Certificate in Building Information Modelling (BIM) - Asset Management for EMSD Projects

11 Overview of Families

CONTENT

Introduction

- Family in Revit is a group of components that shares a set of common properties, parameters, and graphical representation.
- Components in a family can have different values for each property and parameter.
- Various components in architecture, structure, and MEP can be made as families. It is similar to ‘block’ in AutoCAD that these two are preset symbol for certain components.
- The differences are that families are objects with properties and generally drawn in 3 dimensional way. Given parameters allow users to adjust detail features of each component.

- Generally, Revit elements have ‘Family Category > Family > Type > Instance’ hierarchy. For a window family, the structure is ‘Windows > Casement Windows > 0610 x 1220mm’.
- Categories control the overall organization, visibility, graphical representations, and scheduling options of Families within a project.
- Families serve to represent a discrete building or documentation elements in a project. It defines parametric, graphical, and documentation requirements.
- Types are defined by distinct parametric, graphical, and documentation characteristics which makes it unique from other types in a family.
- An Instance is an individual representation of a type. There are 3 kinds of families in Revit.

11.1 System Families

- System families are very basic components in architectural, structural, and MEP representation. They can be created in a project with basic functions.
- In Revit MEP, pipes, ducts, cable trays, and conduits are system families.
- The shape (more specifically, the section profile) of these families cannot be changed, but the dimensions can be controlled.
- They cannot be loaded, but they can host some of ‘loadable families’.
- They are stored within a project and pre-set and can be transferred to another project using Transfer Project Standards.

11.2 Component Families

- Standard component families can be created and edited in the family editor.
- Loadable families include diffusers, dampers, valves, tags, and so on. They are saved in separate files in ".rfa" files (not in project file with '.rvt' extension) and they can be loaded to projects for the use.
- Some of their parameter values are referred from lookup tables, type catalogues

11.3 In-Place Families

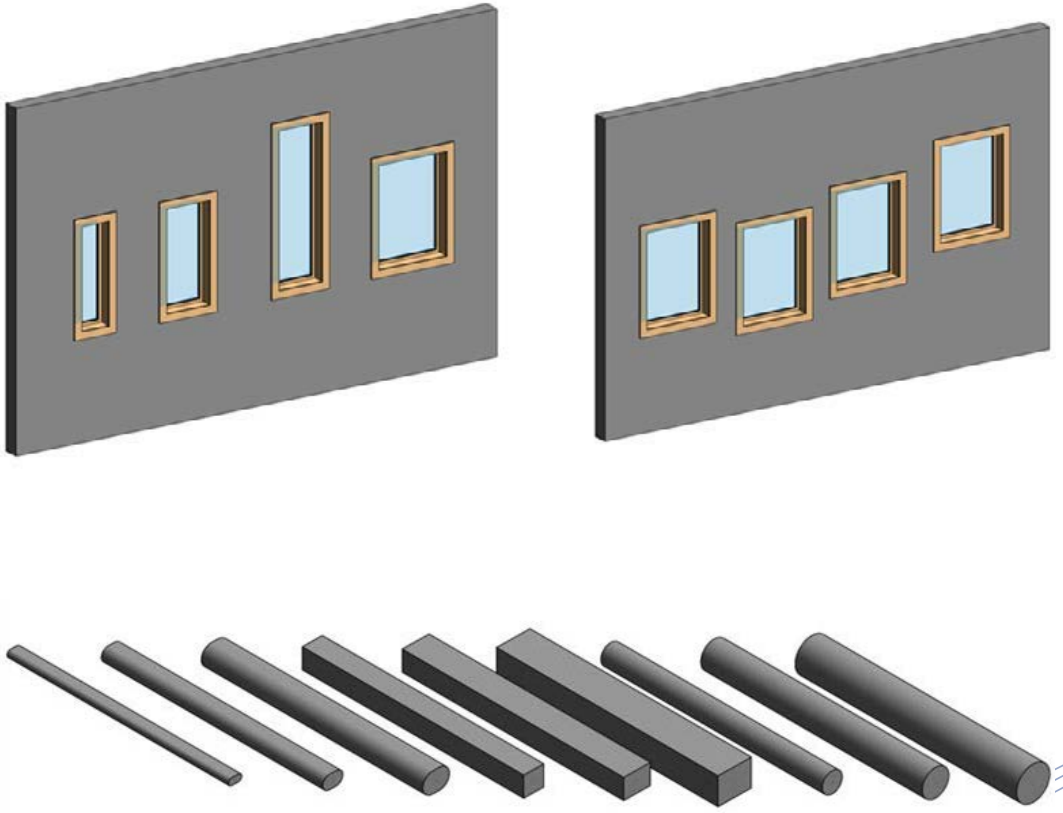
- In-place families are project specific families with custom shapes and parameters.
- In one project, multiple in-place families can be used and each of them can be copied.
- Unlike system family or loadable family, multiple types cannot be created. They are also transferable to other projects.

