

# **BIM REVIT How-to Guides**

**2022**

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# 1 Preface

It is recommended that users have gone through the documents in the resource kit, which provides an overview on the requirements and the importance of preparing an IFC model for submission to Corenet X;

Step 0) How to Learn IFC-SG,

Step 1) IFC 101,

Step 2) Industry Mappings,

Step 3) Configurations (respective BIM Authoring Tool)

Users may refer to Step 4) Exercise on IFC Key Data Structure to verify their understanding when they have completed all the steps above.

## 2 Introduction

IFC-SG aims to adopt the international Industry Foundation Classes (IFC) standard as the base for the common representation for BIM submission. IFC is a standardized, digital description of the built asset industry. It is an open, international standard ([ISO 16739-1:2018](#)) and promotes vendor-neutral, or agnostic, and usable capabilities across a wide range of hardware devices, software platforms, and interfaces for many different use cases.

This document is intended as a reference for the users in preparing BIM files for submission in IFC-SG. It contains software configuration setup, export settings, and IFC-SG-specific concepts used to map the native information for the applicable IFC-SG export.

### 2.1 UNDERSTANDING IFC-SG

With IFC being a semantically rich data structure, IFC Concepts are captured and used to map objects for IFC-SG. The building elements listed in the IFC-SG BIM Objects Dictionary are derived from various regulatory handbooks that are mapped in the early stage of IFC-SG. These objects are any physical elements referred to as BIM concepts such as walls, doors, and windows, and non-physical elements such as building containers, space, properties, and material information. IFC Concepts provide another level of identifying what an object is. IFC concepts are

- Standard IFC entities and types,
- predefined type enumeration, and
- IFC standard property set(s).

When no directly appropriate entity, predefined type, or property set is found, standard extension using USERDEFINED ObjectTypes and USERDEFINED PropertySets “SGPset\_” is used

### 2.2 IFC4 REFERENCE VIEW

IFC-SG is mapped using IFC4 Reference View, which is currently the broadest proliferation of IFC BIM data across many software application types supporting different communication and collaboration workflows.

IFC4 Reference View is particularly suitable for all BIM workflows that are based on reference models, where the exchange is mainly one-directional, similar to the workflow defined for the exchange in requirements in IFC-SG.

### 2.3 IFC-SG AS A MODEL VIEW DEFINITION

IFC-SG is like what an Model View Definition (MVD) does. It is only a subset of requirement definition from the overall IFC schema to describe data exchange for a specific use or workflow. Mainly, it narrows down the scope of the IFC schema to one that will be used as an exchange requirement for the local building plans submission using a neutral format.

# 3 Autodesk Revit

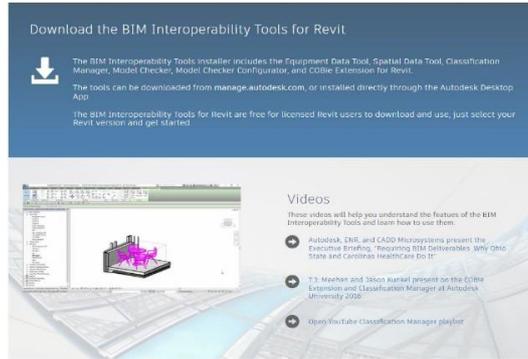
## 3.1 GENERAL BIM GUIDE

Note: It is preferable that users refer to the original guide from authoring tool —Revit IFC Manual

<https://damassets.autodesk.net/content/dam/autodesk/www/pdfs/revit-ifc-guide-high-res.pdf>

### 3.1.1 How to Use BIM Interoperability Tools for Revit

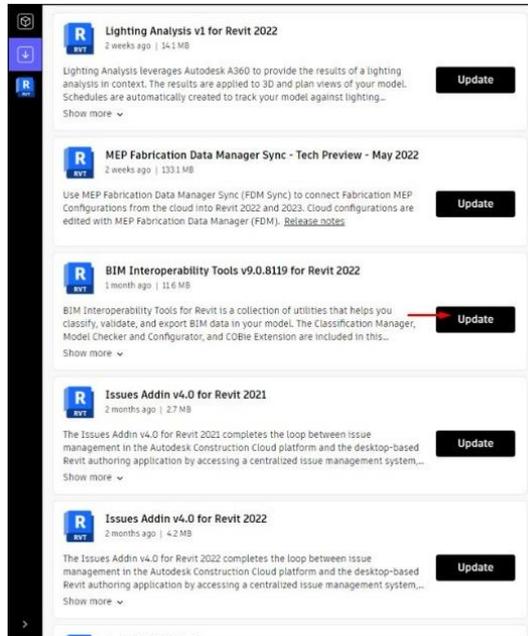
1. Install BIM Interoperability Tools for Revit.



#### BIM Interoperability Tools

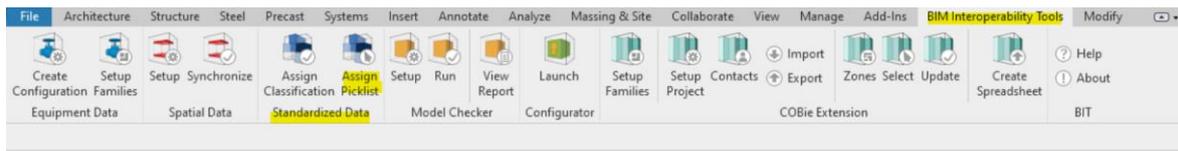
Note: To use IFC Classification Manager for Revit, User must install the BIM Interoperability Tools as an Add-in.

<https://www.biminteroperabilitytools.com/classificationmanager.php>



BIM interoperability tools can be accessed via the Autodesk desktop app as well.

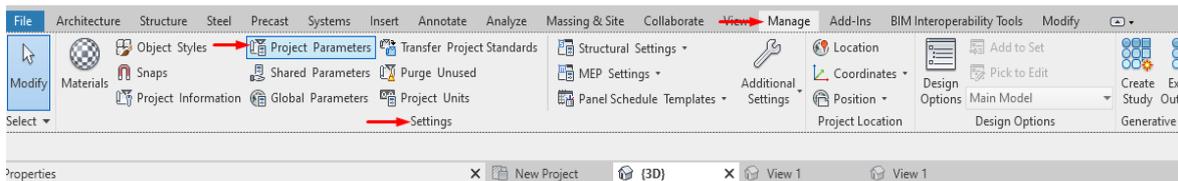
2. After the installation, under BIM Interoperability Tools Ribbon Tab, in Standardized Data Panel, select Setup to upload the Revit Classification excel sheet.



### BIM Interoperability Setup

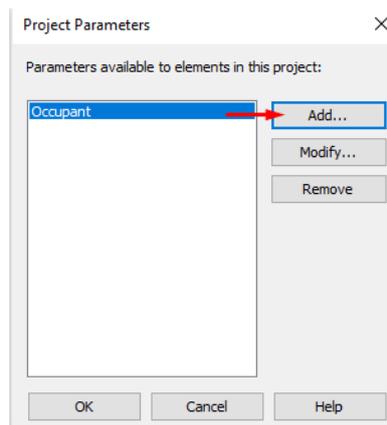
### 3.1.2 How to Add a Shared Project Parameter

1. To add a Project Parameter simply go to the **Manage** Ribbon Tab, under **Settings** Panel select **Project Parameters**.



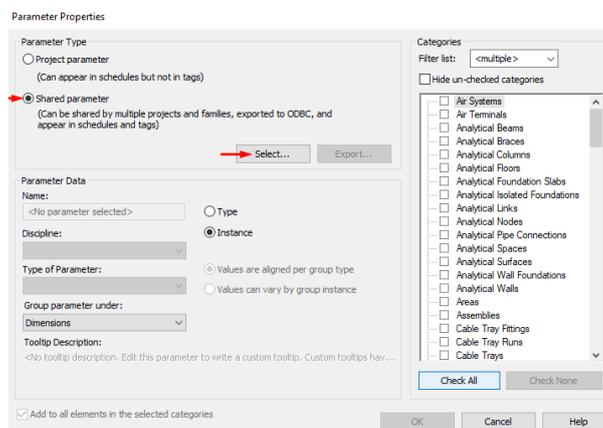
### Project Parameter from Manage Tab

2. After selecting Project Parameters dialog box, click **Add** to proceed adding a parameter.



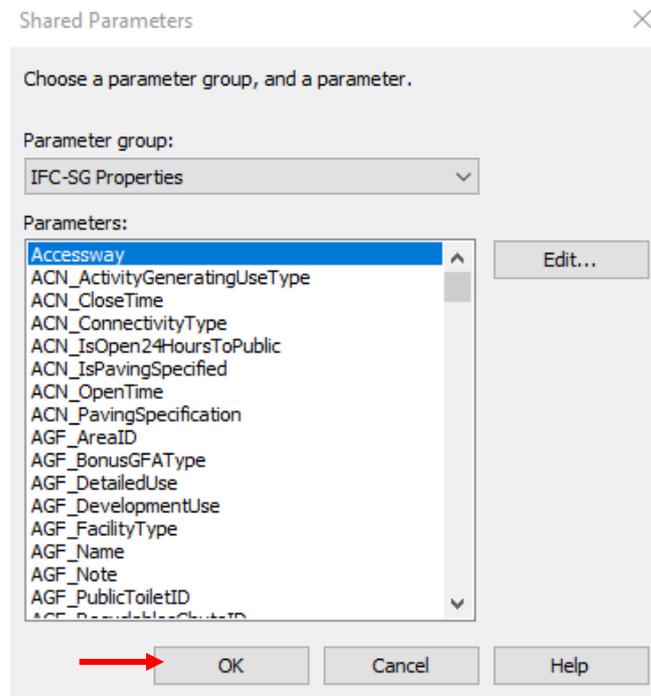
### Add Parameter

3. In the Parameter Properties dialog, under Parameter Type, select **Shared parameter**, and click **Select**.



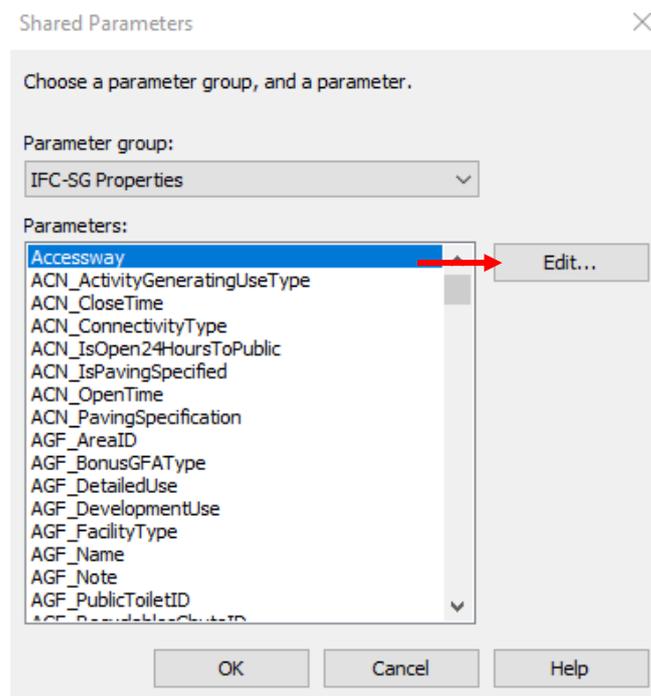
### Shared Parameter as Parameter Type

4. In the Shared Parameter dialog, select the appropriate and click ok.



Shared Parameter as Parameter Type

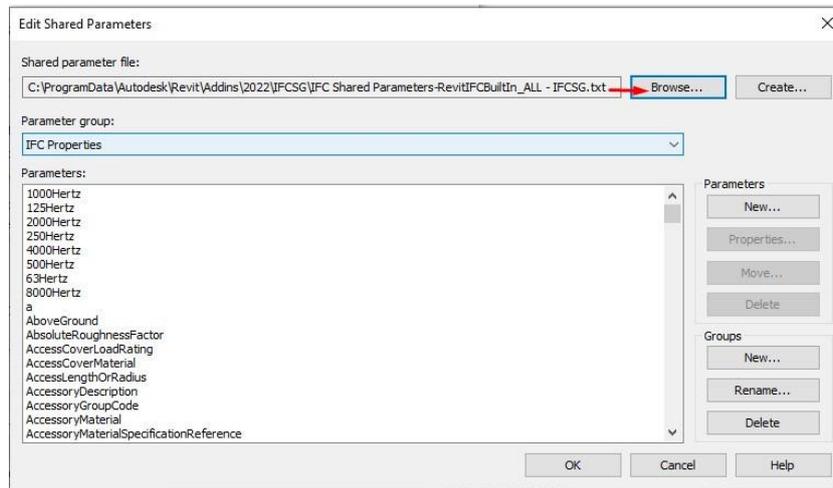
5. Click **Edit** to display the edit shared parameters dialog box.



Select "Edit"

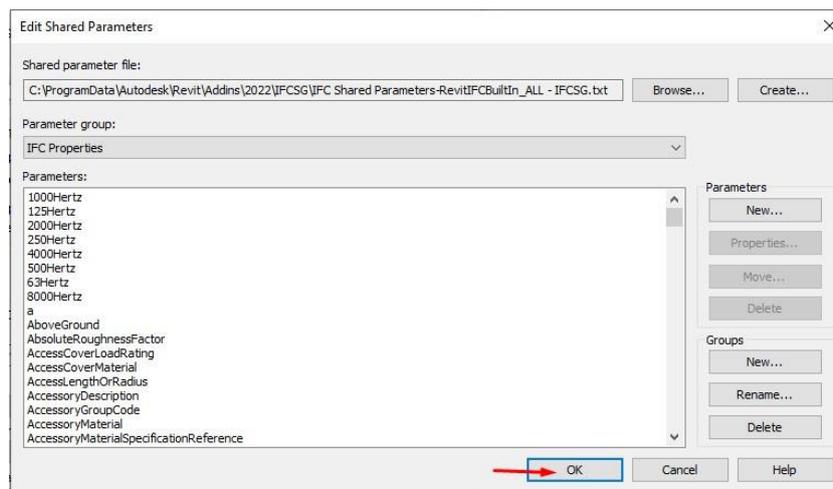
6. From this dialog, users can open a different shared parameter file or add new parameters.

