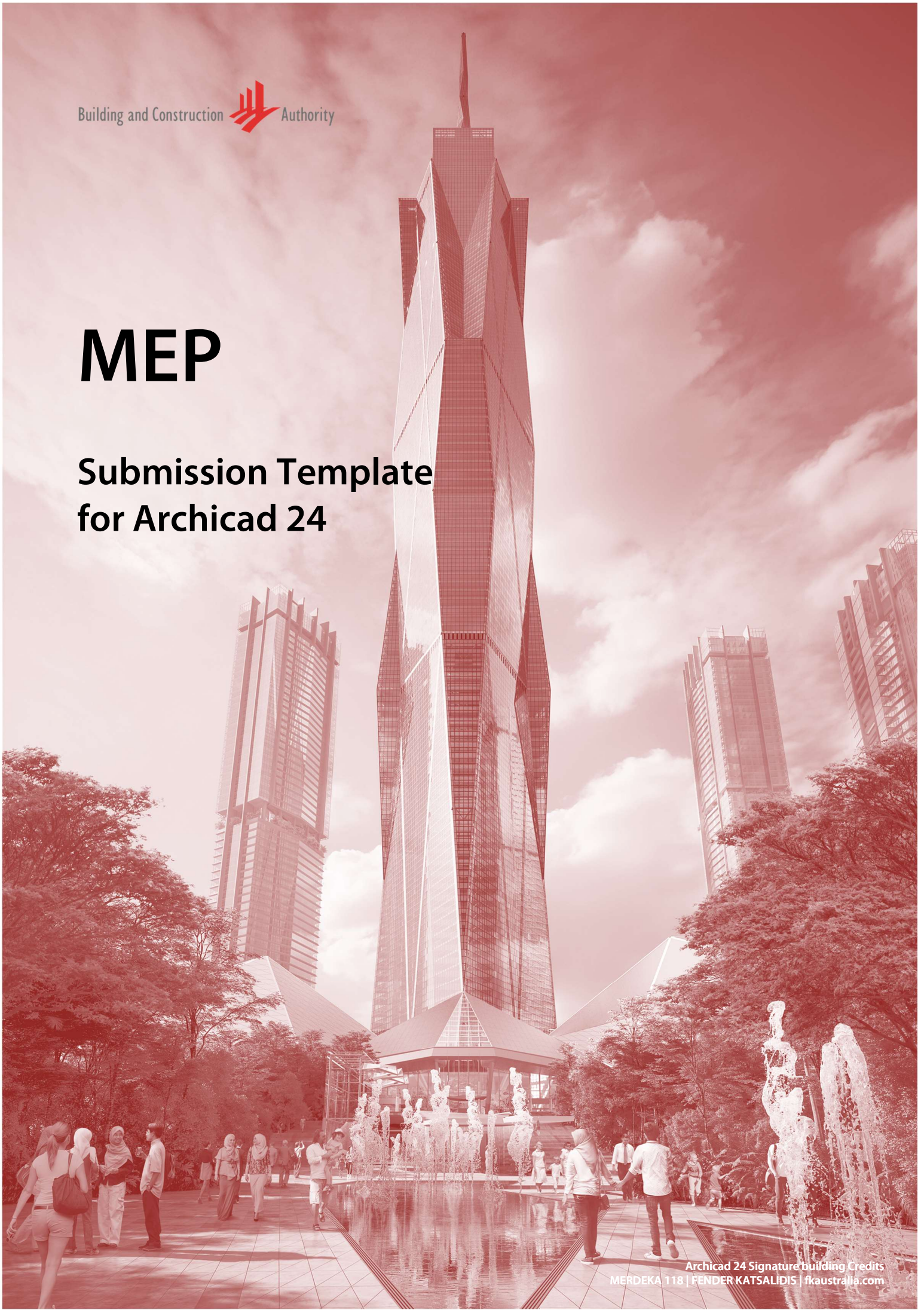
Building and Construction Authority

MEP

Submission Template for Archicad 24



Archicad 24 Signature building Credits
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INTRODUCTION

The objective of this document is to assist mechanical engineers in developing BIM models collaboratively based on both the *Reference Model* and *One-Model Concepts*.

This is a generic reference guide and shall not be considered as an extensive document including all project cases. The template and actual workflows may be changed based on certain scenarios and the users are recommended to audit and revise their workflows from project to project.

This document is focusing on the use of GRAPHISOFT Archicad 24 with regard to the requirements of BIM collaboration and it does not include the explanation of Archicad terms in general.

Though the solutions demonstrated in this guide are aligned with the specifications of the Singapore BIM e-Submission Guidelines and Code of Practice, the users are required to check the actual requirements and GRAPHISOFT shall not be held responsible for non-compliance.

Architectural project delivery and submission is not covered in this document, for details refer to the relevant Archicad templates and guides available at the CORENET website.

The current version of the template and its user guide is under constant development and updates may be available at a later time.

Find the **BIM e-Submission Templates and Guidelines** at the CORENET website here:
https://www.corenet.gov.sg/general/building-information-modeling-(bim)-e-submission.aspx

Find the **Archicad Libraries** for each template on the GRAPHISOFT SG website here:
(requires GRAPHISOFT ID and SSA license to log in)
https://graphisoft.com/sg/ssa/downloads

ONE-MODEL CONCEPT vs. REFERENCE MODEL CONCEPT

Compared to the *Reference Model Concept* where each discipline is able to edit and modify its own model only while using the others' models as protected references alongside their own, the One-Model Concept allows different disciplines to work on one central model. The members of these disciplines have different access rights to edit elements and properties depending on their role in the project.

The One-Model Concept can be followed in case all three disciplines (architects, structural engineers and MEP engineers) **are using Archicad as the BIM authoring tool**.

Working with the One-Model Concept does not mean that there are no links in the project or that there is only one single project file for the modeling and documentation.
Creating modules/groups improves the workflow for example by the easier management of repetitive parts. It also helps by separating the work areas of disciplines if needed, for example in case of combined models of architects and MEP engineers where the two disciplines usually should not change the other domain.
In case of collaboration between architects and structural engineers however, it is necessary that **the structural team has access to certain elements that were originally defined by the architects** (beams, columns, etc.) for refinement. These **refinements are done on the architectural elements directly by the structural engineers** with the One-Model Concept.

The One-Model Concept may also have **file separation for documentation purposes** or performance optimization.

Due to the nature of MEP modeling, the one-model concept and the reference modeling requires the same from the MEP team since the architectural elements are not used directly but referenced in both cases.

Note: **No IFC file exchange is necessary when using the One-Model Concept** compared to the Reference Model Concept.

MEP WORKFLOW

In regular reference-based workflows the MEP team provides design consultation during the Conceptual Design stage and is not expected to create BIM content until the Preliminary Design stage.
In the One-Model Concept however, the MEP modeling can be started in the earlier phases already, shortening the overall project delivery time.

One workflow example is as follows:

1 **The architectural team prepares the unit files** (eg apartments that are repetitive in the building) **and the block file** (eg building that contains the apartments).

2 **The MEP team prepares the Project Base File** according to the architectural project, based on the MEP template.

3 **The architecturally complete unit file is hotlinked into an MEP base project**. The unit file is linked as a whole teamwork project - there is no need to publish MOD or PLN files. During the import of the architectural model (including its documentation and annotation elements) unnecessary content will be created that the MEP team will have to filter by Layers for example.

4 **The architecturally complete block file is hotlinked into the MEP base file**. The block file is linked as a whole teamwork project - there is no need to publish MOD or PLN files. During the import of the architectural model (including its documentation and annotation elements) unnecessary content will be created that the MEP team will have to filter by Layers for example.

Note: To avoid discrepancies between attributes within each file, it is recommended to set up and use a *Project Base File* or a template with common attributes if such hotlinking occurs. The preparation of these base files is the scope of the BIM Manager. Any interim changes to the attributes should be thoroughly carried out in all related project files.

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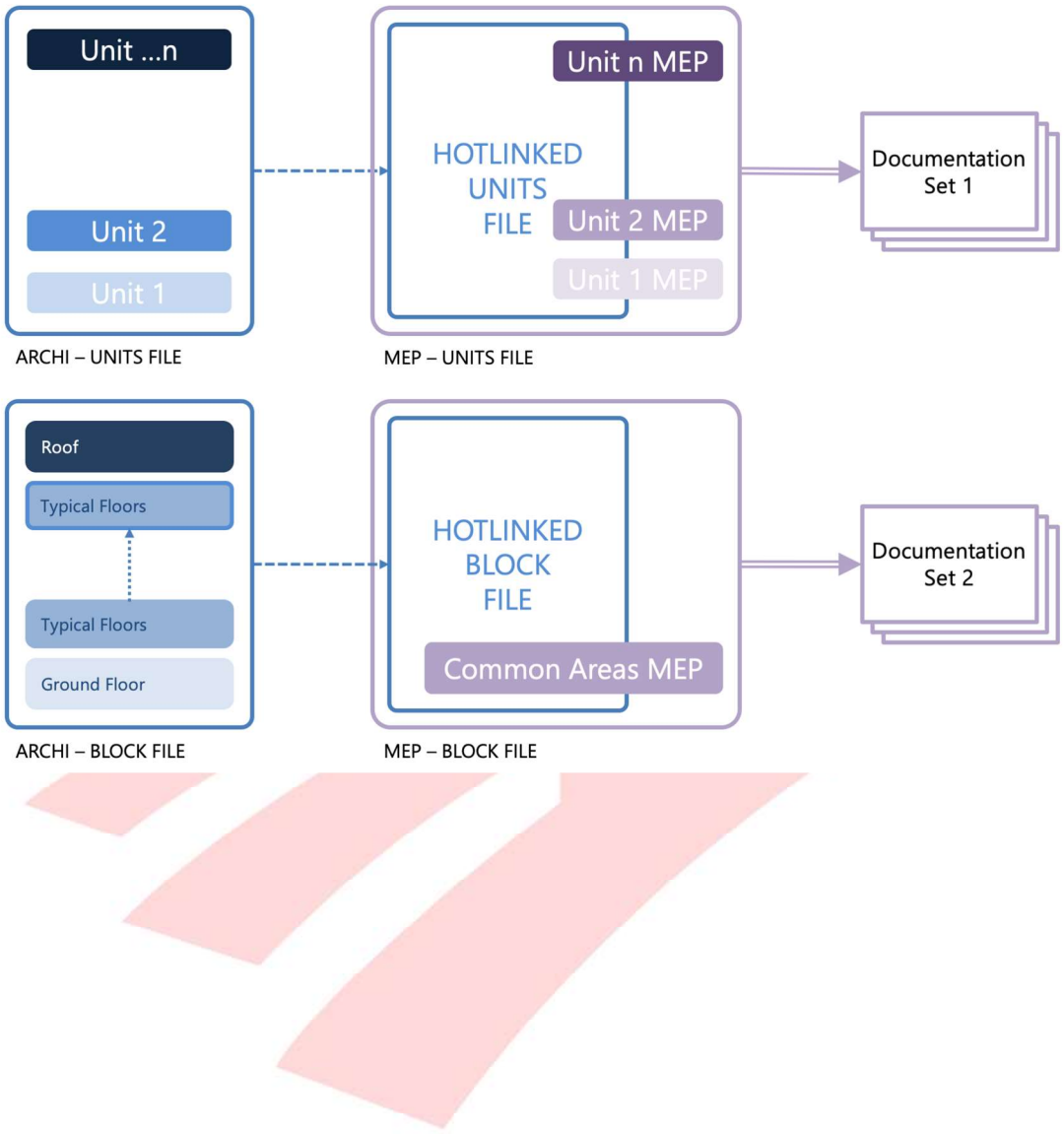
5 **The MEP team will complete the units with MEP elements for each unit type. The architectural model is not edited**. If some editing is still needed it will be done in the architectural units file.

6 **The MEP team then completes the blocks by adding the MEP elements of common areas**. Again, **the architectural model is not edited**. If some editing is still needed it will be done in the architectural block file.

7 **The MEP Documentation Set is partially produced from both the MEP units file and the MEP block file project files/teamwork projects**.

Example of file organization:



TEMPLATES AND PROJECT BASE FILES

Project Base Files can be created based on the existing company templates or the templates discussed in this document, before the project starts.

The Project Base File allows the different teams to link the model portions smoothly. **Usually, the structural and MEP teams use the empty architectural file as a base to inherit their settings and update their templates for the actual projects**.

1 The BIM Manager should **collect the templates for all the disciplines**. These are generic templates.

2 As the **architectural team** leads the project development, they **set the base design and update their template** for the actual project (ARCHI Template).

3 **The structural and MEP teams will use this new template as a reference to set the same framework for their projects** (STR Template and MEP Template). These template files should be stored in a common folder on the company File Server.

4 **The new templates will be used for solo Archicad files, which can be shared** to the BIMcloud later. These solo files can still reside on the File Server.

5 **Share the architectural solo Base File** and start working on the Teamwork Project.

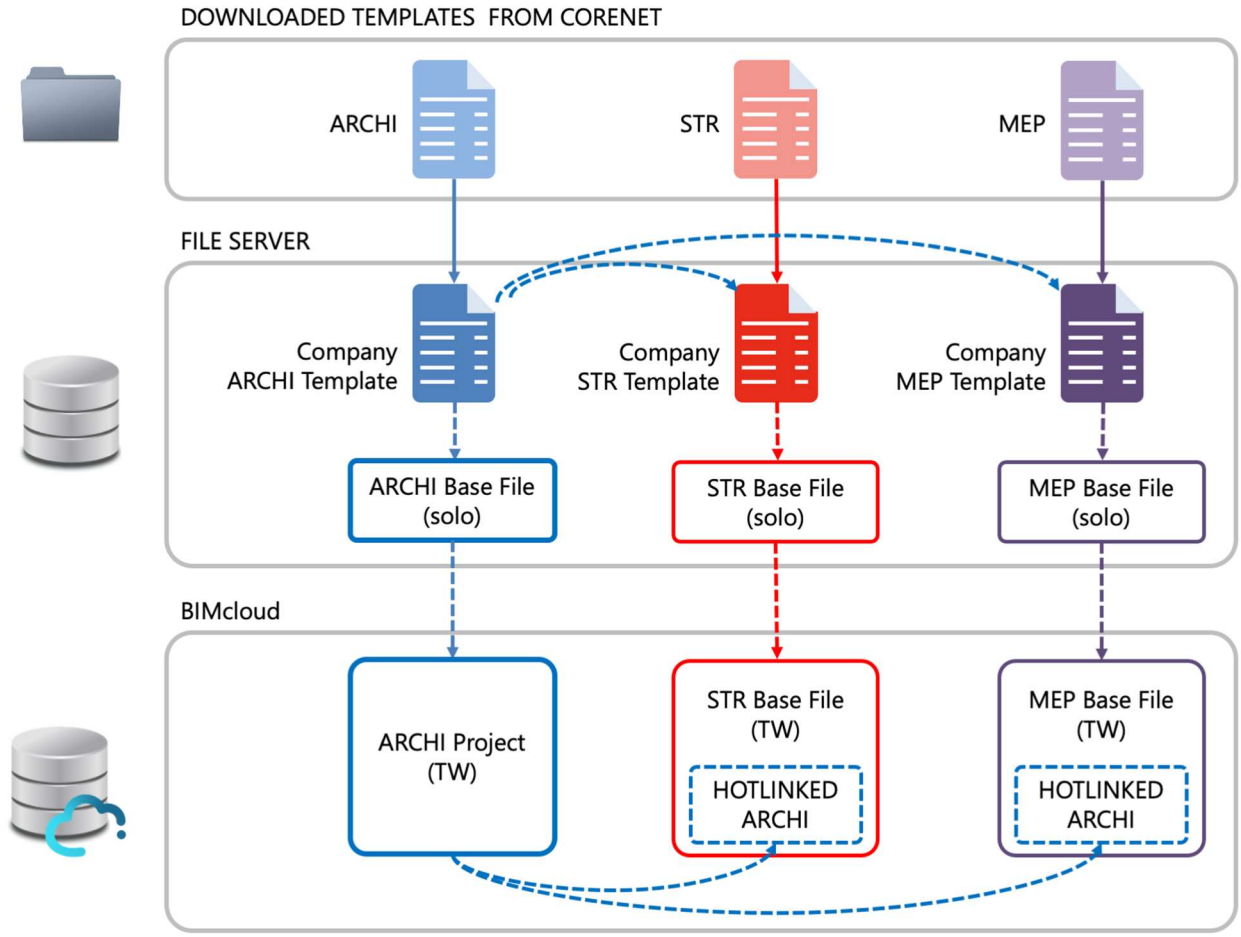
6 Meanwhile **the structural and MEP teams also create a solo Base File based on their updated templates**.

