



Lands Department

The Government of the Hong Kong Special Administrative Region

Manual for Producing Harmonised IFC in Archicad

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Revision History

Revision	Date	Amendment	Version Number
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Abbreviation Table

Abbreviation	Definition
BIM	Building Information Modelling
DEVB	Development Bureau
GBDR	Government BIM Data Repository
IFC	Industry Foundation Classes
LandsD	Lands Department
LOD	Level of Development
LOD-G	Level of Graphics
LOD-I	Level of Information
N/A	Not Applicable

1. Introduction

1.1. Background

To facilitate the sharing of BIM models in more native formats, the Government BIM Data Repository (GBDR) was upgraded in October 2023 to allow for BIM submissions generated by different BIM software. Previously accommodating Revit and Civil 3D, the GBDR now also accepts submissions from Archicad, OpenBuildings Designer, OpenRoads Designer, SketchUp and Tekla.

However, the existence of wide variety of BIM software, each with its own native formats, poses challenges when it comes to analyzing BIM data. To address this issue, the Government has been promoting the adoption of open BIM practices. The Development Bureau BIM Harmonisation Guidelines for Works Departments designate IFC v4 as the interoperable and shareable BIM format, facilitating the exchange of geometrical and non-geometrical information. By converting native BIM models into the open BIM format, it enhances interoperability and fosters innovation, allowing a broader range of stakeholders to leverage the BIM data effectively.

In this regard, the Lands Department conducted a study focusing on configuration settings in one of the most commonly used native BIM software, Archicad. The study aims to facilitate the generation of IFC models using Archicad 25 and Archicad 26, promoting compliance with the common practice by the industry and the requirements as stipulated in the Development Bureau BIM Harmonisation Guidelines for Works Departments (hereafter referred to as **Harmonised IFC**).

1.2. Purpose and Scope

The purpose of the “Manual for Producing Harmonised IFC in Archicad” (hereafter referred to as **the Manual**) is to provide recommended practices and step-by-step procedures for configuring the settings of Archicad 25 and Archicad 26 in compliance with the Development Bureau BIM Harmonisation Guidelines for Works Departments to facilitate effective Harmonised IFC sharing. To facilitate the initial assessment of the quality of BIM models in IFC format, Lands Department has been offering an IFC Validation Tool since January 2023.


The Manual should be used in conjunction with the Development Bureau BIM Harmonisation Guidelines for Works Departments. Section 2 outlines the configuration of the Coordinate System settings. Section 3 provides detailed information on the IFC Translator settings and configuration about Common Attributes and Project Information. Finally, Section 4 concentrates on configuring the settings related to the IFC Schema,

Model View Definition, and Unit.

1.3. Revision of this Manual

The Manual will be updated periodically to take account of advances in technology and BIM standards, as well as updates of the Development Bureau BIM Harmonisation Guidelines for Works Departments.

2. Set Coordinate System

To set up BIM models in reference to Hong Kong 1980 Grid and Hong Kong Principal Datum, the survey point should be activated by clicking the “Show Survey Point ” in the Toolbar of Archicad 25 and Archicad 26. Once activated, the “Show Survey Point” button will be highlighted (refer to **Figure 1**).

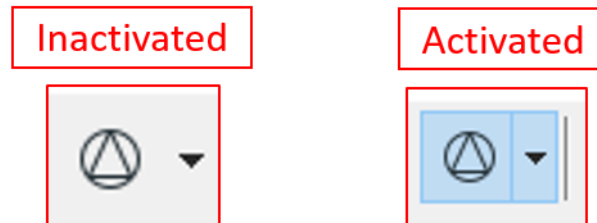


Figure 1 Activating Survey Point

Then, click “Options” → “Project Preferences” → “Location Settings” (refer to **Figure 2**).

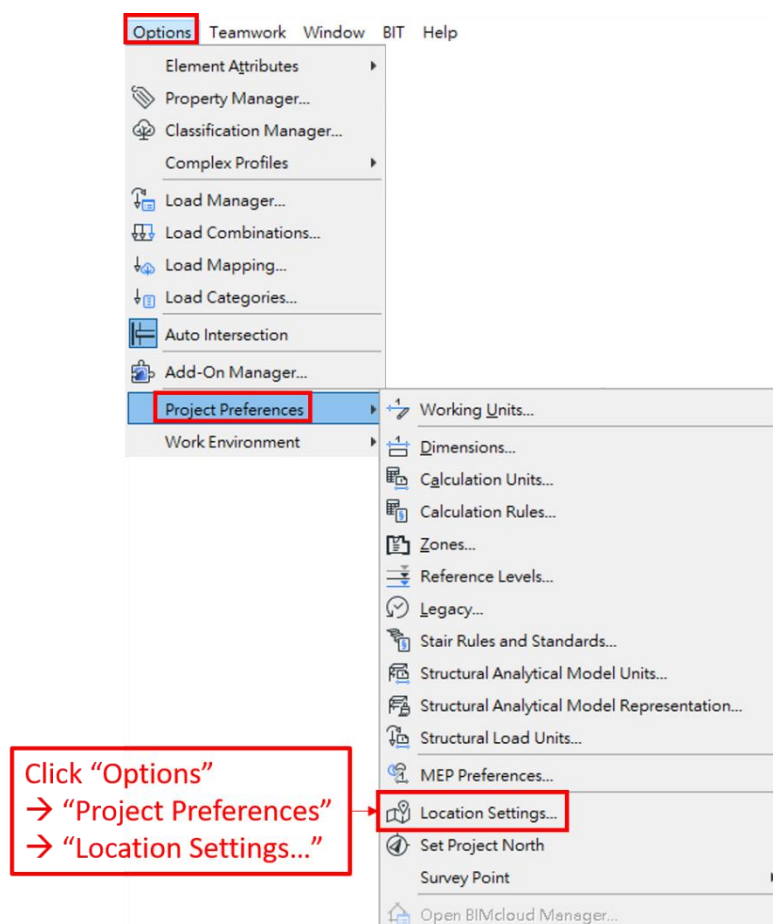


Figure 2 Selecting Location Settings

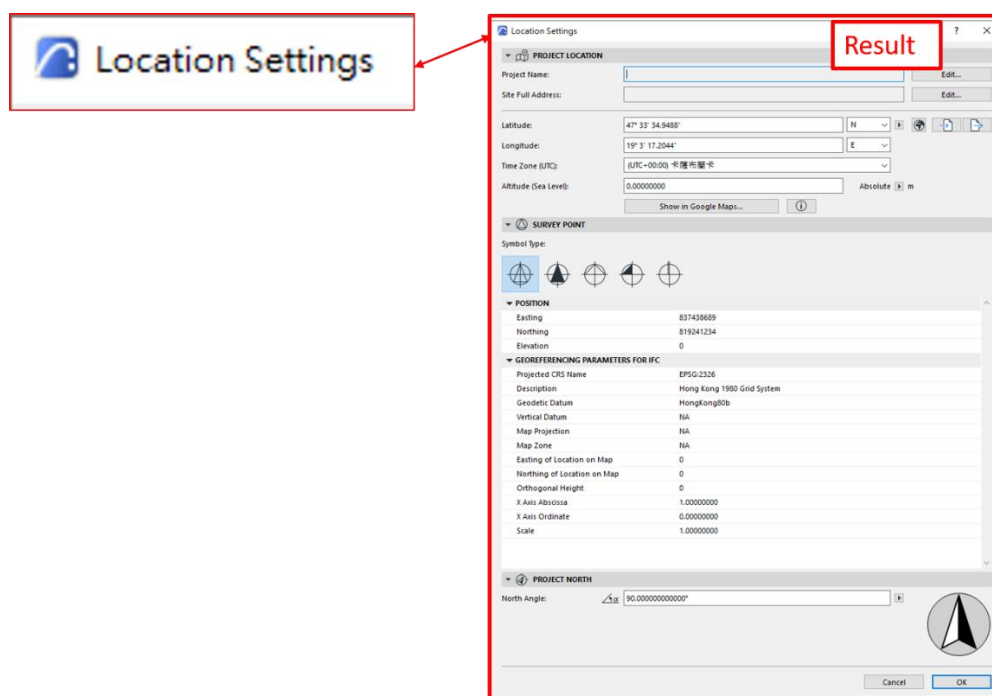


Figure 2 (con't) Selecting Location Settings

Then, fill in the section “Georeferencing Parameters for IFC” of “Location Settings” (refer to **Figure 3**), according to the details provided in Table 1.