7. Click **Browse** to preload the configured shared parameter file.



Select "Browse"

8. Look for IFC-SG Shared Parameter.txt file in the IFC-SG Resource Kit> Step 3) Revit>01) Setting up Revit Tool folder, select and then open.
9. After opening the **.txt file**, the window will look like the reference image below.

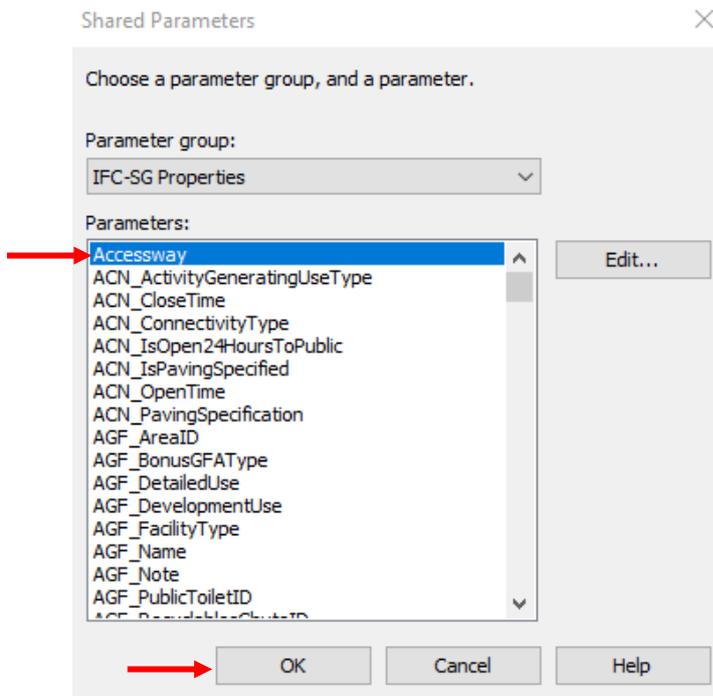


.txt File Loaded Successfully

## 10. Advance users to note

- a. For advance users who will be merging the IFC-SG Shared Parameters into existing company's shared parameter, use text editor tools such as notepad++ or excel, save the file as delimited (Tabs) .txt file.
- b. To manage the merge, and do take note of the following:
  - i. Ensure there is no duplicate parameter name
  - ii. For duplicate parameter names, ensure that the Revit GUID of the shared parameter (for parameter of similar name) follows the IFC-SG shared parameter, and remove the older parameter.
- c. Revit Schedule will not work be able to list the values of parameters of the same name but with different Revit GUID.

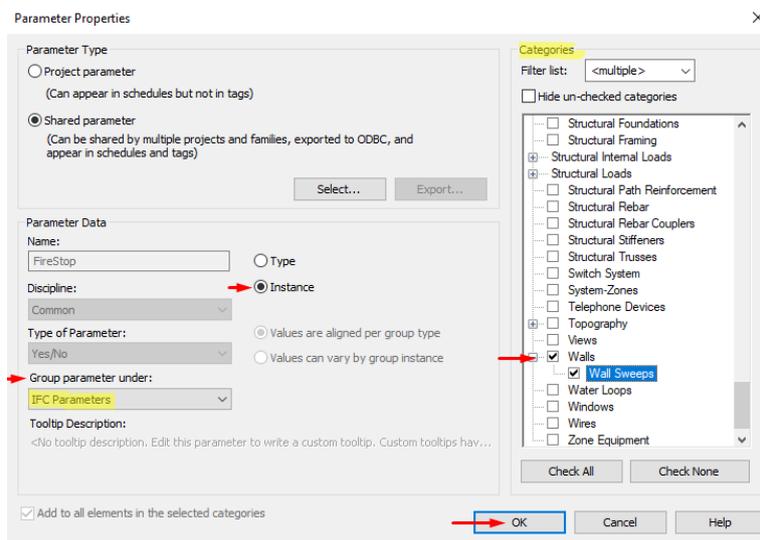
11. Find the parameter to be added. Search for the parameter manually or enter the parameter.



Select the Proper Property

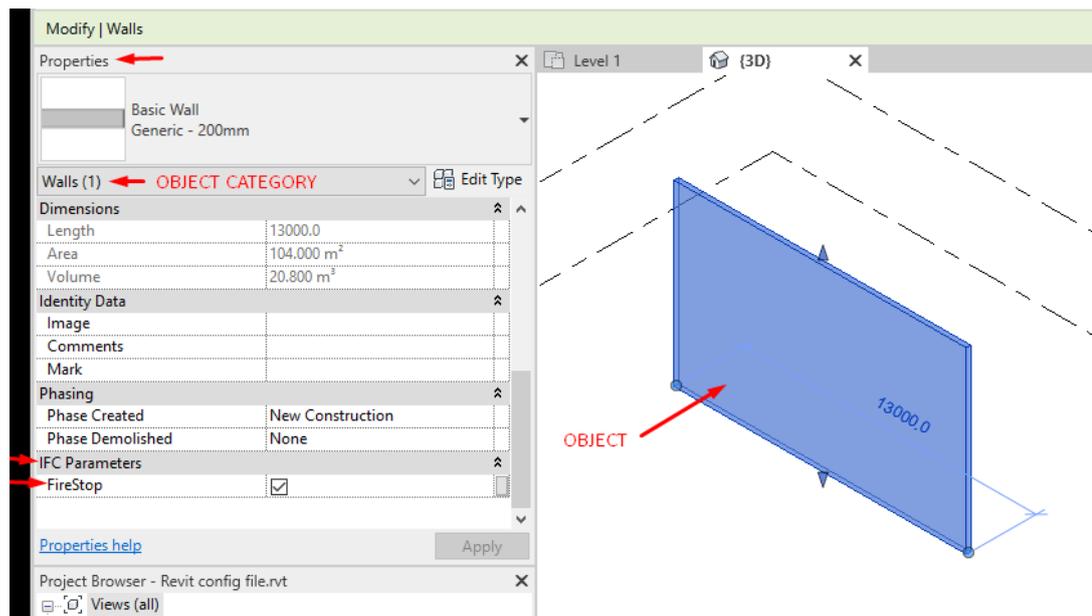
12. Under Parameter Data, set the parameter selected to **Instance** and group parameters to **IFC Parameters**.

Do not forget to check the target object's category to make sure it's correct. (In this case, the Walls is a category), click **OK**.



Adding property into object category

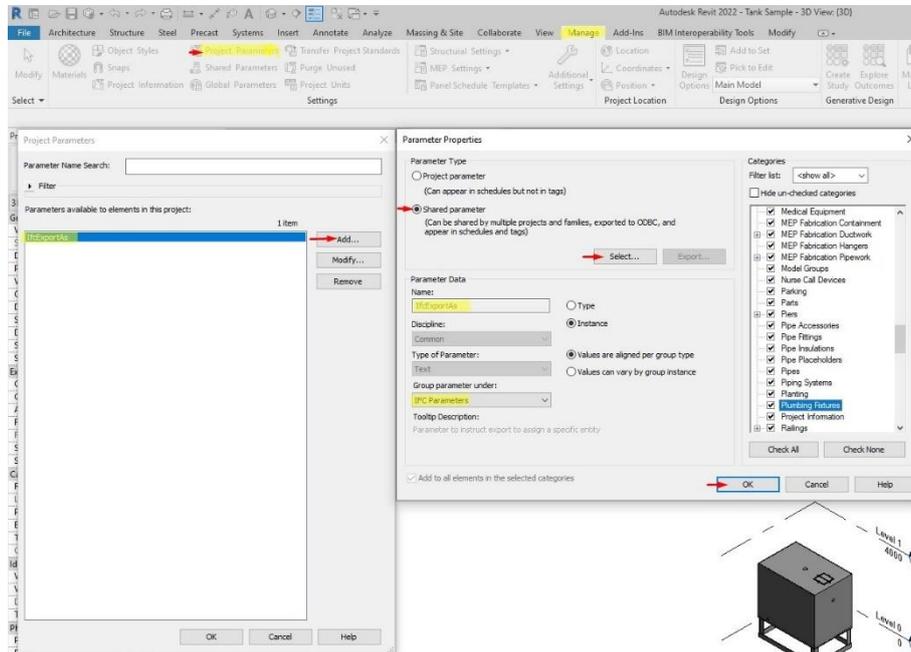
13. To confirm the added parameters, select the target object, look for IFC Parameters in Properties.



Property Successfully Added into the Object

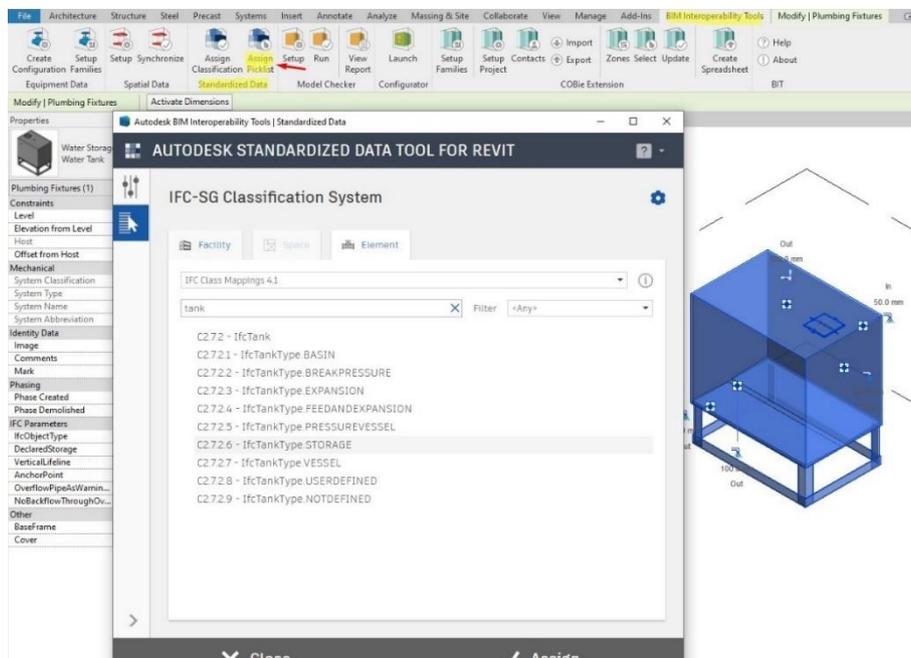
### 3.1.3 How to Apply Predefined Type (For Revit 2022 and before)

1. Predefined type can be added manually or through BIM Interoperability tools. In this example, BIM Interoperability has been used.
2. Before assigning in any object using BIM Interoperability tools, the Description Parameter (for example in picture below "IfcExportAs") should be pre-created under IFC Parameters group.



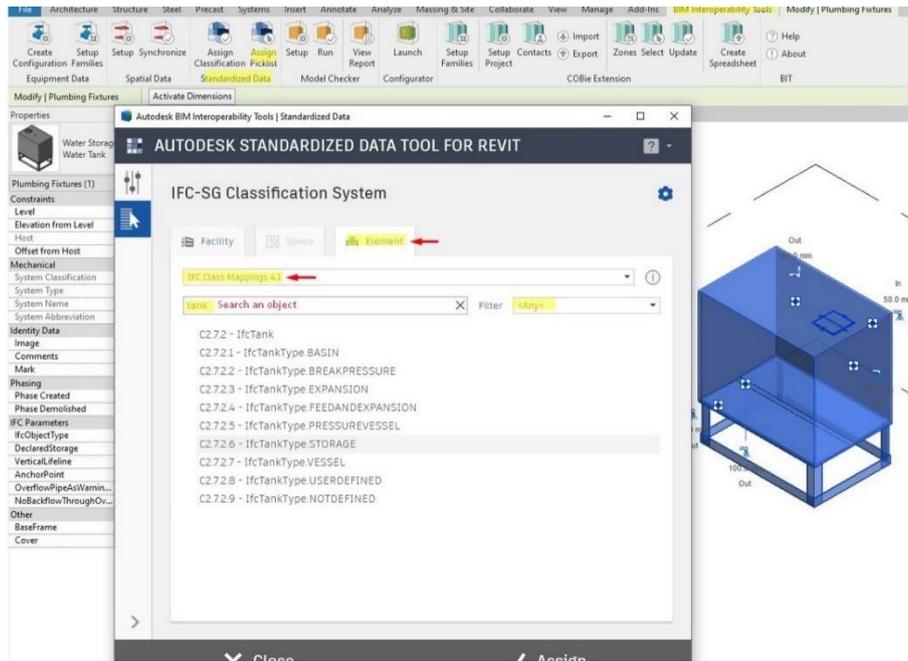
Pre-created IfcExportAs under IFC Parameter Group

3. Select the object to classify, go to BIM Interoperability Tools Ribbon Tab in the Standardized Data Panel, and select **Assign Picklist**.