7 **The structural and MEP teams share their Base File to the BIMcloud** to make it a Teamwork Project.

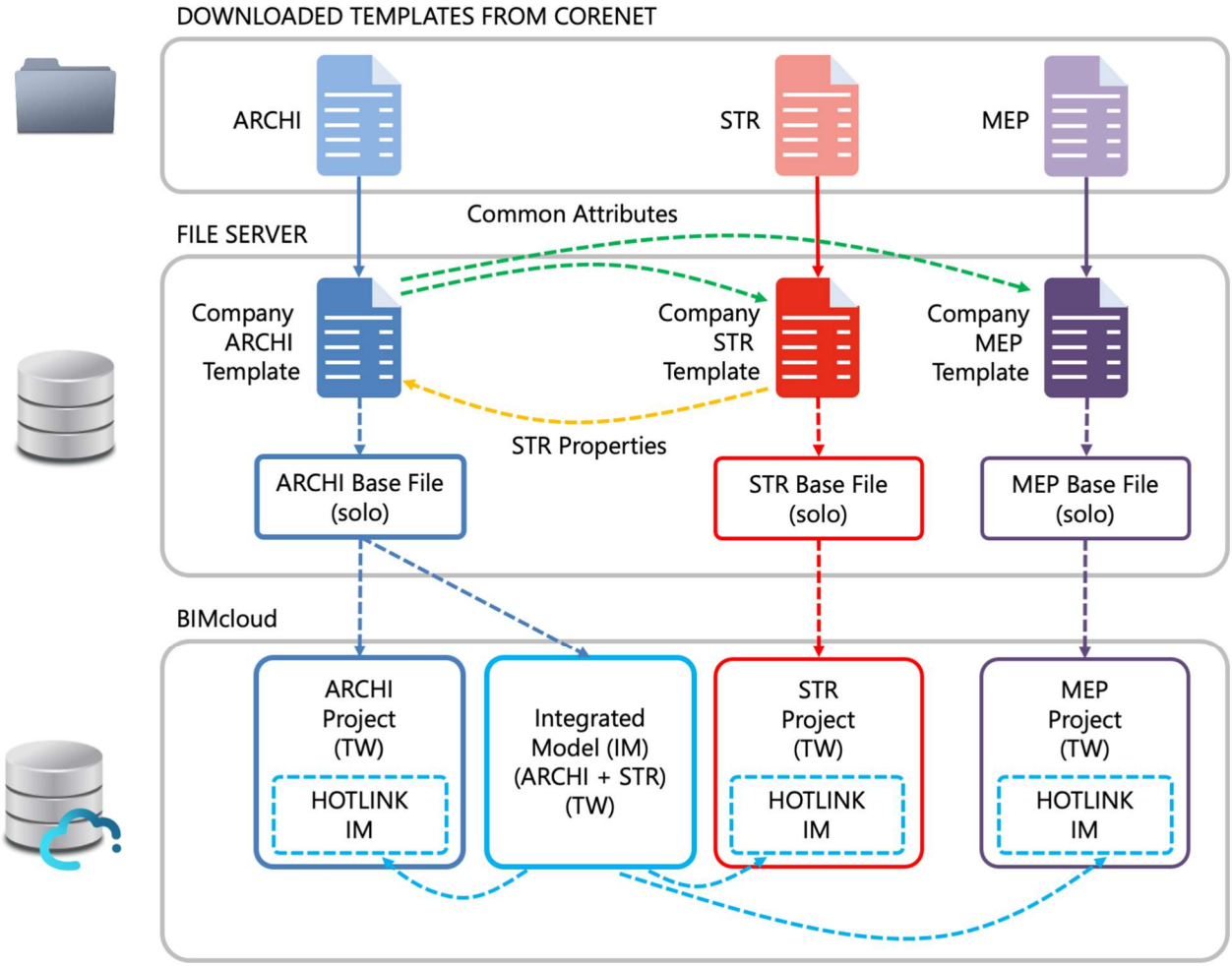
8 **The structural and MEP teams hotlink the architectural projects** into their Teamwork Projects.

9 **All disciplines work on their own projects** and create the relevant Documentation Sets onwards.

Example 1 of file structure and workflow.
Based on hotlinking to Architectural Model.



Example 2 of file structure and workflow.
Based on an Integrated Model approach between Architectural and Structural teams.

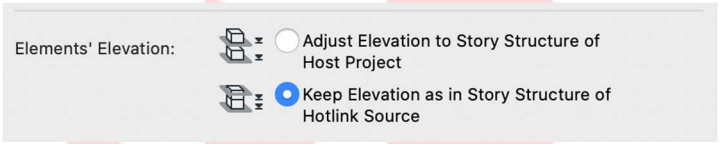


The following are necessary to be defined in the Project Base Files/Templates:

- **Project Location** - based on surveyors' input (external drawings, list of coordinates, point cloud surveys, etc.).

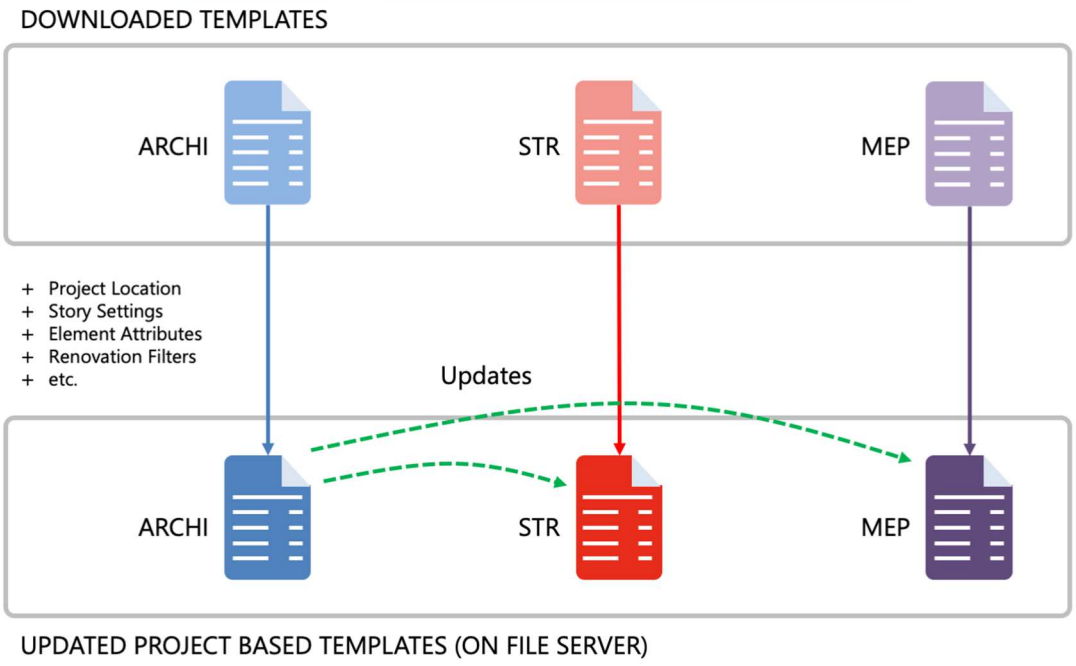
- **Story Settings** - when content is hotlinked in Archicad via the **File/External Content/Place Hotlink** command, check the **Elements' Elevation** settings and choose to:

    - **Adjust Elevation…** when the hotlink's story heights should adjust to the host's story heights, or
    - **Keep Elevation…** when the hotlink's story height should remain intact, and not adjust to the host's story heights.



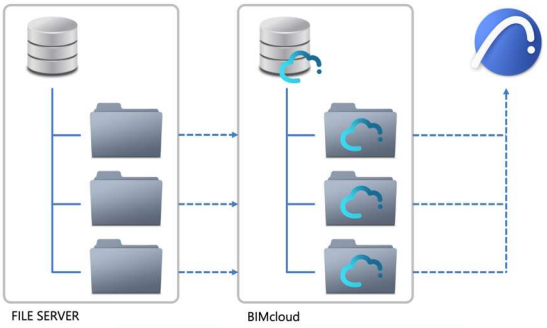
  It is advised to coordinate the story heights between all linked files, to avoid any mismatch or overlapping elements. The setup of Stories is a **process done in each file as they cannot be imported**. Once created, **make sure that affected View Map Cloned Folders are updated** with the IDs and Names.

- **Element Attributes** - to ensure that content shows the same in all linked files, any newly created attributes have to be careful added and synchronized in all project files.



LIBRARY MANAGEMENT

The **original downloaded libraries are placed onto the company file servers**. These will be uploaded to BIMcloud, then accessed and loaded by Archicad. When sharing a solo project with the libraries attached, these libraries will also share (and upload) to the BIMcloud if they weren't uploaded previously.



1. To add these libraries to BIMcloud, go to **File/Libraries and Objects/Manage BIMcloud Libraries...** in Archicad.

2. Log in and select the correct **BIMcloud** from the popup control, with the appropriate logged in user.

3. Click the icon button **Upload a local Library to the BIMcloud** to browse the downloaded libraries on the file servers to add into the BIMcloud.

4. Click **Choose** once the library/folder on the file server is selected, this will upload the selection to BIMcloud.

5. **Close** the Manage BIMcloud Libraries dialog once all libraries have been uploaded.

6. To add these BIMcloud libraries to an active Teamwork project, go to **File/Libraries and Objects/Library Manager…**

7. **Reserve** the Library Manager dialog, and click **Add** – this will open the Choose BIMcloud Libraries dialog

8. **Select** the previously uploaded Libraries, and click **Add**, to add these libraries to the current Teamwork Project

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Note: After the libraries are uploaded to the BIMcloud, the originals on the file server will remain offline and untouched.

GETTING STARTED

Once you have downloaded the template from the CORENET website, do the following preparations before using the template for the first time.

1 Place the **sg_mep-submission-template_v24.tpl** file to:
Option 1: On your file server in a dedicated template folder. Then in Archicad 24 New dialogue, use "Browse" and load this template. If the path or name changes, then you'll need to browse again to load this template again.
Option 2: Copy the template to the Archicad application folder, the template will auto load into the New dialogue when you start the application. This folder is usually located at
C:/Program Files/GRAPHISOFT/ARCHICAD 24/Defaults/ARCHICAD.

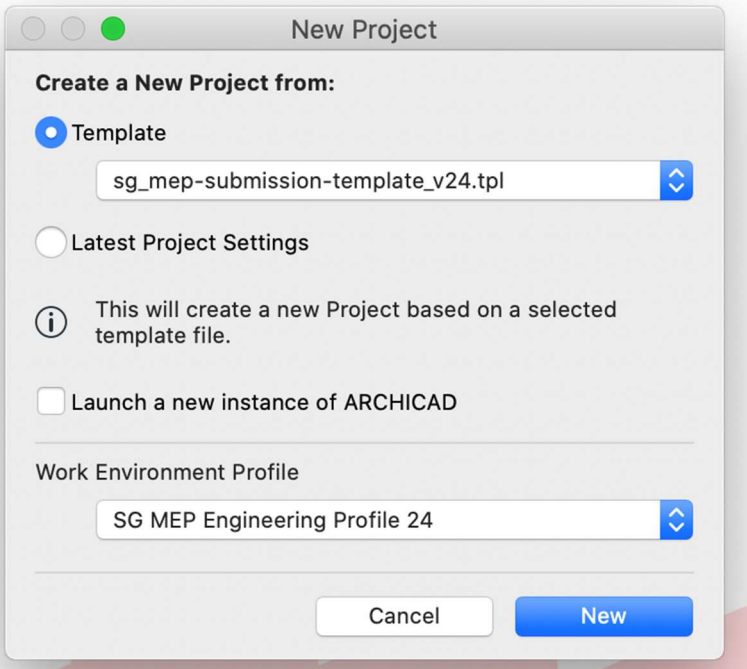
2 Place the **GSSG MEP Library.lcf** library container file into a folder where it will not be modified/moved/deleted, such as a company file server. There are following sections that will go into this in more detail.

3 Launch **GRAPHISOFT Archicad 24** using the desktop shortcuts.

4 The Start Archicad 24 dialog appears, choose **New…** at the top of the dialog.

5 Click into the dropdown list and use the **Browse Template...** option to locate the **sg_mep-submission-template_v24.tpl** template file.

6 Choose the **SG MEP Engineering Profile 24** Work Environment and click **New**.



Note 1: To ensure the authenticity of the downloaded template file, make sure you obtain it from the CORENET BIM e-Submission site:
https://corenet.gov.sg/general/building-information-modeling-(bim)-e-submission.aspx

Note 2: The template is constantly improved based on user feedback, therefore minor differences may occur between the actual version and the screenshots presented in this guide. Only the latest versions of the template are available on CORENET.
The naming of the template file indicates the updates and revisions, such as **...template_v24.tpl** for the initial version, then **...template_v24.1.tpl**, **...template_v24.2.tpl**, etc., if available subsequently.

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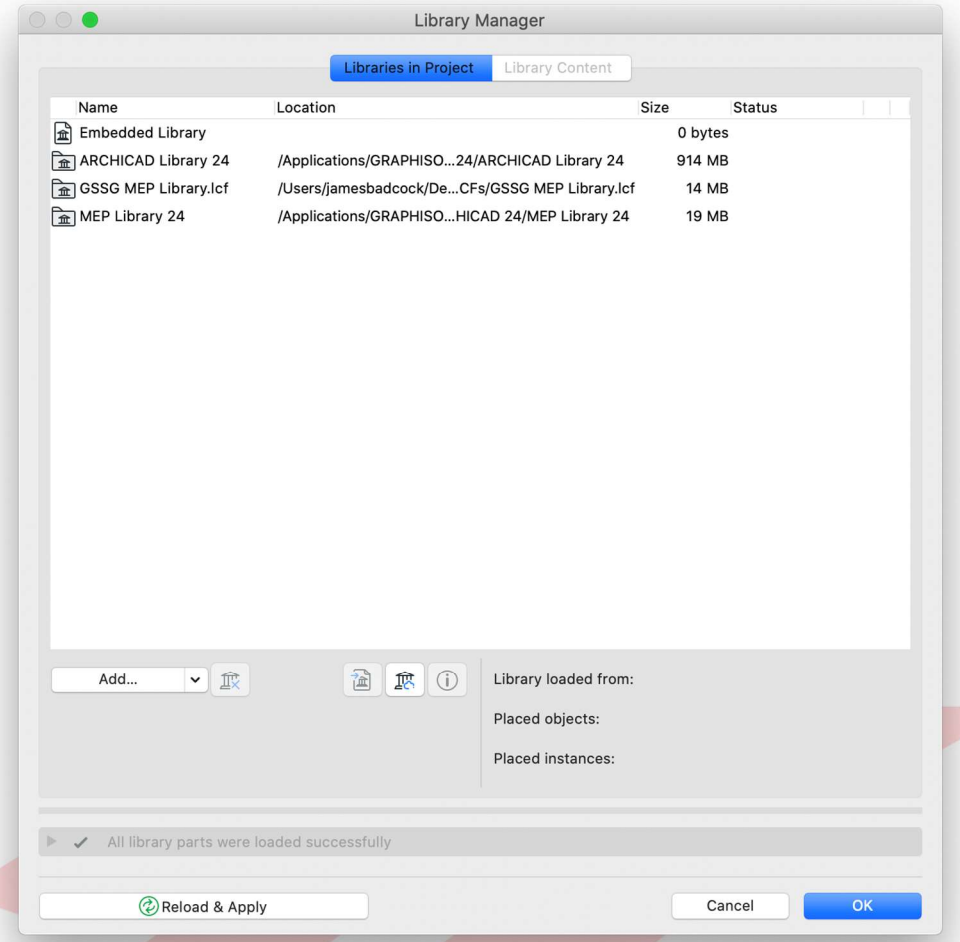
7 Once Archicad 24 is launched, it will not prompt for missing libraries as all warnings are collated into the Action Center, therefore go to **File/Libraries and Objects/Library Manager…** to check if the GSSG MEP Library.lcf is linked to the project or not. If it is missing, then you need to Add it.



8 Click **Add...**. Locate the LCF file and click **Open**.

9 Click **OK** to close the Library Manager and load the libraries.

WORK ENVIRONMENT PROFILES

To help with work efficiency, the MEP team might create custom *Work Environment Profiles* to provide a customised interface for the different MEP disciplines (Water, Gas, ACMV, Electrical, etc.), for example to show the relevant tools only.

