CONSTRUCTION INDUSTRY COUNCIL
建造業議會

BIM

Appendix 1

User Guide for using BIM in generation of MEP digital drawings for statutory submissions

Revit

Disclaimer

Whilst reasonable efforts have been made to ensure the accuracy of the information contained in this publication (Reference Materials), the CIC nevertheless encourages readers to seek appropriate independent advice from their professional advisers where possible. Readers should not treat or rely on this publication (Reference Materials) as a substitute for such professional advice.

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1 Hardware / System Requirements

1.1 General

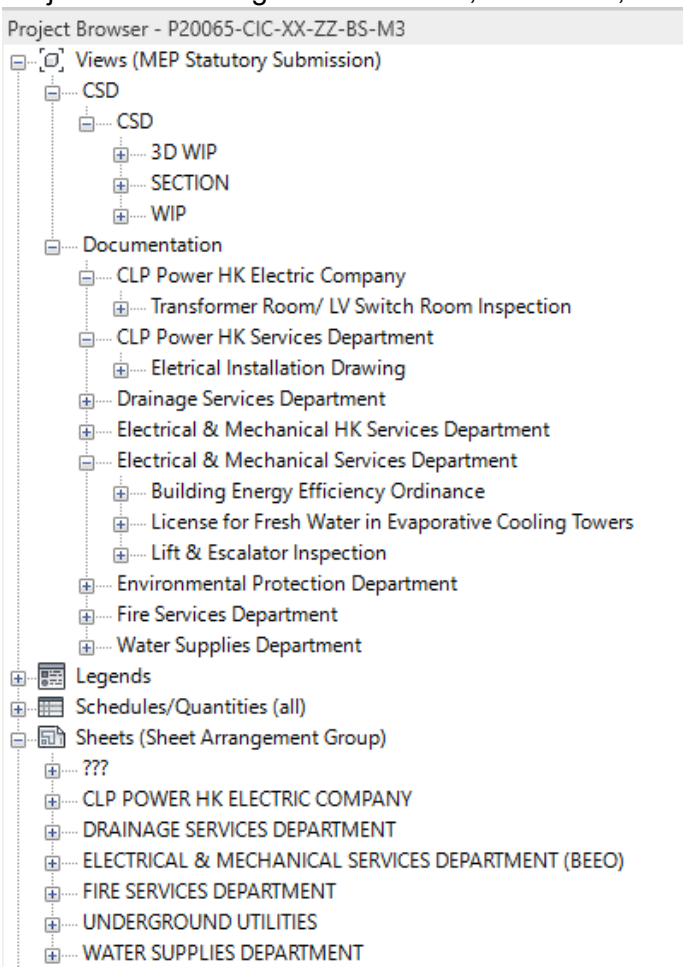
Hardware / system requirements for modelling, coordination and visualisation on desktop/notebook computers and mobile devices should be determined by the BIM managers for different projects on a case by case basis. The minimum requirement varies for different applications, project sizes and operating systems.
https://www.autodesk.com/collections/architecture-engineering-construction/included-software

2 Revit Basics

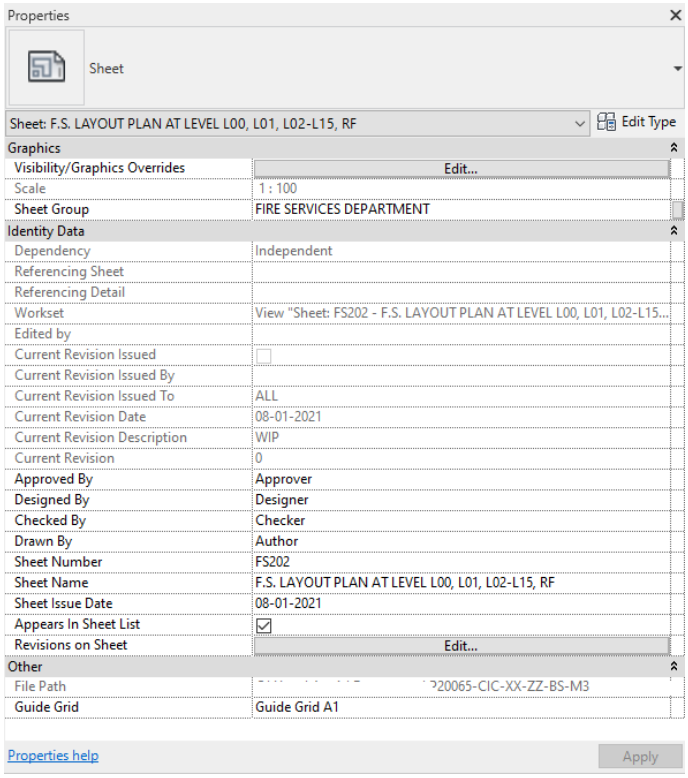
2.1 User Interface

Open a project or family or create either one from a template to get started. The user interface provides the tools need to work in a model. The user interface can customise the interface to support the way for different works.

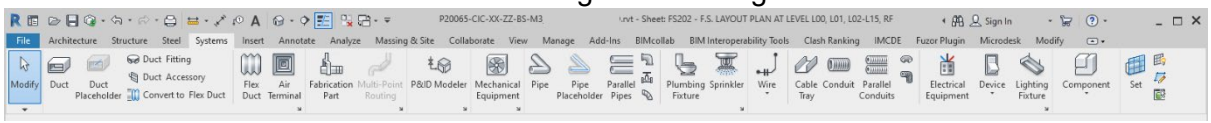
Project Browser: organise the views, schedules, and sheets of the current project.



- Properties palette: modify properties of selected elements.



- Ribbon: select the tools needed to design the building model.



- View Control Bar: provide options for changing the scale, view display, including scale or visual style.

2.2 Difference of RVT, RTE, and RFA files

It will eventually become necessary to save our work and share our progress with others in the model.

- **RTEs** are project template files.
- **RVTs** are working project files. Both files can be generated from Revit® projects. The difference is that the template is used when you start a new project.
- **RFAs** are family files that can either be loaded into a project or saved externally.

2.3 Types of Family (system families, loadable families, and in-place families)

BIM object in Revit calls as a family. There are three types of families in the model, which are system families, loadable families and in-place families.

2.3.1 System Families

System families are basic elements to the assembly on a construction site. It can be predefined in the model, for example: duct, pipe, cable tray, conduit etc.

Remarks:
There is no system family for trunking in Revit. In practice, duct with different system names and the setting is used to imitate trunking in Revit environment.
OR
To maintain the electrical properties of the “trunking” element, you are advised to prepare the “trunking” by using a cable tray with a different type name and setting. The geometry (size) of the trunking could serve 3D coordination. However, it could not reflect the realistic 3D presentation.

2.3.2 Loadable Families

Loadable families are families used to create customised components such as fitting, valves, lighting, pump, and chiller. It includes customisation of annotation elements, such as symbols and title blocks.

2.3.3 In-Place Families

In-place elements are unique elements for a specific project. It can be created in-place geometry or imported to other projects to resize the shape. However, in-place families should be avoided as much as possible, except for custom components generally built “on site” or for building massing during design.

2.4 Categories and Types

Category assigns the properties of a predefined family category to the component. Assignment of category should be referred to the CIC's Master list of 'Category' and 'Functional Type' (also known as 'Cat-Code' and 'Sub-Cat Code') of BIM object.

Types define components that apply across all types in that family.

2.5 Parameters

Technically in Revit, there are four (4) types of parameters that can be identified which are Project, Built-in, Family Parameters and Shared Project Parameters. The details of each are presented below.

Project Parameters	The parameters are created by the user and able to add multiple categories of elements in a project.
Built-In Parameters	The parameters are the default setting when creating a new family. This cannot be customised or changed accordingly.
Family Parameters	The user may create the parameter to help in controlling the parametric object within the family. However, It can be custom as a type or an instance property of a family but cannot be used for scheduling or tagging purposes.
Shared Project Parameters	Similar to family parameters but they are created within the "Shared Parameter List" and can be used for scheduling and tagging purposes. It is strongly recommended to prepare for the common parameters, such as "Width", "Length", "Symbol_Offset" etc, and the information to be scheduled and tagged.

2.6 Survey Point, Project Base Point, Grid, Internal Origin, Levels and Work Planes

2.6.1 Survey Point

Survey Point is an absolute and true coordinate of a project surveyed by a land surveyor. Commonly, it is typically set at a point in the boundary line. The value should match exactly as the survey information.

2.6.2 Project Base Point

Project Base Point defines the origin of the project coordinate system initially. Location of point can be determined by the team as a reference point. It can be used to establish a reference for measuring distances and positioning objects in relation to the model and used to position the building on site. It refers to a point common to all stakeholders which is typically set at a point in the intersection of two grids or special feature location of the site boundary by the architects and designers.

2.6.3 Internal Origin

Internal Origin is a start-up point for the Revit internal coordinate system and it never moves. Model geometries are recommended to be placed within a 16 kilometer radius from the Internal Origin for stable and reliable model behaviour.

2.6.4 Grid

Grid is an annotation element that help to determine whether grids appear in each plan view that you create for a project.

2.6.5 Level

Level can act as a reference for level-based elements for story or reference plane within a building. In a section view or elevation view, it can add a level line in a model and create an associated plan view.

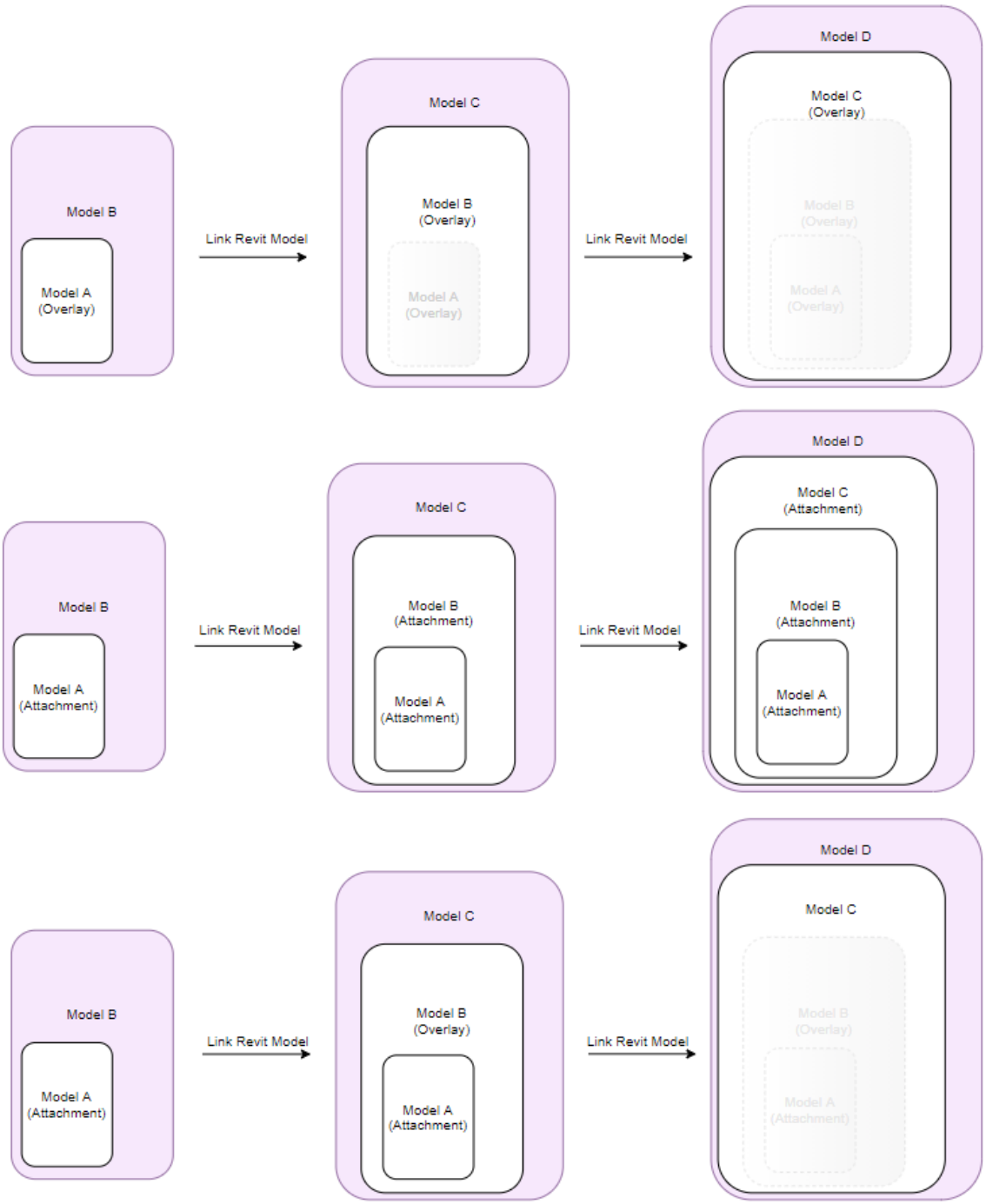
2.6.6 Work plane

Work plane defines a virtual 2-dimensional surface used as the origin for viewing or for sketching in the model. It can create on Architecture / Structure / System tab.

2.7 Link Model Reference Type

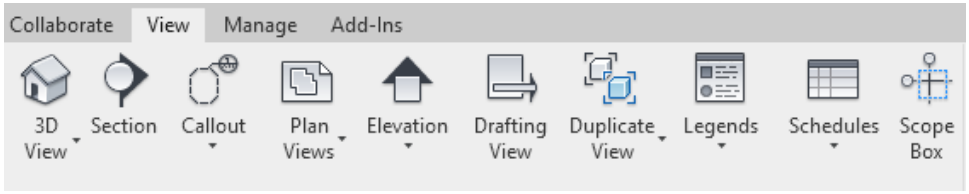
When you underlay a model through link Revit model, reference type of the link shall be well-defined according to the purpose.

- Overlay - load the link in the host model only
- Attachment - load the link as nested in the host model



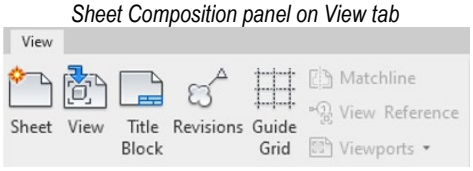
2.8 Views and Sheets

Views are oriented to specific coordinates such as plan, elevation, section, callout, 3D View and camera. Schedule, legend and drafting view are another way of viewing information in neither 2D nor 3D. A new view can be generated from the create panel on View tab of the ribbon.

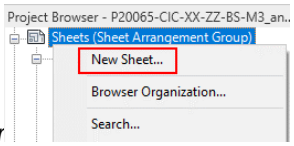


Sheets are used for documentation. Sheet can be created through sheet composition panel or in Project Browser as below:

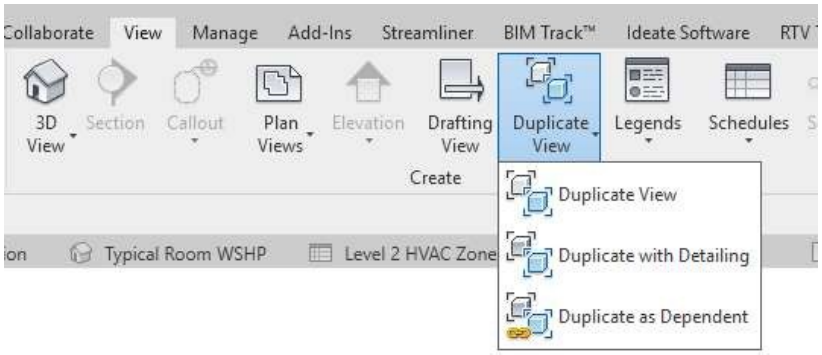
Sheet Composition panel on View tab



Create Sheet in Project Browser



After the initial setup of the sheet, desired views could be dragged directly from the Project Browser to the workplace of the sheet. However, all the views (except schedule and legend) can only be inserted to the sheet **once** in the project. If the plans are needed to be appeared more than one sheet, you should duplicate the view for another sheet insertion.

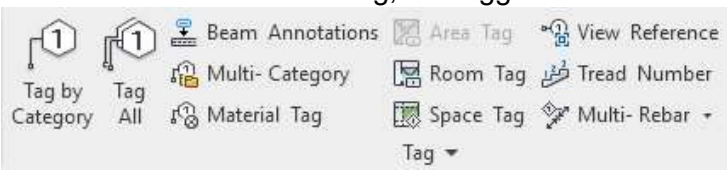


Or you can right-click a view name in Project browser and select one of the Duplicate View commends.

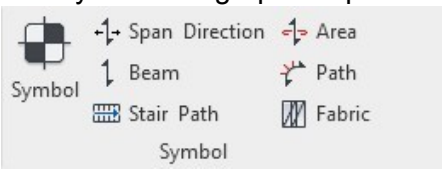
After creating a model in Revit, you can print the sheets by creating viewport for collecting documents. A sheet set consists of many sheets. Layout, elevation, section, schematic, details, schedule, legend etc. can be included in the sheet set.

2.9 Tag, Symbols and Dimensions

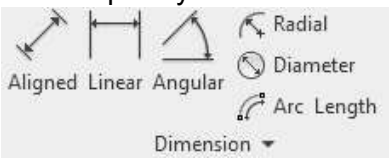
Tag is an annotation (label) to identify elements in a drawing. Tag is intelligent, bi-directional graphics that report information stored in an object's properties. Once you have tagged an element and entered a value in the tag, the tagged element will retain that value until you remove it.



The symbol is a graphic representation of an annotation or other object.



Dimensions are used to convey the distance or angle between elements or part of elements. It is a bi-directional annotation that you can edit the distance directly within the dimension string to move elements a specific distance apart and updates automatically. There are permanent dimensions and temporary dimension can be used in the model.



2.10 Different Parameters

All contents in the model have parameters, which are simply the information or data about the objects/ items.

Parameters that you create display in the Properties palette or Type Properties dialogue under the group you define and with the values you define.

Project Parameters - specific to a single project file and cannot share with other projects. They are added to elements by assigning them to multiple categories of elements, sheets, or views. It can be used for sorting, scheduling, and filtering.

Family Parameters – control variable values of the family, such as materials. It is specific to the family.

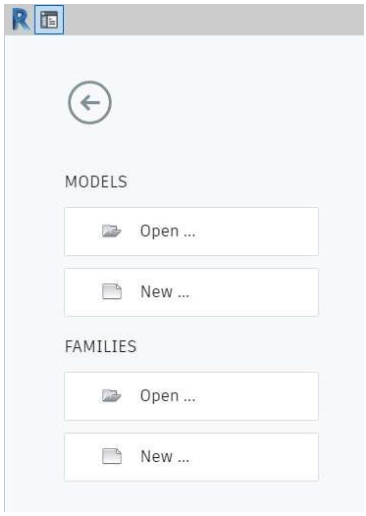
Shared Parameters - can be used in multiple families or projects. The definition of a shared parameter is stored in a separate file (.txt). After assigning a shared parameter definition to a family or project, the corresponding shared parameters' value can be tagged and scheduled in the project.

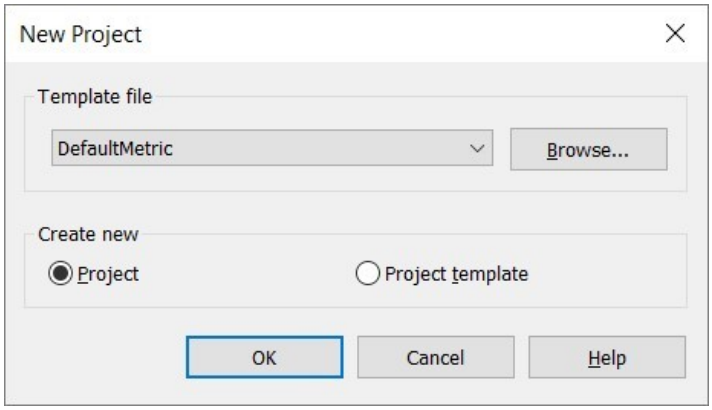
3 Getting Start

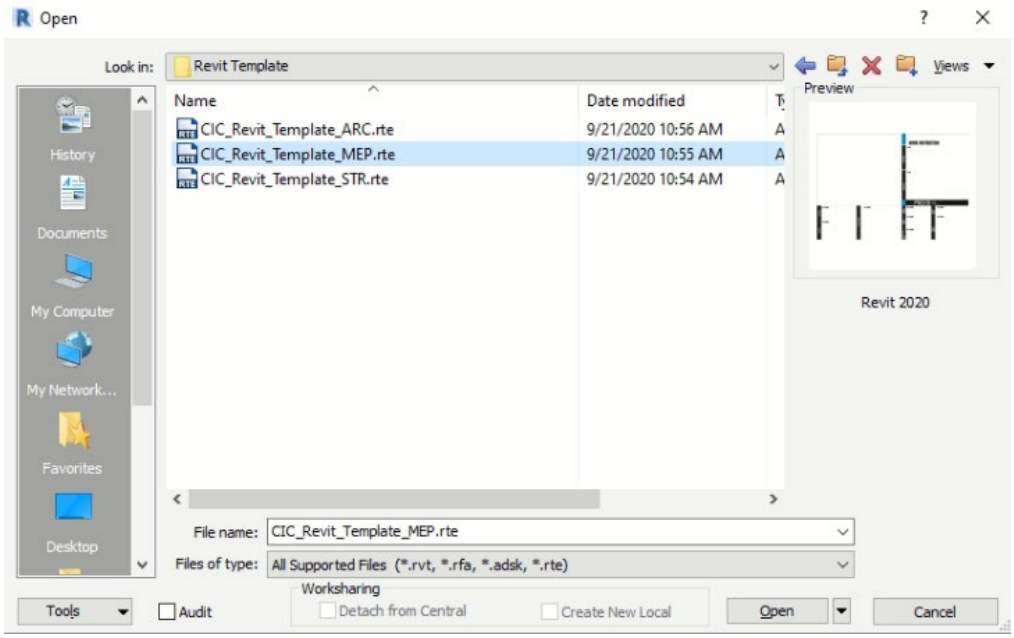
This chapter covers how to configure and manage standards through the development and use of a project template. The template can be rich with information that goes beyond the out of box content that Revit provides. Thus, the template setting is established, content explains how the reuse of work will increase productivity and standardise with each project for different statutory submission.

3.1 Open a new project in Revit

Open Revit ➜ click “New” button ➜ click “Browse” in New Project browser to open template (CIC_Template_MEP.rte) ➜ click “OK”

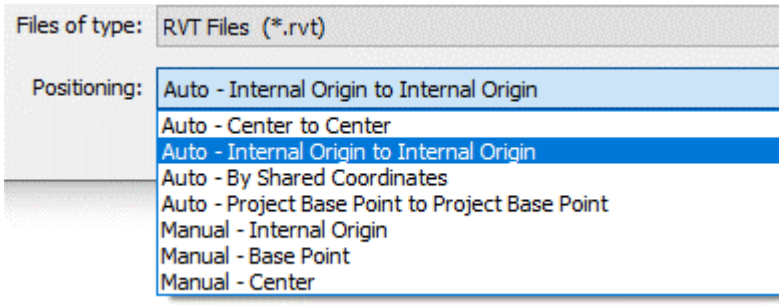




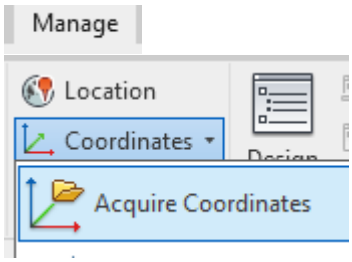


3.2 Set Project Coordinates (Building Projects)

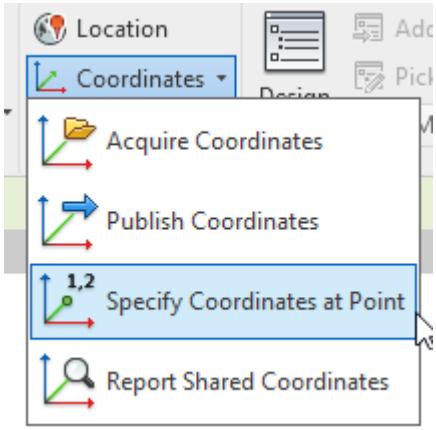
For **building projects**, the coordinates shall be defined by the Architects. To make reference to the Architectural model, it shall be linked into the MEP project by “Internal Origin to Internal Origin”.



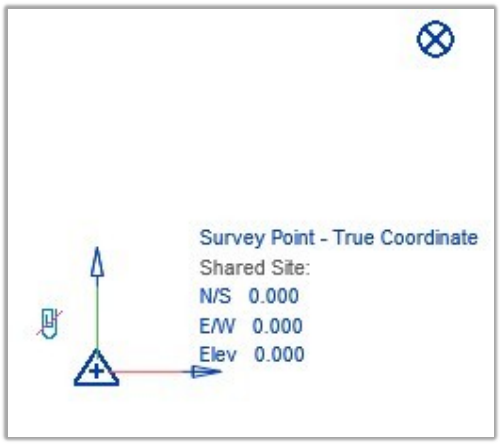
Open a floor plan at project ground level as site plan in Revit ➜ click “Manage” in ribbon ➜ “Project Location” ➜ “Coordinates”➜ click “Acquire Coordinates” ➜ select Architectural Link Model



The Project Base Point shall be updated accordingly. However, the elevation (mPD Level) of project ground floor shall be “Specify Coordinates at Point” manually. (For Revit 2020, this exercise is not required if your Revit has updated with 2020.2.4 Hotfix.)



In the same view, select the Survey Point, unclip the point. Move the Survey Point manually towards the targeted location which is stated in Architectural Link Model.



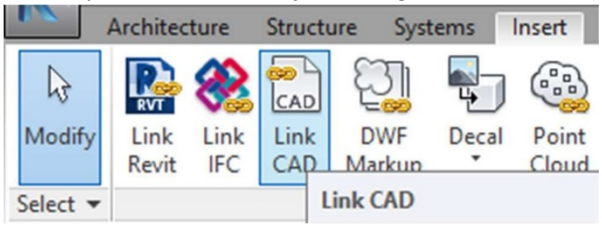
To generate a good model of housing keeping, the user shall pin the Project Base Point and Survey Point after relocation.

All the Internal Origin, Project Base Point and Survey Point shall be invisible for all the views, except the site plan, after linking all the project models.

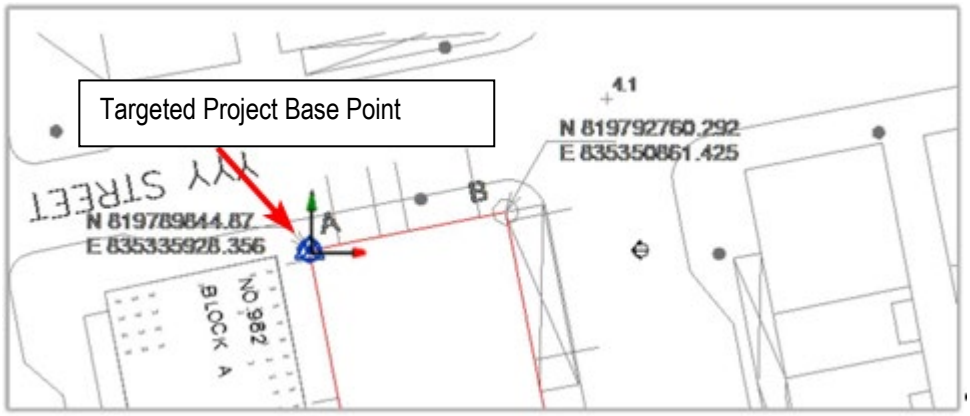
3.3 Set Project Coordinates (Civil Projects)

For **civil projects**, the coordinates might be defined by the Engineers. The setup shall regard to as survey plan.

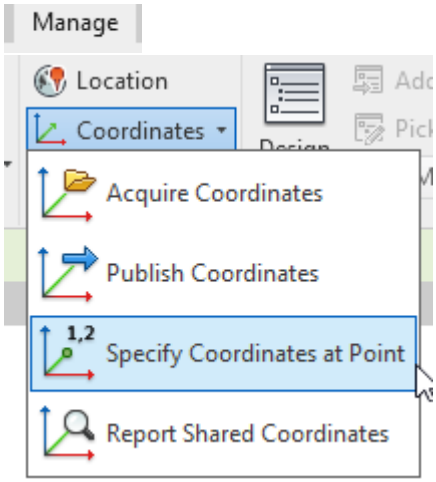
Open a floor plan at project ground level as site plan in Revit ➜ Insert survey plan (in .dng or .dwg format) into the view by clicking “Insert” ➜ “Link CAD.”



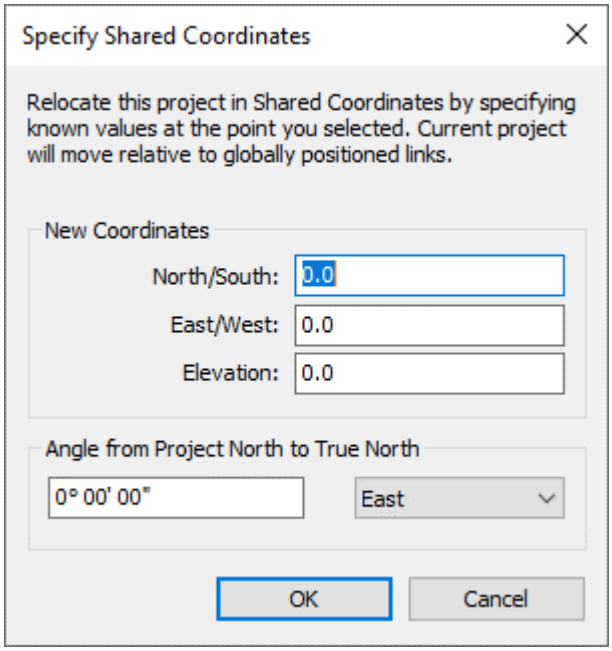
Move the survey plan regarding the desired Project Base Point towards the Internal Origin (i.e. same as the initial Project Base Point (0,0,0). Pin the survey plan to avoid being moved accidentally.



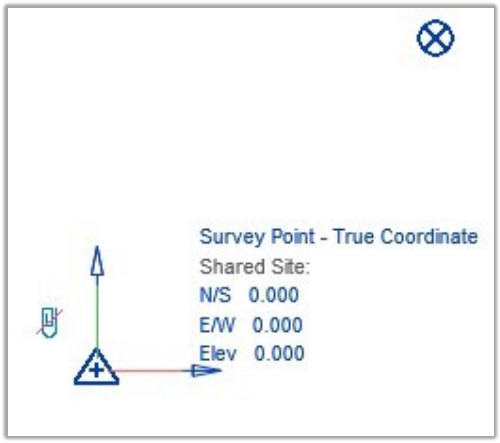
Click “Manage” in ribbon ➜ “Project Location” ➜ “Coordinates” ➜ click “Specify Coordinates at Point.”



Click the targeted Project Base Point on the site plan ➜ Define the coordinates of the Project Base Point, Elevation (mPD Level) of project ground floor and angle from Project North to True North.



In the same view, select the Survey Point, unclip the point. Move the Survey Point manually towards the targeted location, which is stated in Architectural Link Model.



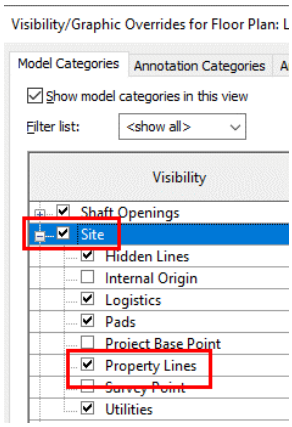
To have good model housing keeping, the Project Base Point and Survey Point shall be pinned after relocation.

All the Internal Origin, Project Base Point and Survey Point shall be set to invisible for all the views ,except site plan, after linking all the project models.

3.4 Site Boundary

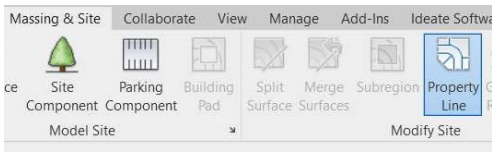
Site boundary (Property Line in Revit) shall be prepared by Architects in Building Projects. MEP engineers should not model the site boundary separately.

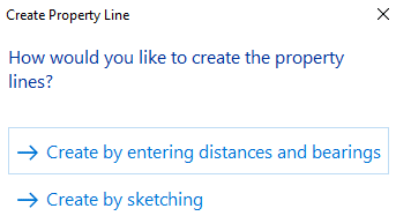
Thus, to show the Architectural site boundary from Linked Architectural Model, user shall turn on the visibility of Property Lines under the Site category in the Visibility/ Graphics Override panel.(Advanced control on a filter, workset and link view settings depend on the model management for each project.)



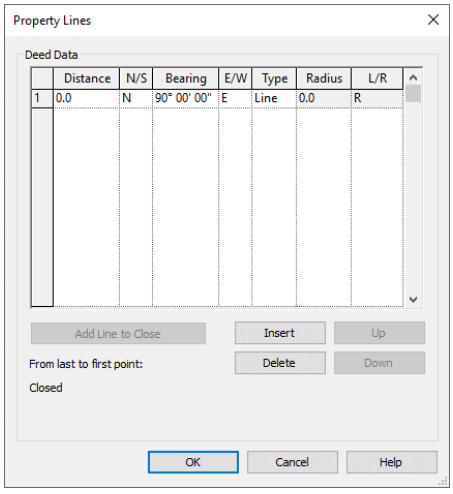
The engineers may lead all the Civil Projects. Engineers then shall be responsible for preparing the site boundary in the MEP models. The site boundary could be determined by survey data or sketching according to a reference survey map.

Click “Massing & Site” ➜ “Modify Site” ➜ “Property Line” to add property line.

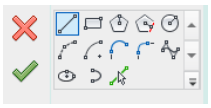




Create by entering distances and bearings



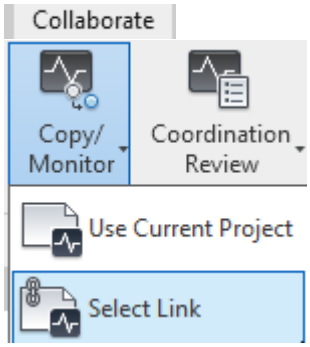
Create by sketching



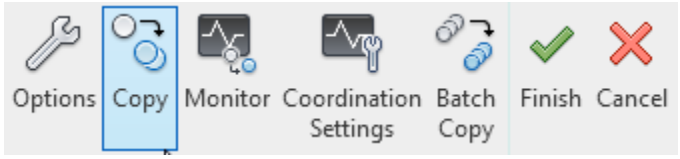
3.5 Create Grid and Level

Grid and Level shall be prepared by Architects in Building Projects. To copy the grid and level from Architectural Link Model, “Copy/ Monitor” shall be used.

Open site plan or appropriate plan where grid locates in the Architectural Link Model ➜ “Collaborate” ➜ “Copy/ Monitor” ➜ “Select Link” ➜ click Architectural Link Model



Click “Copy” ➜ Select appropriate Grids ➜ click “Finish”

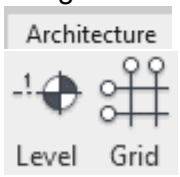


Open an elevation view and repeat the above steps to copy the levels.

By the “Copy” function, the location and information of the grid and level from the Architectural Link Model would be copied to the MEP model. The relationship between the link model and copied elements would be monitored. A warning will be popped up if there is a change of relationship, not limited to naming, location or deletion. However, it is a reminder to the users. The copied elements would not be automatically updated unless you declare in “Coordination Review”.

Users may go to the site plan to create an extra grid for the MEP model or a civil project,.
Click “Architecture” ➜ “Datum” ➜ “Grid” to create a grid in the model according to a specific design.

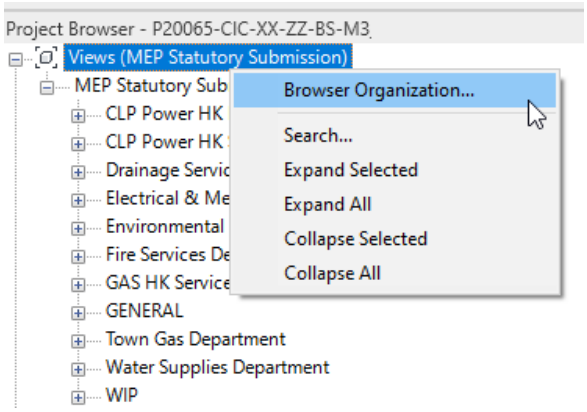
To create extra level for MEP model or for civil project, you may go to the elevation view.
Click “Architecture” ➜ “Datum” ➜ “Level” to create a level in the model according to a specific design.



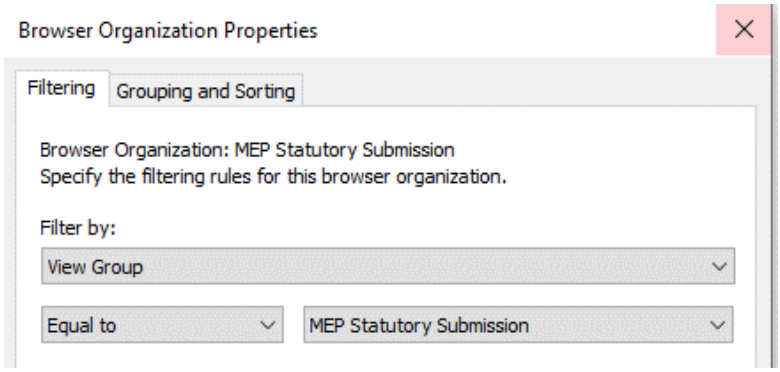
Remark: The naming of grids and levels should be unique.

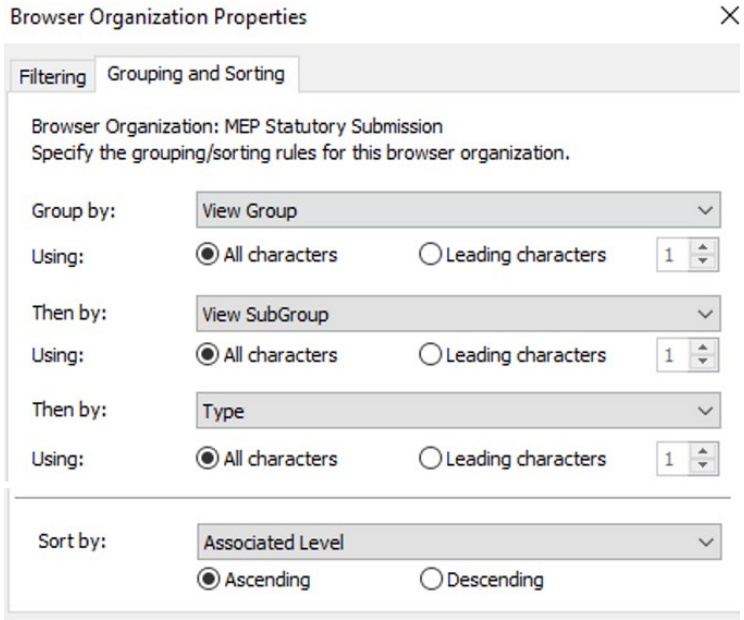
3.6 Managing Project Browser

More than one set of views and sheets might be prepared in the same model. To manage the views in Project Browser, “Browser Organisation” is crucial.

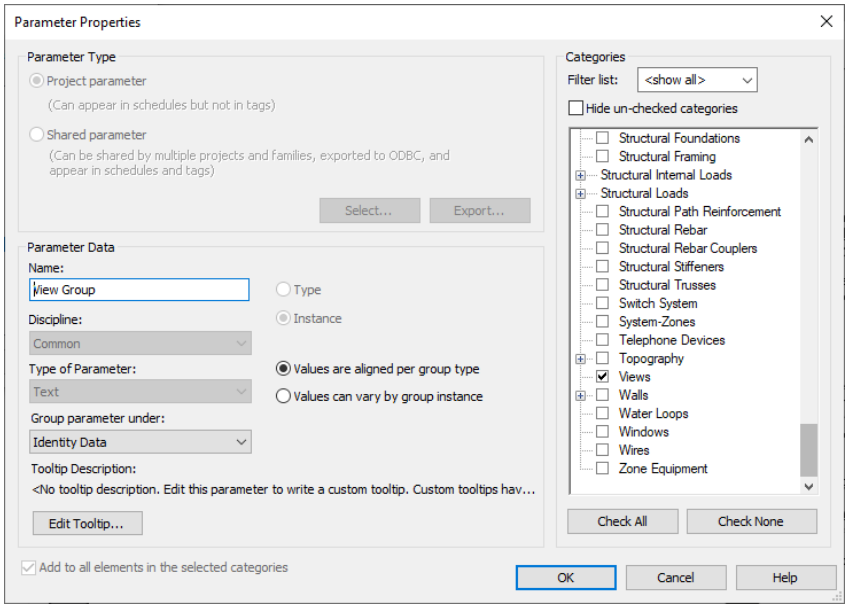


In CIC sample project, the views are filtered and arranged as below:



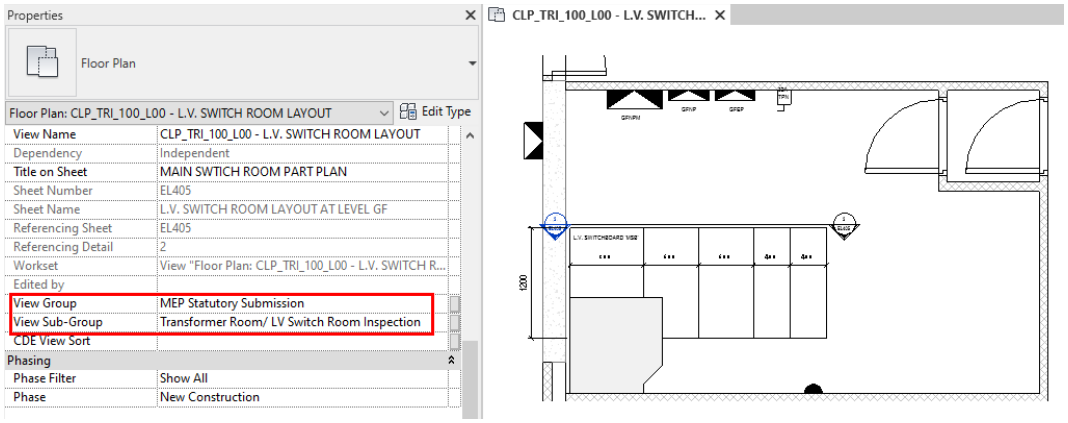


The “View Group” and “View SubGroup” are the custom project parameters added to the model.

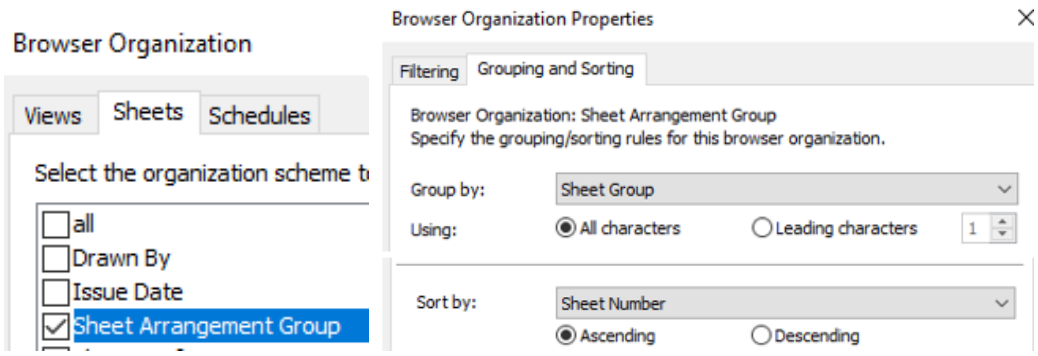


They could be also prepared by Shared Parameter in order to apply to multiple projects.

Each view’s information shall be input to the corresponding parameter through the “Properties” panel.



A similar setting is applied for Sheet Arrangement as below:



4 Creating Model Objects

4.1 Mechanical System: Pipework

The following objects will be modelled for every service that involves Pipework (i:e Water Supply Services, Drainage Services, Fire Services, MVAC-Pipe etc.) :

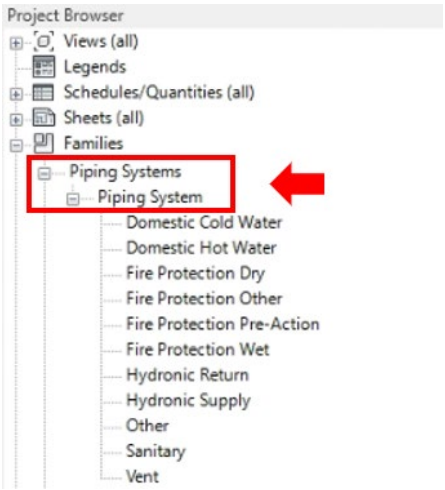
The Pipe, Flex Pipe, Piping System and Pipe Type are defined as System Families, while Pipe Fittings and Pipe Accessories are defined as Loadable Families in Revit. Most parameters and functions for the system family cannot be edited or modified by users, except the below settings.

Before starting the plumbing project, Piping System and Pipe Type should be well established.

4.1.1 Piping System

Piping System indicates the function of the complete pipework.

In the project browser, find the Piping System under the families category to create a piping system.

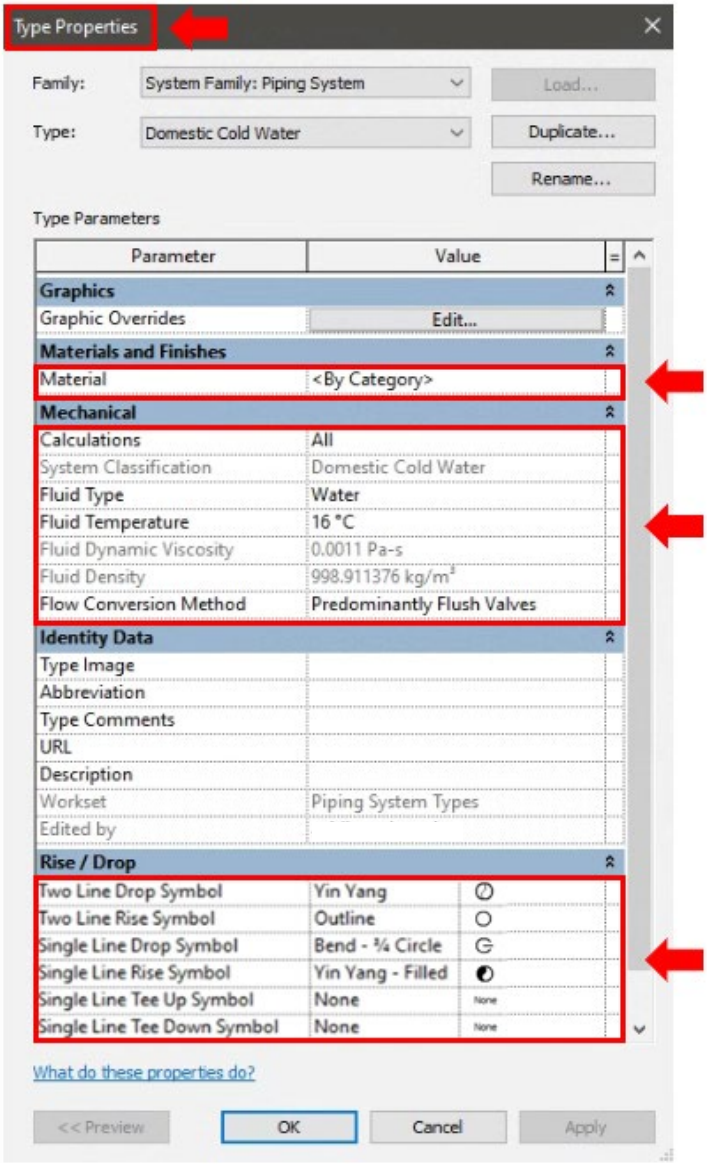


Listed piping systems are default settings in Revit. Each system contains unique settings. An appropriate system should be duplicated and renamed according to the project needs.

Reference Table for Piping System (System Classification):

Sub-category	Functional type (System)	Functional type (short form)
Domestic Cold Water	Fresh Water Pipe	PL FWP
Domestic Hot Water	Hot Water Pipe	PL HWSP

Once the piping system is created, establish the unique setting for each pipes settings under type properties for the type of material, mechanical settings and rise/drop symbols setup accordingly.



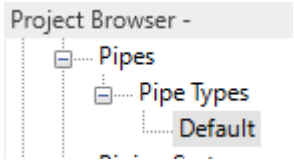
It is recommended to assign an abbreviation to the drawings to the “Abbreviation” parameter while a detailed description of the system should set to the “Description”.

Identity Data	
Type Image	
Abbreviation	FWP
Type Comments	
URL	
Description	Fresh Water Pipe

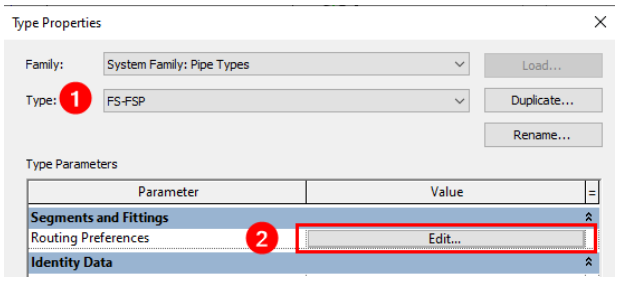
4.1.2 Pipe Type

The Pipe Type indicates the material and fitting arrangement of the pipe. Typical fitting types shall be set as routing preferences. Therefore, pipe fittings can be automatically generated when drawing pipework.

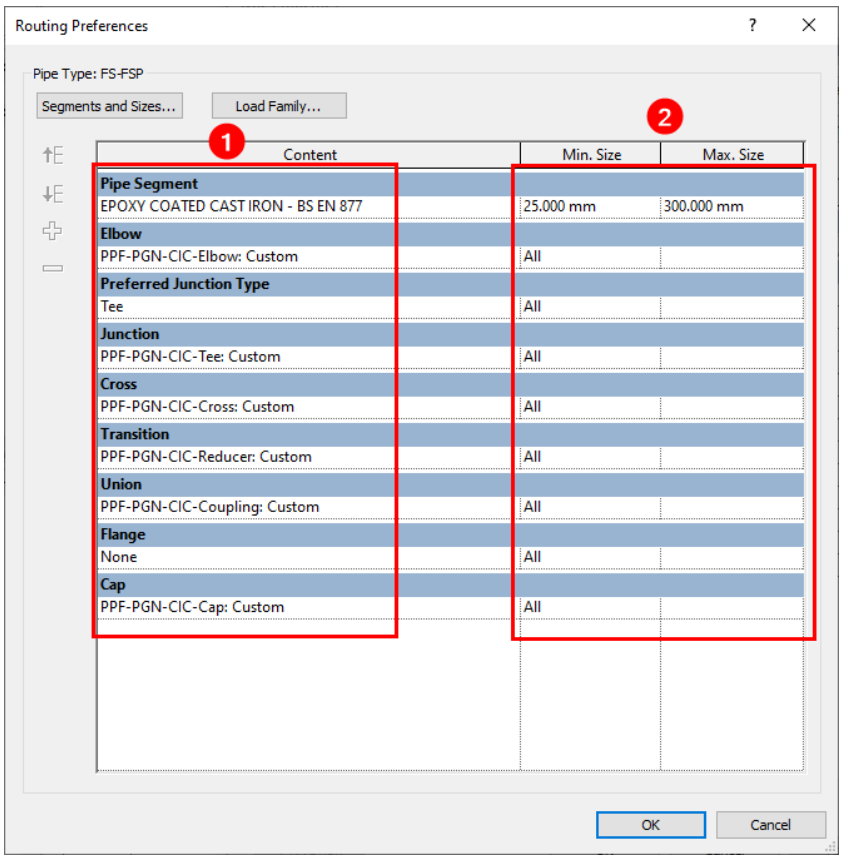
In the project browser, find the Pipe Type under the families category.



Select “Default” or appropriate Pipe Type ➜ click “Edit” under “Routing Preferences.”

