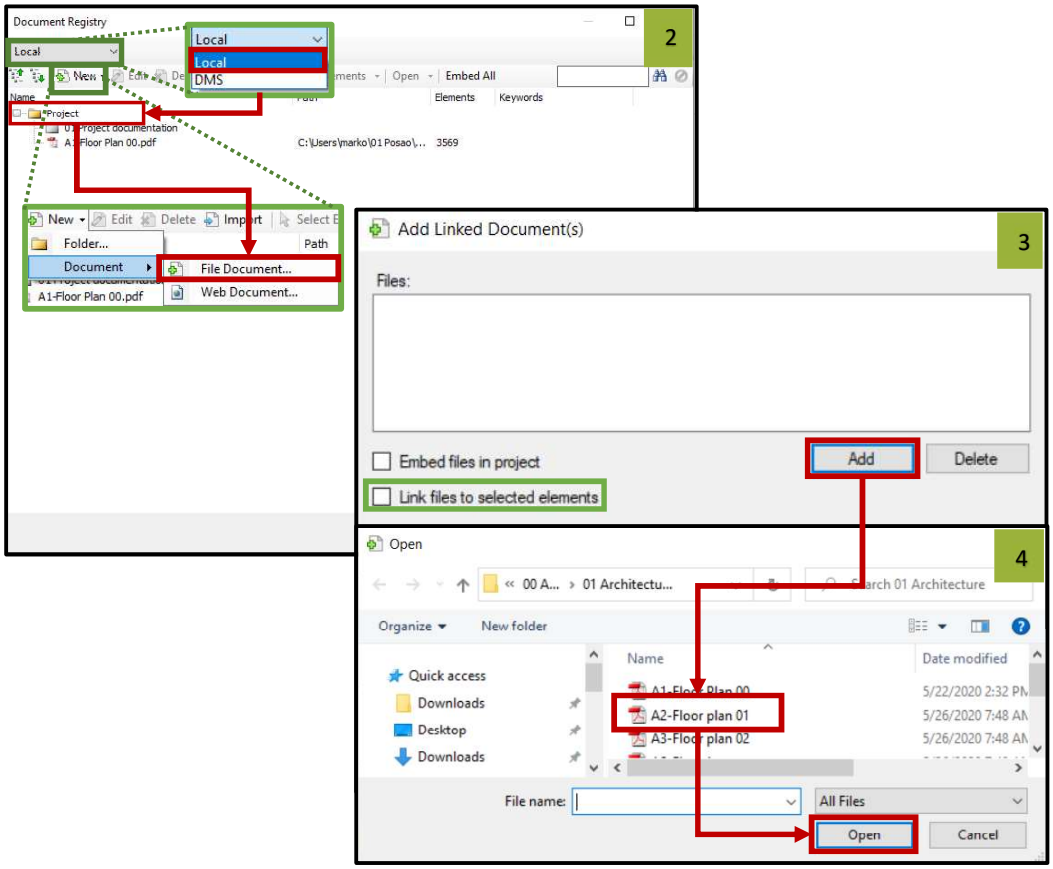
The linked document appears in the Documents palette where we can also see the number of elements which has been connected with document.

Please, notice that this document also appears in the Document Registry, in the Local section. So, we can do the same using the Document Registry. Now we will link documents for the elements on the second floor.

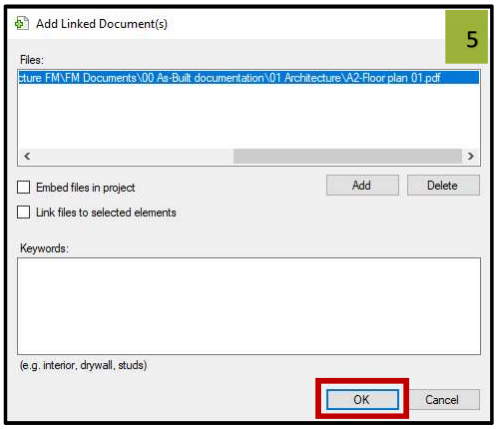
1. Go to **Spatial structure** and select **02-Floor**. All elements on this level are selected in the main viewport. →



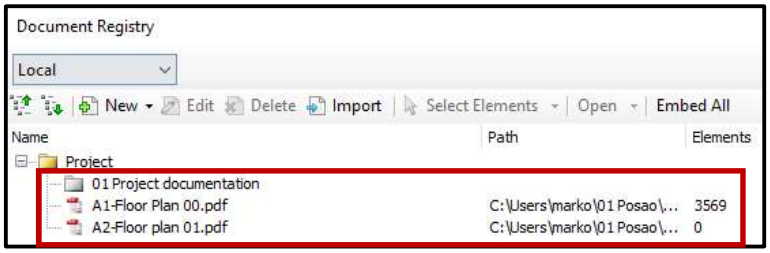
2. Go to **Document registry**. → Choose the **Local** option from drop-down window. → Select desired folder, in this case Project. → Click on the arrow next to the **New** button. → Choose the **Document** then the File **Document** option.
3. The **Add Linked Document(s)** window opens. Pay attention that option the **Link files to selected elements** is not checked in this case. If we want to link files to selected elements check it. The rest of procedure is the same as in previous paragraph. → Click on the **Add** button. →
4. Choose the file from the local computer to link it to selected elements, document **A1-Floor Plan 01.pdf.** → Click the **Open** button. →



5. Click the **OK** button to finish the command.



We didn't check **the Link files to selected elements** command so the document is not linked to selected elements.



The linked document appears in the Documents palette where we can also see the number of elements which has been connected with document.

If there are not selected elements or if we don't want to link documents to the model elements at the moment, anyway the files we have added to the Document Registry appear in Local section. This is how we add the Local documents we mention in previous chapter. If the documents are not linked to model elements, the number of linked elements is 0 in the Document Registry. Any of the documents from the Document registry can be also linked to the 3D model elements later.

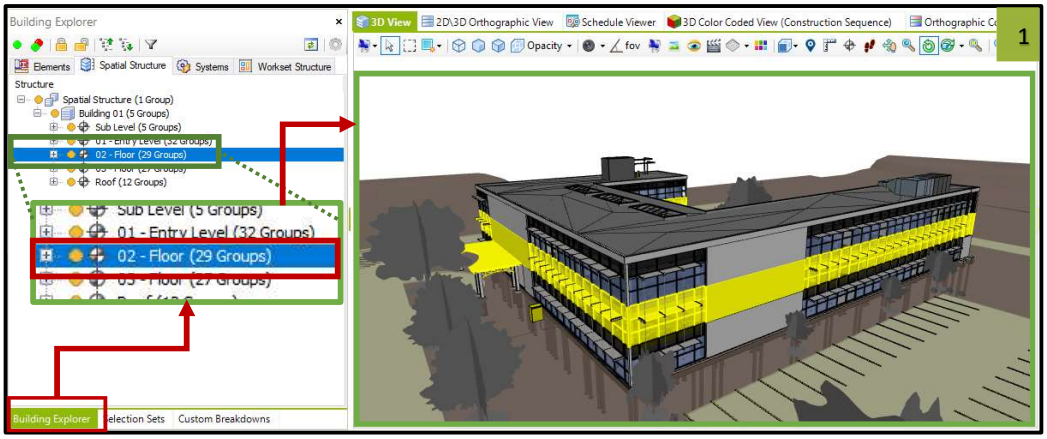
NOTE: In the Documents palette we see the documents which are linked to selected 3D model elements.

In the next chapter we will go through other option for element selection where we will create and use the Smart Selection Set for selection. We will also make some changes which elements we use to link the architecture document related to entry level.

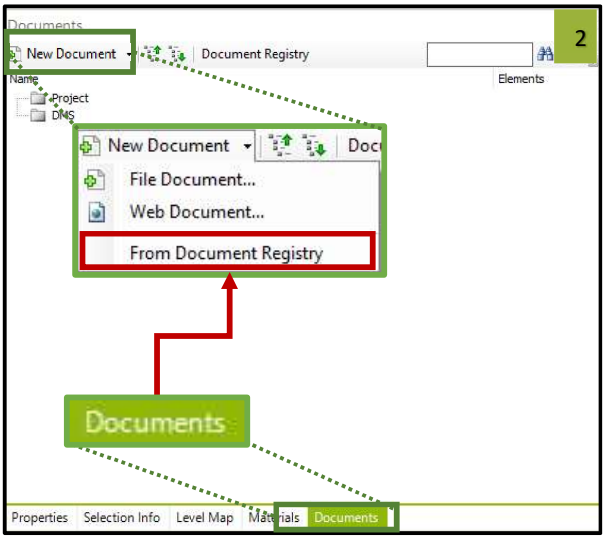
Linking documents from the Document registry

Select desired elements. In this case we are going to select elements on the second floor and link document for that level.

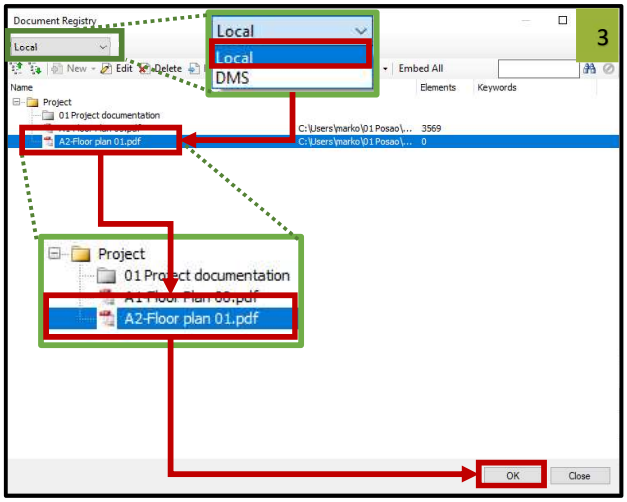
1. Go to **Spatial structure** and select **02-Floor**. All elements on this level are selected in the main viewport. →



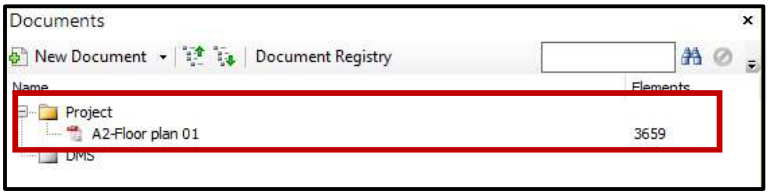
2. In the Documents palette click the arrow next to the **New Document** command. → Choose the **From Document Registry** option. →



3. The **Document Registry** window opens. → Choose the **Local** or the **DMS** option. → Here we choose the **Local**. → From the document list choose the document we want to link to selected elements; in this case it is document **A1-Floor Plan 01.pdf.** → Select it and click the **OK** button.

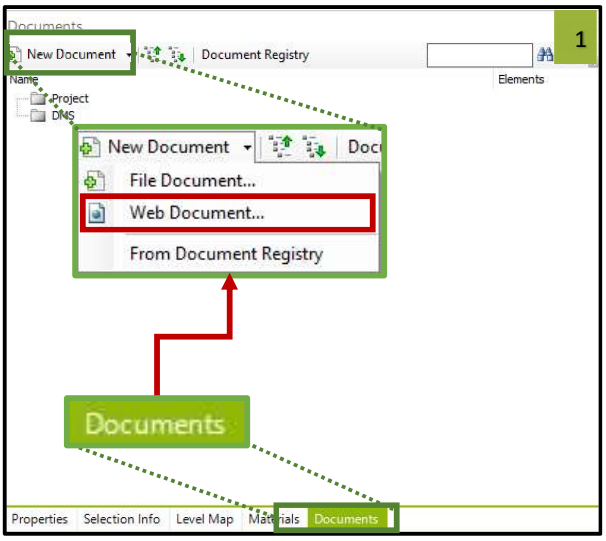


If the selection is active, the linked document appears in the Documents palette where we can also see the number of elements which has been connected with document.

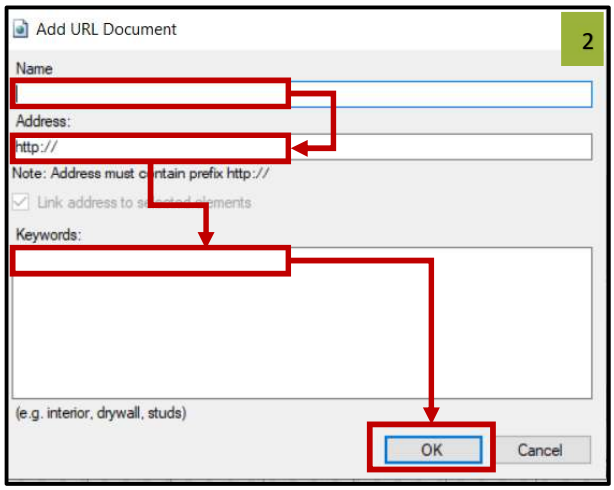


Linking web documents

1. Select desired 3D model elements. In the **Documents** palette click the arrow next to the **New Document** command. Choose the **Web Document** option.



2. The **Add URL Document** window opens where we should enter the **Name**, the **Address** and **Keywords** (optional). Click the **OK** button to finish linking the Web document to selected elements.



If the selection is active, the linked web document appears in the Documents palette where we can also see the number of elements which has been connected with document.

9.4. CREATING SELECTION SETS FOR THE PURPOSE OF LINKING DOCUMENTATION WITH THE BIM MODEL

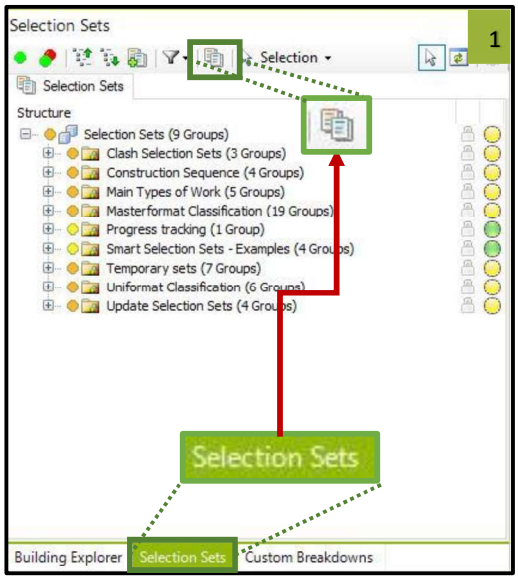
Selection sets can be created manually where we use different tools like selection regime. Creation of selection sets can be also based on certain rules by which we create Smart selection sets. Creating Smart Selection Sets is recommended because during project life, the project changes. Smart Selection sets updates automatically after the project is updated.

In this exercise we will create smart selection set which will contain architectural and structural elements on the entry level. We will use this selection set to link architectural document from As-build documentation related to this level.

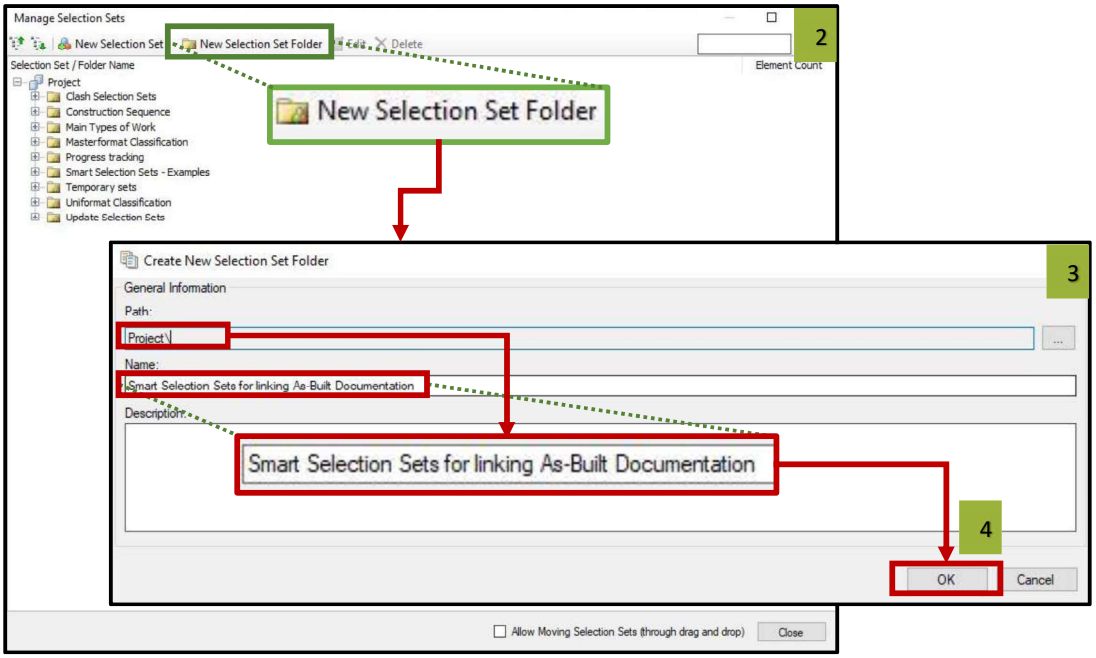
Find out as-built documentation within folder structure: FM Documents/00 As-Built documentation/01 Architecture, document we use for this exercise is **A1-Floor Plan 00.pdf.**