Along with the MEP template, an MEP Work Environment has been developed, to show the most useful and needed tools.

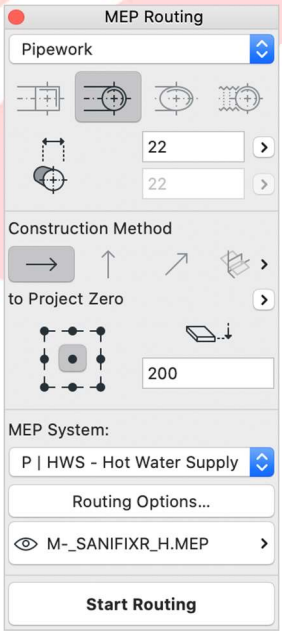
These Work Environment profiles can be imported into Archicad via the **Options/Work Environment/Work Environment...** command. Click **Import...** to browse and import the relevant folder containing the profiles.

Note: Work Environments are individual preferences of each computer/user, therefore cannot be managed centrally. All users have to import/create them for themselves.

If not using the Work Environment profiles provided by GRAPHISOFT, then make sure the following palettes are added:

- **MEP Engineer Toolbar** - **Window/Toolbars/MEP Engineering**

- **MEP Routing** palette - **Window/Palettes/MEP Routing**



HOTLINKING THE ARCHITECTURAL PROJECTS

Once the architectural elements are ready for documentation, it can be hotlinked, into the MEP project. Either using native Archicad files or other formats converted to IFC file format. In a Teamwork environment the following steps are required:

1 **Open the MEP Base File** (TPL or PLN format) in Archicad as an offline file and **verify that it has the same settings (such as Attributes) as the architectural project**. **Do not load any additional Libraries** other than the default Archicad Library and the MEP Object Library.

2 Go to **Teamwork/Project/Share...,** name the project accordingly to the company standards and share it. **The file will be uploaded, and the linked Libraries will also be shared on the first occasion when they are shared**. In subsequent cases Archicad will detect **if the Libraries are already present on the server and will use those instead of re-uploading** new libraries.

3 Go to **File/Libraries and Objects/Library Manager...** and review the Libraries, to make sure there are no missing objects or libraries.
For example, the Archicad 24 Library, MEP Library 24, GSSG Libraries and any custom company libraries should be loaded.

Note: Usually all the disciplines for the one project for would reside on the same server. In case they are hosted on separate servers, **make sure that the offline Libraries are located on the same location of the file server** to ensure easier update of the uploaded library content.

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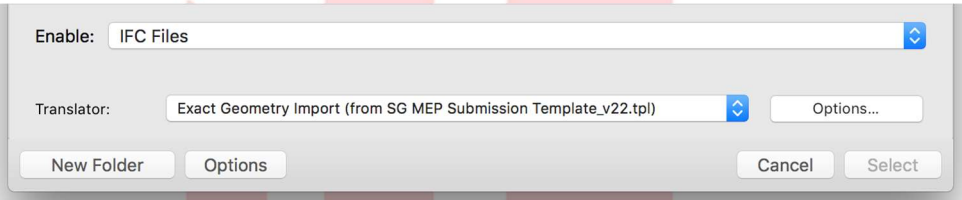
4 **Go to a plan view** in the MEP project and insert the module via the **File/External Content/Place Hotlink...** command.

5 **Make sure that the Master ID and Master Layer are defined** for each module to make filtering easier later.

Note: **Master ID will add a prefix to the ID** that is set in the Element Settings dialog (*Compact ID*). The Master ID and the Compact ID together will result in the *Full Element ID*. **All elements in the module will get the Master ID prefix when linked**, the source will preserve the Compact IDs of course.

6 **Choose Hotlink from Teamwork file...** in case of the architectural block. Click **Place Module** when finished with the setup. The inserted files can be native Archicad files, such as MOD or PLN, or content from external applications in IFC format.

Note: **When selecting IFC files for linking** (original architectural model created in Revit for example), the IFC **Translators need to be defined based on an existing template file**, which stores the actual translators.



7 **Insert all stories**, make sure to match the correct ones.

8 Repeat the same process for the units MEP project.

CORE INFORMATION (ELEMENT PROPERTIES)

The MEP Requirements (from the BIM e-Submission portal) has several required Core Information properties that have to be defined for submission. Compared to the structural referencing **the MEP elements having the properties are part of the native model content** and can be edited directly.

1 Go to **Options/Property Manager...** to see the available properties (in both architectural and structural projects).

The following properties are available in the MEP template on their own, differentiated by their prefixes:

- **MEP | - required to be filled out correctly for submission**.

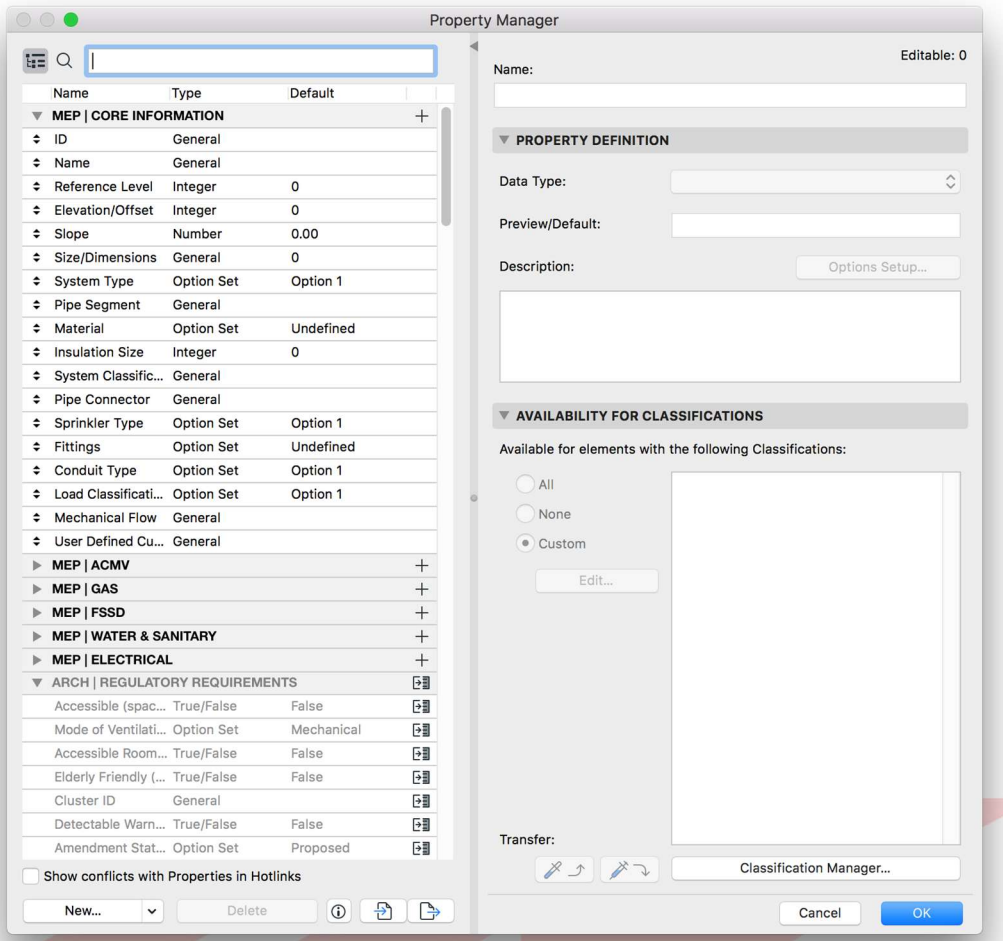
When linking the architectural model into the structural project the architectural Properties will be shown if they are not present in the structural file yet. These can be:

- **without prefix -** the default Archicad factory template (architecture) Properties. Since these are very generic Properties, the architectural team might have already replaced/filtered these to have relevant Properties only for their needs, therefore **these may be (or may have been) deleted in the architectural project**.
  To make the setup easier, **these properties are arranged to the end of the property list** in the architectural project.

- **ARCH | - the Properties used for the architectural native BIM submission**. These Properties will be irrelevant for the MEP workflow.

Note: **Properties are not considered as Element Attributes and are identified by the Groups they are in and their Names**, not by Index Number.

These imported properties will be greyed out and like any other settings of hotlinked modules, **they are not editable in the host file** (the MEP file).



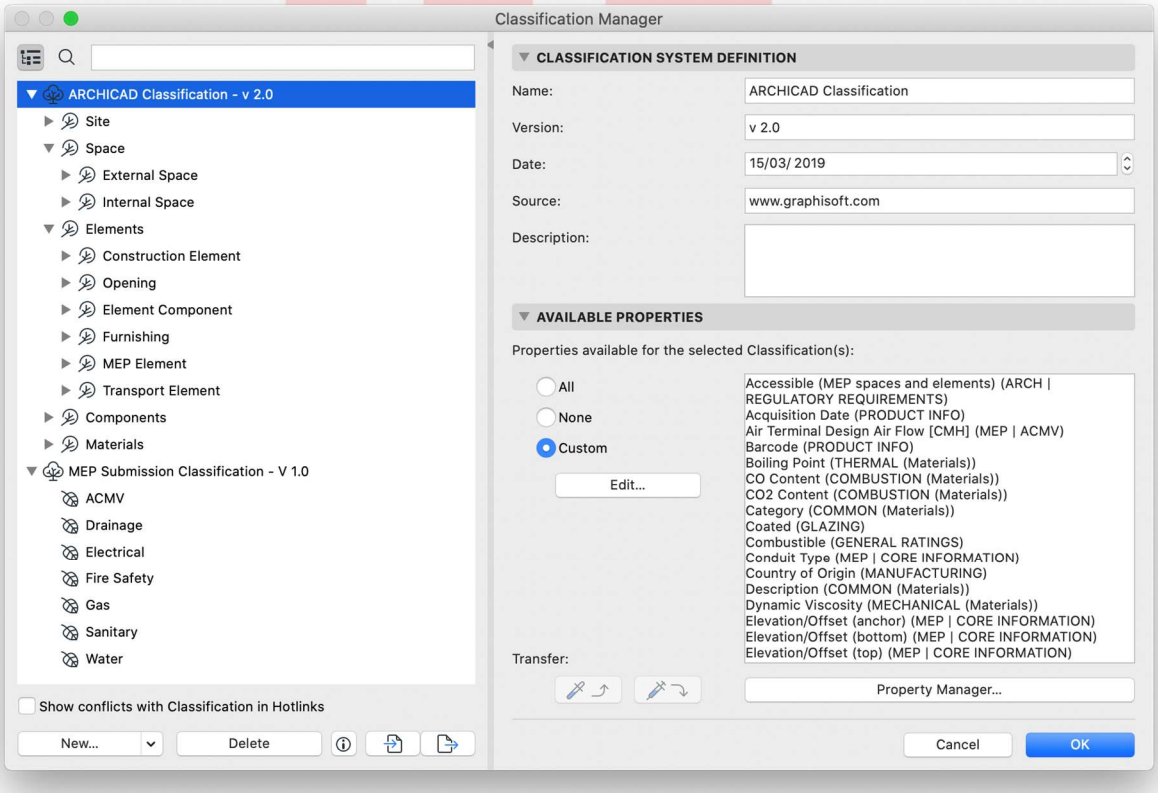
Find more info on **Properties in Hotlinks**
at the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide/128340/

CLASSIFICATION SYSTEMS

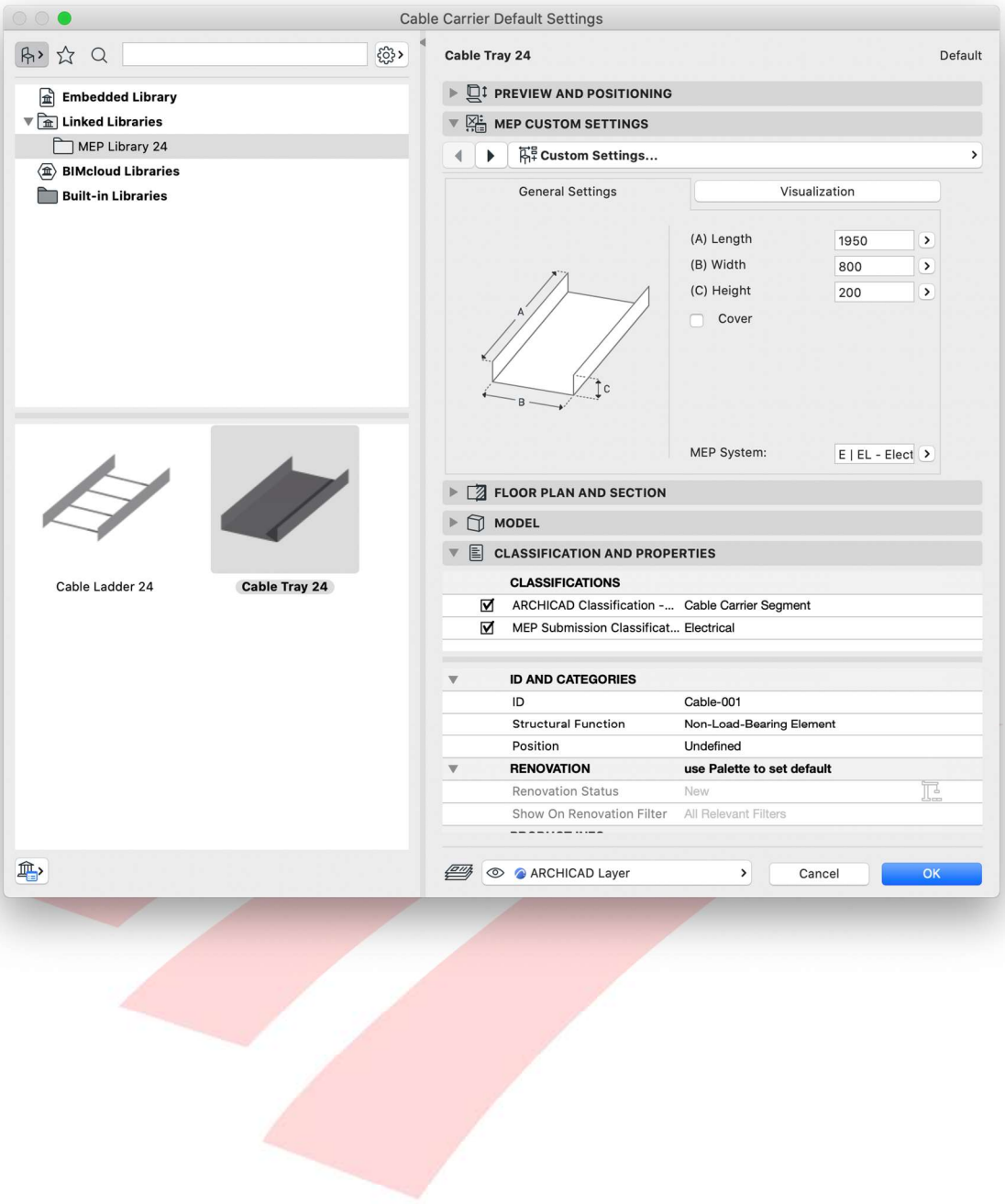
Though there is no specific classification system in effect for MEP elements, it is recommended to use the MEP Submission Classification system that is provided with the template. **Using classifications makes searching, filtering and element definition easier, than Tool-based methods**, for example. At the same time, **classifications automate the assignment of Properties** (Core Information) to the elements.

Open **Options/Classification Manager...** to view the Classification Systems:

- **Archicad Classification – v 2.0** - comes with the default Archicad template. It is recommended to keep it as the default IFC Translators are based on these classifications.
- **MEP Submission Classification – V 1.0** - a simplified system (compared to the default) for categorizing MEP elements.



Classifications can be set for individual elements under the **Classifications and Properties** panel in the element settings dialogs or stored with Favorites.



MEP PLAN REPRESENTATION AND MODELING IN THE MEP PROJECT

Once the architectural models are inserted, the predefined Views in the *Navigator* should show the proper representation of the elements on the generic stories.

The modeling conventions do not have specific requirements, the MEP team will use the built-in MEP Modeler features as-is and replace certain elements with their Singapore-specific version. For generic modeling using the MEP Modeler refer to the MEP Modeler help guide.