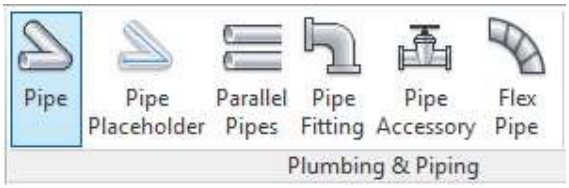


Set appropriate pipe material and pipe fitting family type in corresponding pipe size

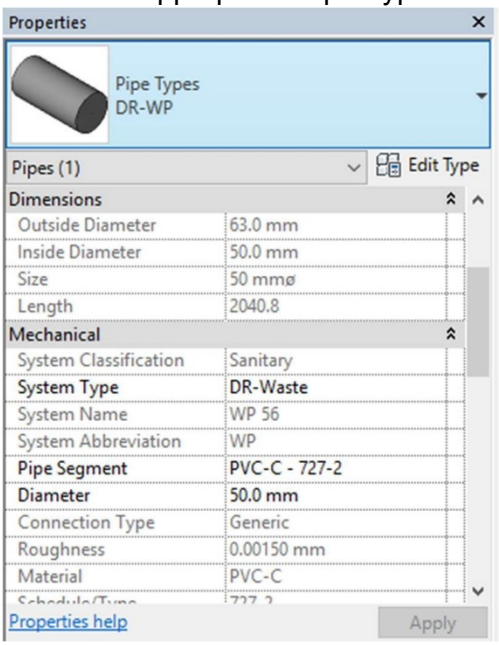


4.1.3 Modelling Pipe

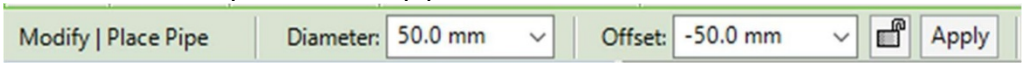
In Ribbon, click “System” ➜ click “Pipe” under “Plumbing & Piping.”



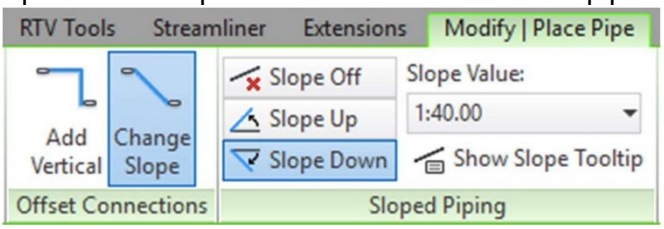
Select the appropriate Pipe Type and System type in the properties panel.



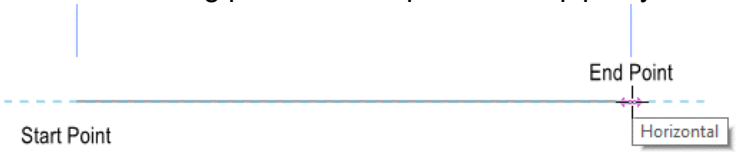
Under the ribbon panel, select pipe diameter and offset from the reference level.



Specific the slope direction and value for the pipe.

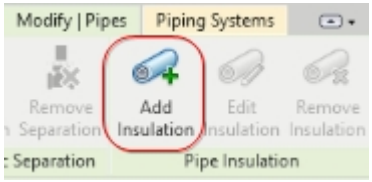


Define the starting point and endpoint of the pipe by clicking.

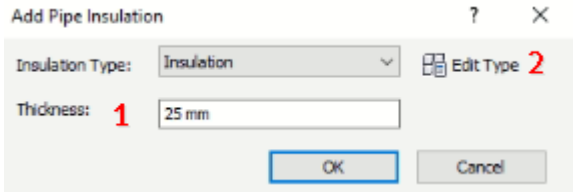


Adding insulation to pipe

Select the specific pipe ➜ in the ribbon, click “Add insulation”.



Define the Thickness and edit the Material as desired

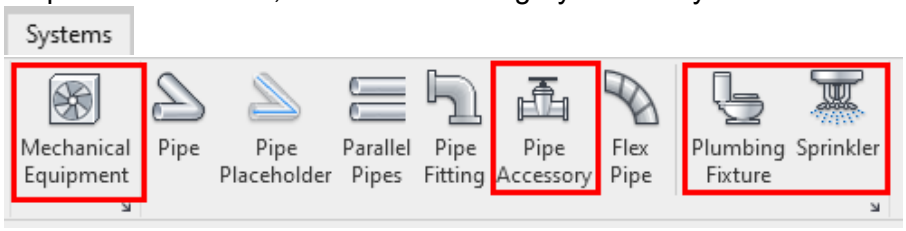


4.1.4 Loadable Families for Pipework

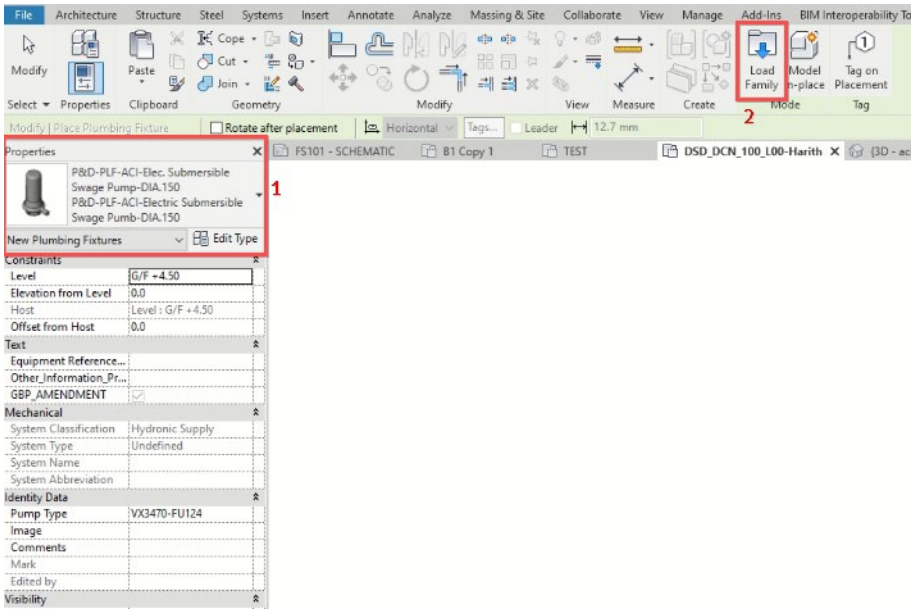
4 common Loadable Families that will be connected with Pipework are namely “Pipe Accessory”, “Sprinkler”, “Plumbing Fixture” and “Mechanical Equipment”.

The best practice is to develop all Pipe Accessory, Sprinkler, Plumbing Fixture and Mechanical Equipment families nested with a 3D model family and an annotation family (symbol).

To place the families, click desired category under “System”



Select appropriate Family and Type in “Properties” panel **(1)** or click “Load Family” **(2)** to load a desired family into the current project ➜ define parameters



4.2 Mechanical System: Ductwork & Mechanical Equipment

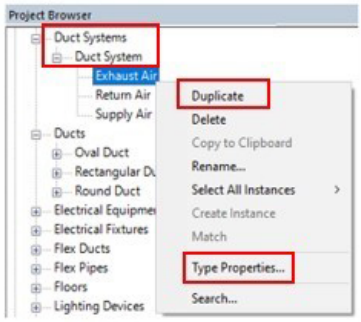
The following objects will be modelled for MVAC plan:

4.2.1 Ducting System

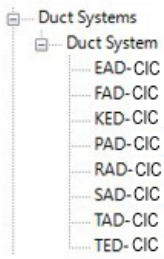
- In Revit, Duct, Ducting System, Duct Placeholder, Flex Duct and Duct Type is a System Families, while Duct Fittings, Air Terminals and Duct Accessories are Loadable Families.
- Most of the parameters and functions for system family cannot be edited or modified by users, except by below settings.
- Before starting the MVAC project, Ducting System and Duct Type should be well defined.
- Ducting System indicates the function of the complete ductwork.
- Duct Type indicates the shape and material of the duct.

4.2.2 Creating Duct

Creating Duct System



Rename Duct Systems suggested in below table



a. In Project Browser ➤ Duct System
b. Right-Click ➤ Rename/ Select Duplicate to create a new Duct System
c. Establish Type Properties (Fluid Types, Calculations, Abbreviation, Rise/Drop Symbol)

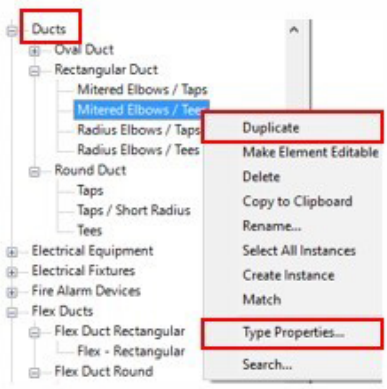
Set Rise/ Drop Sybmol

Duct System	Rise/ Drop Symbol
SAD/PAD/ FAD/TAD	Cross - Filled
RAD	Slash - Filled
EAD/KED/TED	Wye

Establish your own abbreviations for Piping System by Abbreviation for Drawing Production (After all systems have been modelled and before producing drawing)

Identity Data	
Type Image	
Abbreviation	EAD
Type Comments	

Creating Duct Type

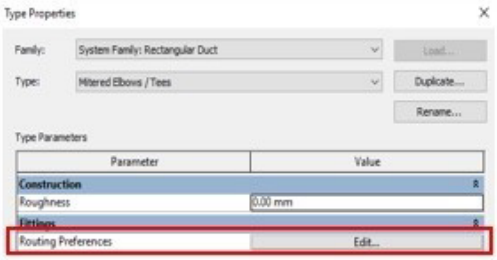


a. In Project Browser ➤ Ducts
b. Right-Click (Suitable Duct shape) ➤ Rename/ Select Duplicate to create a new Duct Type (Tees)
c. Establish Duct Type's information (Routing Preference, Type Mark).

Rename Duct (Types) suggested in below table

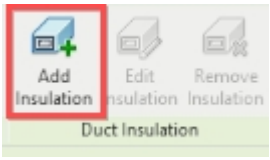
- Ducts
  - Oval Duct
    - GFD- CIC-Gored
    - Gored Elbows / Taps
    - Mitered Elbows / Taps
    - Mitered Elbows / Tees
    - PFD- CIC -Gored
    - PVC- CIC -Gored
    - SSD- CIC-Gored
  - Rectangular Duct
    - GFD- CIC -Mitered
    - GFD- CIC -Radius
    - Mitered Elbows / Taps
    - PFD- CIC -Mitered
    - PFD- CIC -Radius
    - PVC- CIC -Mitered
    - PVC- CIC -Radius
    - Radius Elbows / Taps
    - SSD- CIC -Mitered
    - SSD- CIC -Radius
  - Round Duct
    - GFD- CIC
    - PFD- CIC
    - PVC- CIC
    - SSD- CIC
    - Taps
    - Taps / Short Radius

Edit Routing Preferences and assign duct fittings with same material

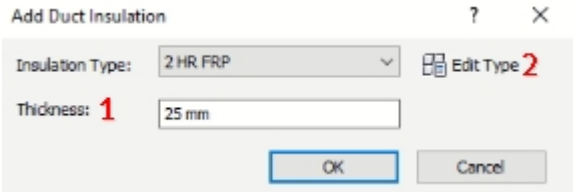


Adding insulation to duct

Select the specific duct ➜ in the ribbon, click "Add insulation"



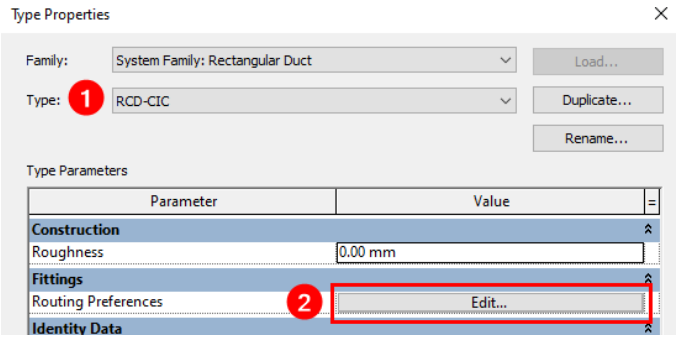
Define the Thickness and edit the Material as desired



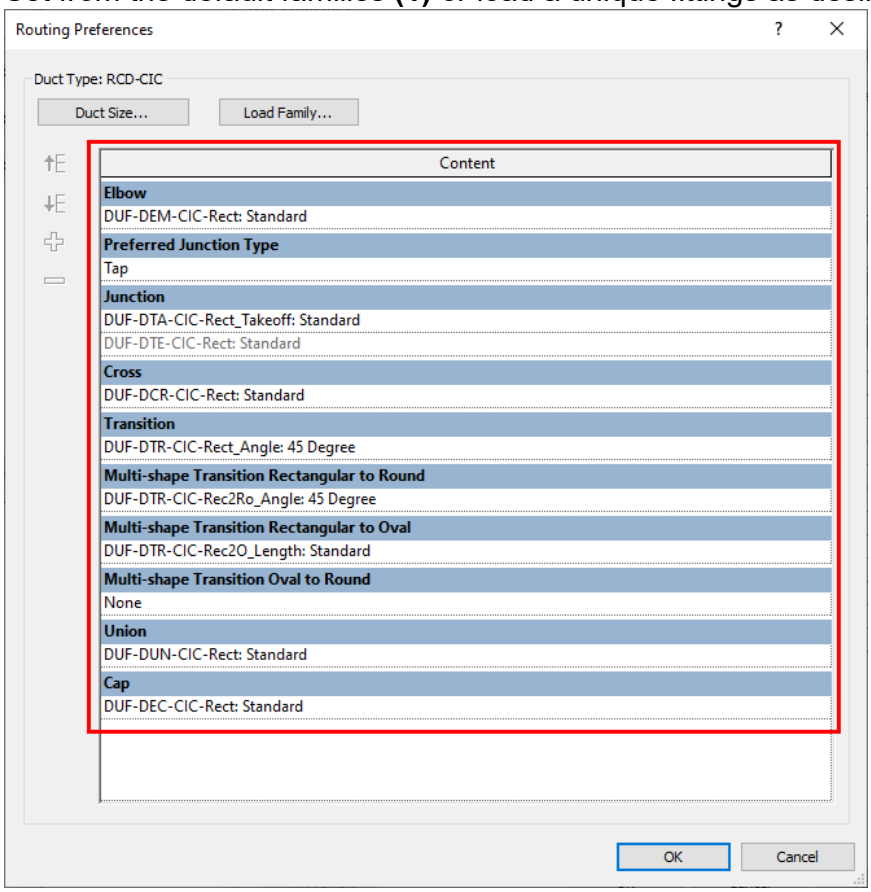
4.2.3 Setting up Duct Fittings

Typical fitting types shall be set as routing preference. Therefore, duct fittings can be generated automatically while drawing ductwork.
Assign the material for specific (material) duct fittings after the pipework has been modelled.

To set or change the routing preference.
Select the duct ➜ ensure the desired “Pipe Type” ➜ navigate to “Routing Preferences” and click “Edit”

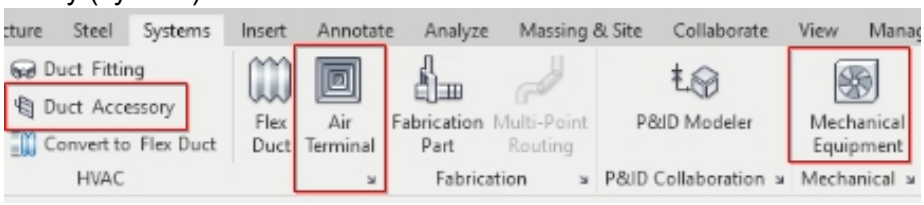


Set from the default families **(1)** or load a unique fittings as desired **(2)**



4.2.4 Loadable Families for Ductwork

In Revit, there are 3 Main Loadable Families that will be used under Ductwork design. They are Duct Accessory, Air Terminals and Mechanical Equipment. The best practice is to develop all Duct Accessory and Mechanical Equipment families nested with a 3D model family and an annotation family (symbol).



Duct Accessory

- All appropriate duct accessory (connectors) shall be modelled in family.

Air Terminals

- Select a suitable hosting type for the components as it cannot be exchanged to other hosting types.
- Air Terminals could be “free stand” family modelled in MEP model.
- Air Terminals could be also hosted on ceiling shall be modelled in ARC Ceiling model file and collaborated with Architects.

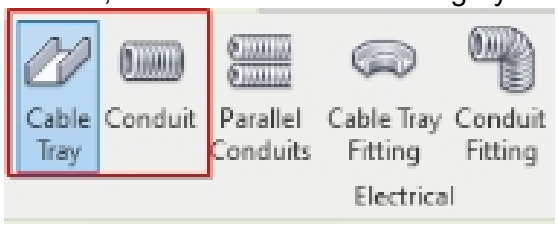
Mechanical Equipment

- For large equipment, a service space/ maintenance space shall be modelled as LOD-I 300.
- A generic service space family with service space/ maintenance space sub-category is suggested to nested with large equipment family. Dimension of the generic service space family shall be controlled by shared parameters. This approach can benefit and facilitate the visibility control for the service space across different categories.

4.3 Electrical System: Cable Tray and Trunking

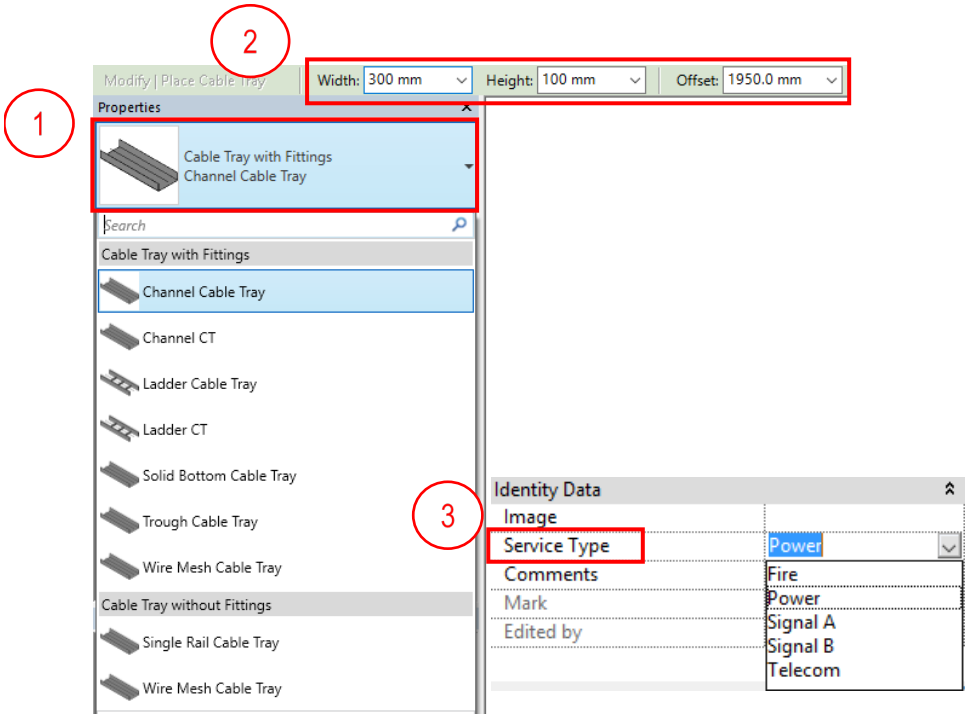
Cable trays and Conduits are both used for providing protection in an environment where either large or small quantities of power control cables are at work. Besides providing mechanical protection, these cables are also designed to facilitate a perfect routing path for power or control cables

In Revit, both are in the same category which is “Electrical”

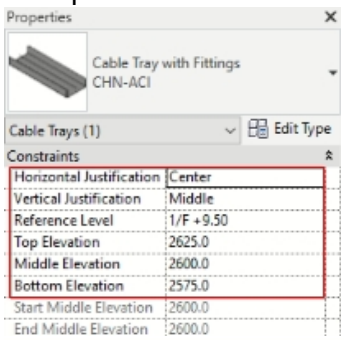


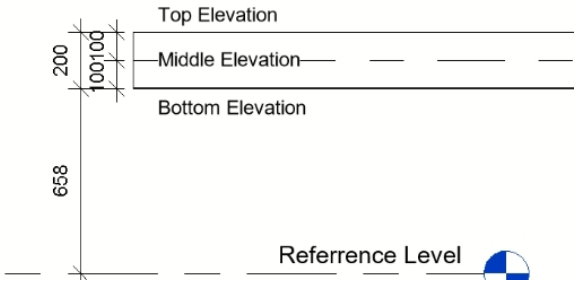
4.3.1 Creating Cable Tray

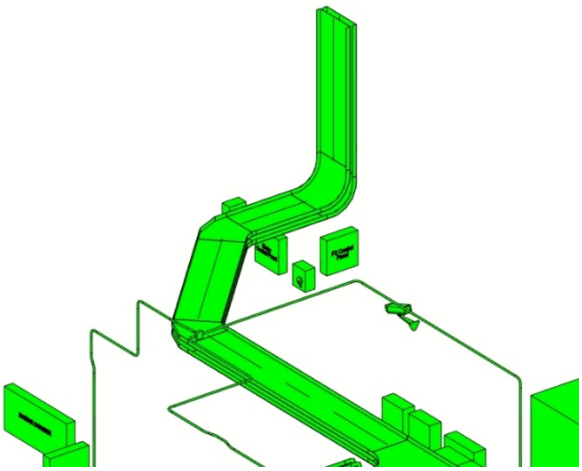
Under “Electrical” ➜ click “Cable Tray” ➜ Set suitable Cable Tray type ➜ Set dimensions and offset ➜ Define Service Type



Best practice is to define all these setting first



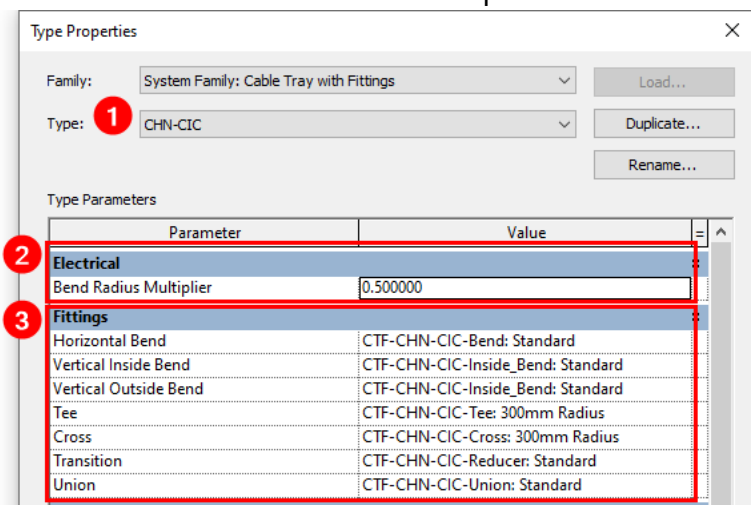




4.3.2 Setting up Cable Tray Fittings

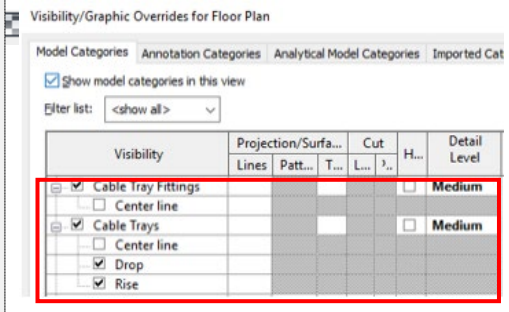
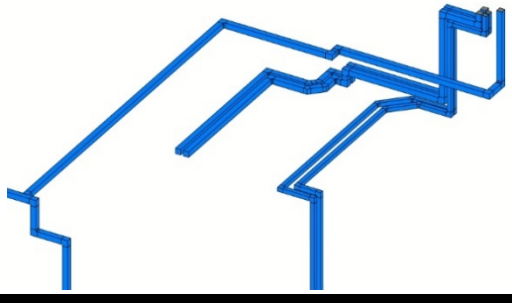
- Typical fitting types shall be set as routing preference. Therefore, cable tray fittings can be generated automatically while drawing cable tray work.
- It is **NOT suggested** to create a fitting family unless there is insufficient fitting design in Revit family library.
- Please follow the below procedure to modify the fittings provided from Revit Library for Hong Kong Practices for Design Stage only.

To set or change the routing preference.
Select the cable tray ➜ set to the desired “Cable Tray” ➜ navigate to “Fittings” and change as desired ➜ set the “Bend Radius Multiplier”



4.3.3 Creating Trunking

- There is no direct tool to develop Trunking in Revit.
- **Method 1:** Model by duct with different system names and the setting is used to imitate trunking in Revit environment. Details refer to section 4.2 Mechanical System: Ductwork & Mechanical Equipment.
- **Method 2:** To maintain the electrical properties of the “trunking” element, it is advised to prepare the “trunking” by using a cable tray with a different type name and setting. The geometry (size) of the trunking could serve 3D coordination. However, it could not reflect the realistic 3D presentation.

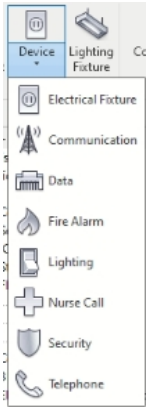
Detail Level	Visibility Setting	3D Model
Medium	 Uncheck Centre line	

4.3.4 Loadable Families for Electrical System

In Revit, there are 3 Main Loadable Families for Electrical Systems. They are Electrical Equipment, Device and Lighting Fixture. The best practice is to develop all 3 Families nested with a 3D model family and an annotation family (symbol).

Each of the Families is uniquely set with specific Service Type either Low-Voltage SSO, Extra-Low Voltage Devices or even equipment.

To use these features, just navigate to desired selection under Electrical Ribbon.
These Main Families is completed with 8 Sub Families which is under the “Device” ribbon.



4.4 BIM Object for MEP

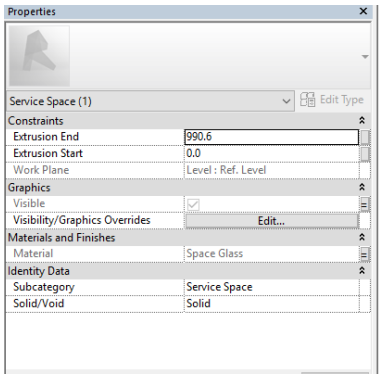
4.4.1 Maintenance/Service Space

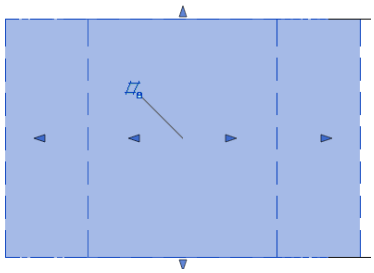
Maintenance space, also known as clearance area, is a designated area for machinery and other objects that may require maintenance or safety measures. There is no other object that can be put in the maintenance space. Keep in mind that the maintenance area isn't usually included in the drawing production. Please follow the steps outlined below to create a maintenance area :

- The maintenance space should create as a separate family and nested into equipment family.
- The maintenance space should use generic model and set as a "**Shared**" family and determine sub-category such as "Maintenance Space". This method allows user to control all maintenance space visibility by sub-category under generic model without limitation of different equipment family categories. Also, use sub-category to control the maintenance space edge line displaying on plan view and elevation view.
- The maintenance space should create by parametric modelling to allow user to change its size in equipment family.
- The maintenance space should be transparent in the 3D view, normally set as 80% in material setting. Also, the transparent setting is not appearing in 2D view so the space should be invisible in 2D view. Use symbolic line to represent the edge of the maintenance space in 2D view.
- The maintenance space should provide a parameter to control its visibility.

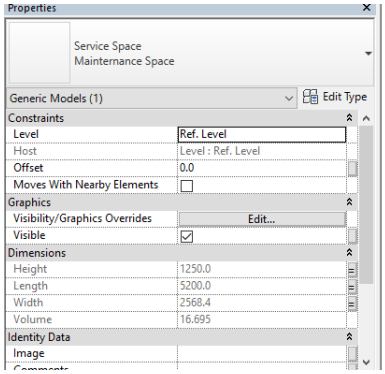
Example for Mechanical Equipment Maintenance/Service space:

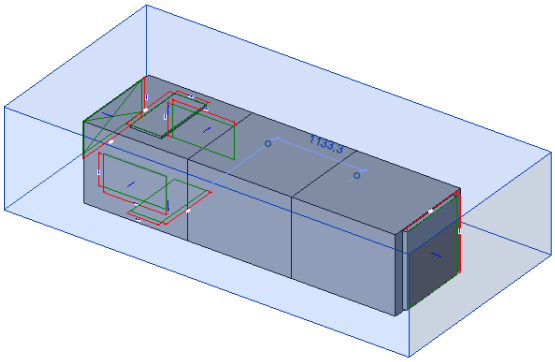
Generic Service Space family

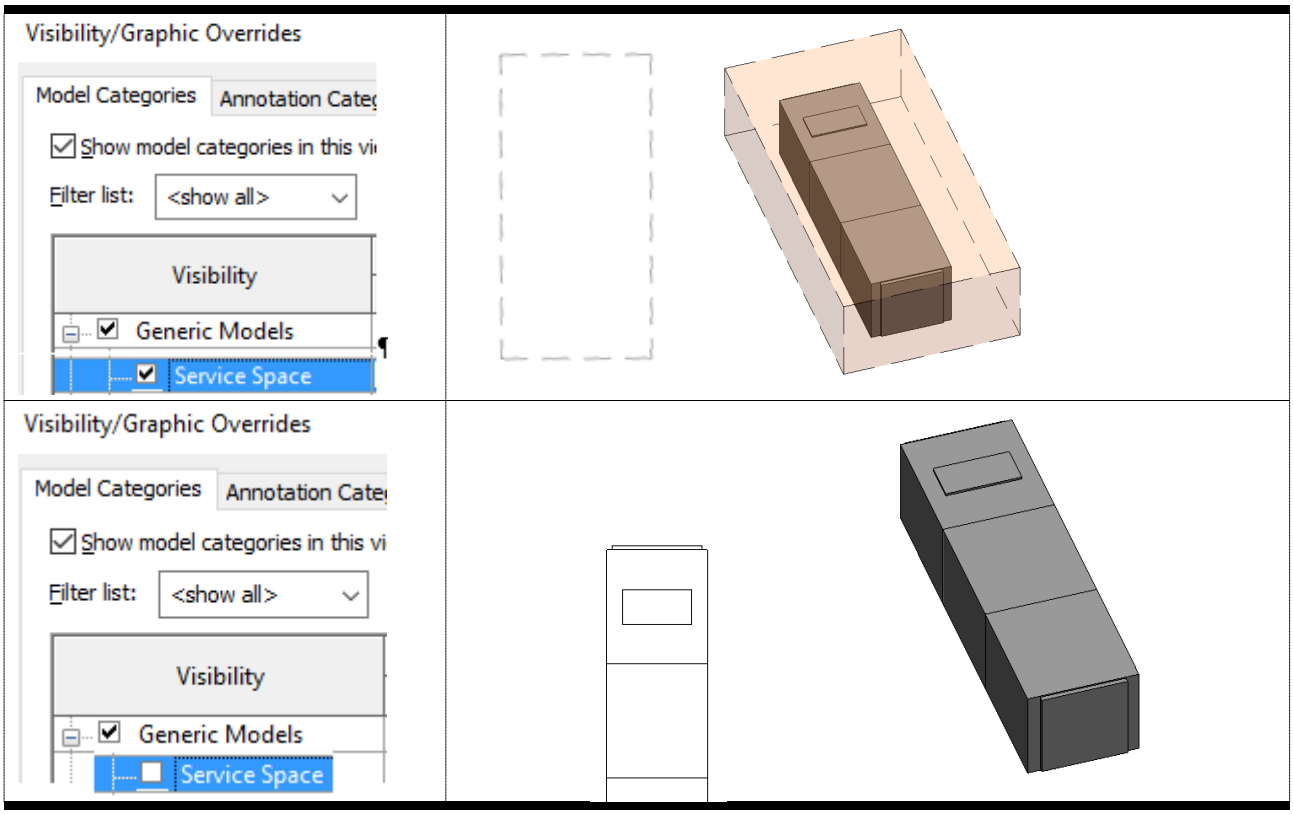




Large equipment family nested with Generic Service Space family

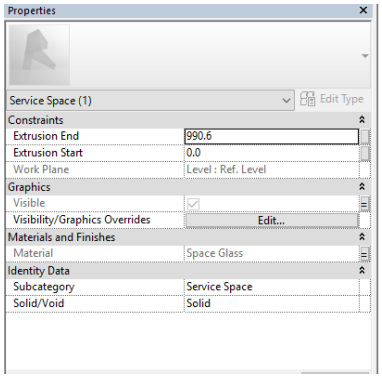


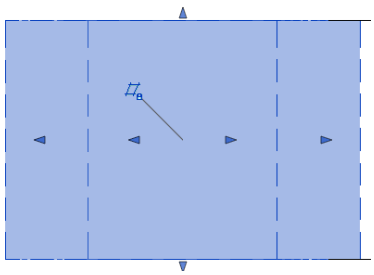




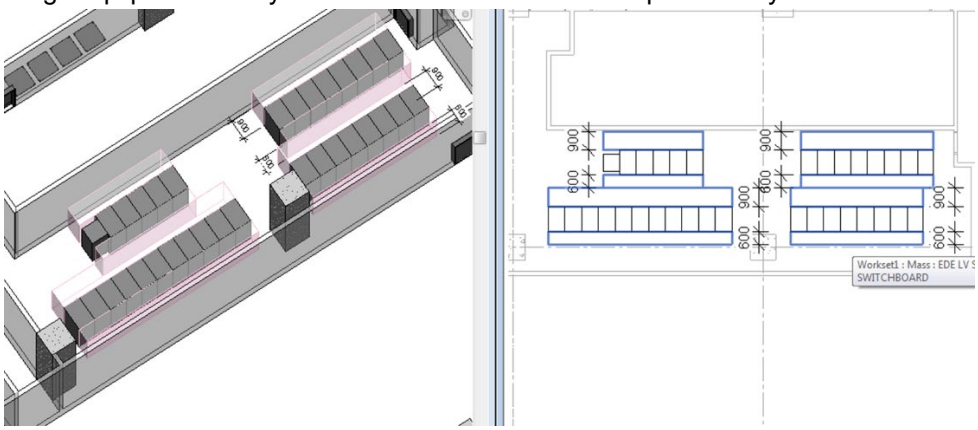
Example for Electrical Equipment Maintenance/Service space:

Generic Service Space family





Large equipment family nested with Generic Service Space family



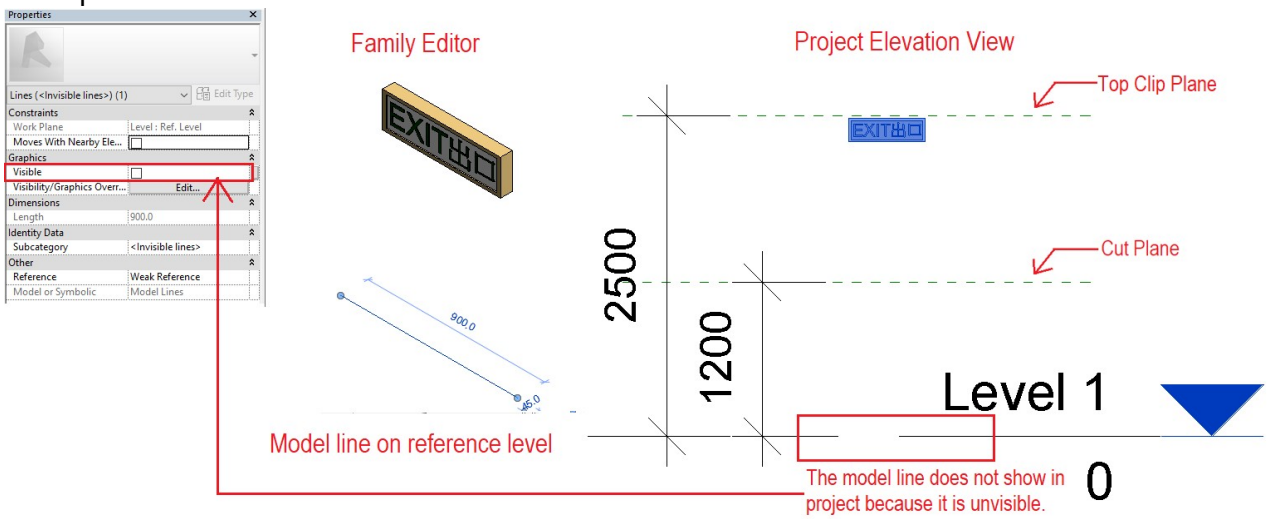
4.4.2 Issue of Plan View Cut Plane

Usually, a floor plan shows all the elements, which are cut by the cut plane (around 1200mm to 1500mm from level), in the associated level. Some elements located at a high position such as exit sign, hose reel and alarm bell etc. may not be visible since they are above the cut plane due to software's interpretation.

Therefore, a visibility quality checking should be carried out during drawing preparation to ensure targeted objects are presented on the plan clearly under a right setting.

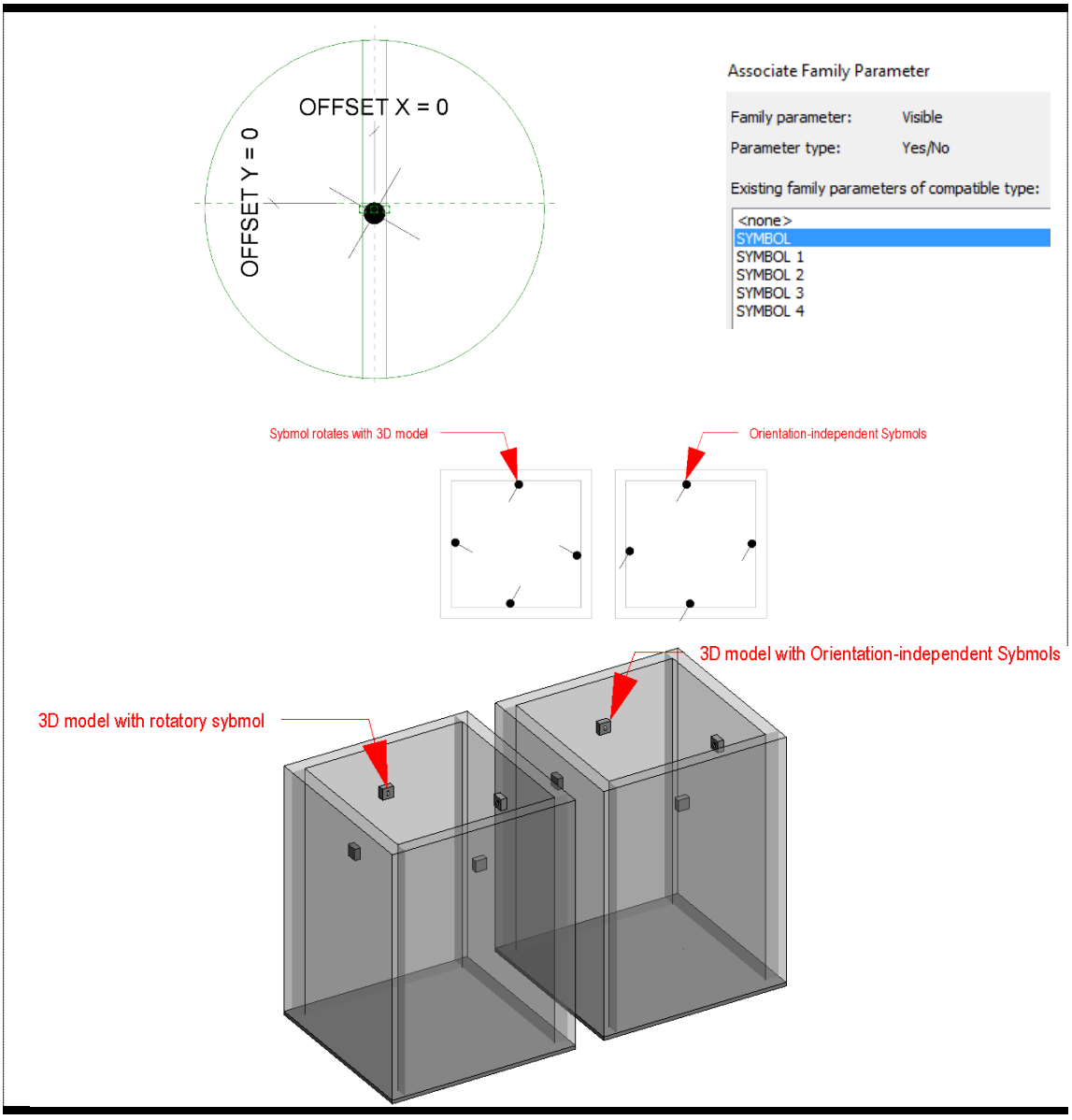
- If "specialty equipment" or "generic model" category is placed above the cut plane but below the top clip plane which defined in view range setting, it will not display on the plan view unless its category is window, casework or generic model.
- However, in some case, user will expect to show the family's symbol on the plan view without modify the cut plane setting.
- Create one model line on the reference level and set its "Visible" property to false.

Example:



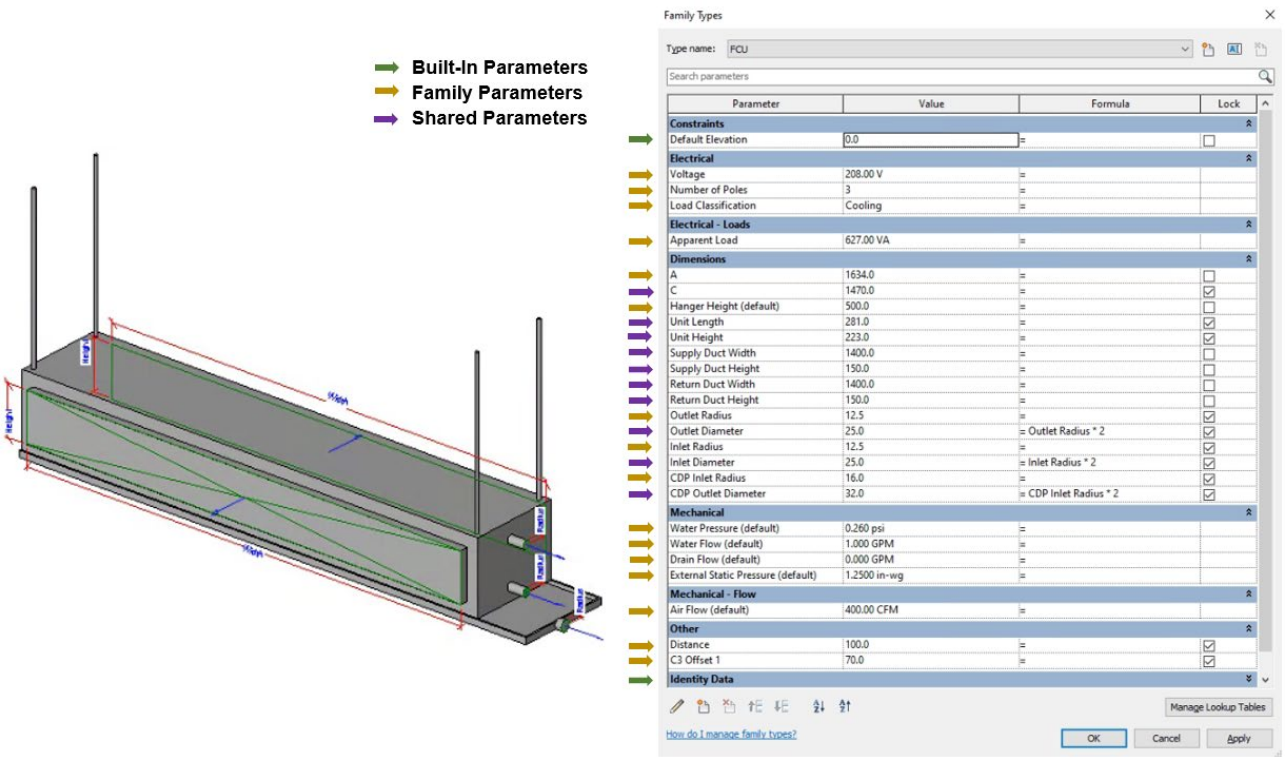
4.4.3 Orientation-independent Symbols

- As 2D Symbol is nested with 3D model, it rotates corresponding to the 3D model in project.
- Under the situation that all the symbols on plan are arranged in the same orientation, the model is required to nested more than 1 symbol or using parameters to control the rotation of the symbol.

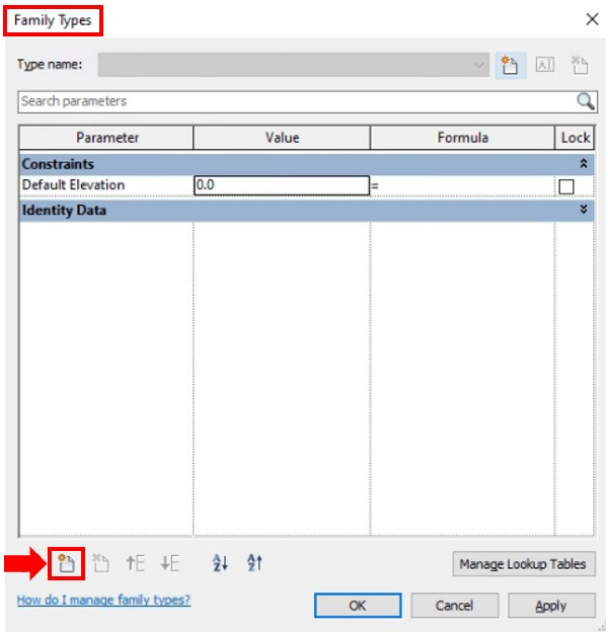


4.4.4 Creating a Shared Parameter in Mechanical Equipment Family

Usually, there is only a “Default Elevation” that was created when first time creating a mechanical family. Hence it is important to create and categorize each element with proper functional parameters so it can be used in generating a schedule.

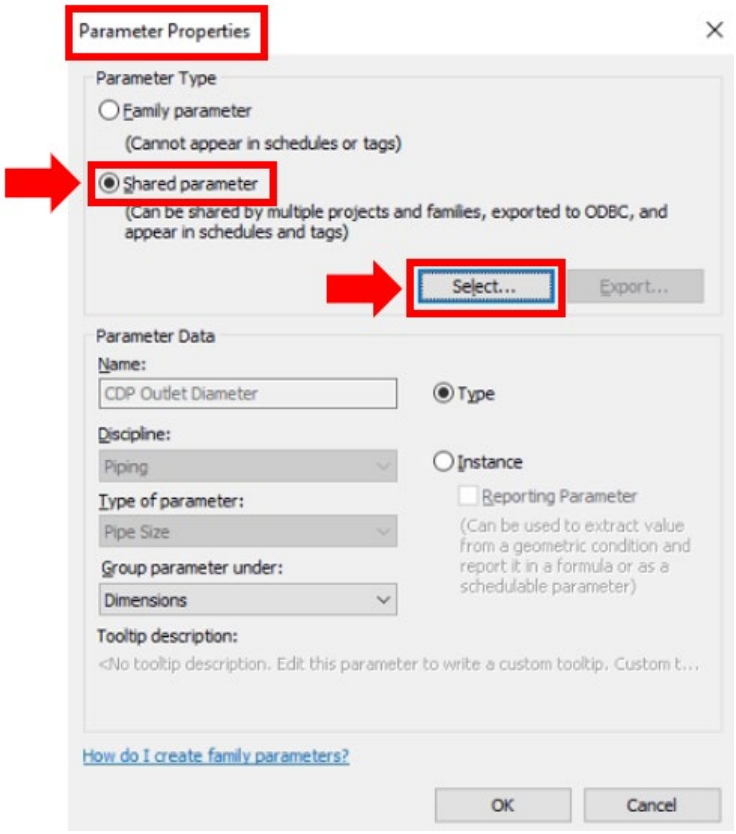


Go to “Create” tab ➜ Properties Category ➜ Select the “Family Types” . A “Family Types” dialogue box will prompted. Under the same dialogue box, click on “New Parameter” symbol to create a new parameter.

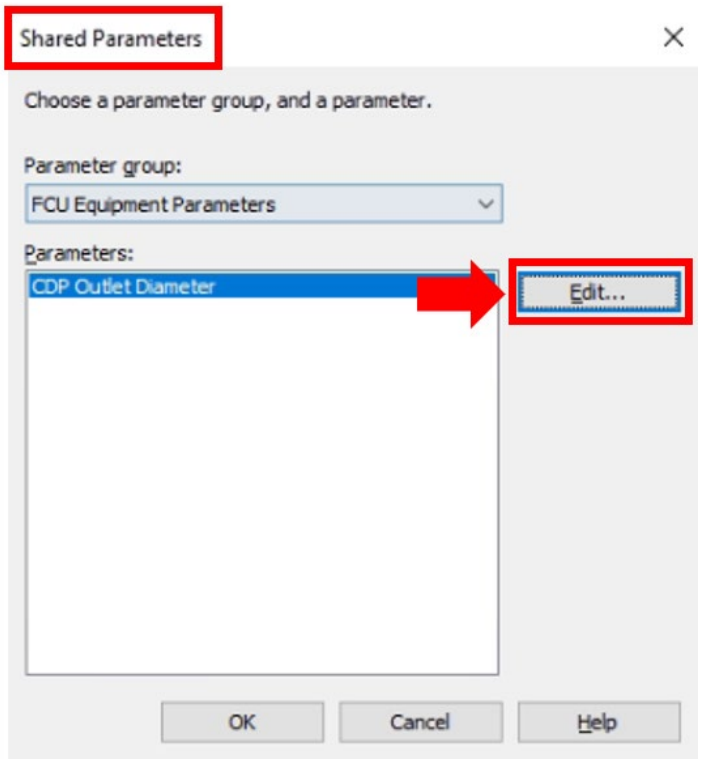


A dialogue box of “Parameter Properties” will be prompted. Click on “Shared Parameter” ➜

“Select”.

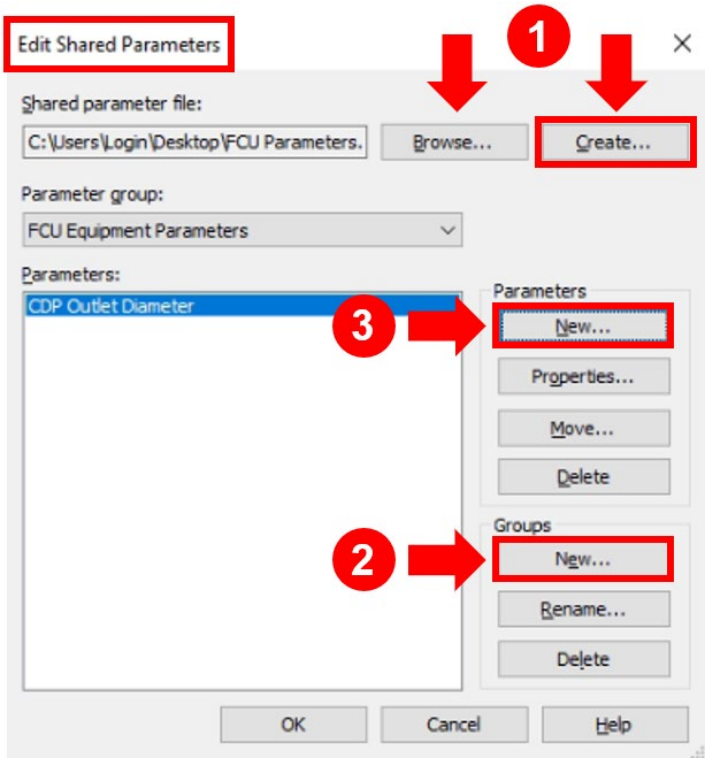


Under the “Shared Properties box ➜ click on “Edit”.

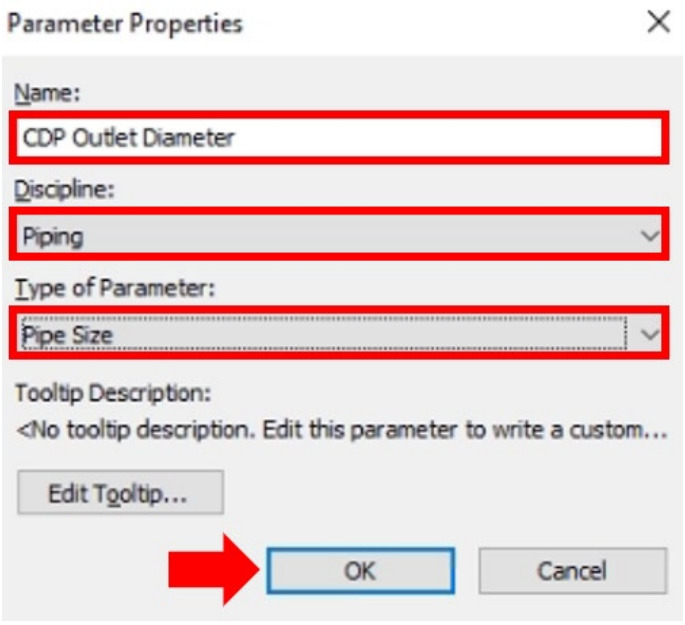


Go to “Create” for your own “Shared Parameter File” with an appropriate naming and location or can click on “browse” to find the existing “txt File” saved ➜ click “New” under “Groups” section to

create a new parameter group ➜ click “New” under “Parameters” to create a new parameter element.