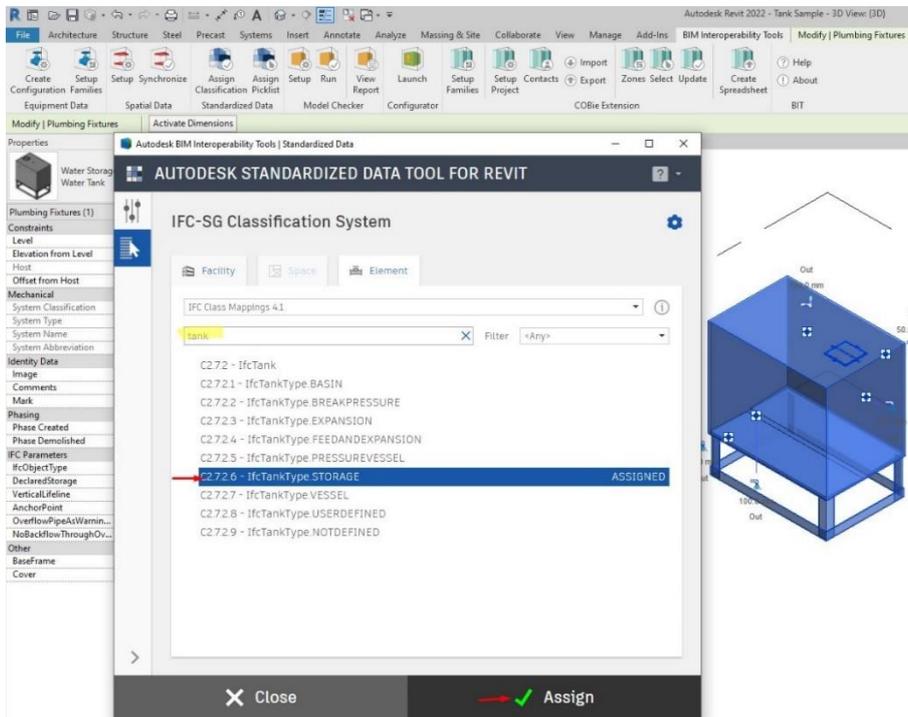
Standardized Data under BIM Interoperability Tools, choose "Assign Picklist"

- Under Elements (for classifying objects), select the version of **IFC Class Mappings 4.1**, and set the **Filter** at Any.



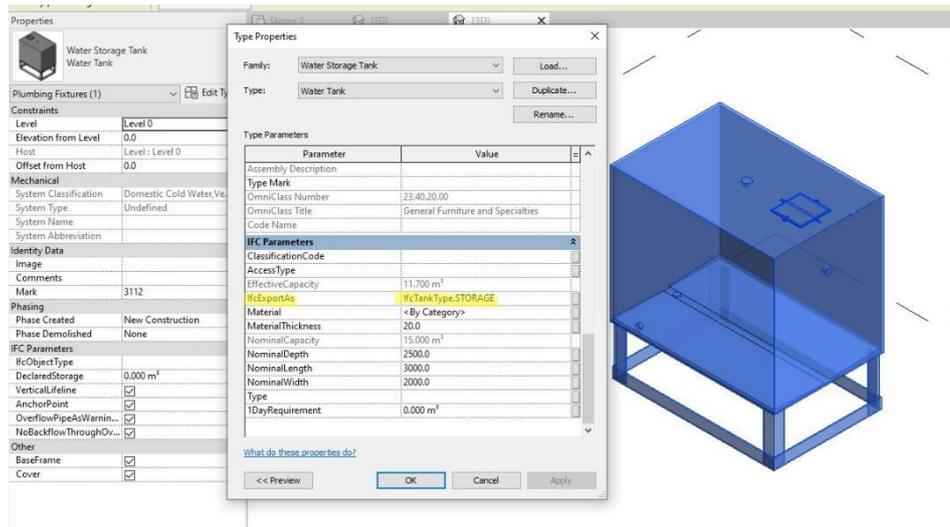
Classifying object under IFC Class Mapping 4.1

- Then **type and search** the object and choose the predefined type value. After that, click **Assign** and close the window. After assigning make sure to go back to the selected object and verify the input.



Assigning Predefined Type

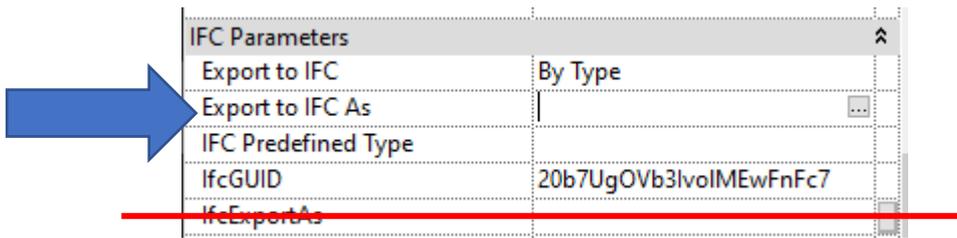
6. The object must already be assigned and categorized in the Properties/IFC Parameters.



Assigned Predefined Type

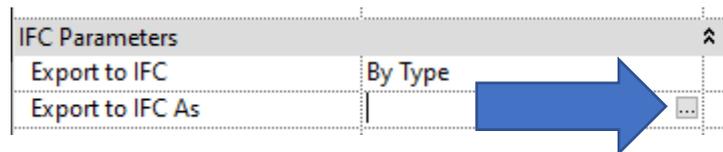
### 3.1.4 How to apply Predefined Type (Revit 2023 and newer)

1. For Revit 2023 and newer, populate the built-in “Export to IFC As” parameter right from the property palette, ignoring the “IfcExportAs” parameter.



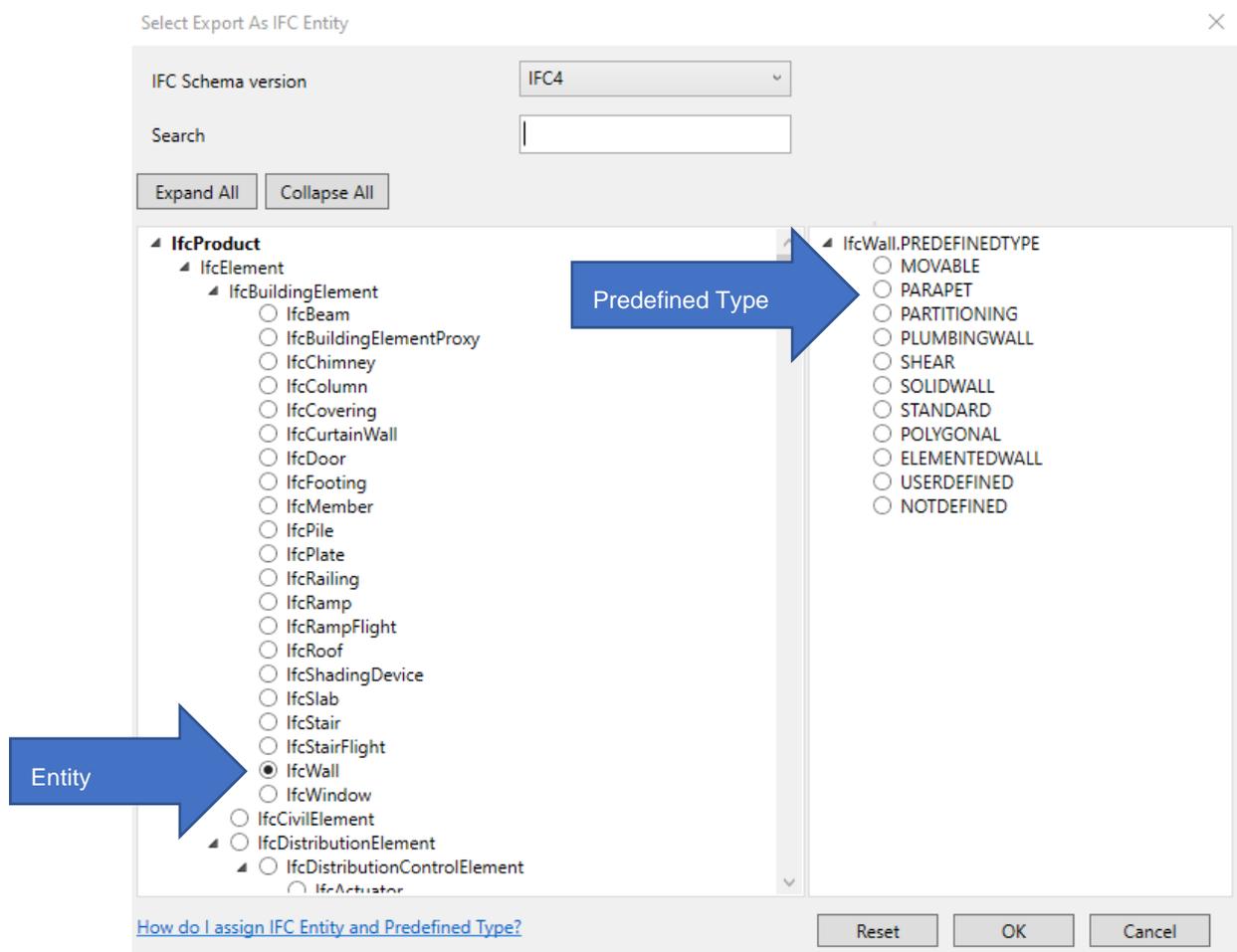
Using Export to IFC As and Ignoring IfcExportAs for R23 and newer

2. Click the options (3 dots icon) to open the IFC Entity Selector.



Open up IFC Entity Selector

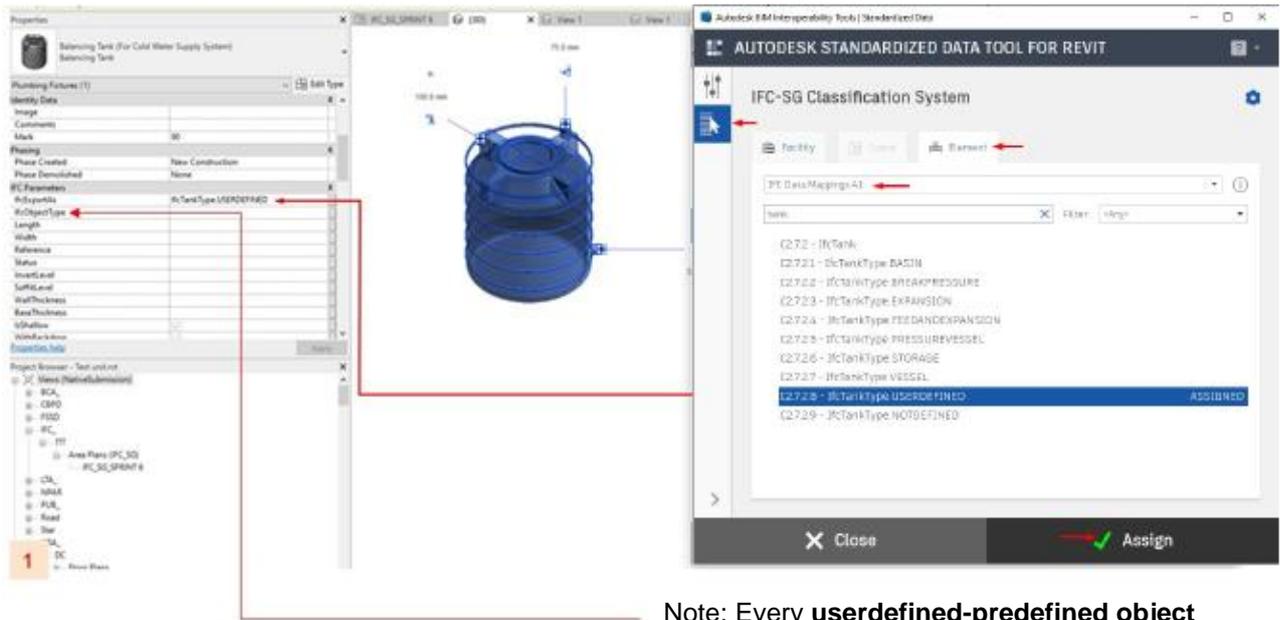
3. Pick and choose the Entity and its Predefined Type as shown and select “Ok”



Assign Predefined Type

### 3.1.5 How to Apply Userdefined Type

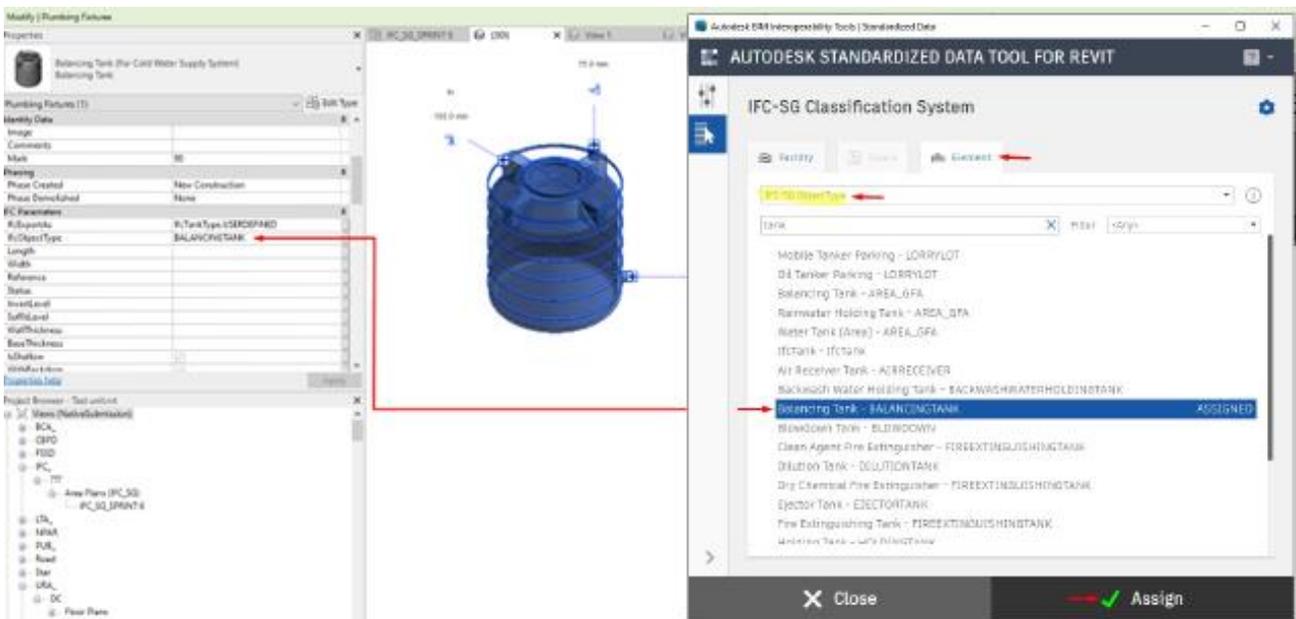
1. To assign userdefined-predefined type using BIM Interoperability Tools, simply assign the selected object to its **USERDEFINED**. In this case, **IfcTankType.USERDEFINED**.