MEP base component Family:

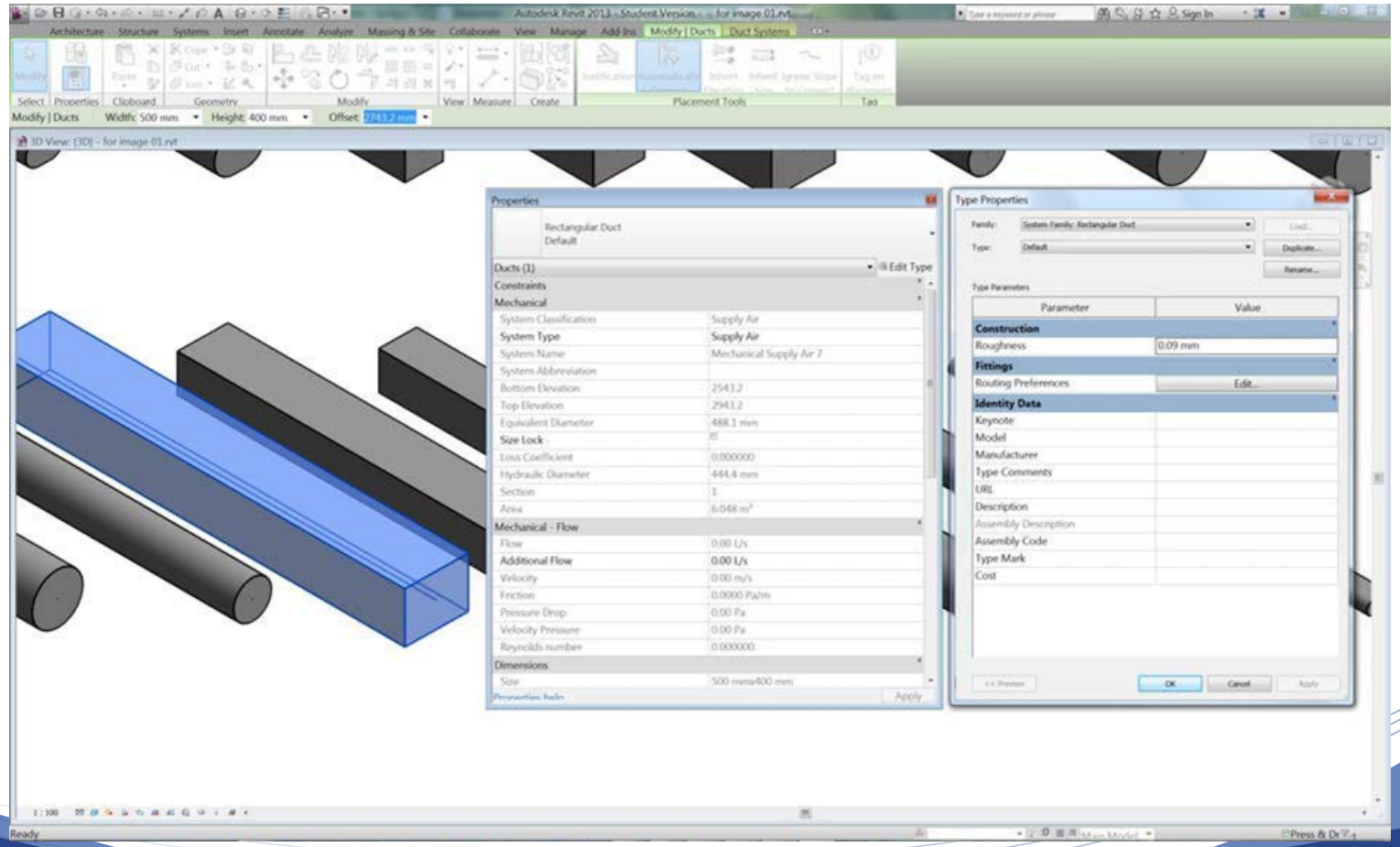
- Loadable MEP components fall into general categories (pipe fittings, lighting fixtures, sprinklers, and so on).
- The family category specified when a family is created determines which family parameters are activated. The settings for these family parameters affect the behavior for the part and identifies the type of component.
- In the Family Editor, the Family Category and Parameters settings are found in the Settings menu. Depending on the family category and the type of template that the family was derived from (host-based, generic model, detail component, generic tag, and so on), different family parameters apply.

Family Types:

- Family types are included in system families and loadable families. Objects under the same type share type parameters and properties. Family instances are individual objects under a certain type in a family. Instances have instance parameters and properties. The image shows various types of ‘Casement Windows’ and objects under ‘0915 x 1200mm’ type with different 'Sill Height' instance parameter value.