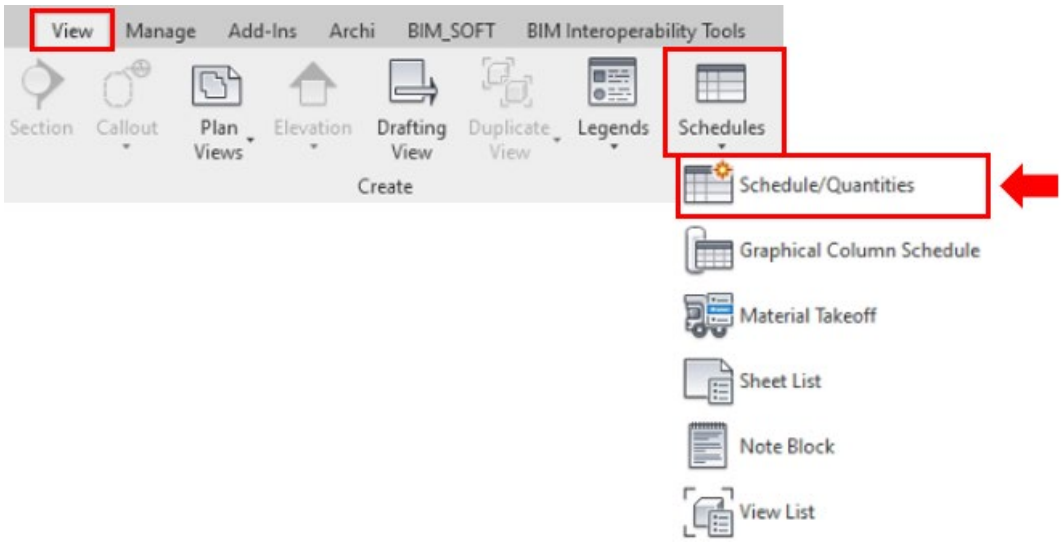
Fill all the information needed in the “Parameter Properties” dialogue box. Then click “Ok”.



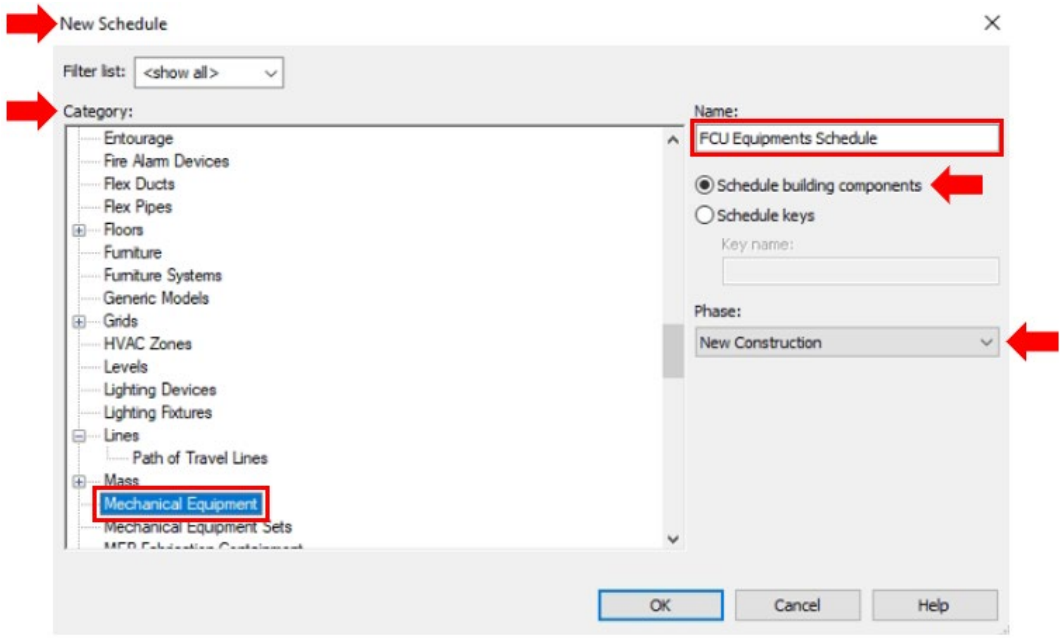
Using shared parameters could facilitate the setup for schedule. Refer to 5.1 Select Fields for Schedule.

5 Preparing Schedules

In the project ribbon, go to “View” ➜ “Schedule” ➜ “Schedule/Quantities”



Once the “New Schedule” window opens, select the “Mechanical Equipment” under the “Category” column. Set the unique name to “FCU Equipment Schedule”. Make sure “Schedule Building Components” and Phase “New Construction” is selected. After that, click “Ok”.

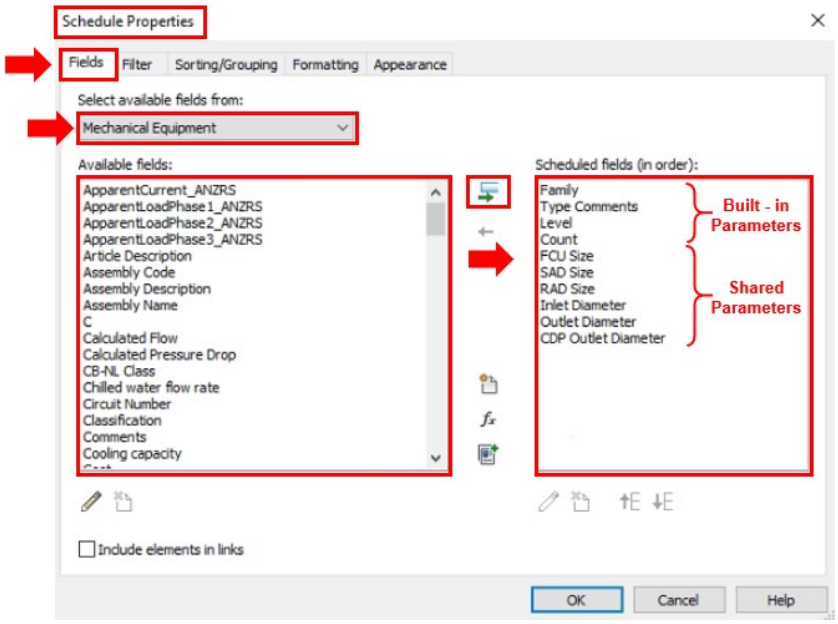


A “Schedule Properties” will prompt. Within the window, there are five (5) different tabs we can use to organise the settings for the schedule. There are “Fields”, “Filter”, “Sorting/Grouping”, “Formatting” and “Appearance”. Each of the tabs will be introduced in the coming sections.

5.1 Select Fields for Schedule

Under the “Fields” tab, then go to the “Available Fields” drop-down and select the “Mechanical Equipment”. Later, pick any “Appropriate Parameters” under the “Available Fields” to specify the information to be included on the schedule. Use the icon“ ” to move the parameter from the left column to the right column. Otherwise, “double click” in the “Available Fields” column to add on into the “Schedule Field” column.

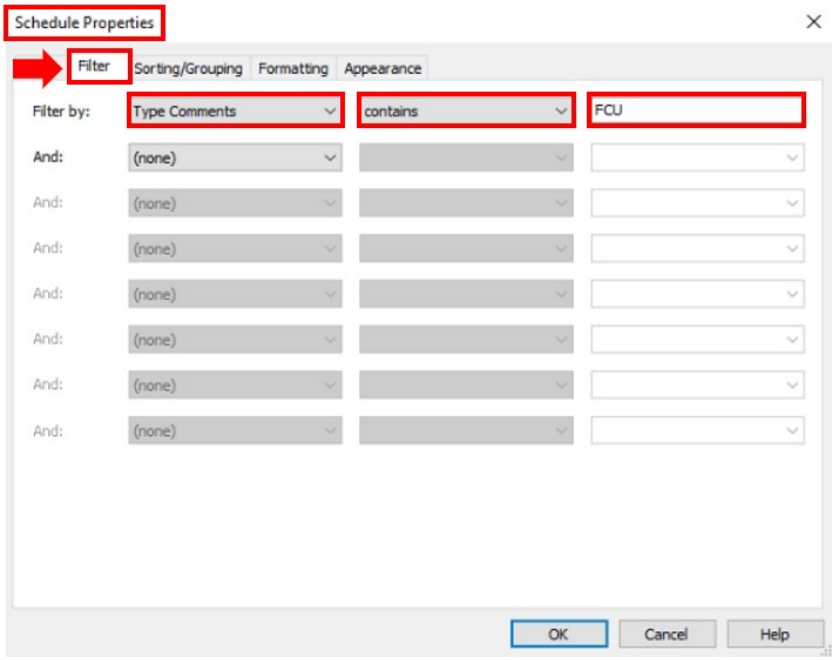
As mentioned in Section 2.5 Parameters, there are two types of parameters for custom family elements; the Built-in-Parameter and the Shared Parameter. The Built-in Parameter is the element or information that already existed in the project, hence no changes can be made. The Shared Parameter is an additional element that has been added into the family or project for easy access to extract the stored information to be used in tagging and scheduling purposes and it can be updated at anytime.



5.2 Data Filter in Schedule

Go to the second tab, “Filter”. Use filter by “Type Comments” ➜ “contains” ➜ “FCU” (this depends on what has been written in your type comments section).

This process is needed because all mechanical equipment has been selected using the “Family Parameter” in the “Fields” tab earlier. Therefore, only mechanical equipment with “FCU” written in the “Type Comments” only selected in generating this schedule.

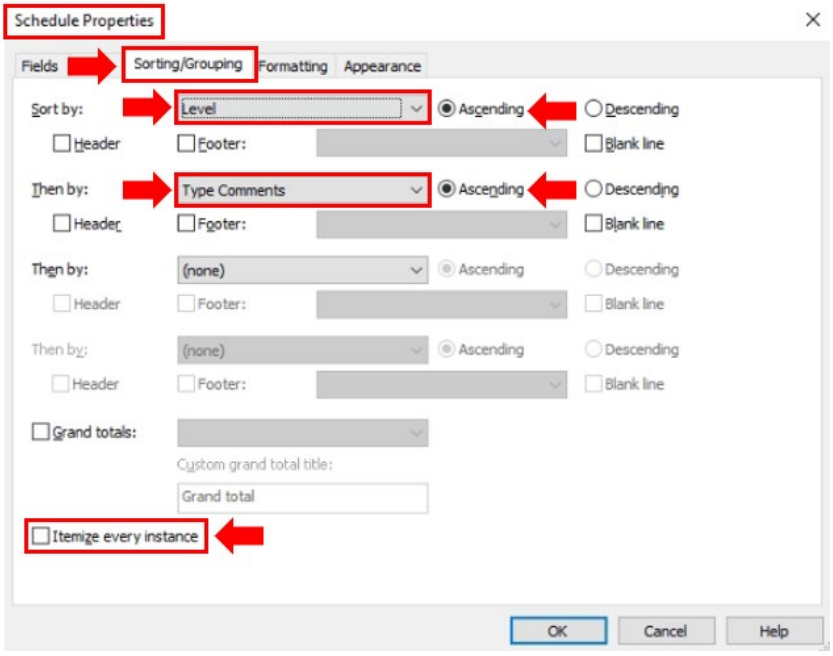


5.3 Sort and Group in a Schedule

Go to the third tab, “Sorting / Grouping”. Select sort by “Level” ➜ then by “Type Comments” ➜ ascending order are selected for both. By default, “Itemize Every Instance” is selected but during this exercise, this is turned off.

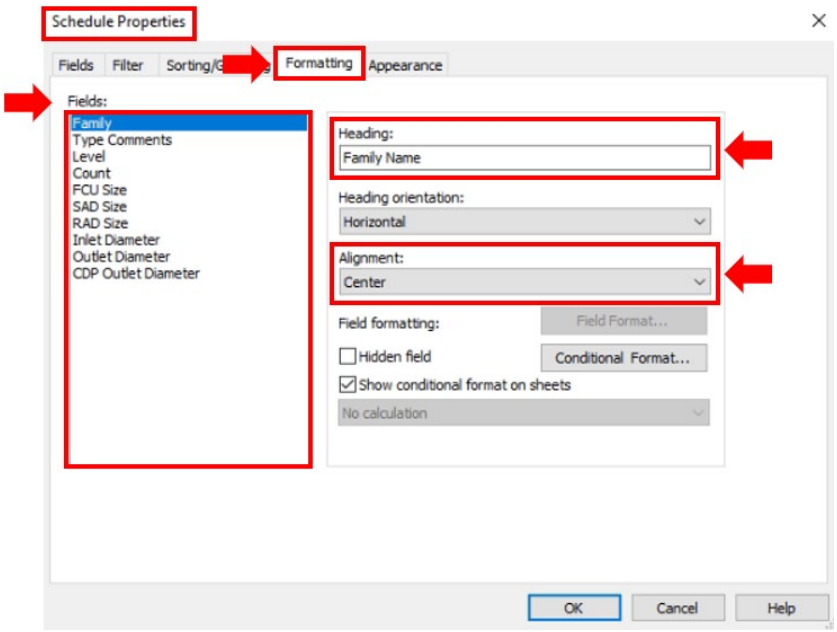
In this exercise, two types of different FCUs have been used. Hence, the “Type Comments” parameter has been used to show these two types of equipment in the schedule.

Ascending order has been selected to organize the level of that particular mechanical equipment located. Therefore, the first row of the schedule will start from GF until RF.



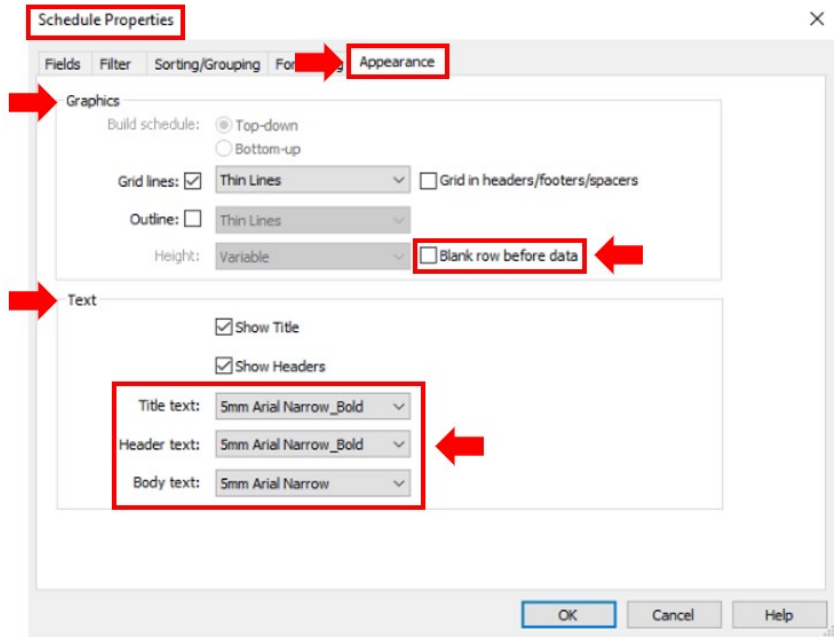
5.4 Formatting in a Schedule

Go to the fourth tab “Formatting”. Go to each parameter under “Fields” category to specify formatting options to change name under “Heading” and “Alignment” change the header alignment.



5.5 Appearance in a Schedule

Go to the fifth tab, “Appearance” and then untick the “Blank row before data” under the graphic setting. Next, change the font type for each “Title Text”, “Header Text” and “Body Text’ under the text setting ➜, then click “Ok”.



After that, find the row that has indicated the column starting from “A”. Drag from “A” to “J” to select all the columns and rows. Select all the schedules ➜ to modify Schedule / Quantities tab ➜ appearance ➜ align vertical ➜ select “Middle” context option.

The width of column size shall be adjusted in the sheet view after dragging the schedule into a created sheet.

FCU Equipments Schedule									
Family Name	FCU Type	Level	Count	FCU Size	SAD Size	RAD Size	Diameter Connection Size		
							CHWR	CHWS	CDP
MCQ-FCU-CIC-FCU	FCU-12	G/F +4.50	3	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	1/F +9.50	6	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	2/F +12.65	6	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	3/F +15.80	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	4/F +18.95	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	5/F +22.10	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	6/F +25.25	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	7/F +28.40	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	8/F +31.55	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	9/F +34.70	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	10/F +37.85	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm

6 Standardising View Setting

6.1 View Templates

"View Templates" are used to manage the view setting and control for multiple views. This could enhance the efficiency of the presentation setup for different submissions. It is suggested to have at least 1 set for working purpose and 1 set for drawing submission purposes. The standardised view properties include but are not limited to view scale, detail level, model display setting. The "View Template" could be applied to all plan view, section views, elevations, detail views and even 3D views.

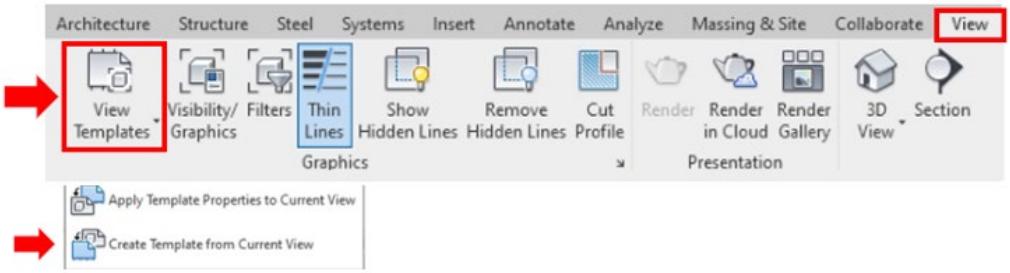
6.1.1 Create View Template

There are two (2) methods to create the view template.

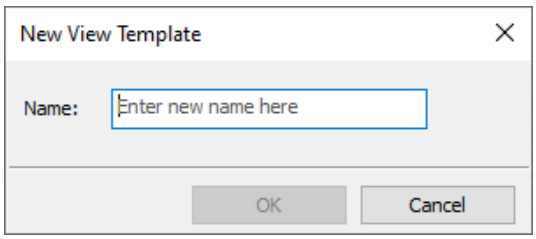
6.1.1.1 Create Template from Current View

Create a view template from the view that is defined with good and appropriate presentation setting.

On the "View" tab ➜ "Graphics" panel ➜ "View Templates" ➜ "Create Template from Current View".



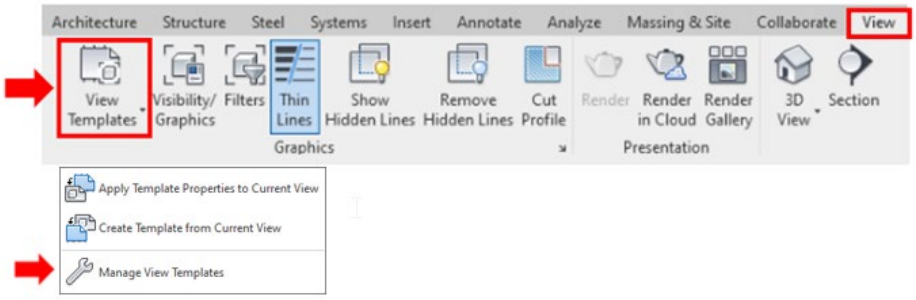
Name the view template



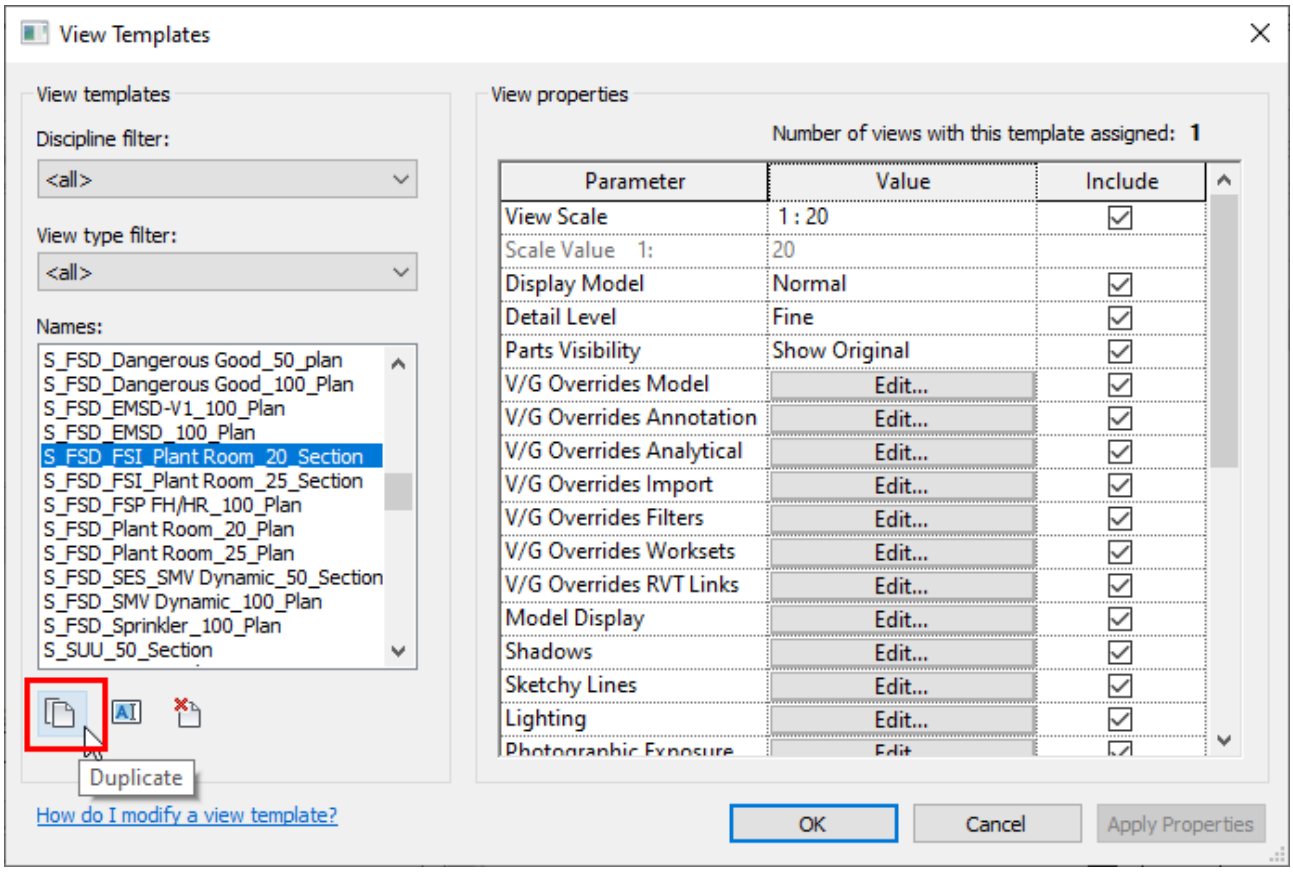
6.1.1.2 Duplicate existing View Template

Create a view template by duplicating the existing view template that has similar presentation setting.

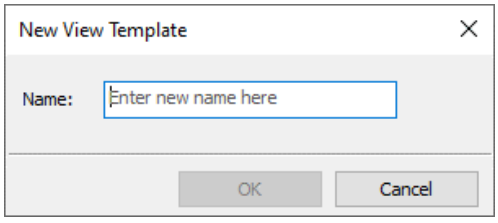
On the “View” tab ➜ “Graphics” panel ➜ “View Templates” ➜ “Manage View Templates”.



Select the existing view template that has similar presentation setting ➜ “Duplicate”.



Name the view template
View Template Naming refer to Section 6.1.1.1 Create Template from Current View.



Modify the new view template settings according to the target submission presentation.

It is suggested to standardise the view template name according to the table below:

<Purpose>_	<Approval Authority>_	<Submission Name/ Remark> _ (if applicable)	< Scale>_	< Type>_	<Remark> (optional)
S_	**FSD_**	**Dangerous Good_**	**50_**	**Plan**	
S_	**EMSD_**	**BEEO_**	**100_**	**Plan_**	**Water Side**
S_	**EMSD_**	**L&S_Escalator_**	**50_**	**Section**	
W_		**EL_**	**100_**	**Plan_**	**Staff_Name**

Purpose (Abbreviation)	Definition
S	**Statutory Drawing**
W	**Working Drawing**

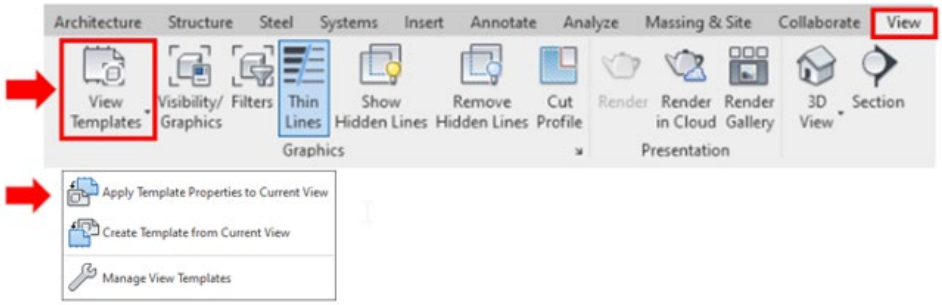
6.1.2 Apply View Template

There are two (2) methods to apply view template.

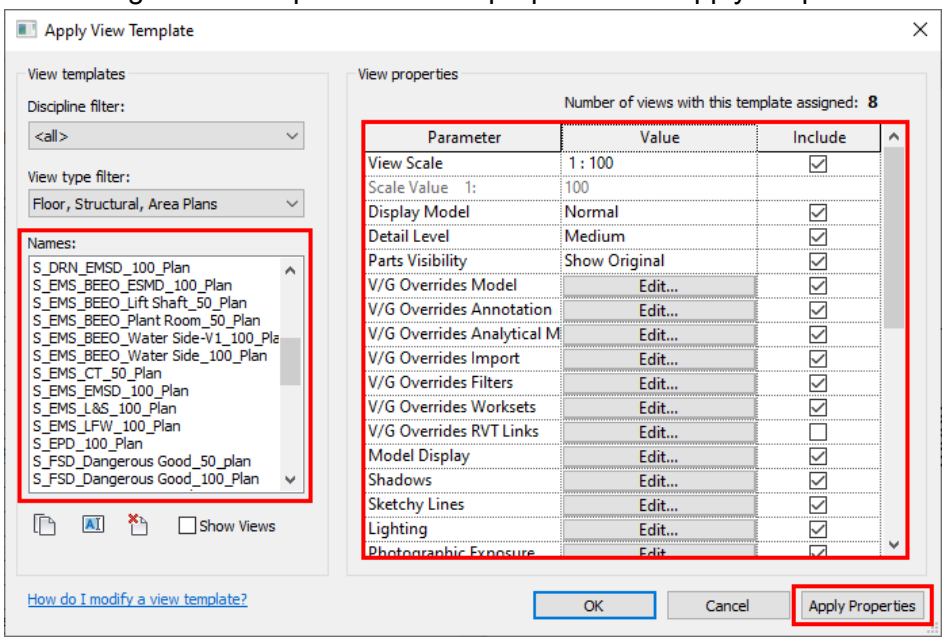
6.1.2.1 Apply Template Properties to Current View

This method is to “borrow” the view properties from the existing view template after application. However, if there is any change in the view template, your targeted view will not be updated automatically. Otherwise, you shall refer to Section 6.1.2.2 Assign Template Properties for more details.

Open the target view ➜ on the “View” tab ➜ “Graphics” panel ➜ “View Templates” ➜ “Apply Template Properties to Current View”.



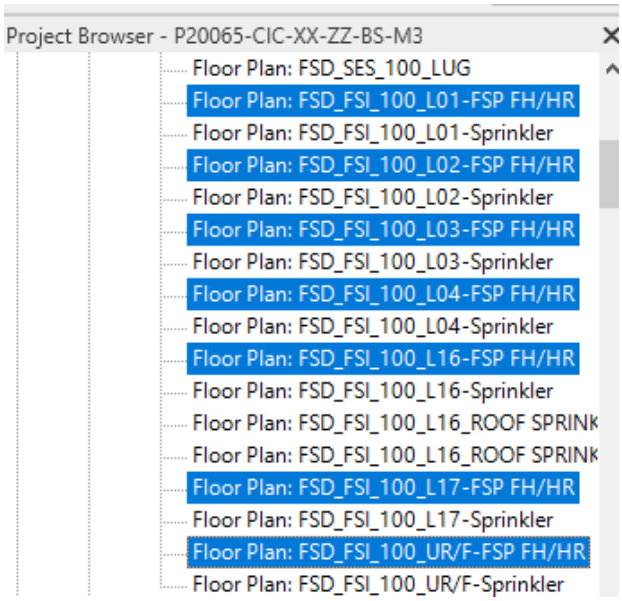
Select target view template and view properties ➜ “Apply Properties”.

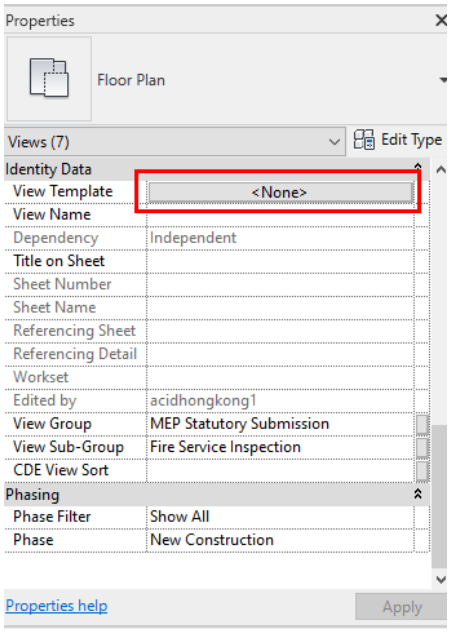


6.1.2.2 Assign Template Properties

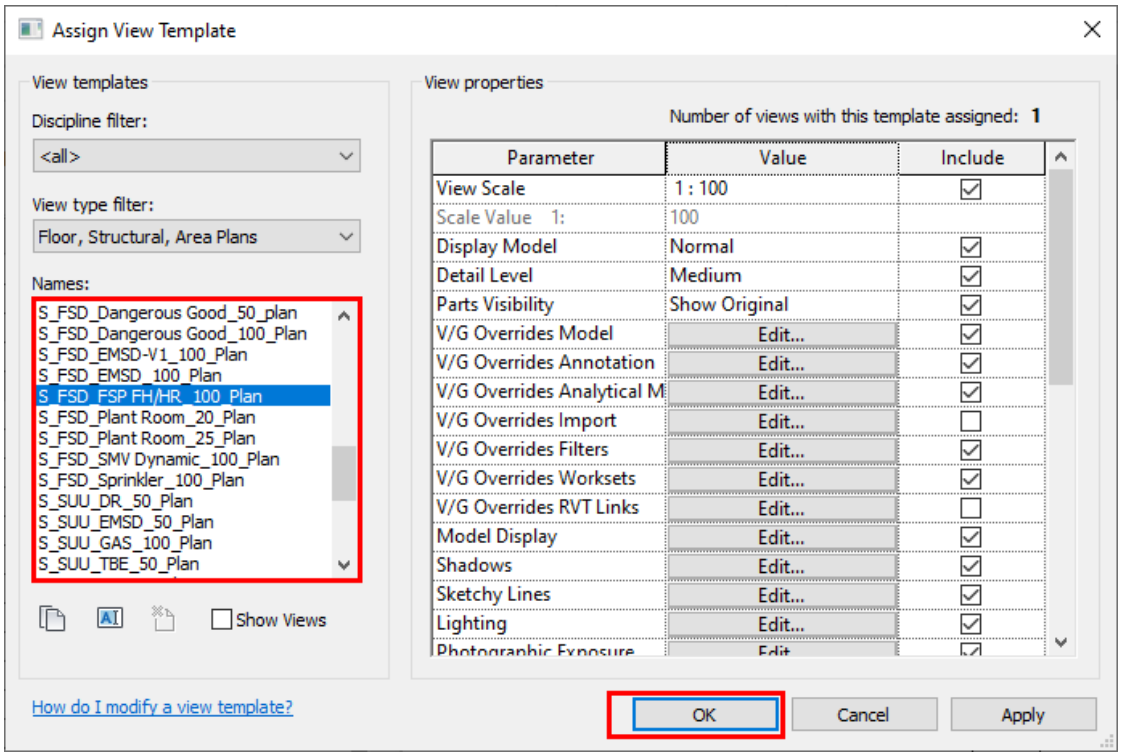
This method could “lock” the view template to target views. Once there is a change in the corresponding view template’ view property, all the assigned views will be updated automatically.

Select the target view(s) in Project Browser ➜ click “None” under “View Template” in “Properties” palettes.

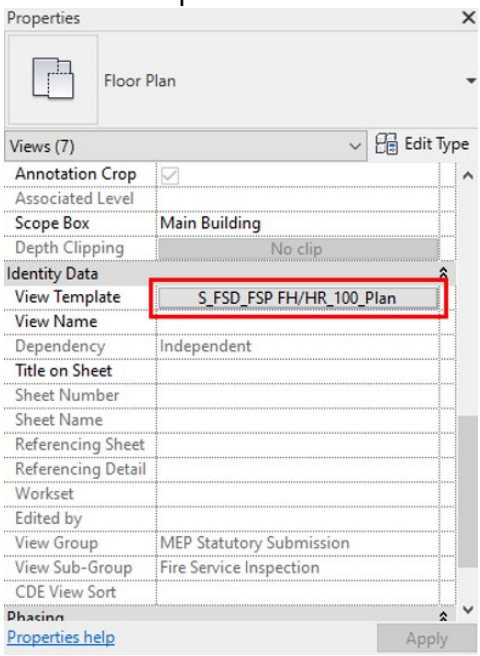




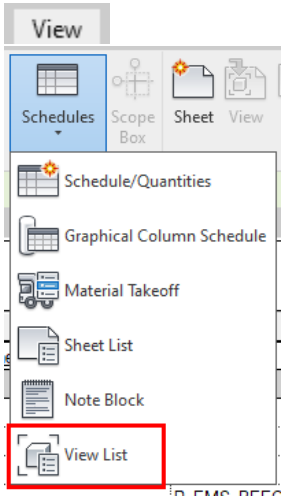
Choose appropriate view template ➜ OK.



The view template would be then be assigned to the target views.



All the assignment of view templates could be reviewed through View List under Schedules on the View tab.



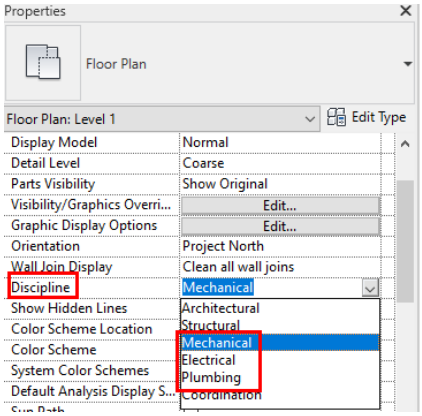
Operation of schedule refer to Section 5 Preparing Schedules.

<W_View List>

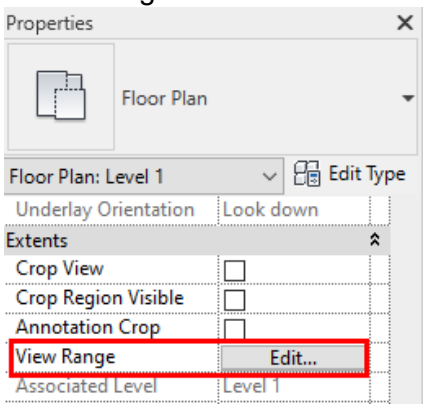
A	B	C	D	E
View Group	Sheet Number	Title on Sheet	View Name	View Template
MEP Statutory Submission	AC001	LOCATION PLAN	AC_1000_LOCATION PLAN	None
MEP Statutory Submission	AC001	SITE PLAN	AC_500_SITE PLAN	None
MEP Statutory Submission	AC101		AC101_HVAC	None
MEP Statutory Submission	AC201	GF PLAN	EMS_BEE_100_L00_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC201	L01 PLAN	EMS_BEE_100_L01_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC201	L02 PLAN	EMS_BEE_100_L02_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC201	L03 PLAN	EMS_BEE_100_L03_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC202	RF PLAN	EMS_BEE_100_L16_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC202	URF PLAN	EMS_BEE_100_L17_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC202	TRF PLAN	EMS_BEE_100_R/F_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC202	L04-L15 PLAN	EMS_BEE_100_L04_HVAC	R_EMS_BEEO_Water Side (FSD)_100_Pl
MEP Statutory Submission	AC203		AIR CONDITIONING PLANT LAYOUT	S_EMS_BEEO_Plant Room_50_Plan
MEP Statutory Submission	AC203	SECTION 2-2	SECTION A-A (HVAC)	W_EMS_BEEO_HVAC Room_20_Section
MEP Statutory Submission	AC203	SECTION 3-3	SECTION B-B	W_EMS_BEEO_HVAC Room_20_Section
MEP Statutory Submission	AC203	SECTION 4-4	SECTION C-C	W_EMS_BEEO_HVAC Room_20_Section
MEP Statutory Submission	AC204	COOLING TOWER PART PLAN	COOLING TOWER PART PLAN	None
MEP Statutory Submission	AC204		SECTION 4-4 (HVAC_CT)	S_EMS_BEEO_25_Section
MEP Statutory Submission	AC204		SECTION 2-2	S_EMS_BEEO_25_Section
MEP Statutory Submission	AC204		SECTION 3-3	S_EMS_BEEO_25_Section

6.2 Plan Views

Discipline for each view should be well defined. The direction of view and graphics setting would be different between Architectural, Structural, MEP and Coordination.

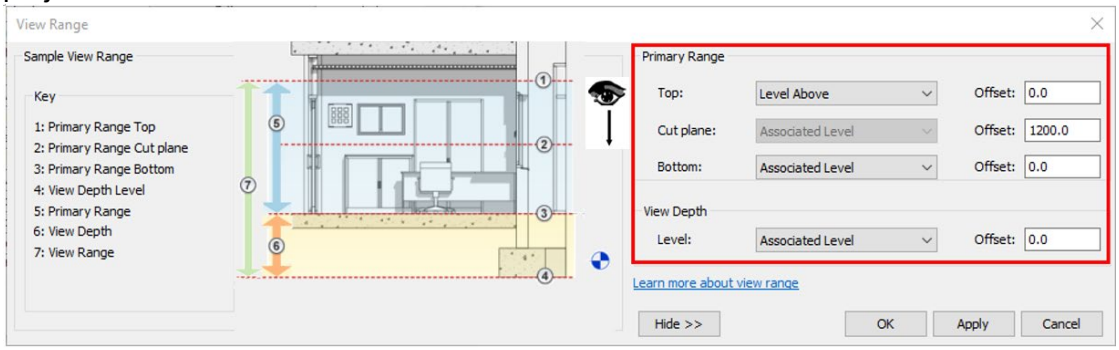


For MEP drawings, “Floor Plan” and “Ceiling Plan” are the usual plans. Both are controlled by “View Range”.

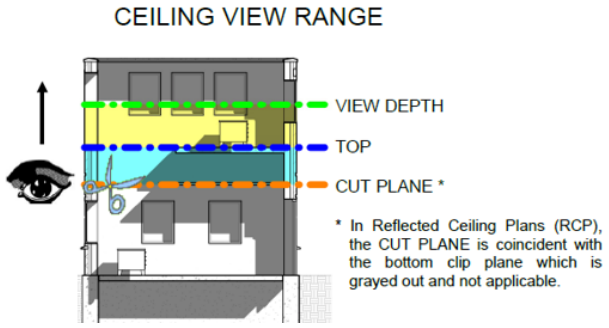


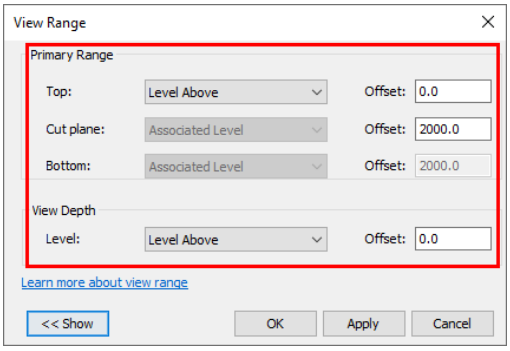
The below figures indicate the direction of the view and common setting for different plans under the MEP discipline.

In the MEP floor plan, system families (such as duct, pipe, cable tray etc.) would be shown with the view direction order from top to bottom. Therefore, the “Top” of view range is “Level Above”. The “Cut Plane” is usually set at 1200mm or 1500mm above the Associated Level (Structural Level). Any custom families’ geometries are cut by “Cut Plane” or located within the “Cut Plane” and “Bottom” zone, including the windows and doors, they would be shown on the floor plan. The “Bottom” is the Associated Level without offset. These settings could ensure adequate model elements to be shown in the view. The setting may be adjusted slightly according to different project and site conditions.



In the MEP ceiling plan, the “Top” of view range is “Level Above”, while the “Cut Plane” is usually set at 2000mm above the Associated Level (Structural Level), i.e. around the ceiling level. Usually, the “View Depth” is zero. All the fixtures, sprinklers, detectors etc., are under the ceiling or within the MEP zone (i.e. between “Top” and “Cut Plane”). The setting may be adjusted slightly according to different project and site conditions.



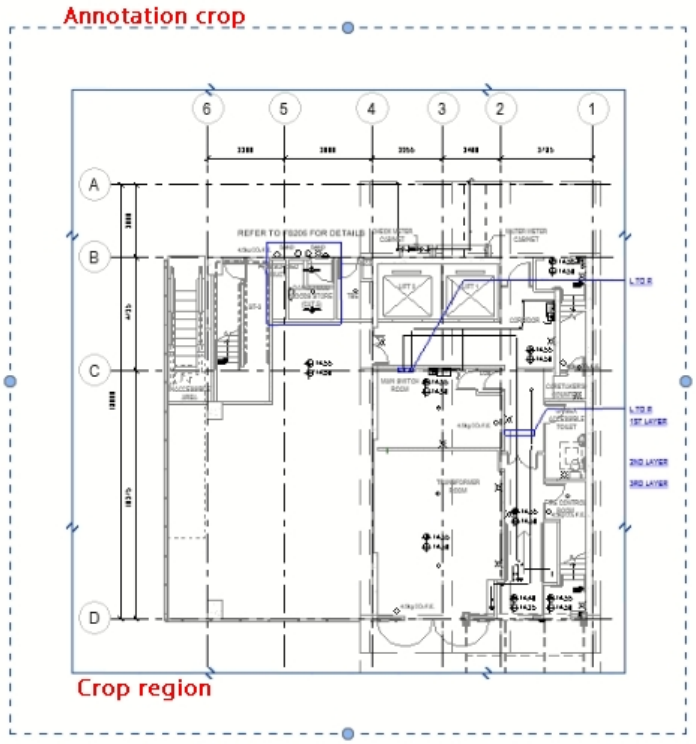


Crop Region

Crop Region can control the boundaries for the view. Datum elements such as levels and grids can adjust automatically according to the crop boundary. The Crop Region also cab be used to resize the viewport on the sheet.

Annotation Crop Region

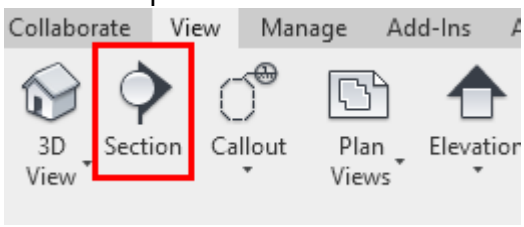
Annotation Crop Region can control the annotation boundaries in the view. By default, it only displays independent views and callout views, but not in the primary view. It is advised to activate the annotation crop region and adjust it until the annotations are well displayed.



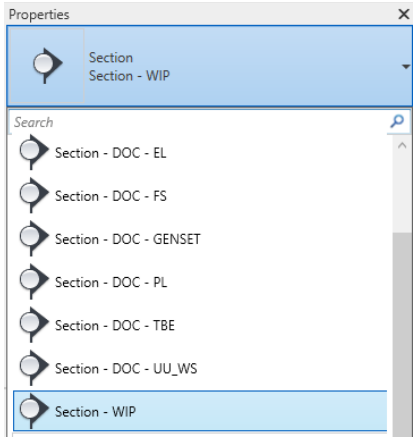
6.3 Section Views

Section views display as section representations in intersecting views. Provide views of specific parts of your model. The crop region and view range must intersect for a section tag to be visible.

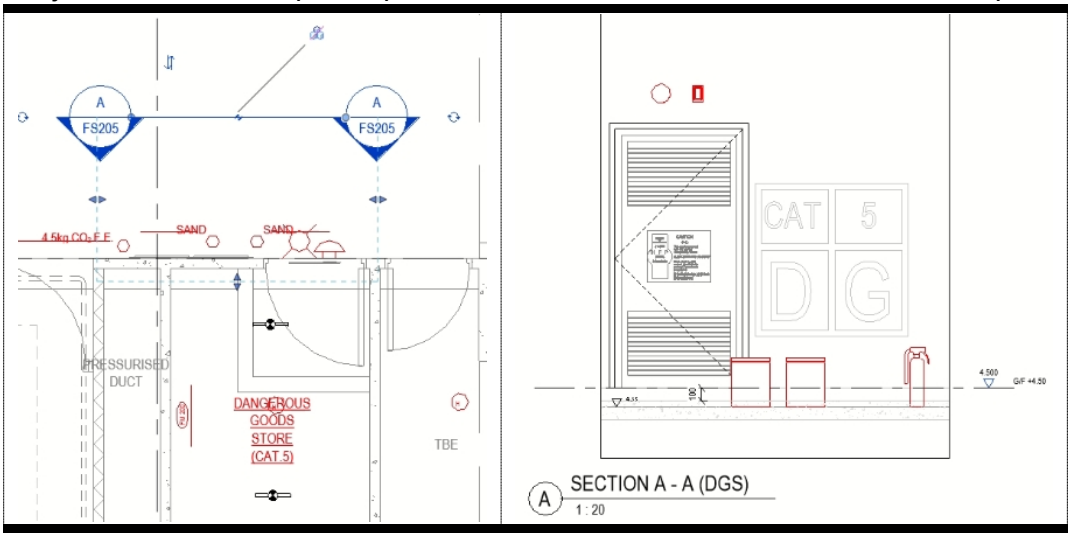
Click View tab ➜ Under “Create” panel ➜ Click at the “ (Section).” ➜ Drag the Section as desired on plan



It is advised to prepare Section Type according to different drawing submissions and working sections. This could facilitate the visibility control on Section Filter for the succeeding drawing preparation.



Adjust the Section depth as preferred. It is not recommended to have a deep section.



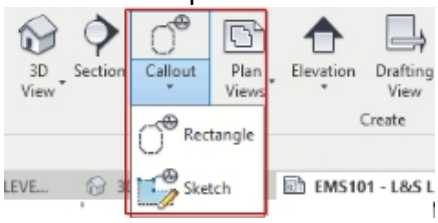
6.4 Callout Views

Callout View shows a blow-up view or an enlarged version of part of the parent view and provides more information about that the building model. You can add a detail callout or a view callout to a plan, section, detail, or elevation view.

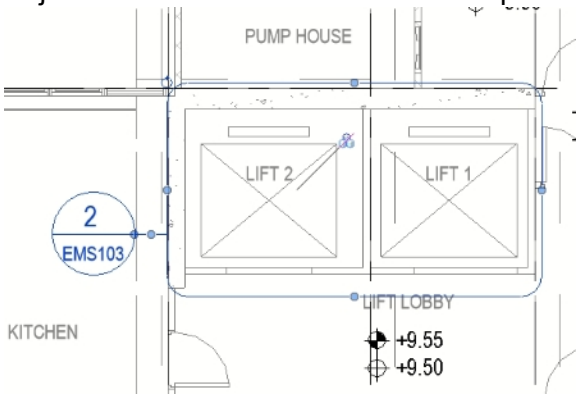
It is recommended to prepare the blow-up view or an enlarged version using Callout View instead of creating a new floor plan view separately. The relationship between the Callout and the parent views would be established in Revit. The reference drawing number of the Callout could be generated automatically in the parent view (master floor plan).

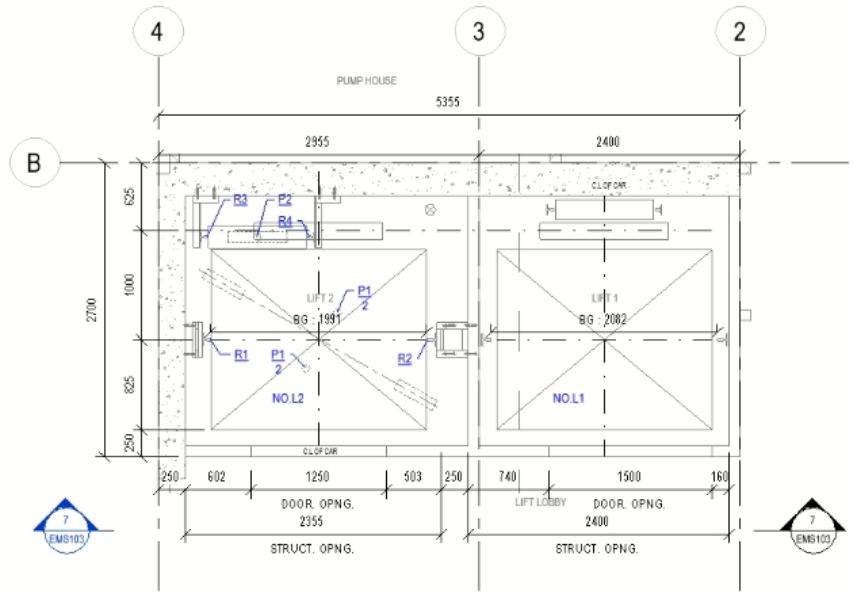
When you draw the callout bubble in a view, Revit creates a callout view.

Click “View” tab ➜ Under “Create” panel ➜ Click at the ” (Callout) “.➜ Drag the “Callout” cloud as desired on plan or section



Adjust the area for the callout view as preferred.



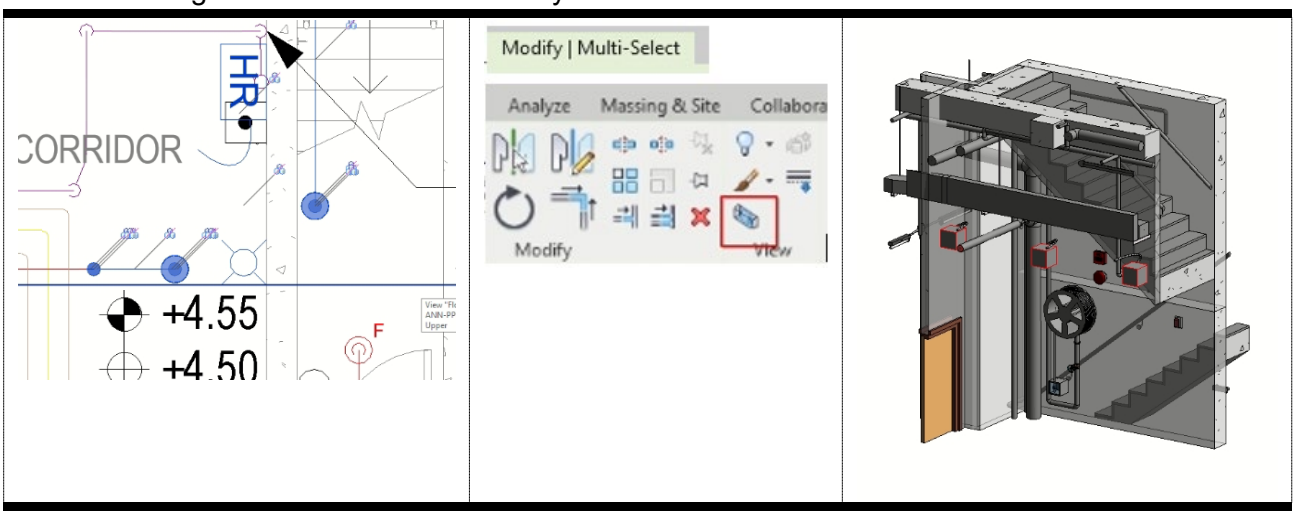


6.5 3D Views

3D Views are helpful for MEP coordination. It is efficient for clash detecting either between other Disciplines or within MEP services itself.