Note: Every **userdefined-predefined** object there should be a corresponding **IfcObjectType** value.

#### For Userdefined Object Type

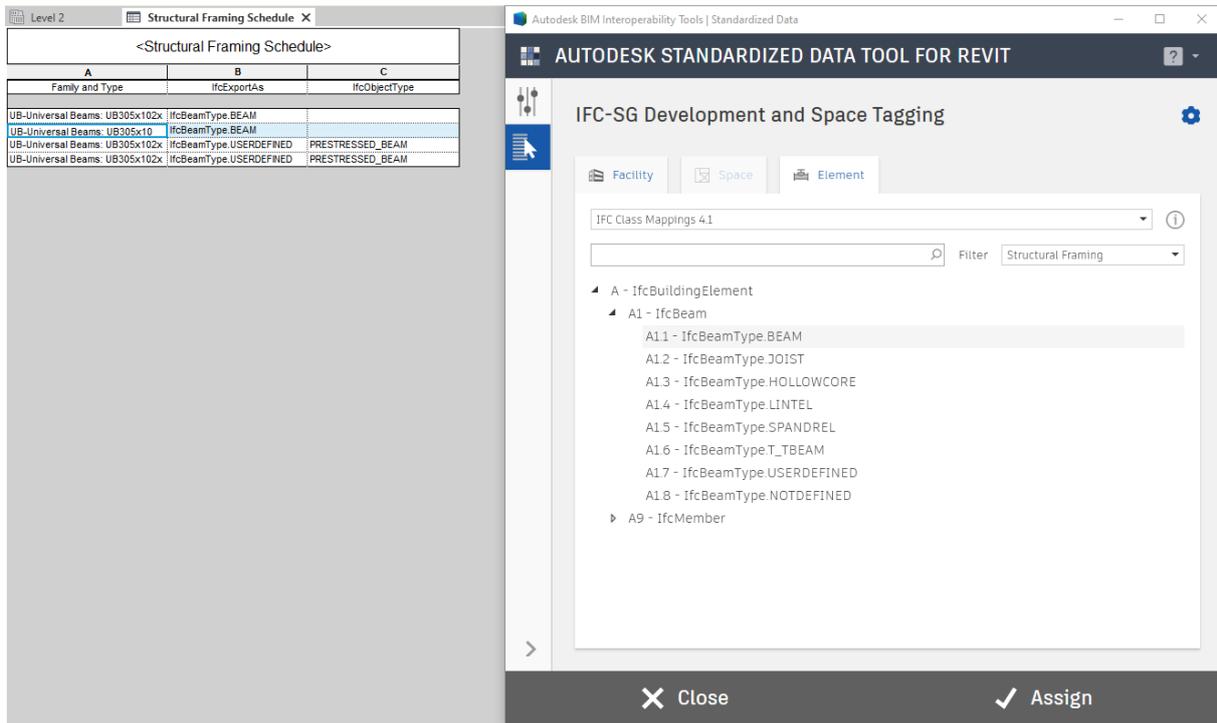
2. If the object is **userdefined**, type and search under **IfcObjectType**. And again, Description Parameter (**IfcObjectType**) should be pre-created before assigning.



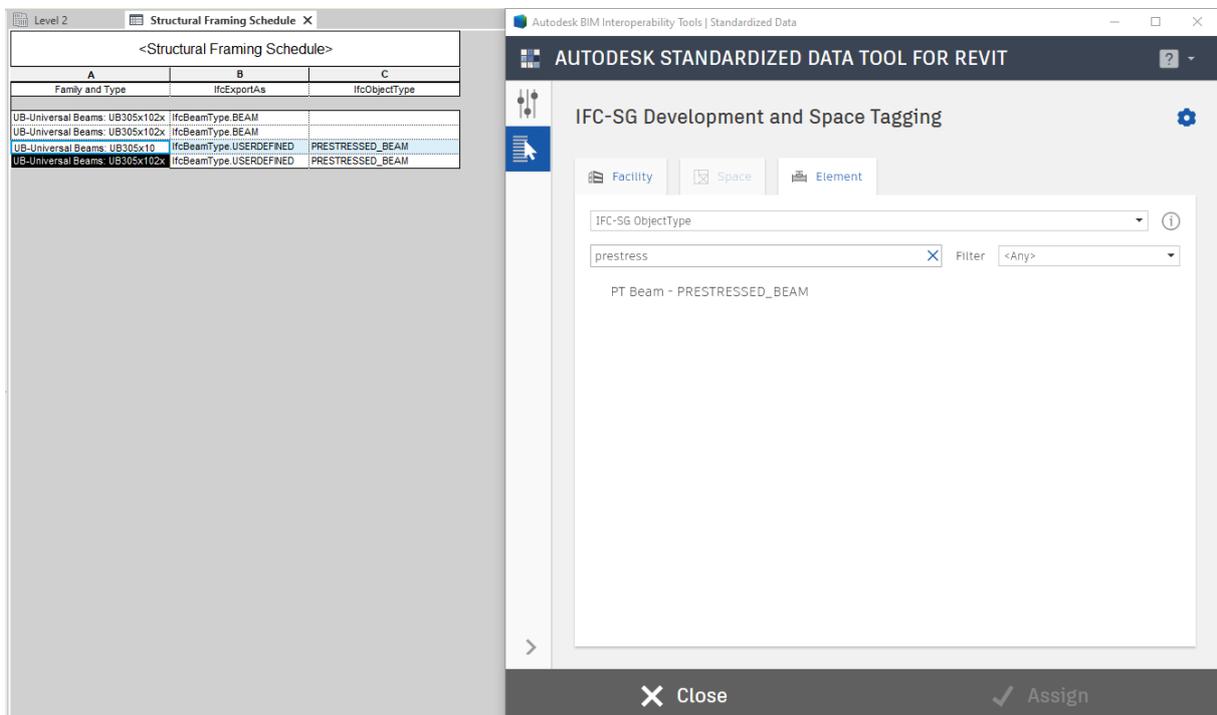
#### Adding the Value for Userdefined Object Type

### 3.1.6 Using Revit Schedule to populate Object Types for IfcExportAs and IfcObjectType

The Revit Schedule feature will allow an overview of the information within a Family. In the below example, a Structural Framing Schedule was created to view on what information the IfcBeam been assigned, and the BIM Interoperability Tool was used to quickly assign values to “IfcExportAs” and “IfcObjectType”



Assigning predefined types to “IfcExportAs”

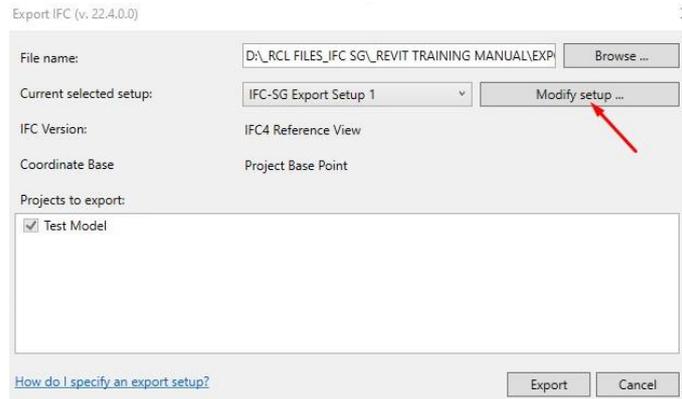


Assigning “USERDEFINED” to “IfcExportAs” and “PRESTRESSED\_BEAM” to “IfcObjectType”

as the object type was not part of the predefined enumeration in IfcBeam.

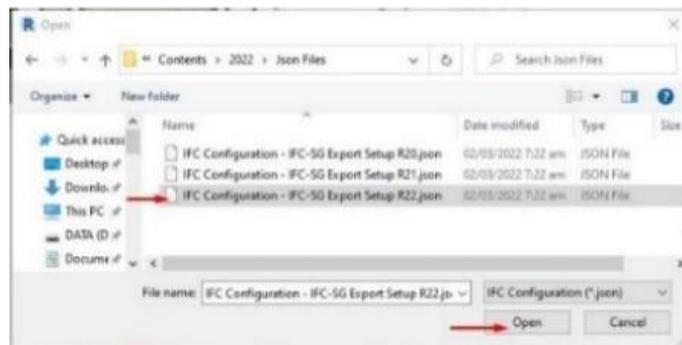
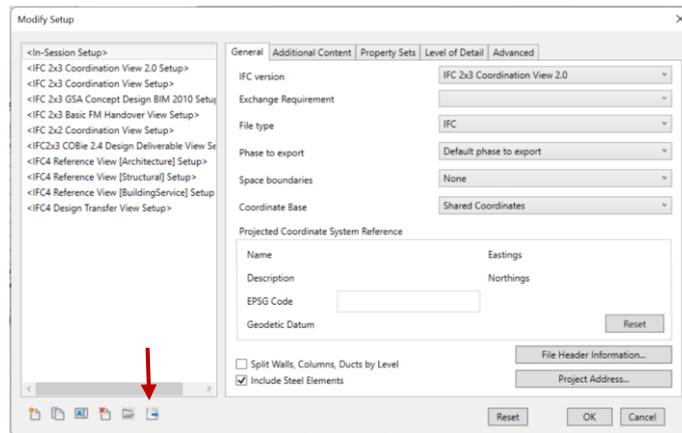
### 3.1.7 IFC Export Setup

1. When exporting the file, make sure that the current setup is the correct format. To check this, click **Modify setup**.



#### Modify Setup under Export IFC

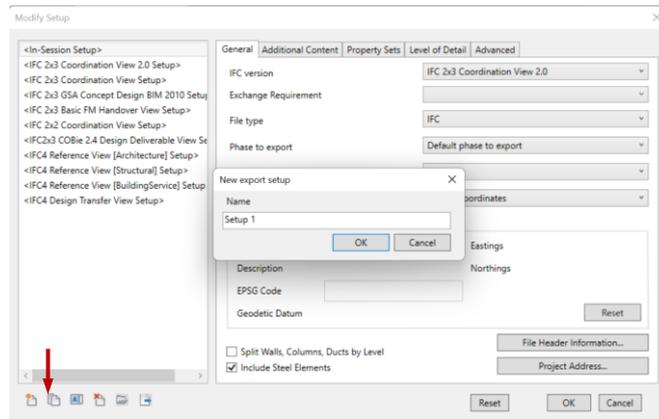
2. User can load the JSON files from the provided files, depending on the version of Revit the user is using. The JSON file would have presented all the needed settings for export to IFC-SG, users will only need to follow Step 6, to browse the local directory for the property mapping file.



#### Loading of JSON File

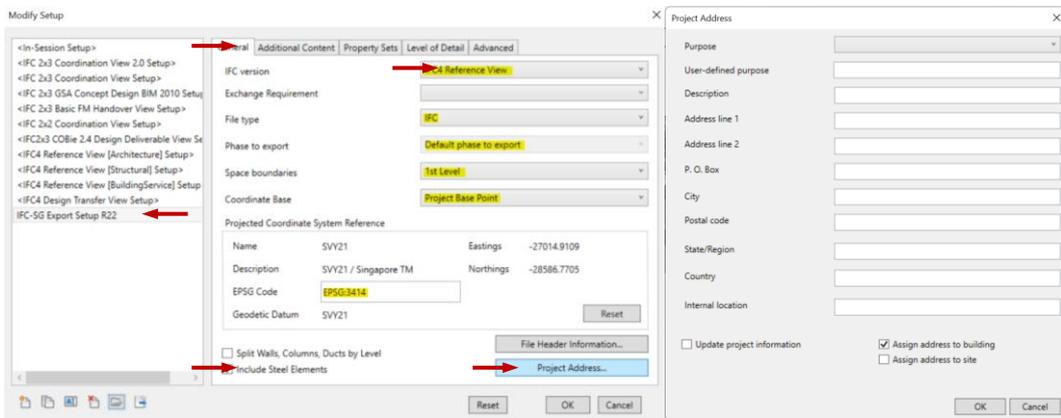
- If these settings are not available/ not usable for specific version, the user can manually apply these settings.

Click create new format and name the new export setup.