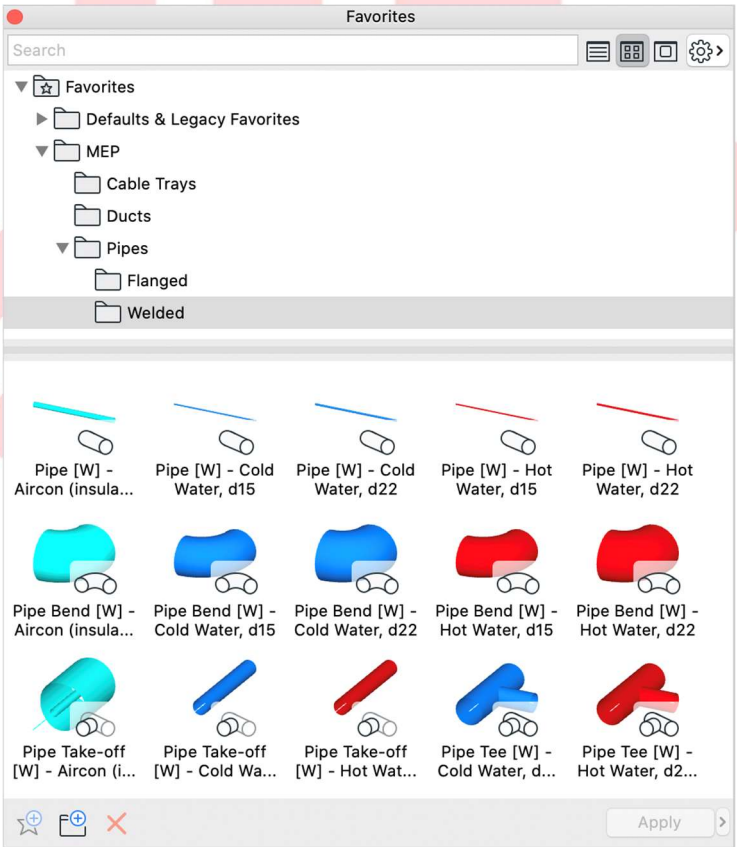
Find the **MEP Modeler** help guide
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide-chapter/85633/

Favorites

The **MEP template includes MEP-relevant Favorites** only, without any default architectural Archicad Favorites, since there is no need for the MEP modelers to create any such elements in their model.

The Favorites store MEP System settings, Connection Types and Sizes and overall Dimensions of the default MEP Library parts and are organized into the following hierarchy:

- **Cable Trays** - has the default Object setting and two examples for cable trays and trunking.
- **Ducts** - includes options for circular and rectangular duct Segments, Bends, Take-offs and Transitions.
- **Labels** - can display IFC Property-based tags for circular and round Duct Segments using the Label tool.
- **Pipes** - includes flanged and welded versions of sanitary, water supply and aircon pipes with Bends, Take-offs and Wye fittings.
    - Flanged
    - Welded



Updating Favorites

The Favorites in the template can be considered as examples - to cover all needs and purposes **users are recommended to update the existing Favorites and/or create their own items to increase their modeling efficiency** and reduce the risk of errors when modeling repetitive parts.

To update Favorites:

- From the Favorites palette: right click on any Favorite and choose **Edit** from the context menu. This will open the relevant **Settings** dialogue to edit directly the Favorite. Click OK to finish editing.
- From the Element Settings dialog: select any Favorite from the Star tab (top left in the dialog), edit on the right side of the dialog then click the **Redefine** button (star with arrows – bottom left in the dialog).

Note: All Favorites in the MEP template, use the Archicad Layer by default, this should be updated with the actual required Layer.

To create a new Favorite:

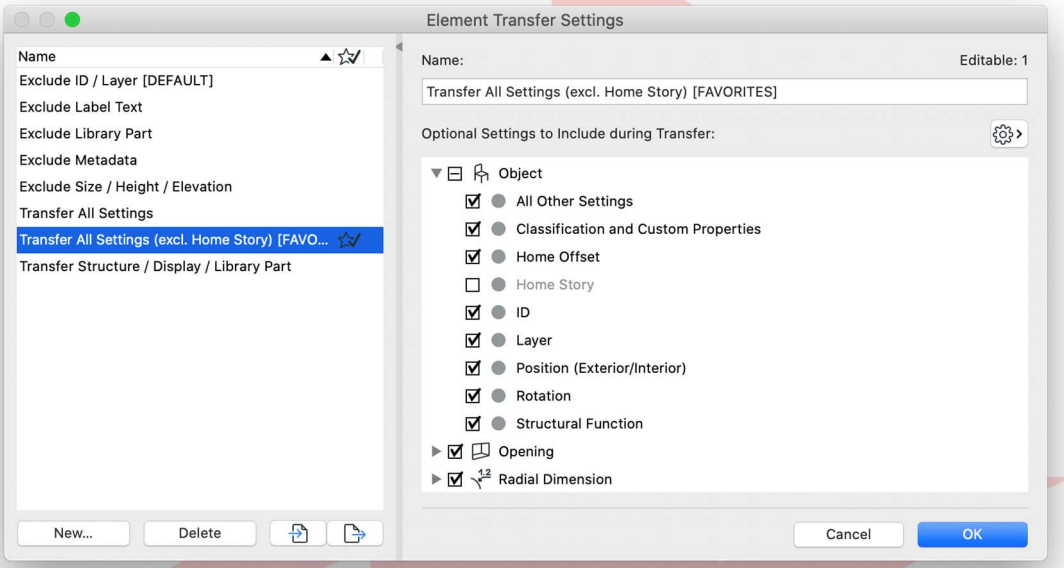
- From the Favorites palette: select 1 MEP element in the model, that has the settings you wish to create a Favorite from. On the palette, click the star icon with the plus (bottom left of palette) to create and name. The new favorite will be created inside the currently active Favorites palette folder.
- From the Element Settings dialog: select the favorites view on the left of the dialog from the Star tab (top left in the dialog), click the star icon with the plus (bottom left in the dialog) to create and name the current settings from the right side of the dialog.

Find more details on **Favorites**
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide/127929/

Using Favorites and Element Transfer Settings

When using Favorites, by double clicking a favorite to apply to a selected element or to the default settings, which settings are transferred depends on the **Element Transfer Settings**. For example, settings like ID, Layer and Elevation can be chosen to not be transferred from the stored favorite.

To adjust these settings, go to the menu **Edit/Element Settings/Element Transfer Settings** or from the Favorites palette, via the cogwheel icon.



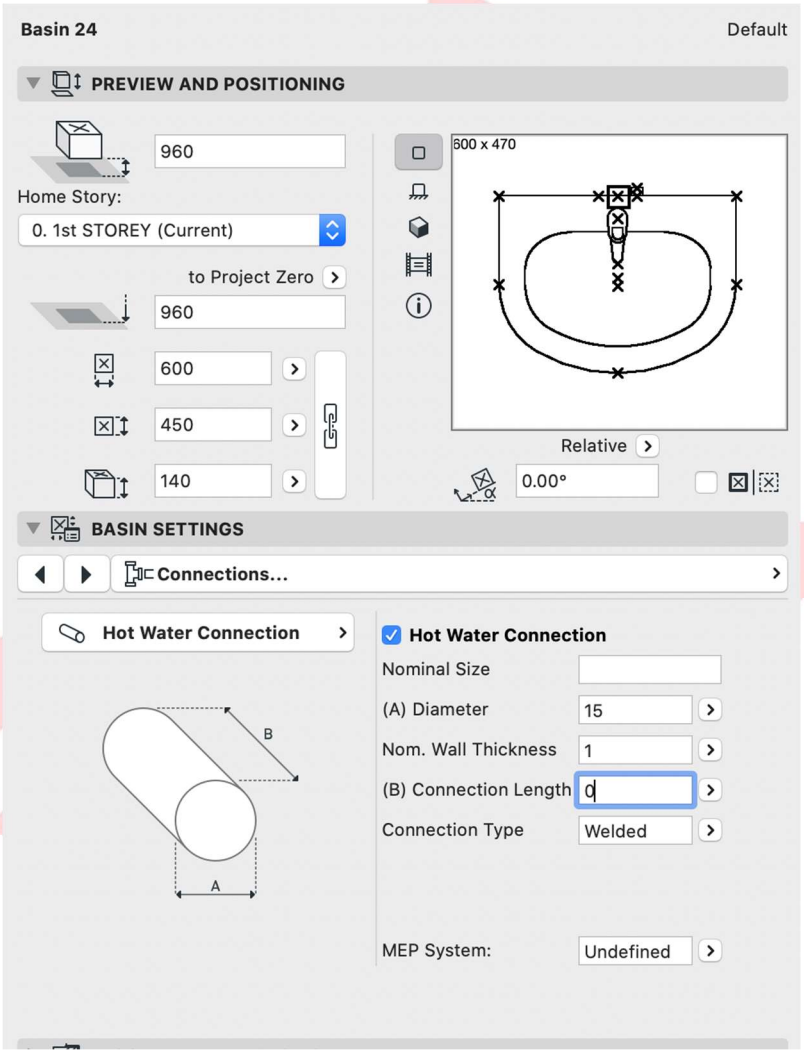
The left side are pre-sets, which can be modified by the user, of different transfer settings that can be selected from the down arrow next to any Favorites **Apply** button, and when using parameter transfer – pickup and inject. The pre-set with the star with tick icon, will be the default when clicking the **Apply** button or **double-clicking** to apply any favorite.

Find more details on the **Element Transfer Settings**
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide/128012/

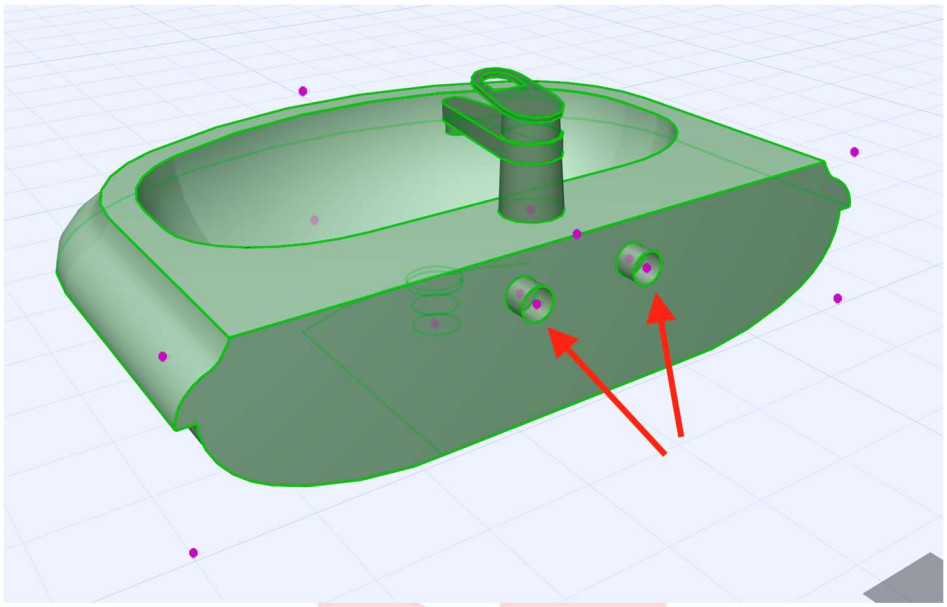
Connections with Hotlinked Fixtures

However, **when linking elements into the project, the connections cannot be created with the linked elements**, typically the sanitary fixtures, coming from the architectural model, but as a more important disadvantage, the connections also become inactive, practically not allowing the user to start routing from the Object. To overcome this, it is recommended to:

1 **Shorten the native Connections of the architectural elements** (in the architectural project).



2 **Place individual Duct/Pipe/Cable Tray segments that fit to the sizes of the future routing** (will actually define the sizes of the connecting elements) so the routing can be started/ended at these connections.



Note: Though placement of starting segments is not a must, in case the MEP Connections of the fixtures are defined wrongly by the architects, the MEP team can still place starting connections with the correct sizes without the need to edit the architectural project.

Modeling Workflow and Routing

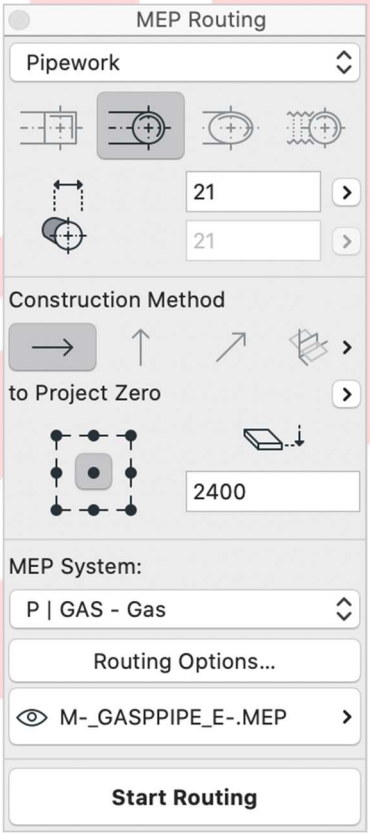
As a best practice the following order is advised when placing MEP elements:

1 Place Terminals and Equipment
2 Create main branches
3 Create Take Offs/Tees/Wyes
4 Connect Terminals to Take Offs/Tees/Wyes

Alternatively:

3 Start routing from Terminals
4 Auto-connect to branches, choose connection on clicking

Open the MEP Routing palette from the **MEP Engineering Toolbar** or by going to **Window/Palettes/MEP Routing**.



Though the Routing palette allows setting the parameters of different segment types when creating new elements, it will adapt and use some of the settings of existing elements when routing is initiated from a node of existing MEP elements.

When connecting to existing elements, insulation and insulation thickness will use the settings from the Routing palette. All other settings will adapt to existing elements being connected to.

Newly created elements will use the parameters as per the Routing palette settings.

Note: Groups must be suspended in order to be able to connect to elements that were created by routing. Routing cannot start at nodes of grouped elements unless they groups have been suspended.

MEP Object Library

GRAPHISOFT Singapore provides custom, localized content for its users with a software service agreement (SSA). The library contains various elements, which will be presented in the following chapters.

The library is named **GSSG MEP Library** and has a uniform **_GSSG** ending for all included Objects.

Find the **GSSG Libraries** on the GRAPHISOFT Singapore website here:
https://graphisoft.com/sg/ssa/

Once loaded, the Library Manager shows two folders and their subfolders within the Library:

- **Electrical**
  - **Fittings**
  - **General Objects**
  - **Lights**
  - **Outlets and Switches**
  - **Segment**

- **Mechanical**
  - **Dampers**
  - **General Objects**
  - **Segment**

- **MEP Marcos** (contains non-placeable objects, used by other objects in Library)

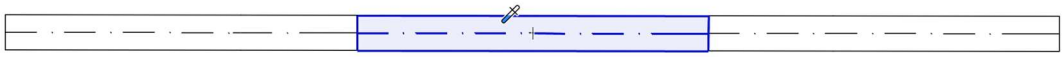
- **Plumbing**
  - **Equipment**
  - **Fittings**
  - **Meters**
  - **Pumps**
  - **Segment**
  - **Tanks**
  - **Traps**
  - **Valves**

Segments with Texts/Labels

As a local requirement, duct and cable tray segments need to show the MEP System information on the plans. To achieve this, individual segments need to be replaced with GRAPHISOFT Singapore created objects that includes the necessary text to be shown.

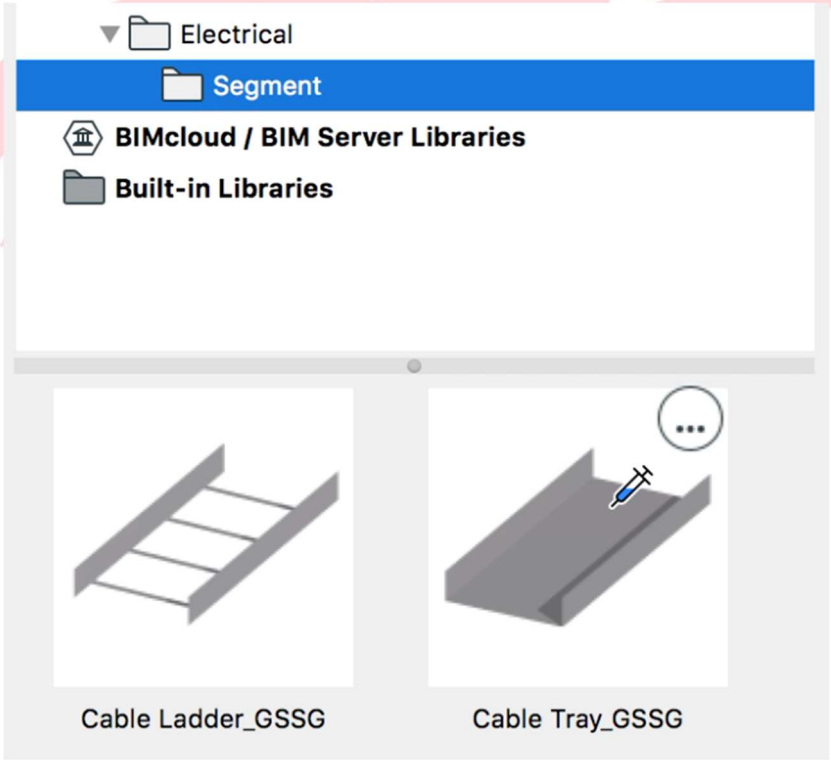
1 Locate the segment to replace.