Create New Selection Set Folder

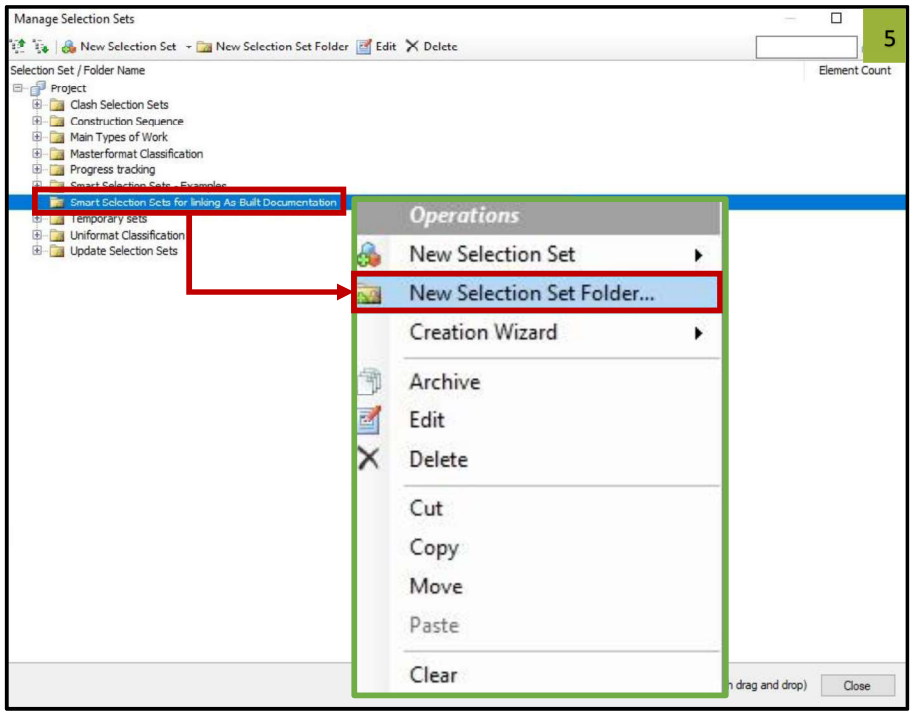
1. Activate the **Selection Sets** palette. → Click on the **Manage Selection Sets** button. →



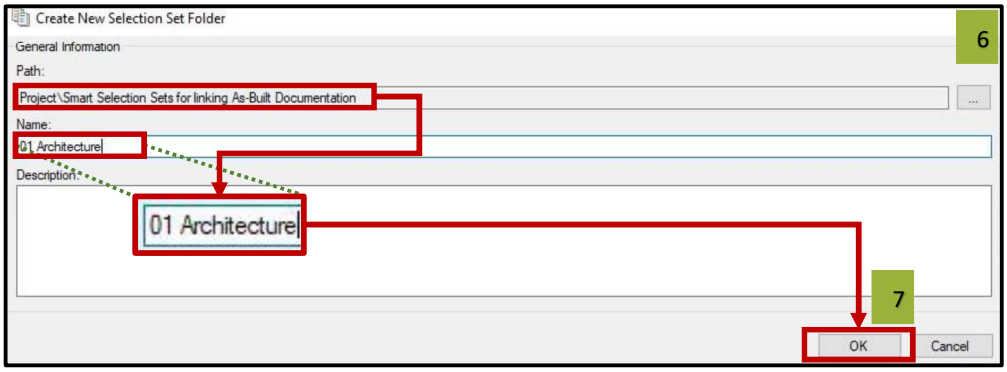
2. The **Manage Selection Sets** window opens. Click the **New Selection Set Folder**. →
3. The **Create New Selection Set Folder** window opens where we define general new folder information. Define **Path** for the new folder by clicking on button, ... we set path **Project\.** → Enter the **Name** for the new folder, in this case we enter the name **Smart Selection Sets for linking As-Built Documentation.** →
4. Click the **OK** button. →



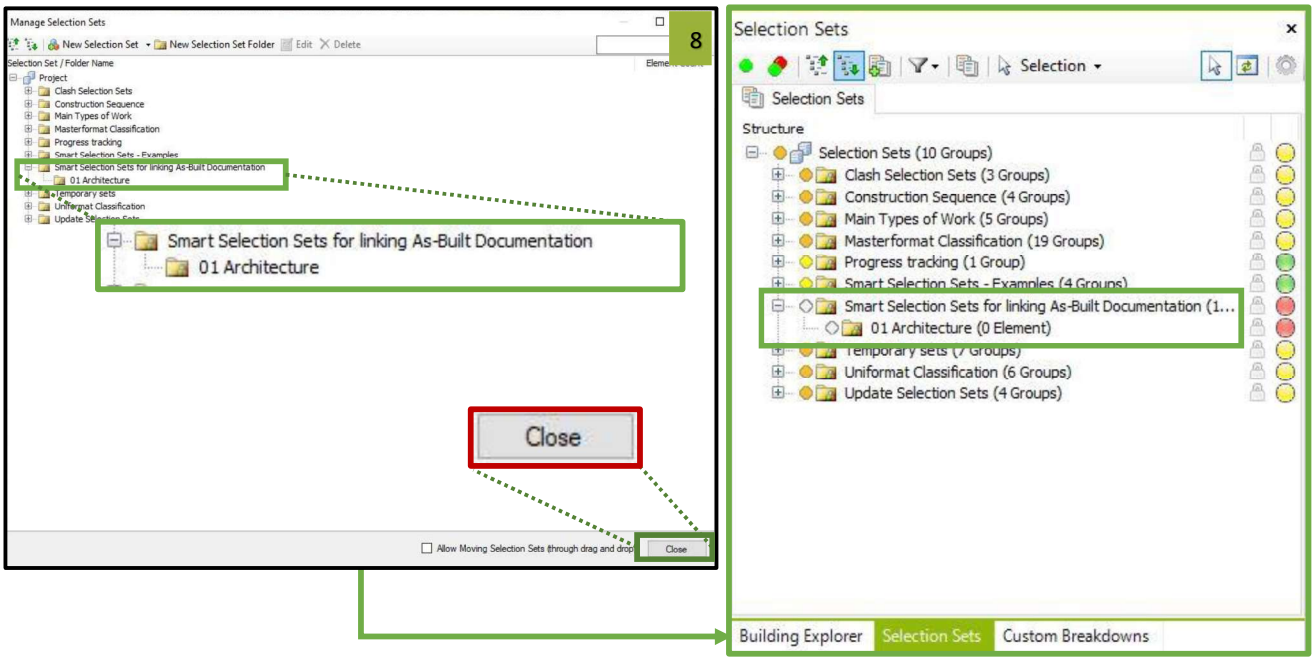
5. Now we will create new folder within the previously created one. The **Manage Selection Sets** window is still open. **Right-click** on the previously created folder. → Choose the **New Selection Set Folder** option. →



6. The **Create New Selection Set Folder** window opens where we define general new folder information. → Define **Path** for the new folder by clicking on ... button, here we set **Project\Smart Selection Sets for linking As-Built Documentation**. → Enter the **Name** for the new folder, in this case we enter the name **01 Architecture.** →
7. Click the **OK** button. →

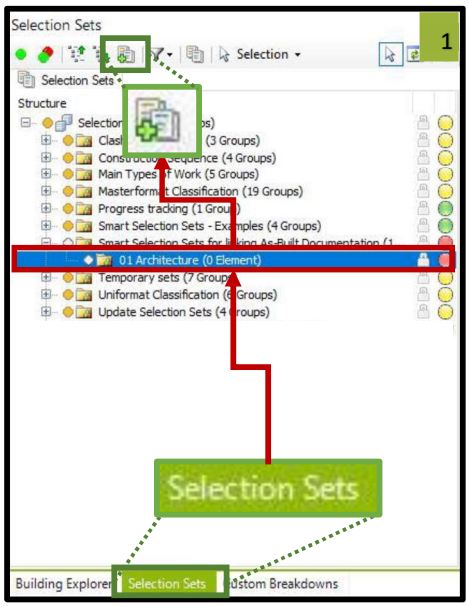


8. Close the Manage Selection Sets window by clicking the **Close** button.
   We have just created Selection sets folders that appear in the Selection Sets tree. There is not selection set within them yet.

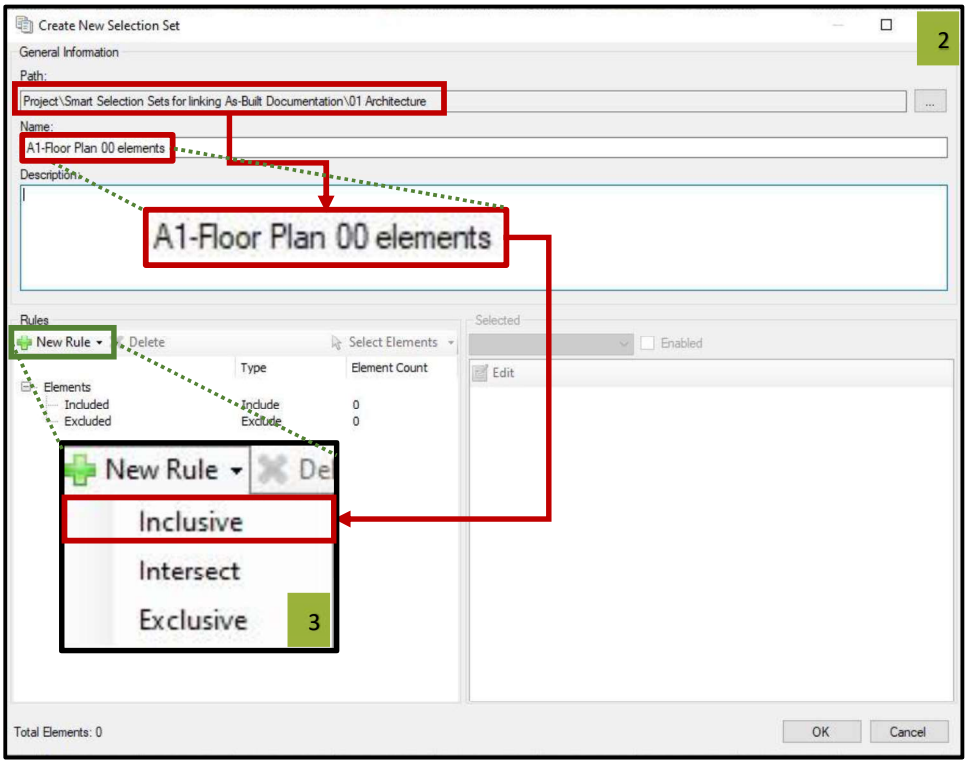


Create Smart Selection Set

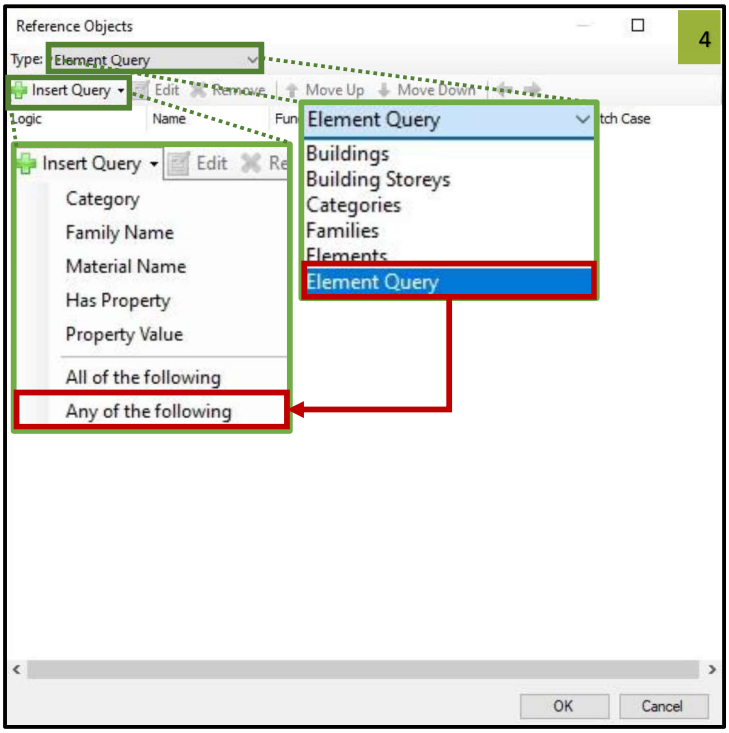
1. The **Selection Sets** palette is still active. → Select desired folder where we want to create new selection set, in this case we select the folder **01 Architecture**. → Click on the **New Selection Set** button. →



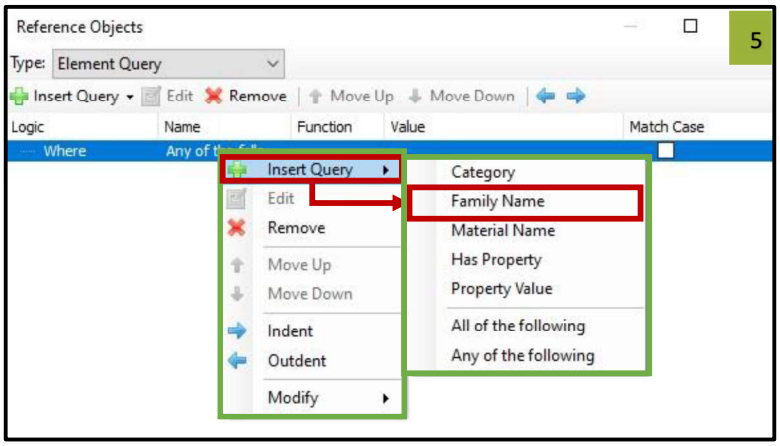
2. The **Create New Selection Set** window opens. → Define the **Path** for new selection set. The Path has been already defined because we have selected desired folder earlier, **Project\Smart Selection Sets for linking As-Built Documentation\01 Architecture**. → Enter the **Name** for the New Selection Set, enter the name **A1-Floor Plan 00 elements**. → Add **description** if needed.→
3. Click the **New Rule** button and choose option **Inclusive**. →



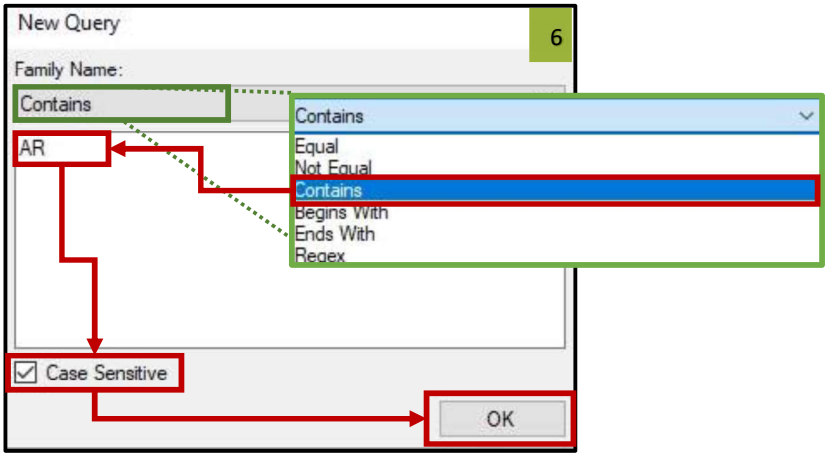
4. Within the **Reference Objects** window choose in the drop-down menu **Type** option **Element Query**. → Click on the **Insert Query** button and choose command **Any of the following**. →



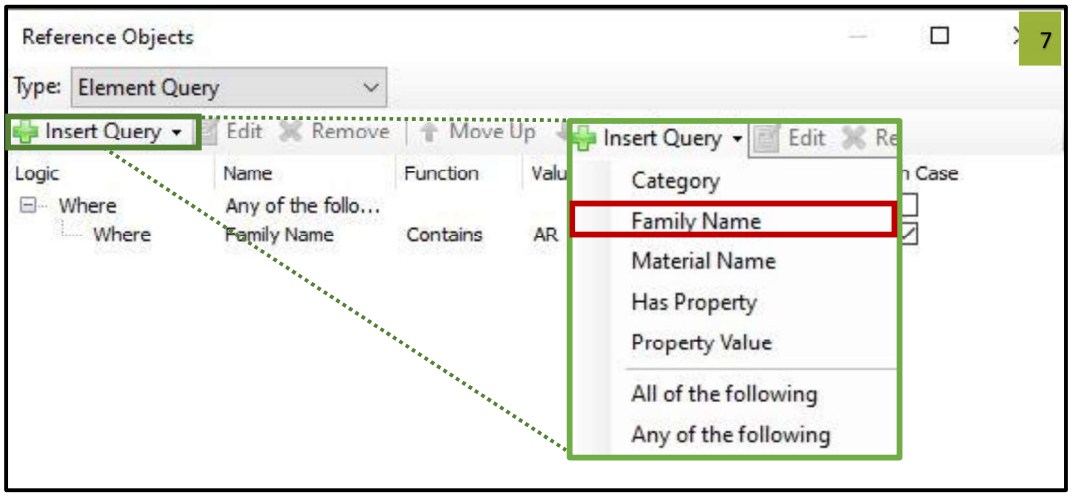
5. **Right-click** on the row with command **Any of the following** and in the drop-down menu choose option **Insert Query**. → In the next drop-down menu choose the **Family Name.** →