- From ‘Type Properties’, Type parameters can be found, and from ‘Properties’ palette, the parameter of each family instance can be controlled.
- The image is ‘0915 x 1220mm’ type properties and instance Properties of a window object.



Parameters:

- In Revit, parameters are values that control the geometry or properties of model components.
- In a model component, relationships between parameters are defined that users can easily have desired results by changing parameters.
- For successful implementation of Revit in a project, it is very important to understand how parameters behave. In Revit, there are 4 kinds of parameters.

Family Parameters:

- Family parameters control properties and graphical representations of families. They can be added and edited only in the family editor. In the project editor, parameter values can be changed.

Project Parameters:

This type of parameters is used in a project file. It is mainly used for schedules, i.e., to add new field to schedules or calculations in schedule.

Shared Parameters:

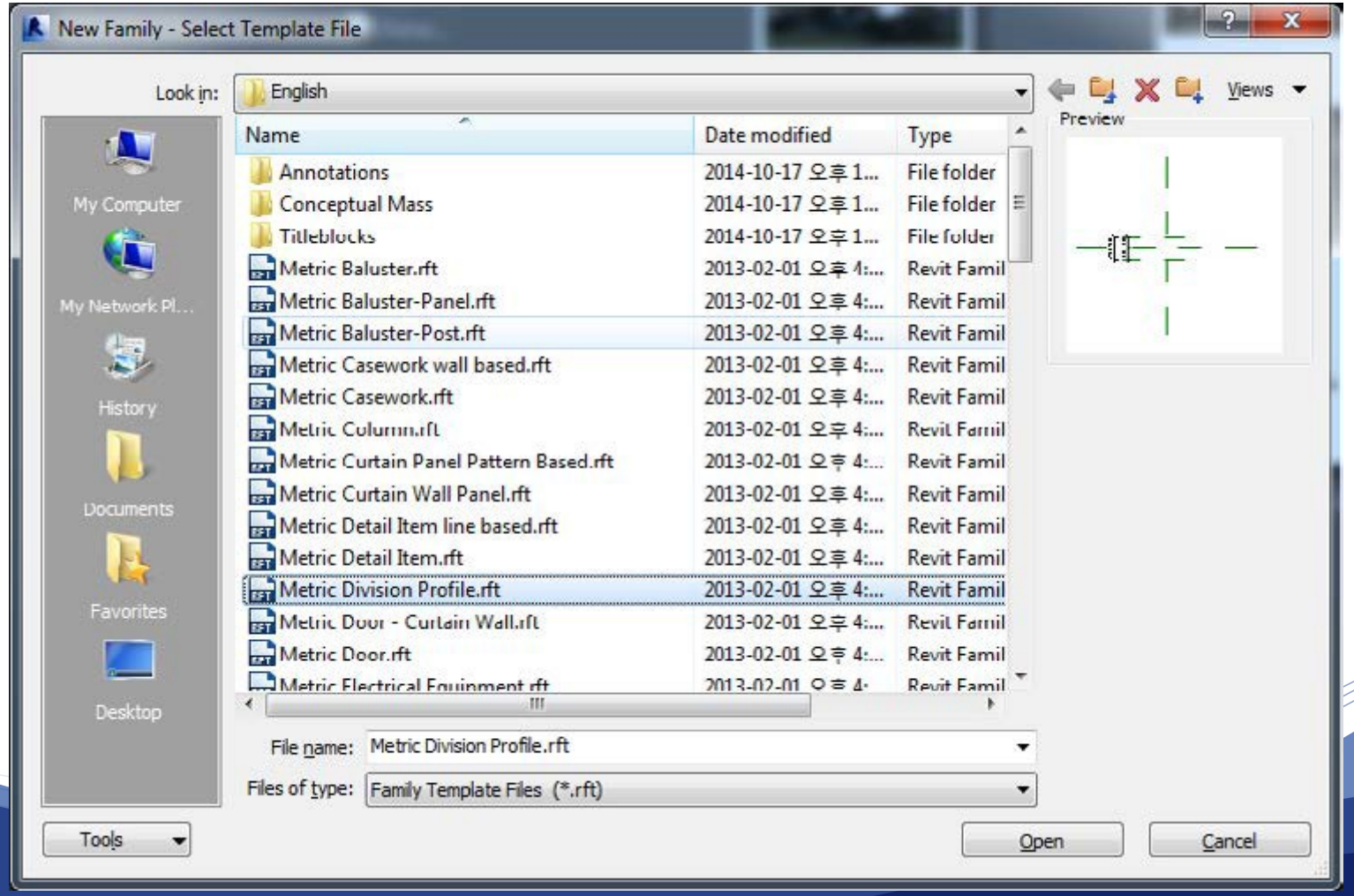
- Shared parameters can be used in families, projects, tags, filters, and schedules. They are applicable to all kinds of categories. Add own parameters that are not provided by family templates or project templates. They are stored in separate text files and loadable from other projects or families.