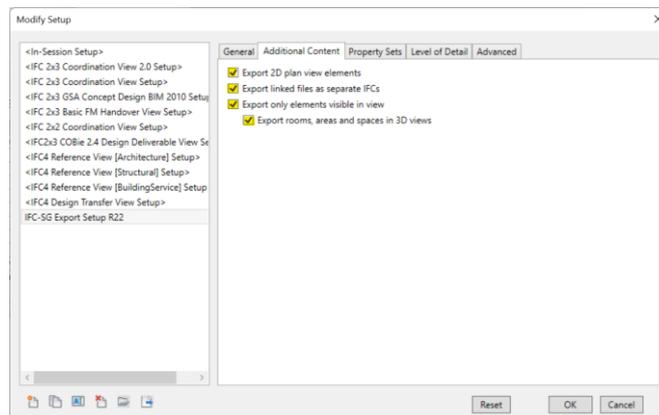
**Creating new Export Setup for Revit2022**

- Select the created setup, go to the General tab, copy the highlighted details and click Project Address to change the desired location.



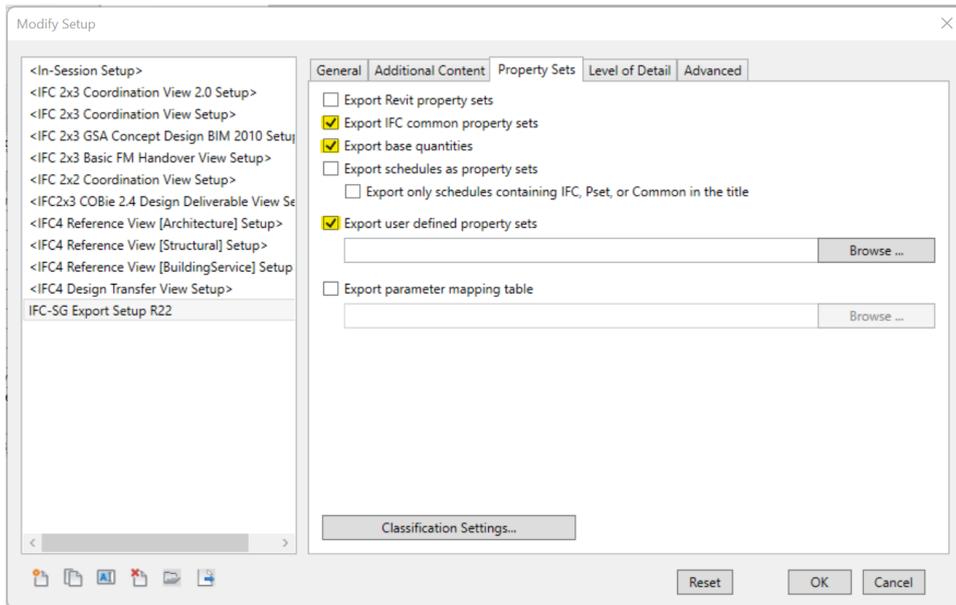
**Setup under General**

- After entering the Project Address, go to the next tab, Additional Content, select all the boxes, and then go to the next tab.



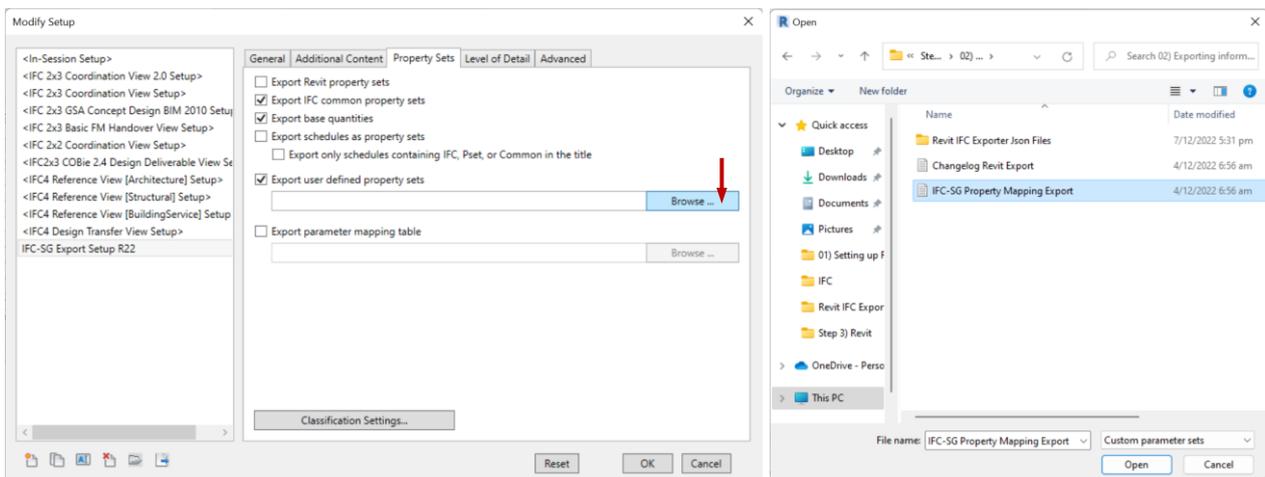
**Setup under Additional Content**

6. After the Additional Content, go to the Property Set and enable the following options in the image below.



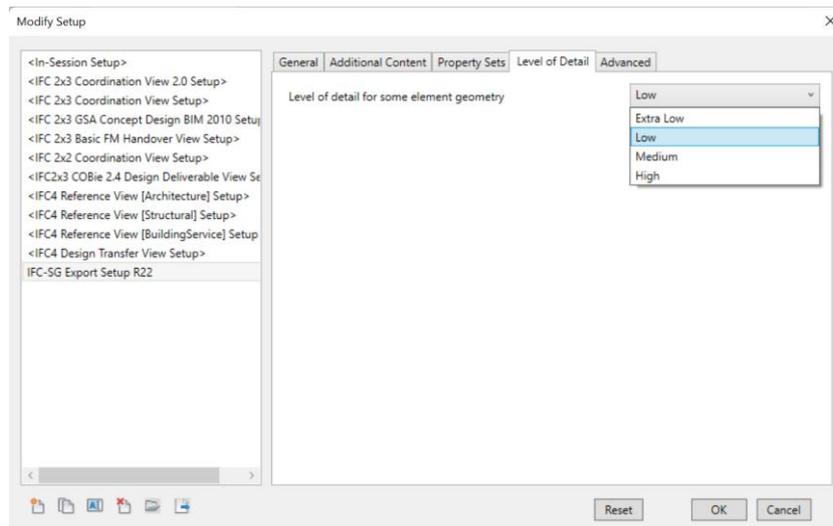
Setup under Property Sets

7. To load the IFC-SG Property Mapping Export file, select browse on the Property Sets tab and select the IFC-SG Property Mapping Export.txt file.



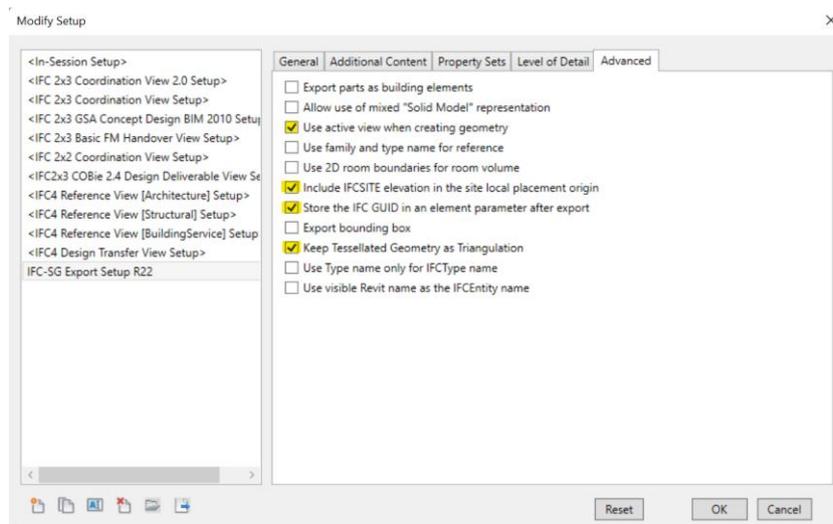
Adding the File for Export Userdefined Property Sets

- After loading into the SGPset, proceed to the Level of Detail tab. Set the “Level of Detail for some element geometry” to **Low**. Then proceed to Advanced tab.



Setup for Level of Detail

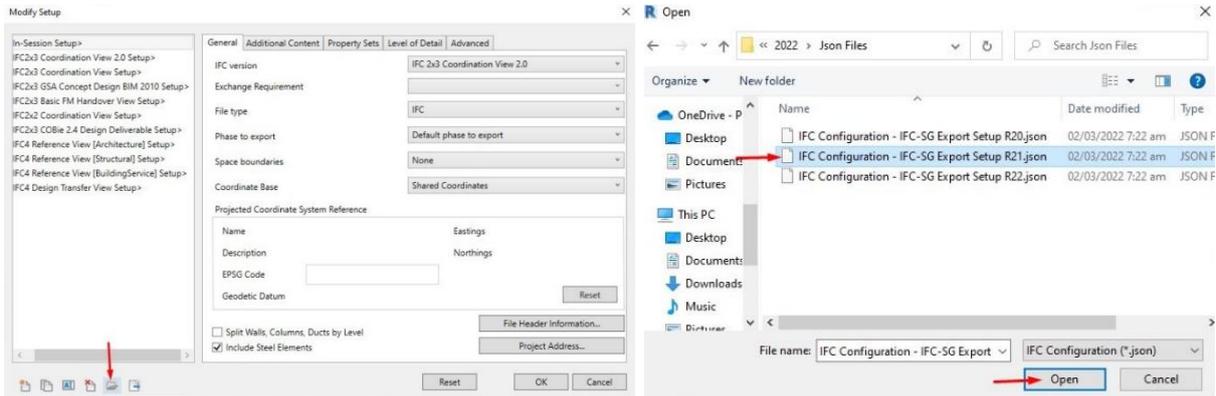
- Finally, on the Advanced tab, **select the Use active view when creating geometry, IFCSITE, IFC GUID and the Tessellated Geometry**. Then go back to all the tabs to see if something missed out and if everything was set up correctly, then click **OK**.



Setup for Advanced

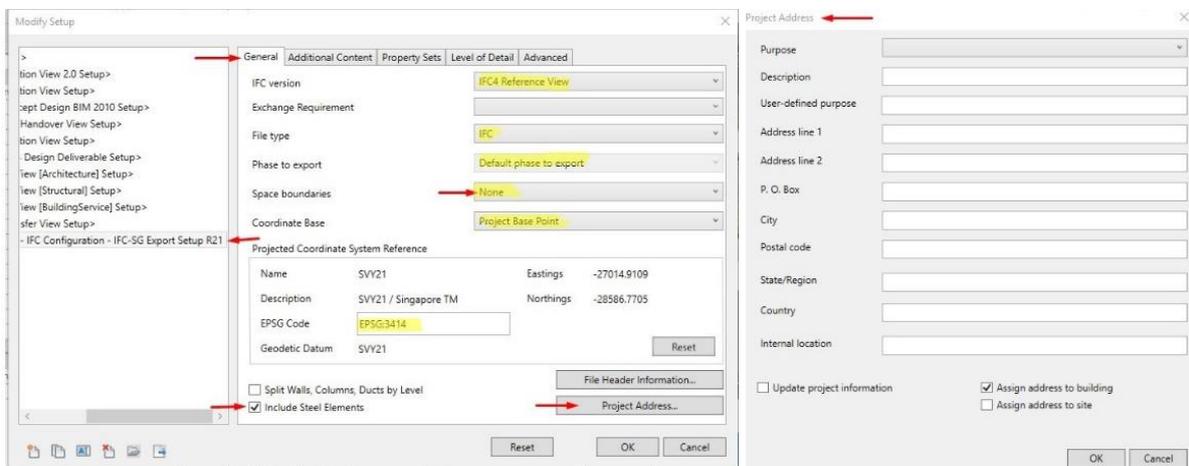
For the **Revit 2021** users, the IFC Export Settings are as follows:

1. The user can load the JSON file from the file provided according to the version.



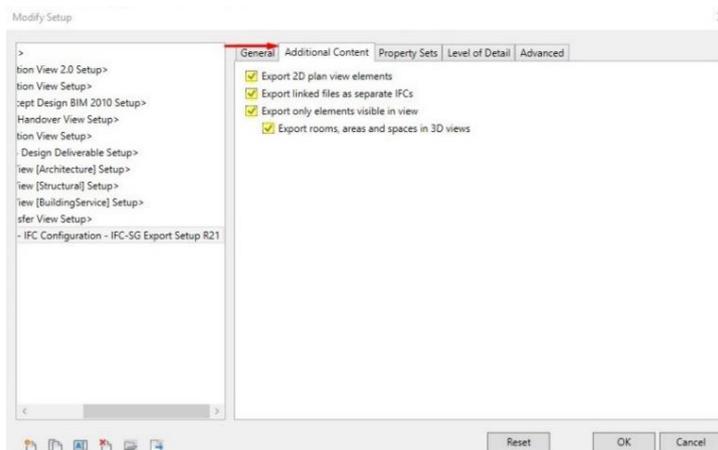
Setup for Revit 2021

2. Select the created setup, go to the General tab, copy the highlighted details and click Project Address to change the desired location.