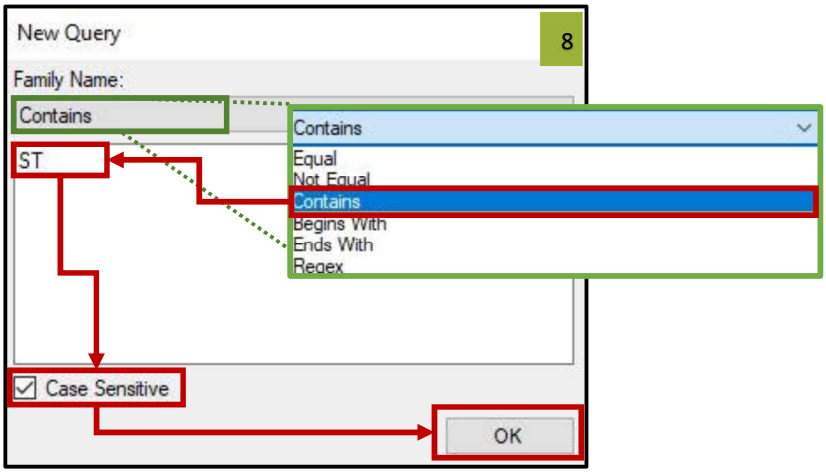
6. The **New Query** window opens. → For the **Family name** choose the **Contains** option. → In the empty field enter AR. → Check the **Case Sensitive** command. → Click the **OK** button to close the **New Query** window. →



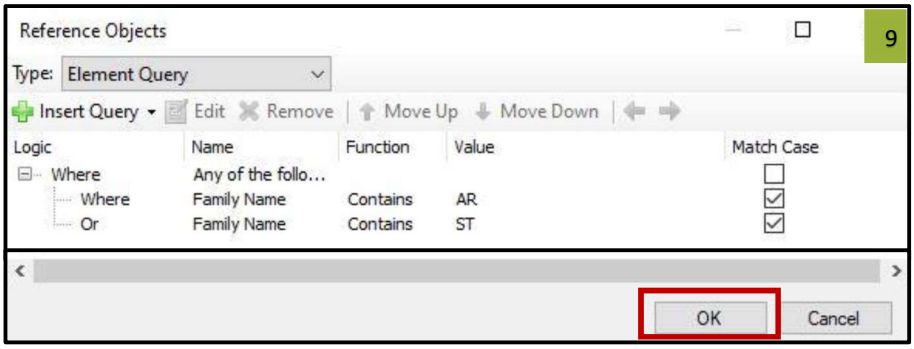
7. Click the **Insert Query** button to add new query. → From drop-down list choose the **Family Name** option. →



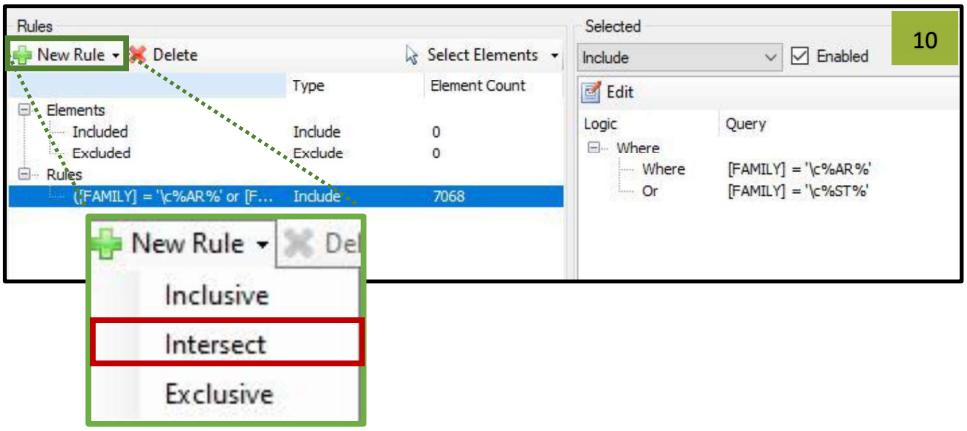
8. The **New Query** window opens. → For the **Family name** choose the **Contains** option. → In the empty field enter ST. → Check the **Case Sensitive** command. → Click the **OK** button to close the **New Query** window. →



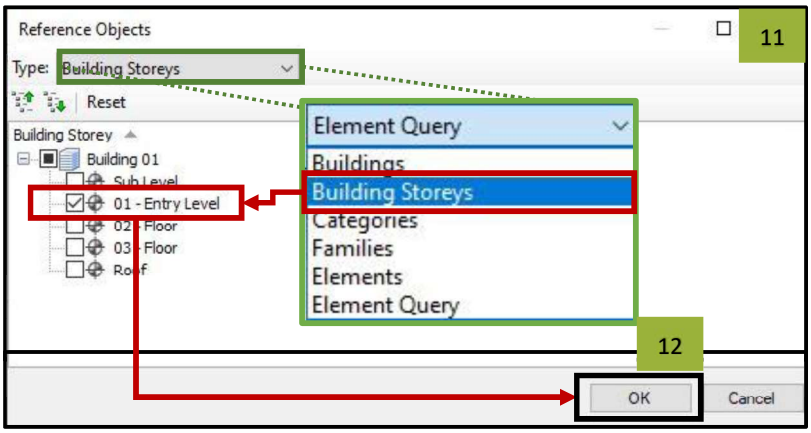
9. Click the **OK** button to close the Reference Objects window. →



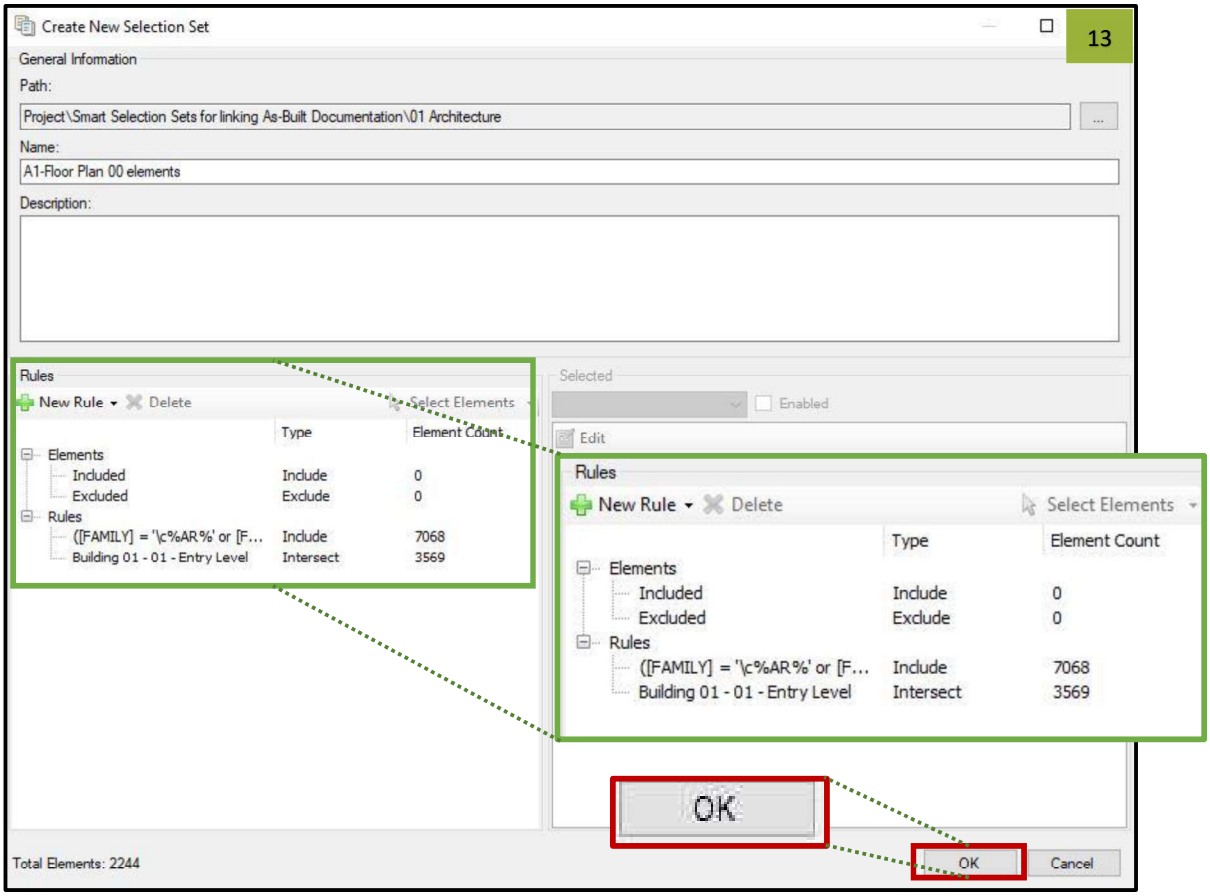
10. Click on the **New Rule** button and choose the option **Intersect**. →



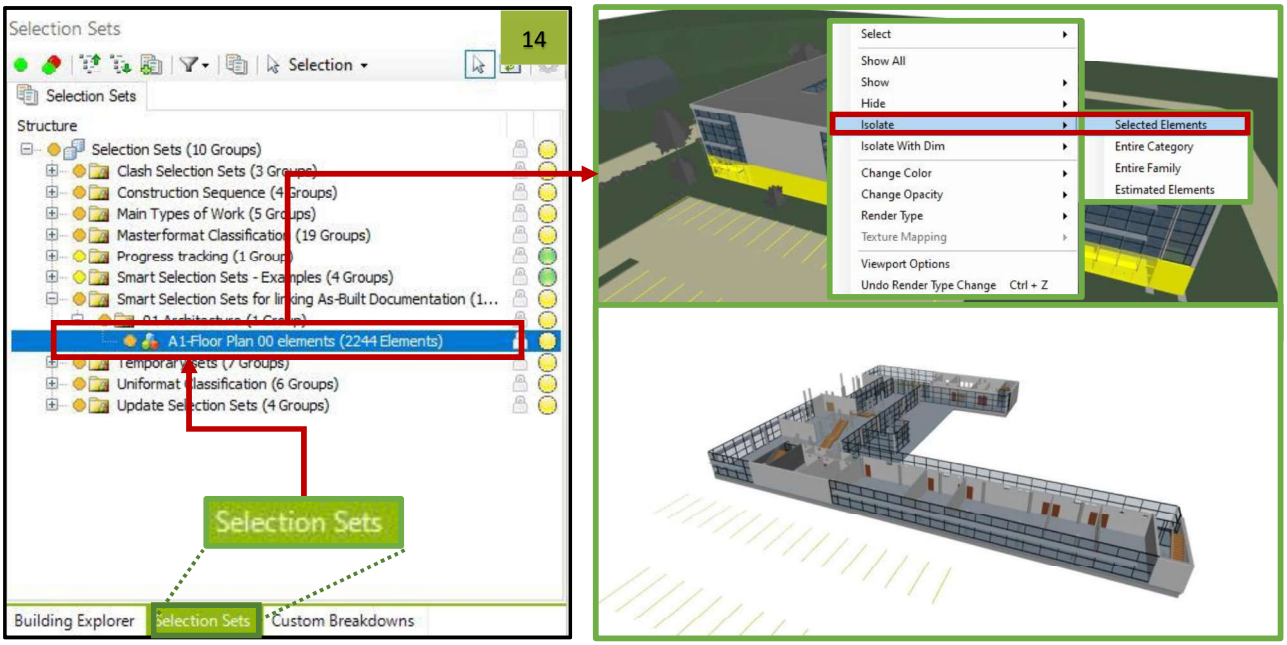
11. Within the **Reference Objects** window choose the **Type** option **Building Storeys**. → In the Building Storey list check the **01 – Entry Level**. →
12. Click the **OK** button to close the Reference Object window. →



13. We have defined rules for smart selection set that contains structural and architectural elements on the entry level. Click the **OK** button to close the **Create New Selection Set** window.



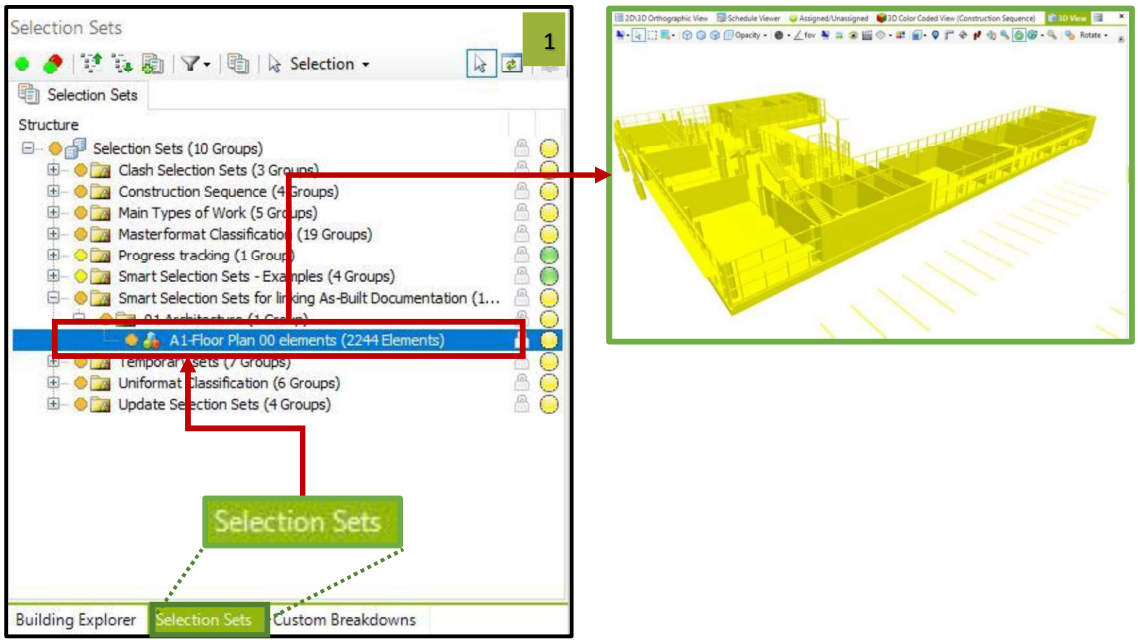
14. In the Selection Sets palette list the created smart selection set appears. Click on it to select elements. → In the main 3D viewport isolate selected elements with **right-click**, choose the **Isolate** command and click on the **Selected Elements** option.



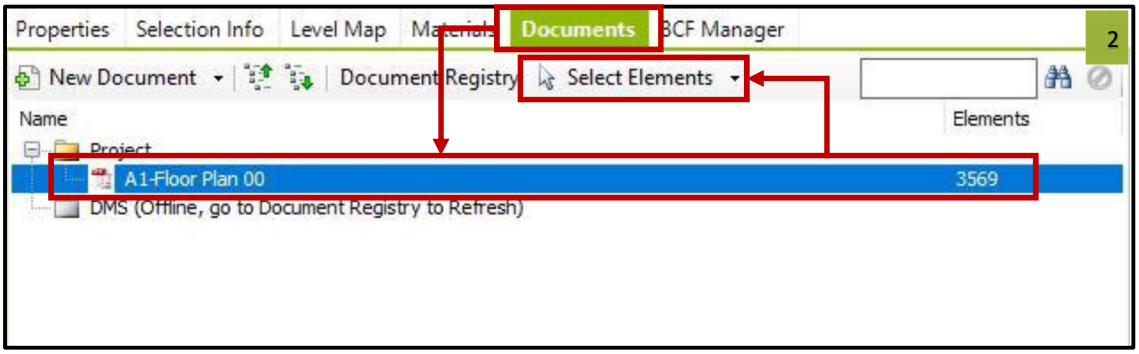
Remove links

We are going to remove link from selected elements and link document **A1-Floor plan 00** again to elements from smart selection set that we have just created**, A1-Floor Plan 00 elements**.