2 Use the **Pick Up** function (**ALT+click**) to pick up the geometry settings of the segment.

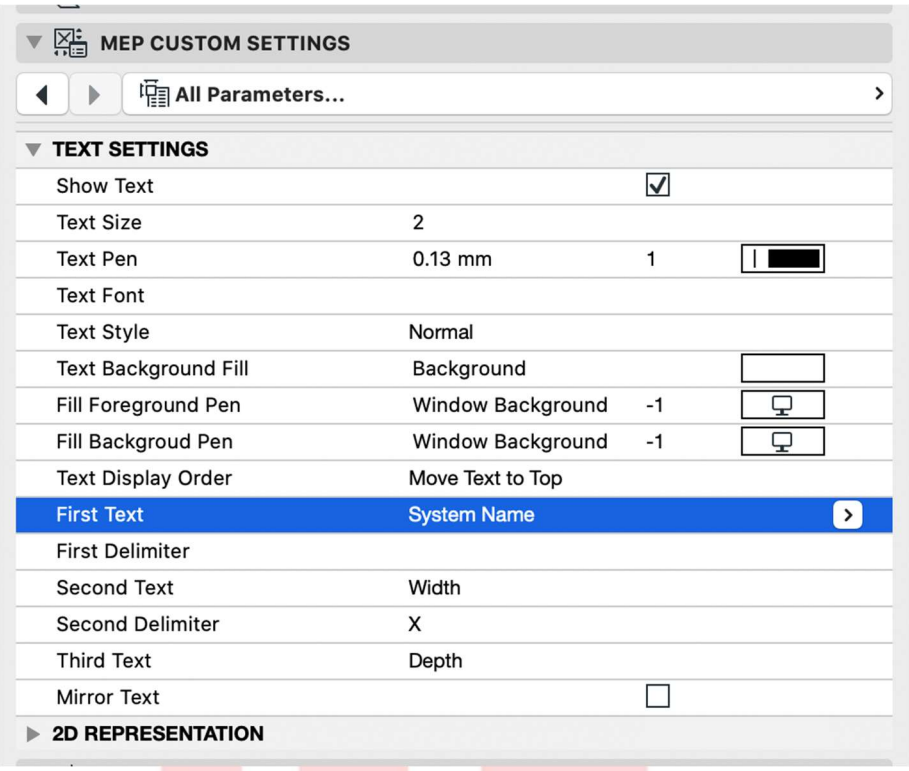


3 **Select the segment and open its settings.**

4 **Navigate to the ..._GSSG equivalent of the element**, but do not select/activate it, otherwise it would override the existing values with its defaults. Instead use the **Inject** function with its shortcut on the Preview picture within the library - **press CTRL/CMD+ALT while clicking on it**. The ..._GSSG Object should now have the inherited settings.

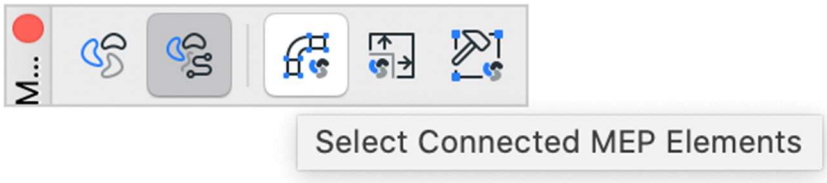


5 Go to the **All Parameters... tab** and change the display options of the text as needed under **Text Settings**.



5 The final result should look similar to the following:

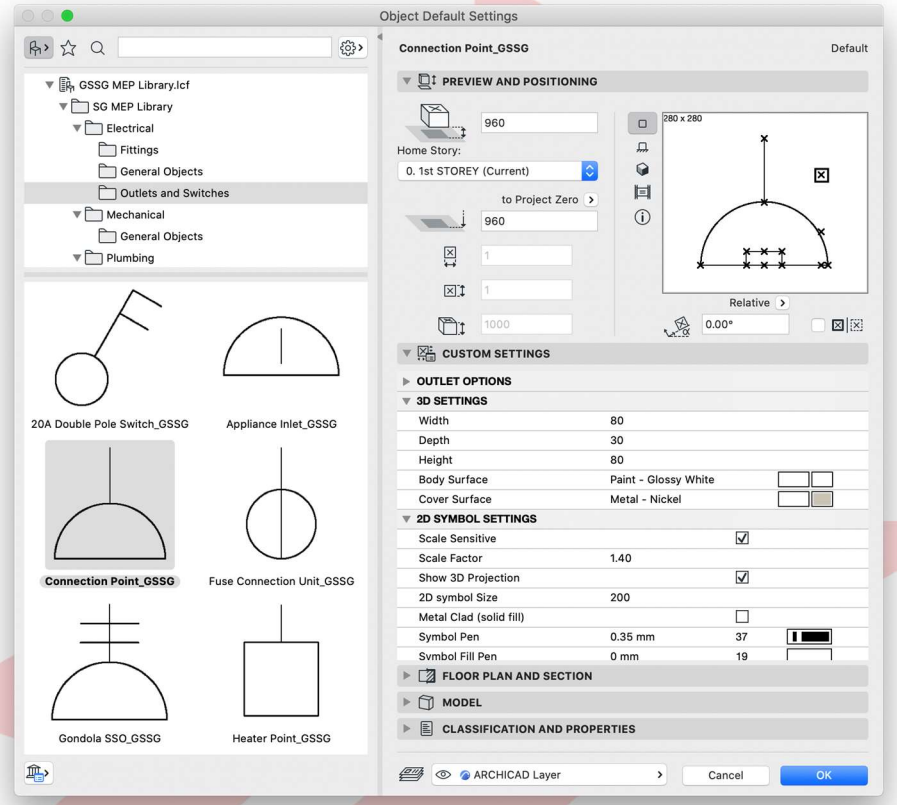
When modeling with MEP elements it is of outmost importance to make sure that the elements are connected properly as it makes the selection and editing easier. The connections can always be checked using the **Select Connected MEP Elements...** function of the MEP Engineering Toolbar.



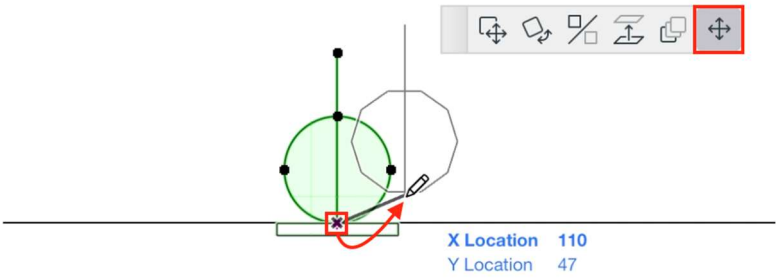
2D Symbols

Typically, electrical symbols are Objects, not MEP parts. In general, the user can:

- set the actual sizes and type of the Object
- turn on Scale Sensitivity to change the size of the 2D symbol on different plans
- turn on actual 3D projection of the element
- add different custom text values to display

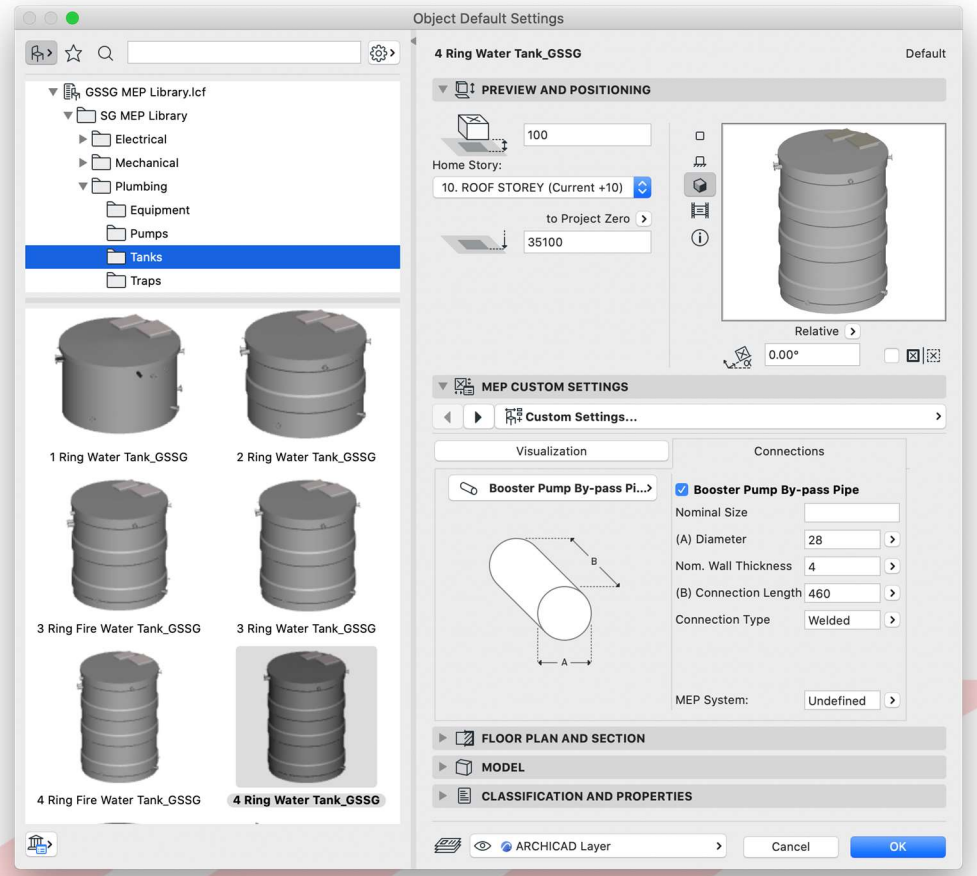


The 2D symbol can be moved independently from the 3D model on the plan views to avoid overlapping symbols by using the **Move node** command of the pet palette.



3D Objects

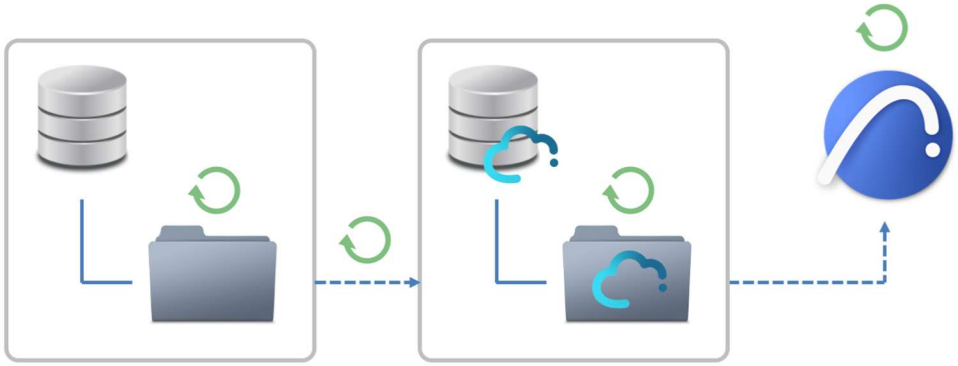
As true 3D objects, various terminal and fitting elements are also available. Their connections include all standard connections for local use in Singapore.



Updating Libraries

The **custom office library might change frequently** by new Objects being added to it in the early project phases or during the implementation process. These **updates should be distributed to the Teamwork users and projects regularly**.

The **updated/new objects should be replaced on the file server first**. Then **the updated folders have to be uploaded to the server**. The BIMcloud libraries can be easily updated without deleting and re-uploading existing libraries.



1 Go to **Files/Libraries and Objects/Manage BIMcloud Libraries...** in Archicad.

2 **Select the BIMcloud library** you wish to update and click the icon button **Update BIMcloud Libraries with a local Library...**.

Note: If the user has the necessary access rights then there is no need to reserve in order to update the libraries.

---

3 **Browse the updated library** on the file server and click **Choose**. An information message will appear indicating the number of objects changed (such as new, deleted or if library is already up to date)

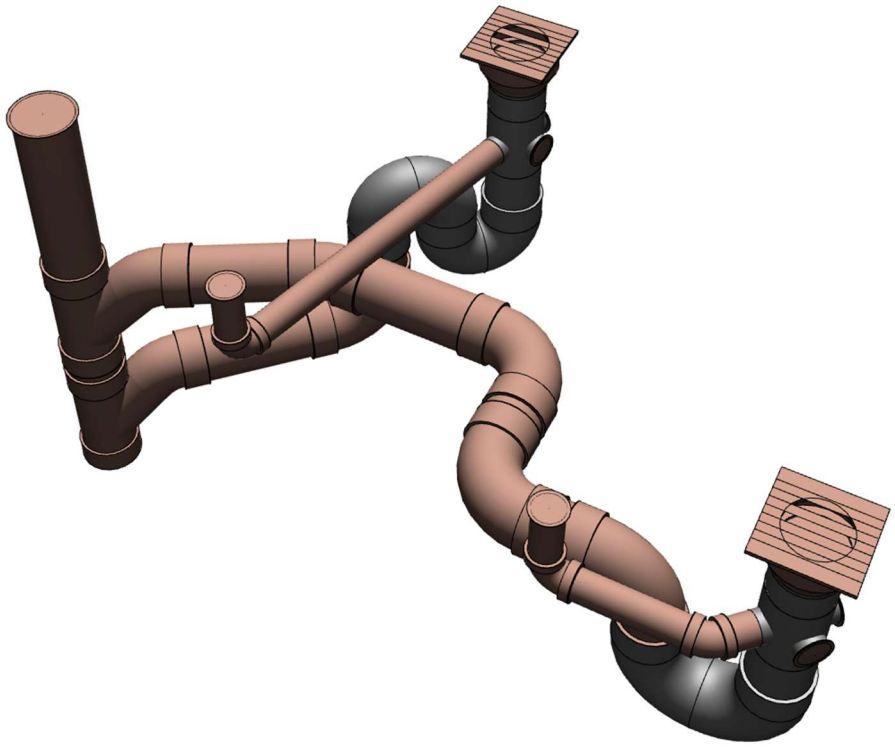
4 Click **Close** and **Reload** when prompted. The new Objects are ready to use.

5 As with newly uploaded libraries, **notify users to Receive**.

Sample Content

Templates can include sample content for the convenience of the MEP modelers. In general, it is advisable to create as many predefined groups as possible, even in an external file, that can be used as a group library file containing predefined configurations of the frequently used variations.