A quick method to prepare a 3D view for target elements

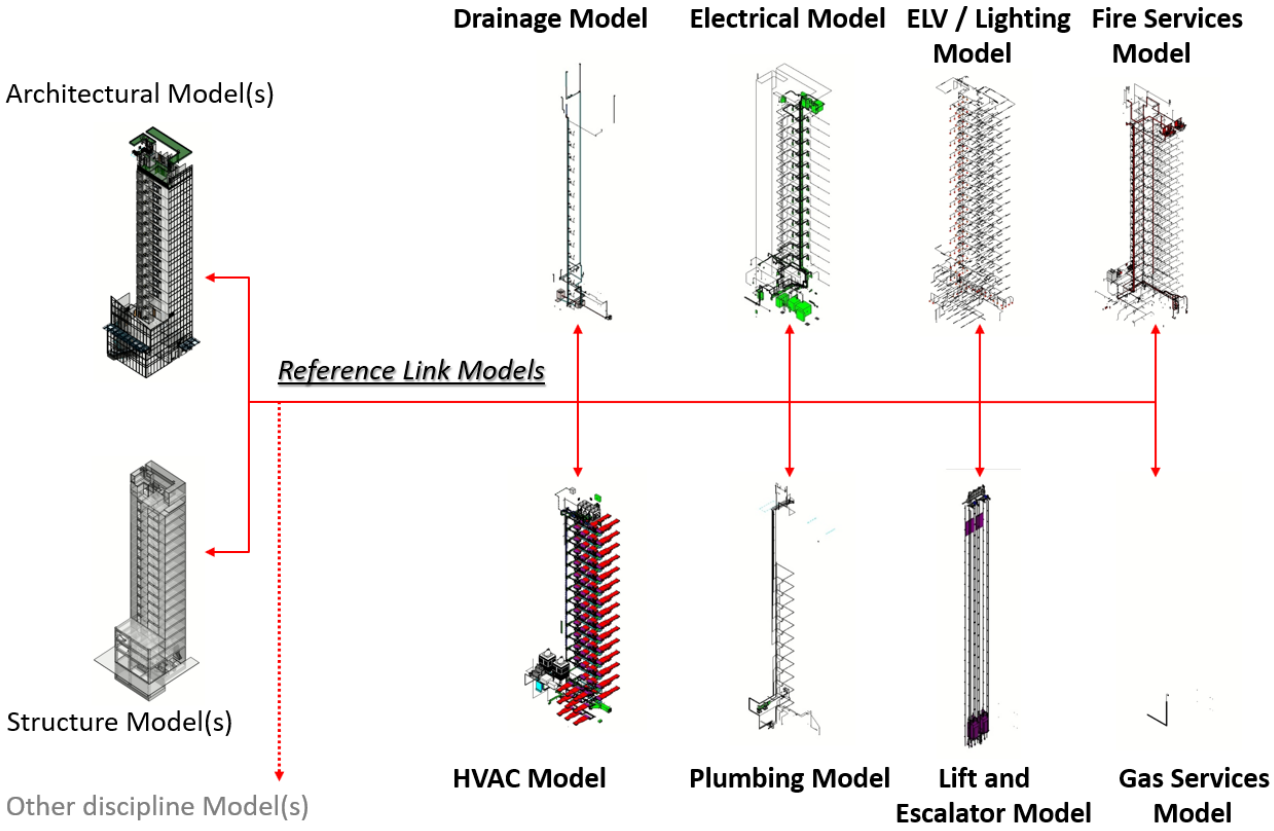
Select the target element ➜ Go to “Modify” tab ➜ click “Selection Box”.



7 Model Segregation

7.1 Discipline Model

The Engineers shall prepare the model by disciplines as the sample below. The overall hierarchy of the project models shall be introduced clearly in the BIM Execution Plan (BEP). If the file size has exceeded the limit listed in the BEP, the discipline models shall then be further segregated by zone or services zone.



Above model segregation is not limited to Revit, it also applies to the discipline models which are prepared by other software. Reference models could also be linked through Industry Foundation Classes (IFC) format.

Details refer to

- CIC BIM Standards – General Section 5.8.2 Collaboration
- CIC BIM Standards – General Section 7 openBIM.
- Revit IFC Manual – Detailed instructions for handling IFC files (Autodesk Inc., 2018)

7.2 Worksets

Worksharing could enable multiple users to edit the Revit Project models at the same time. Workset serves as permission contain originally. In fact, workset can serve as a purpose container efficiently since the elements would not be disconnected and the control on visibility is easy.

Recommend worksets:

Workset	Elements to be included
General Modelling	All elements except those listed in the below worksets. This is renamed from “Workset 1” which is the default workset in Revit.
Shared Grids and Levels	Grids and Levels
Revit Link	All Linked Revit
CAD Link	All Linked CAD
Builders Work	Plinths, Openings, Supporting etc.
Hidden	To be hidden from the modelling due to Revit modelling limitation
(By Discipline)	*

* If the project is relatively small, it might be possible and efficient to prepare all the discipline elements within one Revit Project file. It is suggested to assign the elements using unique discipline worksets. This arrangement shall seek prior approval by the Appointing Party (Client) and BIM Manager.

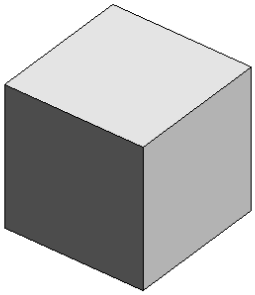
8 Collaboration with Other Disciplines

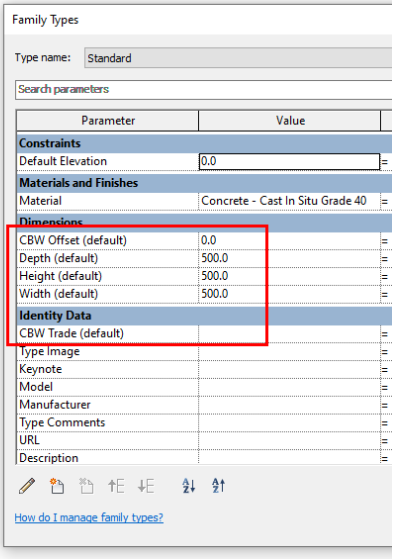
8.1 A/S/M Plinth

Refer to CIC MEP BIM Guide Section 8.9.1 A/S/M Plinth for general workflow.

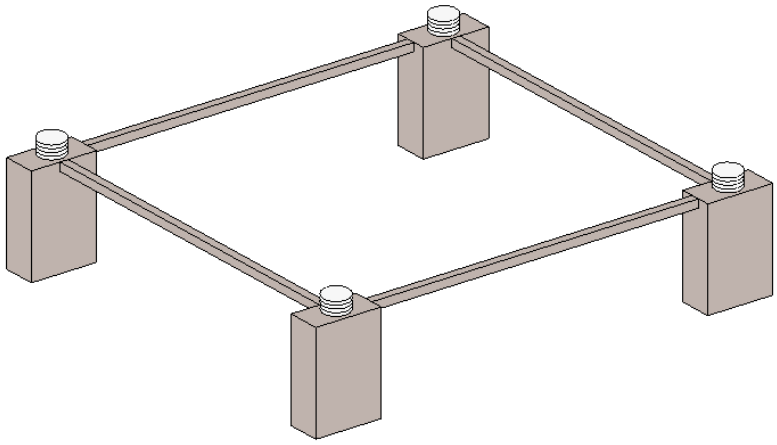
Plinth elements shall be modelled under “Builders Work” workset or “CBWD” workset. The user could control the visibility of elements easily by controlling the corresponding workset.

It is recommended that the Engineers model the simple Plinth elements by a cuboid parametric family.





It is recommended that the Engineers prepare a separate family (as sample below) for equipment such as chiller and pump.



The last priority options to model the Plinth are using “Floor”, which with the Type Name Descriptor as “_Plinth”, and “In-Place model”, which only for irregular form and with Type Name as **“<Level>_<Room/ Location>**_Plinth”.

Methodologies adopted shall be informed to the Architects, the Structural Engineers and the Quantity Surveyors.

8.2 A/C/S/M Manhole

Refer to CIC MEP BIM Guide Section 8.9.2 A/C/S/M Manhole for general workflow.
It involves cross-discipline collaboration on the manhole design.

Architects shall be modelled the Manhole elements in ARC model for initial advisory purpose for MEP Engineers and Structural Engineers. MEP Engineer shall refine the design and model a detailed manhole under the drainage services of the MEP model.

The Civil Engineer shall be in charge of the whole manhole design, location arrangement, structural analysis and manhole schedule preparation for the civil projects. The manholes shall be modelled in the civil model. The Engineers shall place the appropriate model families in the civil model according to the architectural layout.

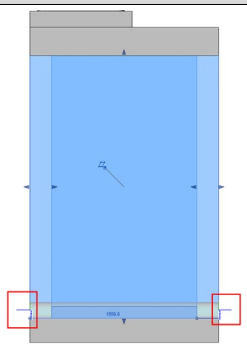
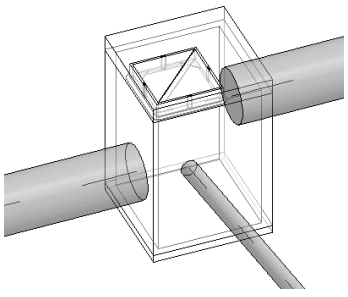
However, for the design stage, it is not recommended to have over-modelled in the manhole family. For the manhole family, it shall at least equip the following information:

- Usage (LOD-I),
- Manhole Type (LOD-I),
- Overall Manhole Type Geometry (LOD-G), and
- Inner size (LOD-G) etc.

Further details on manhole interior design should be presented by 2D detail drawings or a separate detail modelled family, which shall not be adopted in the project modelling. Otherwise, the over-modelled family may increase the loading time, file size and affect the model navigation.

The Revit family's connector is not adaptive as same as the reality. They would not relocate automatically to the inlet pipe's and the outlet pipe's positions nor adjust the angle to fit with connecting pipe's slope.

In practice, the drainage pipes connecting to the manhole or Gully should be modelled with the correct slope and size in order to spot out the invert levels. However, there is no "real" connection between the manhole and pipes. The information of pipes connecting to the manhole shall be input manually.

Not practical to control all the connectors for inlet and outlet pipes	**Practical Situation**
	

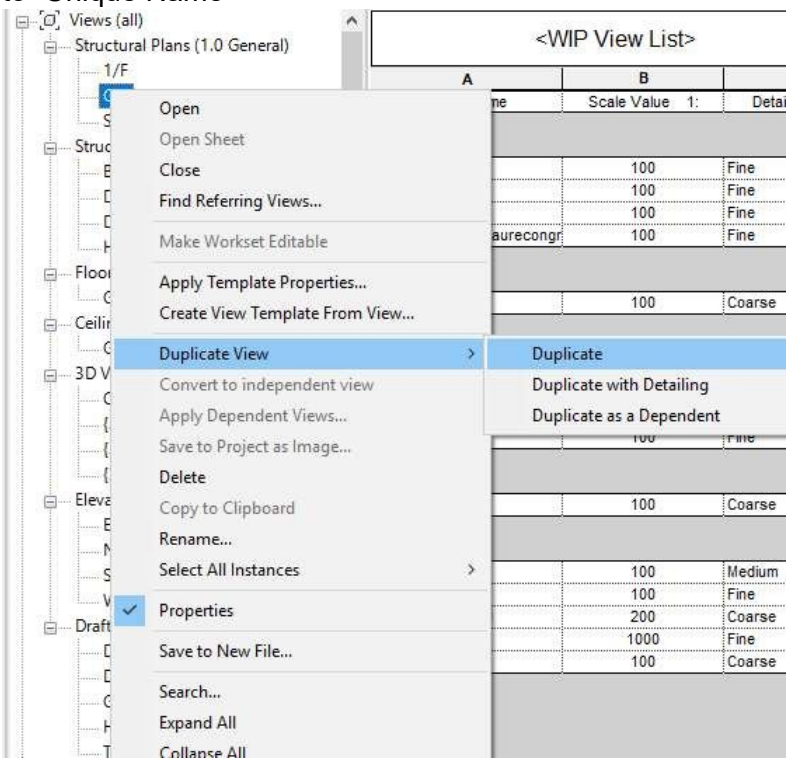
9 Preparing Drawing Production

9.1 View Preparation

9.1.1 Duplicating views

Since the view can be only inserted into the sheet once in Revit, for drawing production, the users may duplicate the view for further editing.

Select the desired plan ➜ right click ➜ click “Duplicate View” ➜ “Duplicate” ➜ re-naming the sheet to “Unique Name”



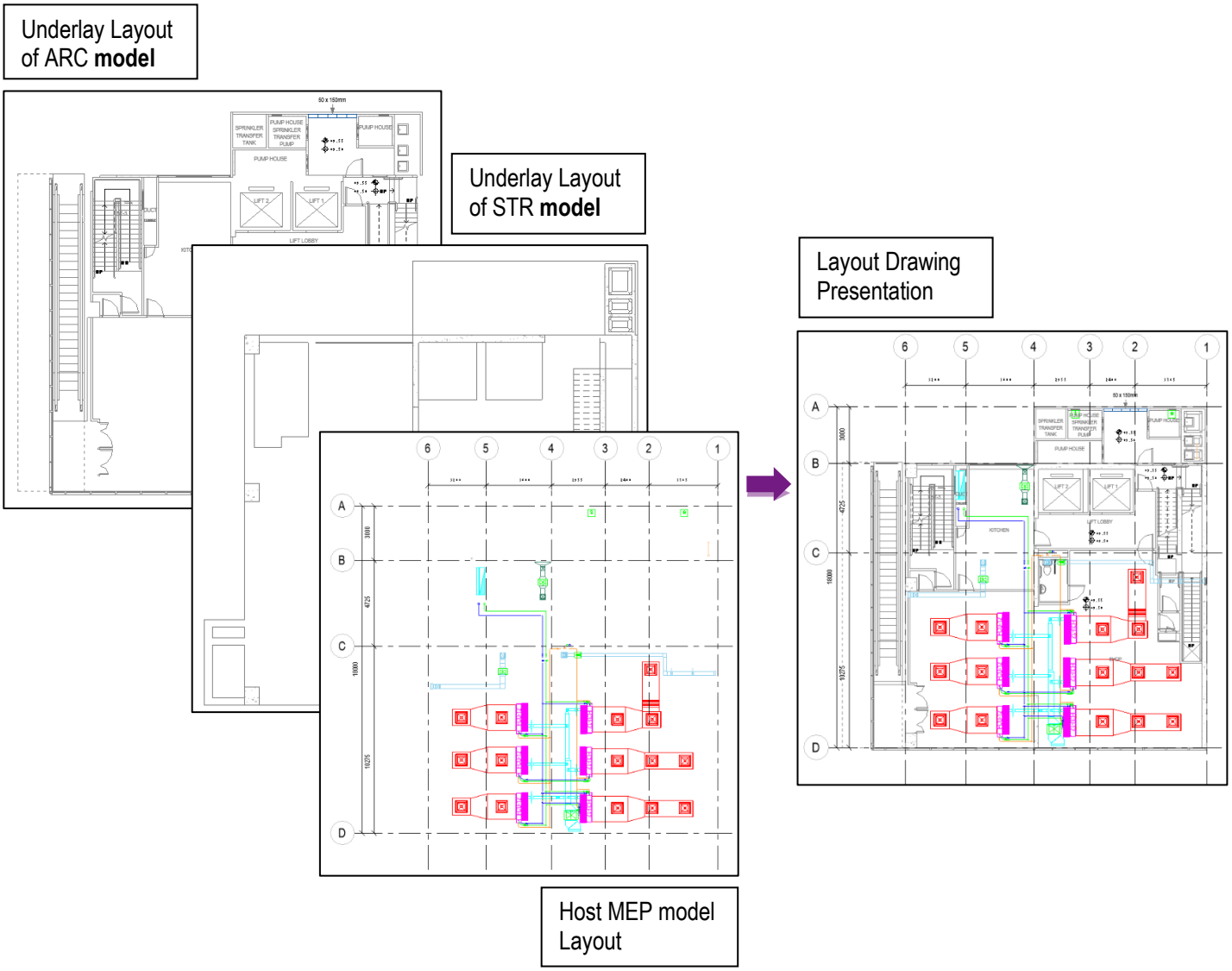
9.1.2 Background Layout Setup

The Architectural, Structural and other MEP disciplines model within the BIM model should be referenced. Details refer to 7.1 Discipline Model.

However, there may be different design authoring tools used for each discipline in a project. Below is the recommended workflow to handle the layout setup.

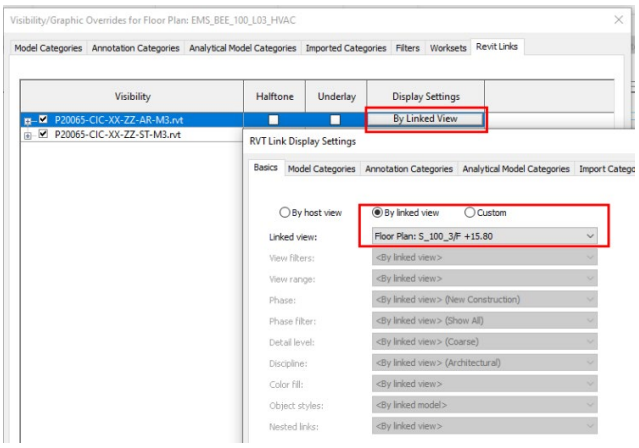
9.1.2.1 Revit Models Approach

Layout Plan / Part Plan



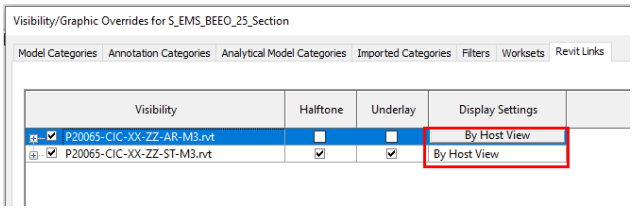
Assuming Architectural Drawings and Structural Drawings are prepared by Revit and liable to inline with the statutory drawings. Therefore, it is recommended that the layout of ARC and STR in the MEP model are prepared by “By Linked View” and their specific plan views.

This method can save time on background layout presentation setup. Furthermore, the “view range” and elements’ visibility of the background layout shall be relied architects’ and structural engineers’ needs. Once ARC and STR drawing models change, the background layout for MEP shall update together.

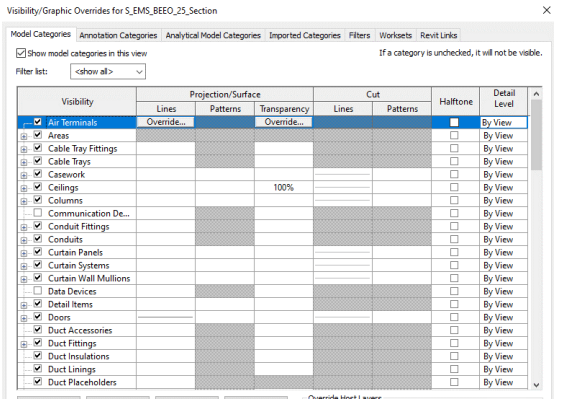


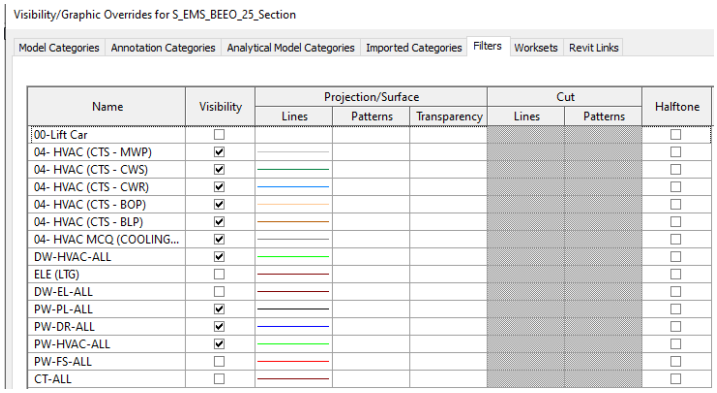
Section/ Elevation

The true size of models shall be reflected in the section and elevation. Therefore, section and elevation outline the shape of the elements at a specific angle or direction. Revit Links are recommended to set as “By Host View” to control the presentation better.



Meanwhile, the control on visibility, graphic and filter for different categories and elements can be applied throughout the host model and all the Revit Links.

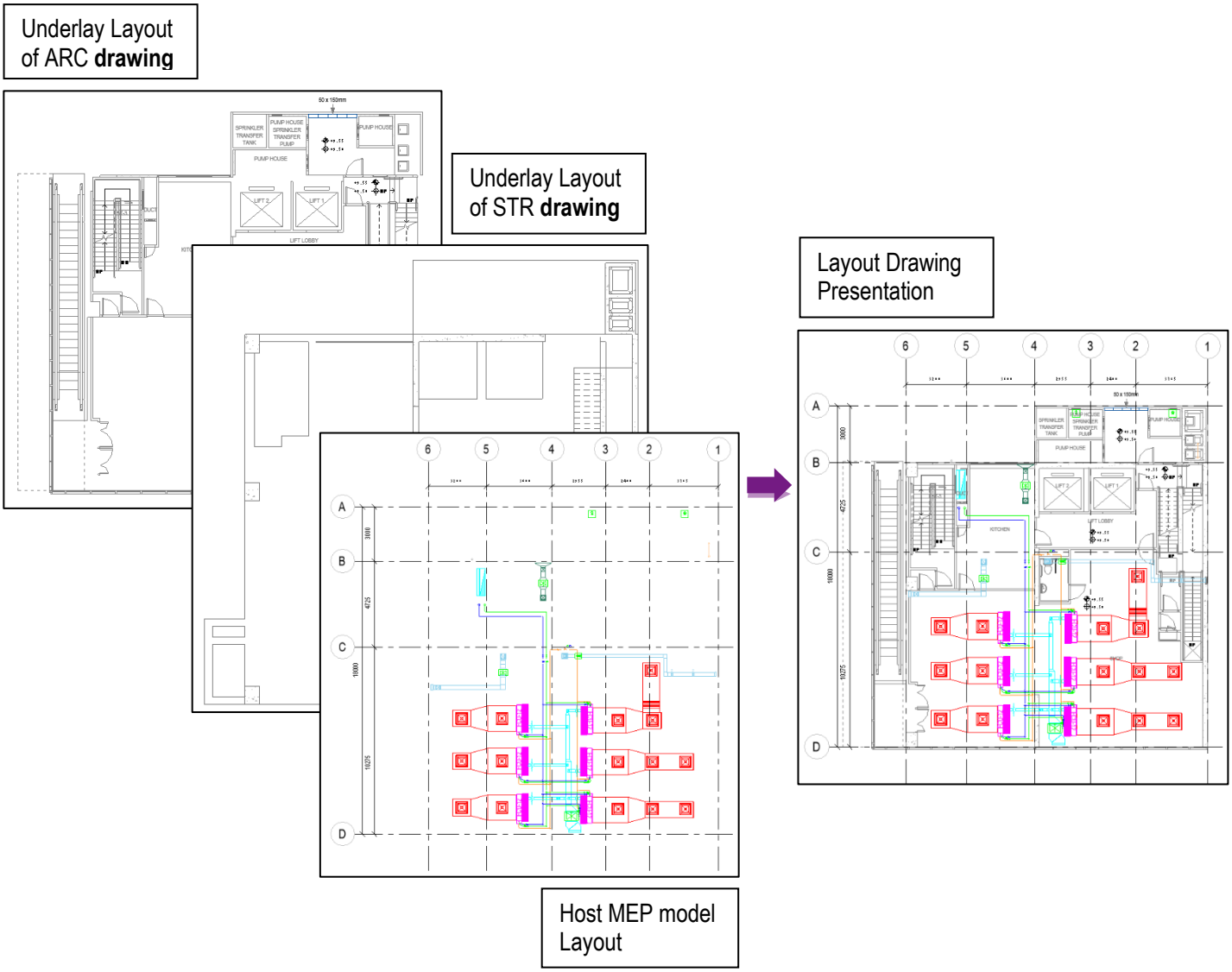




9.1.2.2 openBIM Approach

Due to the limitation of interoperability between different BIM design authoring software, Revit may not extract the native data and object through the method mentioned in section 9.1.2.1 Revit Models Approach. If so, it is recommended to link the reference model through Industry Foundation Classes (IFC) format.

Layout Plan / Part Plan

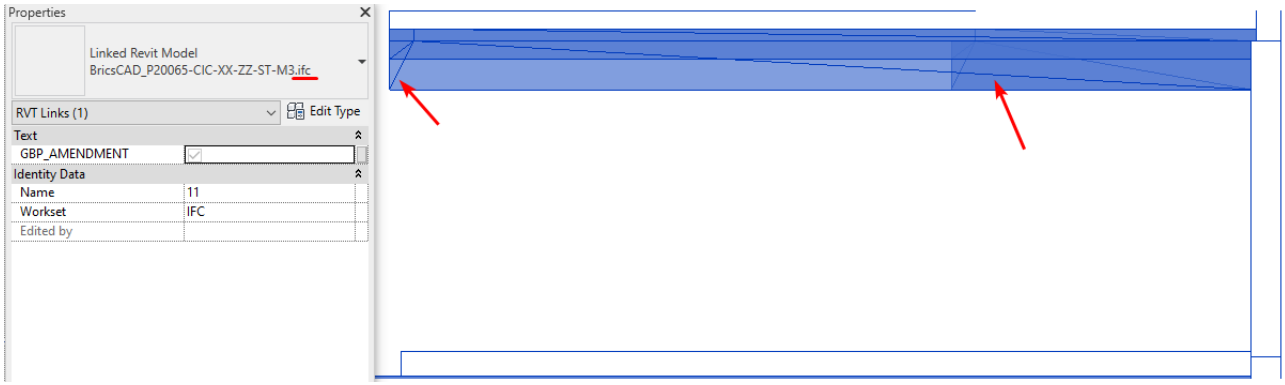


Since IFC model could not retrieve the drawing setup prepared in the design authoring tools, it is the last resort and only way to underlay the reference “drawings” which are the approved statutory drawings from Architects or Structural Engineers through linked dwg, pdf or dwf formats.

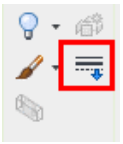
However, this is not implied that the coordination and collaboration work revert back to “2D CAD coordination”. The 3D BIM IFC models should be used as geometry coordination and BIM information review. The recommended underlay of drawings above is only the workaround method for drawing production purpose only. There may be enhanced methods upon the development of IFC exporter and reader upgrade.

Section/ Elevation

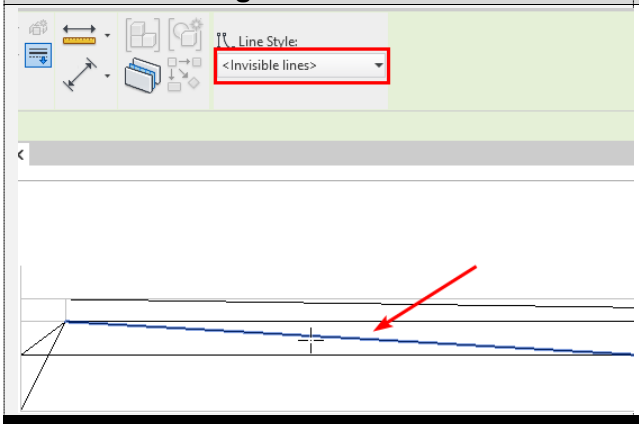
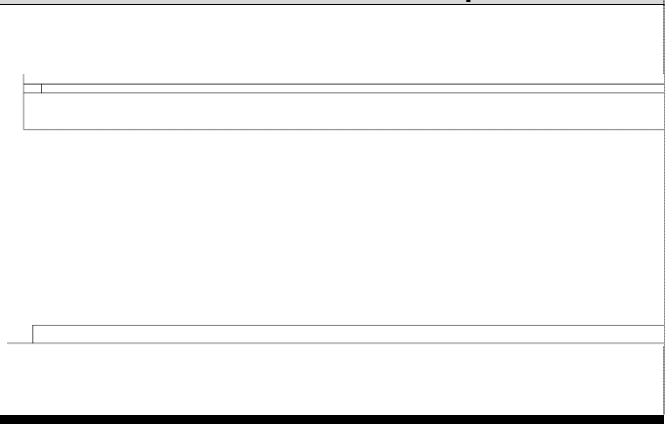
The true size of models shall be reflected in the section and elevation. The IFC model should be used as background layout reference. However, the geometry in IFC may be triangulated. Extra edge of topology may be shown as the image below.



Users shall have manually touch-up on the presentation through “linework” under “Modify” ribbon.

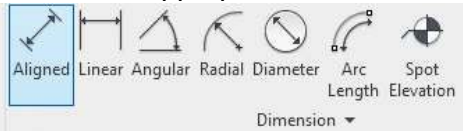


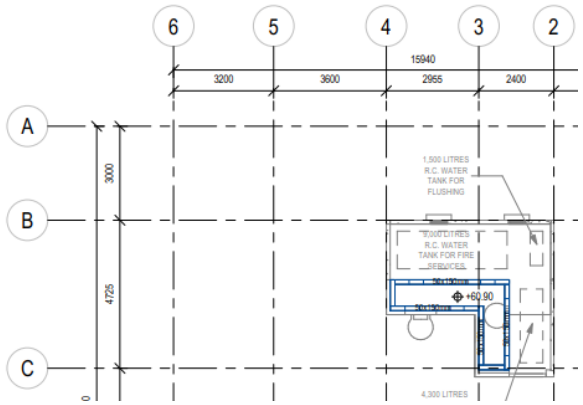
Then select “Invisible lines” type to override the triangulated edge.

Override the edge	Presentation of IFC after touch-up
	

9.1.3 Add Dimensions

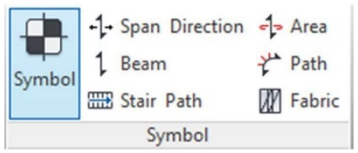
Create the appropriate dimension under Dimension in Ribbon.



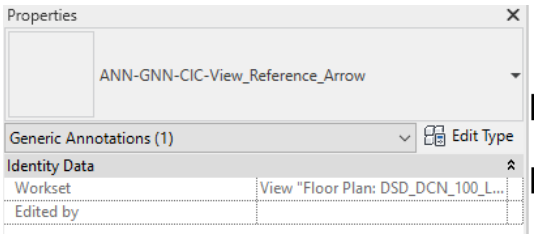


9.1.4 Add Annotation Symbols

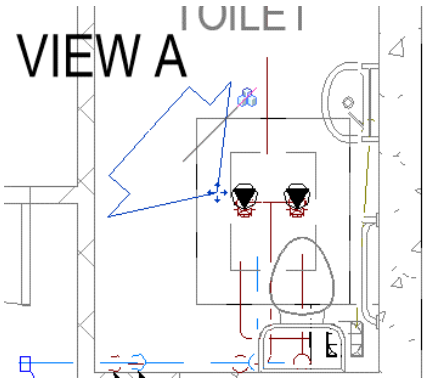
Click “Annotation” in ribbon ➜ click “Symbol” to place annotation symbols.



Select the specific type of symbol from “Properties”.



Place it to desired location.

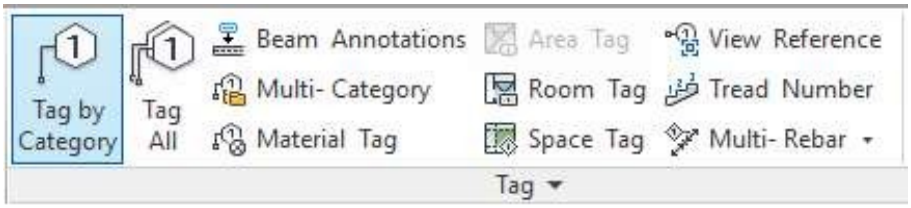


These annotation symbols are placed manually to enhance the presentation and elaboration of the drawing.

9.2 Tags

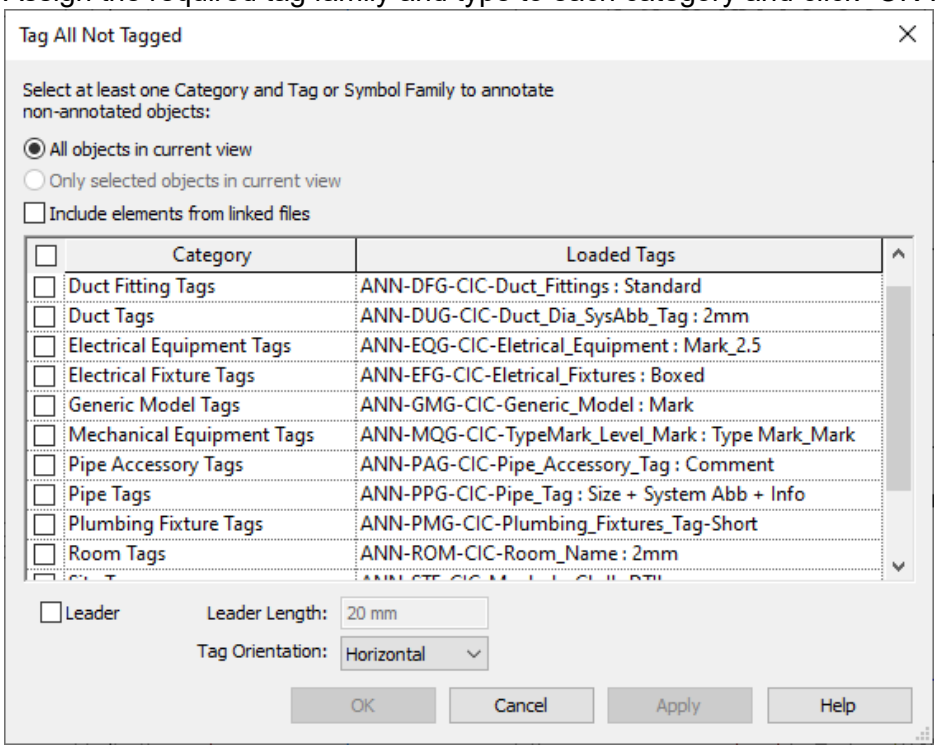
9.2.1 Add Tags

Click “Annotation” in ribbon ➜ click “Tag by Category”.



Click “Tags..” in Option bar.

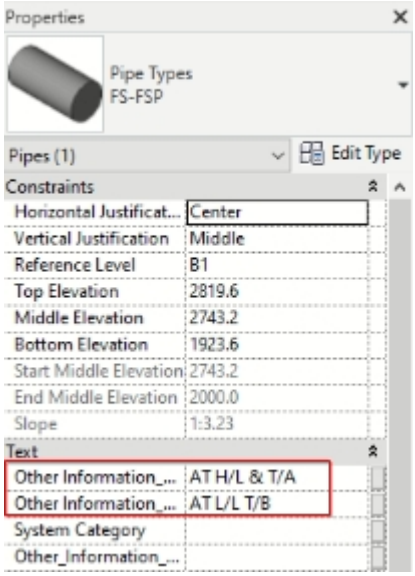
Assign the required tag family and type to each category and click “OK”.



Click the desired object to tag.

9.2.2 Add Tags for Riser

The user will assign the drawing information production to the pipe once all the pipeworks have been modelled. The riser, the vertical pipe crossing all levels, may have different versions of information for drawing production. Therefore, the user shall assign appropriate information to the parameters below carefully:



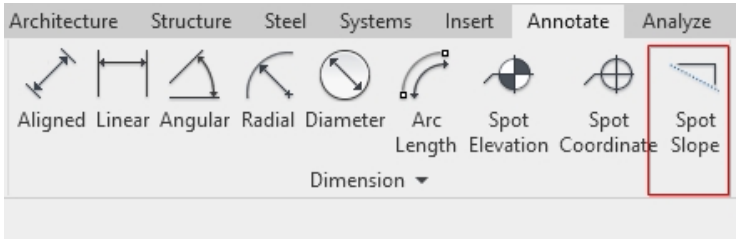
Assign appropriate information to corresponding parameters on the same elements.

9.2.3 Add Tag for Direction of Flow

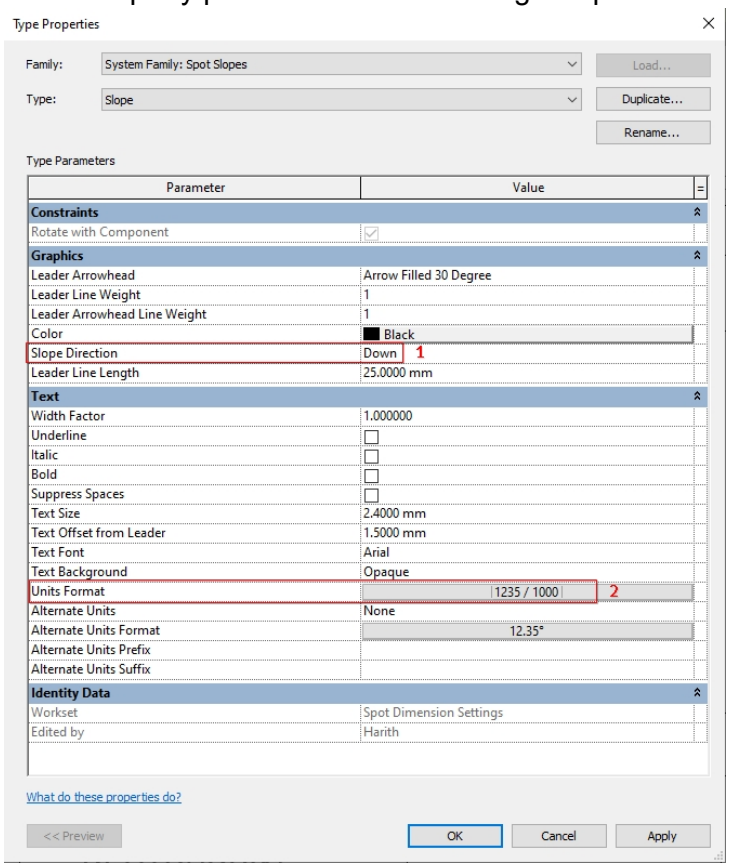
For a Pipe with Slope or Gradient, there are two ways to annotate them with “Tag” function as follow:

9.2.3.1 Automatic Slope Tag

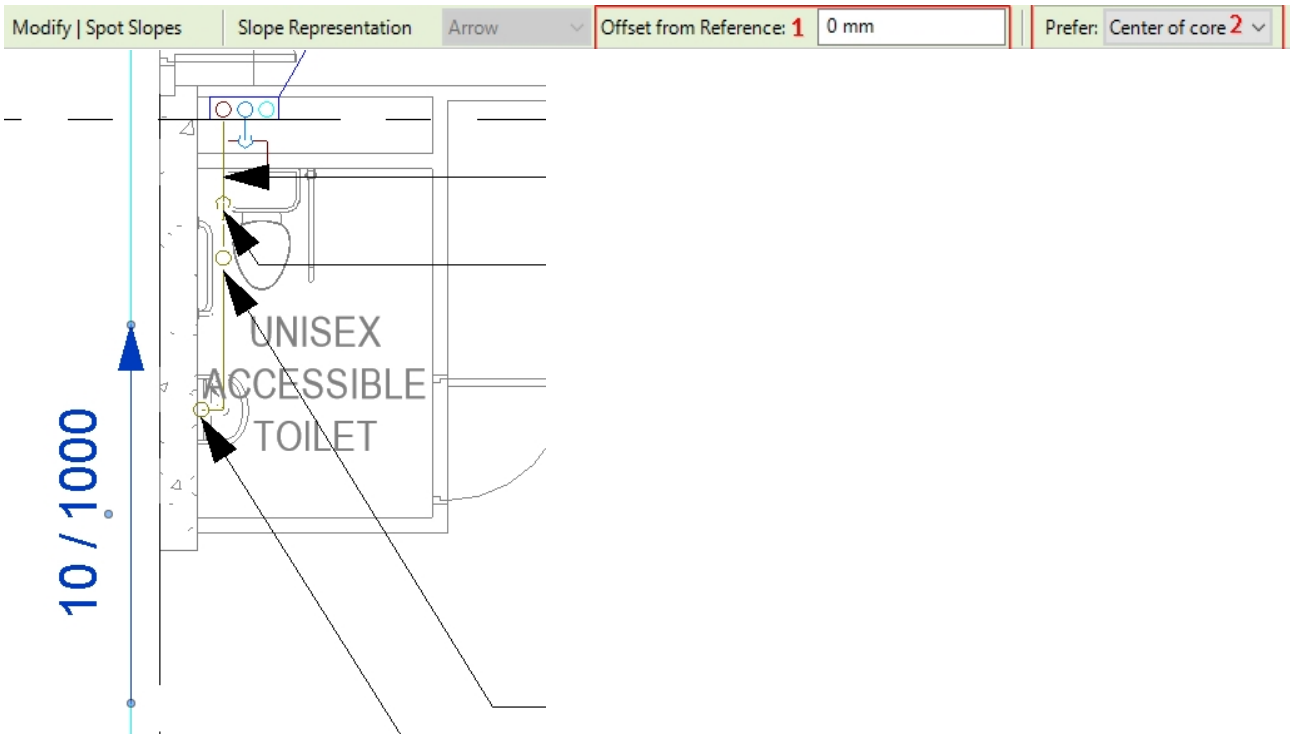
Tag with “Spot Slope” tools
Navigate to the “Annotate” tab ➜ Click “Spot Slope” ➜ Select the desire pipe to tag



Go to Property panel and edit the settings as preferred.



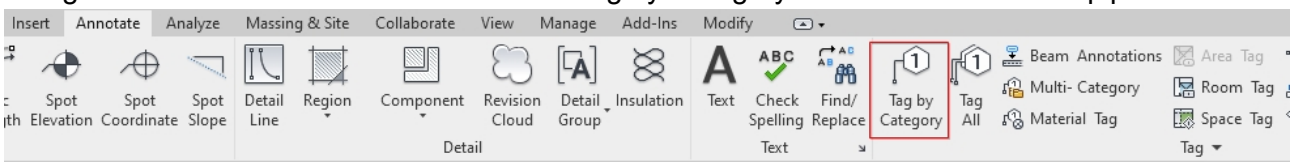
It is advise to set the “Offset from Reference” to 0 and “Prefer” to Centre of core.



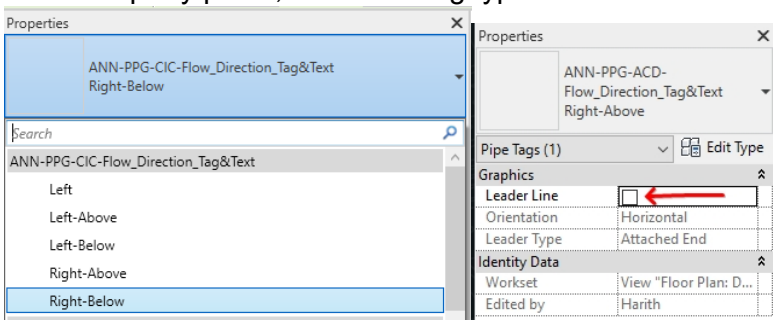
9.2.3.2 Manual Direction Tag

Tag with “Tagging” tools

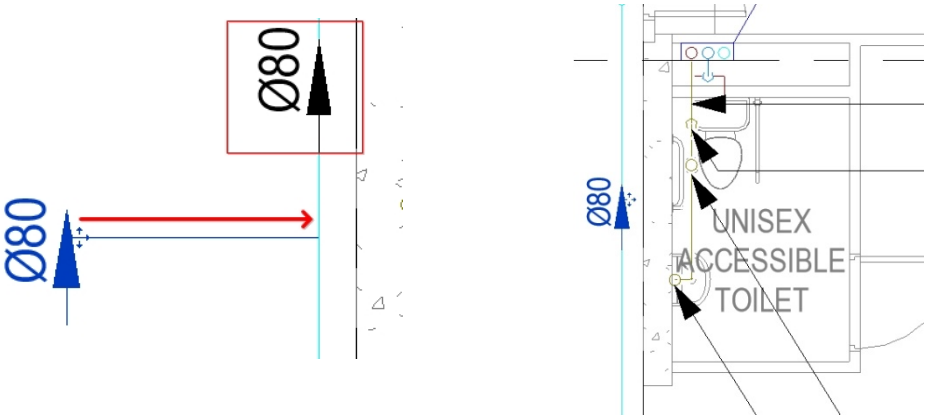
Navigate to the “Annotate” tab ➜ Click the “Tag by Category” ➜ Select the desired pipe



Go to Property panel, select the tag type as shown below and uncheck the “Leader Line” box.

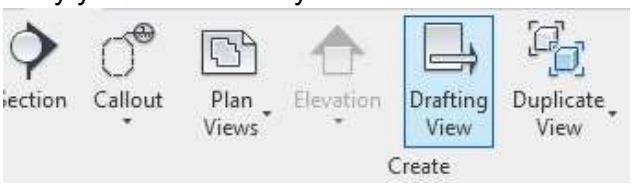


Manually drag the tag to the centre of the pipe as shown below:



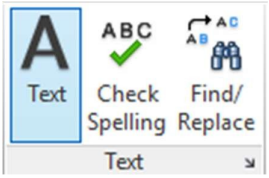
9.3 Creating Drafting View

Despite creating 3D objects, 2D information can also be drafted in the drafting view when appropriate. For example, general notes and typical details.
Click “Drafting View” under Create in View ➜ Re-naming the drafting view to “GENERAL NOTES” or by your own for easy reference.

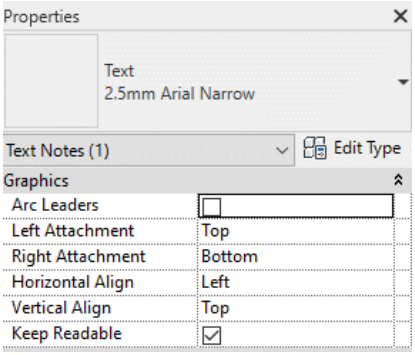


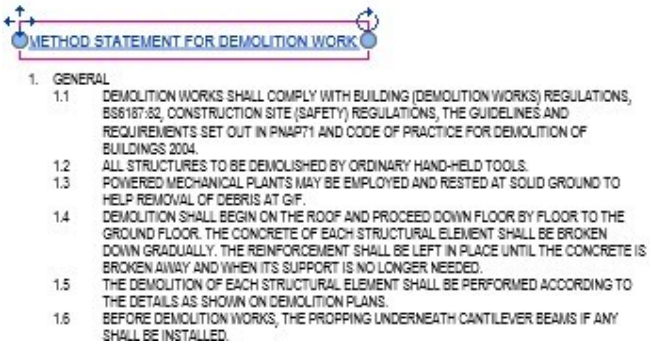
9.3.1 Text Note

Insert text using the annotation tool.



In the properties panel, choose the specific type of text.

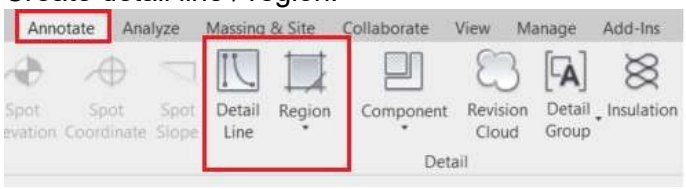


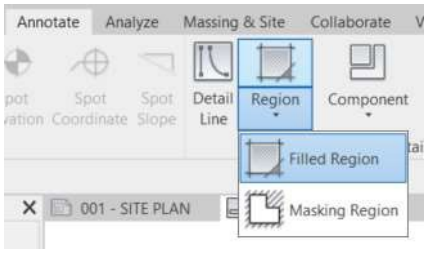

METHOD STATEMENT FOR DEMOLITION WORK

1. GENERAL
1.1 DEMOLITION WORKS SHALL COMPLY WITH BUILDING (DEMOLITION WORKS) REGULATIONS, BS6187:82, CONSTRUCTION SITE (SAFETY) REGULATIONS, THE GUIDELINES AND REQUIREMENTS SET OUT IN PNAP71 AND CODE OF PRACTICE FOR DEMOLITION OF BUILDINGS 2004.
1.2 ALL STRUCTURES TO BE DEMOLISHED BY ORDINARY HAND-HELD TOOLS.
1.3 POWERED MECHANICAL PLANTS MAY BE EMPLOYED AND RESTED AT SOLID GROUND TO HELP REMOVAL OF DEBRIS AT G/F.
1.4 DEMOLITION SHALL BEGIN ON THE ROOF AND PROCEED DOWN FLOOR BY FLOOR TO THE GROUND FLOOR. THE CONCRETE OF EACH STRUCTURAL ELEMENT SHALL BE BROKEN DOWN GRADUALLY. THE REINFORCEMENT SHALL BE LEFT IN PLACE UNTIL THE CONCRETE IS BROKEN AWAY AND WHEN ITS SUPPORT IS NO LONGER NEEDED.
1.5 THE DEMOLITION OF EACH STRUCTURAL ELEMENT SHALL BE PERFORMED ACCORDING TO THE DETAILS AS SHOWN ON DEMOLITION PLANS.
1.6 BEFORE DEMOLITION WORKS, THE PROPPING UNDERNEATH CANTILEVER BEAMS IF ANY SHALL BE INSTALLED.

9.3.2 Typical Details

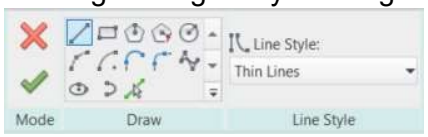
Create detail line / region.

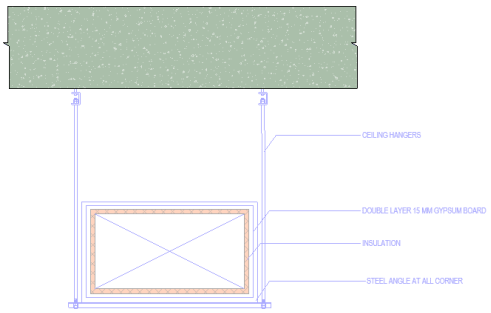




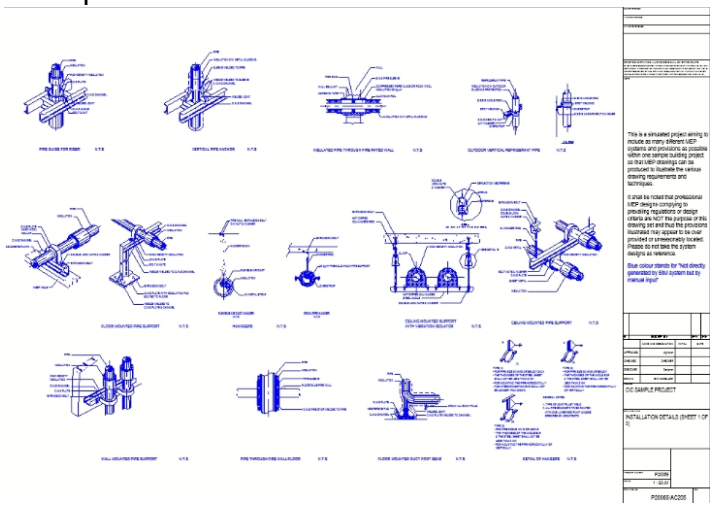
Create lines and choose different Line Style.

Drafting the region by drawing tools.