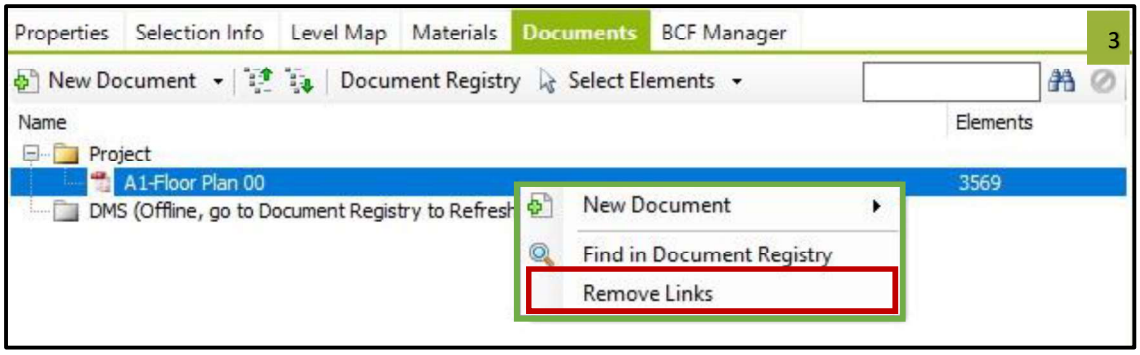
1. Click on the Selection set **A1-Floor Plan 00 elements** to select elements we added to this group. →



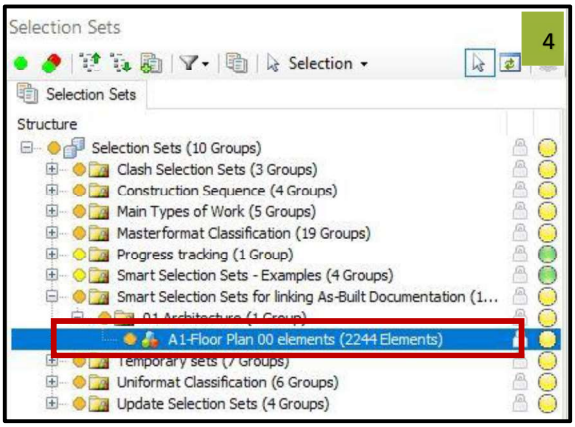
2. Activate the **Document** palette. → We notice that the document **A1-Floor plan 00** has link to selected elements. We did it in previous chapter, where we linked documents to all elements on the entry level, not just structural and architectural elements. → Now we are going to remove link from these elements and link document to elements from smart selection set that we have just created**, A1-Floor Plan 00 elements**. Select the document **A1-Floor plan 00**. → Click on the **Select elements** button. →



3. **Right-click** on the document. → From the drop-down list choose the **Remove Links** option. We have removed linked document from selection that contained all elements on the entry level.→

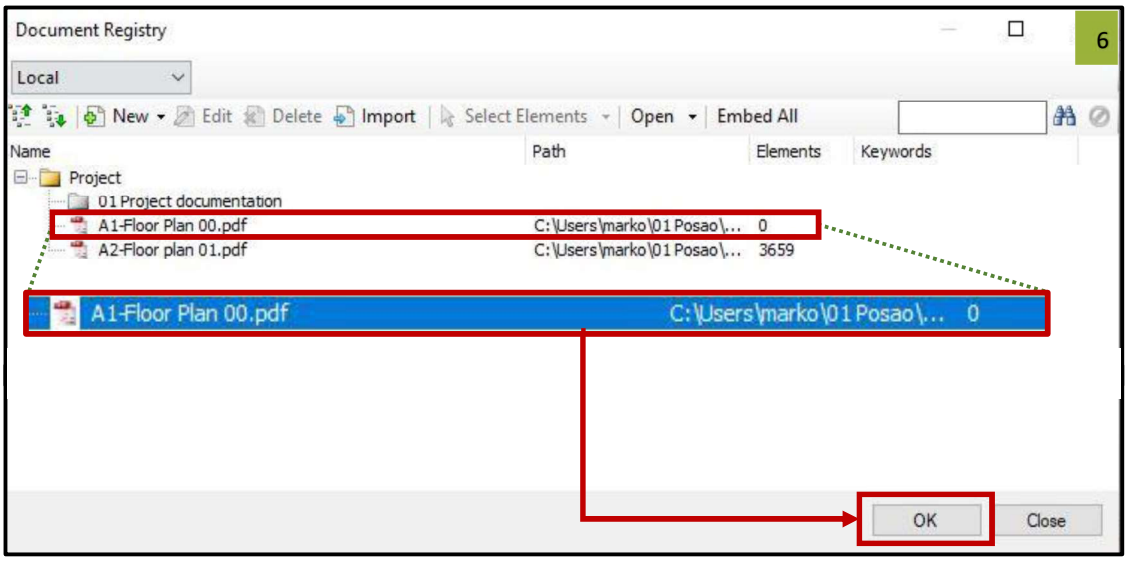


4. Select elements again by click on the smart selection set **A1-Floor Plan 00 elements.** →

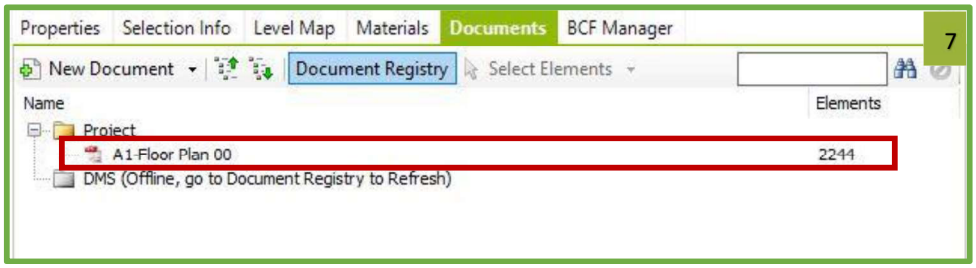


5. There are not linked documents in the **Documents** palette. → Click on the **arrow** next to the **New Document** button. → From drop-down list choose the **From Document Registry** option.→

6. The **Document Registry** window opens. → Here we find the desired document, **A1-Floor Plan 00**. → We notice that number of elements next to this document is 0 because we remove link. Select the document. → Click the **OK** button. →



7. In the **Document** palette linked document appears, and it is linked to the elements on the entry level, on the structural and architectural elements.

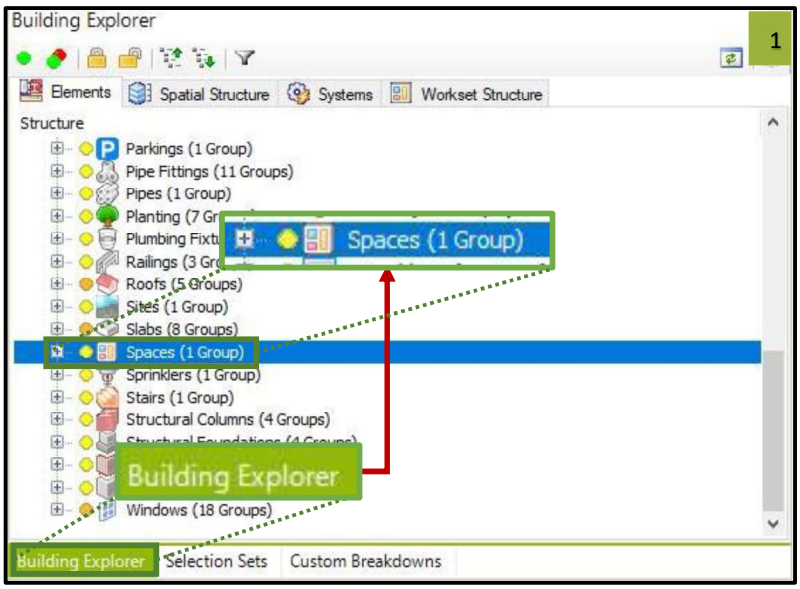


9.5. ADDING NEW PROPERTY

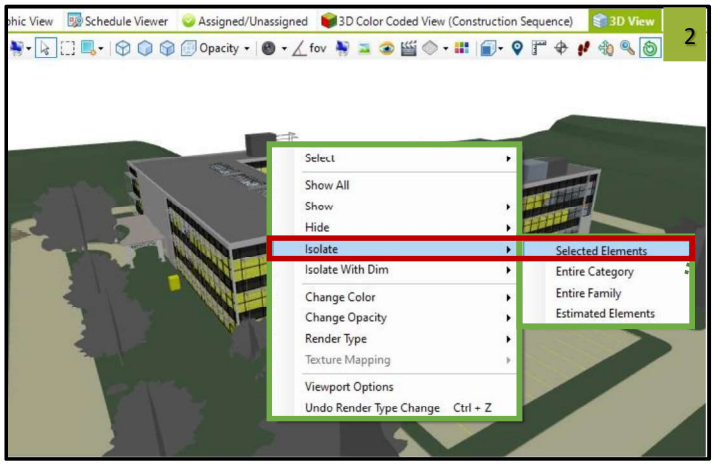
Adding new properties can be useful in many ways. We create new properties usually when we don't have information we need, created in BIM Authoring tool.
For this purpose, we will create new properties that are related to 6D BIM model elements such as spaces. We will define new property for rooms that are rentable and we will define their rentier.
In this exercise, rentable rooms are the Library and Conference room. First, we will create the new property for the whole category Spaces, **FM – Rentable**. After that, we will set the property value only for the Library and the Conference room. Another property that is going to be added to rentable elements is **FM – Rentier**, where we will set the property value **Person 1**.

First import predefined custom breakdown structure according to procedure explained in the **Chapter 4.6**. Import the file **Exercise - Custom Breakdown for Import.bxf** that can be downloaded from Bexel User Area. Download **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 9.0\Exchange**.

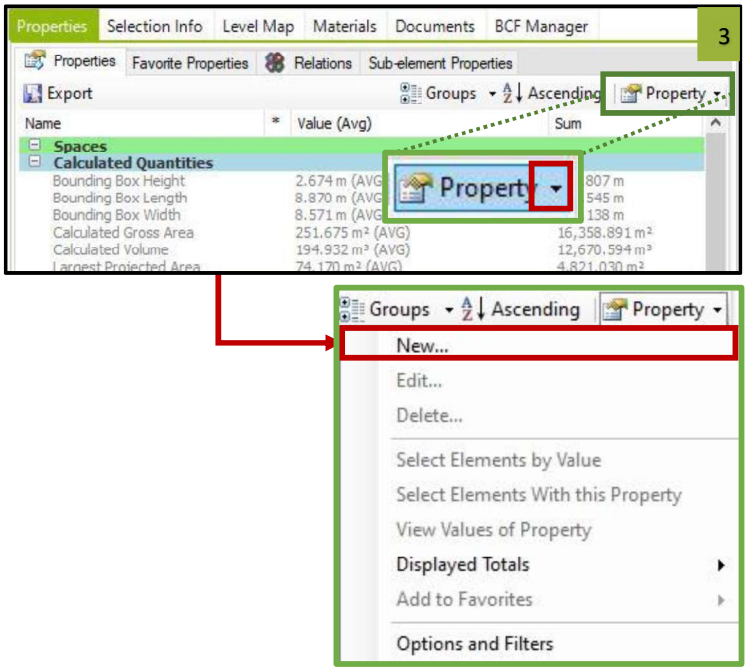
1. In the **Building Explorer** palette select category **Spaces**. →



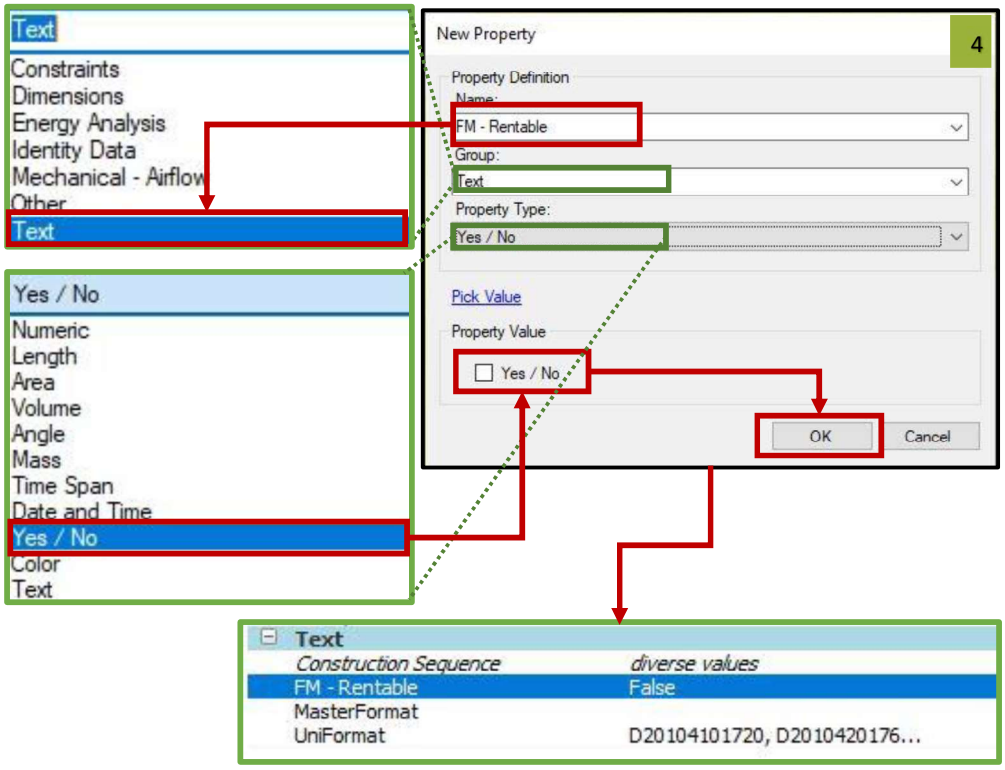
2. Isolate the selected group in the **Viewport**. **Right-click** on the 3D viewport, click the **Isolate** command. Choose the **Selected Elements** option. →



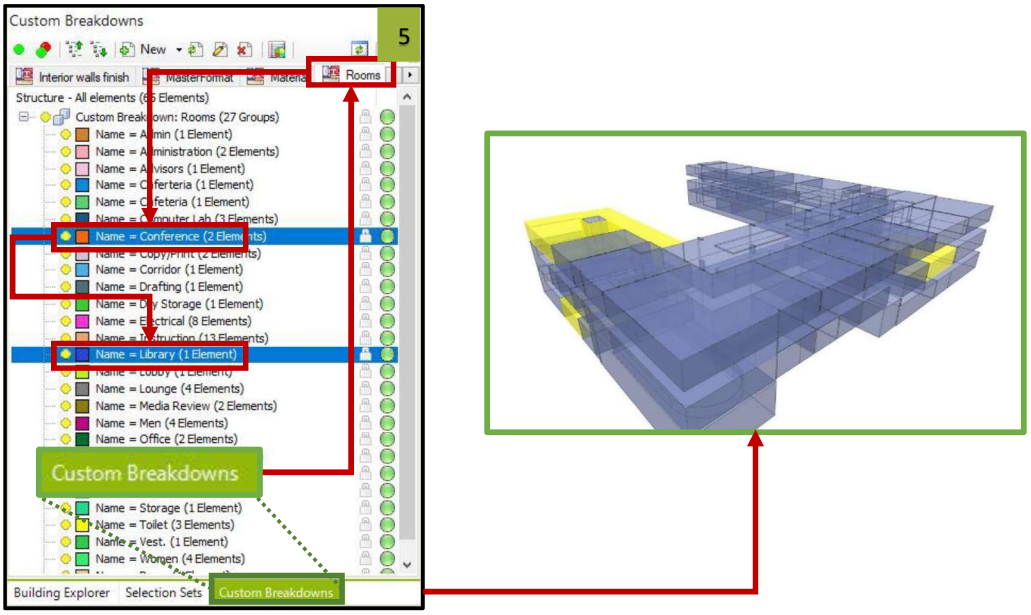
3. Click on the **arrow** next to the **Property** button within the **Property** palette. → A drop-down menu activates, choose command the **New**. →



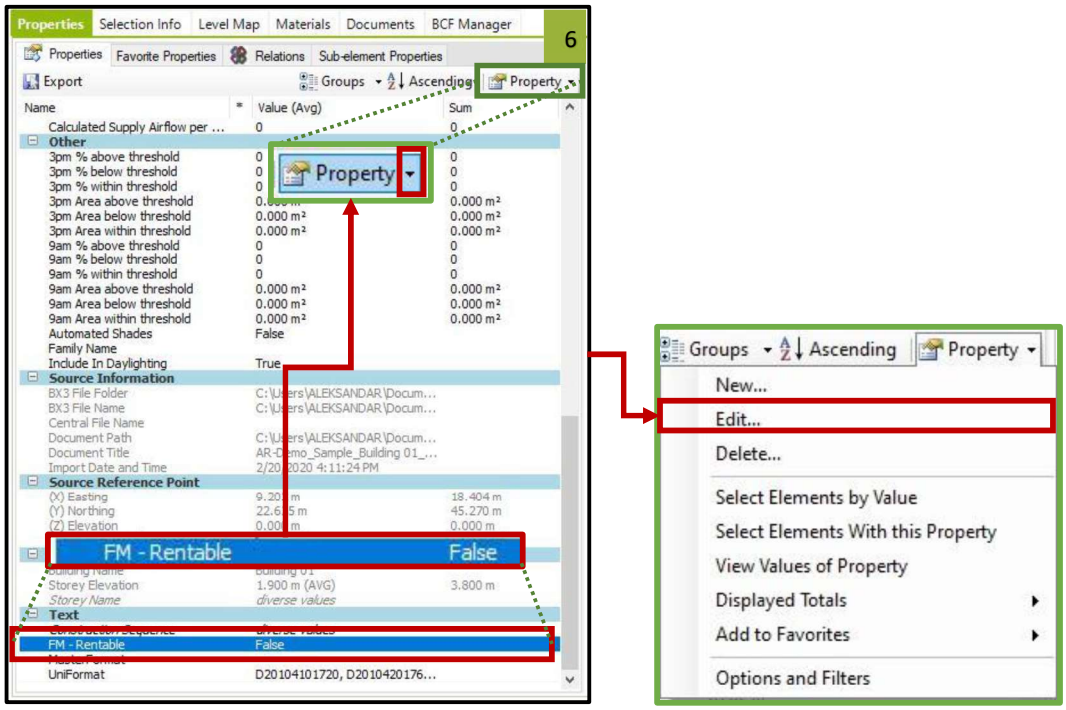
4. The **New Property** window opens. → In the **Name** field add a new name **FM - Rentable**. → In the **Group** section from the drop-down list choose the **Text** option. → In the **Property Type** drop-down menu choose the **Yes / No** option. → Click on the **OK** button to finish the process.
Check the Properties palette, in the Text Property Group, the created property **FM – Rentable** appears with value False.