Example of the type of content that could be created:

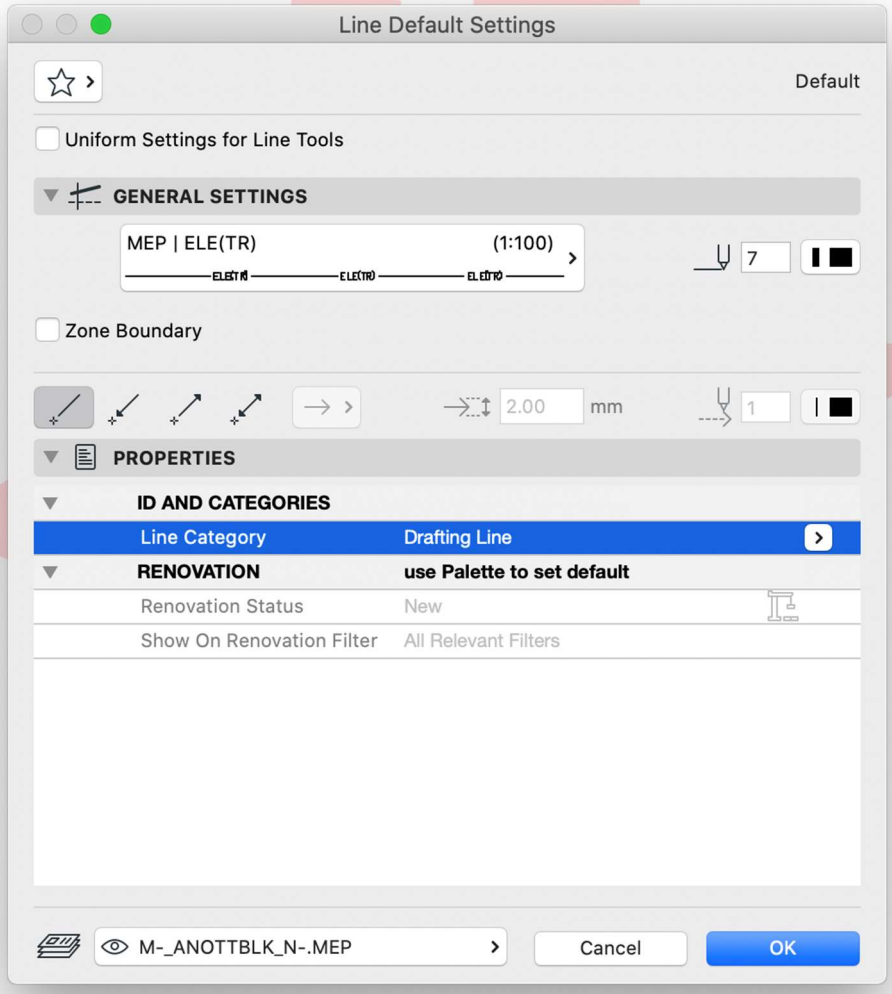


Plans Based on 2D Tools

Those 2D plans where certain systems would require similar or same types of elements above each other, the additional text would still not be sufficient enough for clarification. These plans are typically electrical plans or site plans where no actual modeling is done, instead, traditional 2D elements are used, such as Lines, Polylines and Arcs with different symbol-based Line Types to specify the number of overlapping routes.
Typically, these plans would have Legends for the Line Types.

1 Activate the **Line/Polyline/Arc tool**.

2 Pick a **Line Type** and set the Line Category as **Drafting Line**.



NAVIGATOR - PROJECT MAP AND VIEW MAP

The **Project Map** contains sample Stories, Sections, Elevation, Worksheets, 3D Documents and Schedules to start with.

- Worksheets were created to introduce sample content, such as:
    - **Endorsements** - the textboxes can be used for Master Layouts
    - **M | Legend** - sample legend content for Layouts
    - **M | Schematic Diagrams** - the diagrams are completely 2D drafting elements as they cannot be directly derived from the model. The actual diagrams can be created on other separate Worksheets, then placed on Layouts for documentation.
    - **M | Text-Based Linetypes** - for 2D-based drawings special Lines can be created as per the examples. Use 2D tools to create the line segments (can be converted texts from existing DWG drawings).

The **View Map** has the following folder structure:

- **3D** and **3D (Simplified)** - generic 3D views, without Zones for better understanding the architecture.
- **M | WORKING VIEWS** - these can be used as a universal reference to switch back to an editable mode for modeling in plan view.
  The plans have View Settings that are very similar to the default Archicad settings with all Layers turned on and an extended architectural Pen Set, originally used for the architectural native BIM submission. The Floor Plan Cut Plane settings are kept as defaults as well.
- **SUBMISSION** - this folder has a structure for Stories, Sections and Elevations by agencies to submit to:
    - **BCA**
        - **CDCD >** PLANS
        - **TSED >** PLANS
    - **CBPD >** PLANS
    - **CityGas >** PLANS
    - **FSSD**
        - **ACMV >** PLANS
        - **DETECTOR >** PLANS
        - **FPS >** PLANS
    - **IDA-TFCC >** PLANS
    - **SPPG**

        - **ESS** > PLANS
        - **UPS** > PLANS
    - **PUB**
        - **WRN** > PLANS
        - **WTR** > PLANS
    - **SMB | SECTIONS & ELEVATIONS** > **S**ECTIONS / ELEVATIONS

- **TENDER** - this folder has a structure for Stories, Sections and Elevations by MEP disciplines:

    - **ACMV** > PLANS
    - **Electrical** > PLANS
    - **FPS** > PLANS
    - **Gas & Water** > PLANS
    - **Rainwater Harvesting** > PLANS
    - **Sanitary (Upper)** > PLANS
    - **Sanitary (Lower)** > PLANS
    - **TDR | SECTIONS & ELEVATIONS** > SECTIONS/ELEVATIONS

Views in *Cloned Folders* are automatically created with the pre-set View Settings, whenever new viewpoints are created in the Project Map.

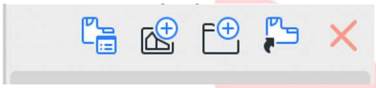
Find more details on the **Cloning a Folder**
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide/127944/

Initial Setup of the View Map

The initial View Map structure is a sample that can be changed/completed according to actual project needs:

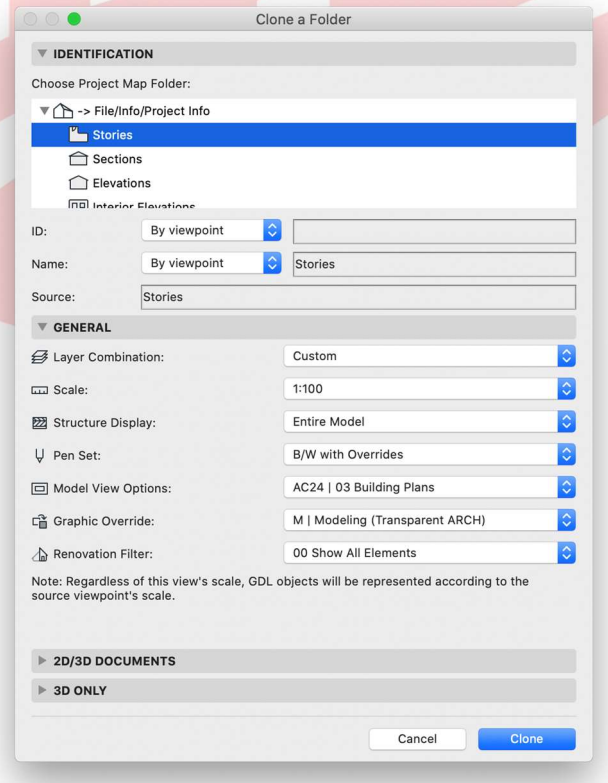
1 Create new regular folders using the **New Folder...** button.

2 Select an item to create a folder inside it. Use the **Clone a Folder...** button to **choose a viewpoint folder** from the Project Map and **set its View Settings**.



When creating a Cloned Folder, **all viewpoints of the referred Project Map group will be cloned. There is no option to remove certain cloned Views while keeping others** in the View Map, therefore consider the need of cloning to avoid the unnecessary number of duplicate Views and to keep their number to the necessary minimum to provide a simpler structure and to avoid performance issues. These **decisions should be made by the BIM Manager** after consulting the project team before actual work begins.

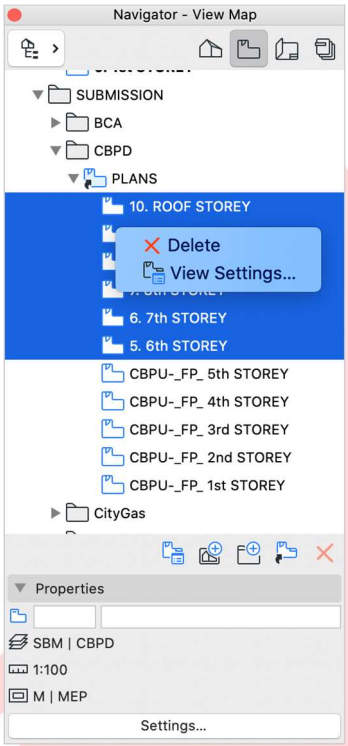
When creating Cloned Folders, all settings should be defined as needed, there should be no "Custom". When a new viewpoint is generated in the Project it will automatically be added into that Cloned Folder, and its settings will use those set by the Clone Folder.



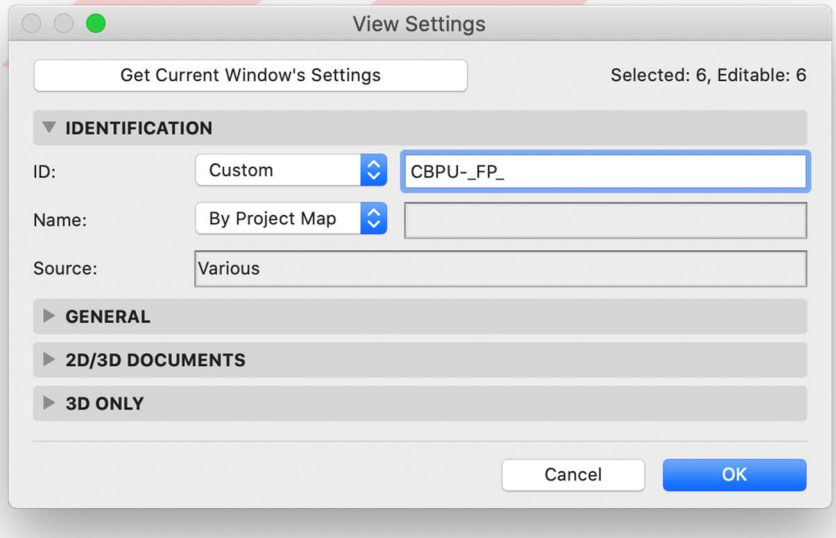
Updating the View Map

After creating Cloned Folders, any setting for **individual Views inside that folder can be set manually and overridden from the initial clone**.

1 **Select the necessary Views** inside the Clone Folder, right-click and choose **View Settings...**.



2 Make sure the ID type is set to **Custom** and **define the IDs**.



MEP SYSTEMS

The MEP Systems, **Design/MEP Systems...,** are named in a manner to ease their selection based on their codes as per the following:

<DISCIPLINE CODE> | <ABBR. OF SYSTEM NAME> - <FULL SYSTEM NAME>

As an additional system, **Undefined** is also present to ensure that the user defines the correct systems. If that is missed, the systems will remain Undefined instead of using a wrong setting.

Definition options of MEP Systems and their effects on representation for the components as per the following:

Type	Available for			System is set for	2D & 3D Representation is based on
	Ducts	Pipes	Cable Trays		
Segment Bend Take-off	□	□	□	entire Object	MEP System settings
Transition Wye	□	□	-	entire Object	MEP System settings
Reducer	-	-	□	entire Object	MEP System settings
Tee Fittings	□	□	□	each Connection	setting of Main 1 Connection
Terminal	□	□	□	entire Object OR available Connection	MEP System settings OR setting of Connection
In-line	□	□	-	each Connection	setting of Inlet Connection
Equipment	□	□	-	not applicable OR available Connection	Object settings (MEP System settings not applied)
Architectural	-	-	-	available Connection	Object settings (MEP System settings not applied)
Custom MEP	□	□	-	each Connection	setting of the first Connection in the list

Note 1: **Equipment elements may have no Connections at all, in this case the MEP System definition is not applicable**.
If there are Connections available those should be assigned to an MEP System.
In both cases the **2D and 3D representation of these elements will be based on the Object settings** and will not be controlled by the MEP System settings.

Note 2: **Architectural elements** of the Archicad 24 Library become available as Equipment, but **only their Connections can be assigned with MEP Systems**. The **2D and 3D representation of these elements will be based on the Object settings** and will not be controlled by the MEP System settings.

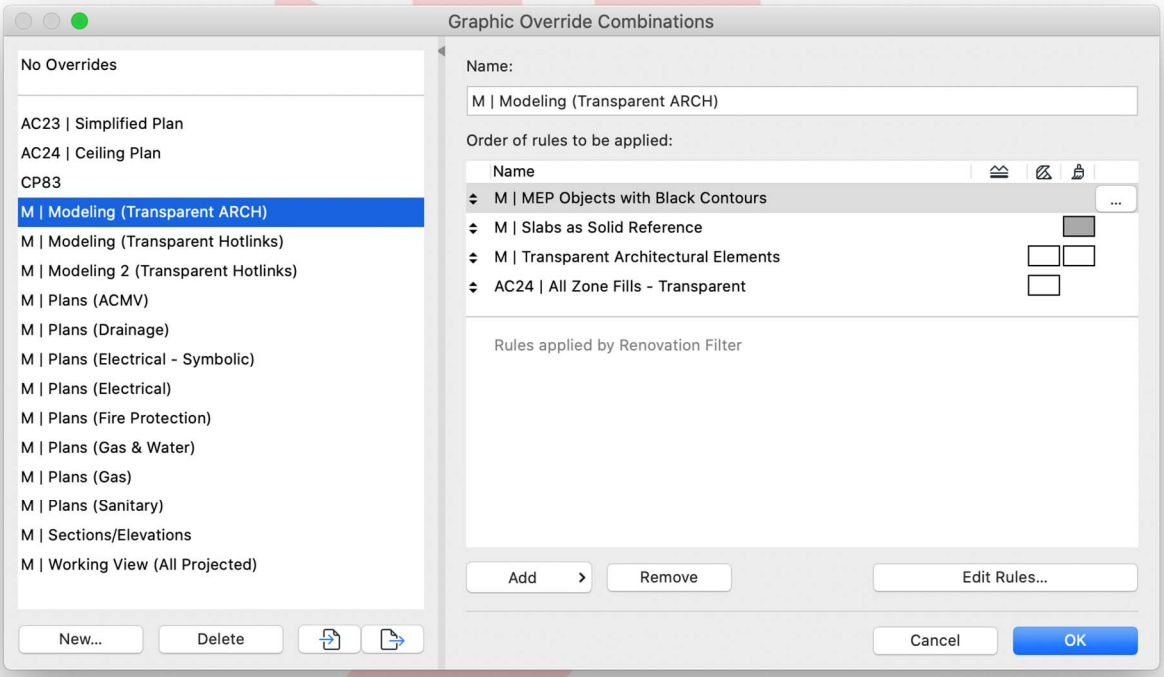
GRAPHIC OVERRIDES

The following Graphic Override Rules and Combinations are available in the MEP template:

- Combinations and Rules with the prefix **AC23 |** and **AC24 |** are the defaults coming from the factory template of Archicad. The **Combinations can be deleted from the MEP file**, but some of the **Rules are used for MEP Combinations as well - deleting these will change the representation, therefore not recommended**.

- **M |** prefixed Rules **must be used for the correct representation of linework in 2D plans, differentiated by sub-disciplines** of MEP.

- **Unmarked Combinations/Rules are present in all discipline templates.**



MEP Graphic Overrides

The following Graphic Override Combinations and Rules are provided for MEP representation:

- **M | Modeling (Transparent ARCH)** - Generic checking option for the MEP team to see the regular architectural elements as transparent.
    - **M | MEP Objects with Black Contours** - Changes the 2D representation to black and white.
    - **M | Slabs as Solid Reference** - Changes the 3D representation to solid grey for slabs.
    - **M | Transparent Architectural Elements** - Changes the 3D representation to transparent for architectural elements.
    - **AC24 | All Zone Fills - Transparent**

- **M | Modeling (Transparent Hotlinks)** - Generic checking option for the MEP team to see the regular architectural elements as transparent.
    - **M | MEP Objects with Black Contours** - Changes the 2D representation to black and white.
    - **M | Transparent Hotlinked Elements** - Changes the 3D representation to transparent for all elements in hotlinked modules.
    - **AC24 | All Zone Fills - Transparent**

- **M | Modeling 2 (Transparent Hotlinks)** - Generic checking option for the MEP team to see the regular architectural elements as transparent.
    - **M | Slabs as Solid Reference** – Slabs shown as solid grey bodies.
    - **M | Transparent Hotlinked Elements** - Changes the 3D representation to transparent for all elements in hotlinked modules.
    - **AC24 | All Zone Fills - Transparent**

- **M | Plans (ACMV)** - Representation for ACMV documentation, the ACMV elements (by Classification) are shown with system colors while all other elements are greyed out.
    - **M | All Greyed out (Except ACMV)** - Changes the 2D representation to greyed for all elements, other than ACMV.

- **M | Plans (Drainage)** - Representation for Drainage documentation, the Drainage elements (by Classification) are shown with system colours while all other elements are greyed out.
    - **M | All Greyed out (Except Drainage)** - Changes the 2D representation to greyed for all elements, other than Drainage.
    - **M | MEP Objects with Black Contours** - Needed to draw and actual contours that are not present by system settings.