Table 1 Information of Coordinate System

Georeferencing Parameters for IFC	
Projected CRS Name	EPSG:2326
Description	Hong Kong 1980 Grid System
Geodetic Datum	HongKong80b
Vertical Datum	N/A
Map Projection	N/A
Map Zone	N/A

GEOREFERENCING PARAMETERS FOR IFC	
Projected CRS Name	EPSG:2326
Description	Hong Kong 1980 Grid System
Geodetic Datum	HongKong80b
Vertical Datum	N/A
Map Projection	N/A
Map Zone	N/A

Figure 3 Updated Georeferencing Parameters for IFC

2.1. Edit Latitude and Longitude

Next, in Archicad 25, click “ Choose a predefined City” and select “Hong Kong” (refer to **Figure 4**).

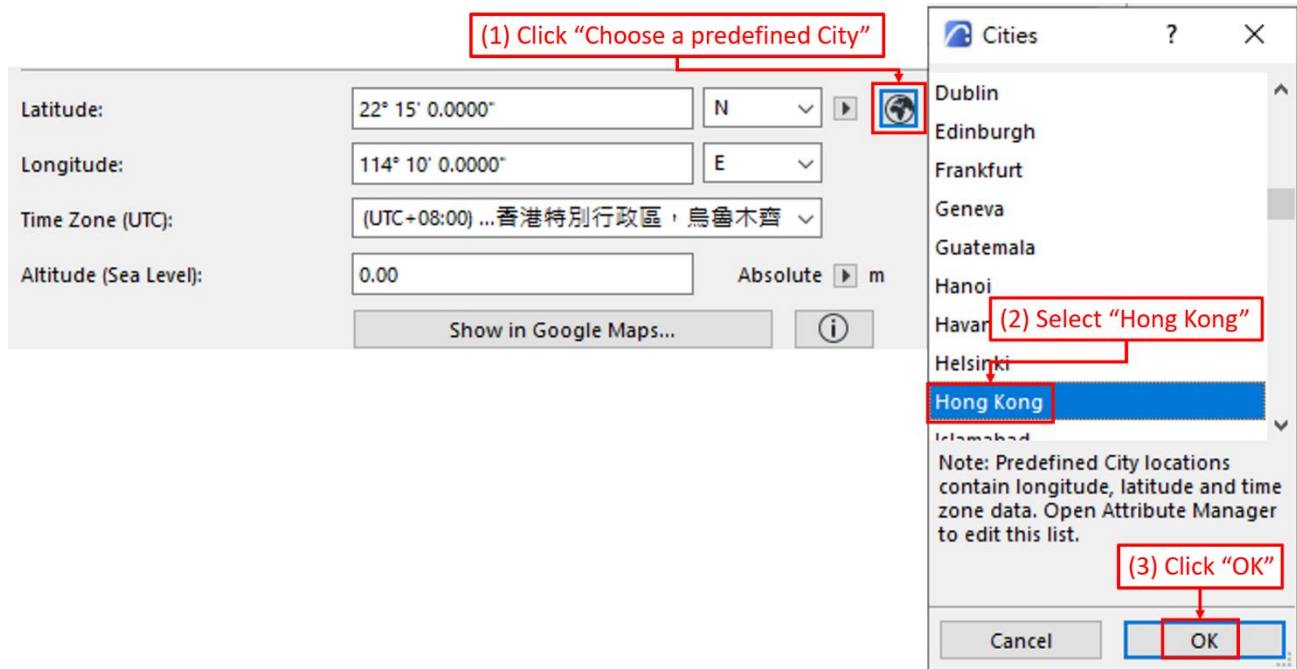


Figure 4 Example of setting Latitude and Longitude in Archicad 25

In Archicad 26, import “Hong Kong Lat & Long_BIM.xml” to update “Latitude, Longitude, Time Zone and Altitude” (refer to **Figure 5**).



Figure 5 Importing XML file in Archicad 26 to set Latitude and Longitude

2.2. Add Survey Point to Data

The survey point unit is based on the working unit. By default, it is in millimeter (mm). Working Unit can be modified by click “Options” → “Project Preferences” → “Working Units”. (Refer to **Figure 6**)

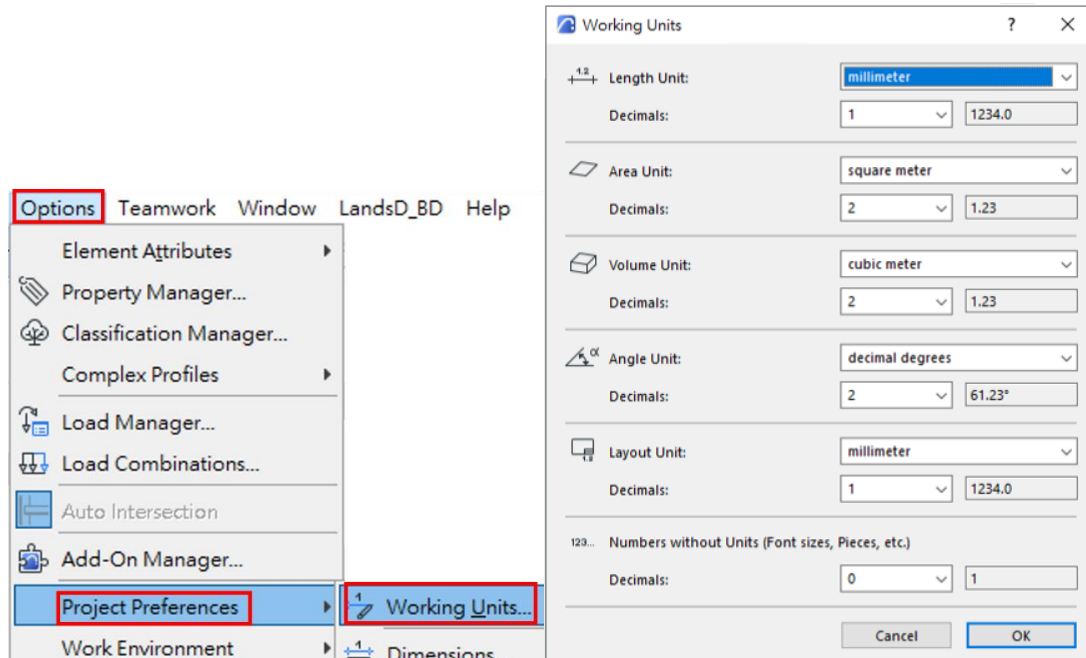


Figure 6 Setting Working Unit

Then, input survey point to “Easting, Northing, and Elevation” of the section “Survey Point” (refer to **Figure 7**). Click “OK” to complete the configuration.

Input Survey Point information

↓

▼ POSITION	
Easting	-837438689
Northing	-819241234
Elevation	0

Figure 7 Example of Survey Point

3. Set Common Attributes and Project Information

Section 3.1 describes the method for setting common attributes and project information **semi-automatically**, while Section 3.3 describes the method for setting them **manually**. Section 3.2 describes the recommended practice for specifying exterior objects within a BIM model, which is **not** a requirement in the DEVB BIM Harmonisation Guidelines for Works Department and is provided for reference purpose.

3.1. Semi-automatically Create Common Attributes and Project Information

Click “File” → “Interoperability” → “IFC” → “IFC Translator”. Then, click on “New” and make a duplicate of “IFC4 Reference View-based Export” and rename it (e.g., BIM Section) (refer to *Figure 8*).

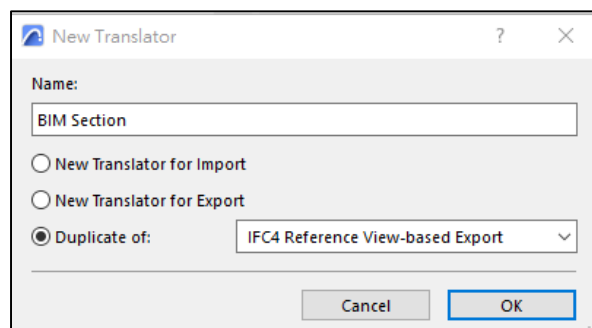


Figure 8 Create a New Translator

Then, select the newly created Translator and click “Set Preview” to preview it on the right-hand side of the IFC Translators (refer to *Figure 9*).