System Parameters:

- System parameters are defined inside of every family. Most of them can be used for schedules and Tags.

Family Templates:

- Family templates are preset canvas for family creation. They define how the family objects behave. To create a loadable family, template is essentially required.



Family Templates:

- Family templates are preset canvas for family creation. They define how the family objects behave. To create a loadable family, template is essentially required.

Major family templates	
Wall-based Template	Template for wall mounted family objects. With 'opening' component, doors and windows can be created. In Revit MEP, lightings and fire alarm families use this kind of template.
Ceiling-based Template	Template for ceiling mounted family objects. This can be used to create ceiling mounted lightings, sprinklers, and diffusers.
Floor-based template	Template for floor mounted family object. In Revit MEP, heating register families can be created with 'opening' component.
Roof-based Template	Template for roof mounted family objects.
Standalone Template	Template for standalone family objects. The family objects do not require host, they can be placed anywhere in a project model. (e. g., furniture, duct fittings)
Line-based Template	Template for family objects along lines
Face-based Template	For reference plane mounted family objects. The host of the family objects is changeable and could be placed in any kind of faces.

Reference plane:

- Understanding the concept of reference plane is fundamental in creation of Revit family and parametric frameworks. It is very important for users to understand how it works to implement Revit it a successful way. It is basically guide plane that the model object can refer to in order to establish parametric frames works for family objects. There are 3 main use of reference plane.
- Users can draw base sketches on it to create extrusions and other ‘formworks’ in Revit.

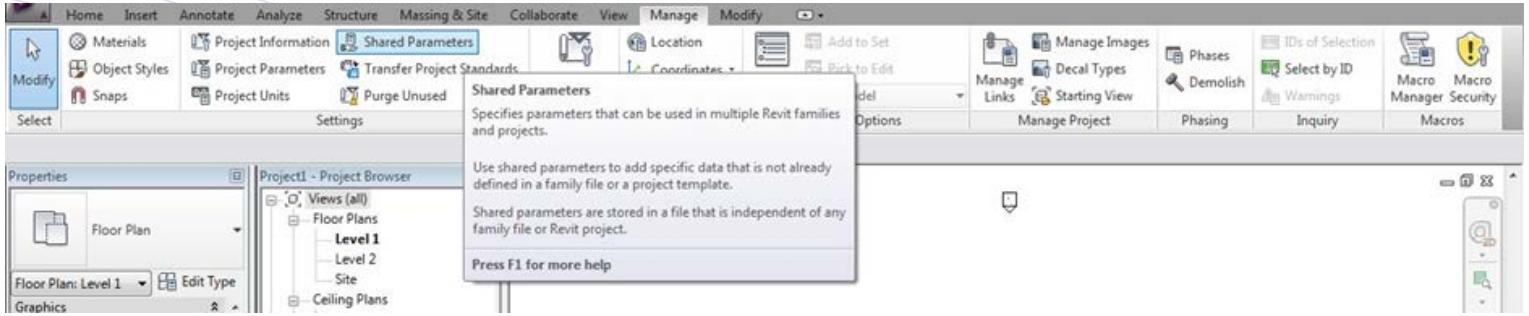
- Faces of models can be aligned to reference planes to create constraints.
- In between reference planes, parametric dimensions can be added to create parametric framework of a model.
- While creating parameters and constrains, test the model as many as possible. This will make sure creating parameters and constraints as intended, It is also helpful to use least number of views for constrains for the future edit & use of the model.

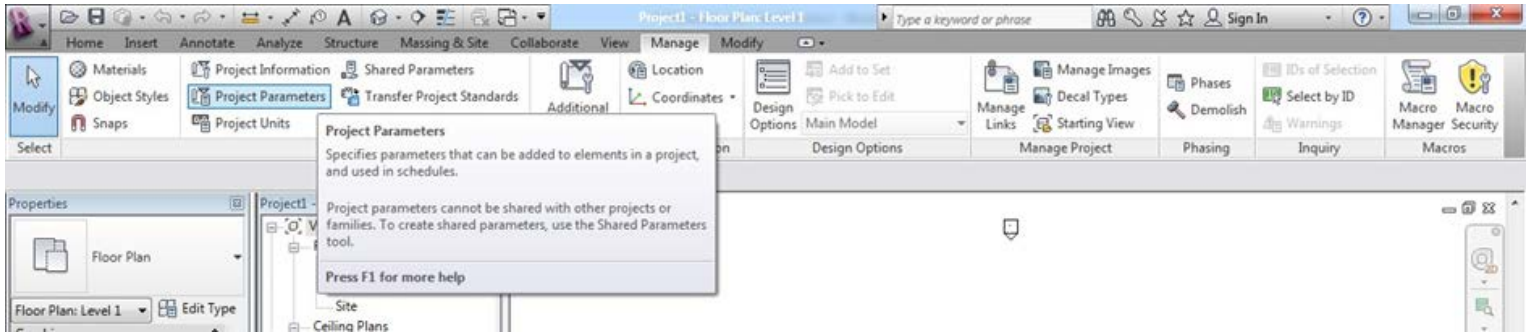
11.4 Shared Project Parameters

Shared Parameters:

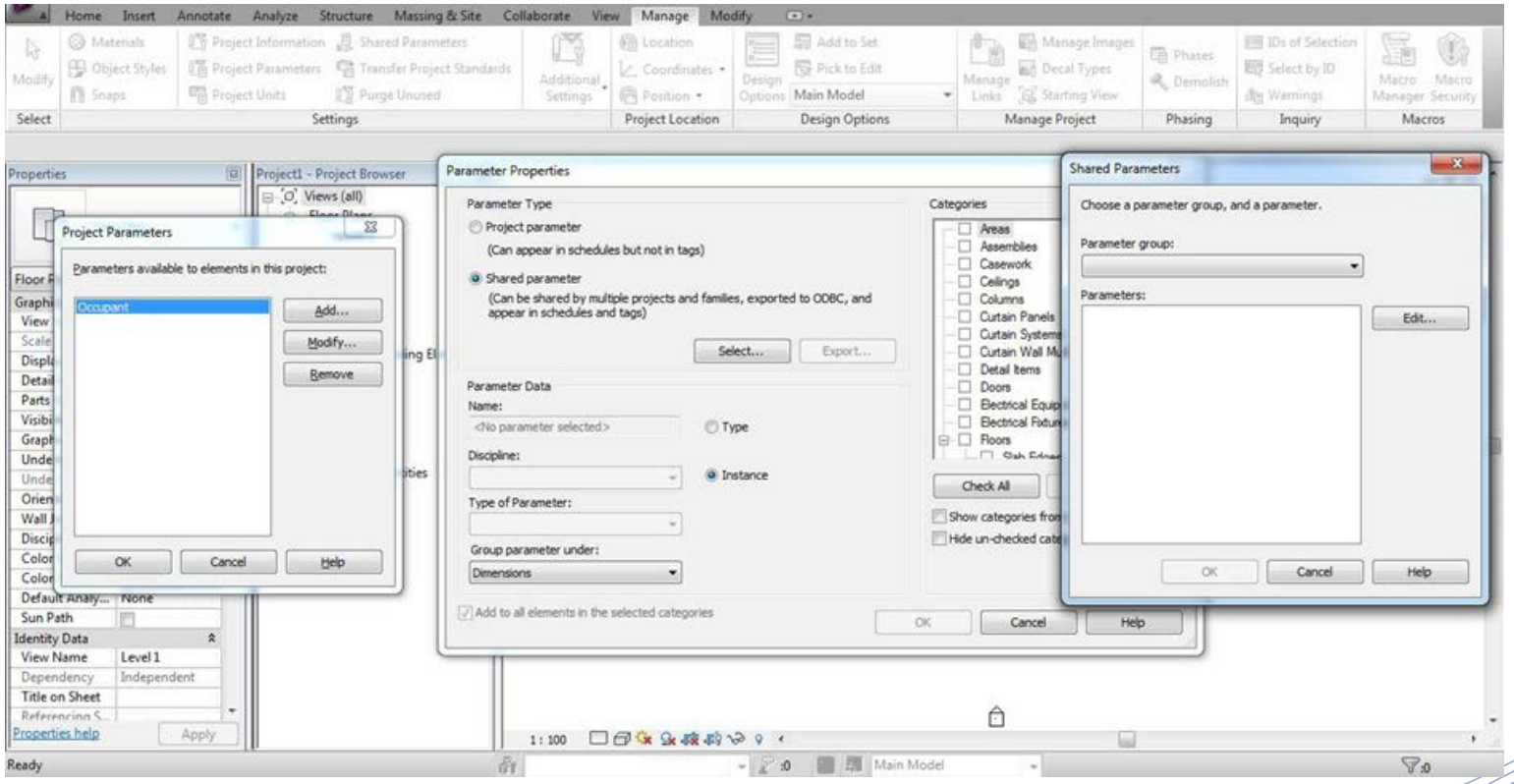
- Shared Parameters are list of parameters that users can add to families or project. The file is stored in separate files in ‘txt’ format and this allow users to load it from other projects. With shared parameters, users can define parameters that are not defined by ‘project template’ or ‘family template’.
- Shared parameter is useful when users want to create schedules with multiple family categories. This is called multi-category schedule. To use parameter information in a tag, the parameter has to be a shared parameter.