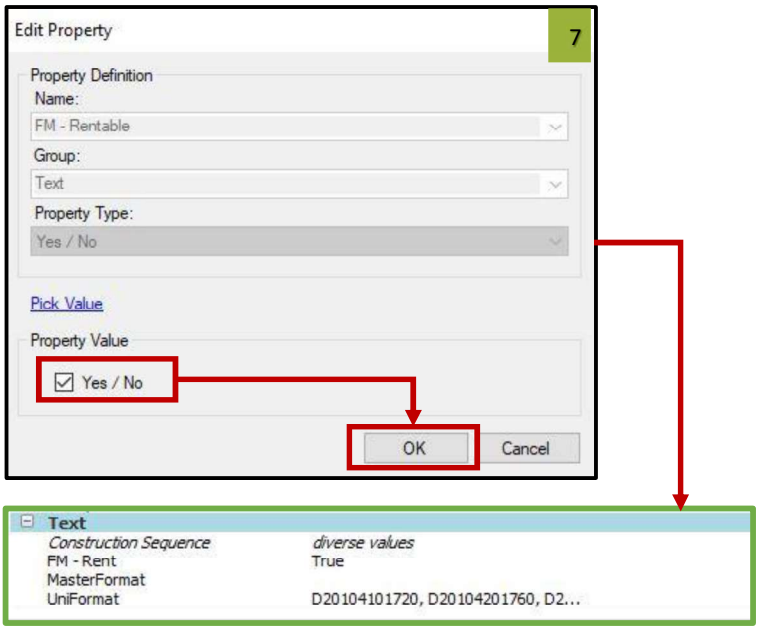
5. To select Library and Conference rooms, we use imported predefined Custom Breakdown. Click on the **Custom Breakdowns** palette and choose **Rooms** card. Select elements which have names Conference and Library.



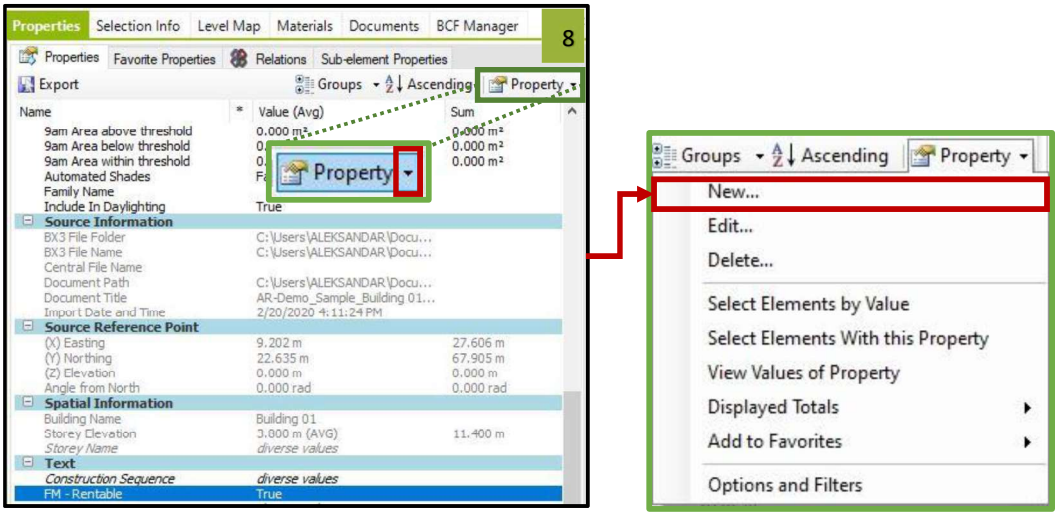
6. Selection is active. In the Properties palette select previously created Property **FM - Rentable**. Click on the **arrow** next to the **Property** button within the Property palette. → A drop-down menu activates, choose command the **Edit**. →



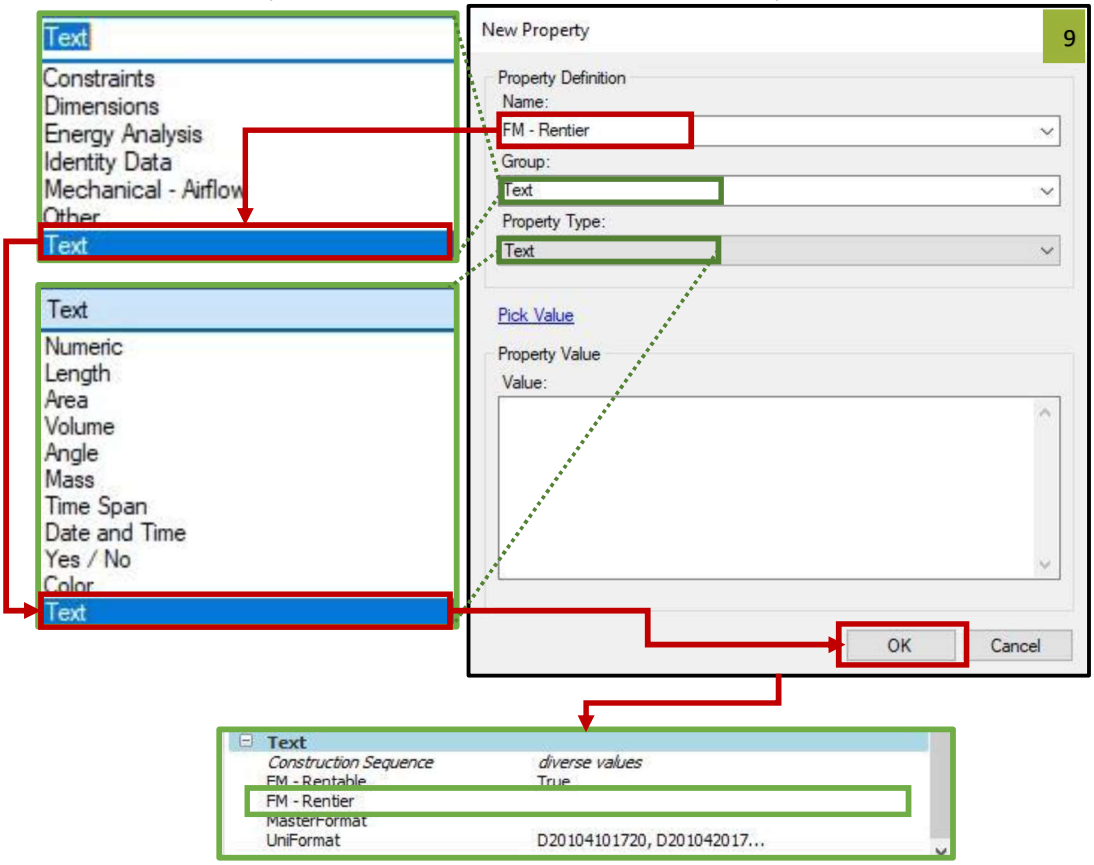
7. The **Edit Property** window opens. → In the Property Value check the **Yes/No** option. Click the **OK** button to close the **Edit Property** window. This way we set these elements to have the True value within the **FM – Rentable** property which means these areas are rentable.



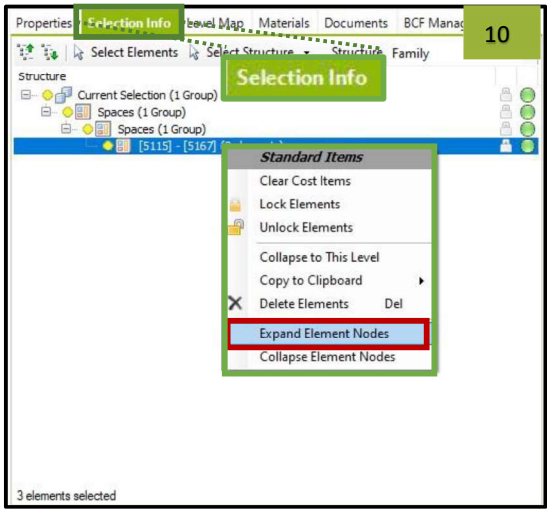
8. Selection is still active. Click on the **arrow** next to the Property button within the Property palette. → A drop-down menu activates, choose command the **New**. →



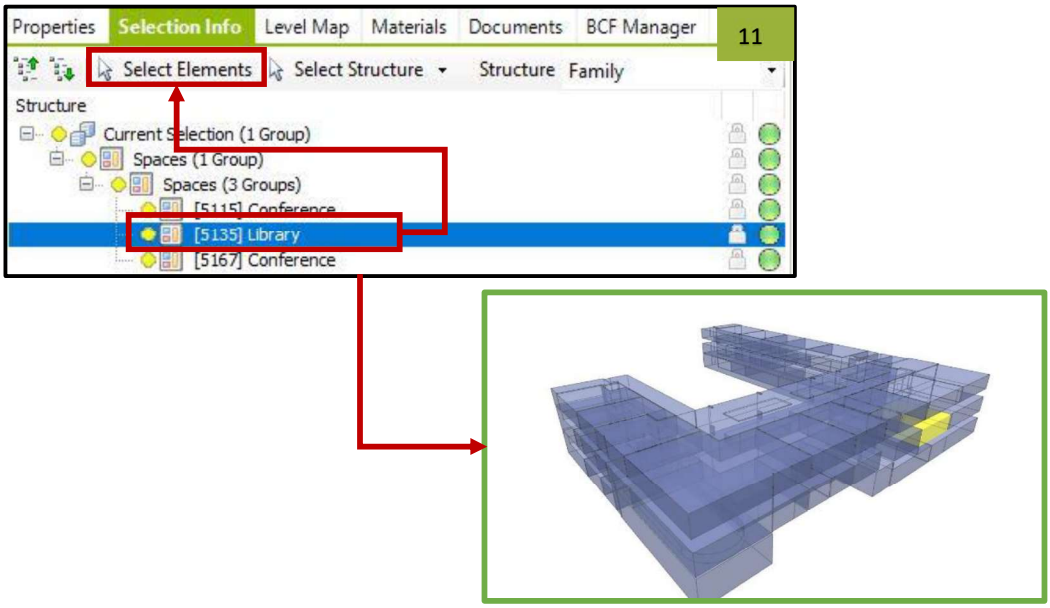
9. The **New Property** window opens. → In the **Name** field add a new name **FM - Rentier**. → In the **Group** section from the drop-down list choose the **Text** option. → In the **Property Type** drop-down menu choose the **Text** option. → Click on the **OK** button to finish the process. →



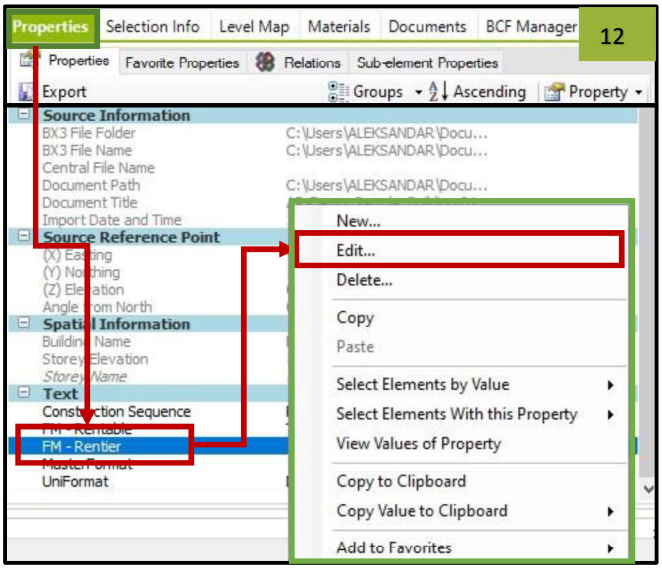
10. Selection is still active. Go to **Selection Info** palette. → **Right-click** on the latest level in the selection tree. Choose the **Expand Element Nodes** command. →



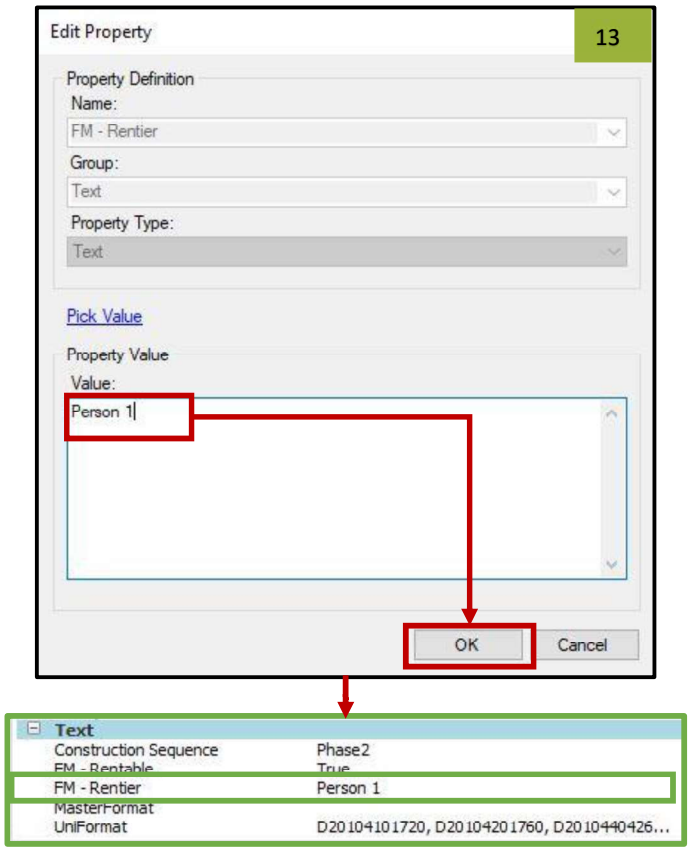
11. In the selection tree list, find out the Library and click on it. → Click on the **Select Elements** button. → In the 3D Viewport field, we see which elements are selected. →



12. Selection is active. In the **Properties** palette select previously created Property **FM - Rentier**.→ **Right-click** on selected property. → A drop-down menu activates, choose command the **Edit**.→



13. The **Edit Property** window opens. → In the Property **Value** enter the **Person 1**. Click the OK button to close the **Edit Property** window. This way we set rentier for the Library, **Person 1**.



Try to edit the Value of the property **FM - Rentier** for Conference room (there are 2 elements which do not have defined this value yet). Follow previous four steps (steps from 10. to 14.) and set the value **Person 2** within the Property **FM – Rentier**. After we select elements related to this action, select the property that should be edited and edit it.

NOTE: It is highly recommended to add element properties using the BIM Authoring tool even though the property can be added to related elements in the Bexel Manager software.

WARNING: Only the elements that were previously selected will have the created attribute.

9.6. CREATING CONTRACTS, PLANS AND ENTRIES

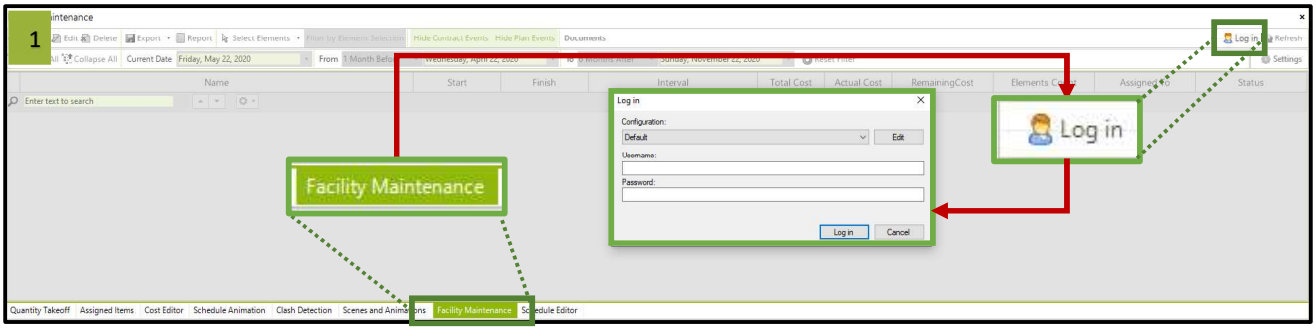
This chapter describes process of creating Contracts, Plans and Entries in the Bexel Manger software, Facility Maintenance part of it.

> **NOTE:** A plan is actually maintenance activity. The dates when this activity will be performed are the Plan events and an Entry represent a completed activity on a certain date at any level.

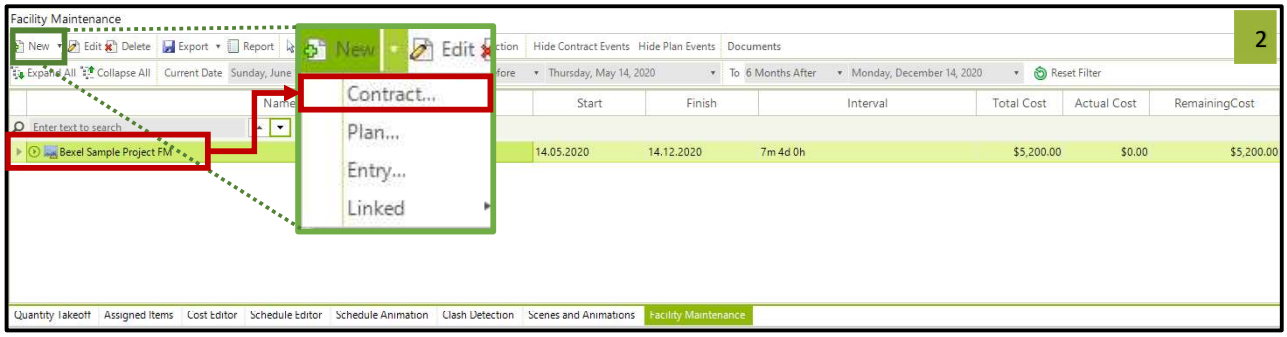
We are going to explain Bexel Manager FM usage on the example of the Carpets Maintenance. The **Company A** is the company we have made the **Contract A** for the **Carpet Facility Maintenance**.