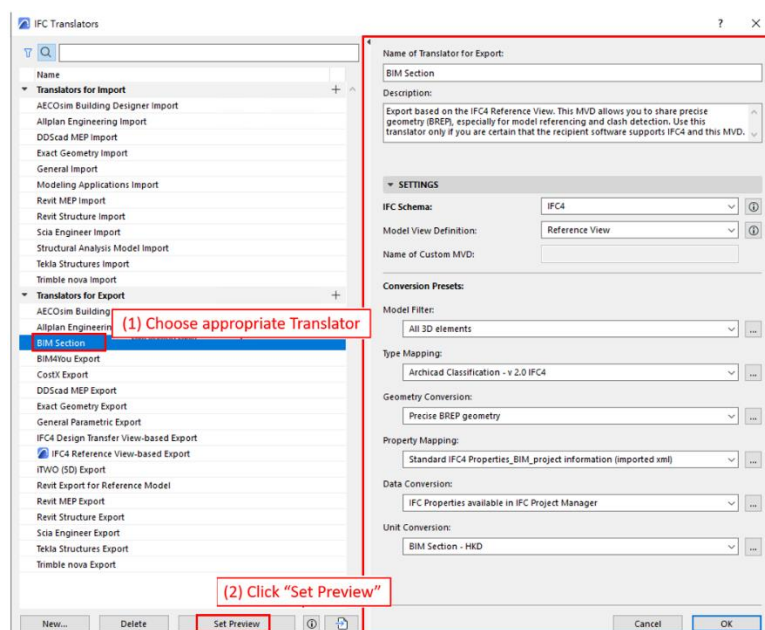



Figure 9 Setting the new Translator (Example: BIM Section) to Preview Translator

Next, click the button  next to “Property Mapping”. Click the “Import” to import the XML file, “Standard IFC4 Properties_BIM.xml”. After importing, “Standard IFC4 Properties_BIM (imported xml)” will appear under “Available Presets”. Click “OK” to finish. Then, select “Standard IFC4 Properties_BIM (imported xml)” under “Property Mapping”, and finally click “OK” to confirm. (Refer to **Figure 10**)

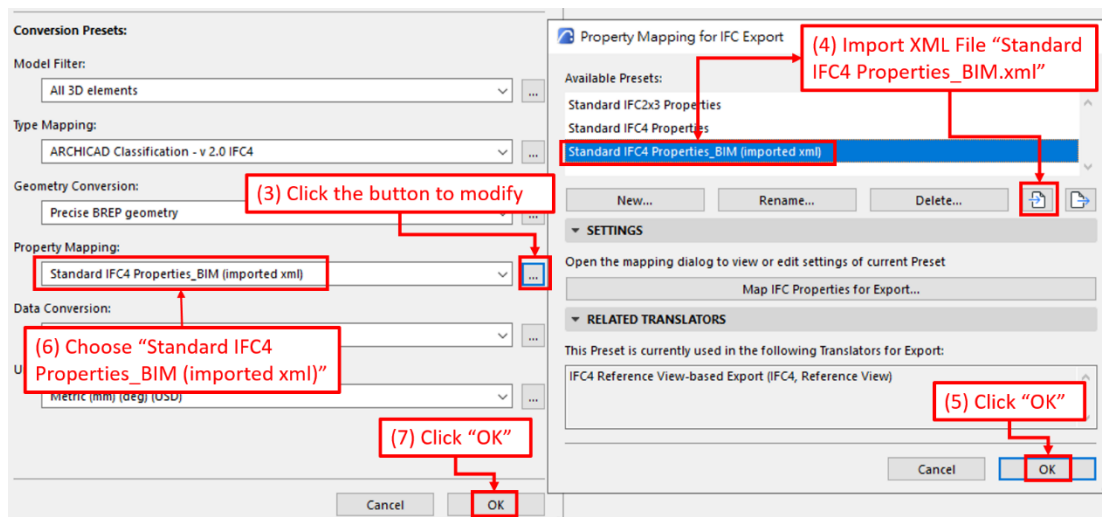



Figure 10 Importing XML file for common attributes and project information

Next, click “File” → “Interoperability” → “IFC” → “ IFC Project Manager”, to preview the new Property Sets and Properties. Tick the boxes for the desired Properties and input values by clicking the empty space between Property and Value Type¹ (refer to **Figure 11**).

¹ Users can also use different authoring methods to input information.

Classification Properties		
<input type="checkbox"/> IsExternal	IfcBoolean	
<input type="checkbox"/> LOD-G	IfcLabel	
<input type="checkbox"/> LOD-I	IfcLabel	
<input type="checkbox"/> OmniClassCode	IfcLabel	
<input type="checkbox"/> OmniClassTitle	IfcLabel	
<input type="checkbox"/> OmniClassVersion	IfcLabel	
Condition Properties		
<input type="checkbox"/> Certified Completion Date	IfcLabel	
<input type="checkbox"/> Handover Date	IfcLabel	
Design Properties		
<input type="checkbox"/> Design Capacity	IfcLabel	
<input type="checkbox"/> Material	IfcLabel	
<input type="checkbox"/> Material Grade	IfcLabel	
General Properties		
<input type="checkbox"/> CAT Code	IfcLabel	
<input type="checkbox"/> Departmental Unique ID	IfcLabel	
<input type="checkbox"/> Location	IfcLabel	
Manufacturer's Equipment Properties		
<input type="checkbox"/> Asset ID	IfcLabel	
<input type="checkbox"/> Brand Name	IfcLabel	
<input type="checkbox"/> Contract Number of the Equipment	IfcLabel	
<input type="checkbox"/> Equipment Capacity	IfcLabel	
<input type="checkbox"/> Manufacturer Name	IfcLabel	
<input type="checkbox"/> Model Number	IfcLabel	
Verification Properties		
<input type="checkbox"/> Verification	IfcLabel	

Classification Properties		
<input checked="" type="checkbox"/> IsExternal	FALSE	IfcBoolean
<input checked="" type="checkbox"/> LOD-G	200	IfcLabel
<input checked="" type="checkbox"/> LOD-I	300	IfcLabel
<input checked="" type="checkbox"/> OmniClassCode	23-21 25 11 13	IfcLabel
<input checked="" type="checkbox"/> OmniClassTitle	Classroom Furniture	IfcLabel
<input checked="" type="checkbox"/> OmniClassVersion	OmniClass 2012-05-16	IfcLabel
Condition Properties		
<input checked="" type="checkbox"/> Certified Completion Date		IfcLabel
<input checked="" type="checkbox"/> Handover Date		IfcLabel
Design Properties		
<input checked="" type="checkbox"/> Design Capacity		IfcLabel
<input checked="" type="checkbox"/> Material		IfcLabel
<input checked="" type="checkbox"/> Material Grade		IfcLabel
General Properties		
<input checked="" type="checkbox"/> CAT Code		IfcLabel
<input checked="" type="checkbox"/> Departmental Unique ID		IfcLabel
<input checked="" type="checkbox"/> Location		IfcLabel
Manufacturer's Equipment Properties		
<input checked="" type="checkbox"/> Asset ID		IfcLabel
<input checked="" type="checkbox"/> Brand Name		IfcLabel
<input checked="" type="checkbox"/> Contract Number of the Equipment		IfcLabel
<input checked="" type="checkbox"/> Equipment Capacity		IfcLabel
<input checked="" type="checkbox"/> Manufacturer Name		IfcLabel
<input checked="" type="checkbox"/> Model Number		IfcLabel
Verification Properties		
<input checked="" type="checkbox"/> Verification		IfcLabel

Figure 11 Example of IFC Project Manager:
(Left) Imported XML File and (Right) Edited Common Attributes with Values

Table 2 Project Information Attributes with the Defined Property Set

Project Information			
	Property Set	Property	Value Type
1	Project Information	Organisation Name	IfcLabel
2		Project Address	IfcLabel
3		Project Issue Date	IfcLabel
4		Project Name	IfcLabel
5		Project Number	IfcLabel

Table 3 Common Attributes with the Defined Property Set

Common Attributes			
	Property Set	Property	Value Type
1	Classification Properties	LOD-G	IfcLabel
2		LOD-I	IfcLabel
3		OmniClassCode	IfcLabel
4		OmniClassTitle	IfcLabel
5		OmniClassVersion	IfcLabel
6^		IsExternal^	IfcBoolean
7	Condition Properties	Certified Completion Date	IfcLabel
8		Handover Date	IfcLabel

9	Design Properties	Design Capacity	IfcLabel
10		Material	IfcLabel
11		Material Grade	IfcLabel
12*		Name*	IfcLabel
13*		Number*	IfcLabel
14	General Properties	CAT Code	IfcLabel
15		Departmental Unique ID	IfcLabel
16		Location	IfcLabel
17	Manufacturer's Equipment Properties	Asset ID	IfcLabel
18		Brand Name	IfcLabel
19		Contract Number of the Equipment	IfcLabel
20		Equipment Capacity	IfcLabel
21		Manufacturer Name	IfcLabel
22		Model Number	IfcLabel
22	Verification Properties	Verification	IfcLabel
<i>^Section 3.2 of the Manual refers</i> <i>*Only Zone in Archicad 25 and 26 is required to fill in Name and Number of Design Properties.</i>			

Common attribute “Material” can be defined using IfcMaterial. The elements that exports IFC with IfcMaterial by default are listed in Table 4. For any elements **not** listed in Table 4, it is recommended to include the common attribute “Material” in IfcPropertySingleValue, which is provided in the “Standard IFC4 Properties_BIM.xml”.