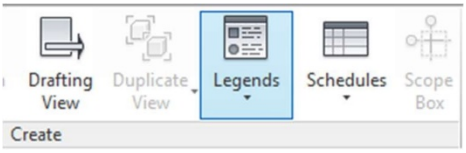


Examples of Detail Installation:

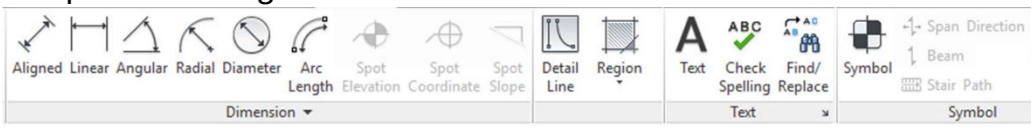


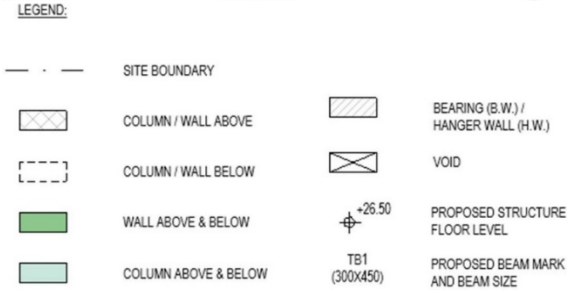
9.4 Creating Legend

Click the “View” in ribbon ➜ click “Legends” to create a new legend view.

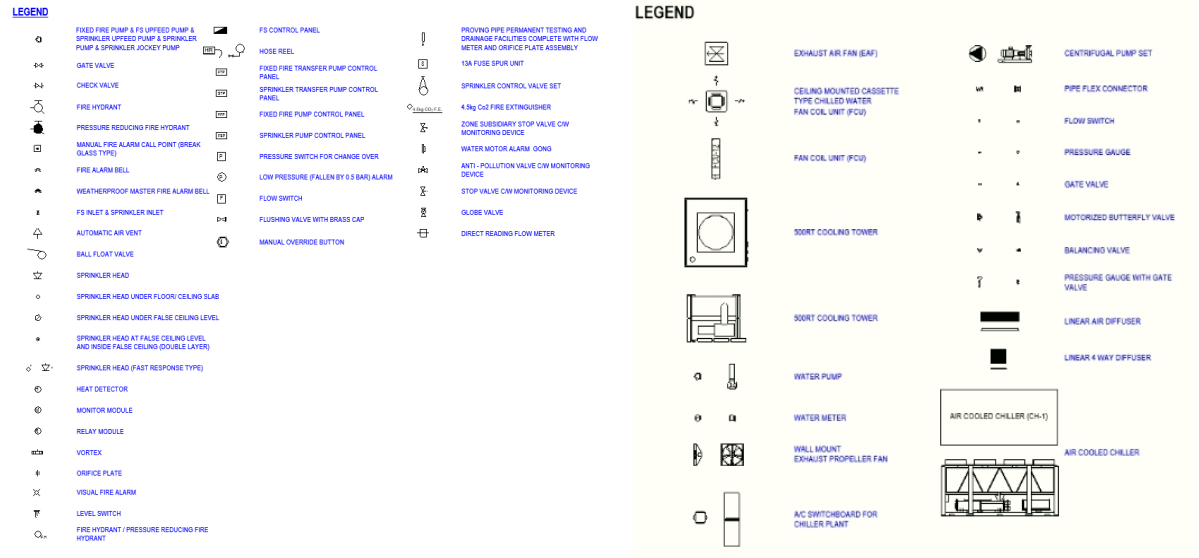


Use the Annotation tool such as text, filled region and symbols to create the components in legends.





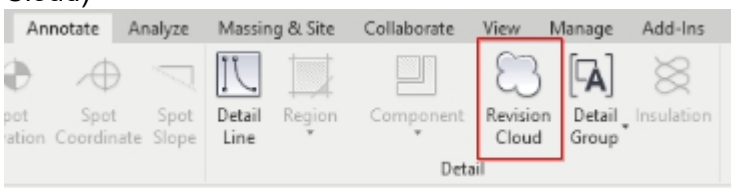
Example of Legends created



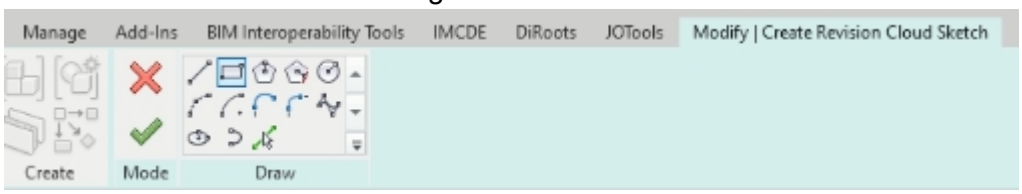
9.5 Revision Cloud

Revision Clouds is used to indicate design areas that have changed in a project. Use revision cloud annotations to mark drawing sections that have been revised. In project views, draw revision clouds to indicate areas of the design that changed.

Open the desired view ➜ Navigate to the “Annotate” tab ➜ Under Detail panel ➜ (Revision Cloud) ”

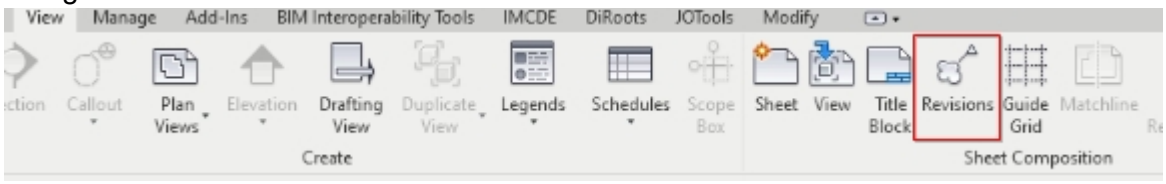


Revit enters sketch mode ➜ Drag/draw as desired

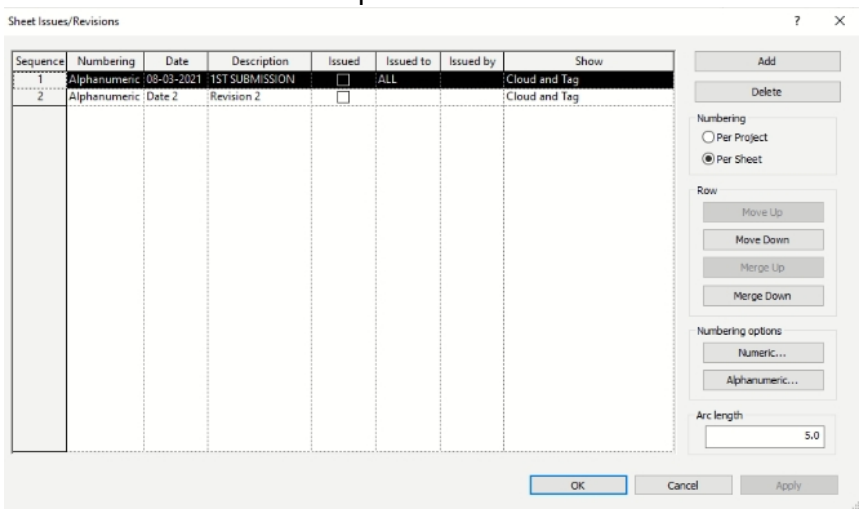


Note : Best practice is to draw all “Cloud” with same revision together, this is to accurately label the Revision number.

To set the Revision number or series
Navigate to “View” tab ➜ Click “Revisions”



Set the Revision details as preferred

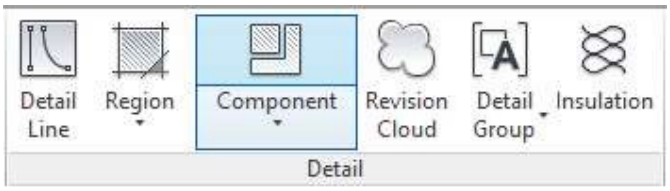


9.6 Create Schematic Diagram

The schematic diagram is drafted in the drafting view when appropriate. Details refer to 9.3 Creating Drafting View. It is advised to insert the schematic diagram (drafting view) into the sheet and confirm the scale before sketching.

9.6.1 Add detail item for equipment

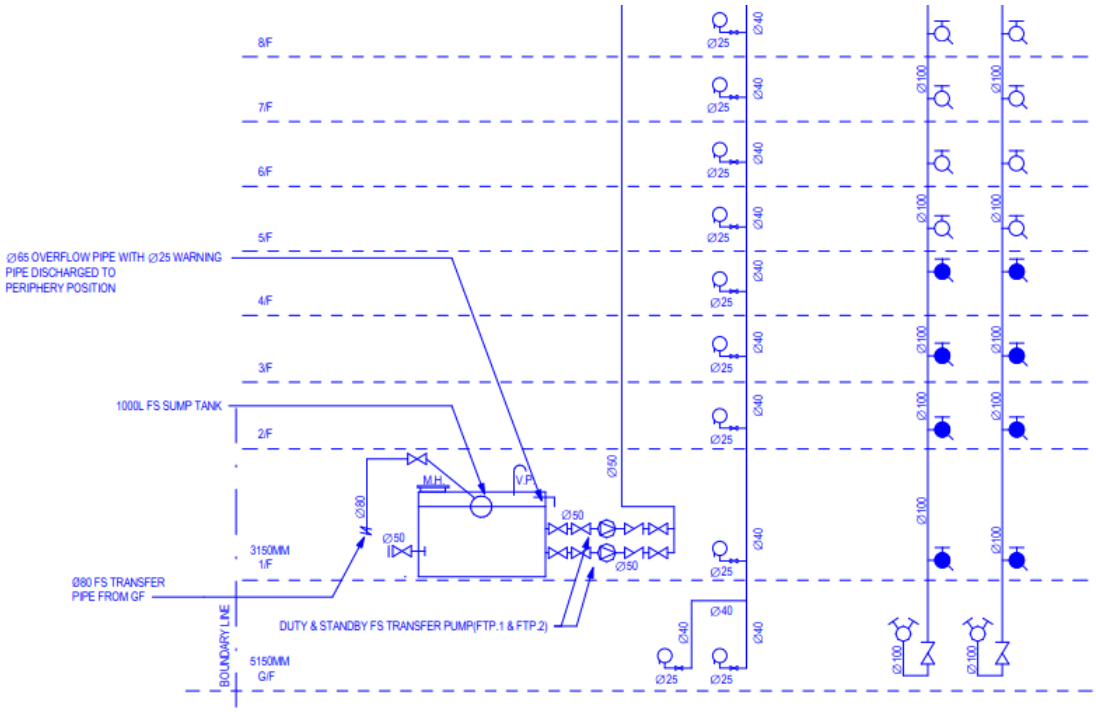
Click “Annotation” in ribbon ➜ click “Component” in “Detail” to place detail item.



9.6.2 Add lines

Click “Annotation” in ribbon ➜ click “Detail Line” ➜ In “Properties”, select appropriate line type ➜ sketch the drawing.

Example of Schematic Drawing



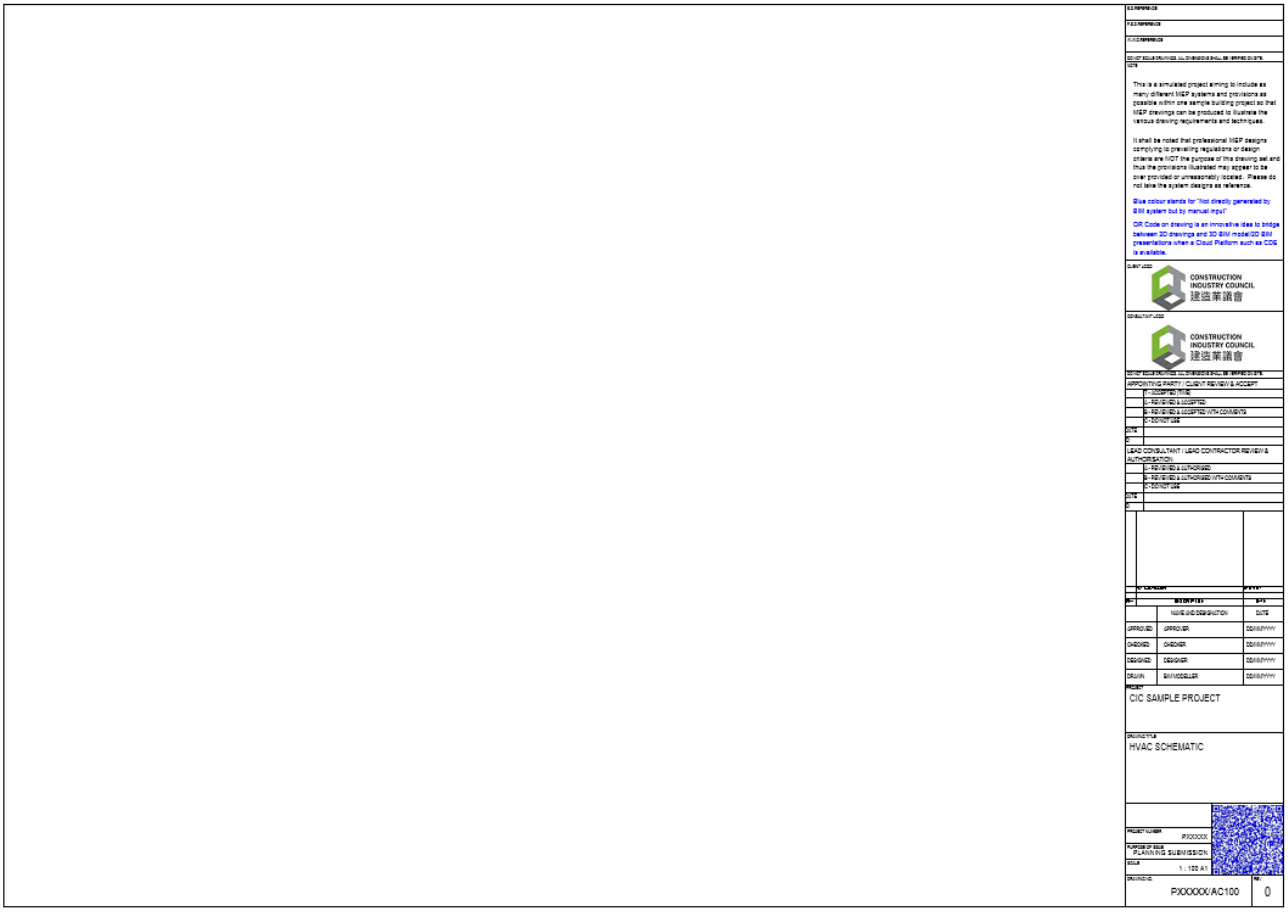
9.7 Creating Sheet

9.7.1 Title Block

- Title block family is available in central resource folder.
- Title block family may be edited to suit project's requirement.
- The modified title block family is to be saved under project resources folder.

Shared Parameter in title blocks:

Parameter Function	Display Name	Parameter Type
Project Name	Project	Type parameter
Drawing Title	Drawing Title	Instance parameter
Drawing Number	Drawing No.	Instance parameter
Scale	Scale	Instance parameter
Revision / Description / Date / Issued By	Revision / Description / Date / By	Instance parameter
Drawn By / Checked By / Authorised By	Drawn / Checked / Authorised	Instance parameter



9.7.2 Sheet List

Users can create a tabular view of sheets in a project. From “View” tab in ribbon ➜ click “Schedule” ➜ click “Sheet List”.
In the field tab of the sheet list, add the field name sheet number, sheet name, sheet issue date and sheet revision to the list of scheduled fields.
To begin adding sheets to the sheet list, go to the row panel in ribbon ➜ click “Insert” ➜ click “Data Rows”. The users can continue populating the schedule in this way.

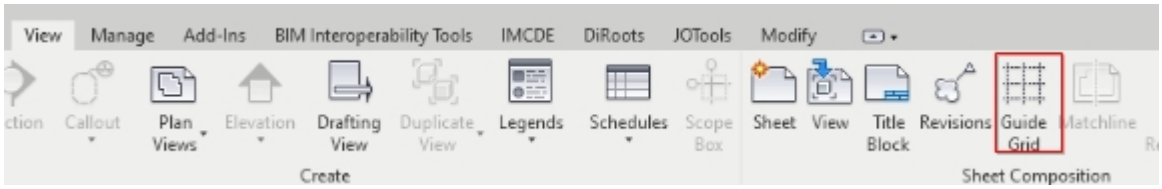
<Sheet List>

A	B	C	D	E
Sheet Number	Sheet Name	Sheet Issue Date	Current Revision	Current Revision Date
A103	FILTER	08/04/11		
A107	EL LEGEND	08/18/11		
A108	KLD	08/18/11		
A109	C&C & FS LEGEND	08/18/11		
A110	LINE STYLE	08/29/11		
A111	SCHEMATIC DRAINAGE	12/14/20		
TG201	TOWN GAS LAYOUT	29-04-2021	A	08-03-2021
PL207	XX LIMITATION	03/18/21		
EMS002	Unnamed	04/16/21		
XXXXX	Toilet Details	05/18/21		
Hezig (Dont D	For User Guide	06/01/21		
FS208	F.S. SMOKE EXTRACTION SYSTEM AT LEVEL B2, B3	06/04/21		
EL402	ELECTRICAL LAYOUT PLAN AT LEVEL GF, L01, L02, L03	29-04-2021	A	08-03-2021
EL403	ELECTRICAL LAYOUT PLAN AT LEVEL L04-L15, RF, URF, TRF	29-04-2021	A	08-03-2021
EL404	TRANSFORMER ROOM LAYOUT AT LEVEL GF	29-04-2021	A	08-03-2021
EL406	EMERGENCY GENERATOR ROOM LAYOUT AND SECTIONAL DETAILS	29-04-2021	A	08-03-2021

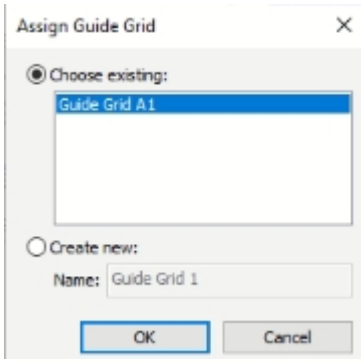
9.7.3 Guide Grid

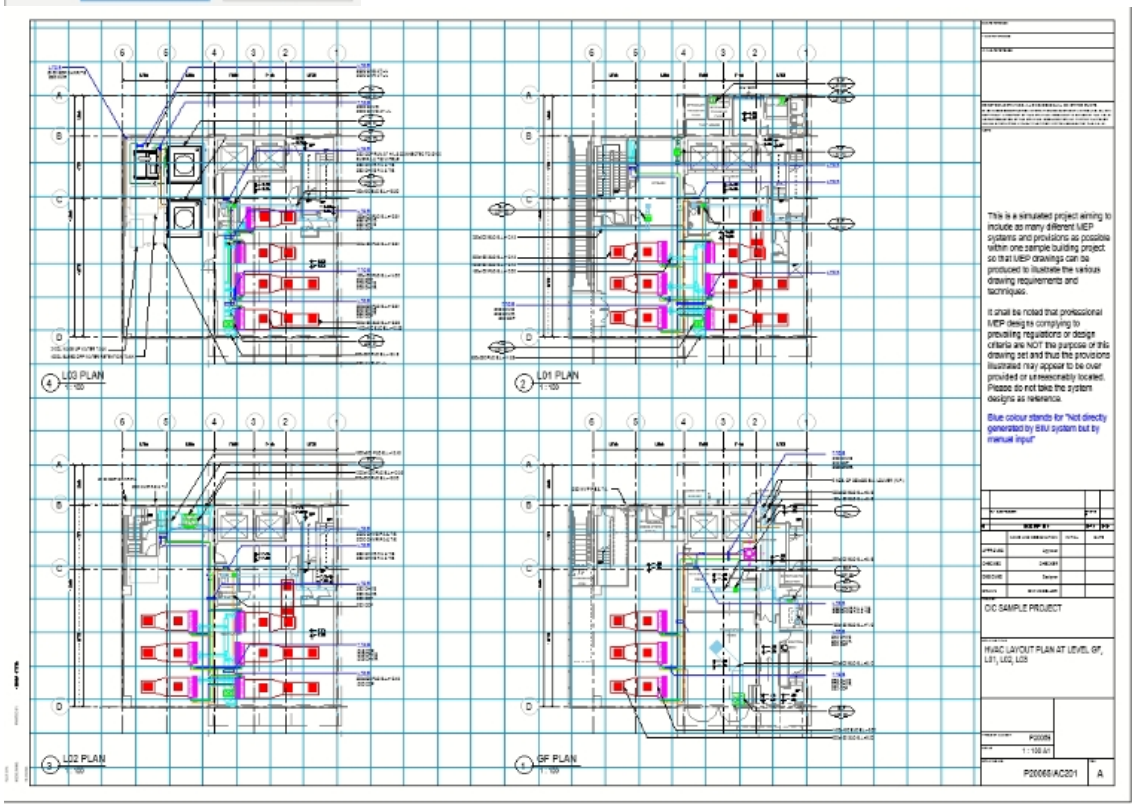
In Revit, the viewport of views placing on sheet cannot be assigned by coordinates as in CAD. However, Guide Grid can help in referencing sheets for an organized presentation. Plans views of different floors can be placed at the same spot across different sheets.

Open Sheet View ➜ Navigate to “View” tab ➜ Under Sheet Composition ribbon ➜ Find “Guide Grid”



Click the “Guide Grid” ➜ Select either ”Existing” or “Create New”





9.7.4 View Control

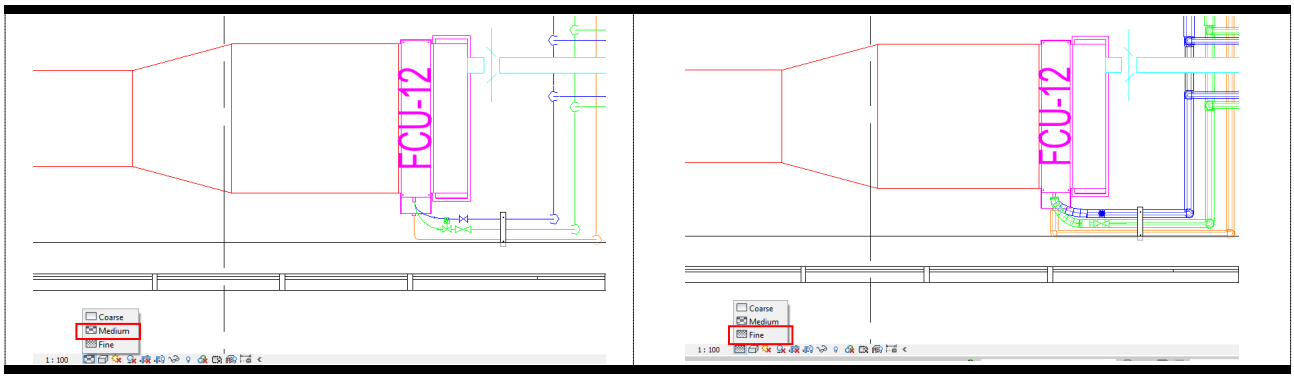
9.7.4.1 Scale

All model files are modelled at the 1:1 Scale. The Scale command in Revit mainly affects the scaling on annotations in a drawing.

9.7.4.2 Detail Level

To achieve the traditional presentation, the detail level setting for MEP elements shall be well defined. The below table lists the presentation for the common Revit MEP routing elements.

	Coarse Level	Medium Level	Fine Level
Duct	Single Line	Double Line	Double Line
Pipe	Single Line	Single Line	Double Line
Cable Tray	Single Line	Double Line (*Trunking presentation in 3D View)	Double Line (*Cable tray presentation in 3D View)

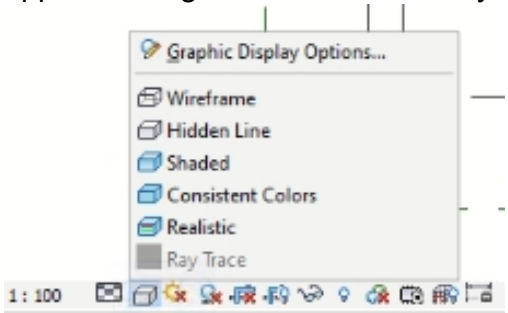


It is recommended to set **Medium Level** for standard layout plans to show all pipes in a single line and ducts in a double line.

It is recommended to set **Fine Level** for plant room layout plan, callout (blow-up) view, sections and 3D views.

9.7.4.3 Visual Styles

Visual Style is the setting for graphic styles. The Hidden line style is commonly used to show the filled colour of components and lines for drawing production. Shaded Visual Style may be applied during coordination for easy understanding of the model arrangement.

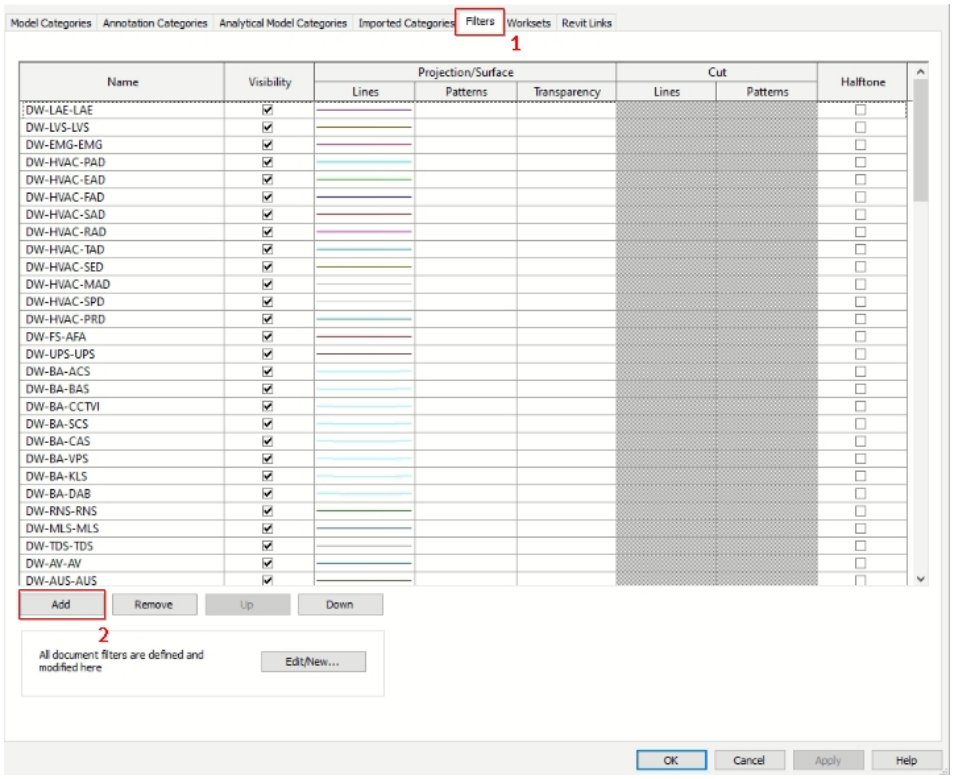


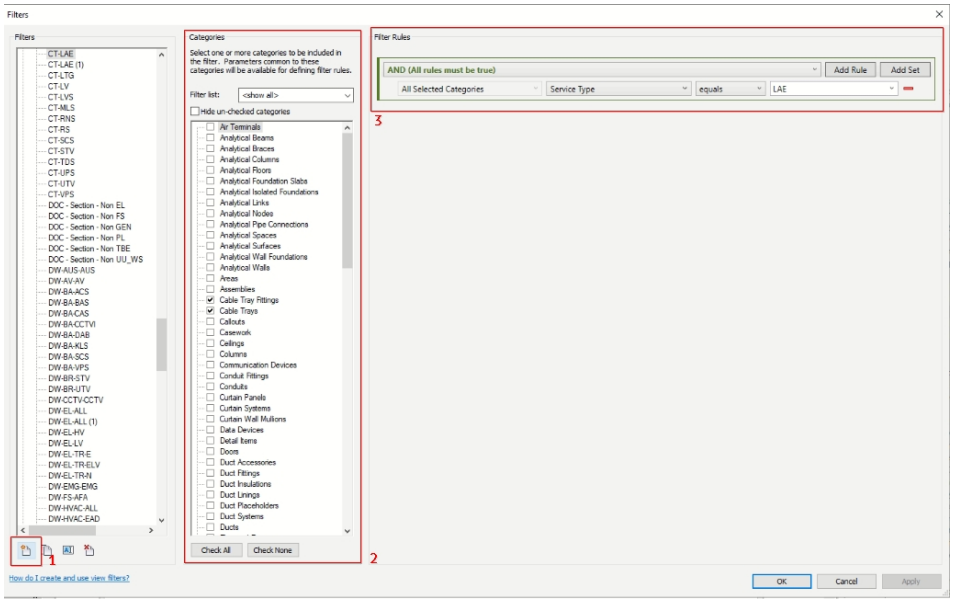
9.7.4.4 View Filter

View Filters based on a set of selected elements or based on categories and parameter values. Apply these filters to views to change the visibility or graphic display of elements.

Setting up Rule-based filters to identify elements using parameter values for selected categories

Hit “VV” ➜ Navigate to “Filter” tab ➜ Click “Add” button ➜ Select “Edit/New” to create a filter

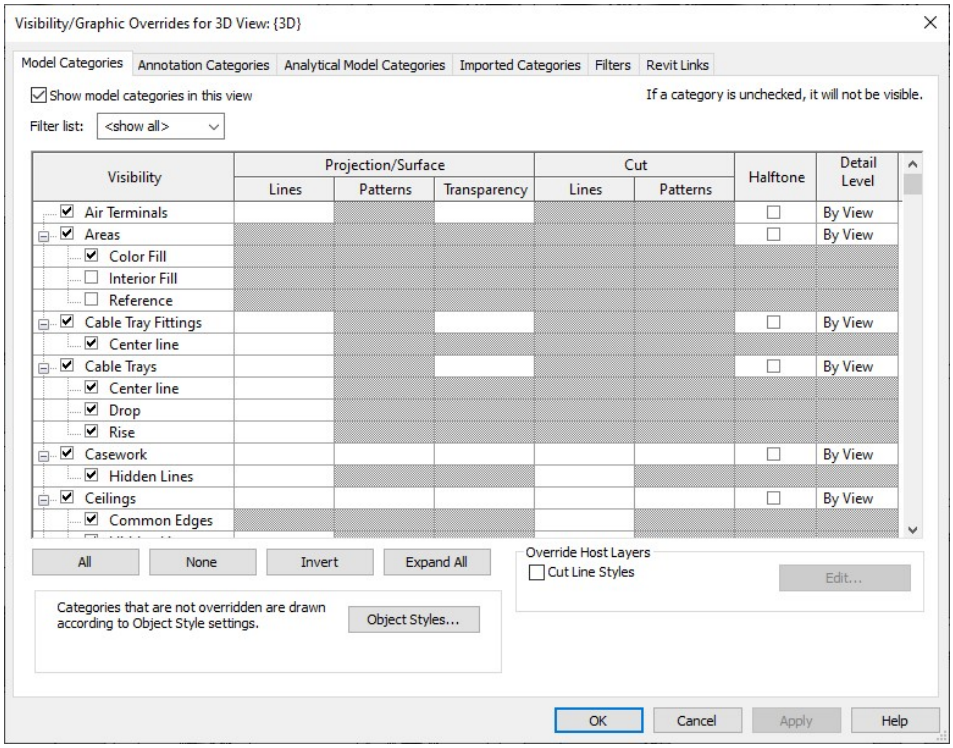




9.7.4.5 Visibility Overrides

View-specific visibility and graphic display such as colouring, patterns, and line style etc. can be assigned using Visibility Overrides according to Model Categories, Annotation Categories, Filters, Worksets and Revit Links. In Revit, Filters have the highest priority in Visibility Override.

Special arrangements for specific categories in detail level are suggested to be set in Visibility Overrides for drawing production purpose. It is recommended to create a view template with the setting shown below and apply it to all plan drawing productions. However, it shall be in Fine level for section and 3D in order to have the spatial dimension. Filter lists under Model Categories can be used to filter categories by discipline.

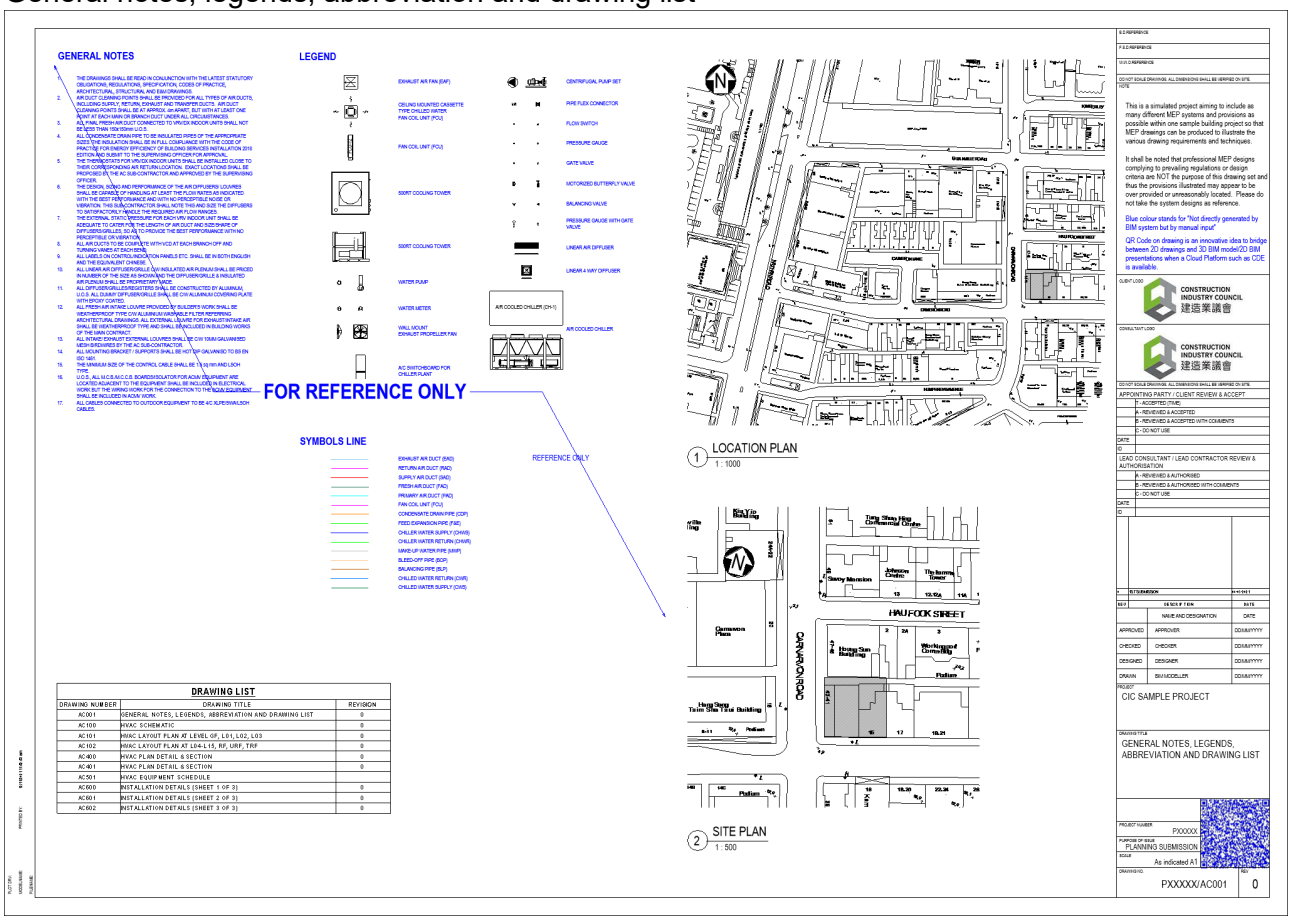


9.8 Types of Sheets Presentation

9.8.1 Combined Information Sheets

A Combined Information Sheet will consist of different Views, Schedules, Legends and Abbreviation composed in a single sheet.

Example types of combined information sheet
General notes, legends, abbreviation and drawing list

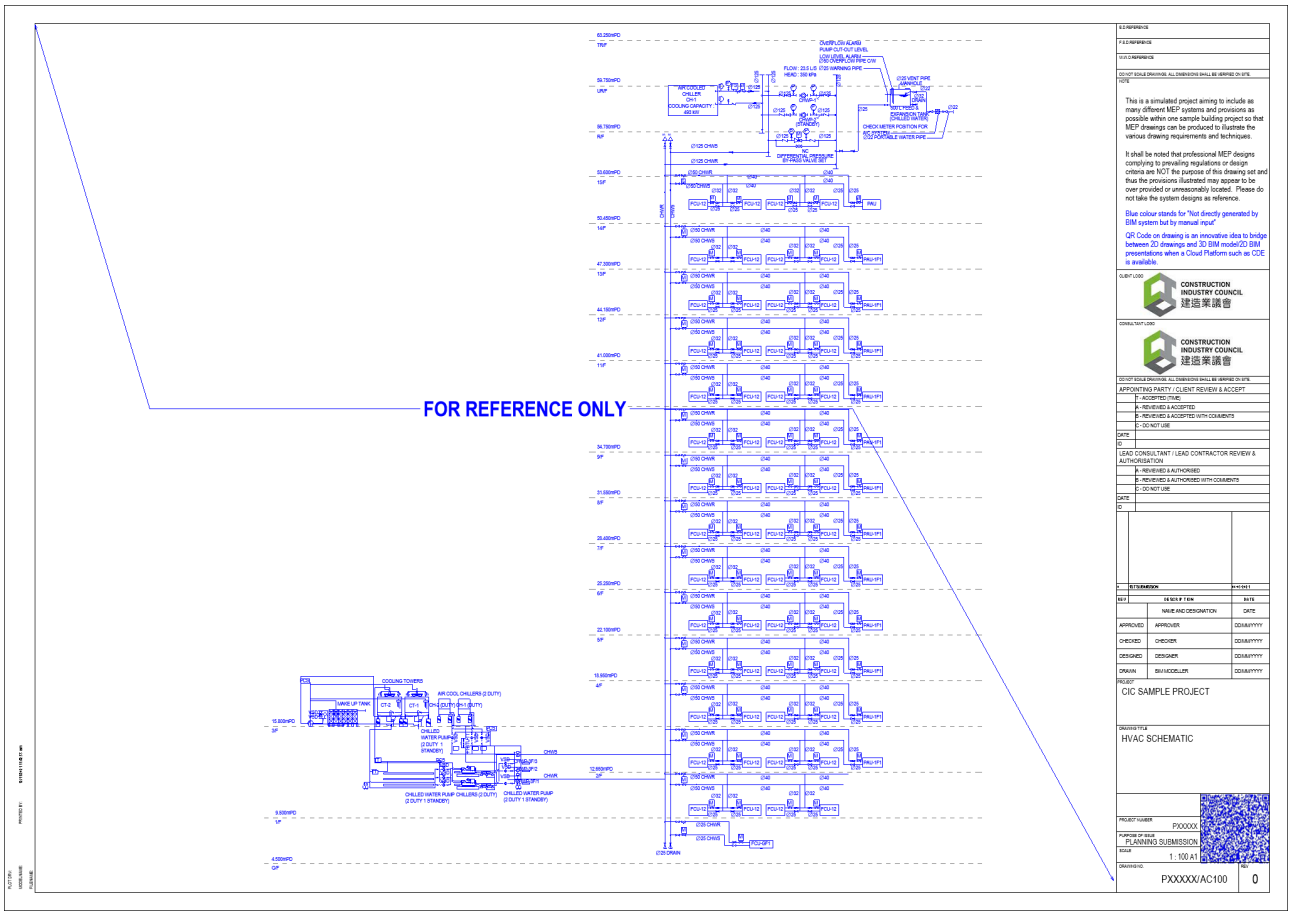


9.8.2 Schematic Drawing Sheets

Schematic Drawing Sheets is used to present specifically all the schematic design drawing.

Example types of the schematic drawing sheet

- MVAC Schematic

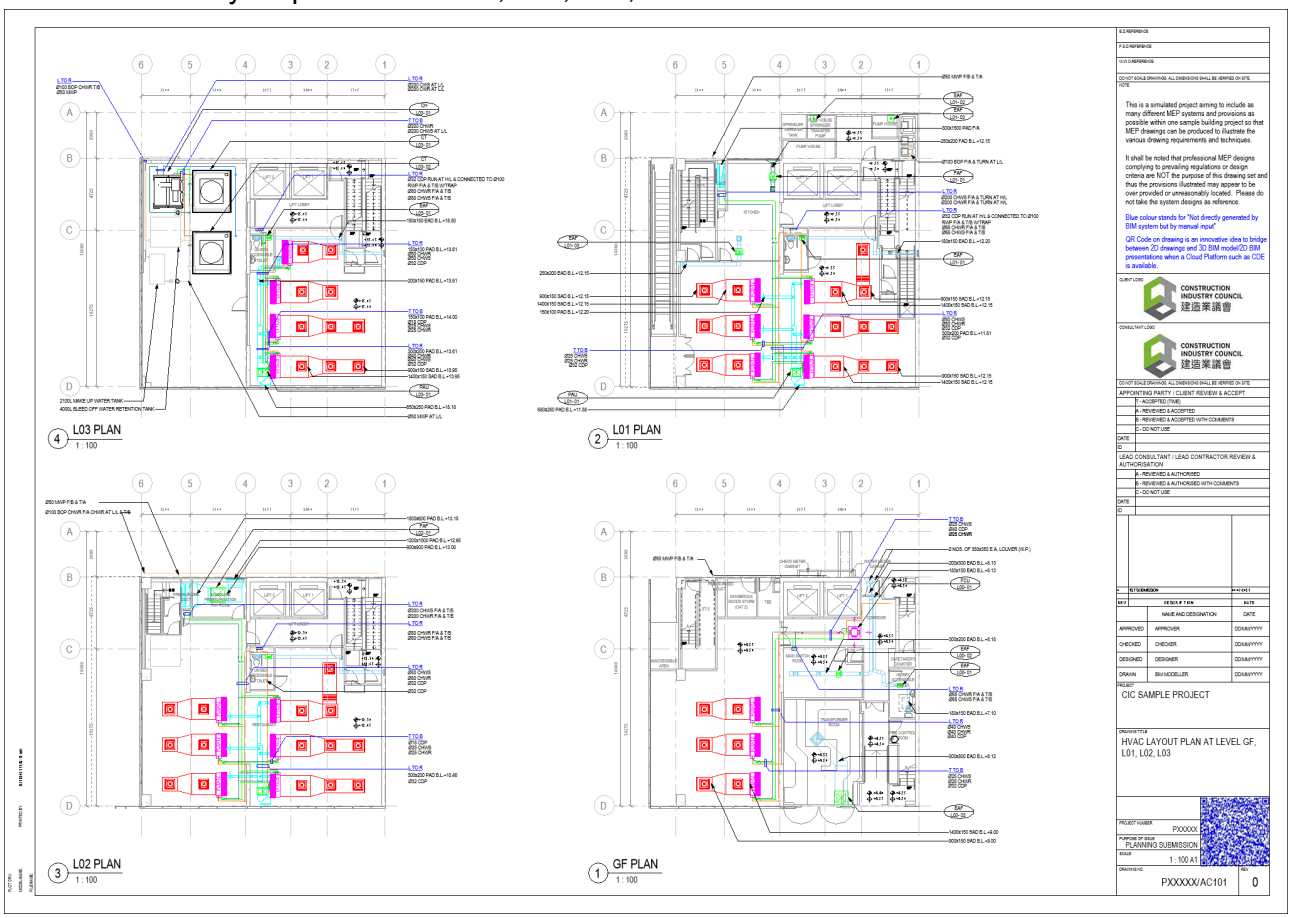


9.8.3 Floor Plan/Layout Sheets

Floor plan or Layout Sheets is sheets to present specifically all the Floor Plans with detailed annotations.

Example types of floor plan/layout sheet

- MVAC layout plan at level GF, L01, L02, L03

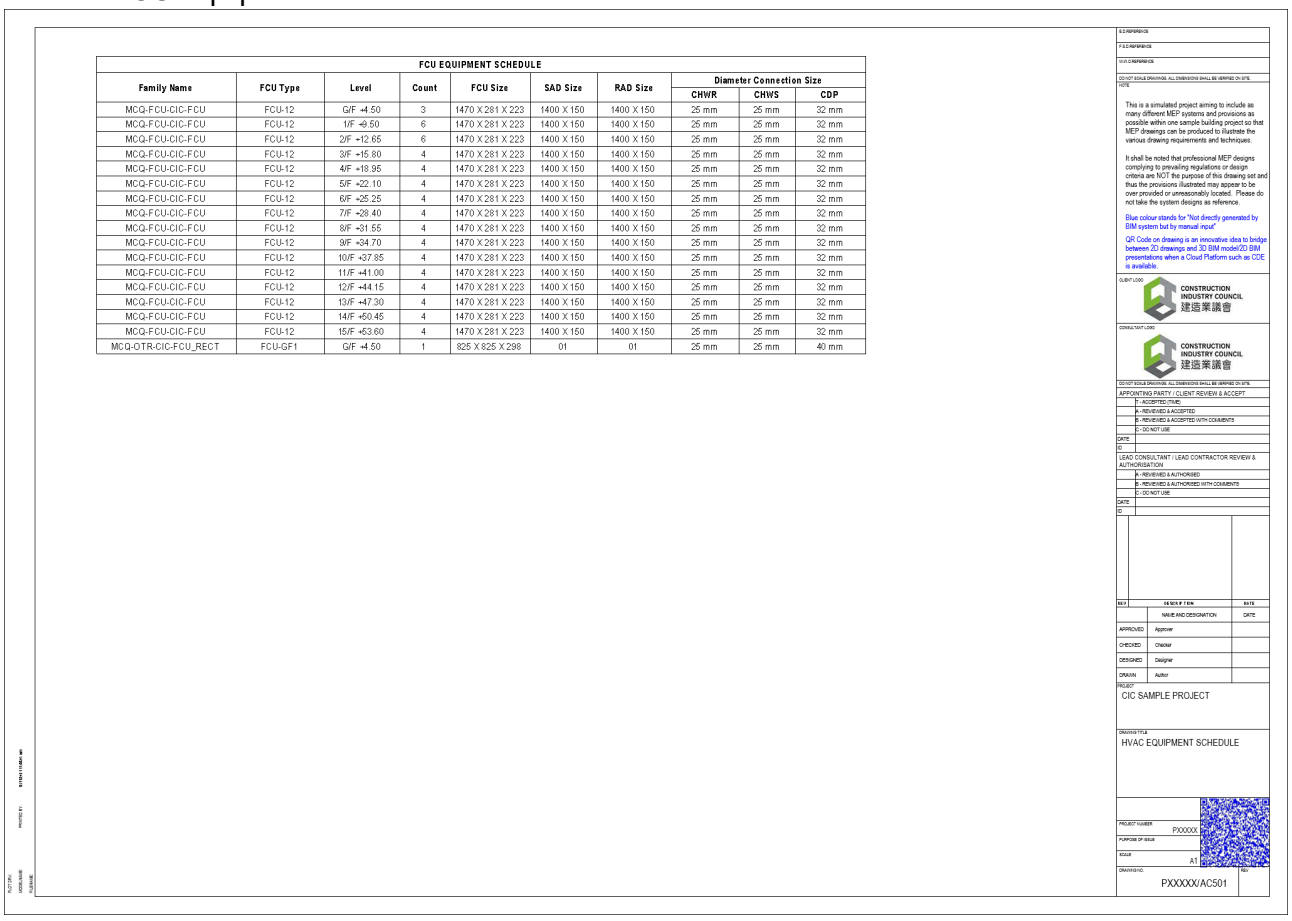


9.8.4 Schedule Sheets

Schedule Sheets is sheets to present specifically all the schedule and detailed information.

Example types of floor schedule sheet

- FCU Equipment Schedule Sheet



FCU EQUIPMENT SCHEDULE

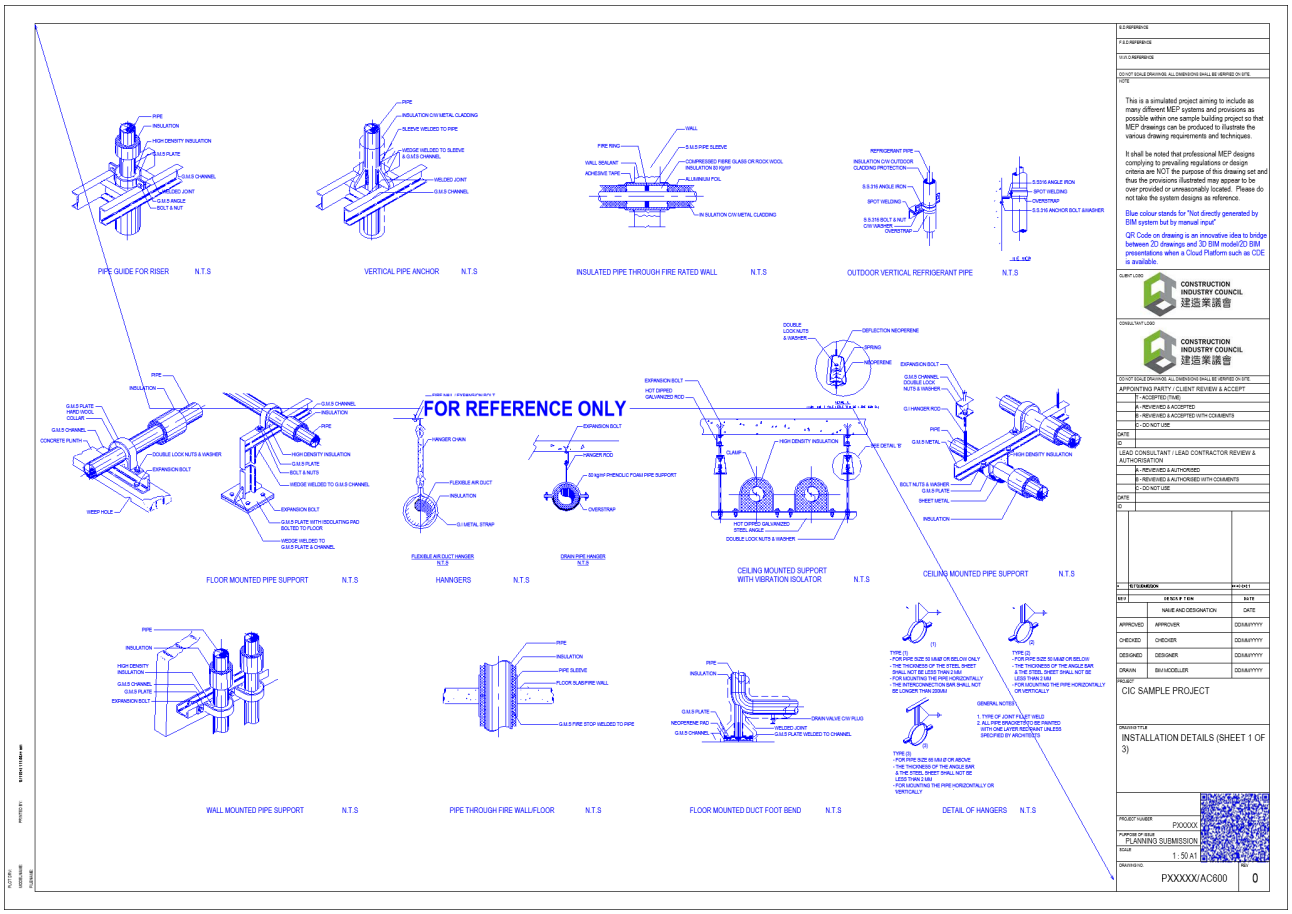
Family Name	FCU Type	Level	Count	FCU Size	SAD Size	RAD Size	Diameter Connection Size		
							CHWR	CHWS	CDP
MCQ-FCU-CIC-FCU	FCU-12	G/F +4.50	3	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	1/F +9.50	6	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	2/F +12.65	6	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	3/F +15.80	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	4/F +18.95	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	5/F +22.10	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	6/F +25.25	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	7/F +28.40	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	8/F +31.55	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	9/F +34.70	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	10/F +37.85	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	11/F +41.00	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	12/F +44.15	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	13/F +47.30	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	14/F +50.45	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-FCU-CIC-FCU	FCU-12	15/F +53.60	4	1470 X 281 X 223	1400 X 150	1400 X 150	25 mm	25 mm	32 mm
MCQ-OTR-CIC-FCU_RECT	FCU-GF1	G/F +4.50	1	825 X 825 X 298	01	01	25 mm	25 mm	40 mm

9.8.5 Detail Drawing/Installation Sheets

Detail Drawing/Installation Sheets is sheets to present specifically all the details drawing or the installation methodology.