To create The Contract folow next steps:

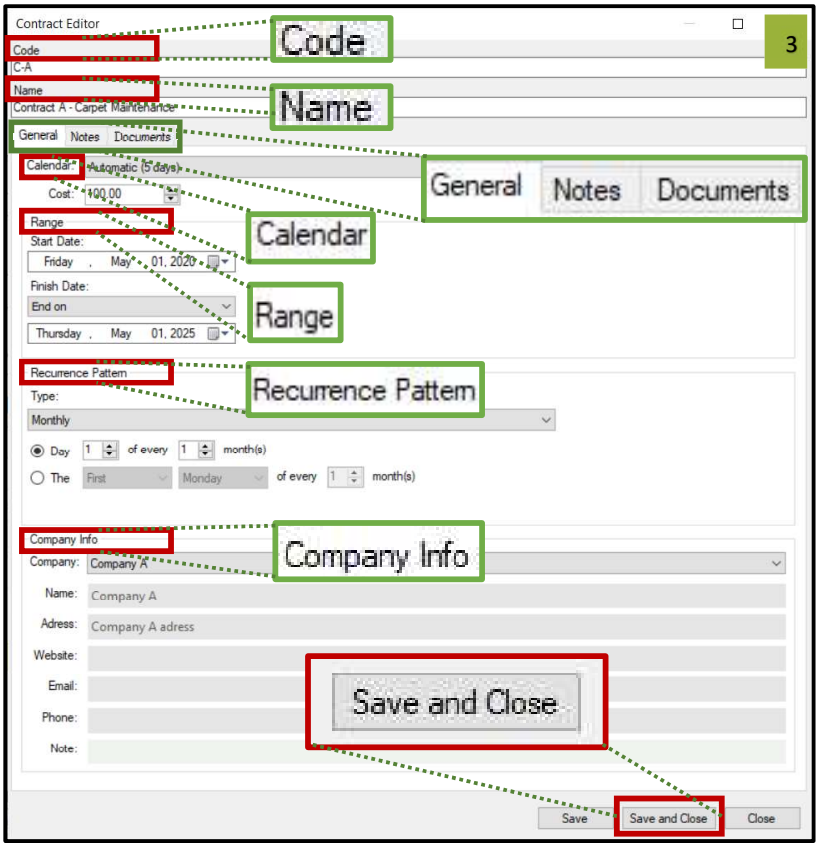
1. After opening the Sample project, go to **Facility Maintenance** palette and log in with login credentials as we explained in the **Chapter 4.1.**



2. Select the project in the Facility Maintenance list and click the arrow next to the **New** command in the toolbar palette and select the **Contract** option. →



3. The **Contract Editor** window opens, which contains three tabs: **General**, **Notes** and **Documents**. → First, we define the code and the name of the contract in the **Code** and the **Name** field. In this case we can enter the code **C-A** and the name **Contract A – Carpet Maintenance**.→ In the **Calendar** field, we define the calendar type. → In the **Start Date** field, we define the date when the contract becomes effective. → In the **Finish Date** field, we define the date until the contract is valid. We can set the range **01.05.2020. – 01.05.2025.** → In the **Recurrence Pattern** field, we define the repetition interval, set **every 1st day.** → Under **Type**, we define whether the task of a contract is at a daily, weekly, monthly or annual level. In this case we set **monthly**. → Based on the selected repetition interval, we define when this task will take place. → In the **Company Info** field, we enter the information about the company which we made the contract with. We can set company name **Company A** and address **Company A address** → In the **Notes** field, we enter various comments and in the **Documents** field we can add additional documents. → Finish the process by clicking the **Save** or **Save and Close** button.



NOTE: If we want to use Bexel Manager Facility Maintenance module, we have to be logged in with our login credentials.

NOTE: If we want to add the new Contract, we have to mark the Project in the Facility Maintenance list.

The exercise instructions:

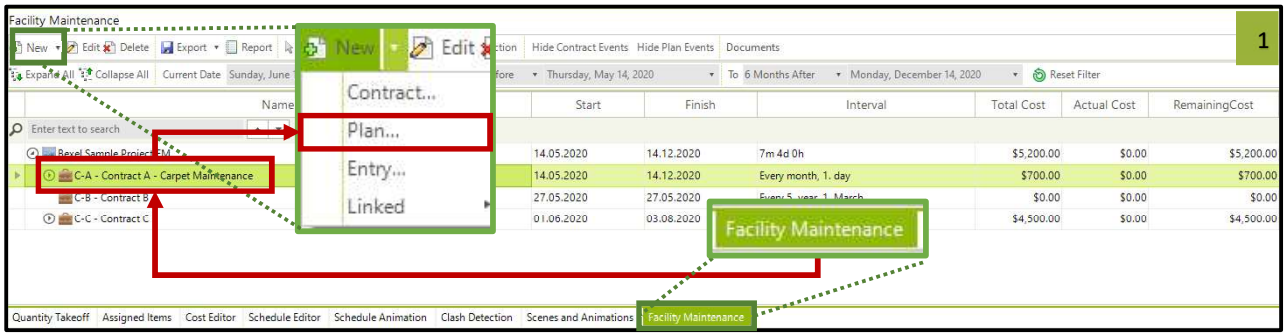
1. Create Contract A – Example for the Carpet Maintenance.
   - **a.** Code: **C-A**
   - **b.** Name: **Contract A – Carpet Maintenance**
   - c. Range: **01.05.2020. – 01.05.2025.**
   - **d.** Recurrence Pattern: **Monthly, every 1st day**
   - e. Company name: **Company A**
   - f. Company address: **Company A address**

   Document for linking to this contract is located in Document registry that have been created: FM Documents/05 Contracts/**CONTRACT A.pdf.** We can download folder structure with document examples from Bexel User Area, download **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 9.0\Exchange**.
2. Create Contract B
3. Create Contract C

To create the Plan, follow next steps:

We will create the Plan **Carpet Vacuuming** which is planned activity, the code is **A1**. The plan should be within **the Contract A – Carpet Maintenance,** the contract we have already created. This activity starts on the same **date** as the Contract and it **repeats daily.** The person responsible for this activity is **Person 1.**

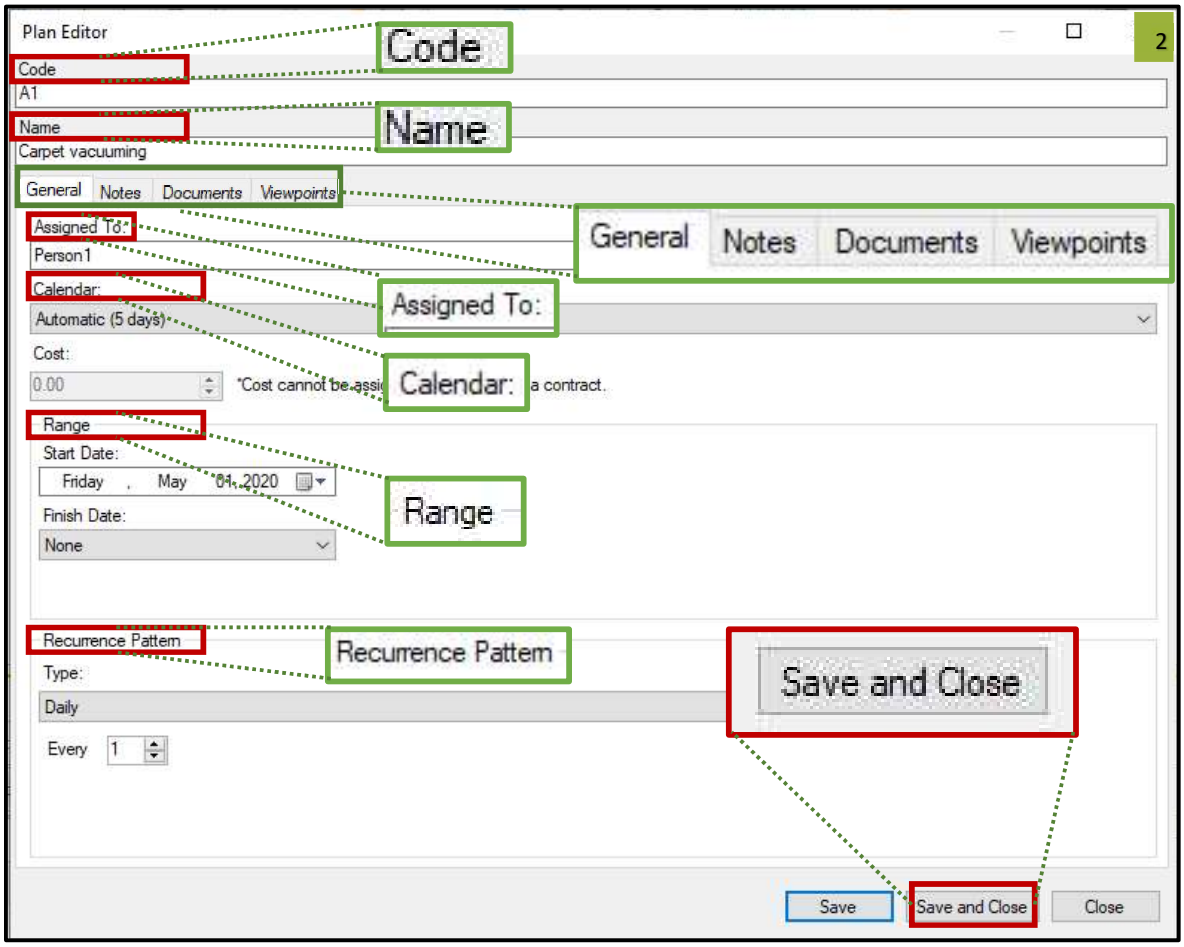
1. Activate the **Facility Maintenance** tab. → Select the Contract where we want to create the Plan or just the project if we want to create the plan out of the Contract. Click on the arrow next to the **New** command in the toolbar palette and select the **Plan** command. →



NOTE: We can create plans which are inside the Contract or they can also be out of the Contract. Please note that the cost cannot be assigned to a plan which is inside a contract.

2. The **Plan Editor** window will open, which contains **General, Notes, Document** and **Viewpoints** tabs. →First, in the **Name** field we define the position name **Carpet Vacuuming**, in the Code field we enter the code **A1**. → Then in the **Assign To** field, we define who is assigned for the implementation of this task, in this case we enter **Person 1**. →In the **Start Date** and **Finish Date** fields, specify the period in which the task is performed. Set the start date 01.05.2020. → In the **Recurrence Pattern** field, we define the repetition interval. → Under **Type** we define whether the task of a plan is at a daily, weekly, monthly or annual level, here we choose **daily** option. Based on the selected repetition interval, we define when this task will repeat. → In the **Notes** field, we enter various comments. → Finish the process by clicking the **Save** or **Save and Close** button.

The exercise instructions:



Create two plans for the example of the Carpet Maintenance. The plans can be inside the Contract we have already created **the Contract A – Carpet Maintenance.**

1.

a) Activity: Carpet vacuuming

b) Code: A1

c) Name: Carpet vacuuming

d) This activity starts on the same **date** as the Contract and it **repeats daily.** The person responsible for this activity is **Person 1.**

e) Document that can be linked to this activity is located in Document Registry that have been created FM/02 FM Documentation/05Contracts/**Manual_Standard_Carpets_Carpet_Care.pdf**

2.

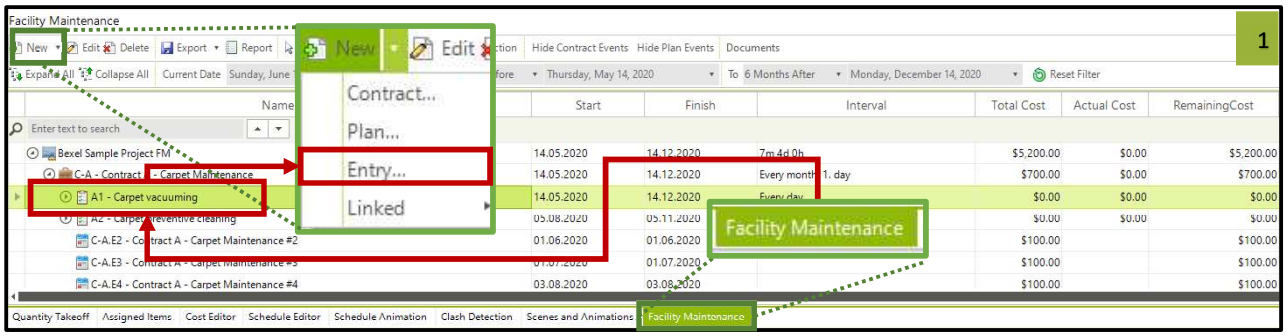
a) Activity: Carpet preventive cleaning
b) Code: A2
c) Name: Carpet preventive cleaning
d) This activity starts on the same **date** as the Contract and it **repeats 4 times per year, every 5th day in the month.** The person responsible for this activity is **Person 2.**
e) Document that can be linked to this activity is located in Document Registry which have been created FM/02 FM Documentation/05Contracts/**Manual_Standard_Carpets_Carpet_Care.pdf**

As we have described a process of creating a contract and plan, now we can describe a process of creating an Entry. An Entry can be created on any level and defines when a certain Plan event was completed whether it was planned or not.

We will create the new entry for not planned activity, carpet vacuuming on **29th of May 2020**, with status Completed. The code is **E1**, the name is **Carpet vacuuming**.

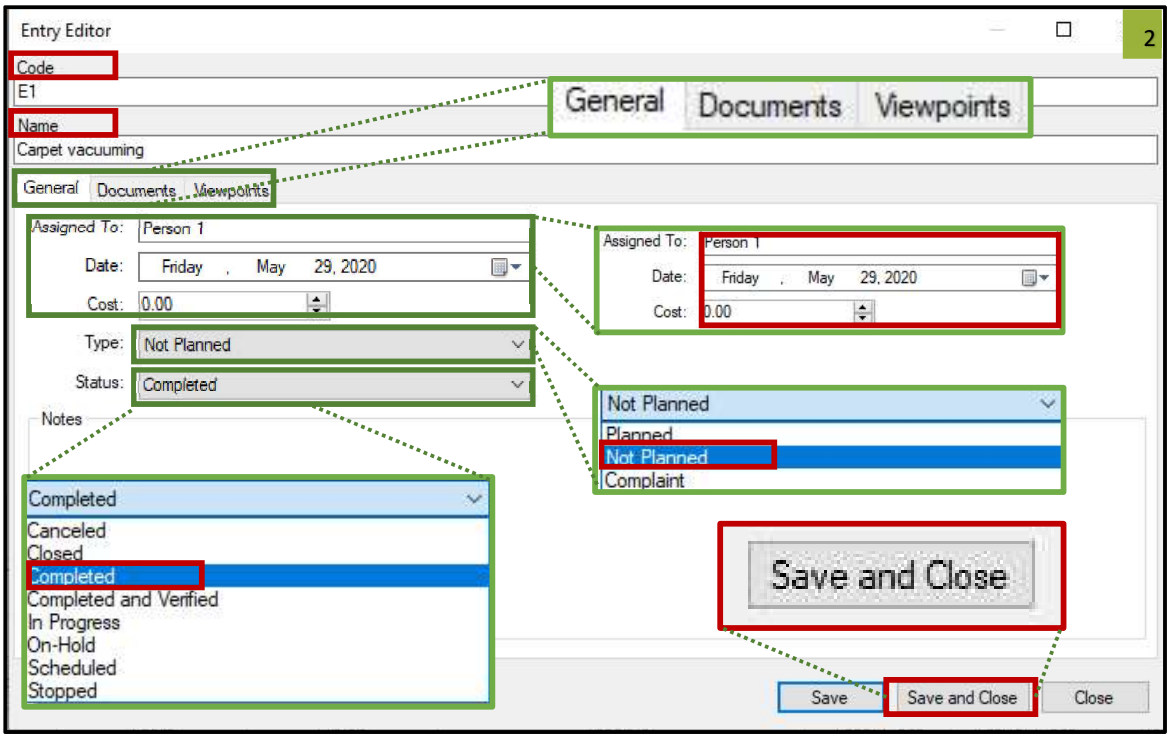
To create the Entry, follow next steps:

1. Activate the **Facility Maintenance** tab. → Select the Plan where we want to enter the new Entry, in this case **A1 – Carpet vacuuming**. → Click on the arrow next to the **New** command in the toolbar palette and select the **Entry** command. →



2. The **Entry Editor** window will open, which contains **General, Documents** and **Viewpoints** tabs. → First, in the **Name** field, we define the position name **Carpet vacuuming**. →Then in the **Assign To** field, we define who is assigned for the implementation of this task, **Person 1**. →In the **Start Date** and **Finish Date** fields, specify the period in which the task is performed, **29th of May 2020.** → Under **Type** we define whether the task of an entry was planned or not, in this case we choose **Not planned** option. → We define the **Status**; in this case we choose **the Completed** option. → Finish the process by clicking the **Save** or **Save and Close** button.