Table 4 Elements with IfcMaterial by default

Wall	Shell
Column	Stair
Beam	Railing
Slab	Curtain Wall
Roof	Morph

Common attributes should be created for every IfcElement. For example, the IfcElement SW-002, SW-003, SW-004, and SW-005 of IfcWall, as shown in **Figure 12** require to input of common attributes. Project information can be input at either “Project”, “Site” or “Building” level.

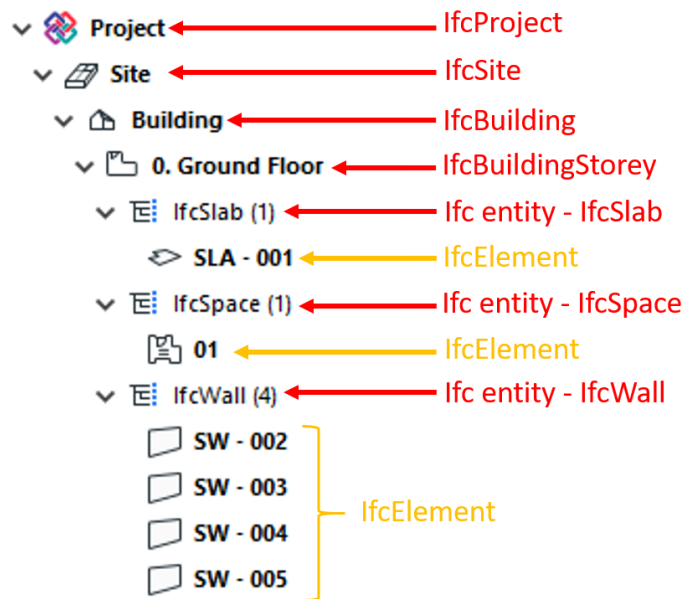



Figure 12 Naming of IFC Entities in IFC Project Manager

Note: To modify the common attributes of hotlinked elements, common attributes information should be input into the module file (*.mod) before loading it into the host file (*.pln and *.pla).

First, click “File” → “Interoperability” → “IFC” → “IFC Translator”. Then, click on “New” to create a duplicate of “Translator for General Export” and rename it (e.g., “BIM Section – Hotlink model”). Next, click the button  next to “Property Mapping”. Click the “Import” to import the XML file, “Standard IFC4 Properties_BIM.xml”. Then, choose the “Standard IFC4 Properties_BIM (imported xml)” under Property Mapping and click “OK” (refer to **Figure 13**). Then, open “IFC Project Manager” to input the common attributes information as described in this section.

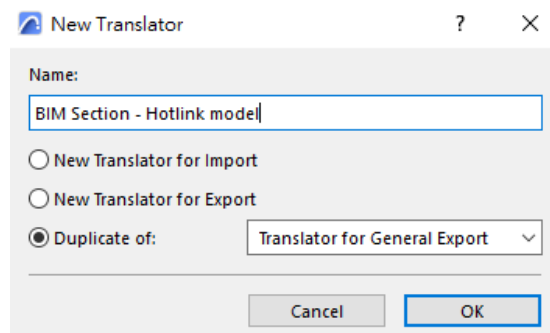


Figure 13 Importing XML file for common attributes and project information for hotlinked modules

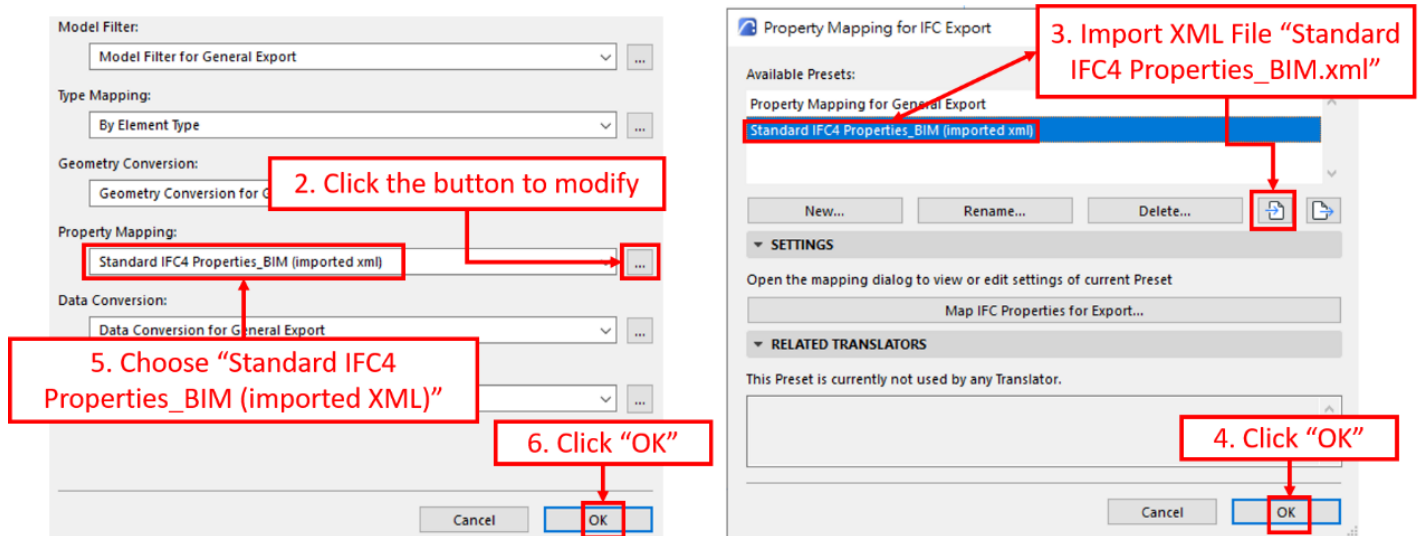


Figure 13 (con't) Importing XML file for common attributes and project information for hotlinked modules

3.2. Specify External Objects

“IsExternal” True/False parameter is populated to specify objects that composes a building layout. If IsExternal is set to true, the object is an external element facing the outside of the building; otherwise, if IsExternal is set to false, it is an internal element. While specifying external objects is not a requirement in the DEVB BIM Harmonisation Guidelines for Works Departments, it is recommended, as this setting aids in identifying exterior objects within a BIM model. This is particularly beneficial, given that the simplification of BIM models for the creation of the 3D Digital Map heavily relies on this distinction.

Table 5 shows IFC Entities that have IsExternal in Property Set Pset_xxxCommon (where xxx stands for relevant IFC entities) by default, as shown in **Figure 14**. For any elements not listed in Table 5, it is recommended to include “IsExternal” manually.