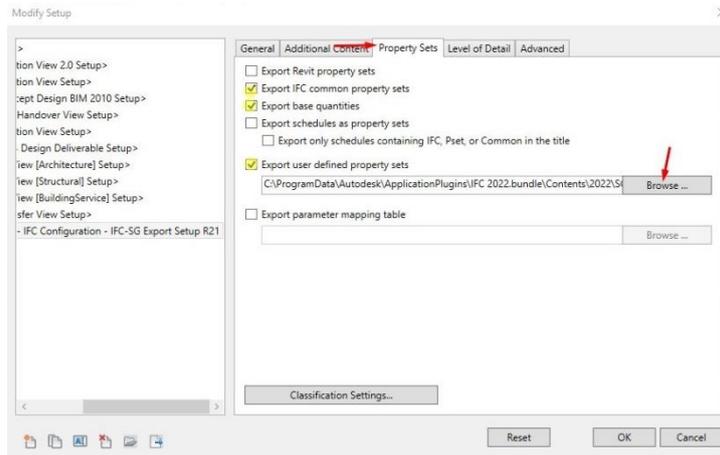
Setup under General

3. After entering the Project Address, go to the next tab, Additional Content, select all the options, and then go to the next tab.



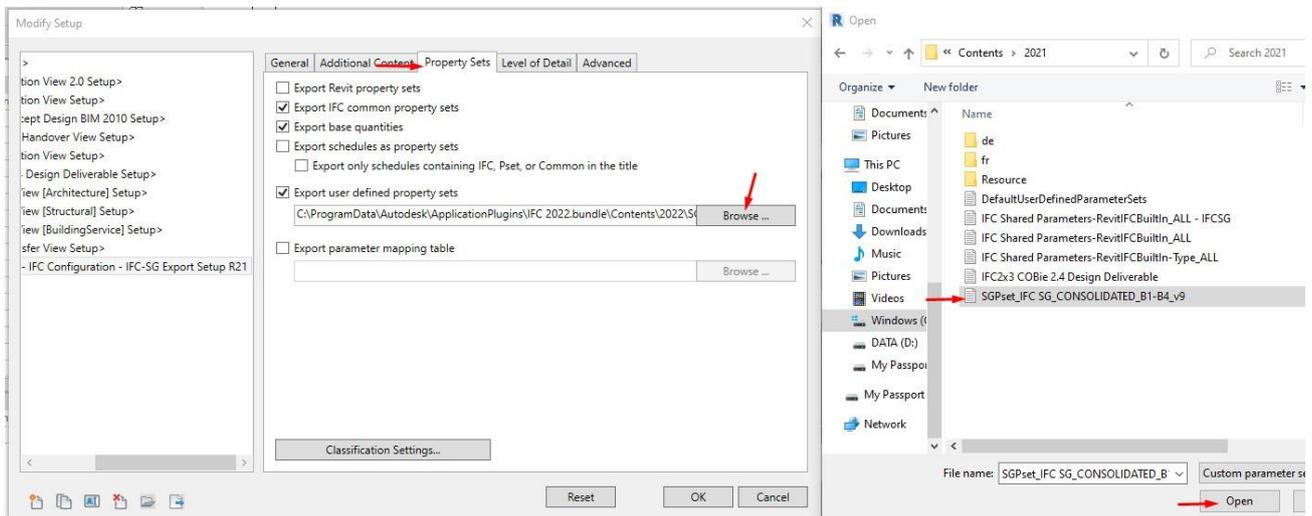
Setup under Additional Content

4. After the Additional Content, go to the Property Set and enable the following features in the image below.



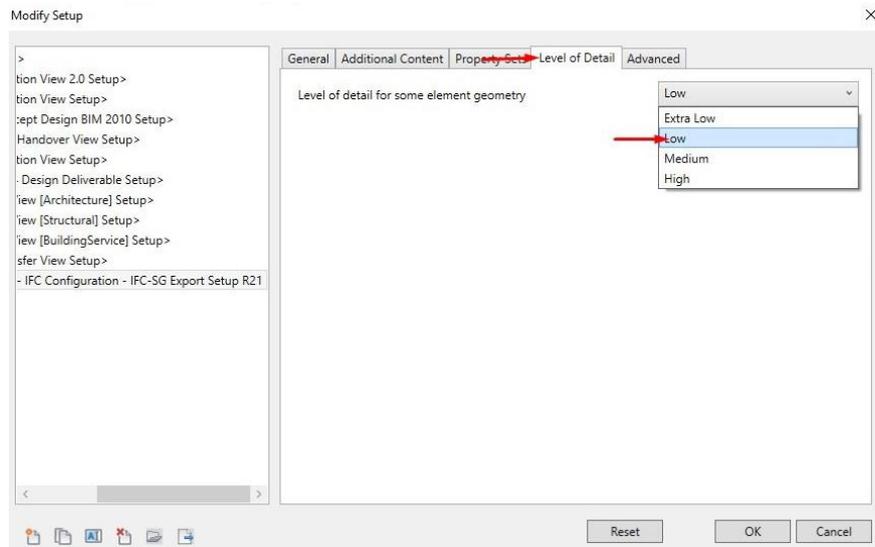
Setup under Property Sets

5. To load the IFC-SG Property Mapping Export file, select browse on the Property Sets tab and select the IFC-SG Property Mapping Export.txt file.



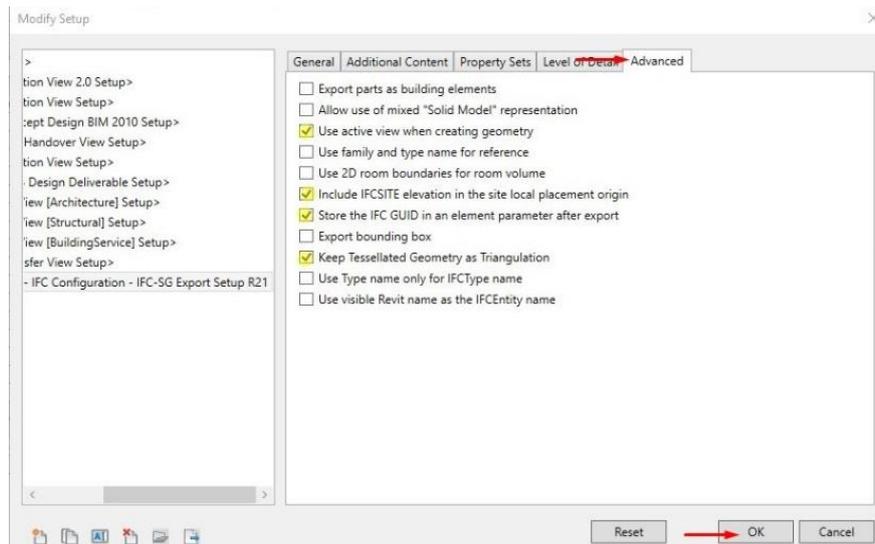
Adding the File for Export Userdefined Property Sets

6. After loading in the SGPset, proceed to the Level of Detail tab. Set the Level of Detail for some element geometry to **Low**. Then proceed to Advanced tab.



Setup for Level of Detail

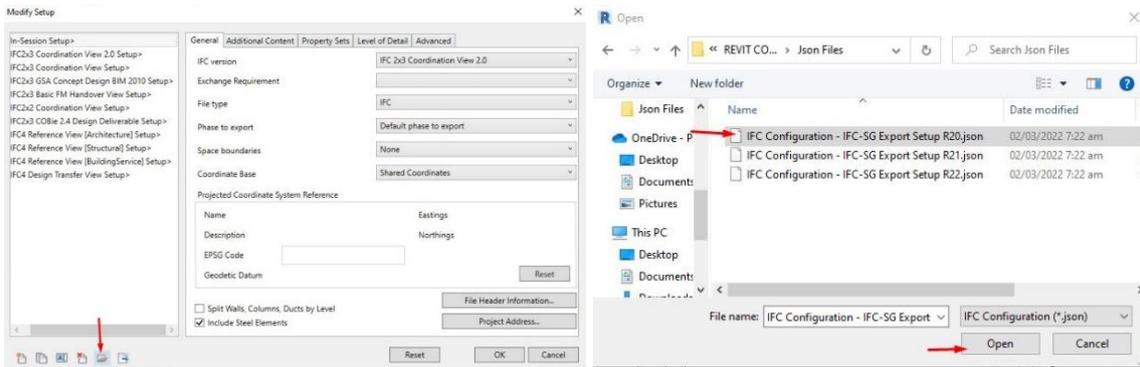
7. Finally, on the Advanced tab, **select the Use active view when creating geometry, IFC SITE, IFC GUID and the Tessellated Geometry**. Then go back to all the tabs to see if something missed out and if everything was set up correctly, then click **OK**.



Setup for Advanced

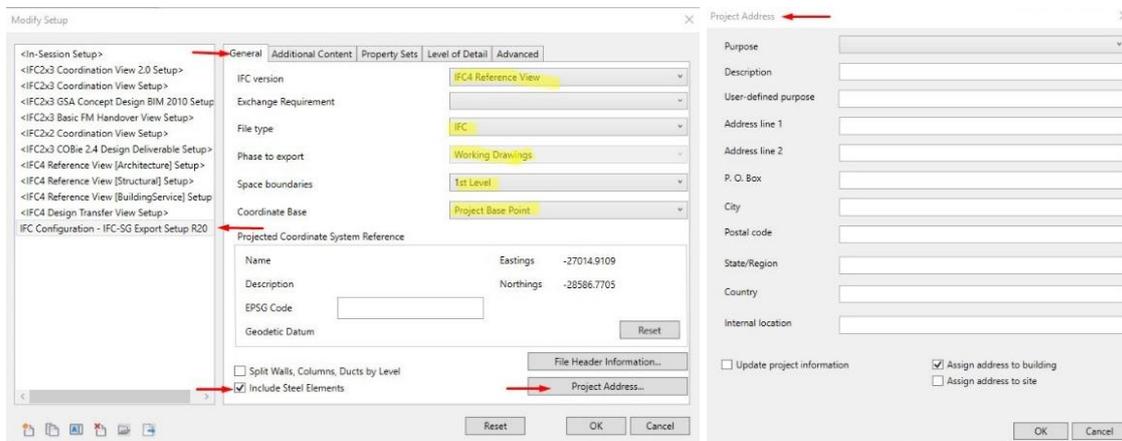
For the **Revit 2020** users, the IFC Export Settings are as follows:

1. The user can load the JSON file from the file provided according to the version.



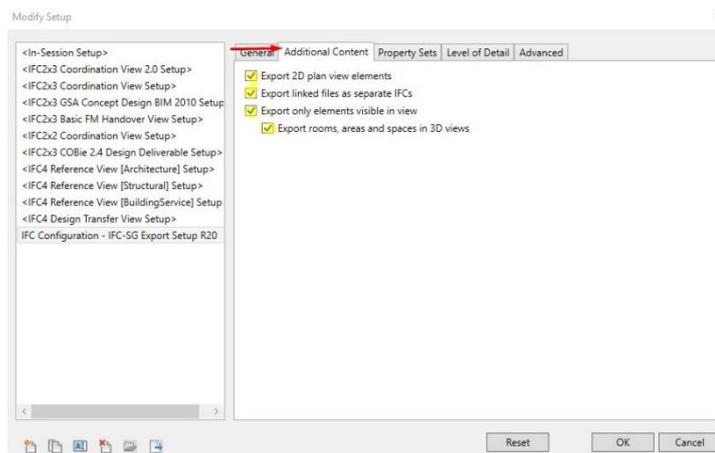
**Setup for Revit 2020**

2. Select the created setup, go to the General tab, copy the highlighted details and click Project Address to change the desired location.



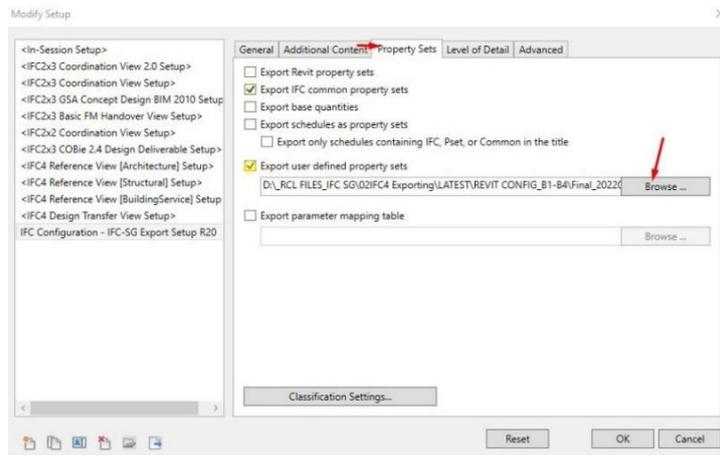
**Setup under General**

3. After entering the Project Address, go to the next tab, Additional Content, select all the boxes, and then go to the next tab.