Example types of detail drawing/installation sheet

- MVAC Installation details

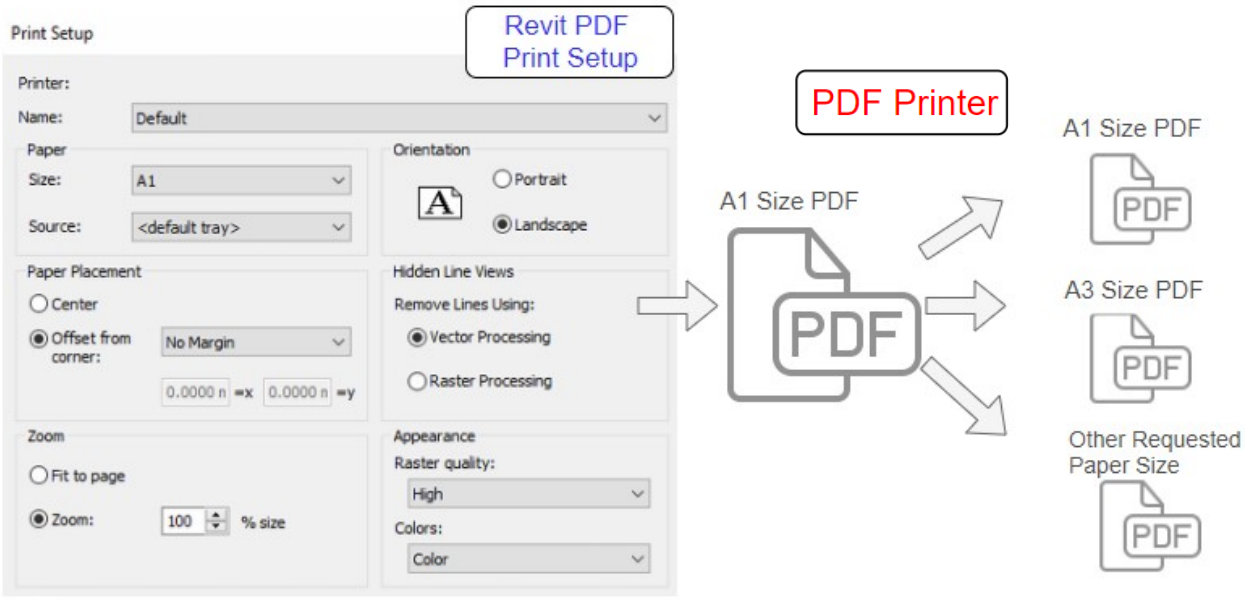


9.9 Preparation for Publication

Prior to the transmittal of the model, the file contents and structure need to be agreed. Drawing sheets from Revit shall be published to DWF (preferred) or stay in raw format (*.rvt), where they can be checked, approved, issued and archived.

Printing

Exporting all the sheets in PDF A1 or A0 paper size in PDF is recommended to ensure the sheets are printed in correct scale and resolution. The user may then print the corresponding PDF files in the required paper size.

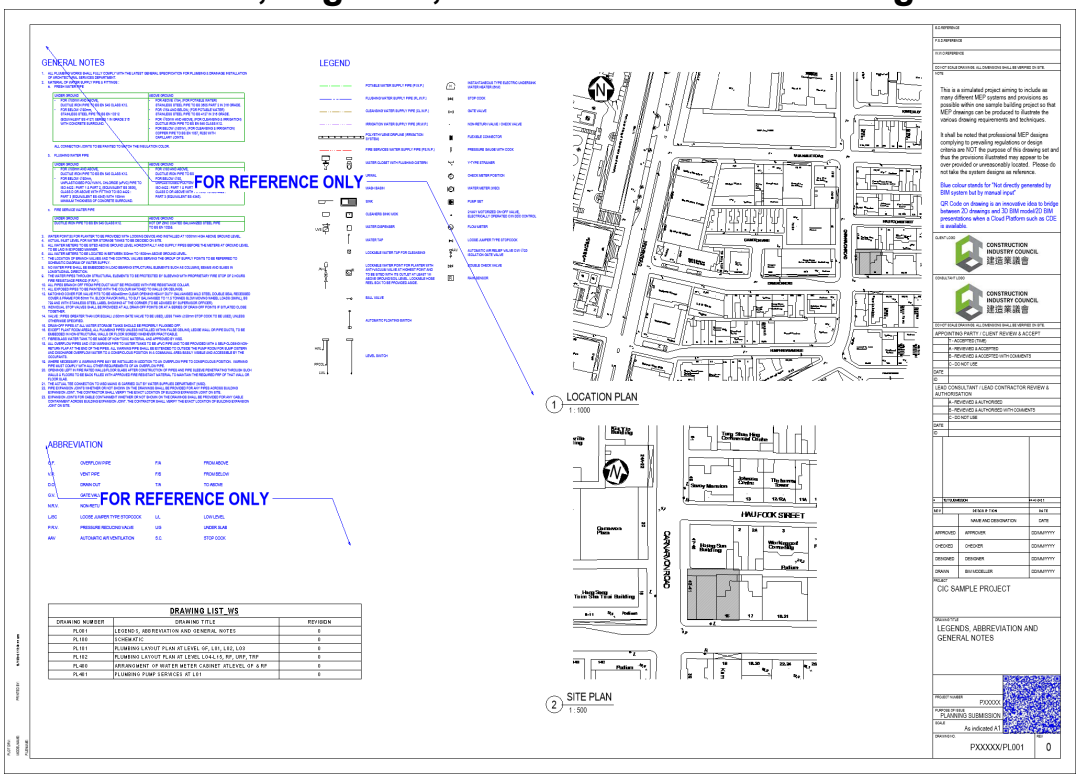


10 Statutory Submission Sample

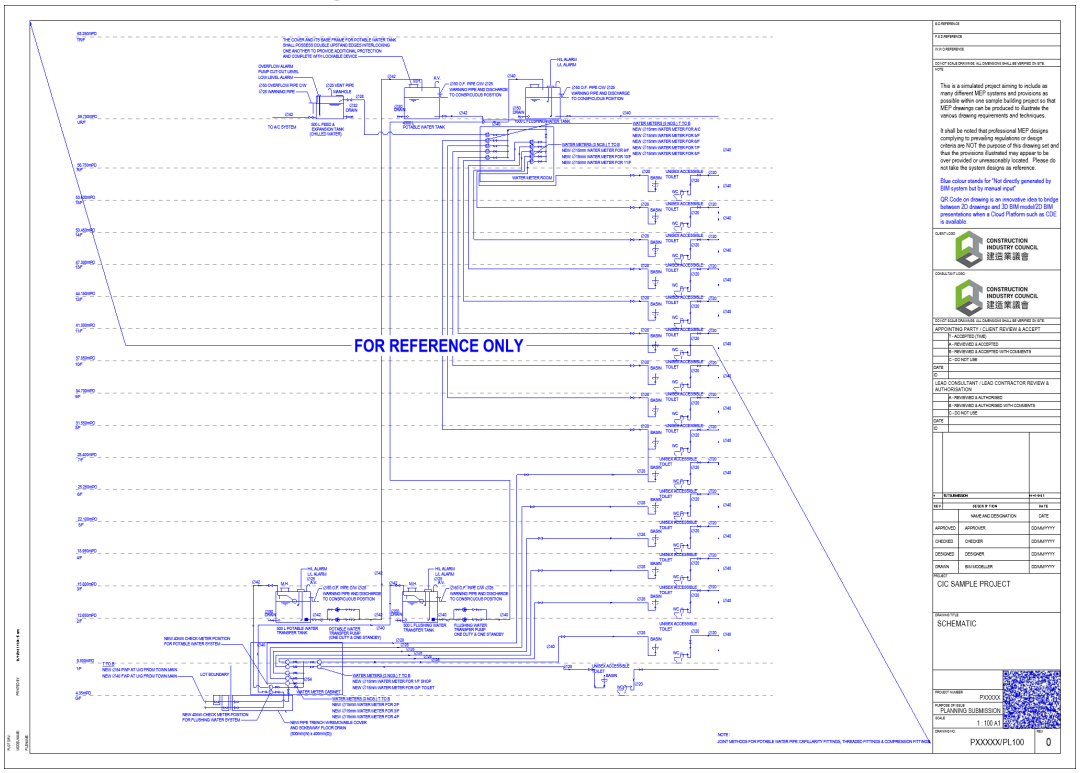
Details refer to Appendix A - Software 1 Sample Drawings.

10.1 Application for the Water Supply

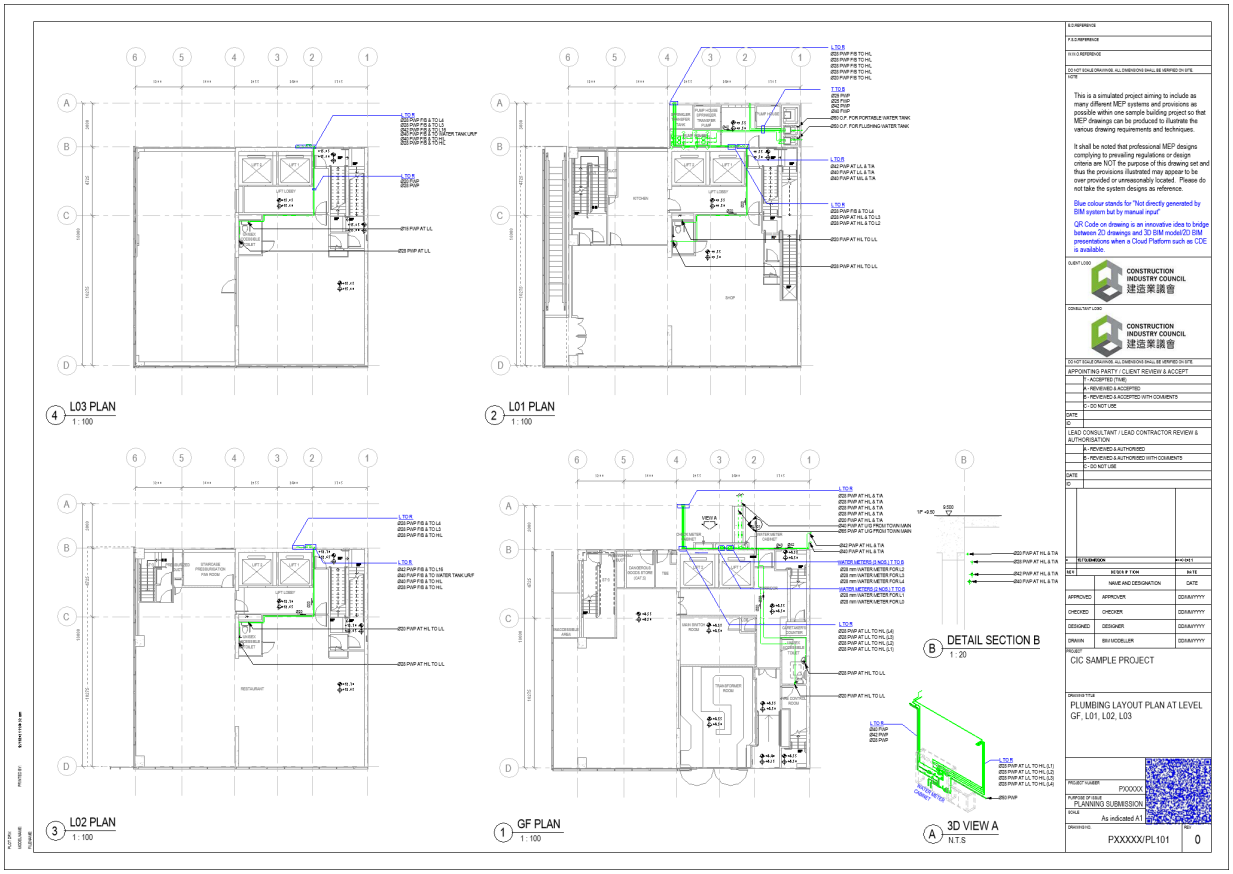
General Notes, Legends, Abbreviation and Drawing List



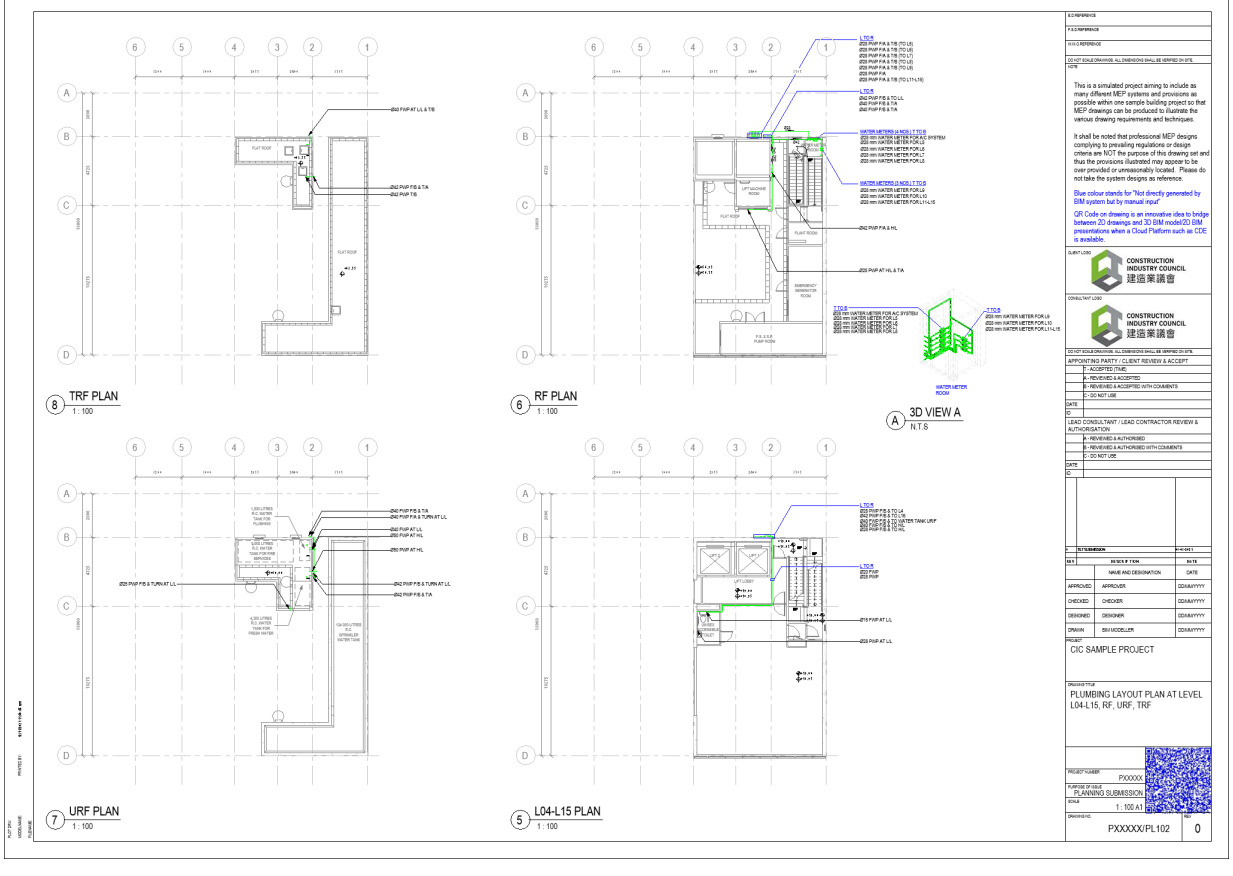
Schematic Drawing



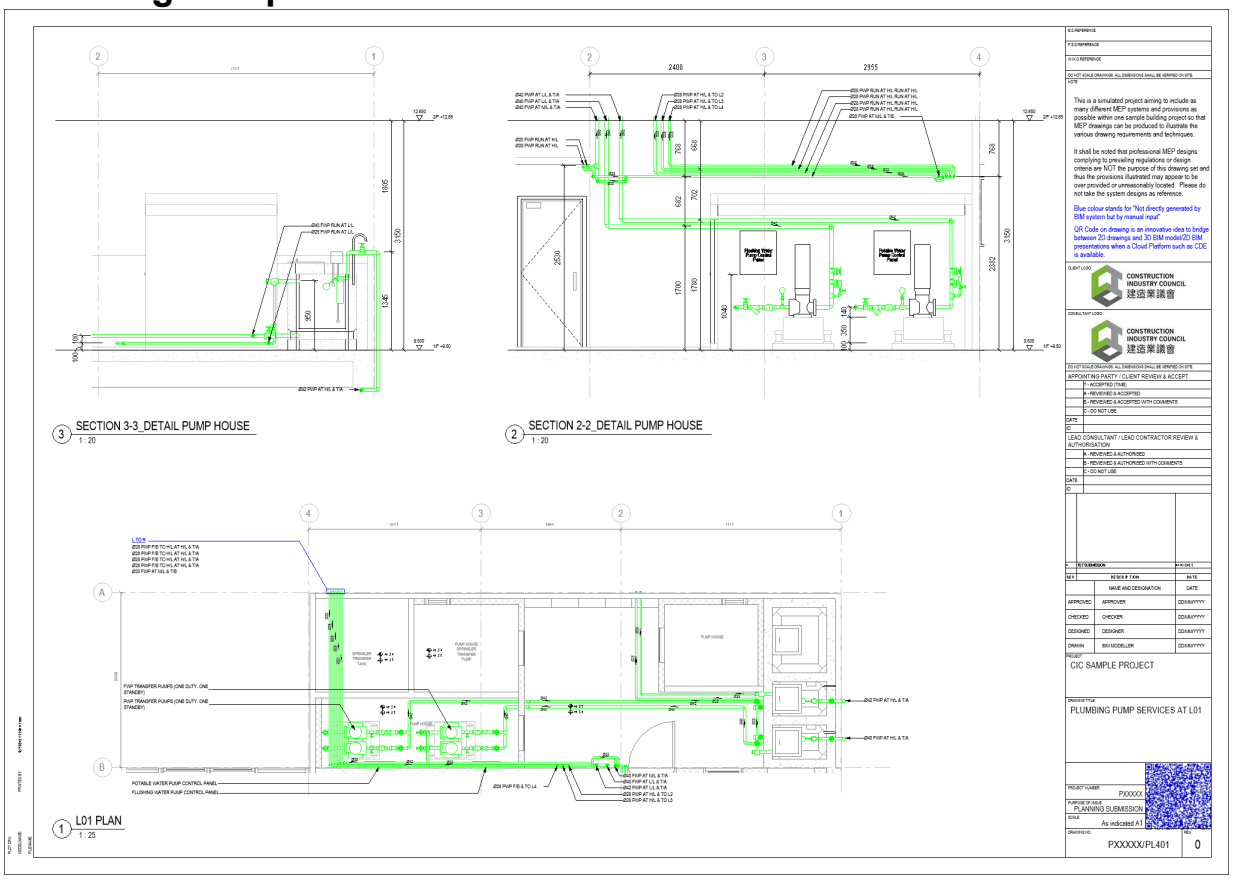
Plumbing Layout Plan at Level GF, L01, L02, L03



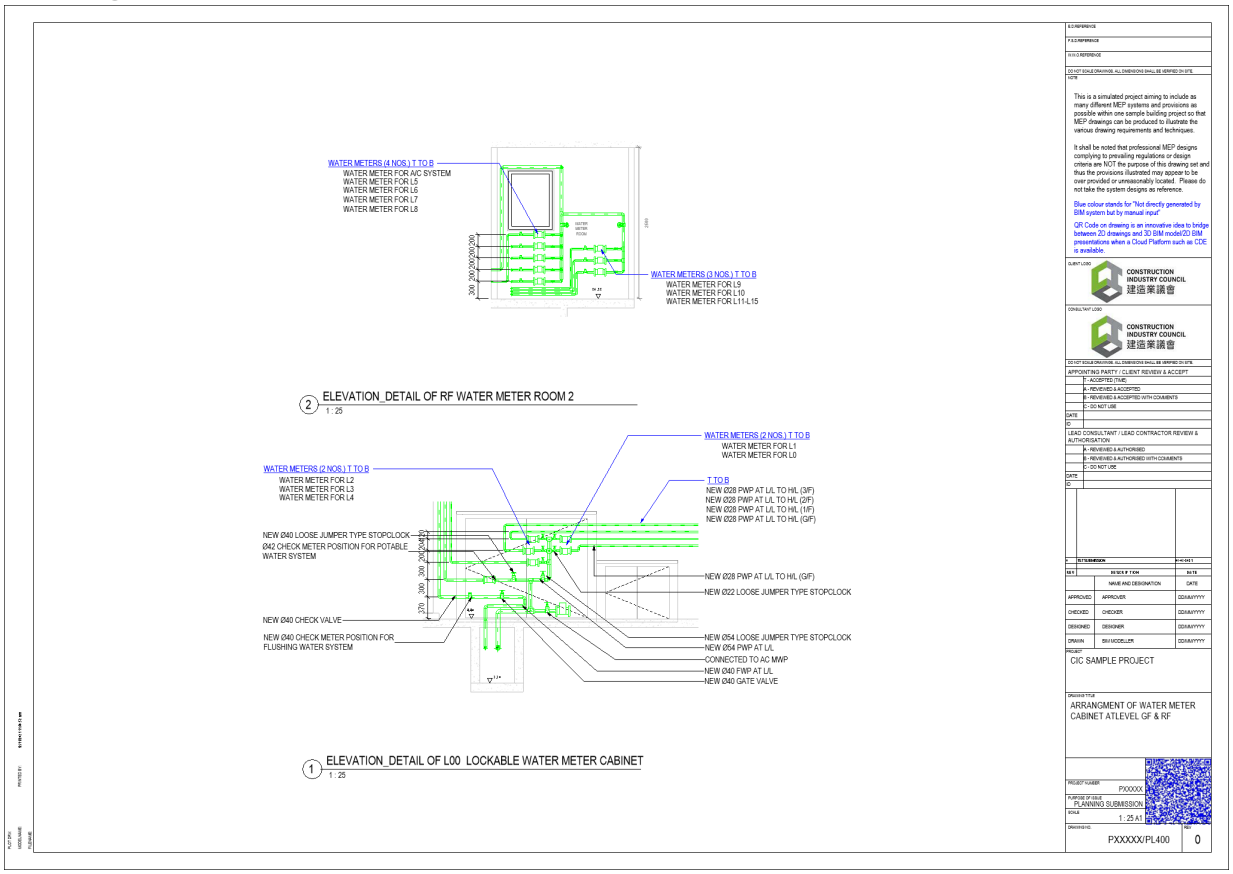
Plumbing Layout Plan at Level L04-L15, RF, URF, TRF



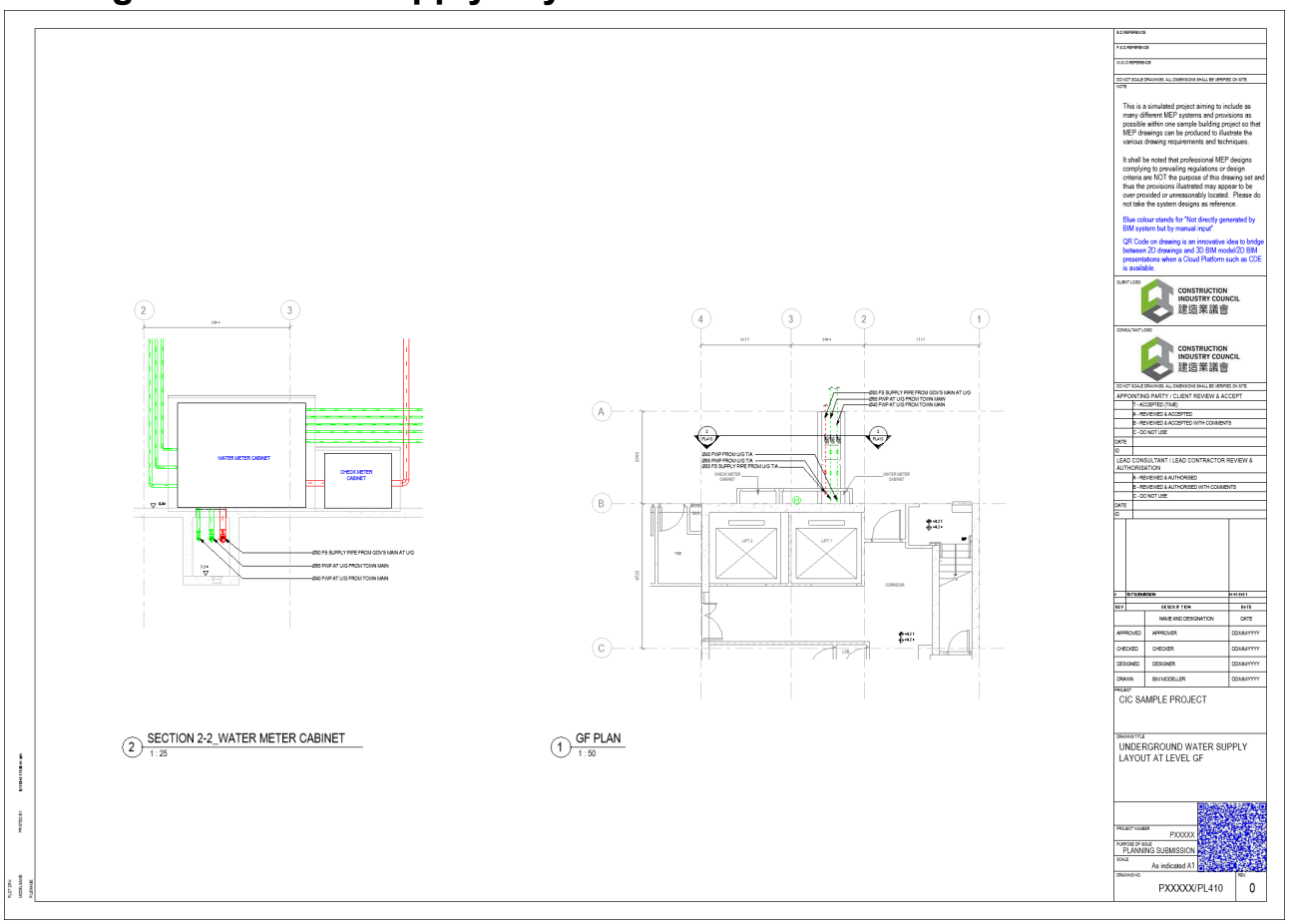
Plumbing Pump Services at L01



Arrangement Of Water Meter Cabinet at Level GF & RF

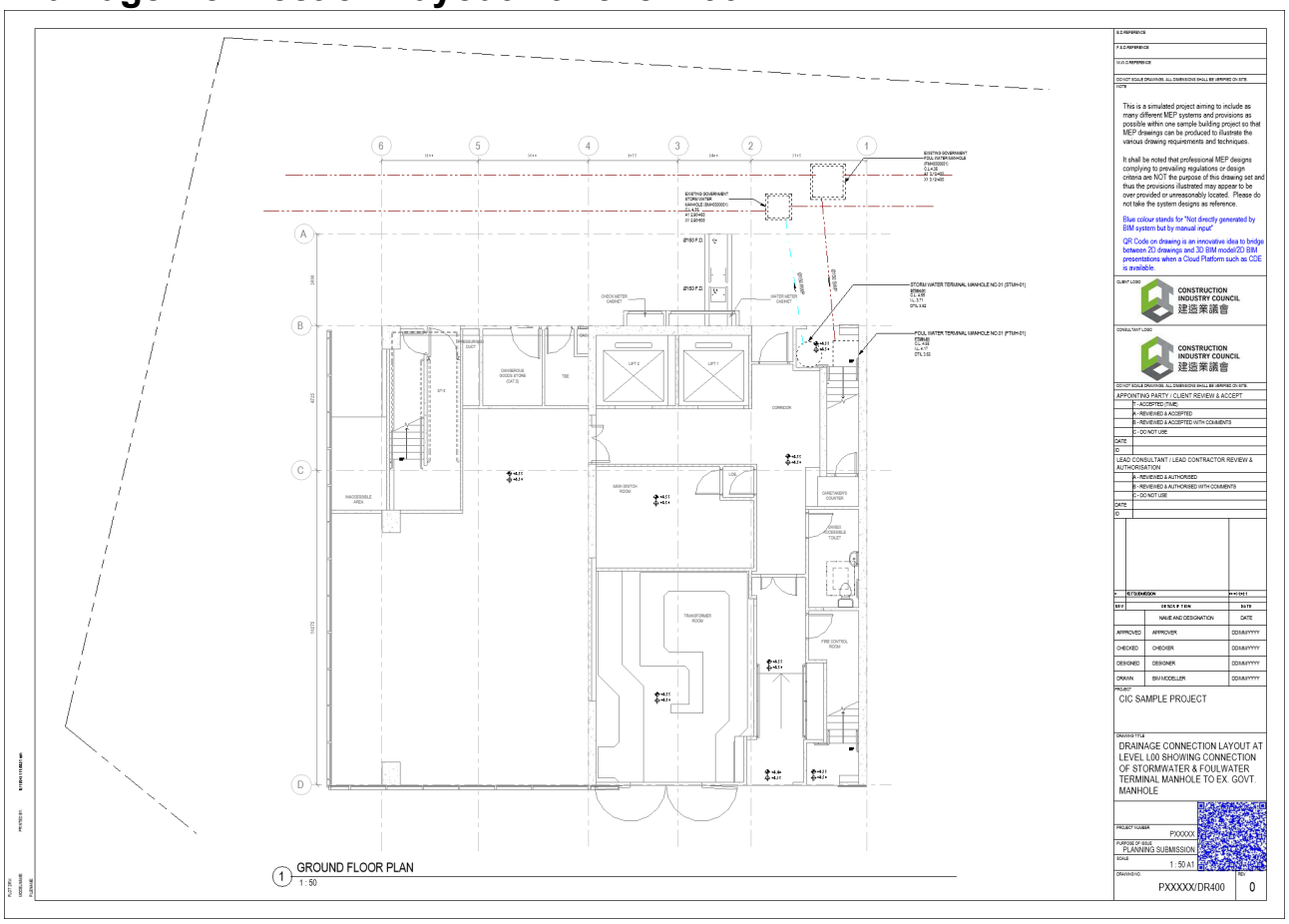


Underground Water Supply Layout At Level GF



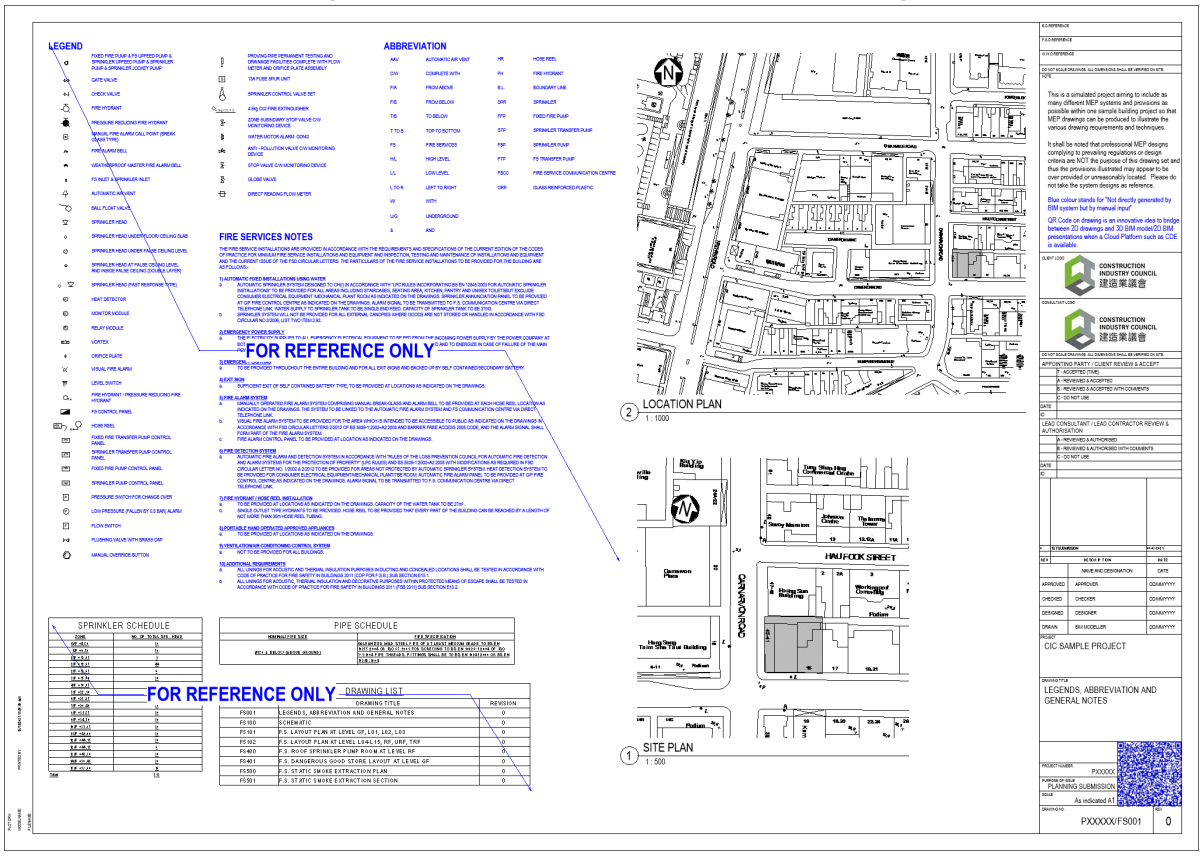
10.2 Application for Drainage Services Department

Drainage Connection Layout At Level L00

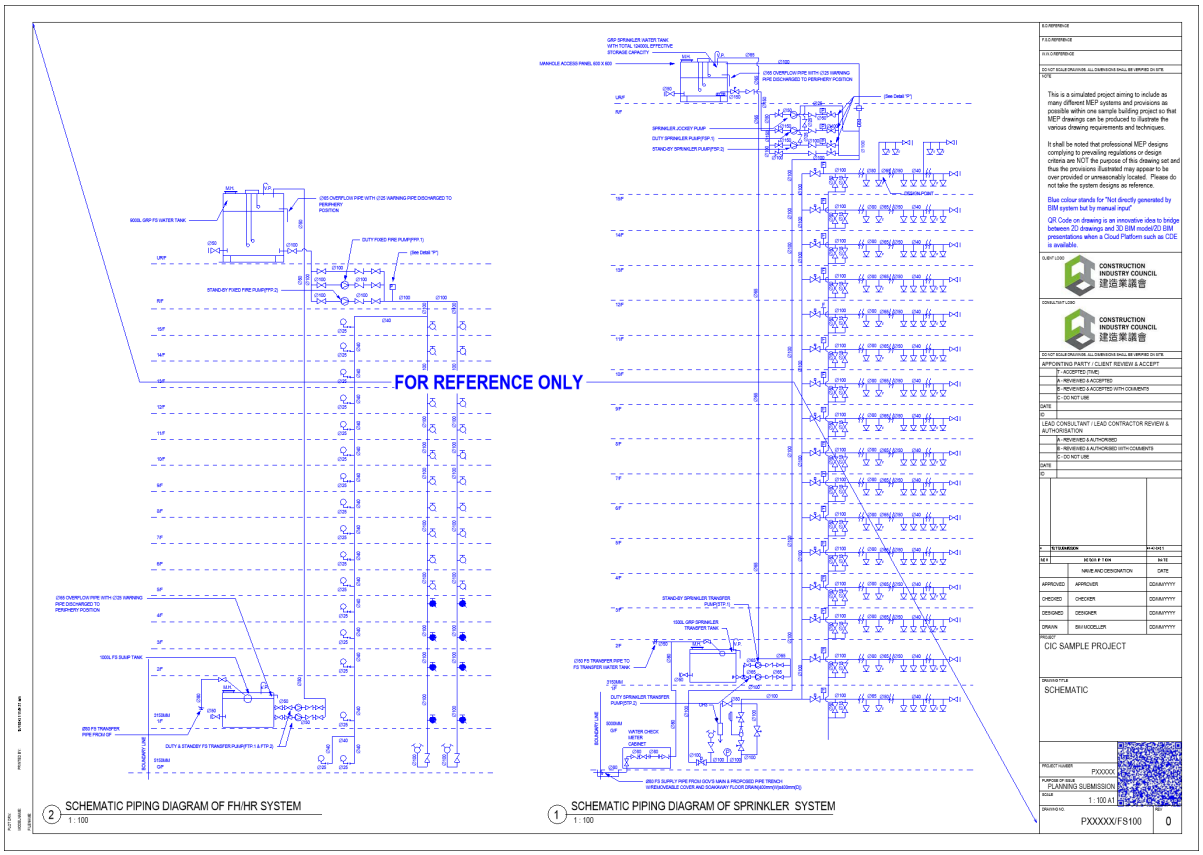


10.3 Application for Fire Services Department

General Notes, Legends, Abbreviation and Drawing List

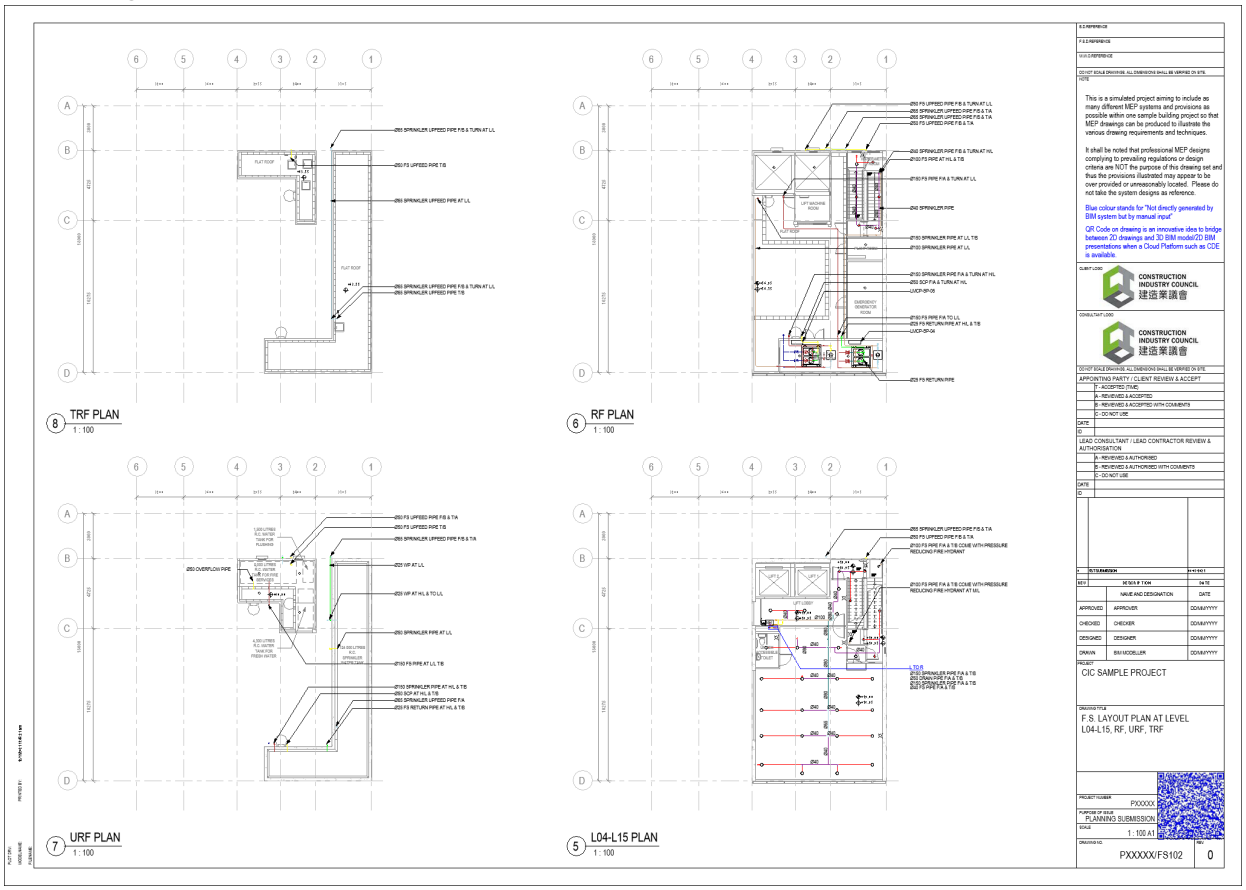


F.S. Sprinkler Schematic

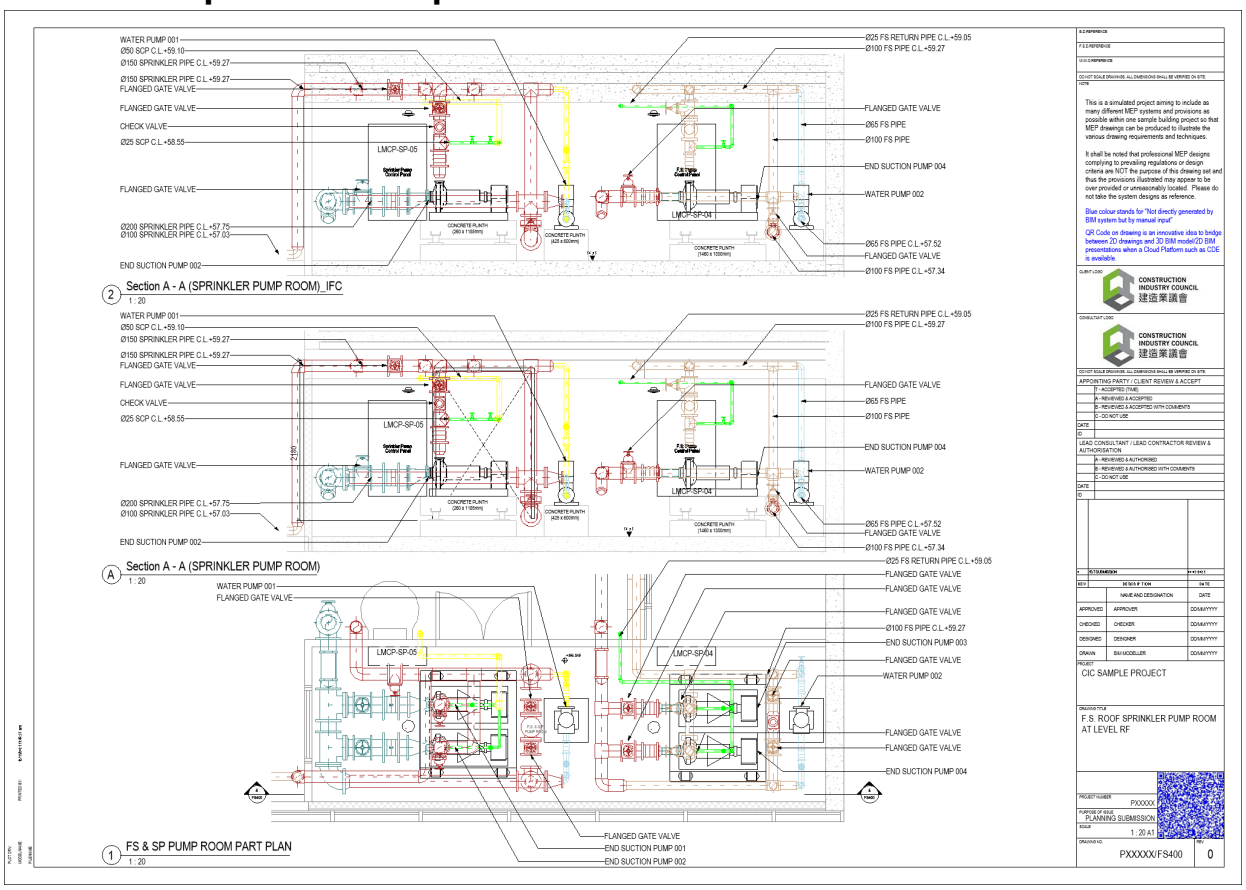


F.S. Layout Plan at Level GF, L01, L02, L03

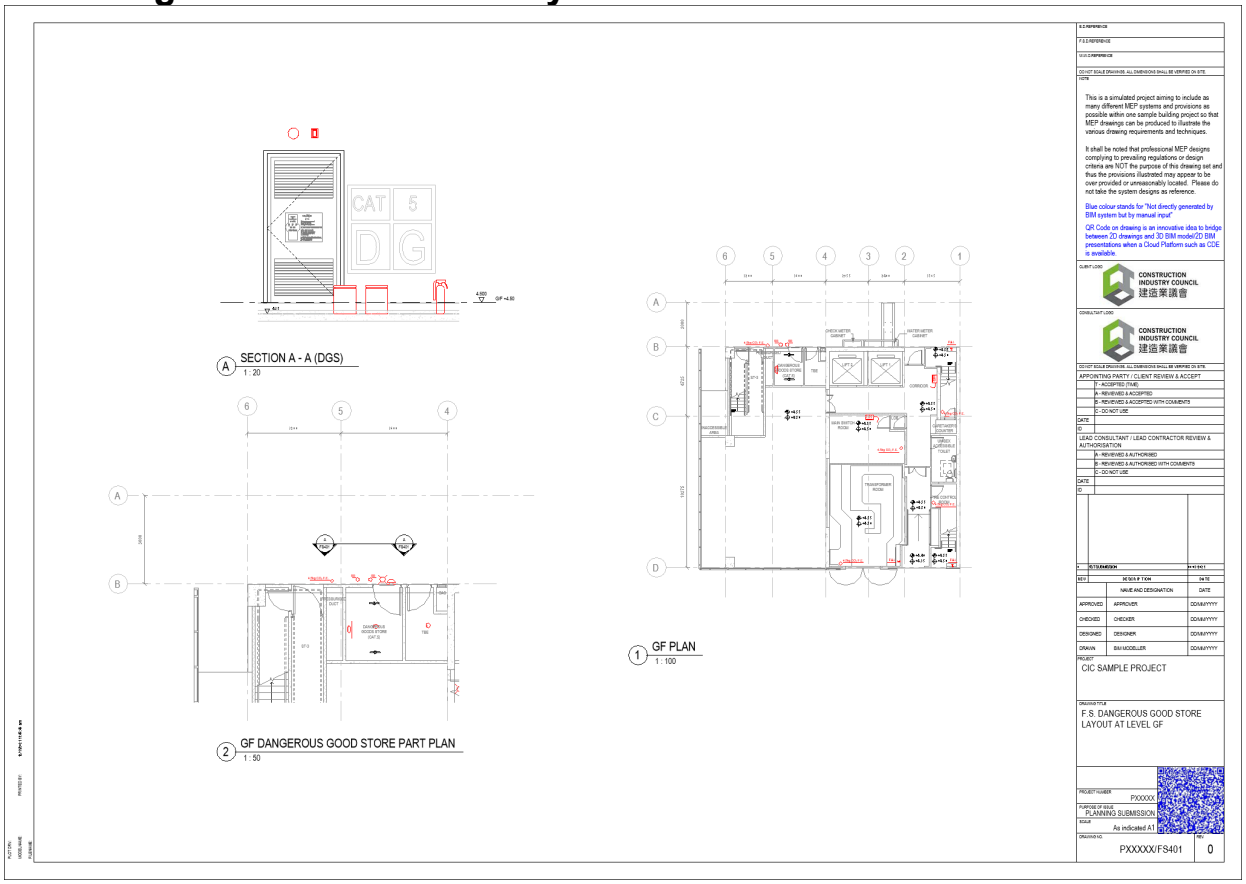
F.S. Layout Plan at Level L04-L15, RF, URF, TRF



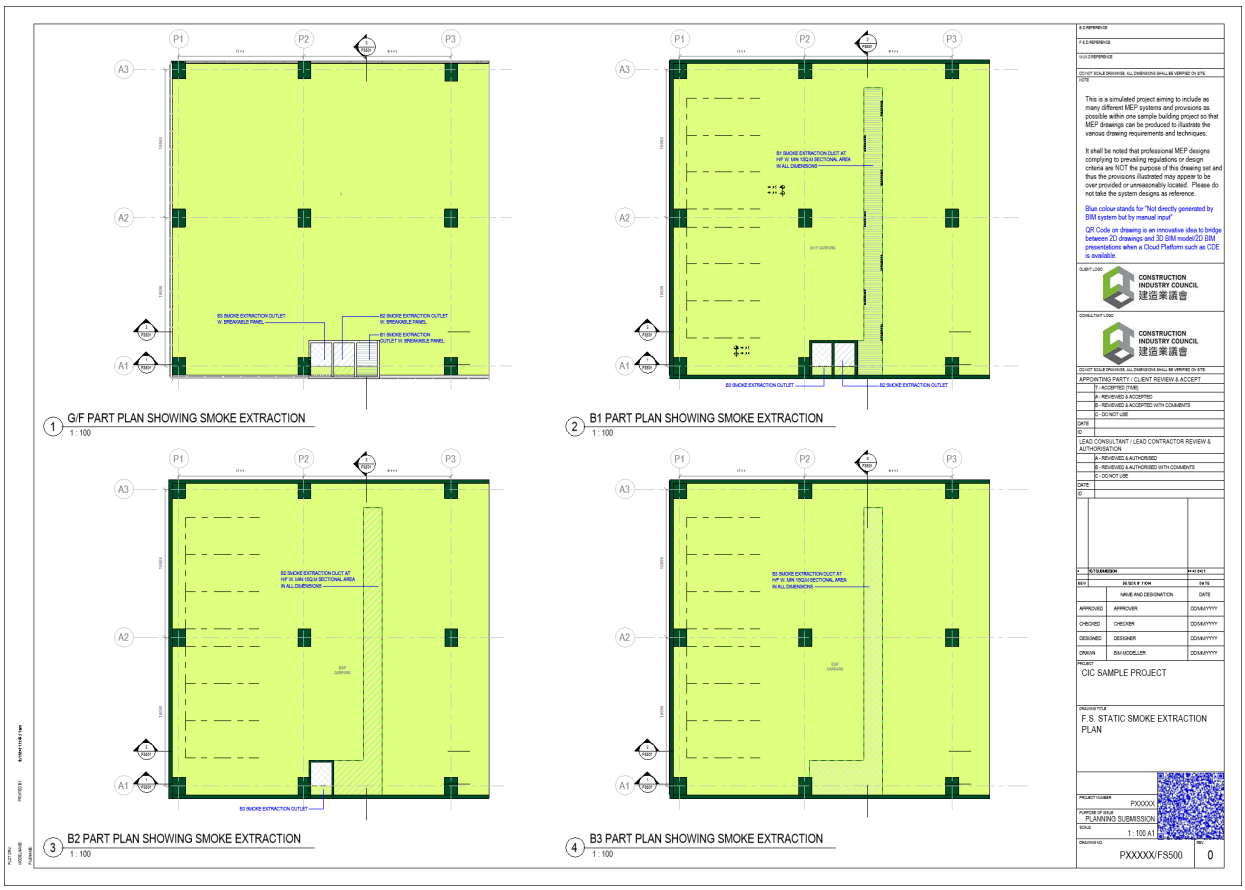
F.S. Roof Sprinkler Pump Room at Level RF