Table 5 IFC entities have property IsExternal in Property Set Pset_xxxCommon by default

IfcBeam	IfcRailing
IfcBuildingElementProxy	IfcRamp
IfcBuiltElement	IfcRoof
IfcChimney	IfcShadingDevice
IfcColumn	IfcSlab
IfcCovering	IfcSpace
IfcCurtainWall	IfcStair
IfcDoor	IfcWall
IfcJunctionBox	IfcWindow
IfcMember	IfcZone
IfcPlate	

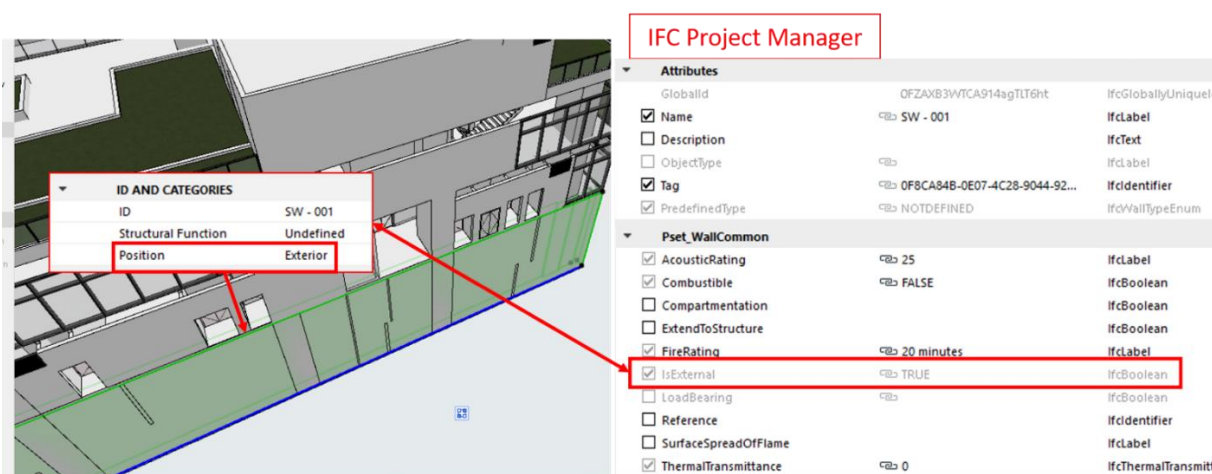


Figure 14 Example of IsExternal under Pset_WallCommon in IfcWall

In Archicad 25 and 26, there are two options for filling the value of IsExternal, either using property set Pset_xxxCommon or create a new property.


Method 1: IFC Entities listed in Table 5 – Using Property Set Pset_xxxCommon

There are two ways to define position of such elements:

- **Method 1A: Default Setting**
- **Method 1B: Selected Object Setting**

Method 1A: Default Setting

This method will change the default setting of object, e.g. Wall.

First, select a drawing tool to draw an object. Then, click “Setting Dialog ” under Main in the Toolbar or shortcut Ctrl + T. Note that the icons may vary depending on object type. Next, change the Position of “ID and Categories” in Classification and Properties, and click “OK” to confirm (refer to **Figure 15**). Finally, draw the object accordingly.

The IsExternal will be shown in IFC Project Manager under Pset_xxxCommon (where xxx stands for relevant IFC entities) (refer to **Figure 16**).

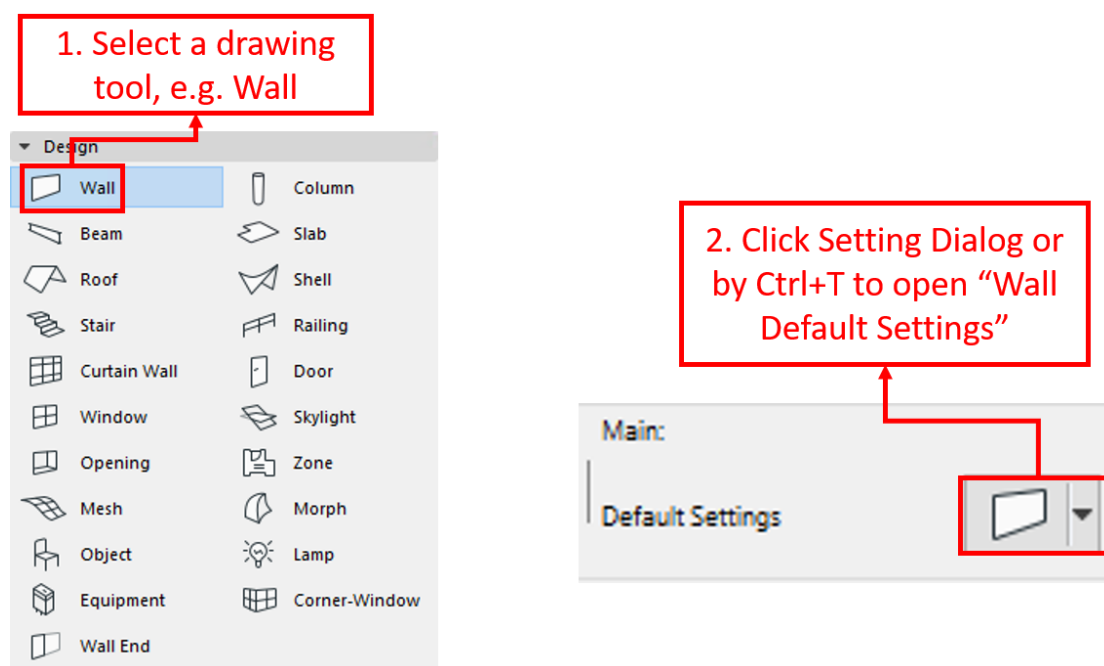


Figure 15 Steps to change Position by default setting

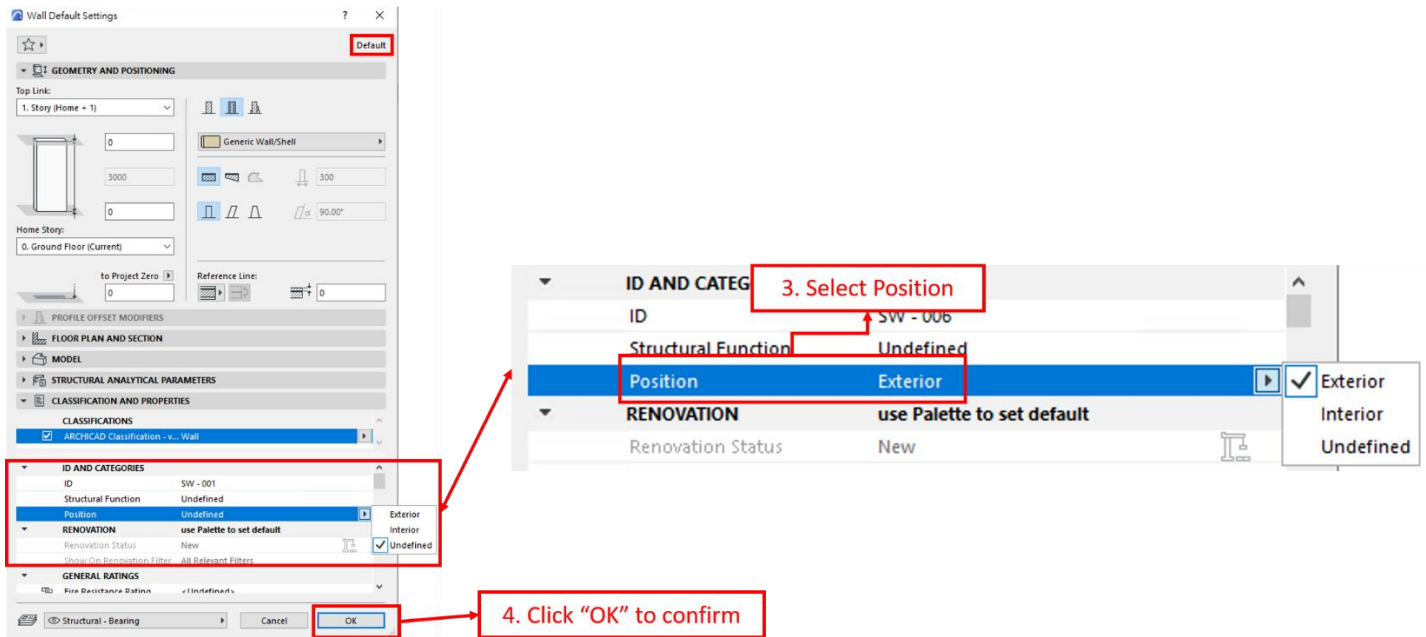




Figure 15 (con't) Steps to change Position by default setting



Figure 16 Example of Wall with IsExternal property by changing default setting

Method 1B: Selected Object Setting

This method changes only the selected object(s).

First, select the object(s) using Arrow . Then, click “Setting Dialog ” under Main in the Toolbar or shortcut Ctrl + T. Next, change the Position of “ID and Categories” in Classification and Properties, and click “OK” to confirm (refer to **Figure 17**).

The IsExternal will be shown in IFC Project Manager under Pset_xxxCommon (refer to **Figure 18**).