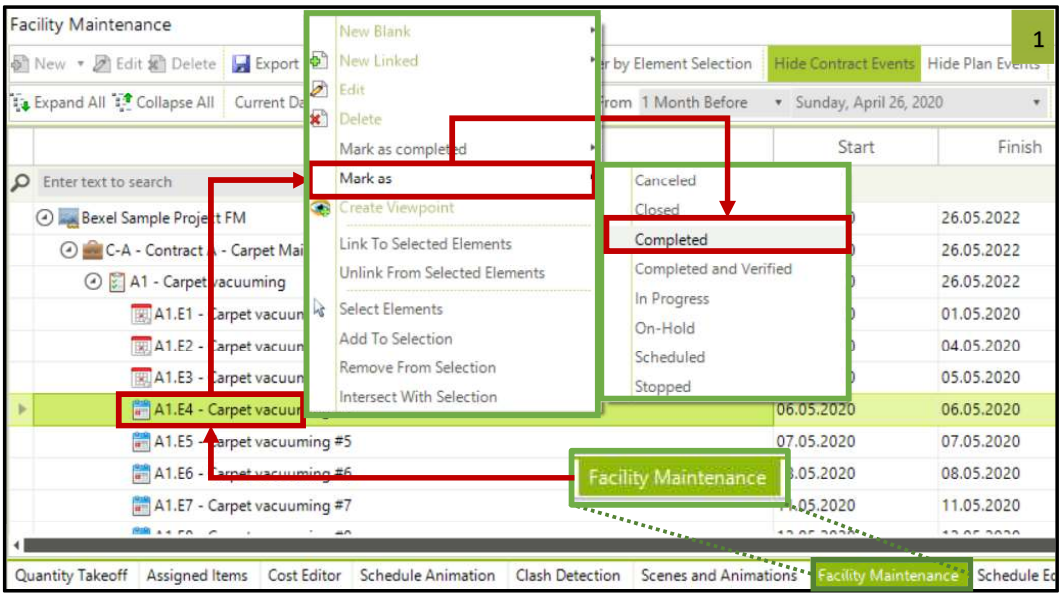
NOTE: There are three Entry types: Planned, Not Planned and Complaint.



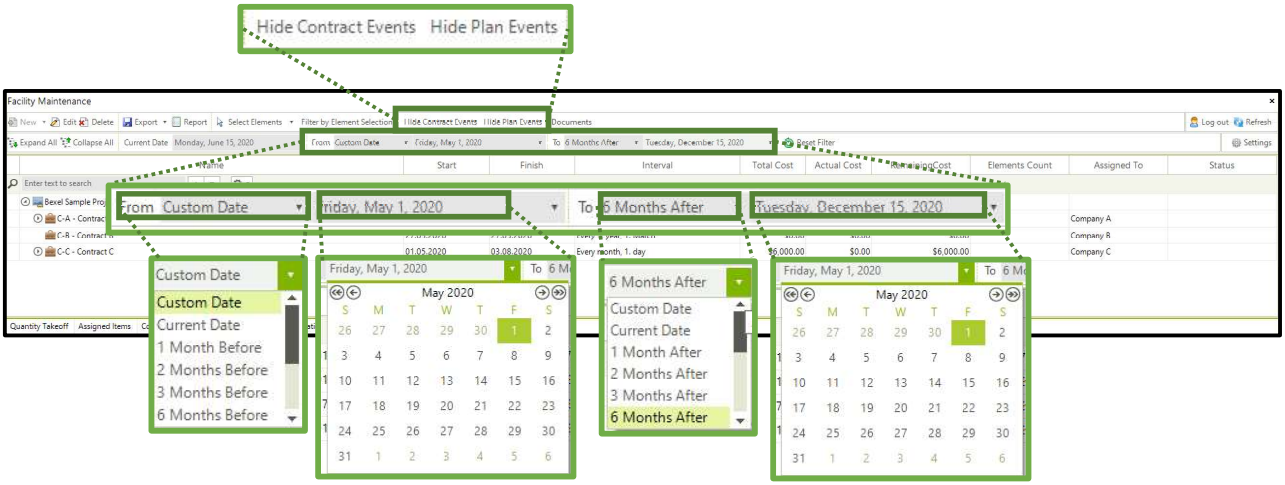
Create the Entry from Plan Event:

When some activity, the Plan Event, has been completed, we can turn it into the planed completed Entry.

1. Select the completed plan Event, in this case we can select certain Plan Event within the Plan **A1 – Carpet vacuuming**. → The **right-click** on it and choose the **Mark as** command. → There are several options, we choose the **Completed** option. Our planed Event became completed Entry.



NOTE: Pay attention on the period which is set in the Facility Maintenance window. Depends on it, the FM activities are listed below. User can change this period and activities will be shown for set period. Also, we can hide contract and plan evens using buttons the **Hide Contract Events** and the **Hide Plan Events**.

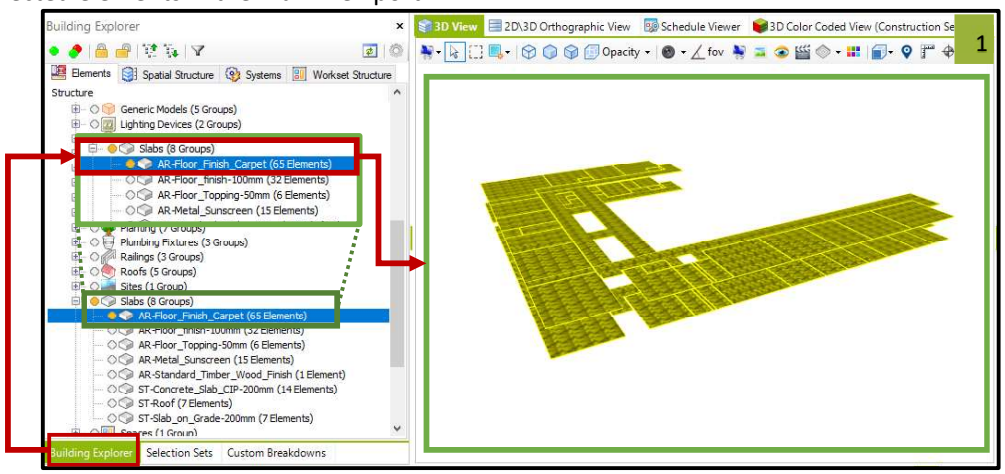


The exercise instructions:
First four plan events in the Carpet vacuuming plan are finished, so make the entries from these four plan events.
Make the new entry for not planned carpet vacuuming on 29th of May 2020, with status Completed. Code is E1, the Name is Carpet vacuuming.

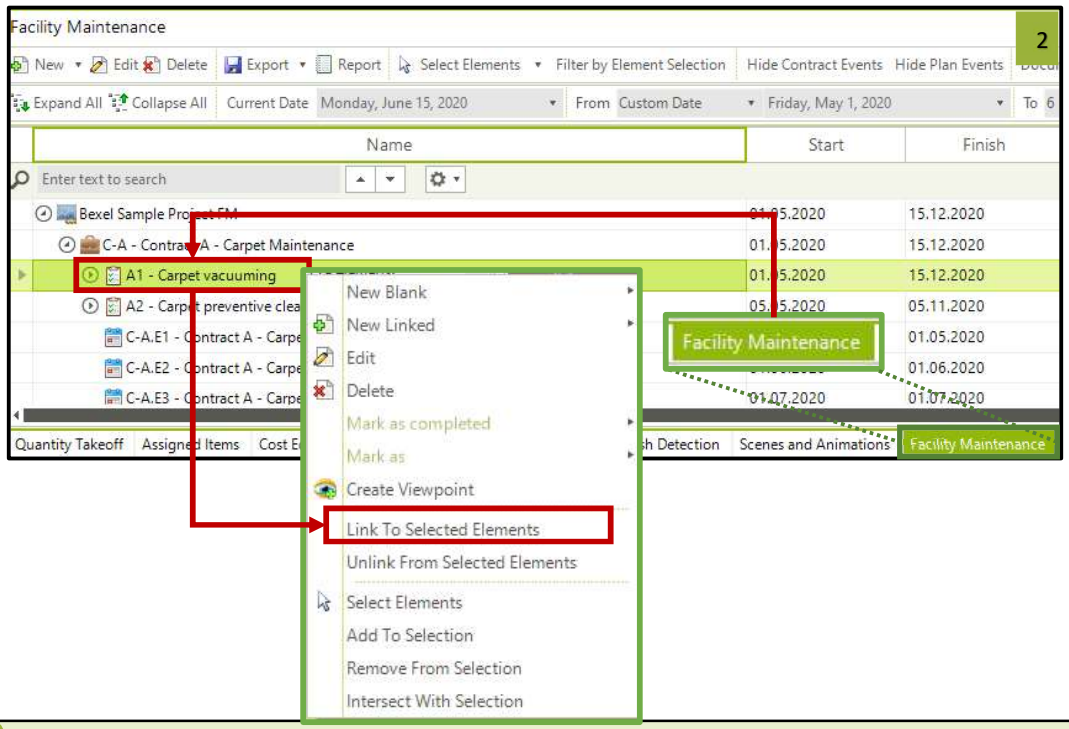
Linking facility maintenance activities to selected elements

We will link all carpets in the object to the plan we made earlier, **A1 – Carpet vacuuming**.

1. Select desired elements which are concerning the relevant facility maintenance activity, in this case we are going to select the family slab/**AR-Floor Finish Carpet**. Go to **Building Explorer** tab, select the category slab, with the family name **AR-Floor Finish Carpet**. Use the command **Isolate** to isolate selected elements in the main viewport.

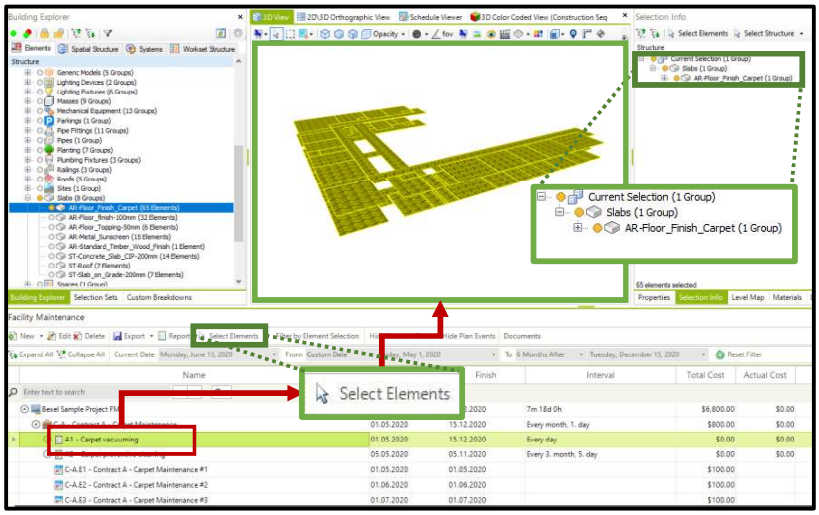


2. Activate the **Facility Maintenance** tab. → Select a certain **plan, plan event or entry** we want to link selected elements to, it is colored green. In this case, we select the plan **A1 – Carpet vacuuming.** → With the **right-click**, activate the menu and select the **Link To Selected Elements** command. To unlink selected elements from an item, just click on the command **Unlink From Selected Elements**.



NOTE: Please pay attention that when we link certain Plan to selected elements, all its Plan events has the same elements linked to them. But also, when we change Plan event to Entry, it does not have linked elements. We have to link certain elements for that Entry.

To check which elements are linked to our facility maintenance activity, mark desired activity and click the button **Select**.

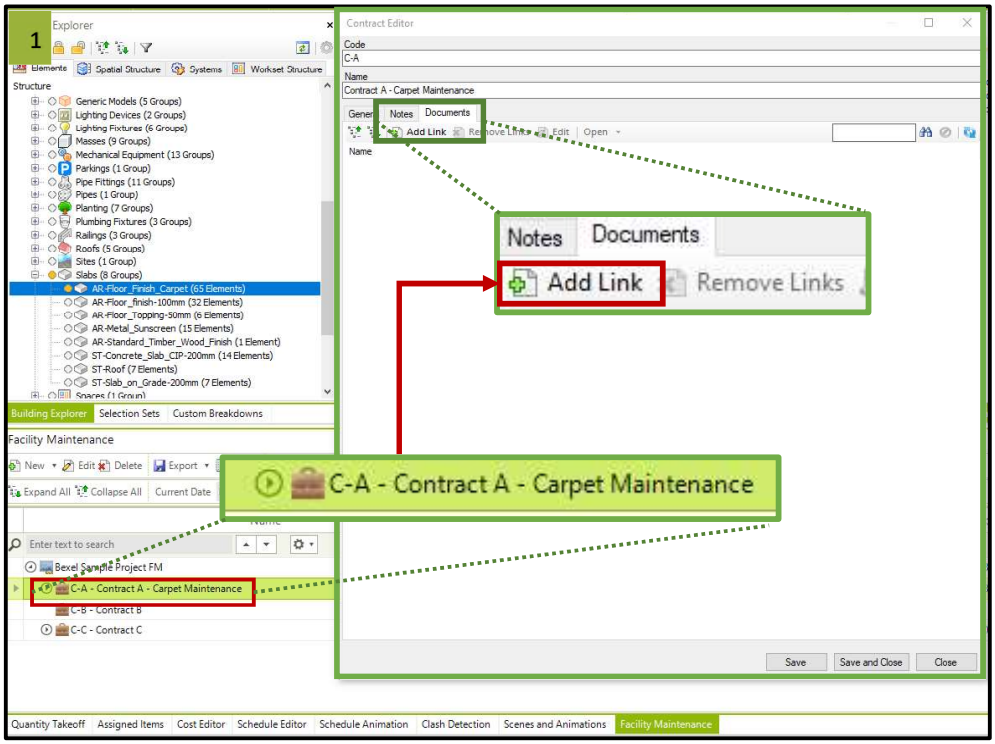


The exercise instructions:
Link all carpets in the object to the plan we made A1 – Carpet vacuuming. For easy selection we can select all slabs which has family name **AR-Floor Finish Carpet**.
We made the entry E1 – Carpet vacuuming for non-planed activity. But this was only for carpets on the 2nd floor. Now we can link carpets on 2nd floor the Entry **E1 – Carpet vacuuming.** Use selection sets for easier selection of carpets and pay attention that only 2nd floor had non planed vacuuming.

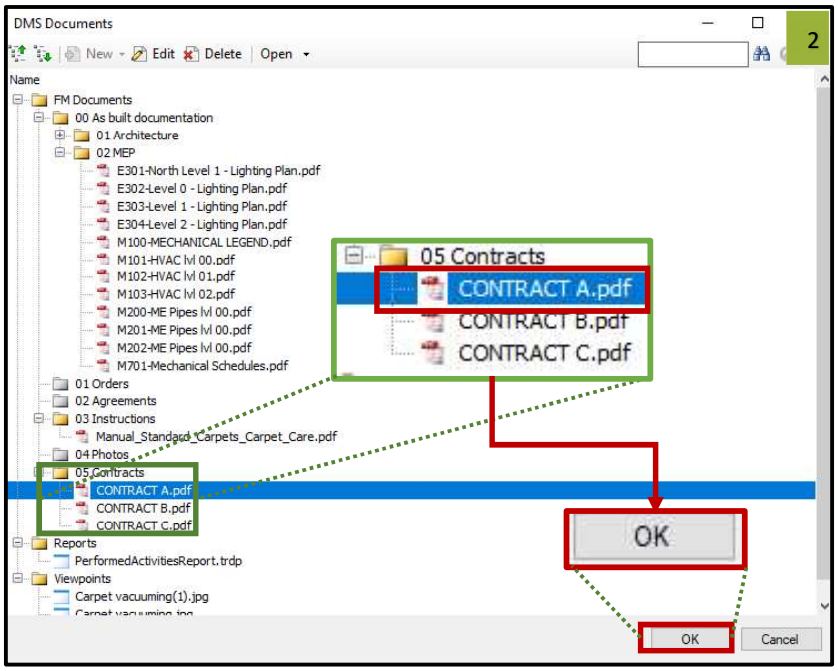
Linking documents to created Contracts, Plans and Entries

We can also link documents to created Contracts, Plans and Entries. If we want to link the **CONTRACT** document to related contract do the following steps:

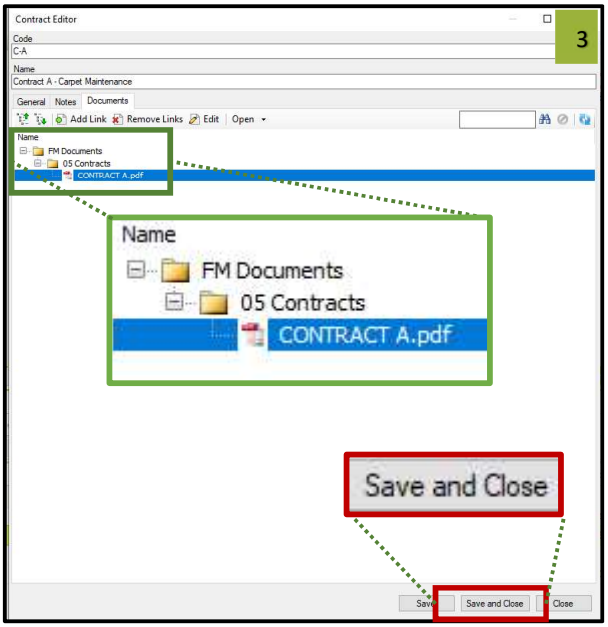
1. **Double click** on the desired contract, in this case we can use the contract we have already created **Contract A - Carpet Maintenance**. → Contract Editor window opens where we select the **Documents tab**. → Click on the **Add Link** button. →



2. DMS Documents window opens where we choose desired document. In this case we will use **05 Contracts** folder and select **CONTRACT A.pdf** document. → Click the **OK** button. →



3. The document link appears in the Documents tab. We can add more documents if it is necessary. → Click the **Save and close** button.