- **M | Plans (Electrical - Symbolic)** - Representation for Electrical documentation, the Electrical elements (by Classification) are shown with symbolic representation while all other elements are greyed out.
    - **M | All Greyed out (Except Electrical)** - Changes the 2D representation to greyed for all elements, other than Electrical.

    - **AC24 | All Cover Fills – Transparent**

- **M | Plans (Electrical)** - Representation for Electrical documentation, the Electrical elements (by Classification) are shown with system colours while all other elements are greyed out.
    - **M | All Greyed out (Except Electrical)** - Changes the 2D representation to greyed for all elements, other than Electrical.
    - **M | MEP Objects with Black Contours** - Needed to draw and actual contours that are not present by system settings.
    - **M | Transparent AR & CS Fills**

- **M | Plans (Fire Protection)** - Representation for Fire Protection documentation, the Fire Protection elements (by Classification) are shown with system colours while all other elements are greyed out.
    - **M | All Greyed out (Except Fire Protection)** - Changes the 2D representation to greyed for all elements, other than Fire Protection.
    - **M | Fire Protection Objects with Red**

- **M | Plans (Gas & Water)** - Representation for Gas & Water documentation, the Gas & Water elements (by Classification) are shown with specific colours while all other elements are greyed out.
    - **M | All Greyed out (Except Gas)** - Changes the 2D representation to greyed for all elements, other than Gas.
    - **M | Ducts (Box up) with Transparent Fills**
    - **M | Water Objects with Blue Contours**
    - **M | Gas Objects with Red Contours**

- **M | Plans (Gas)/(Sanitary)** - Set similarly to Drainage.

- **M | Sections/Elevations** - All MEP elements with contours and system colour while all other elements with transparent fills.
    - **M | MEP Objects with Black Contours**
    - **AC24 | All Cut Fills - Transparent, No Skin Separators**

- **M | Working View (All Projected)** - All elements with contours and white fills.
    - **M | Elements with Black Contours and Solid White Fills**

ATTRIBUTES

Lines

The following Line types were created for MEP use. These are to be used for those plan views where the content is not modelled.

- **MEP | IC**
- **MEP | EL**
- **MEP | SE**
- **MEP | ELE(TR)**
- **MEP | CL**
- **MEP | TL**
- **MEP | T**
- **MEP | TV**
- **MEP | CU**
- **MEP | AL**
- **MEP | CAX**
- **MEP | NCAX**
- **MEP | XXX**
- **MEP | R**
- **MEP | W**
- **MEP | DR**
- **MEP | HR**
- **MEP | D**
- **MEP | WR**
- **MEP | WL**
- **MEP | HOT**
- **MEP | GAS**
- **MEP | SPR**
- **MEP | WS**
- **MEP | CWR**
- **MEP | CWS**

Example of MEP | GAS Line type:

Additional Line types can be created as necessary, based on the above.

Find more details on **Creating Symbol** L**ines**
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide/128977/

Note: **Symbol-based text does not adapt if the Line/Polyline/Arc is mirrored**. In these cases, the drawing direction of the named elements has to be changed. For the same reason **these elements can only be used in Hotlinked Modules with limitations**, since the Modules are typically mirrored in large projects.

Layer Combinations

The following Layer Combinations, which define the state of every layer such as show/hide and lock/unlock, are available in the MEP template as a base for working:

- General purpose Layer Combinations:
    - **All Visible Shown Editable** - shows all Layers turned on
    - **Coordination View (AR & CS)** - shows all architectural, structural and MEP elements only for coordination/visual checking.

- For actual modeling work of the different sub-disciplines of MEP there are specific Layer Combinations for each discipline to show their own elements only or with the architecture as well as a reference.
    - **M | ACMV & AR**
    - **M | ACMV Only**
    - **M | EL & AR**
    - **M | EL Only**
    - **M | EL-LIGHT & AR**
    - **M | EL-POWER & AR**
    - **M | RWTR & AR**
    - **M | RWTR Only**
    - **M | SANI & AR (Lower)**
    - **M | SANI & AR (Upper)**
    - **M | SANI Only (Lower)**
    - **M | SANI Only (Upper)**
    - **M | SPK & AR**
    - **M | SPK Only**
    - **M | WATER-GAS & AR**
    - **M | WATER-GAS Only**

- For submissions there are specific Layer Combinations for each agency to show the relevant content.
    - **SBM | BCA-CDSD**
    - **SBM | BCA-TSED**
    - **SBM | CBPD**
    - **SBM | CityGAS**
    - **SBM | FSSD-ACMV**
    - **SBM | FSSD-Detector**
    - **SBM | FSSD-FPS**
    - **SBM | IDA-TFCC**
    - **SBM | PUB-WRN**
    - **SBM | PUB-WTR**
    - **SBM | SPPG-ESS**
    - **SBM | SPPG-UPS**

As the Layers in use are very specific from practice to practice, the **MEP team is required to adjust the Layer Combinations to their needs**.

1. Go to **Document/Layers/Layer Settings (Model Views)...**.
2. **Select the Layer Combination** to edit.
3. **Change the Layer statuses** on the right side.
4. Click **Update** at the bottom left of the dialog.
5. Click **OK** to close and apply the changes.

Alternatively, use the **Attribute Manager**, to change the Layer state of multiple Layers across multiple Layer Combinations.
https://helpcenter.graphisoft.com/user-guide/127898/

SECTION DIAGRAMS AND WORKSHEETS

Section diagrams must be created using traditional 2D tools as they cannot be derived from the BIM model due to their generic nature.

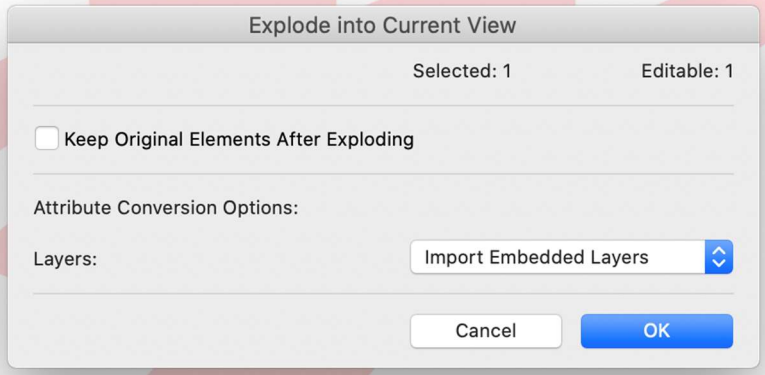
Existing external drawings, such as DWG, PDF or Images, may be referenced and imported then reused for new projects:

1 Go to **File/External Content/Place External Drawings...**. or go to the **Drawing Tool** and click to place, a dialog will open to choose the file you wish to place.
Alternatively, use Xrefs, to merge and link DWG files. To embed, use the *Bind* command in the Xref Manager. However, all attributes will merge into and potentially contaminate the Archicad project. It is therefore advised to use Drawings.

2 **Select the Drawing, right-click** and choose **Explode into Current View** to merge its content into the current view.

3 Uncheck Keep Original Elements after Exploding checkbox**.**

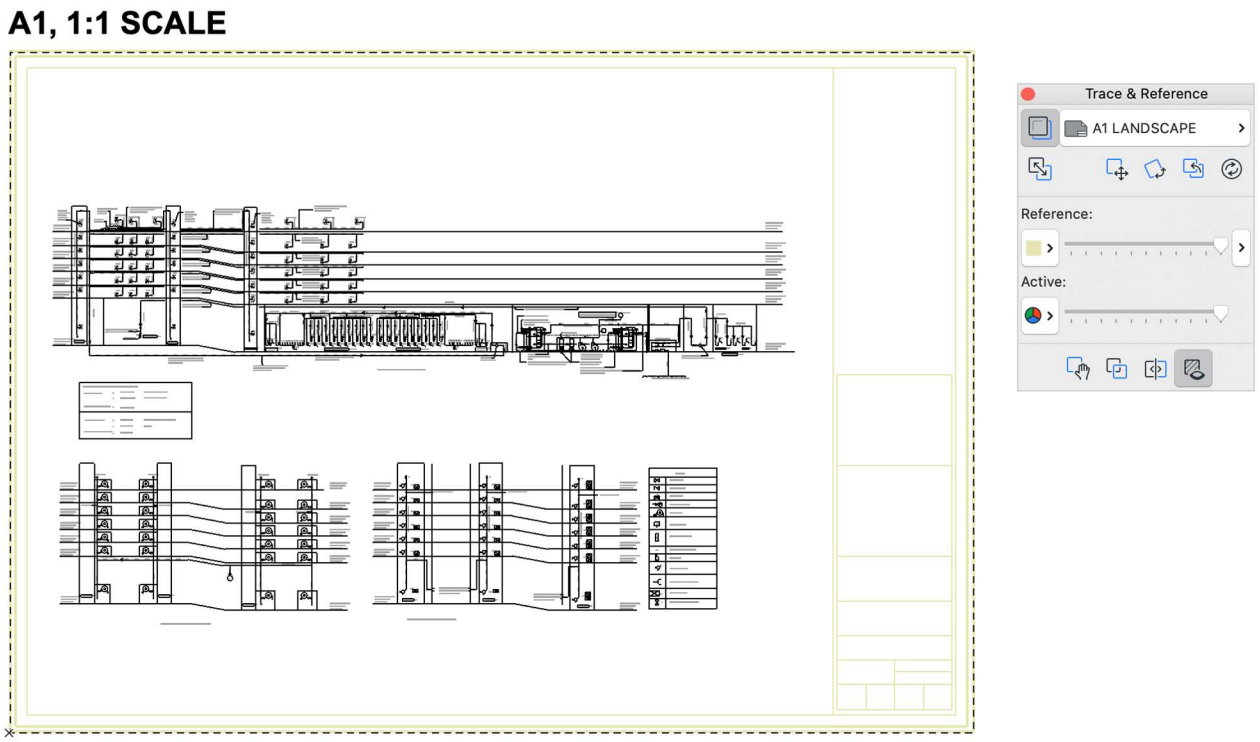
4 To preserve and import the original Layers, select the **Import Embedded Layers** option, however this may contaminate the current project file with unnecessary layers.



5 Click **OK** to explode.

An Independent Worksheet can be created at any time to place necessary 2D information. It is advised to use separate worksheets for different content, to avoid having too many 2D elements in one view – which can slow the 2D navigation.

A sample diagram has been placed onto the **M | Schematic Diagrams** Worksheet for reference, set to 1:1 scale, with the A1 Landscape Master Layout referenced in the background – using Trace and Reference.



After placing a 2D Drawing and exploding it onto a Worksheet, it is advised to consolidate the linework, and any fills, to get rid of unnecessary elements and clean up the view:

1 **Select the 2D linework** to consolidate.

2 Go to **Edit/Reshape/Linework Consolidation...**.

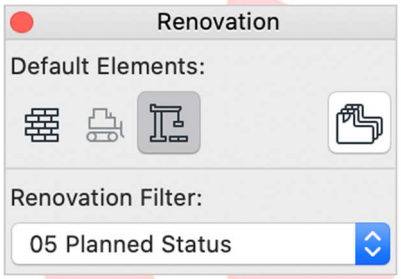
3 Follow the steps in the appearing dialog.

The same process can be repeated with selected Fills, by using the **Fill Consolidation** dialog.

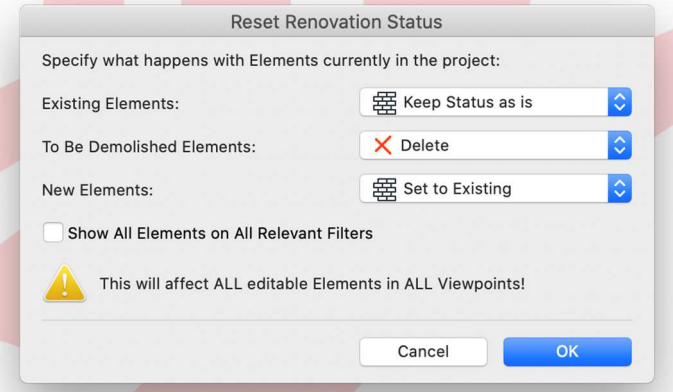
AMENDMENT/A&A/RECONSTRUCTION SUBMISSIONS

By default, all elements are defined as *New*. Renovation Filter colours are based on the CP83 colour coding.

Use the Renovation palette, **Windows/Palettes/Renovation**, to change the default renovation status of elements or change the current renovation status of specific elements, which are selected.



To change the Renovation Status of all elements (for example change all *New* elements to *Existing* after finishing a phase) use the **Document/Renovation/Reset Renovation Status...** menu command and the upcoming dialog.

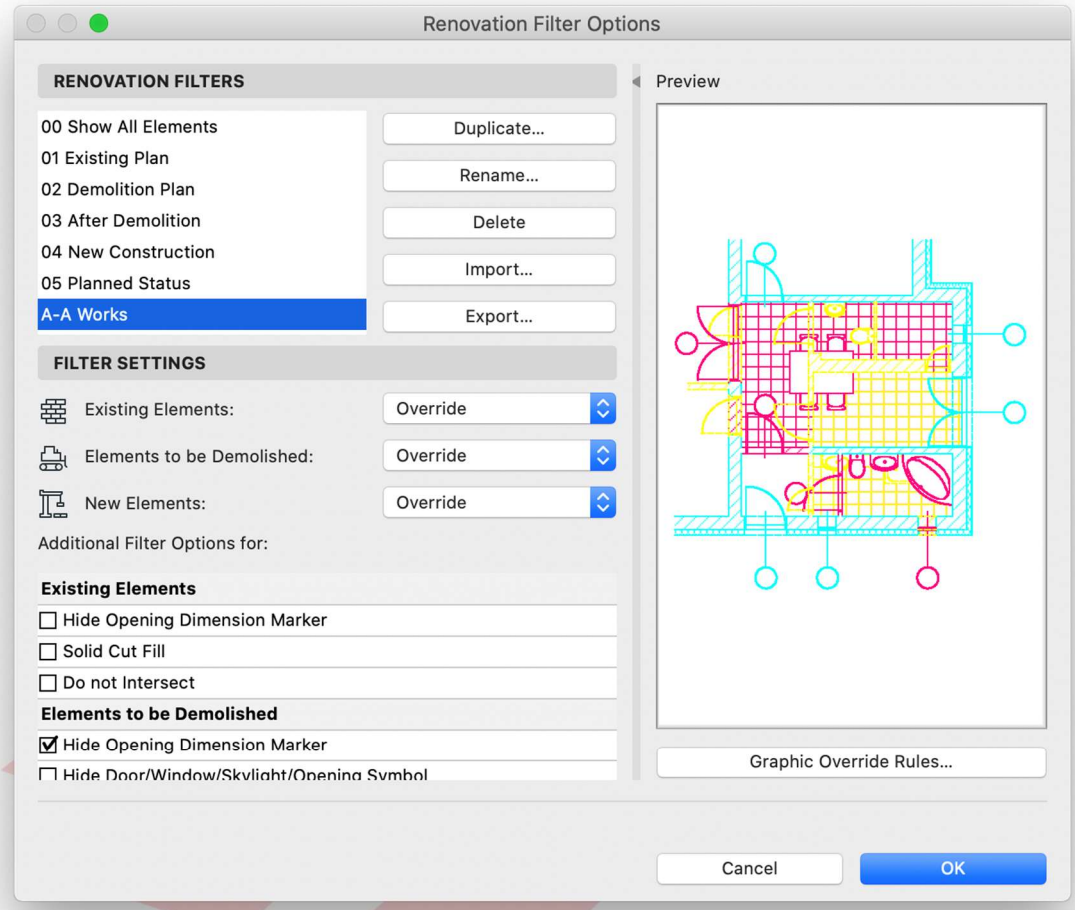


Find more information on the **Renovation** feature
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide-chapter/85569/