- Create or load shared parameters from ‘Edit Shared Parameters (‘Manage > Settings > Shared Parameters’)’ window.
- From the window, save ‘parameter groups’ and ‘parameters’ in a separate txt files. Once create or edit a shared parameters file, you can add or edit the Parameter Group. Also add shared parameters from ‘Manage > Settings > Project Parameters’





- From ‘Project Parameters’ window, click ‘Add…’, set the ‘Parameter Type’ option to ‘Shared parameter’ and click ‘Select, then choose one from ‘Parameters:’.



11.5 EMSD Asset data Template (ADT) & GUID file

- Appendix B - Asset Information Requirement v2.0.zip

BIM-AM Standards and Guidelines Version 2.0

BIM-AM Standards and Guidelines Version 2.0
>> EMSD BIM-AM Standards and Guidelines v2.0.pdf [PDF format]

Appendix A - Building Code
>> Appendix A - Building Code v2.0.xlsx [Spreadsheet format]

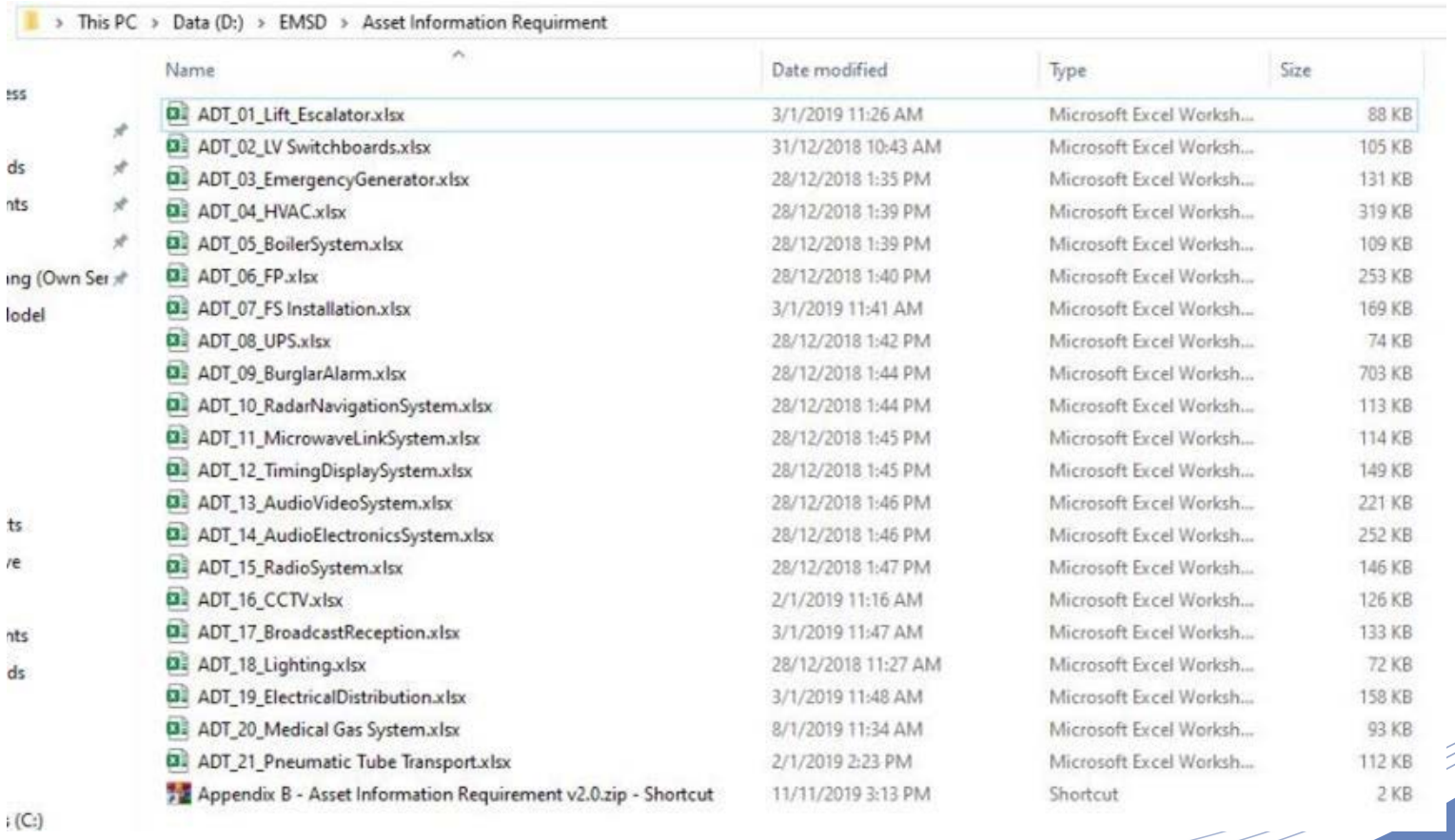
Appendix B - Asset Information Requirement
>> Appendix B - Asset Information Requirement v2.0.zip [ZIP format]