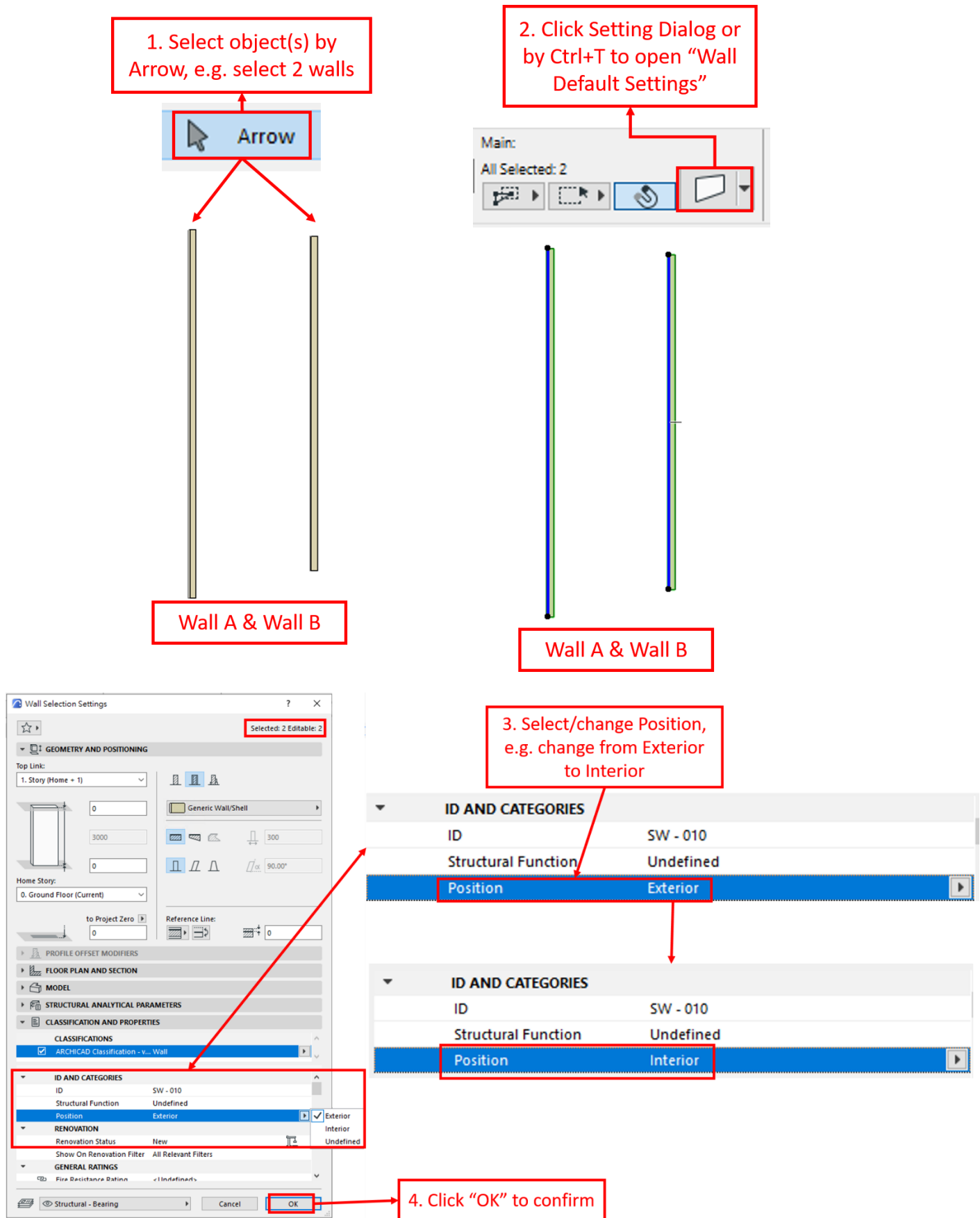


Figure 17 Steps to change Position by modifying selected object setting



Figure 18 Example of Wall with IsExternal property by modifying selected object setting

Method 2: Create a New Property

For those IFC entities not listed in Table 5, use Method 2 to input IsExternal property.

In Section 3.1, a XML file is loaded to the project. Check the box for IsExternal in Classification Properties to choose either **True** for Exterior or **False** for Interior, example is shown in **Figure 19**.

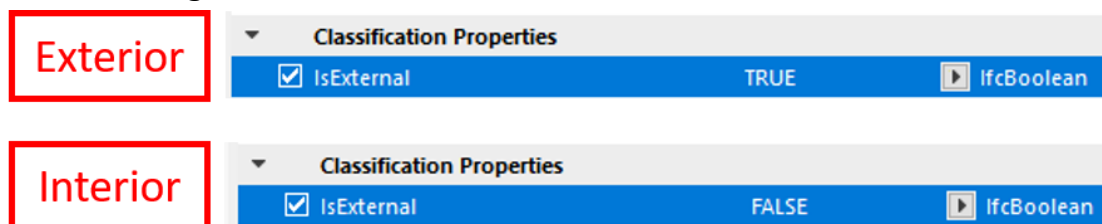


Figure 19 Example of Method 2

3.4. Manually Create Project Information and Common Attributes

To create project information, select either “Project”, “Site”, or “Building” in “IFC Project Manager”. Then, click “New” to create a new Property (refer to **Figure 20**).

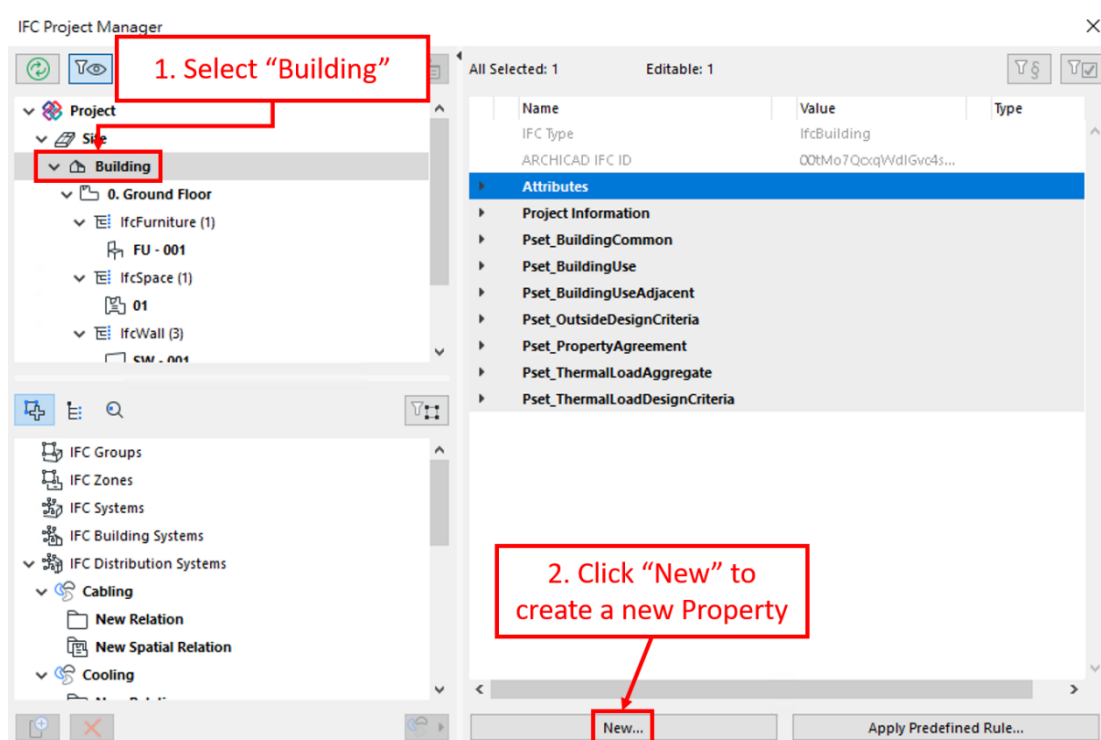


Figure 20 Example of Creating a new Property – Project Information in Building Level

Under “Create New IFC Property/Classification”, fill in the Property Set, Property and Value Type according to the details provided in Table 2 (refer to **Figure 21**). Then, click “OK” to finish. Repeat this step to create all properties of project information.