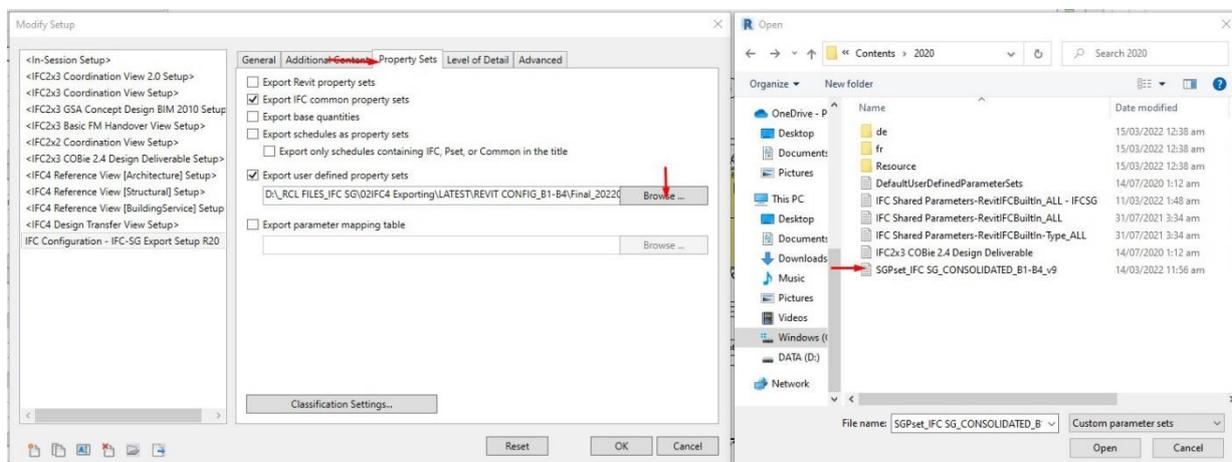
**Setup under Additional Content**

4. After the Additional Content, go to the Property Set and copy and follow this format.



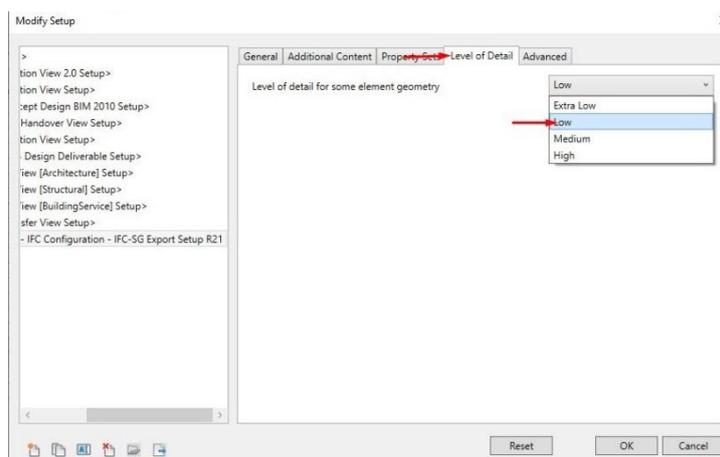
Setup under Property Sets

5. To load the SGPset .txt file, select browse on the Property Sets tab and select the SGPset file.



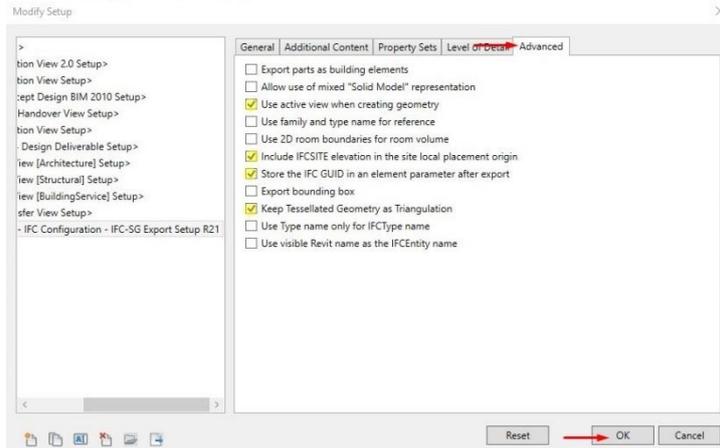
Adding the File for Export Userdefined Property Sets

6. After loading into the SGPset, proceed to the Level of Detail tab. Set the Level of Detail for some element geometry to **Low**. Then proceed to Advanced tab.



Setup for Level of Detail

7. Finally, on the Advanced tab, **select the Use active view when creating geometry, IFCSITE, IFC GUID and the Tessellated Geometry.** Then go back to all the tabs to see if something missed out and if everything was set up correctly, then click **OK**.



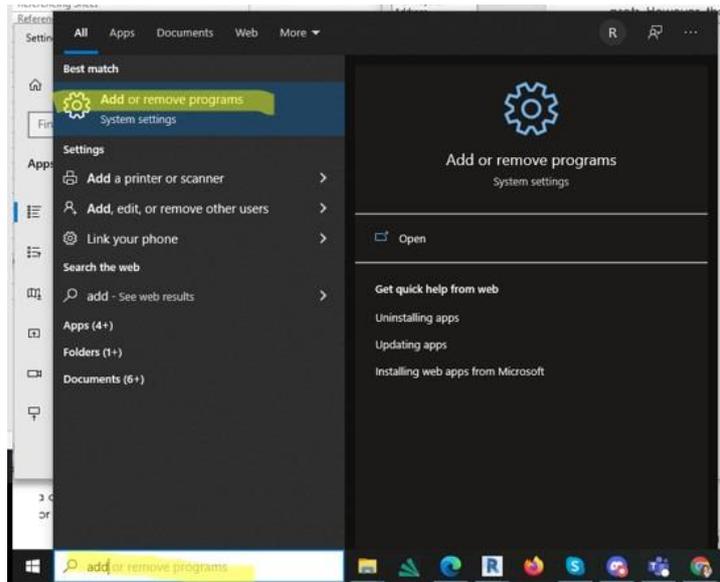
Setup for Advanced

### 3.1.8 IFC Installation Guide

There are 2 means of updating the built-in IFC exporter to its latest release, either a) automatically via the Autodesk desktop application, or b) through manually downloading the latest release for respective Revit versions (eg. Revit 2022, 2023, etc...) through the GitHub releases page.

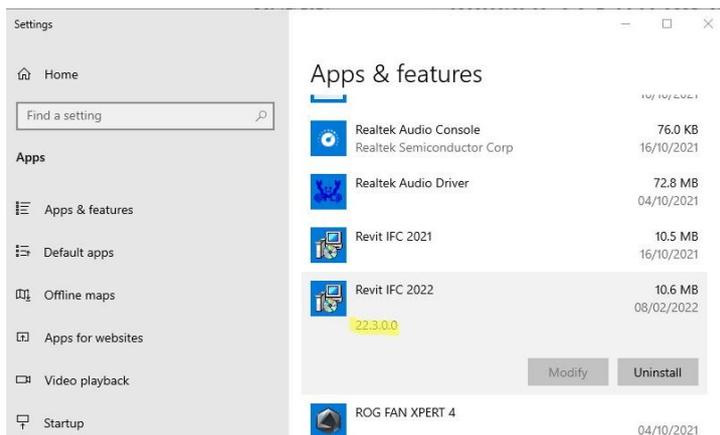
It is recommended to perform IFC exporter updates through the desktop application whenever possible and to only use the GitHub method (b) if the updating through the desktop application fails.

1. Before performing any updates to the IFC exporter, please check if there was an earlier version of the IFC exporter installed.
2. To check the current version of IFC exporter installed, click on the windows icon and then type “Add or remove program”.



IFC Exporter from System Programs

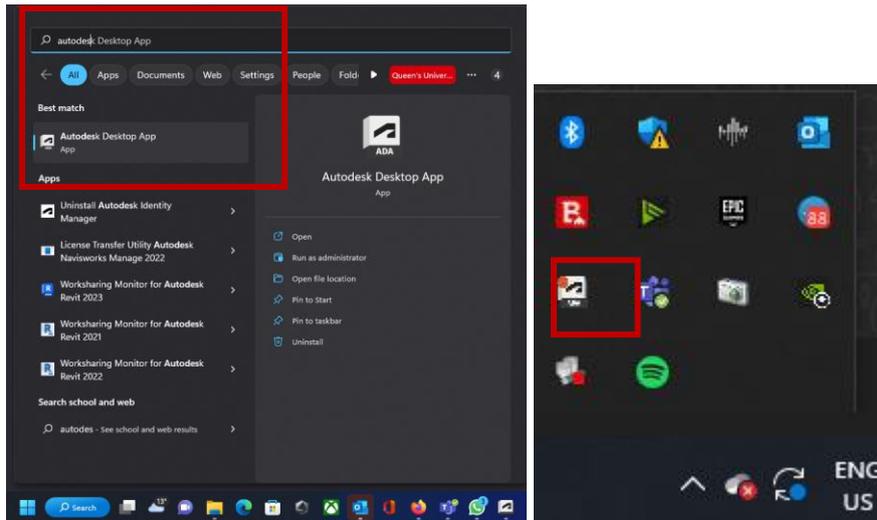
3. Uninstall the previous versions of Revit IFC exporter before proceeding to install the latest release of Revit IFC Exporter.



Uninstall the older version of Revit IFC Exporter

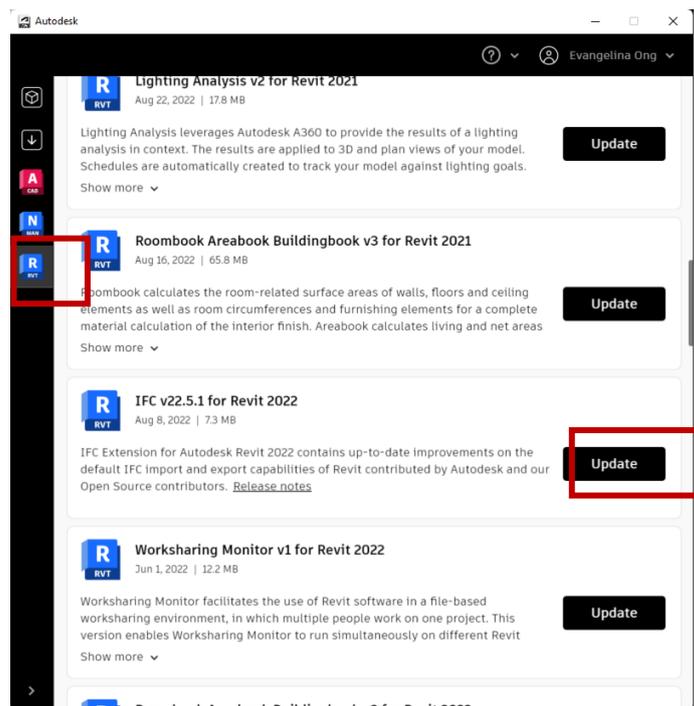
- a) Through the Autodesk desktop application.

1. Launch the Autodesk desktop application through searching for the application from the the windows home menu, or through the shortcut located in the taskbar.



Launching the Autodesk Desktop Application

2. Once launched, navigate to the Revit tab on the left to check for any new releases for the relevant Revit versions and to click on the corresponding update button, to the latest version available.



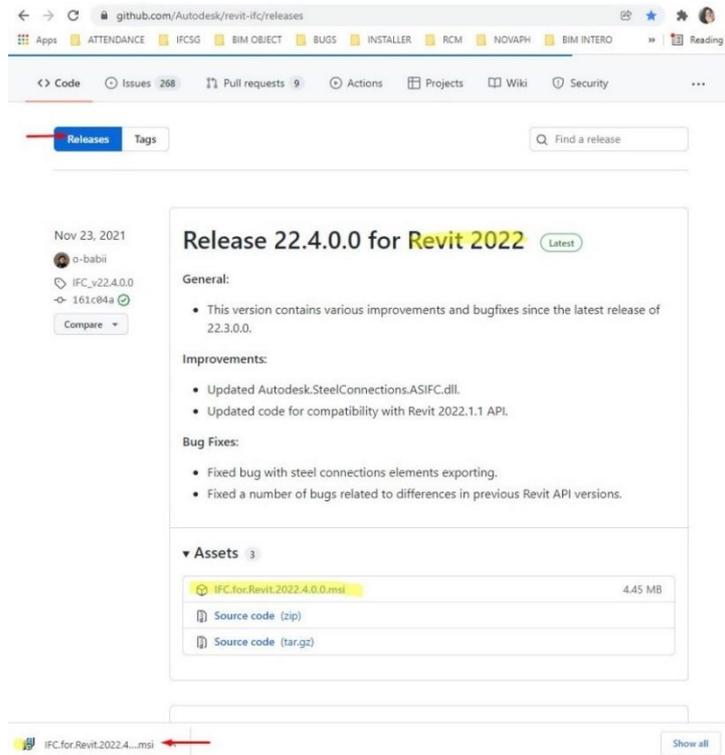
Updating of IFC Exporter Version

b) Though GitHub

When installing the Revit IFC Exporter, check for the latest Releases at the following link: <https://github.com/Autodesk/revit-ifc/releases>

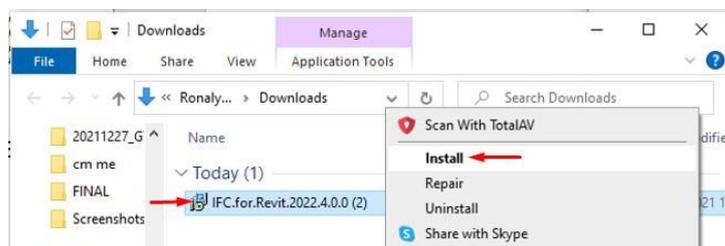
In this example, download the Revit 2022 IFC Exporter.