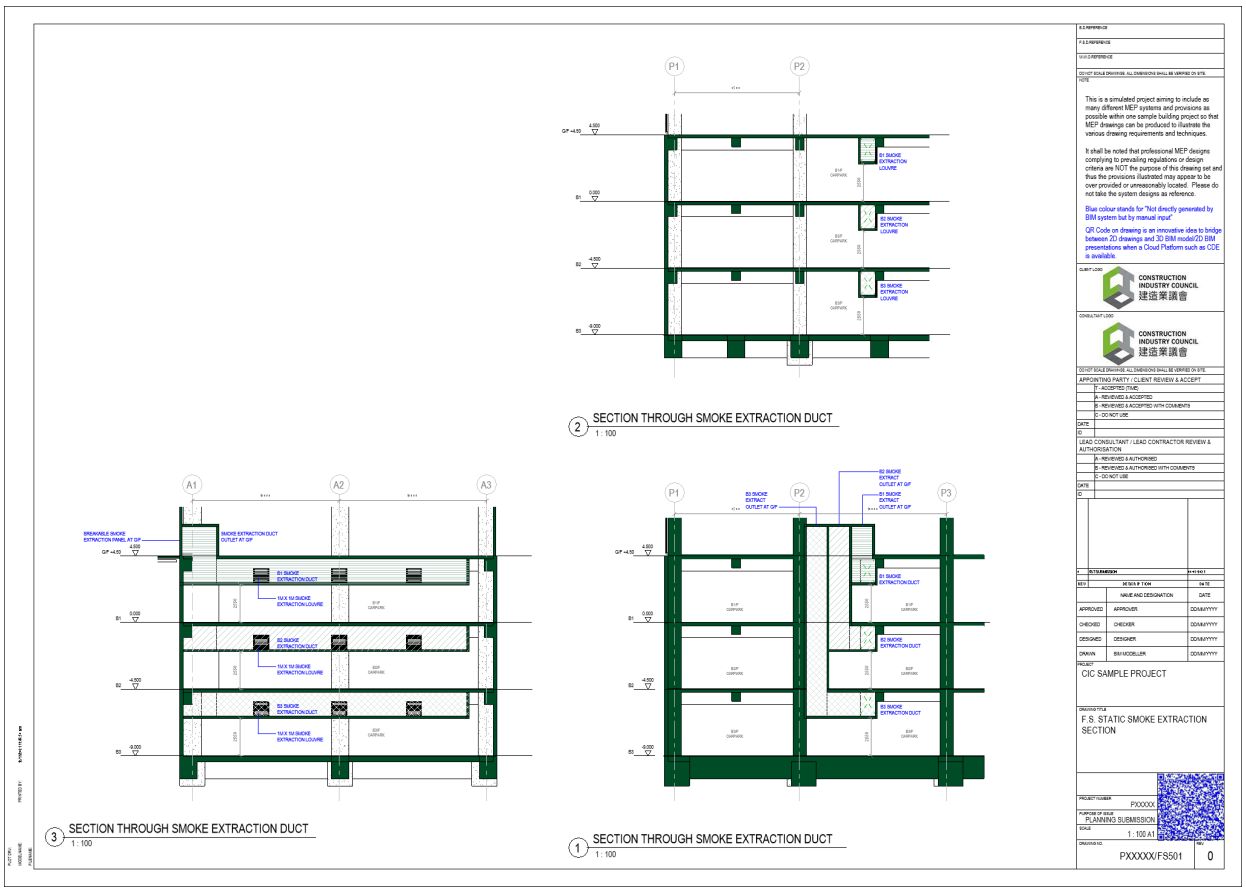
F.S. Dangerous Good Store Layout at Level GF



F.S. Static Smoke Extraction Plan

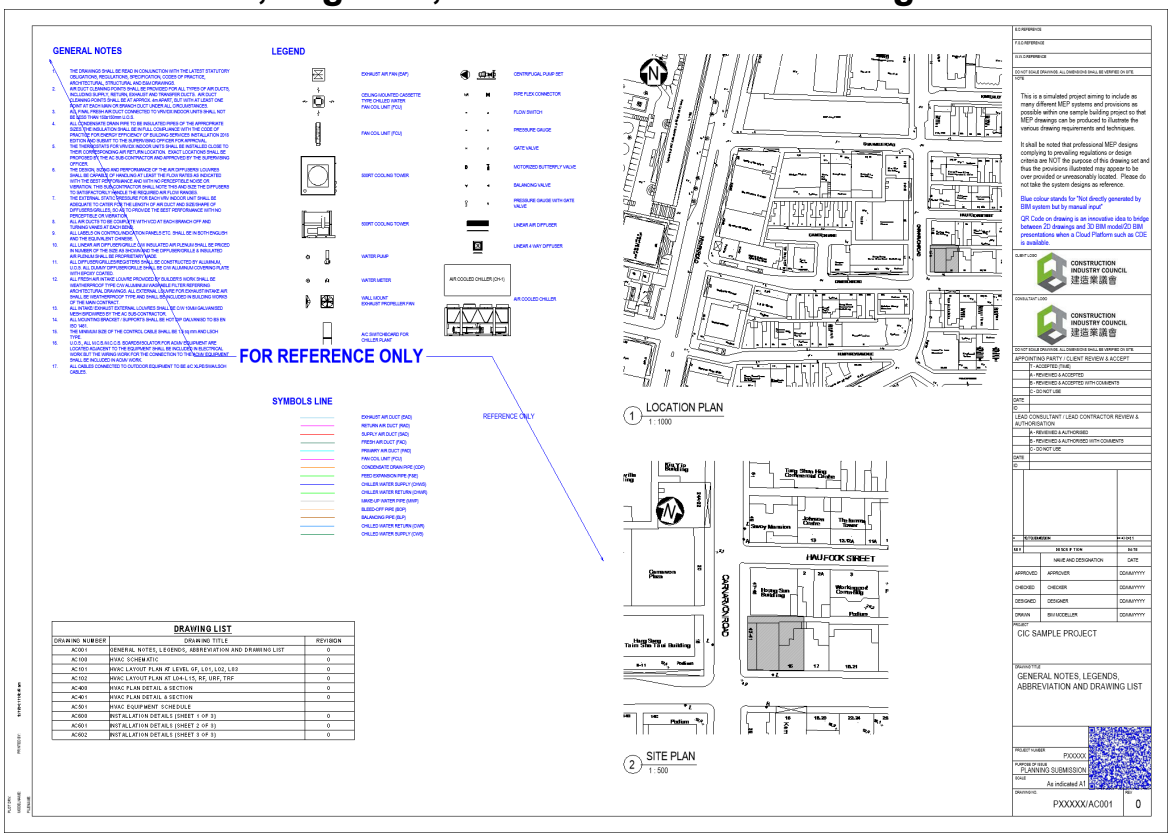


F.S. Static Smoke Extraction Section



10.4 Application for Electrical and Mechanical Services Department

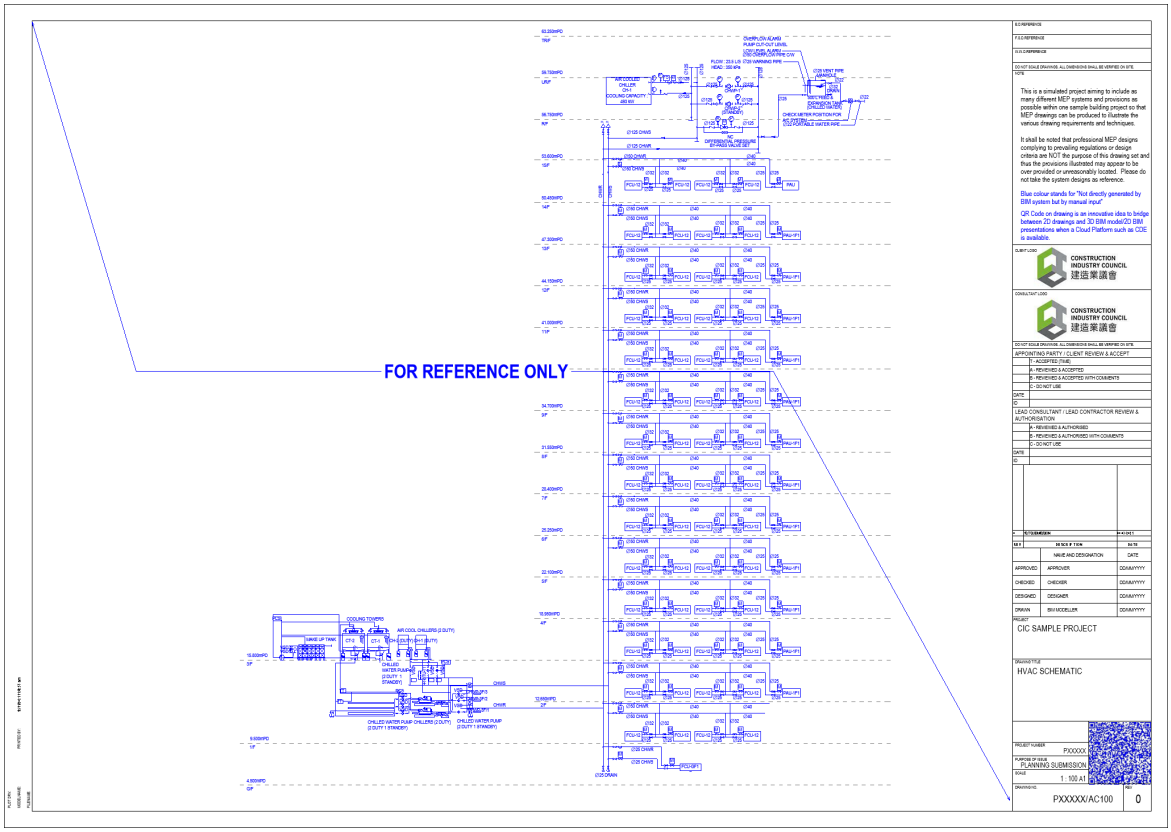
General Notes, Legends, Abbreviation and Drawing List



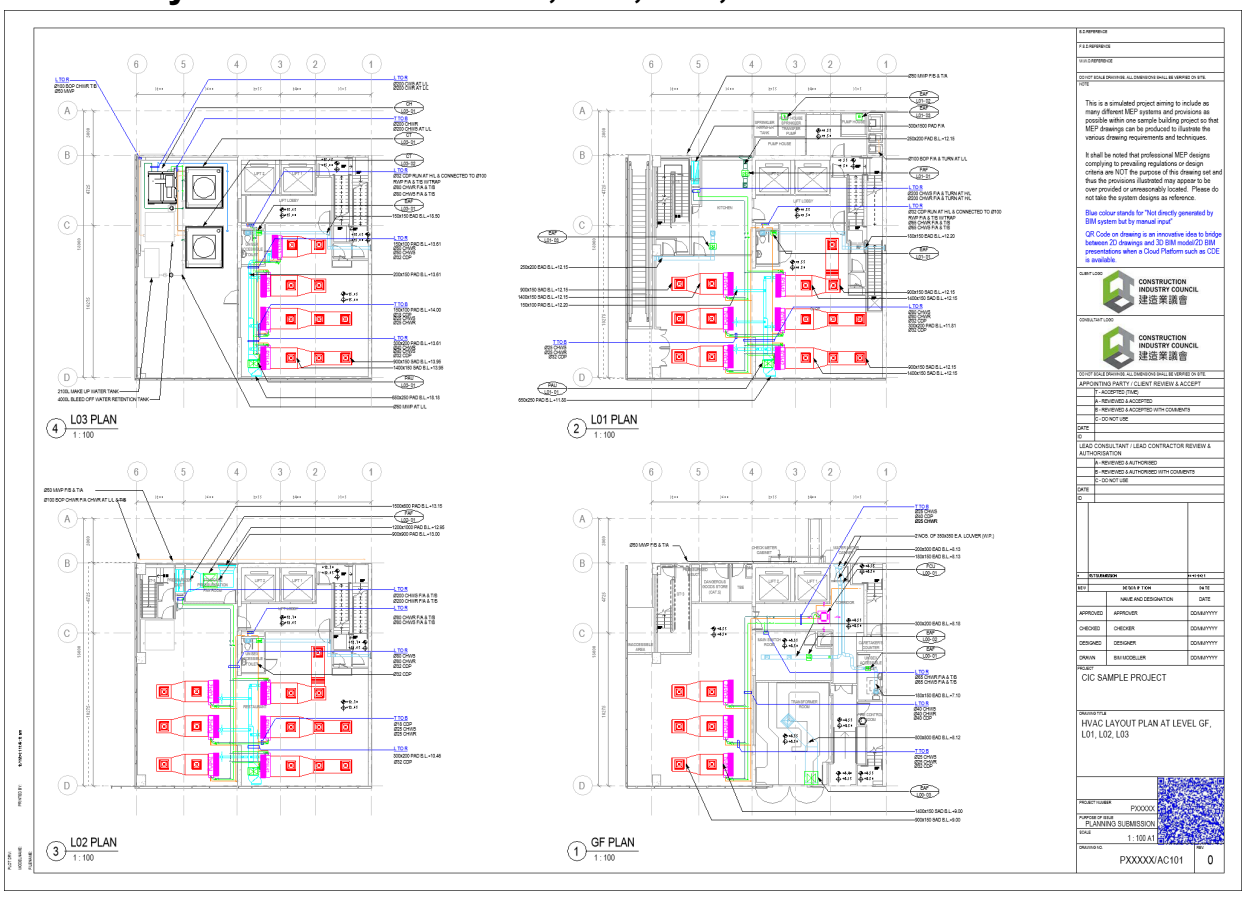
DRAWING LIST

DRAWING NUMBER	DRAWING TITLE	REVISION
AC-001	GENERAL NOTES, LEGENDS, ABBREVIATION AND DRAWING LIST	0
AC-100	HVAC SCHEMATIC	0
AC-101	HVAC LAYOUT PLAN AT LEVEL GF, L01, L02, L03	0
AC-102	HVAC LAYOUT PLAN AT L04-L15, RF, URF, TRF	0
AC-400	HVAC PLAN DETAIL & SECTION	0
AC-401	HVAC PLAN DETAIL & SECTION	0
AC-501	HVAC EQUIPMENT SCHEDULE	
AC-600	INSTALLATION DETAILS (SHEET 1 OF 3)	0
AC-601	INSTALLATION DETAILS (SHEET 2 OF 3)	0
AC-602	INSTALLATION DETAILS (SHEET 3 OF 3)	0

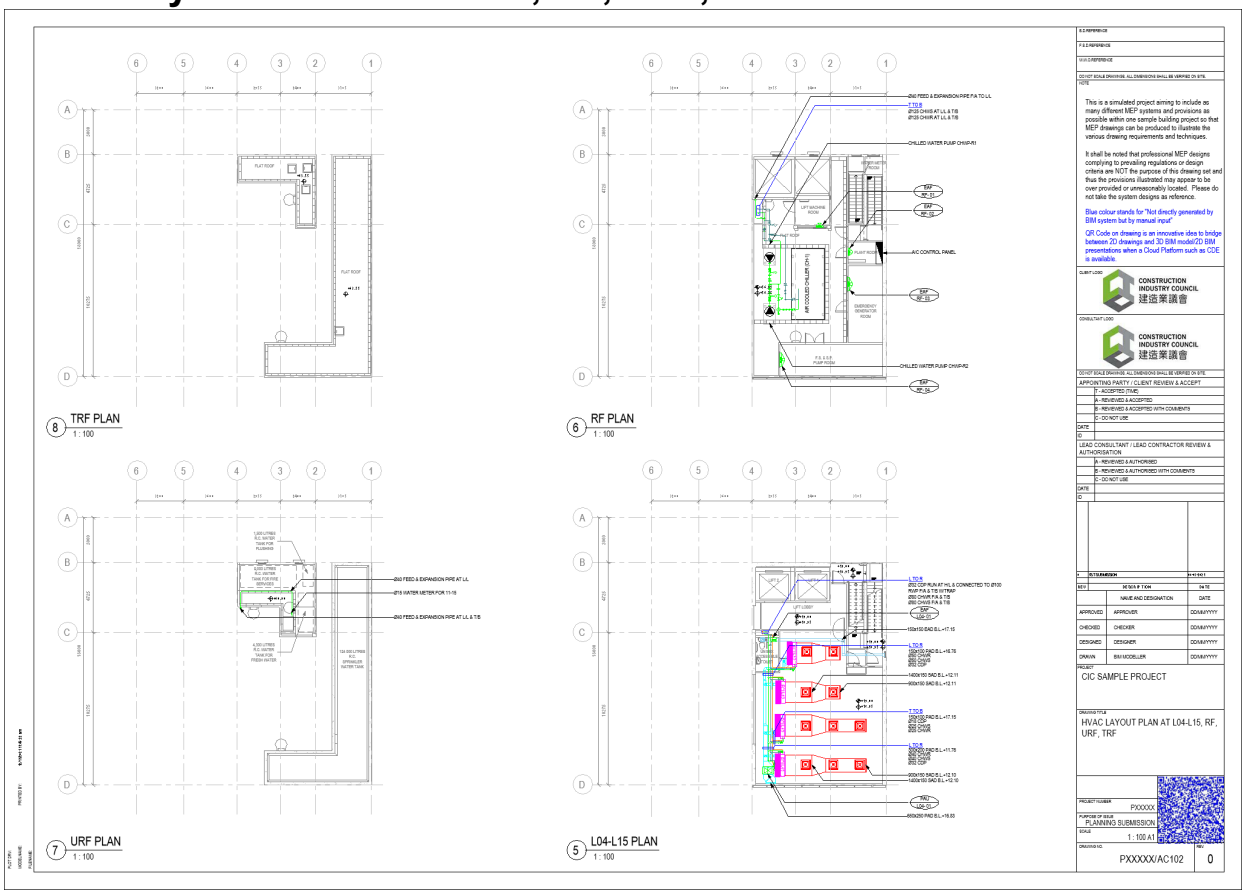
MVAC Schematic



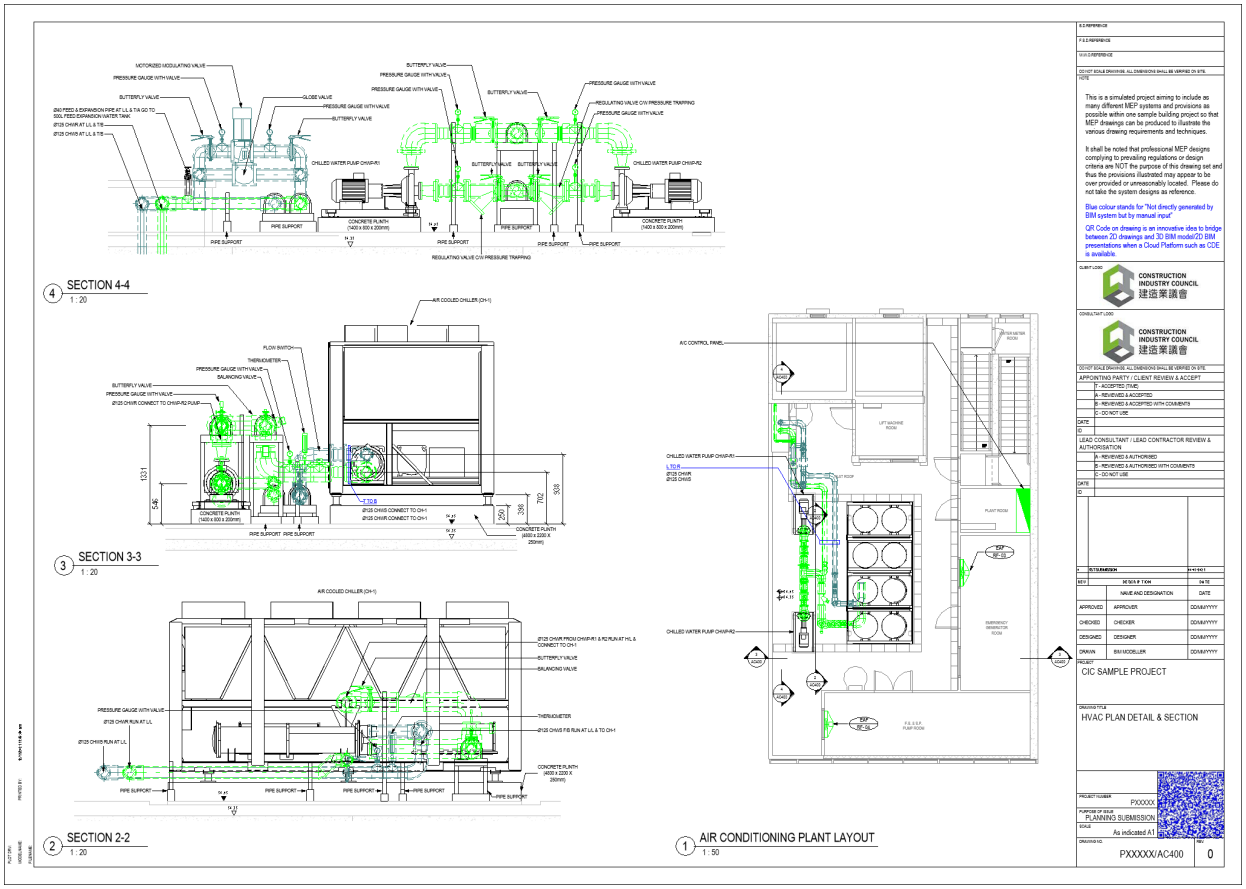
MVAC Layout Plan at Level GF, L01, L02, L03



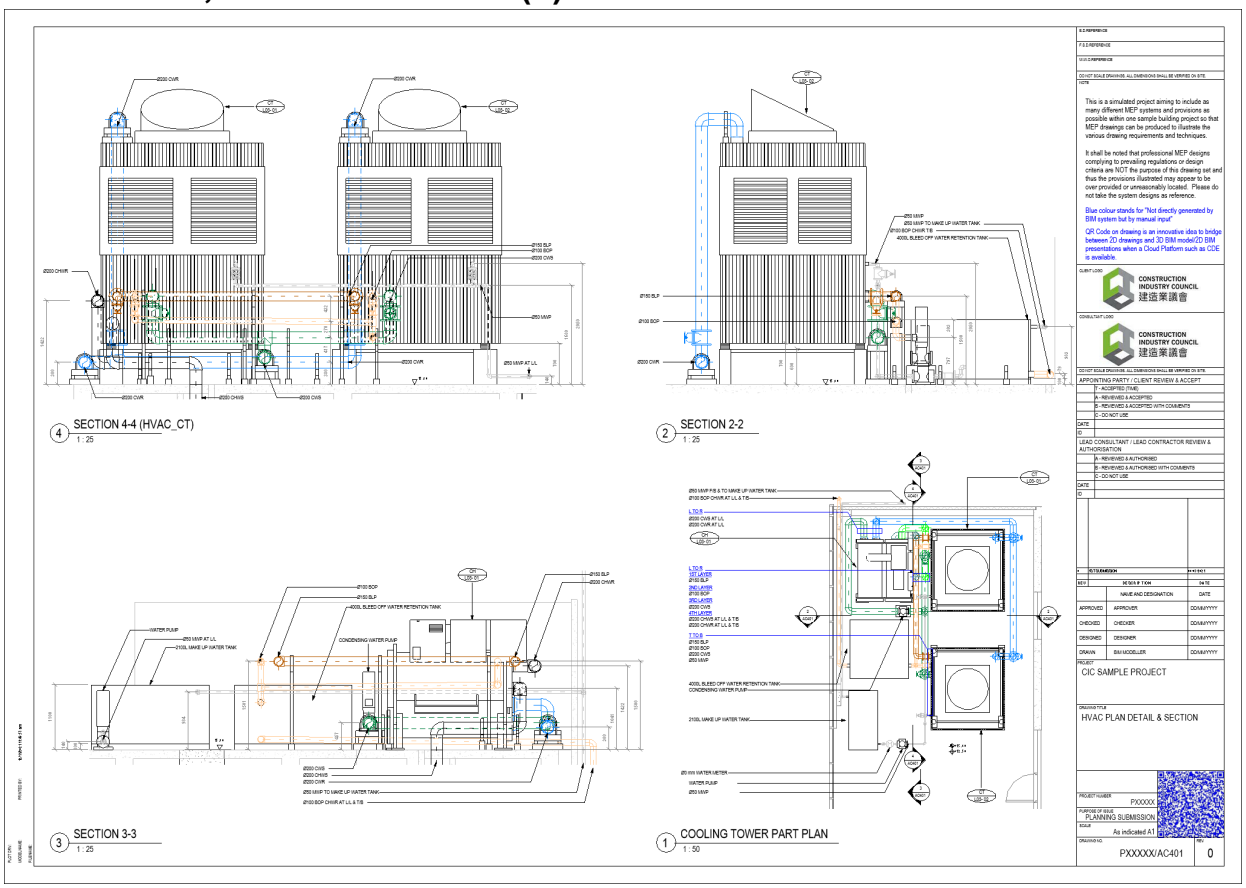
MVAC Layout Plan at L04-L15, RF, URF, TRF



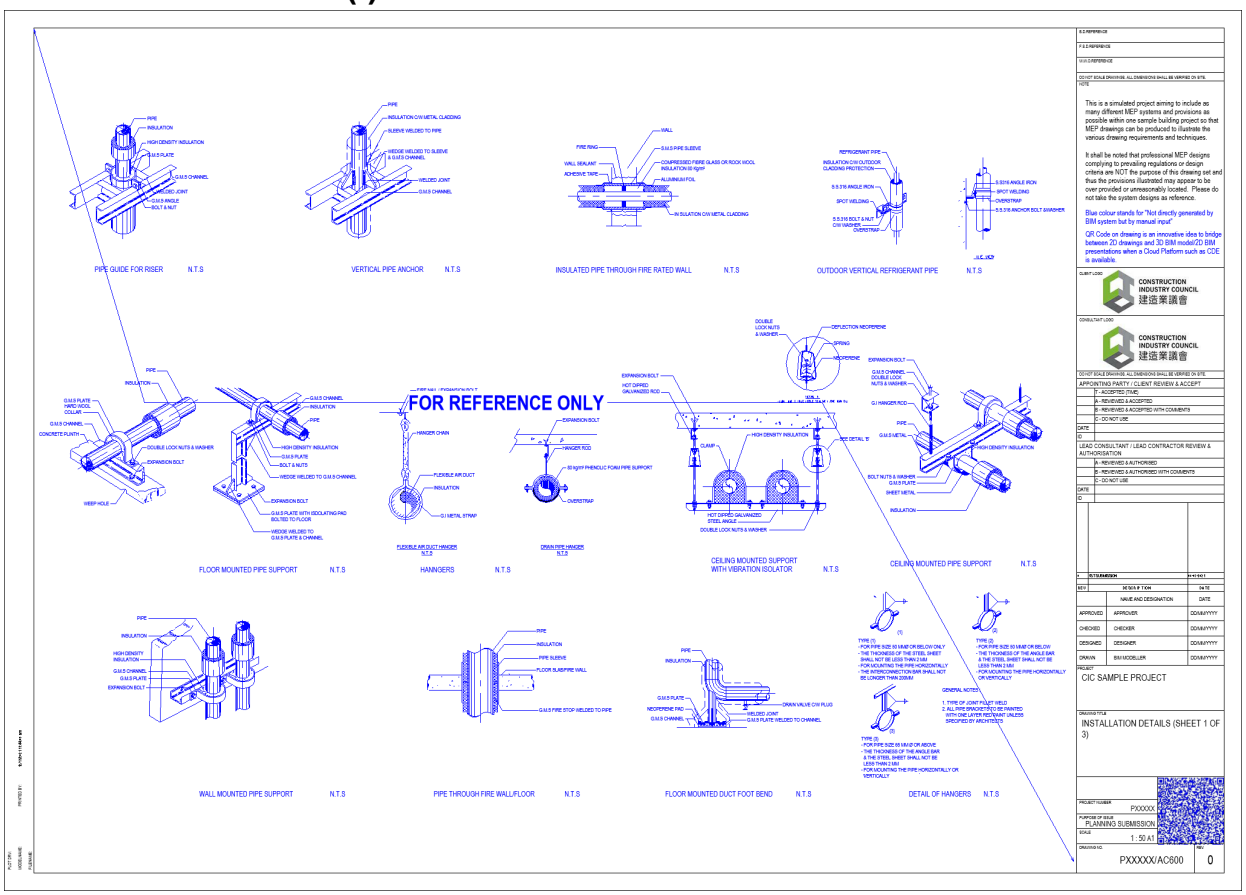
MVAC Plan, Detail & Section (I)



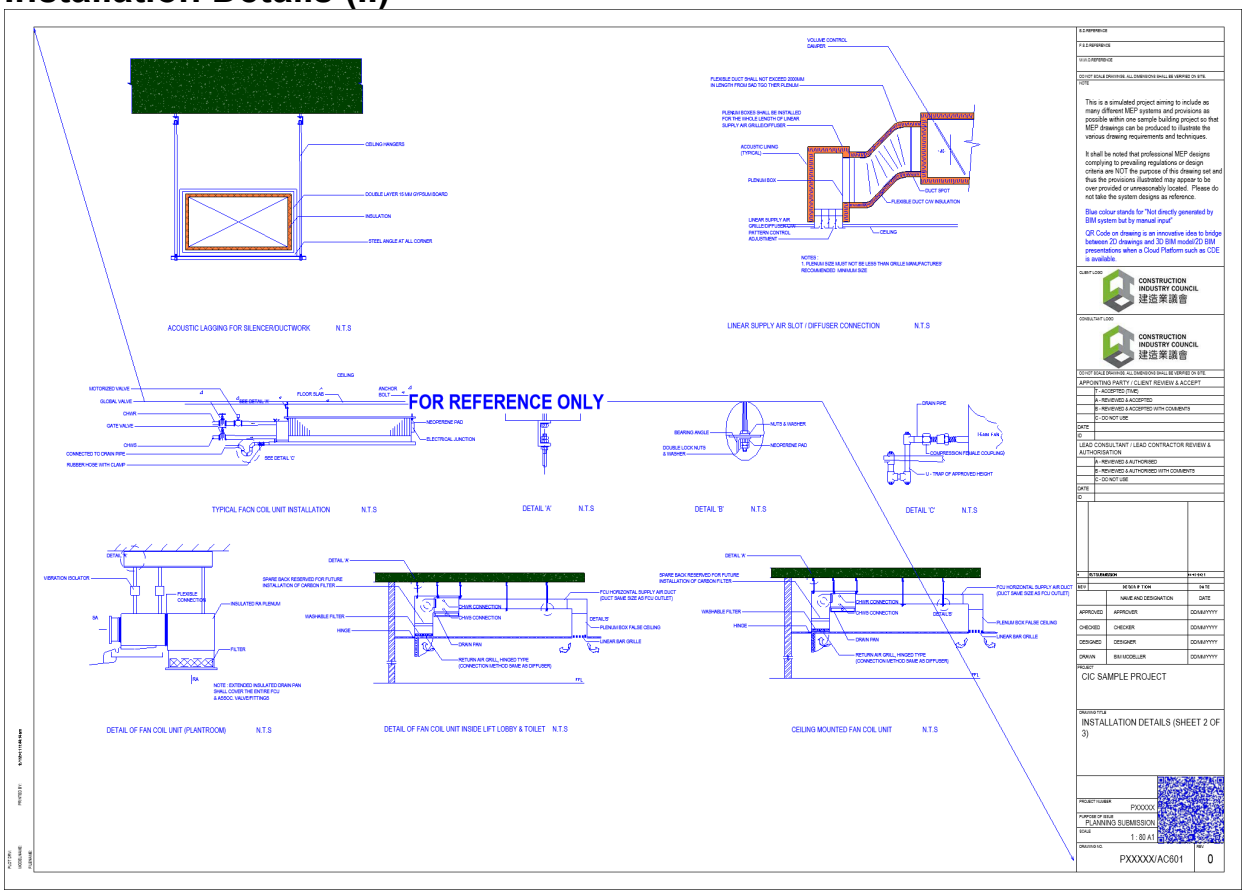
MVAC Plan, Detail & Section (II)



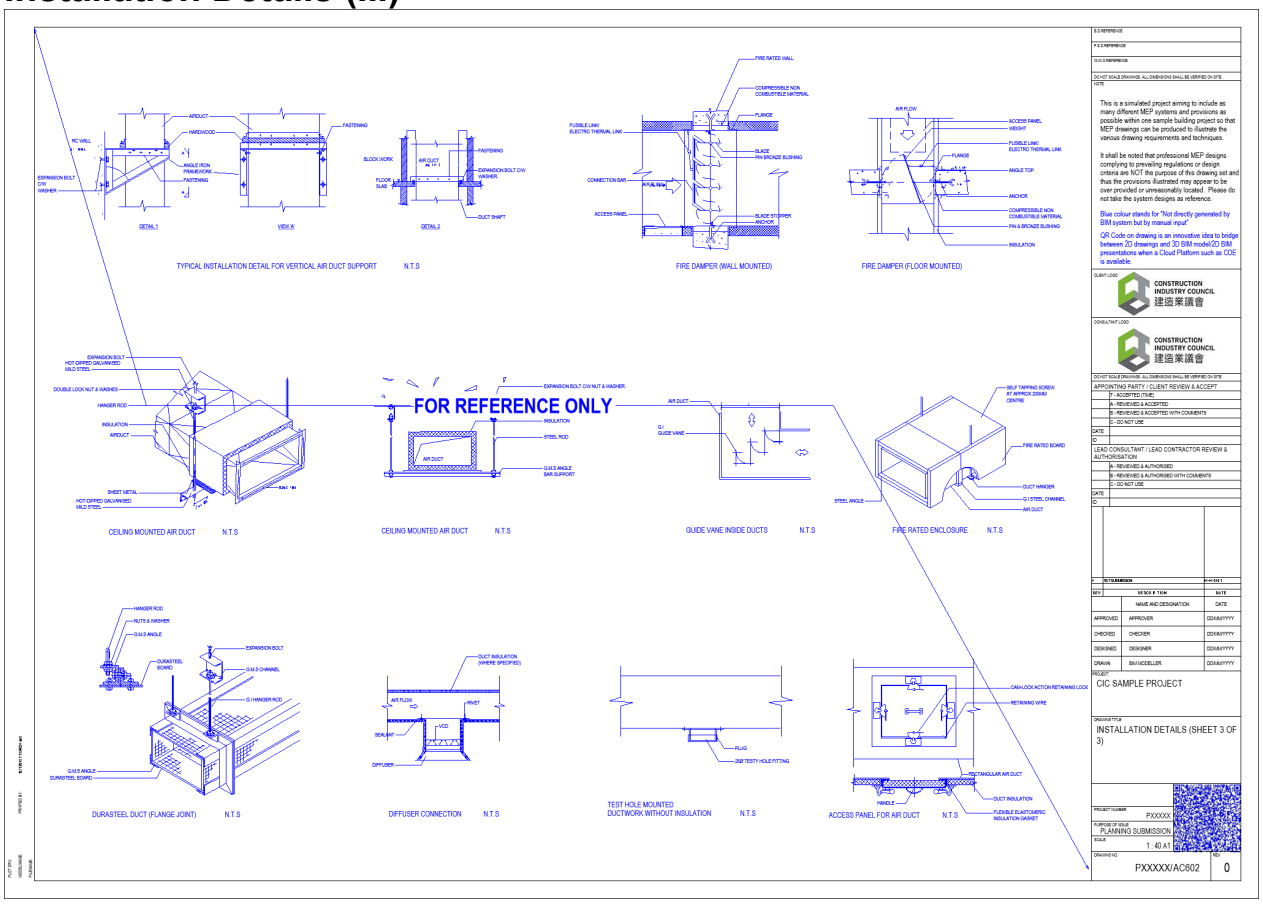
Installation Details (I)



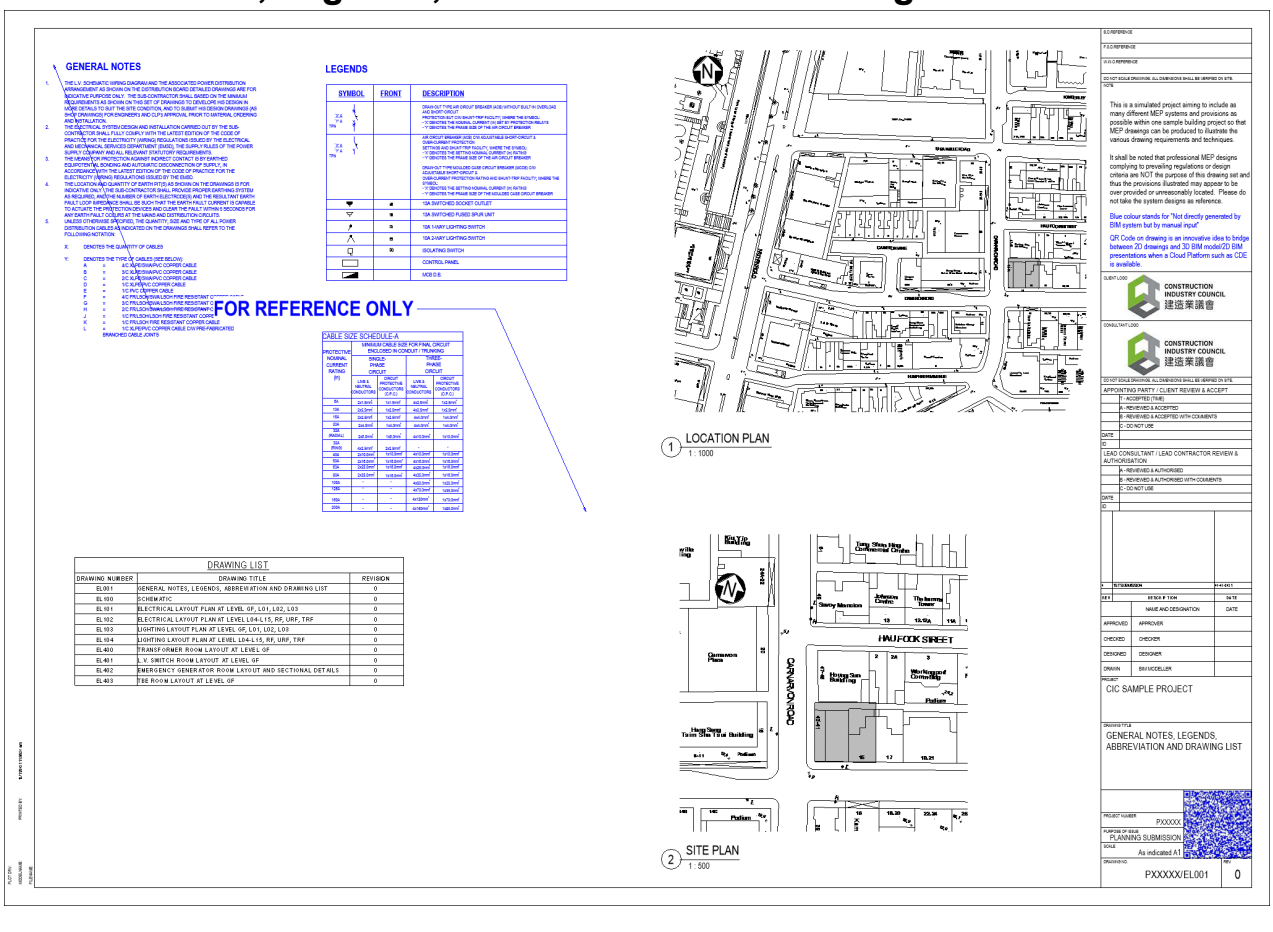
Installation Details (II)



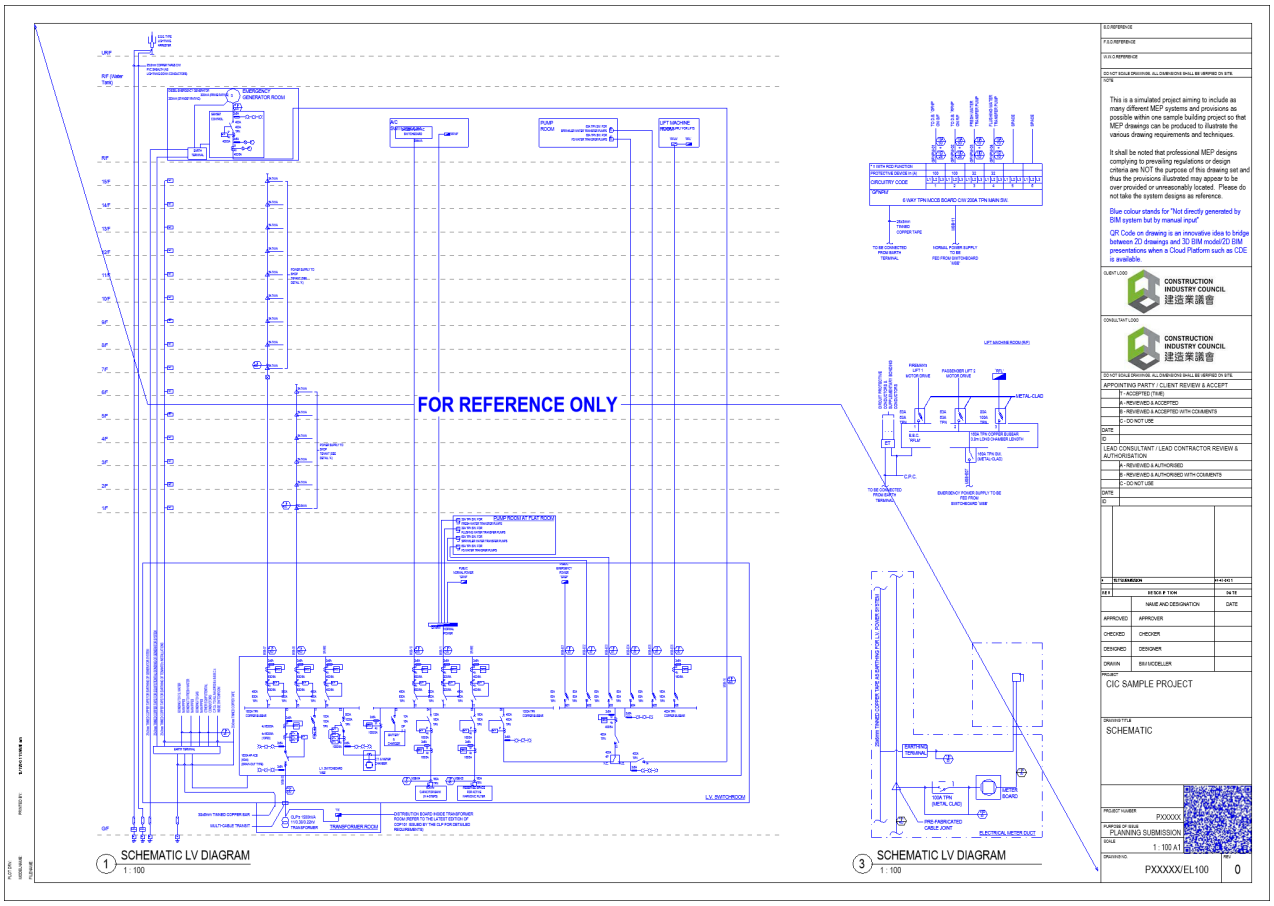
Installation Details (III)



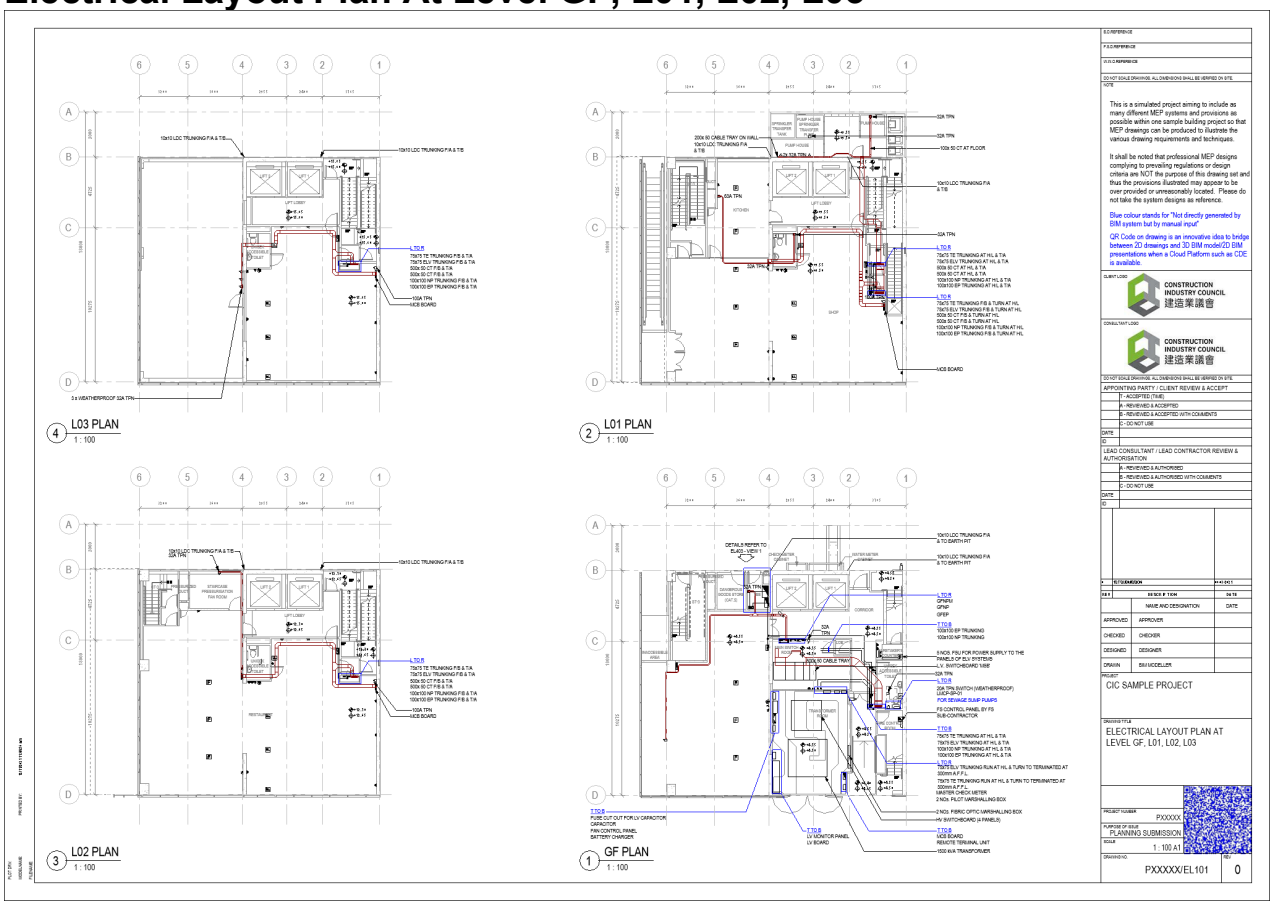
General Notes, Legends, Abbreviation and Drawing List