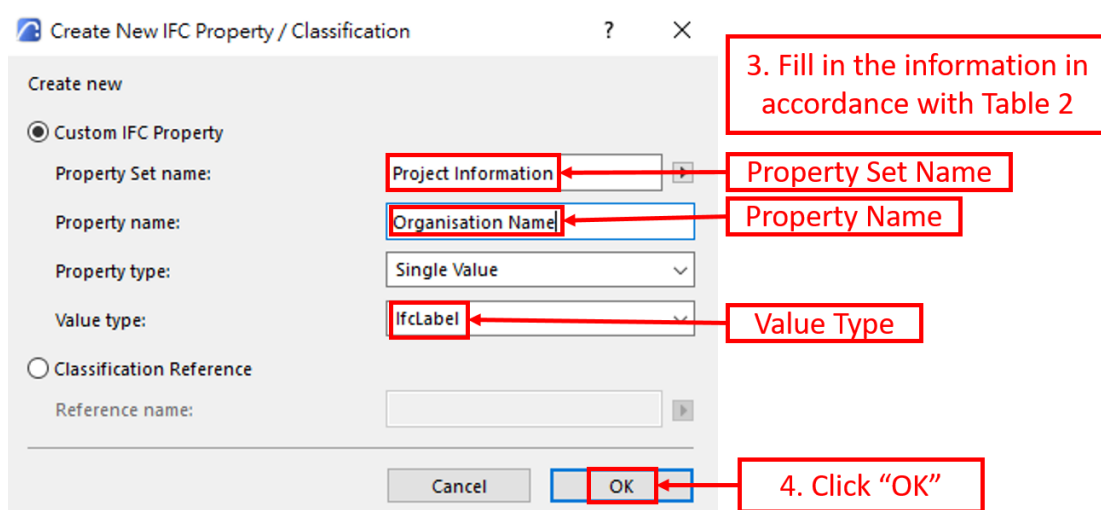


Figure 21 Creating a New IFC Property – Project Information

To create common attributes, select an IFC element in “IFC Project Manager” to add common attributes. Then, click “New” to create a new Property (refer to **Figure 22**).

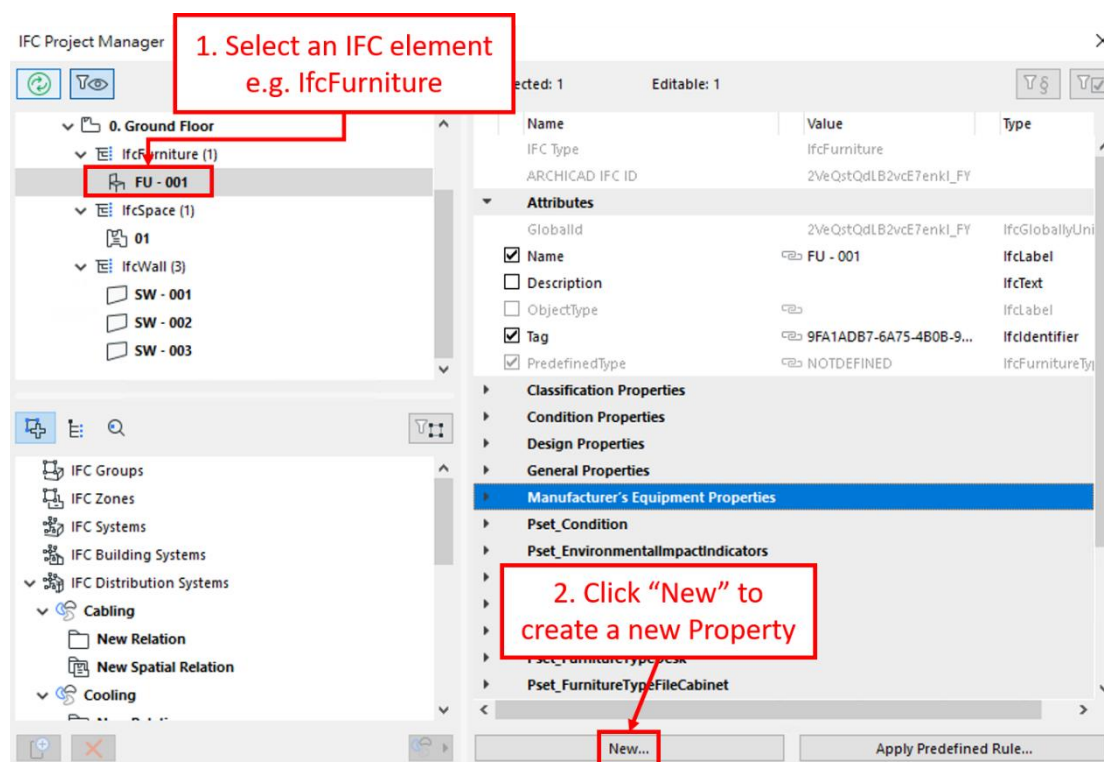


Figure 22 Illustration of creating a new Property – Common Attributes

Under “Create New IFC Property/Classification”, fill in the Property Set, Property and Value Type (refer to **Figure 23**). Then, click “OK” to finish. Repeat this step to create all properties of common attributes according to the details provided in Table 3.

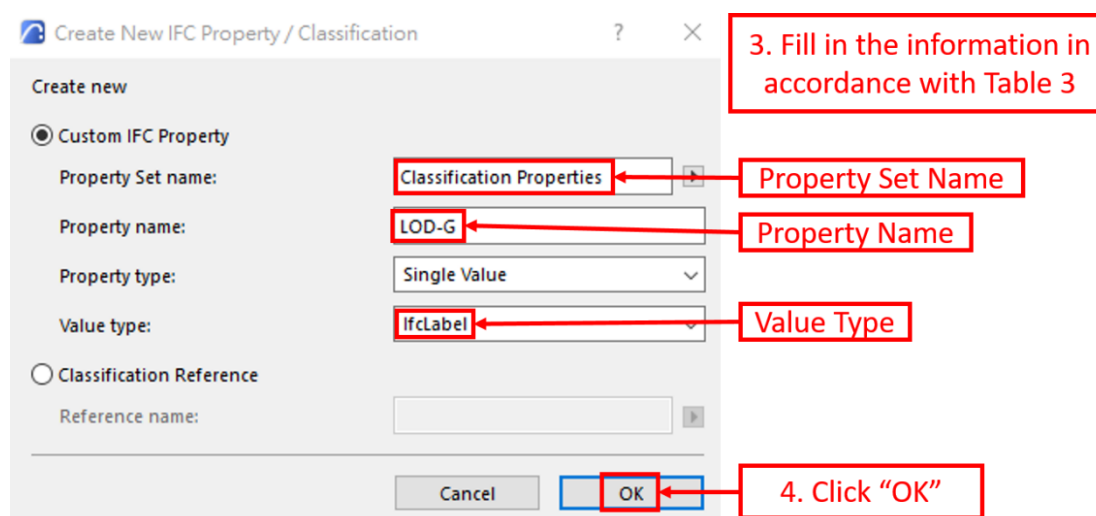




Figure 23 Creating a New IFC Property – Common Attributes

4. Set Unit, IFC Schema and Model View Definition

4.1. Set Unit

First, click “File” → “Interoperability” → “IFC” → “ IFC Translator” and ensure that the new created Translators mentioned in Section 3.14 is set to preview translator.

Then, click the button  next to Unit Conversion. The preview of such unit preset is shown in “Unit Conversion for IFC Export”. Then, click “New” to create a new Presets duplicated from “Metric (mm) (deg) (USD)” and rename it”. It is suggested to use the default settings in Length, Angle, Area, Volume and Time while changing the Currency Unit to HKD (refer to **Figure 24**).