Appendix C - Asset Information Input Tool (AIIT) User Manual
>> Appendix C - AIIT User Manual.pdf [PDF format]

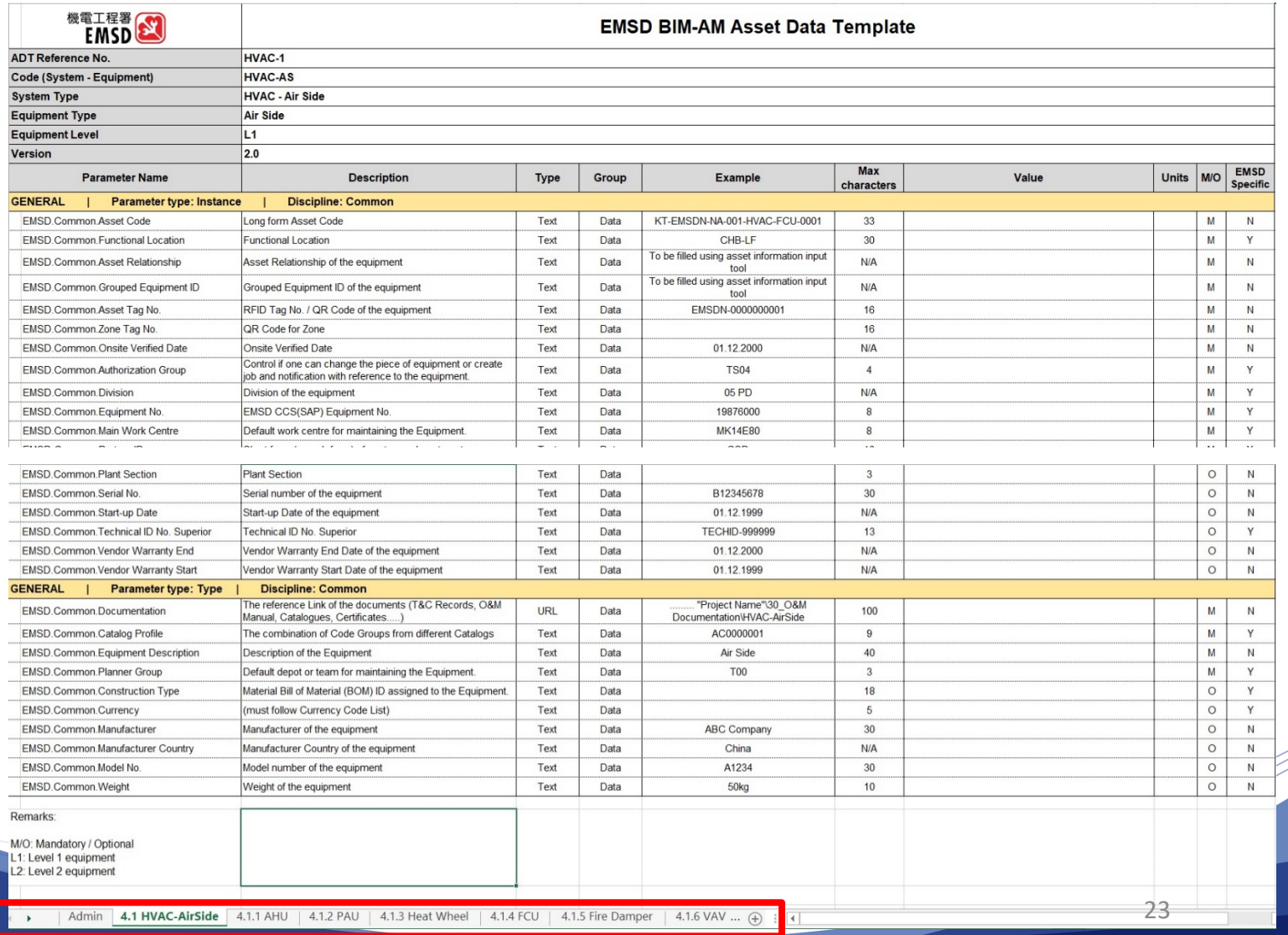
Appendix D - Shared Parameter File for EMSD BIM-AM
>> Appendix D - Shared Parameters File for EMSD BIM-AM v2.0.txt [TXT format]

Major Changes between BIM-AM Standards and Guidelines v1.0 and v2.0
>> Major Changes between BIM-AM Standards and Guidelines v1.0 and v2.0.pdf [PDF format]

- After Unzip the file, Excel in different MEP system would be generated. Open Specific MEP system Excel.