Now the **Contract C-A-Contract A** has linked document **CONTRACT A.pdf**.
The exercise instructions:
Link certain contract document to the contracts we have created: Contract A, Contract B and Contract C. Documents are located in the Document Registry folder **05 Contracts.**
Link the document **Manual_Standard_Carpets_Carpet_Care.pdf** to the Plan **A1 – Carpet vacuuming**. The document is located in the Document Registry folder **03 Instructions**.

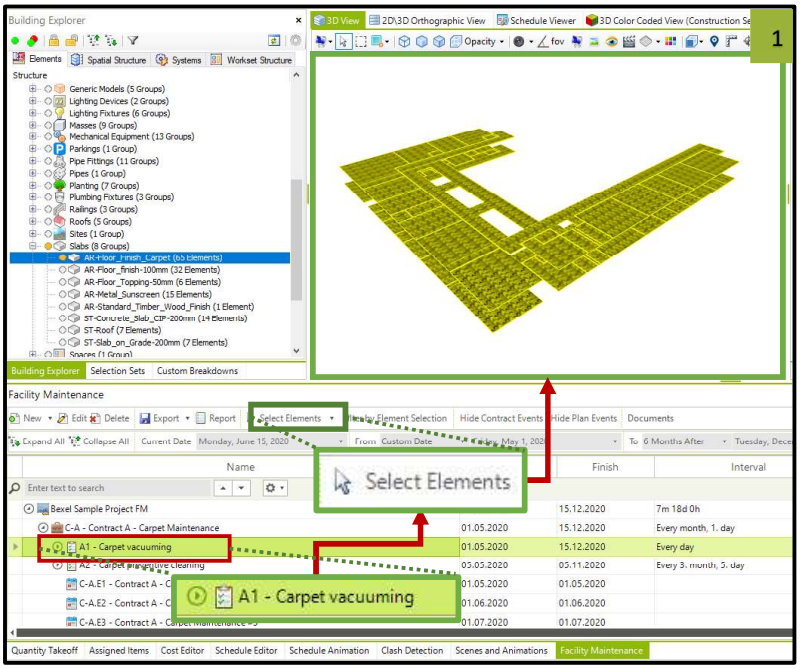
All documents we use for previous exercises can be downloaded from Bexel User Area. Downloading **PATH: Bexel_Step_By_Step_Workflow_Guide_ENG\Lessons\Lesson 9.0\Exchange**, **Folder Structure Example.rar**.

Creating Viewpoints

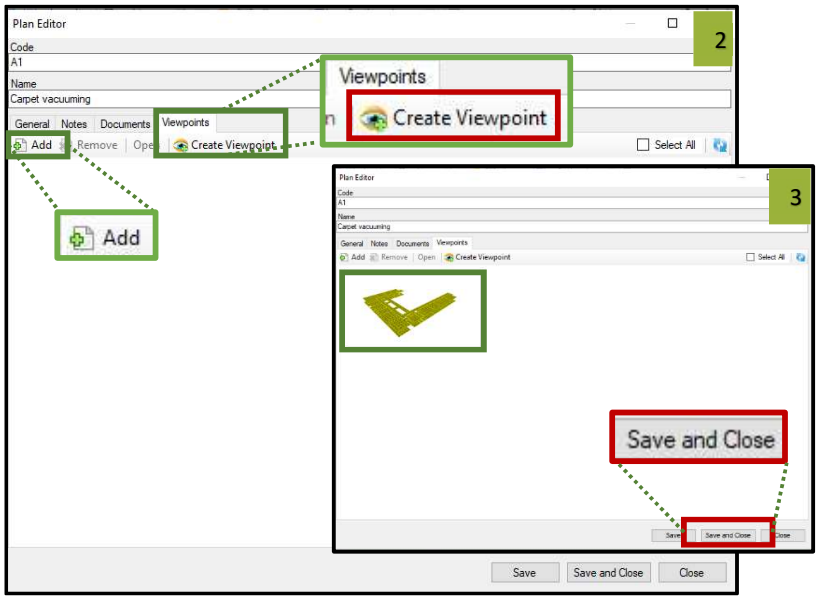
We can create Viewpoints for Plans and Entries.

To create Viewpoint for the certain Plan, do the following steps:

1. Select elements that are linked to the plan **A1 – Carpet vacuuming**, **right-click** on the Plan and click on the **Select Elements** command. The elements are selected in the main 3D viewport, isolate selected elements. → **Double click** on the Plan. →



2. The Plan Editor window opens. Select Viewpoints tab. Click the **Create Viewpoint** command.→ If we click the **Add** button, we can add some Viewpoints we have created on the local computer.→
3. The Viewpoint appears below. Click the Save and Close button.



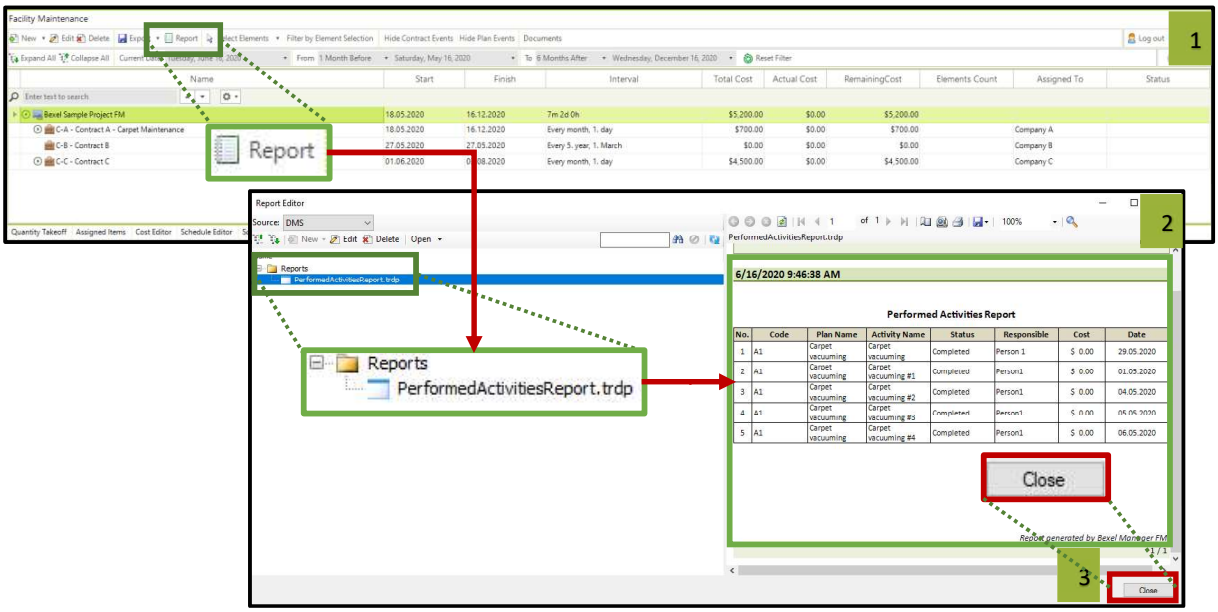
NOTE: Please notice that created viewpoints appears in the Document Registry after we refresh it.

The exercise instructions:
Create Viewpoints for the Entry that have already been created **E1 - Carpet vacuuming**.

9.7. CREATING REPORTS

The Report layout, as well as which maintenance items it contains, the period of activities and other information importante for the certain project, could be adjused to the users needs.

1. Activate a certain form of a report by clicking on the **Report** button located in the **Facility Maintenance** tab. →
2. The **Report Editor** window opens where on the left side of the window there is list of pre-created report templates, which can be located on the **local** computer or **DMS**. → After double click on selected template report, on the right site the automatically generated report appears.→
3. To close the Report Editor, click the **Close** button.



TERMS AND DEFINITIONS

AD-HOC quantity takeoff – A quick check without generating Takeoffs.

API (Application programming interface) – Enables the user to write C# scripts directly inside Bexel Manager environment.

BCF (BIM Collaboration Format) – An open file format that allows coordination of information that can live completely separately from the 3D model. It contains issue descriptions, snapshots, comments, information about authors, creation date, linked objects, view section planes, a unique GUID and more around an issue without containing any model element geometry itself.

BEP (BIM Execution Plan) – Plan prepared by the suppliers to explain how the information modelling aspects of a project will be carried out.

BIM – Building information modelling - process of designing, constructing or operating a building or infrastructure asset using electronic object-oriented information.

BIM element – Precise 3D representation of an object or part of an object that contains all additional attributes and information used for various BIM analyzes, simulations and estimates. BIM model element can be integrated with all important project documentation, which provides information on the items that refer to the building, including the time of construction, type of maintenance, belonging to the construction phases and spatial zones, and more.

Clash Detection Job – A clash analysis between the individual model elements.

Clash Detection Matrix – Intersects minimum required distances for each discipline defined by clash detection rules.

Clash detection Rule – A type of a formula defining minimum distances and tolerances for each discipline that needs to be included in clash detection test.

Classification – A standard used for classifying building specifications for a certain project.

Classification item – A folder within a classification in Bexel Manager software that consists from other classification items and cost items.

Color Coding Rule – A rule which defines coloring the results of a created Custom Breakdown structure placed within the Create Custom Breakdown window.

Continuous Property – A numeric property based on which a Custom Breakdown can be created.

Cost item – An item within Cost Editor module that contains information about price, type of quantity and unit of measure of elements and is created based on the classification used on a specific project.

Custom breakdown Rule – A criteria, for example, a discrete or continuous property based on which the Custom Breakdown structure is created.

Custom Breakdowns structure – A group of elements, crated by various criteria, for example, a discrete or continuous property within Bexel Manager software.

Discrete Property – A non-numeric property based on which a Custom Breakdown structure can be created.

Duplicate (Bounds) – A type of clash where we check whether the project has duplicate model elements.

Entry – An entry represents a completed activity on a certain date at any level within the Facility Maintenance module.

5D BIM Model – BIM model, usually formed in BIM Analysis tool software by integrating cost data and resource needs data with the 3D or 4D BIM model on per element basis. It allows generation of Bill of Quantities, and when integrated with the 4D BIM model, it allows cost and time driven analysis of the construction process such as monthly cash flow requirements, as well as manpower, equipment or material needs etc.

4D BIM Model – BIM model, usually formed in BIM Analysis tool software, by integrating 3D BIM model with the construction schedule by linking specific BIM elements to the corresponding construction schedule tasks. It allows generating 4D Construction simulation which represents the planned construction methodology, but also the tracking of the construction process by inputting the on-site progress data.

Geometric attributes – Data that describe the 3D model's geometry. Geometric together with non-geometric attributes define the BIM model.

Hard Clash – Detects cases where the elements physically look side by side by actually break through.

IFC2x3, IFC4 (Industry Foundation Classes) – Basic industrial classes for the exchange of data in the field of construction and facility management. IFC file format represents an open file format used by Building Information Modeling (BIM) programs which contains a model of a building or facility, including spatial elements, materials, and shapes, and which can be shared between various BIM software.

LOD (Level of Development) – The Level of Development is a reference that enables practitioners in the AEC Industry to specify and articulate with a high level of clarity the content and reliability of Building Information Models (BIMs) at various stages in the design and construction process. It defines and illustrates characteristics of model elements of different building systems at different Levels of Development.

Masterformat – A standard used for organizing specifications and other written information for building projects in North America.

Methodology – Is a construction methodology within the Bexel Manager created based on the structure of works and the positions of selected classification, based on which a schedule can be created.

Plan – A plan describes a maintenance position like, for example, monthly elevator checks within the Facility Maintenance module.

Quantity takeoff – A custom, model-based takeoff by various criteria.

Quantity takeoff template – is a template of a custom, model-based takeoff by various criteria, which can be exported to various projects.

Selection set – A group of elements, crated by various criteria or manually using different tools like Navigation Regime or Selection Regime tool.

6D BIM Model – BIM model, usually formed in BIM Analysis tool software by integrating as-built documentation as well as all documentation needed to support facility management.

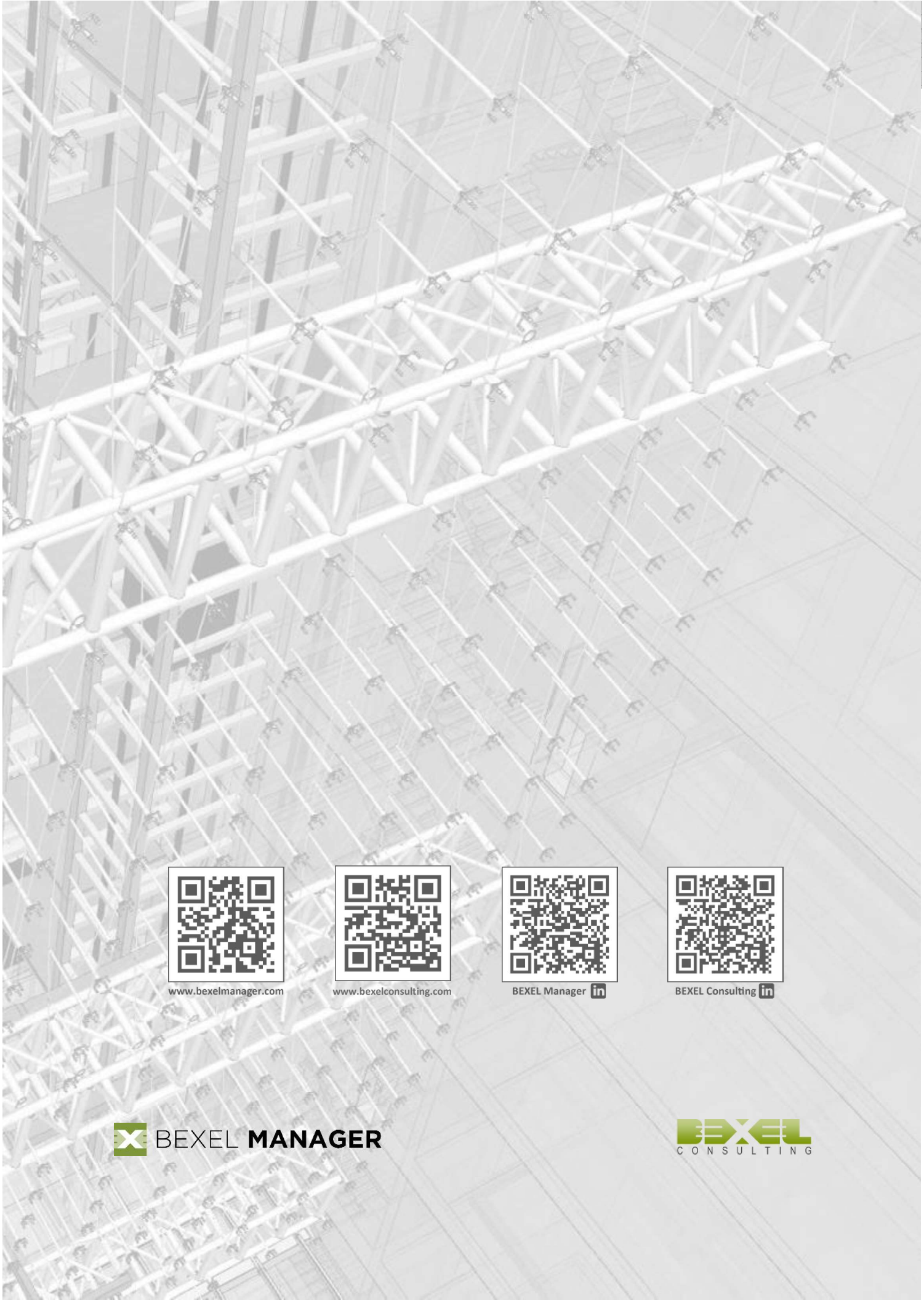
Smart Selection set – A group of model elements created based on defined rules.

Soft Clash (Clearance) – Detects the distance between the individual elements of the system that is not large enough and exceeds the allowed tolerance.

3D BIM Model – 3D model consisted of BIM elements, which serves as the basis for generating all visualizations, animations and analyzes such as synchronization and coordination of all types of construction works, quantity takeoff and bill of quantities of works, generating 4D and 5D building simulations, monitoring construction, maintenance of the building, and more.

Uniformat – A standard used for classifying building specifications, cost estimating, and cost analysis in North America.

Zone – A zone within the Schedule Editor module represents a level in the schedule and consist form zone objects, for example, buildings, categories, families, selection sets, etc.



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