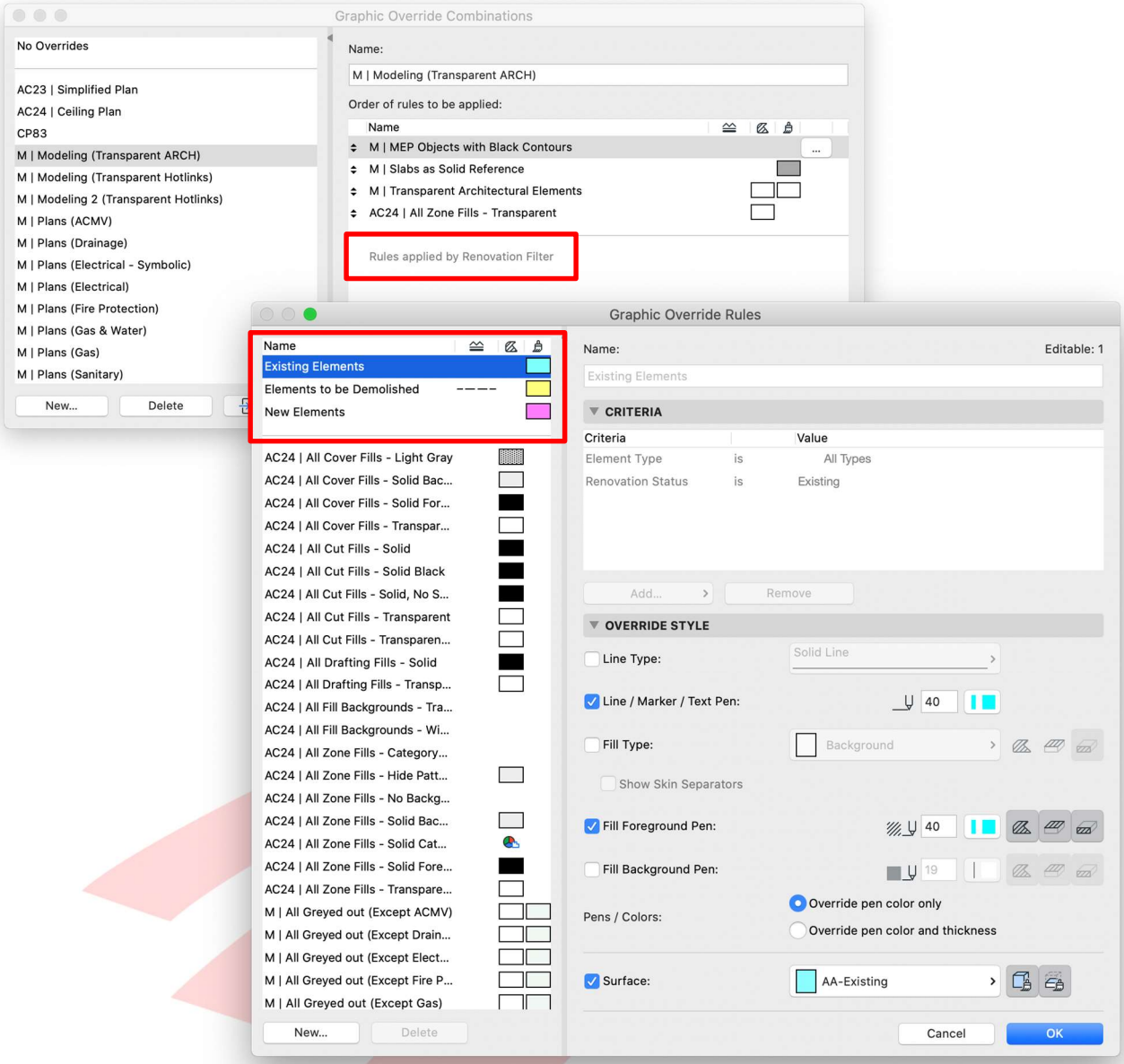
For additional filtering options:

1 Open **Document/Renovation/Renovation Filter Options...**.

2 Under Filter Settings, filtering options can be changed. To edit the appearance of elements when overridden, use the **Graphic Override Rules...** button at the bottom right.



3 Select the status at the top left to override to modify the 2D/3D representations under Override Style.



Note: Renovation overrides are the weakest overrides, which means that **if other Graphic Overrides are active and affect elements, then they would also affect the Renovation colours**, therefore is it recommended that no other Graphic Overrides are used when highlighting the amendments.

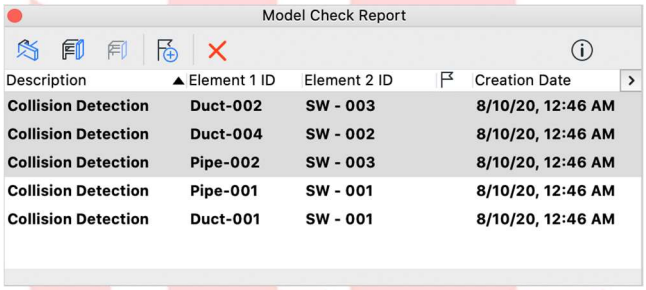
COLLISION DETECTION

Collision detection is optional and can be carried out in between accessibility elements and regular building elements to ensure access and clearances. This is completely voluntarily and will not be checked by the officers, however it can increase the quality of the BIM project.

1 Launch the **Design/Model Check/Collision Detection...** dialog.

2 **Define the two groups** you wish to check for collisions between. Pre-set Find & Select Criteria Sets can be used for this purpose. Then click **Check**.

3 The **Model Check Report** palette will open indicating all found collisions. If there are too many, it may be worth to delete the entries and run the Collision Detection again after adjusting the criteria between each group to fine tune the check.



4 Review each entry by double clicking each to select and zoom to the elements in either the Floor Plan or 3D Window.

5 If the collision is a valid issue, either the issue should be fixed now or an **Issue** created, which can be managed by the team, by selecting the entry and clicking the icon with the Flag. If the collision is not a valid issue, then the Collision Detection criteria and/or visible Layers may need be adjusted to avoid the issue reappearing next time the Collision Detection is run.

6 If Collision entries have been added to the **Issue Manager**, a Flag icon will appear next to the entry in the report. To review all created Issues, go to **Document/Issue Manager**. From here, issues can be assigned to Teamwork members and managed.

Find more details on the **Issue Manager**
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide/128778/

DOCUMENTATION

Layouts and Master Layouts

The MEP Layout Book includes some mandatory items and samples for customization as follows:

- **M | 01 SUBMISSION** – Contains all folders from the SUBMISSION View Map folder
- **M | 02 TENDER** – Contains all folders from the TENDER View Map folder
- **M | 03 Sample Subset** - Samples of layouts, the users have to create their own based on their company standards. This folder therefore **may be deleted** from the office template.
    - **S-01 Sample Layout** - contains the 1st STOREY floor plan as a sample.
    - **S-02/S-03 Sample Legends 1/2** - contain sample legend content. Since these do not change frequently, the users might want to keep them on Layouts and skip the Worksheets.

Master Layouts are available as references for:

- **A1 LANDSCAPE** - generic Layouts with a sample title block
- **A1 EMPTY** - generic Master Layouts for importing existing title blocks

Additional Master Layouts may be created according to the office standards.
To **set a Master Layout as a default** for newly created Layouts:

1 **Select the Master Layout.**

2 **Right-click** and choose **Set as Default.**

Project and Layout Info

Project Information is accessible via **File/Info/Project Info**. Use the **Export.../Import...** buttons on the Project Info dialog to transfer project info between projects.

Project Info is referred to by *Autotexts*, which are also available for Layout and Drawing Information.
To add these, use the **Text or Label tool** and the **Insert Autotext** icon to add different types of autotexts along with any relevant custom text.

The values of these autotexts can also be defined in the Layout Settings dialogs.

1 **Select the Layout** in the Layout Book.

2 **Right-click** and choose **Layout Settings....**

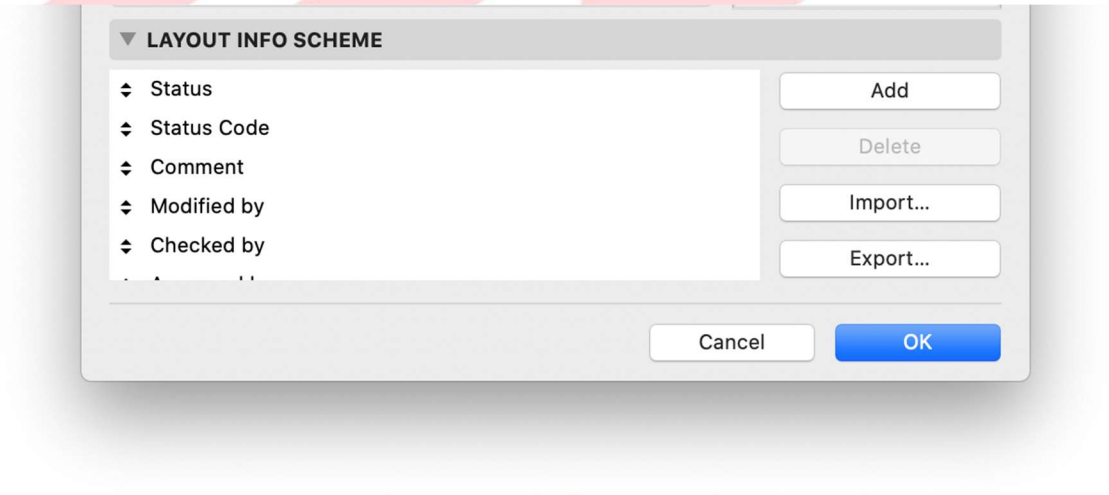
3 **Add values** as needed under the Layout Info panel.

The contents of this Layout Info panel can be customized and expanded by going to the Book Settings.

1 **Select the Layout Book** - the topmost item in the Layout tab of the Navigator.

2 **Right-click** and choose **Book Settings....**

3 **Add** items as needed under the **Layout Info Scheme** panel**.** The new fields will be available for all Layouts in this project.



Publisher

Publisher Sets have to be created manually. Once the Layout Book subsets are created, use the **Add Shortcut ›››** button in the **Organizer** to create continuously updated content within the Publisher Sets.

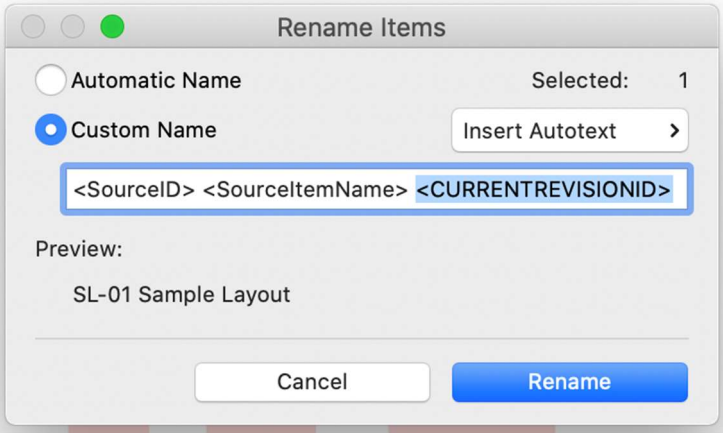
The default Publisher Sets contain:

- **1 - Views** - the content of the View Map in PDF format
- **2 - Layouts (PDF)** - the content of the Layout Book in PDF format
- **M | Layouts (DWF)** - the content of the Layout Book in DWF format
- **M | Layouts (DWG)** - the content of the Layout Book in DWG format
- **M | Layouts (PRINT)** - the content of the Layout Book ready for printing
- **M | Module - All Storeys** - content of each storey saved into a module file for further linking
- **M | Module - All Storeys as One Module (Break Nested)** - content of all storeys saved into a single module file for further linking
- **M | Module - Typical Storey** - content of the typical storey saved into a module file for further linking
- **M | Ref. Model for Coordination (IFC)** - exports the 3D content with exact geometry conversion for clash detection/referencing in IFC format
- **M | Ref. Model for External MEP (IFC/DWG)** - exports the 3D content with 2D documentation for further use in Revit MEP in IFC and DWG formats respectively
- **M | Submission Layouts (PDF)** – all Layouts from the SUBMISSION Layout Book folder saved as PDF
- **M | Submission Views (PMK)** – all Views from the SUBMISSION View Map folder saved as PMK for linking into an external documentation file (large projects)
- **M | Tender Layouts (PDF)** – all Layouts from the TENDER Layout Book folder saved as PDF
- **M | Tender Views (PMK)** – all Views from the TENDER View Map folder saved as PMK for linking into an external documentation file (large projects)

The Publisher Set item names can also include Autotexts, such as codes, IDs, revision numbers, etc. Those custom fields that were created under the Layout Info Scheme can also be inserted.

1 **Right-click** on any item(s)/folder **and choose Rename Items...**.

2 **Add Autotexts from the Insert Autotext control,** these can be combined with custom text as well.

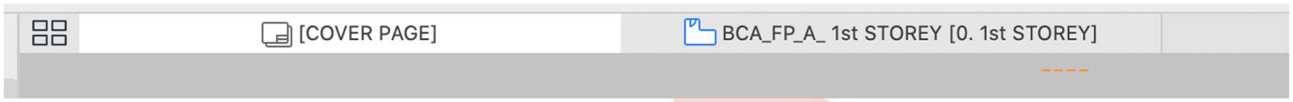


Find more details on **Revision Management** in general
on the GRAPHISOFT Help Center here:
https://helpcenter.graphisoft.com/user-guide-chapter/85600/

Submission Requirements

Saving the files requires a specific naming format to define the following.

1 Make sure that the **COVER PAGE layout is opened** and **moved to the beginning** of the Tab Bar, followed by the Floor Plan of the project (which must be open to keep the file open in Archicad). This COVER PAGE has to be the first one that officers see when they open the file. All other tabs are to be closed.



2 Use **File/Save as...** menu command and save the file in one of the required formats.

- **BIM native file format and software version in a single file:**

  Archicad **.PLA**, version **24**, indicated in the file name, for example:

  ABCDEF_M1_BLK01_A_**A24** _123456**.pla**

Note: PLA files include all library elements used in a project and make the file management easier for the submission, therefore it is highly recommended to use this format.

File naming conventions – as per the **BCA General Requirements**, indicating maximum number of characters per part:

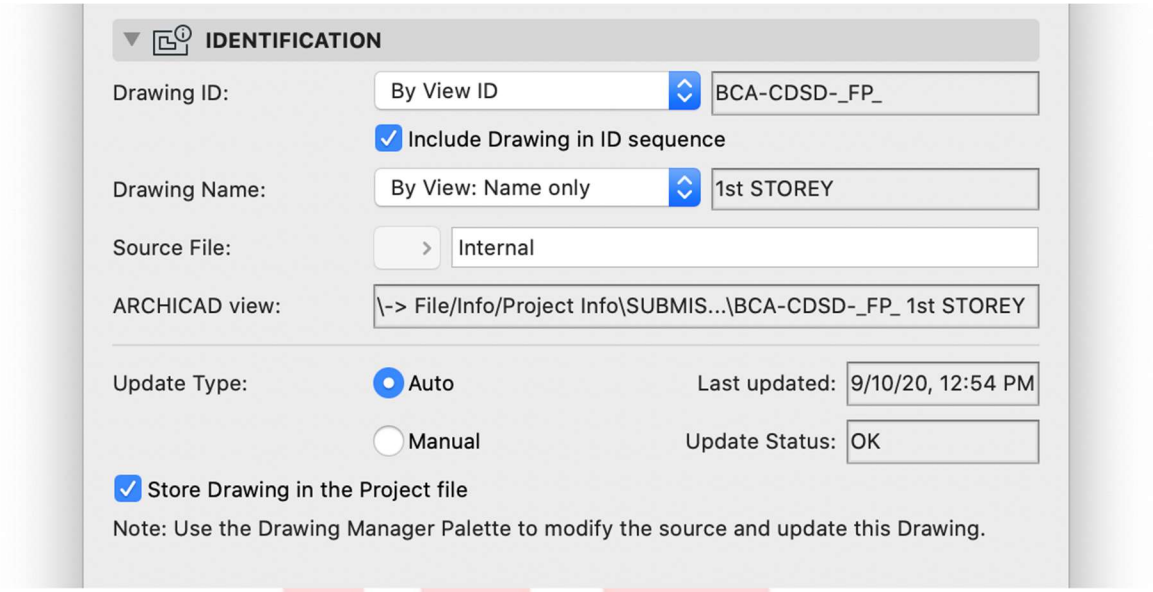
Project ID (6)	_	Author (2)	_	Model Part (6)	_	Submission Version (1)	_	Software Version (3)	_	User Defined (6)
A B C D E F	_	M 1	_	B L K 0 0 1	_	A	_	A 2 4	_	1 2 3 4 5 6

Before submitting the file make sure all necessary views are set correctly and show the relevant information.

Make sure that all external references (2D drawings) are stored within the project file, to ensure that the checking officers will see the same content as the QP.

1 Select the linked drawings (this can be done through the **Drawing Manager**) and open their settings.

2 Check the **Store Drawing in the Project file** checkbox for each drawing.



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