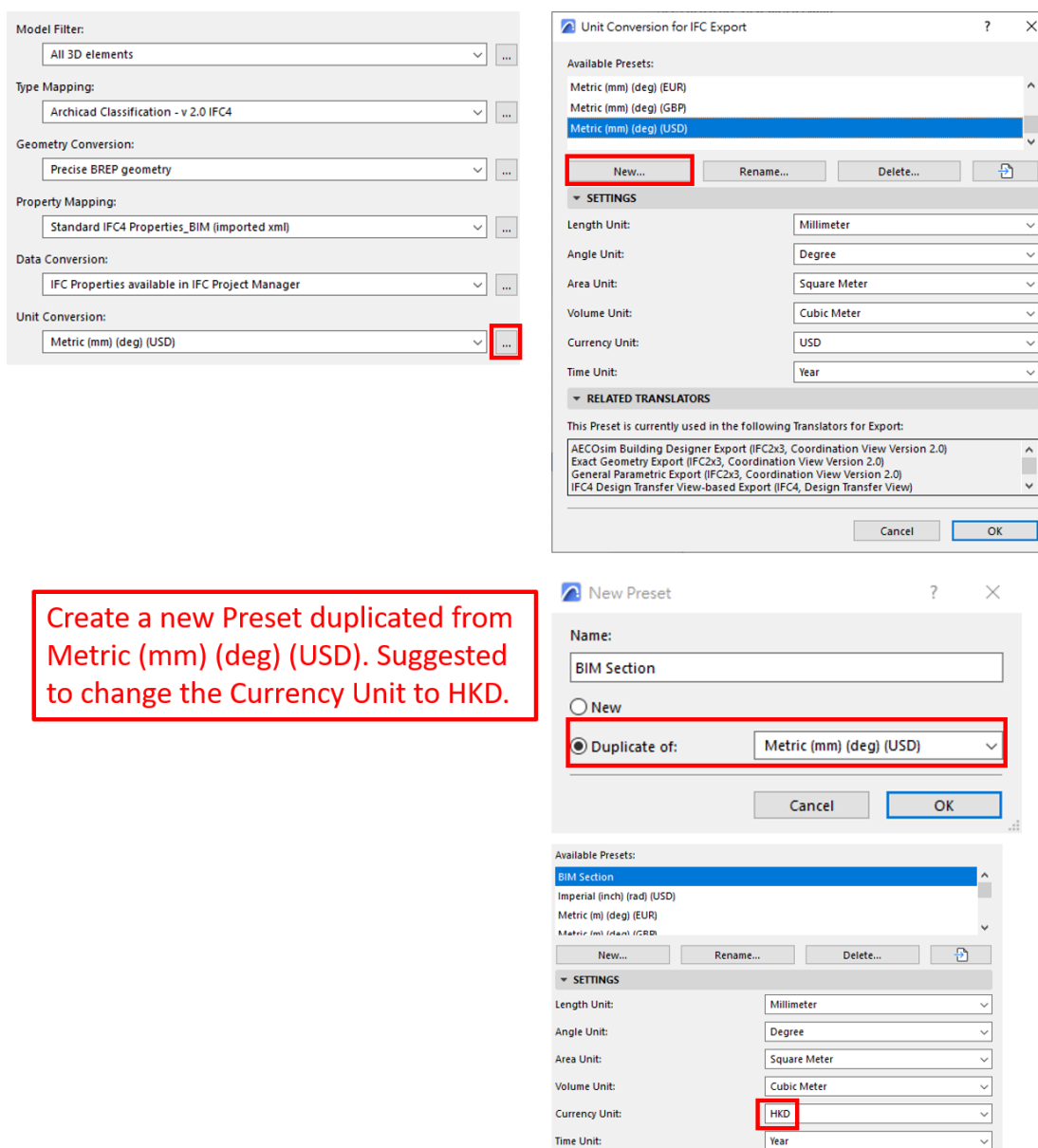



Figure 24 Preview of IFC Unit Set

4.2. IFC Export Setup

Then, click the button  next to Type Mapping. In the pop-up window “Type Mapping for IFC Export”, click the Map IFC Types for Export. Then, navigate to the Source Classification System tab, select the classification for the object type you wish to export. Confirm by clicking “OK” to save (refer to **Figure 25**).

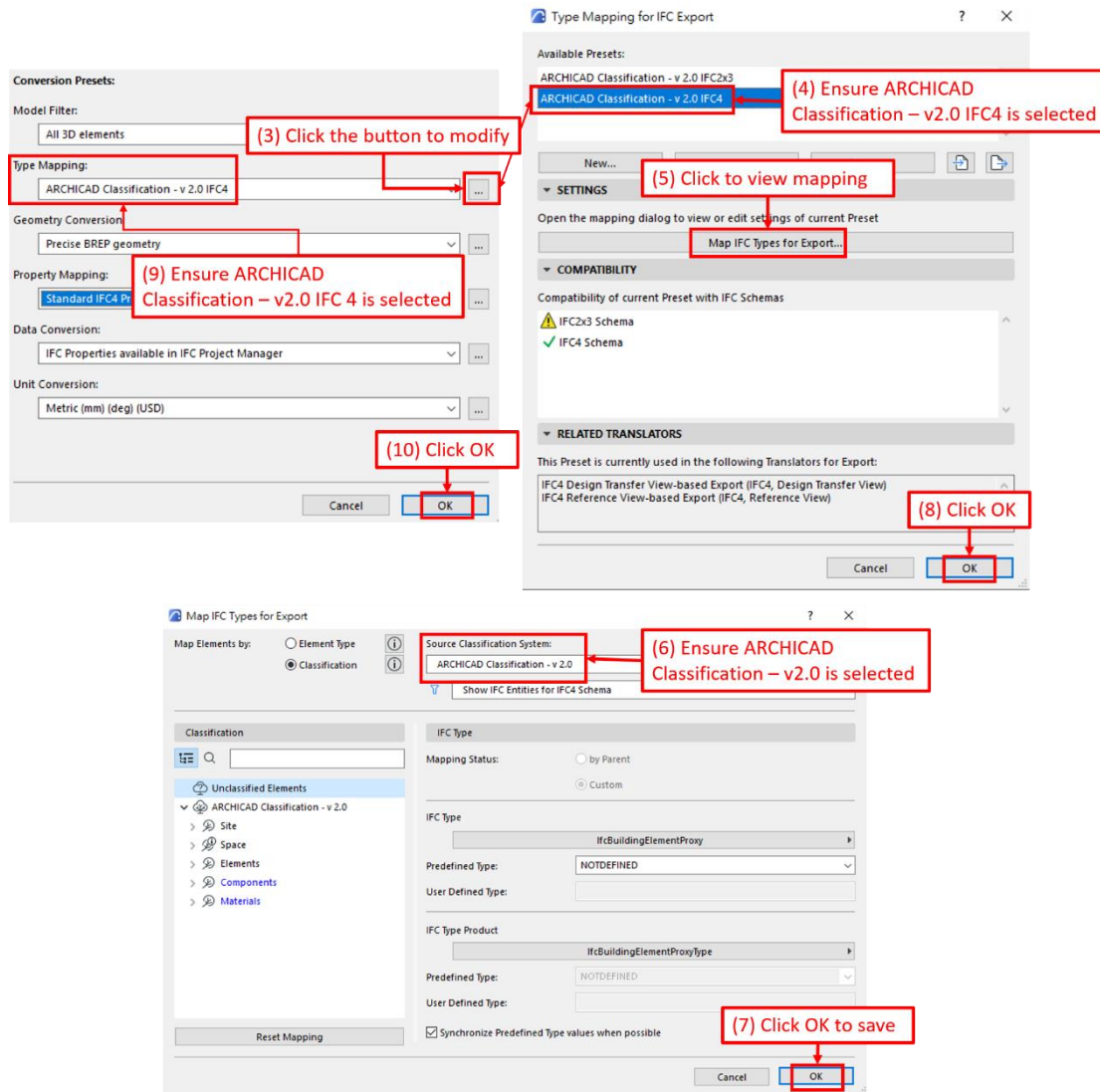


Figure 25 IFC Export Setup

4.3. Select IFC Schema and Model View Definition

Click “File” → “Save / Save as...” to save a new IFC file (*.ifc) (refer to **Figure 26**).

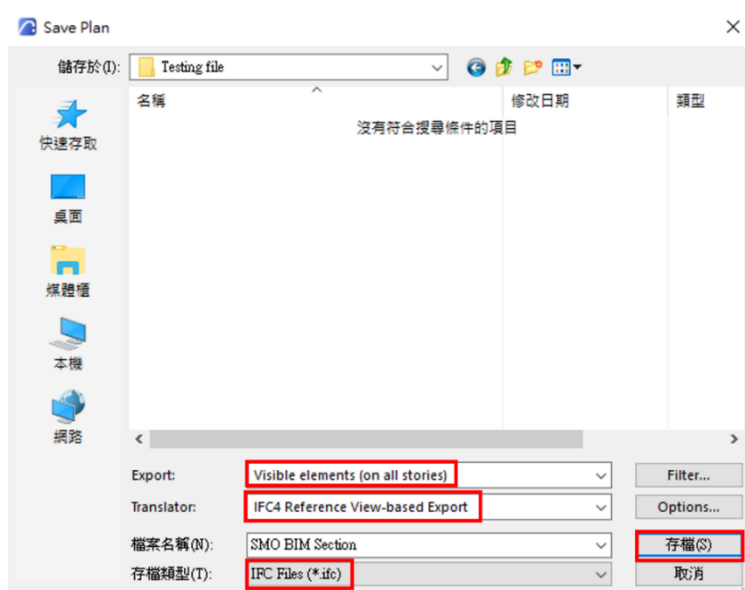


Figure 26 Setting of IFC Schema and Model View Definition

Enquiry and Feedback

Users are always welcome and encouraged to provide comments or feedback on the Manual to Lands Department (Attn.: Government BIM Data Repository, BIM Section, Survey and Mapping Office of LandsD at email: gbdr@landsd.gov.hk) so that continual improvements can be made to future edition.