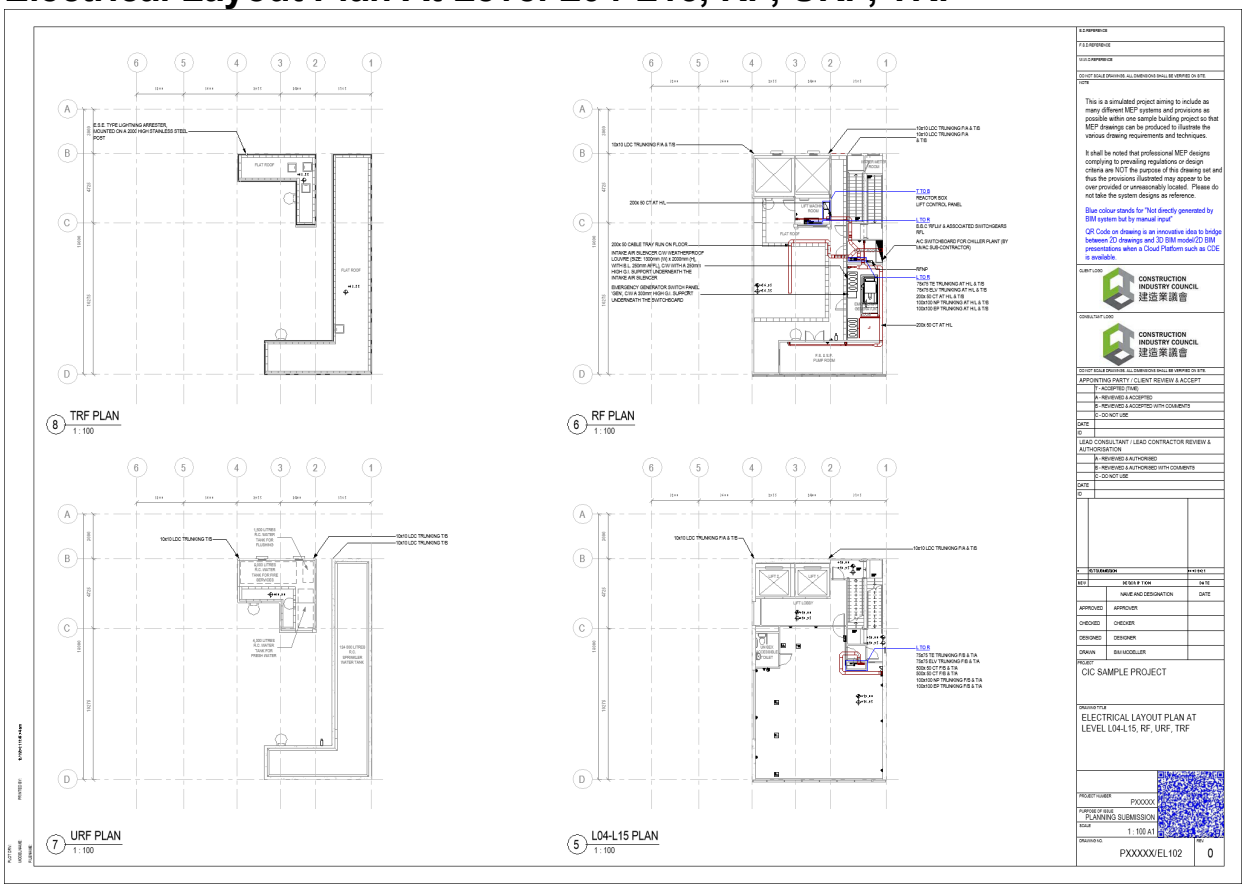
LV Schematic



Electrical Layout Plan At Level GF, L01, L02, L03



Electrical Layout Plan At Level L04-L15, RF, URF, TRF

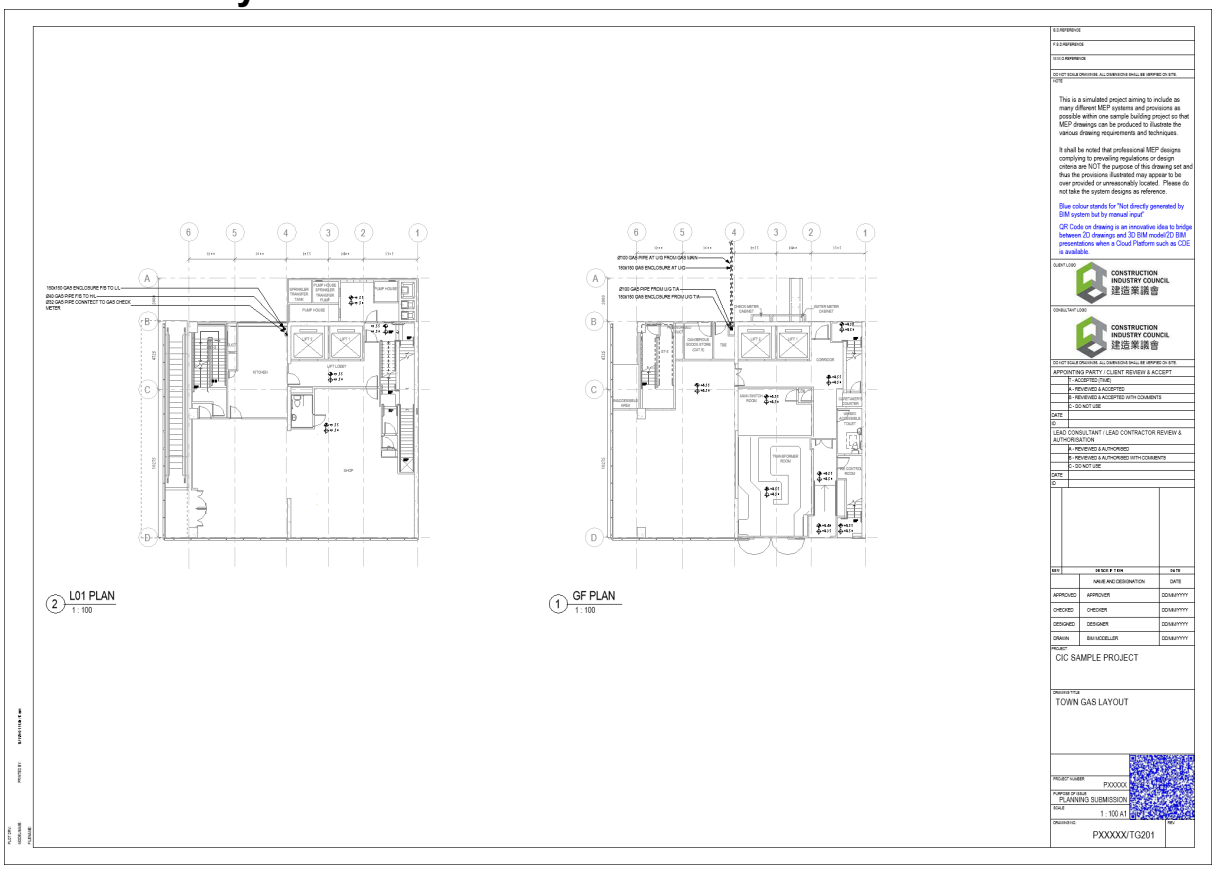


Lighting Layout Plan at Level GF, L01, L02, L03

Lighting Layout Plan at Level L04 - L15, RF, URF, TRF

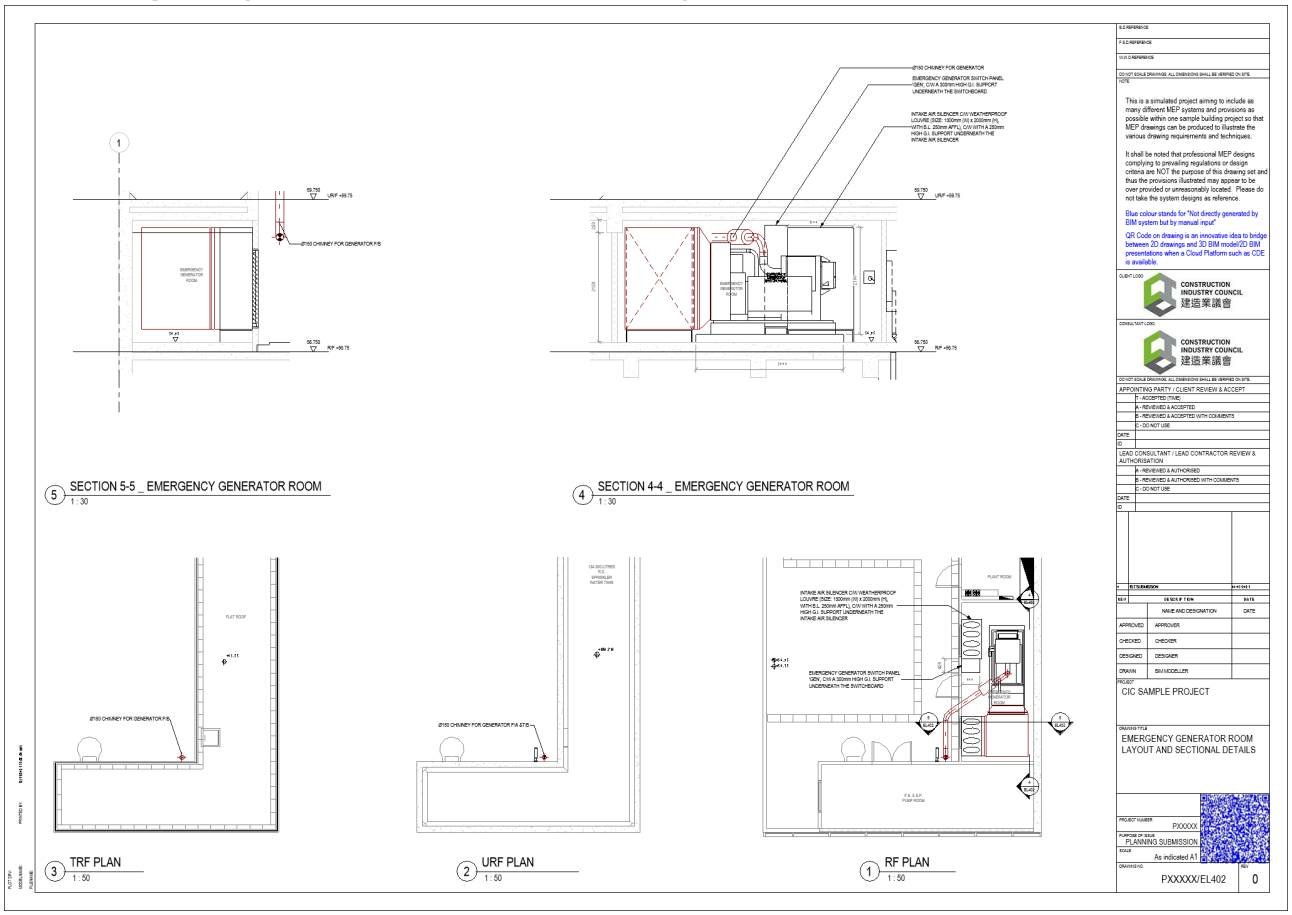
10.5 Application for Gas Installation

Town Gas Layout



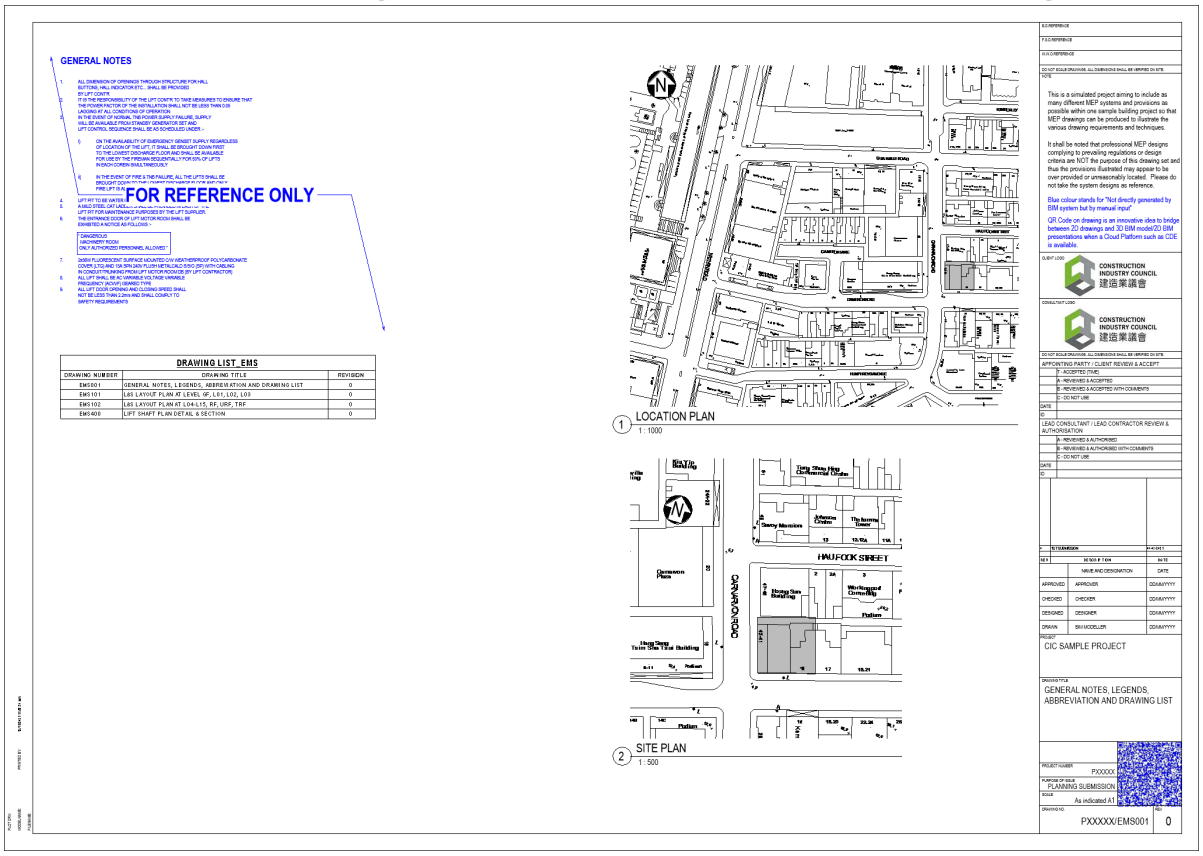
10.6 License for Generator

Memergency Generator Room Layout and Sectional Details



10.7 Lift & Escalator Inspection

General Notes, Legends, Abbreviation, and Drawing List



GENERAL NOTES

1. ALL DIMENSION OF OPENINGS THROUGH STRUCTURE FOR HALL SUTTING, HALL INDICATOR ETC., SHALL BE PROVIDED BY LIFT CONTR.
2. IT IS THE RESPONSIBILITY OF THE LIFT CONTR TO TAKE MEASURES TO ENSURE THAT THE POWER FACTOR OF THE INSTALLATION SHALL NOT BE LESS THAN 0.85 UNDER ALL CONDITIONS OF LOADING.
3. IN THE EVENT OF NORMAL THE POWER SUPPLY FAILURE, SUPPLY WILL BE AVAILABLE FROM STANDBY GENERATOR SET AND LIFT CONTROL SEQUENCE SHALL BE AS SCHEDULED UNDER :-
   i) ON THE AVAILABILITY OF EMERGENCY GENSET SUPPLY REGARDLESS OF LOCATION OF THE LIFT, IT SHALL BE BROUGHT DOWN FIRST FOR USE OF THE FIREMAN. SUBSEQUENTLY THE SUPPLY SHALL BE AVAILABLE FOR USE OF THE FIREMAN. RESIDENTIAL LIFTS FOR 50% OF LIFTS IN EACH CORE IN SHALL TIMED DUTY.
   ii) IN THE EVENT OF FIRE & THE FAILURE, ALL THE LIFTS SHALL BE BROUGHT DOWN TO THE LOWEST FIRE EXIT FLOOR AND PARKED IN OPEN CONDITION. THE LIFTS SHALL BE AVAILABLE FOR USE OF THE FIREMAN. RESIDENTIAL LIFTS FOR 50% OF LIFTS IN EACH CORE IN SHALL TIMED DUTY.
4. LIFT PIT TO BE WATER PROOFED.
5. A MILD STEEL CAT LADDER [illegible]
6. LIFT PIT FOR MAINTENANCE PURPOSES BY THE LIFT SUPPLIER.
7. THE ENTRANCE DOOR OF LIFT MOTOR ROOM SHALL BE EXHIBITED A NOTICE AS FOLLOWS :-

   DANGEROUS
   MACHINERY ROOM
   ONLY AUTHORIZED PERSONNEL ALLOWED

8. 2x36W FLUORESCENT SURFACE MOUNTED C/W WEATHERPROOF POLYCARBONATE DIFFUSER AND ELECTRONIC BALLAST IN METALLIC BOX (SP) WITH CABLING IN CONDUIT PLINGED FROM LIFT LOBBY PCB (SUPPLIED BY LIFT CONTRACTOR)
9. ALL LIFT SHALL BE VVC VARIABLE VOLTAGE VARIABLE FREQUENCY (ACH AVF) GEARED TYPE
10. ALL LIFT DOOR OPENING AND CLOSING SPEED SHALL NOT BE LESS THAN 0.2m/s AND SHALL COMPLY TO SAFETY REQUIREMENTS

FOR REFERENCE ONLY

DRAWING LIST_EMS

DRAWING NUMBER	DRAWING TITLE	REVISION
EMS001	GENERAL NOTES, LEGENDS, ABBREVIATION AND DRAWING LIST	0
EMS101	L&S LAYOUT PLAN AT LEVEL GF, L01, L02, L03	0
EMS102	L&S LAYOUT PLAN AT L04-L15, RF, URF, TRF	0
EMS400	LIFT SHAFT PLAN DETAIL & SECTION	0

1 LOCATION PLAN
1 : 1000

2 SITE PLAN
1 : 500

This is a simulated project aiming to include as many different MEP systems and provisions as possible within one sample building project so that MEP drawings can be produced to illustrate the various drawing requirements and techniques.

It shall be noted that professional MEP designs complying to prevailing regulations or design criteria are NOT the purpose of this drawing set and thus the provisions illustrated may appear to be over provided or unreasonably located. Please do not take the system designs as reference.

Blue colour stands for "Not directly generated by BIM system but by manual input"

QR Code on drawing is an innovative idea to bridge between 2D drawings and 3D BIM model/2D BIM presentations when a Cloud Platform such as CDE is available.

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

APPOINTING PARTY / CLIENT REVIEW & ACCEPT
F - ACCEPTED (TAIC)
A - REVIEWED & ACCEPTED
B - REVIEWED & ACCEPTED WITH COMMENTS
C - DO NOT USE

LEAD CONSULTANT / LEAD CONTRACTOR REVIEW & AUTHORISATION
A - REVIEWED & AUTHORISED
B - REVIEWED & AUTHORISED WITH COMMENTS
C - DO NOT USE

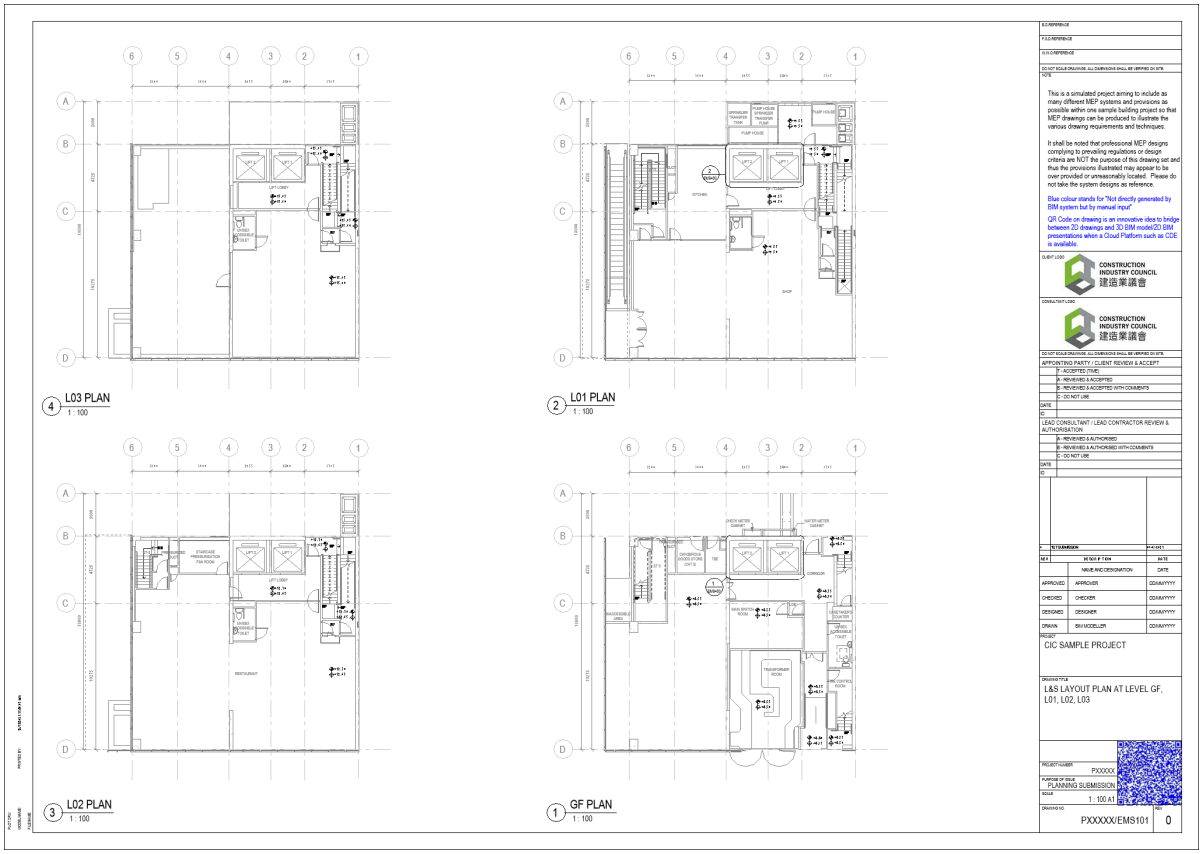
REV	REVISION	DATE
	NAME AND DESIGNATION	DATE
APPROVED	APPROVER	DD/MM/YYYY
CHECKED	CHECKER	DD/MM/YYYY
DESIGNED	DESIGNER	DD/MM/YYYY
DRAWN	BIM MODELLER	DD/MM/YYYY

PROJECT: CIC SAMPLE PROJECT

DRAWING TITLE: GENERAL NOTES, LEGENDS, ABBREVIATION AND DRAWING LIST

PROJECT NUMBER: PXXXXX
PURPOSE OF ISSUE: PLANNING SUBMISSION
SCALE: As indicated A1
DRAWING NO.: PXXXXX/EMS001 REV: 0

L&S Layout Plan at Level GF, L01, L02, L03



4 L03 PLAN
1 : 100

2 L01 PLAN
1 : 100

3 L02 PLAN
1 : 100

1 GF PLAN
1 : 100

This is a simulated project aiming to include as many different MEP systems and provisions as possible within one sample building project so that MEP drawings can be produced to illustrate the various drawing requirements and techniques.

It shall be noted that professional MEP designs complying to prevailing regulations or design criteria are NOT the purpose of this drawing set and thus the provisions illustrated may appear to be over provided or unreasonably located. Please do not take the system designs as reference.

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CONSTRUCTION INDUSTRY COUNCIL 建造業議會

APPOINTING PARTY / CLIENT REVIEW & ACCEPT
F - ACCEPTED (TAIC)
A - REVIEWED & ACCEPTED
B - REVIEWED & ACCEPTED WITH COMMENTS
C - DO NOT USE

LEAD CONSULTANT / LEAD CONTRACTOR REVIEW & AUTHORISATION
A - REVIEWED & AUTHORISED
B - REVIEWED & AUTHORISED WITH COMMENTS
C - DO NOT USE

REV	REVISION	DATE
	NAME AND DESIGNATION	DATE
APPROVED	APPROVER	DD/MM/YYYY
CHECKED	CHECKER	DD/MM/YYYY
DESIGNED	DESIGNER	DD/MM/YYYY
DRAWN	BIM MODELLER	DD/MM/YYYY

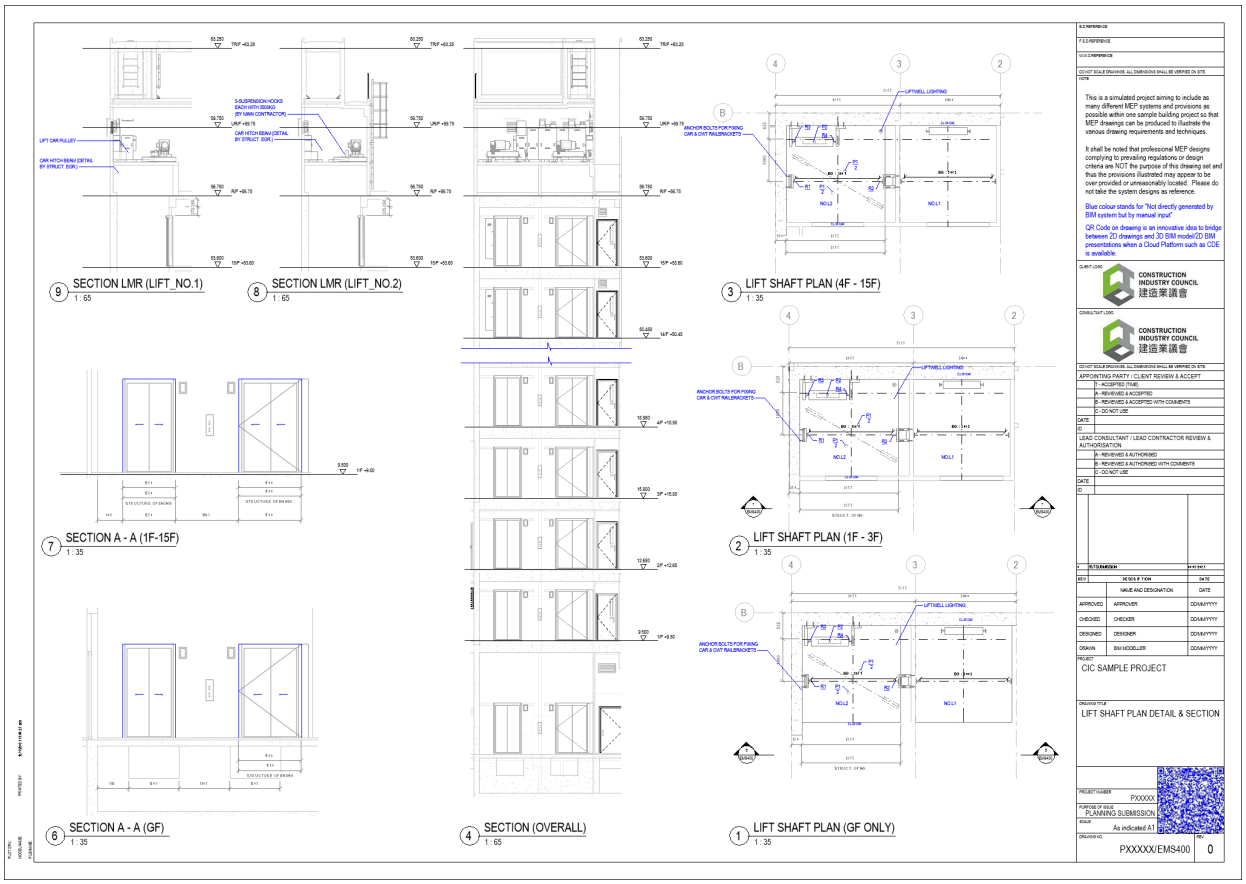
PROJECT: CIC SAMPLE PROJECT

DRAWING TITLE: L&S LAYOUT PLAN AT LEVEL GF, L01, L02, L03

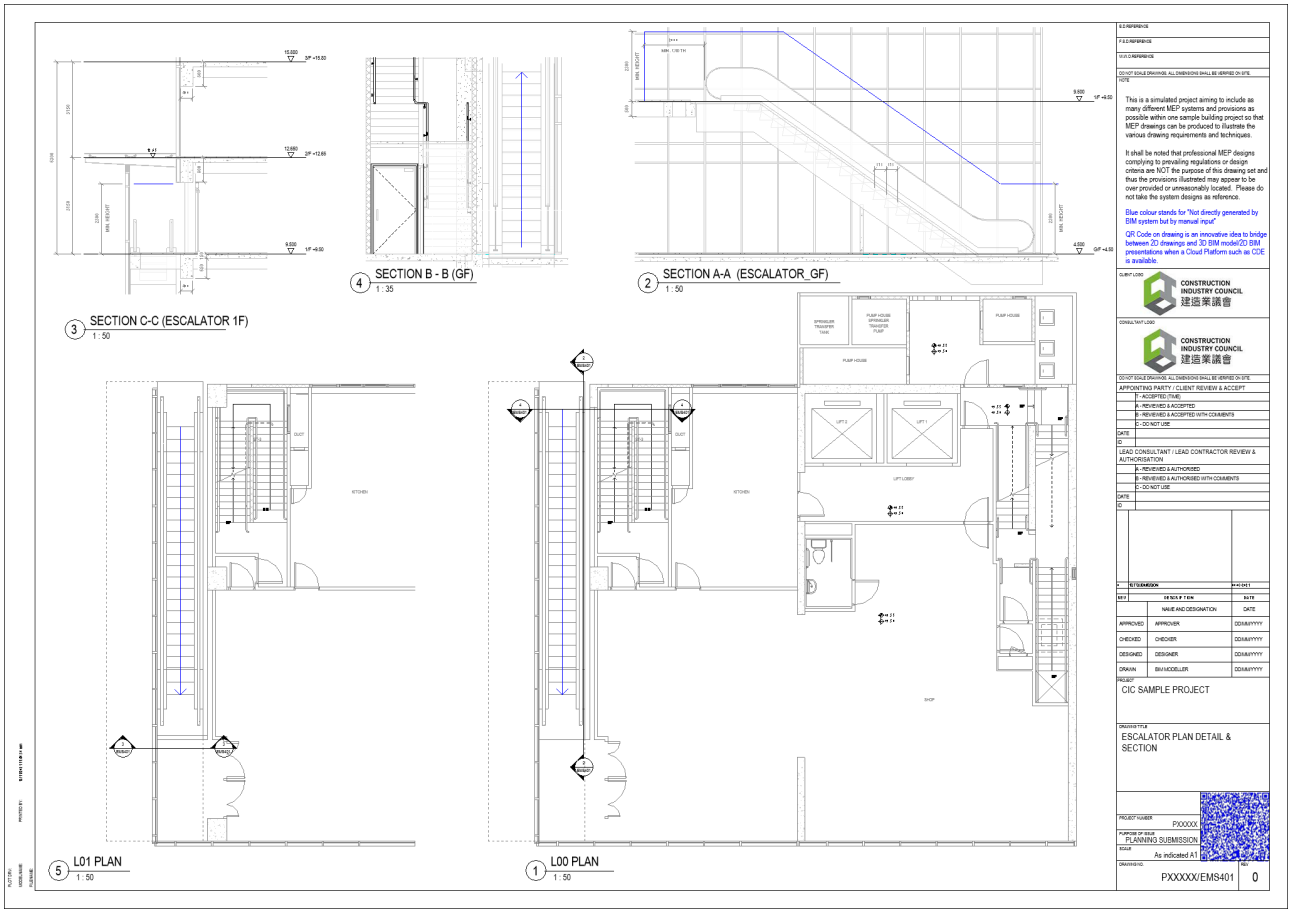
PROJECT NUMBER: PXXXXX
PURPOSE OF ISSUE: PLANNING SUBMISSION
SCALE: 1 : 100 A1
DRAWING NO.: PXXXXX/EMS101 REV: 0

L&S Layout Plan at Level L04-L15, RF, URF, TRF

Lift Shaft Plan Detail & Section

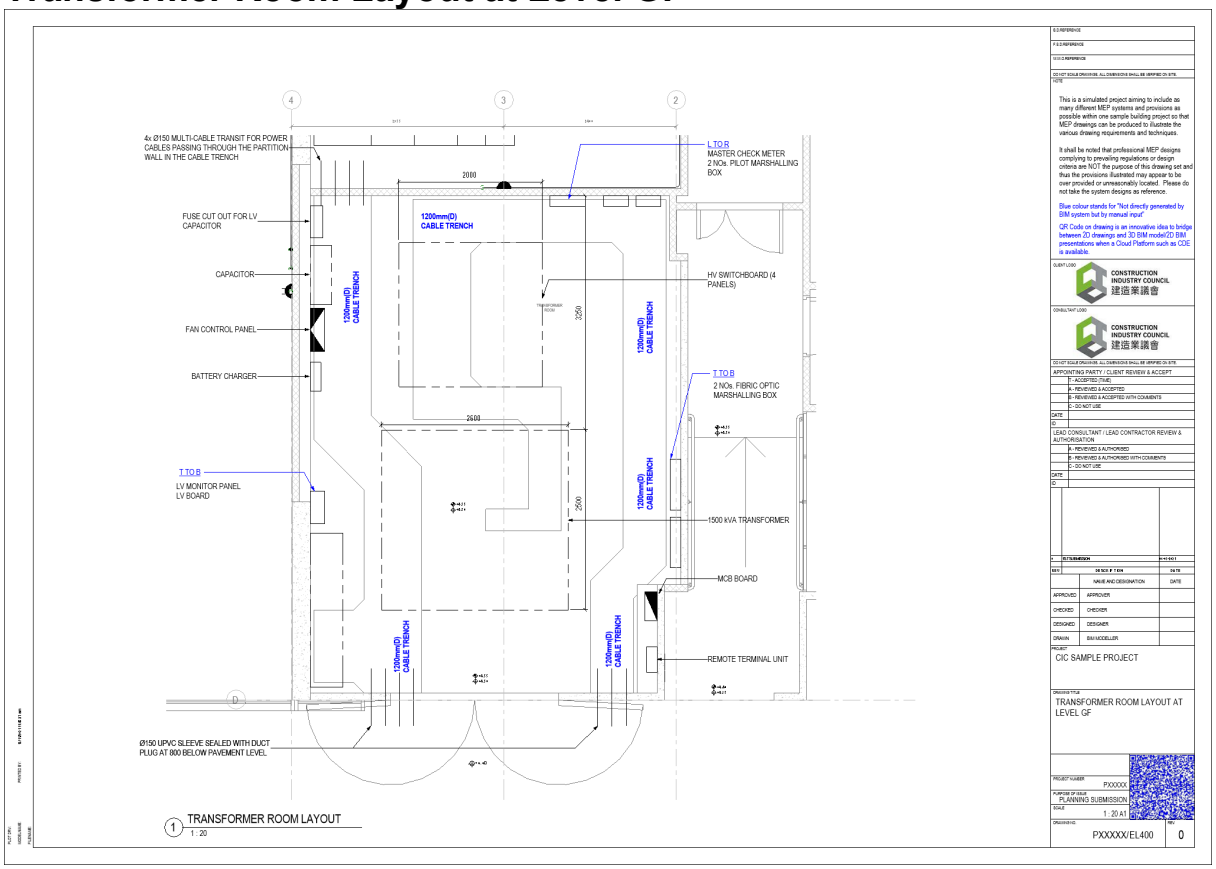


Escalator Plan Detail & Section

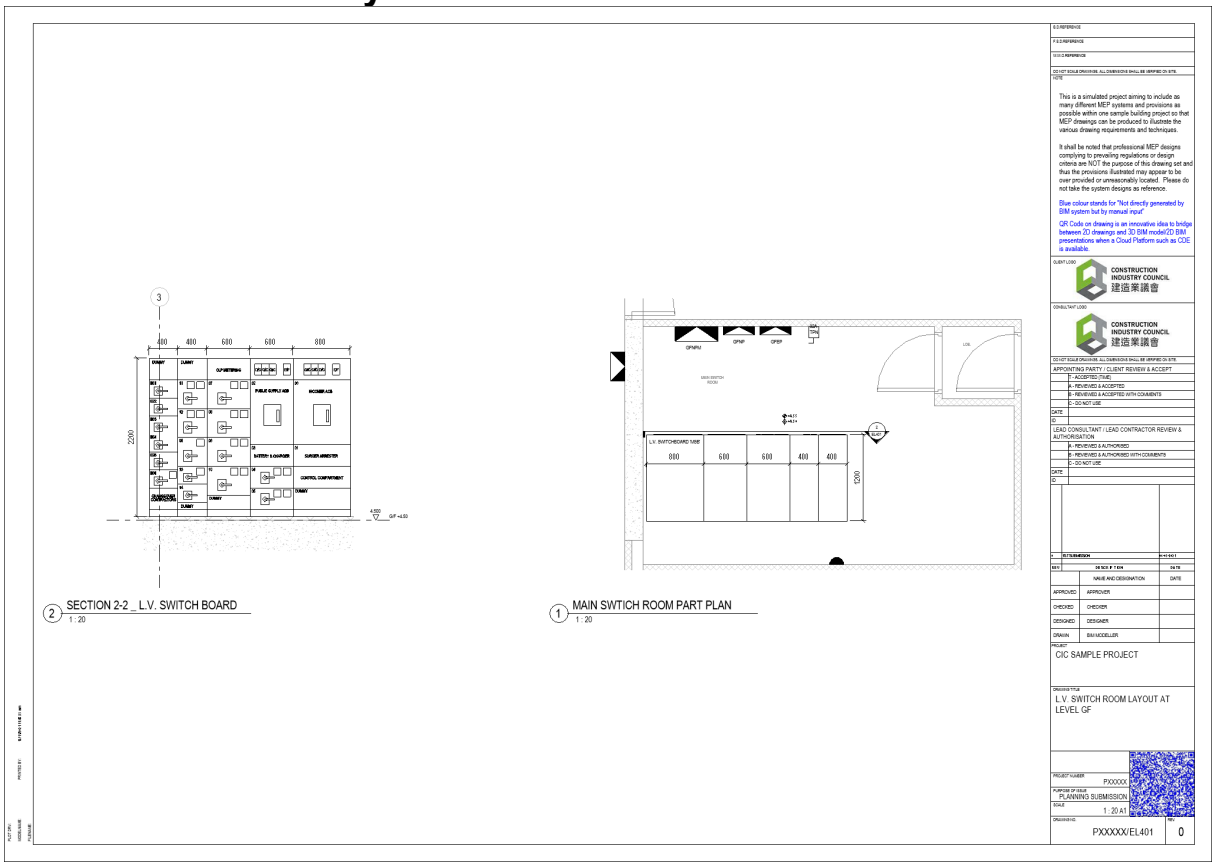


10.8 Transformer Room / LV Switch Room Inspection

Transformer Room Layout at Level GF

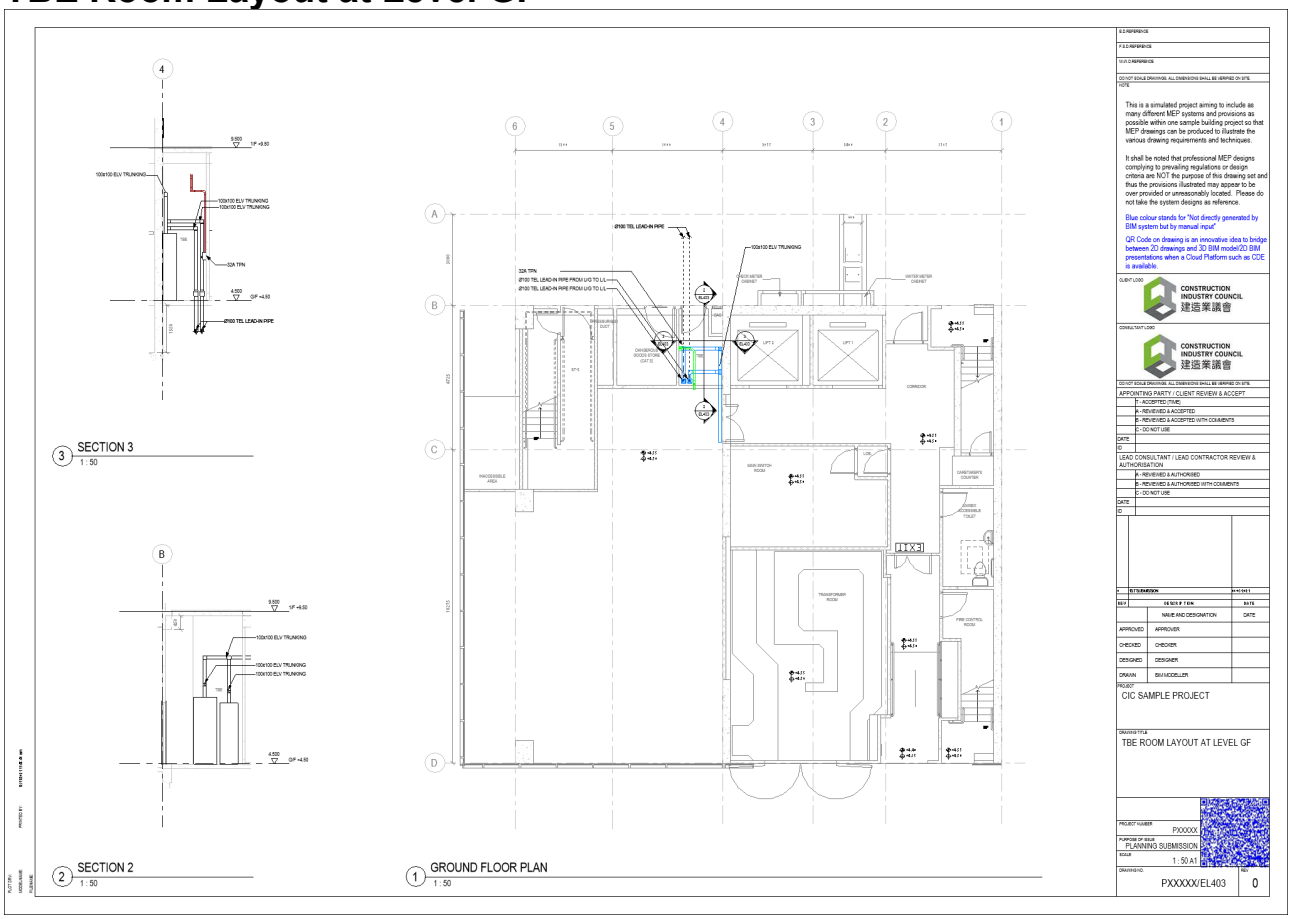


L.V Switch Room Layout at Level GF



10.9 Telecommunication

TBE Room Layout at Level GF

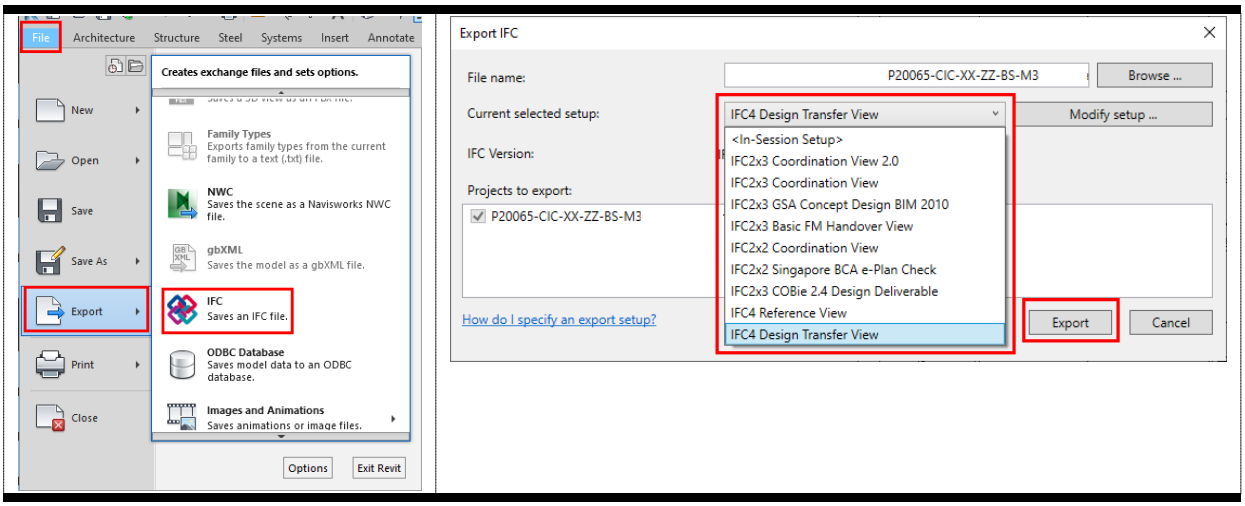


11 Exporting Models as Deliverables

11.1 Exporting 3D models as Industry Foundation Classes (IFC)

Users can export the Revit model to IFC format. The IFC file format is a platform-neutral format used to allow interoperability between industry BIM programs.

Click “File” ➜ click “Export” ➜ select “IFC” ➜ define the file name and IFC version ➜ “Export’

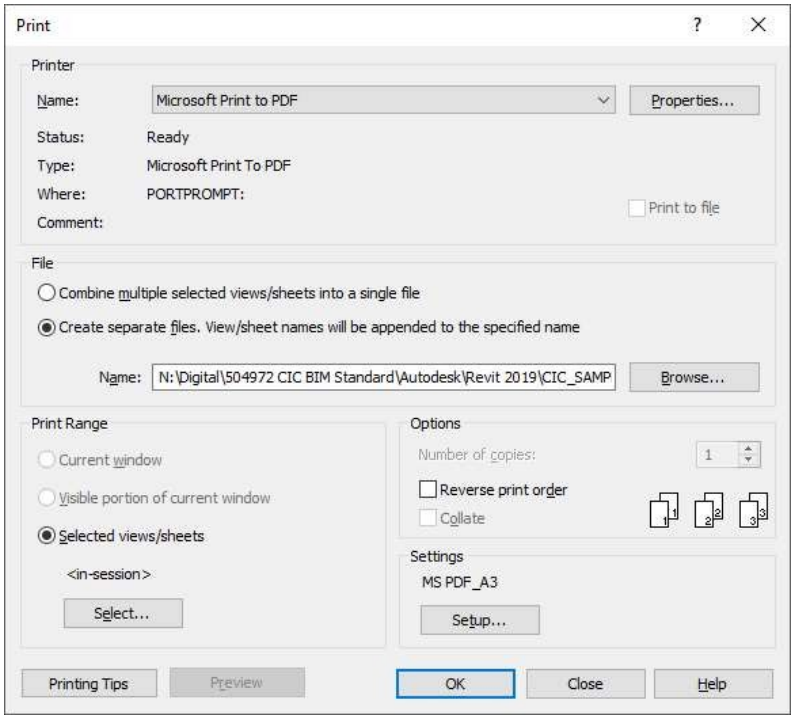


Details refer to Revit IFC Manual – Detailed instructions for handling IFC files (Autodesk Inc., 2018)

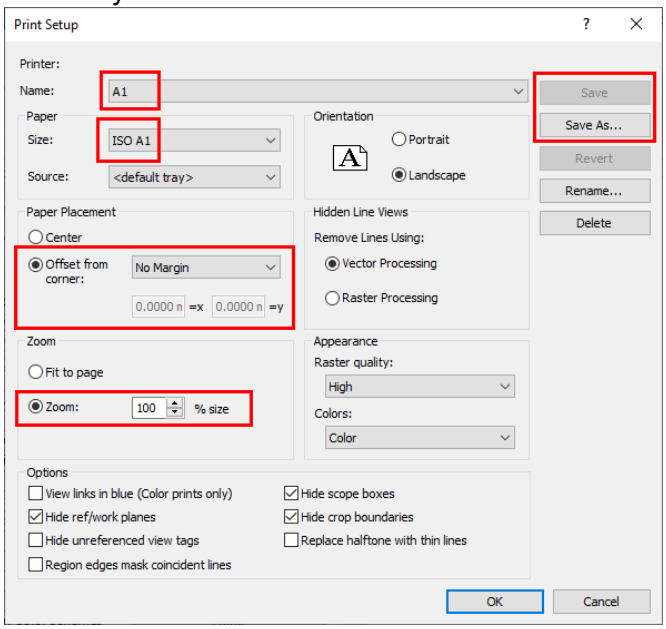
11.2 Exporting 2D models as PDF

Publishing to 2D can create either a single view or a whole collection of interconnected views and sheets packaged as one file.

Click “File” ➜ click “Print” ➜ define “Printer”, “Properties”, “File Location”, “Print Range” and “Settings” ➜ click “OK” to publish PDF.



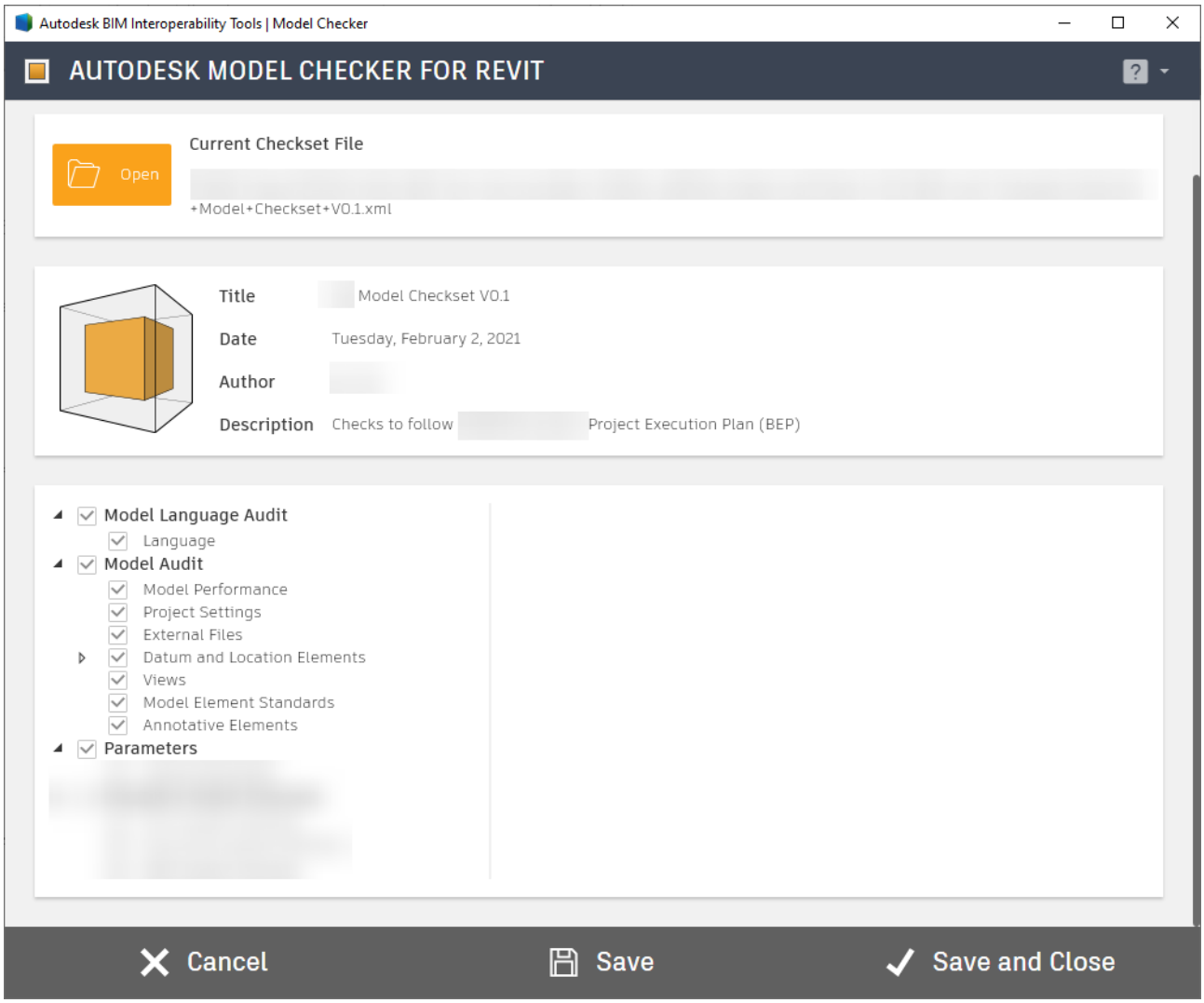
It is recommended to pre-set print setup for several sizes to standardise and enhance the efficiency.



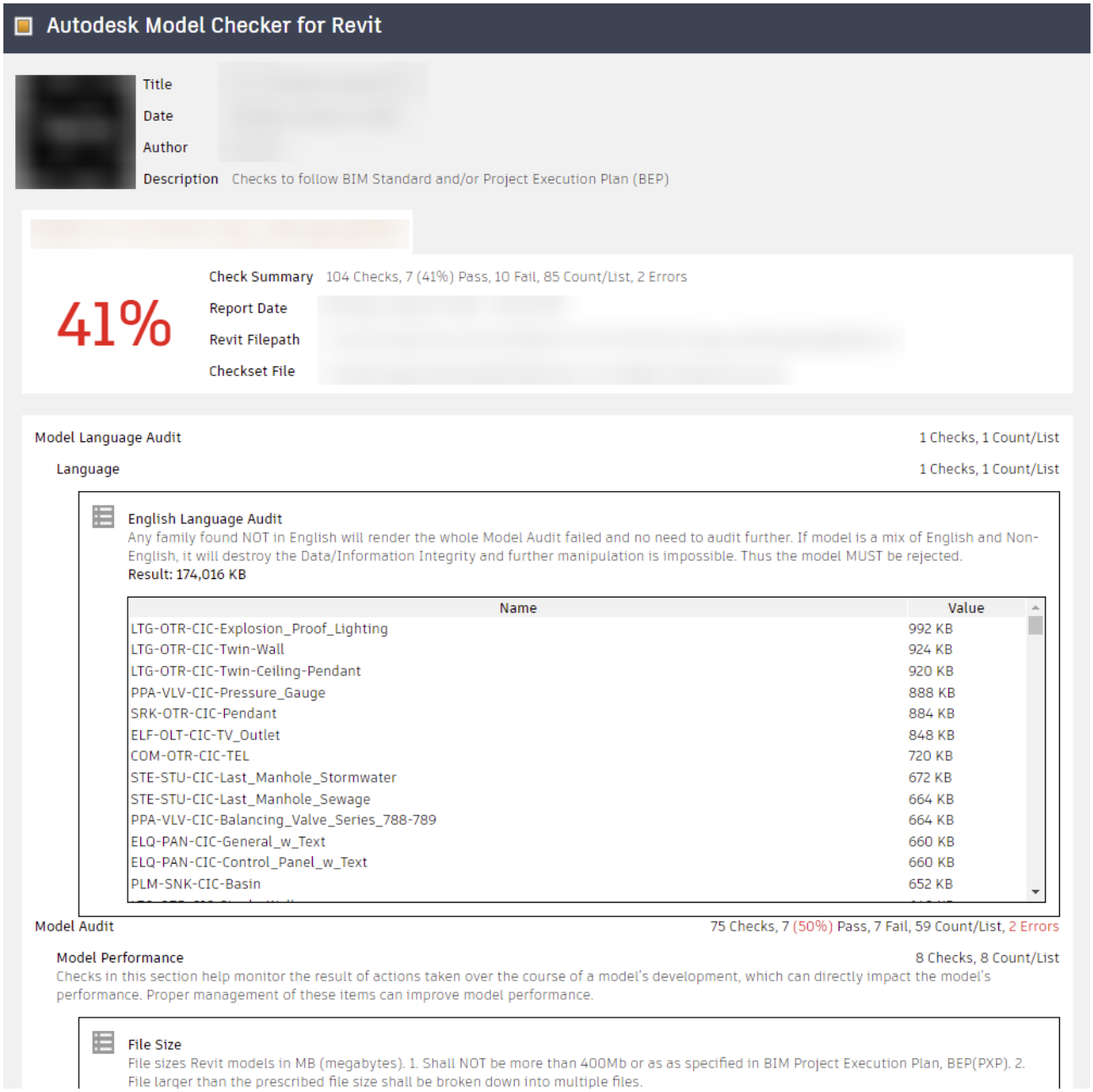
12 BIM Auditing

All models and deliverables shall be audited regularly and before each submission.

An Autodesk Plugin, namely “BIM Interoperability Tools for Revit” could facilitate part of the BIM Auditing checking. Some auto data retrieval rules can be pre-set through the Autodesk Model Checker.



Report can be generated for the selected models according to the listed checking items.



Autodesk Model Checker for Revit

Title
Date
Author
Description Checks to follow BIM Standard and/or Project Execution Plan (BEP)

41%

Check Summary 104 Checks, 7 (41%) Pass, 10 Fail, 85 Count/List, 2 Errors
Report Date
Revit Filepath
Checkset File

Model Language Audit 1 Checks, 1 Count/List

Language 1 Checks, 1 Count/List

English Language Audit
Any family found NOT in English will render the whole Model Audit failed and no need to audit further. If model is a mix of English and Non-English, it will destroy the Data/Information Integrity and further manipulation is impossible. Thus the model MUST be rejected.
Result: 174,016 KB

Name	Value
LTG-OTR-CIC-Explosion_Proof_Lighting	992 KB
LTG-OTR-CIC-Twin-Wall	924 KB
LTG-OTR-CIC-Twin-Ceiling-Pendant	920 KB
PPA-VLV-CIC-Pressure_Gauge	888 KB
SRK-OTR-CIC-Pendant	884 KB
ELF-OLT-CIC-TV_Outlet	848 KB
COM-OTR-CIC-TEL	720 KB
STE-STU-CIC-Last_Manhole_Stormwater	672 KB
STE-STU-CIC-Last_Manhole_Sewage	664 KB
PPA-VLV-CIC-Balancing_Valve_Series_788-789	664 KB
ELQ-PAN-CIC-General_w_Text	660 KB
ELQ-PAN-CIC-Control_Panel_w_Text	660 KB
PLM-SNK-CIC-Basin	652 KB

Model Audit 75 Checks, 7 (50%) Pass, 7 Fail, 59 Count/List, 2 Errors

Model Performance 8 Checks, 8 Count/List
Checks in this section help monitor the result of actions taken over the course of a model's development, which can directly impact the model's performance. Proper management of these items can improve model performance.

File Size
File sizes Revit models in MB (megabytes). 1. Shall NOT be more than 400Mb or as as specified in BIM Project Execution Plan, BEP(PXP). 2. File larger than the prescribed file size shall be broken down into multiple files.

13 Reference

1. Revit IFC Manual – Detailed instructions for handling IFC files (Autodesk Inc., 2018)

Feedback Form

CIC User Guide for using BIM in Generation of MEP Digital Drawings for Statutory Submissions – Revit

To improve future editions of this publication, we would be grateful to have your comments.

(Please put a "✓" in the appropriate box.)

1. **As a whole, I feel that the publication is:**	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Informative	❑	❑	❑	❑	❑
Comprehensive	❑	❑	❑	❑	❑
Useful	❑	❑	❑	❑	❑
Practical	❑	❑	❑	❑	❑
2. **Does the publication enable you to understand more about the subject?**	Yes		No		No Comment
	❑		❑		❑
3. **Have you made reference to the publication in your work?**	Quite Often		Sometimes		Never
	❑		❑		❑
4. **To what extent the publication benefits you?**	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Supply chain Information/data integrity	❑	❑	❑	❑	❑
Work efficiency	❑	❑	❑	❑	❑
Project Collaborations	❑	❑	❑	❑	❑
5. **Overall, how would you rate our publication?**	Excellent	Very Good	Satisfactory	Fair	Poor
	❑	❑	❑	❑	❑
6. **Other comments and suggestions, please specify (use separate sheets if necessary).**					

Personal Particulars (optional):*

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