- Open “ADT_04_HVA.xlsx - 4.1 HVAC-AirSide”



機電工程署 EMSD

EMSD BIM-AM Asset Data Template

ADT Reference No.	HVAC-1
Code (System - Equipment)	HVAC-AS
System Type	HVAC - Air Side
Equipment Type	Air Side
Equipment Level	L1
Version	2.0

Parameter Name	Description	Type	Group	Example	Max characters	Value	Units	M/O	EMSD Specific
GENERAL | Parameter type: Instance | Discipline: Common									
EMSD.Common.Asset Code	Long form Asset Code	Text	Data	KT-EMSDN-NA-001-HVAC-FCU-0001	33			M	N
EMSD.Common.Functional Location	Functional Location	Text	Data	CHB-LF	30			M	Y
EMSD.Common.Asset Relationship	Asset Relationship of the equipment	Text	Data	To be filled using asset information input tool	N/A			M	N
EMSD.Common.Grouped Equipment ID	Grouped Equipment ID of the equipment	Text	Data	To be filled using asset information input tool	N/A			M	N
EMSD.Common.Asset Tag No.	RFID Tag No. / QR Code of the equipment	Text	Data	EMSDN-0000000001	16			M	N
EMSD.Common.Zone Tag No.	QR Code for Zone	Text	Data		16			M	N
EMSD.Common.Onsite Verified Date	Onsite Verified Date	Text	Data	01.12.2000	N/A			M	N
EMSD.Common.Authorization Group	Control if one can change the piece of equipment or create job and notification with reference to the equipment.	Text	Data	TS04	4			M	Y
EMSD.Common.Division	Division of the equipment	Text	Data	05 PD	N/A			M	Y
EMSD.Common.Equipment No.	EMSD CCS(SAP) Equipment No.	Text	Data	19876000	8			M	Y
EMSD.Common.Main Work Centre	Default work centre for maintaining the Equipment.	Text	Data	MK14E80	8			M	Y
EMSD.Common.Plant Section	Plant Section	Text	Data		3			O	N
EMSD.Common.Serial No.	Serial number of the equipment	Text	Data	B12345678	30			O	N
EMSD.Common.Start-up Date	Start-up Date of the equipment	Text	Data	01.12.1999	N/A			O	N
EMSD.Common.Technical ID No. Superior	Technical ID No. Superior	Text	Data	TECHID-999999	13			O	Y
EMSD.Common.Vendor Warranty End	Vendor Warranty End Date of the equipment	Text	Data	01.12.2000	N/A			O	N
EMSD.Common.Vendor Warranty Start	Vendor Warranty Start Date of the equipment	Text	Data	01.12.1999	N/A			O	N
GENERAL | Parameter type: Type | Discipline: Common									
EMSD.Common.Documentation	The reference Link of the documents (T&C Records, O&M Manual, Catalogues, Certificates.....)	URL	Data	..... "Project Name"\30_O&M Documentation\HVAC-AirSide	100			M	N
EMSD.Common.Catalog Profile	The combination of Code Groups from different Catalogs	Text	Data	AC0000001	9			M	Y
EMSD.Common.Equipment Description	Description of the Equipment	Text	Data	Air Side	40			M	N
EMSD.Common.Planner Group	Default depot or team for maintaining the Equipment.	Text	Data	T00	3			M	Y
EMSD.Common.Construction Type	Material Bill of Material (BOM) ID assigned to the Equipment.	Text	Data		18			O	Y
EMSD.Common.Currency	(must follow Currency Code List)	Text	Data		5			O	Y
EMSD.Common.Manufacturer	Manufacturer of the equipment	Text	Data	ABC Company	30			O	N
EMSD.Common.Manufacturer Country	Manufacturer Country of the equipment	Text	Data	China	N/A			O	N
EMSD.Common.Model No.	Model number of the equipment	Text	Data	A1234	30			O	N
EMSD.Common.Weight	Weight of the equipment	Text	Data	50kg	10			O	N

Remarks:

M/O: Mandatory / Optional
L1: Level 1 equipment
L2: Level 2 equipment

Admin | 4.1 HVAC-AirSide | 4.1.1 AHU | 4.1.2 PAU | 4.1.3 Heat Wheel | 4.1.4 FCU | 4.1.5 Fire Damper | 4.1.6 VAV ...

11.6 EMSD Standard Shared Parameters

Common Parameters (Project Parameters):

- Common Parameters should be applicable to all equipment; related parameters should be added to separate Master file and all MEP File.
- After finished add Equipment Specific Parameters into specific type of family in different MEP discipline, project parameters would be added automatically when loaded the family into project.

Equipment Specific Parameters (Family Parameters):

- Equipment Specific Parameters should only be applicable to specific MEP System equipment.
- Object naming, BIM Category of Object and Asset Information Requirement of the object system should be checked before add any Equipment Specific Parameters into the family.
- Refer to chapter “MEP Asset Data/ Manage Shared Parameters.