3. Click on the **Releases** to check for a latest release update.
4. Under Assets, download the .msi file.



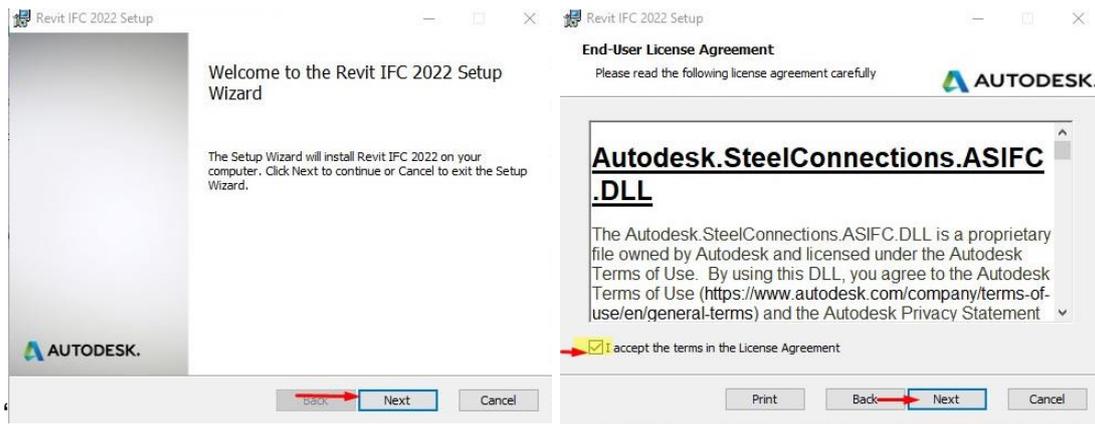
Revit IFC Exporter

5. Start installing the latest release of the Revit exporter.



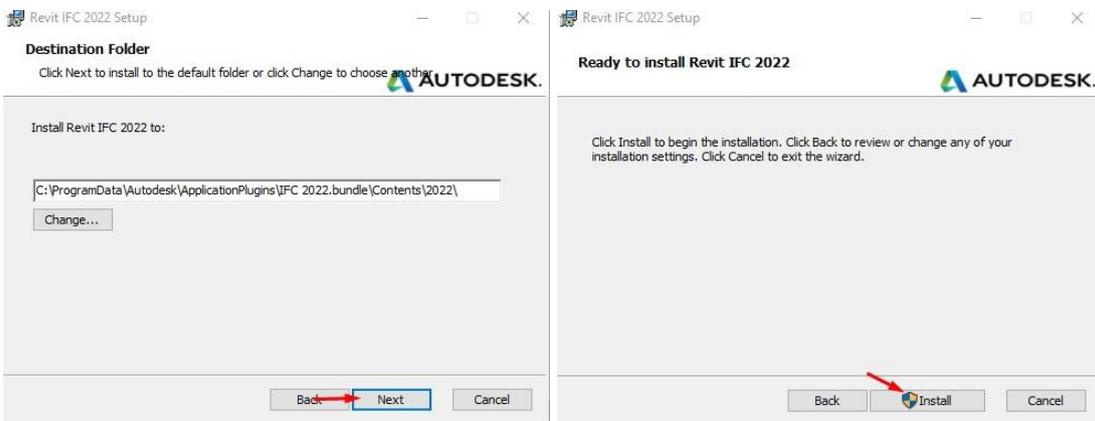
Installing the latest Revit IFC Exporter

6. Click Next to continue installing, tick the 'I accept' message, then click Next...



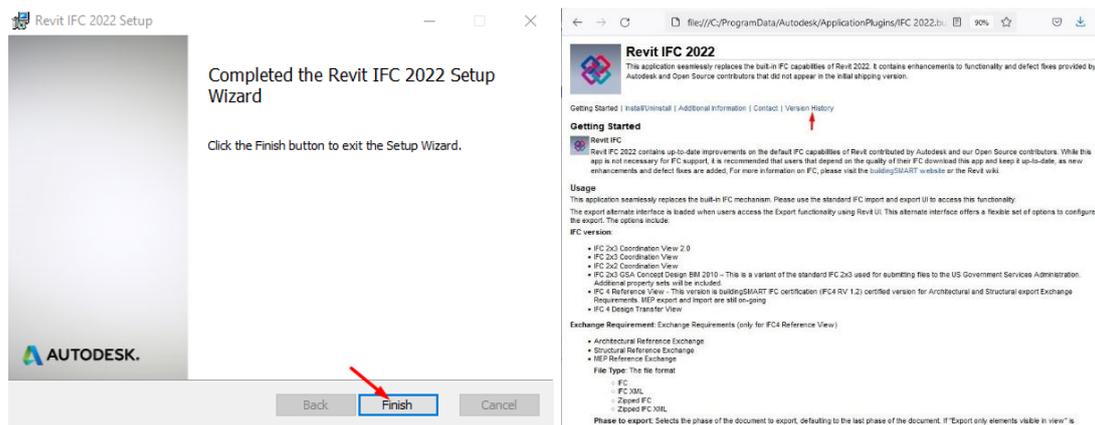
#### Installing setup

7. Click Next after verifying the location of the destination folder. Then click Install.



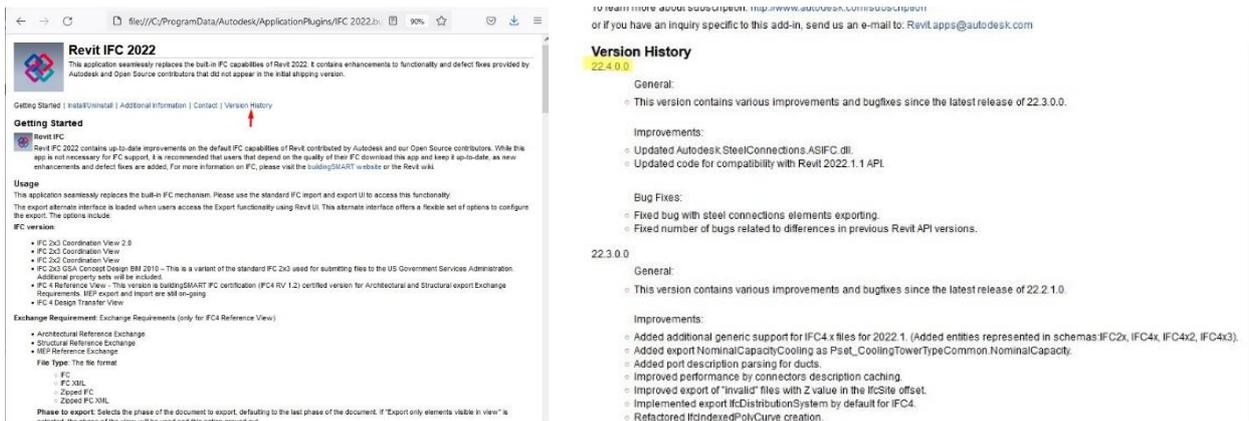
#### Install the latest Revit IFC Exporter

8. Click finish. If the installation is done correctly, it will redirect to a link of the Revit IFC 2022.



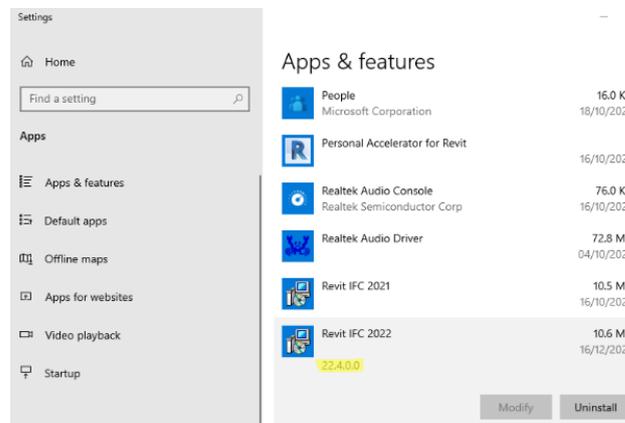
#### Installed successfully

9. Verify if the installed Revit IFC exporter has the version 22.4.0.0 by clicking the Version History.



Verified Revit IFC Exporter version in the link

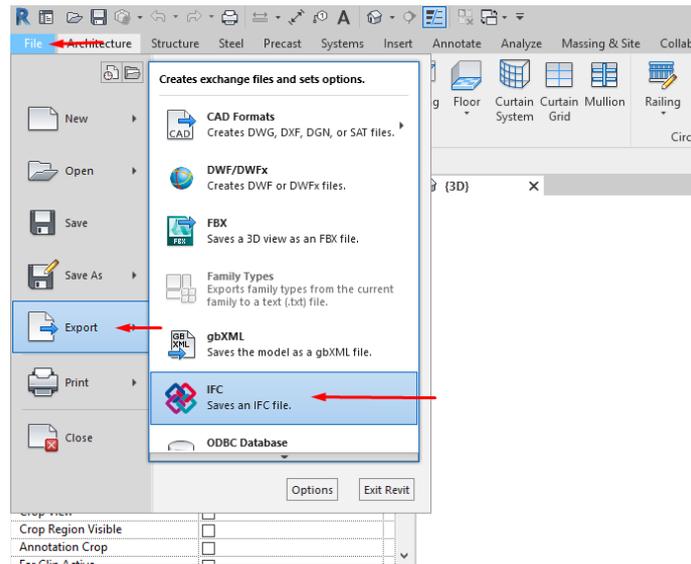
10. Check also in the windows under Apps & features if the installed IFC Exporter is the latest version.



Verified Revit IFC Exporter version in windows installed

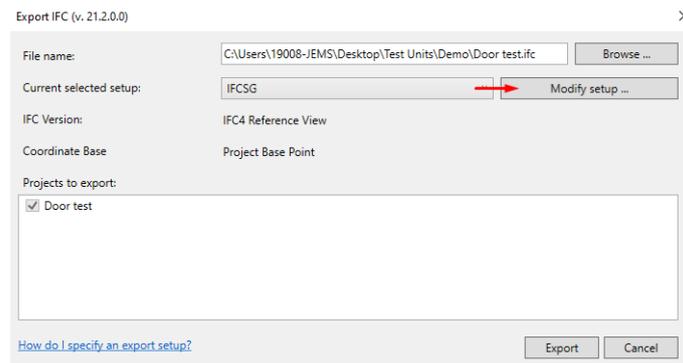
### 3.1.9 IfcMapConversion

1. When dealing with the exact origin of the BIM, IfcMapConversion allows local engineering coordinate system to its place within the map by specifying its datum within the model. To specify the datum simply go to **File Ribbon Tab** select **Export** then click **IFC**.



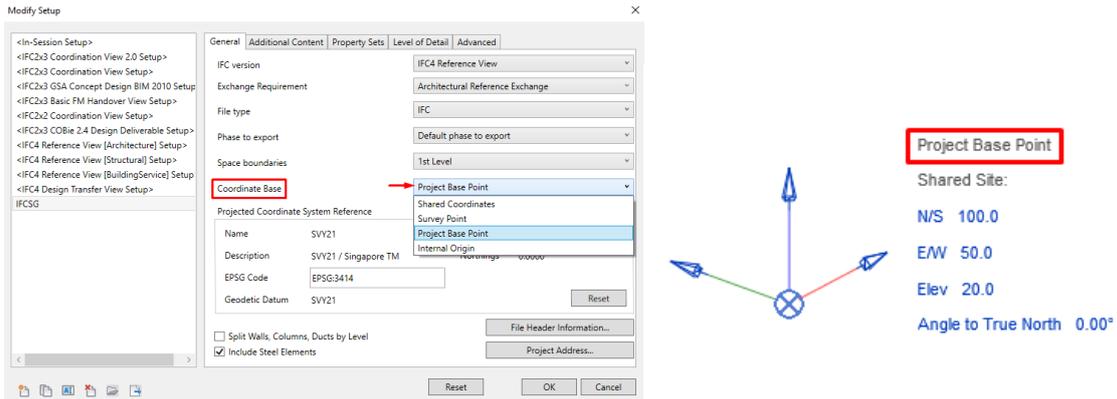
Select IFC under Export

2. Select "Modify setup ..."



Modify Setup

3. Select the preferred Coordinate Base, note that the origin of the coordinate base must be specified first so it will reflect in the exported file (refer to step 5-4). In this example Project Base Point is used as Coordinate Base.



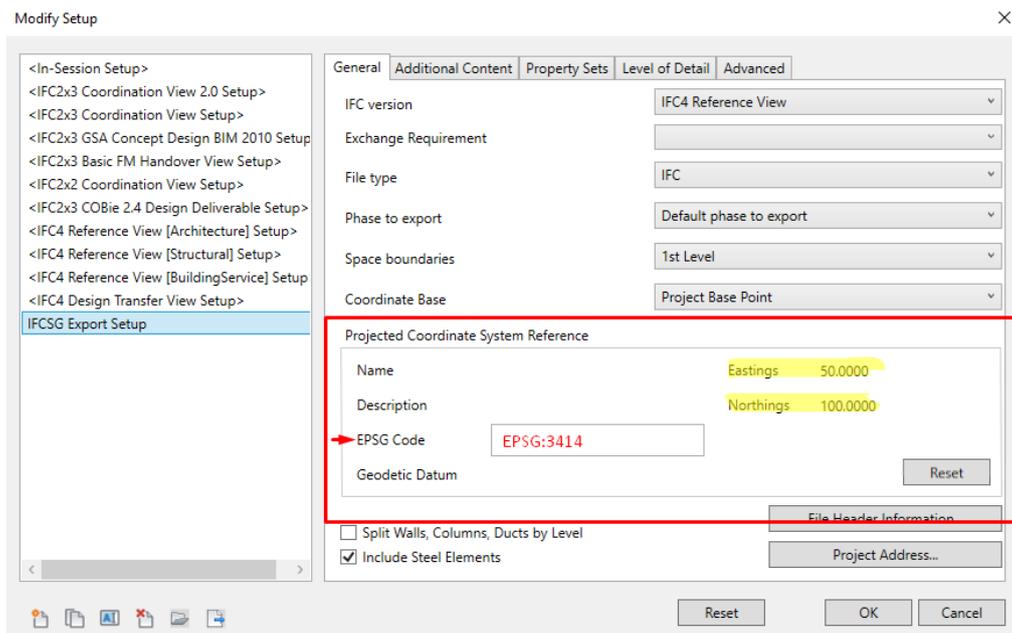
Project Base Point as Coordinate Base

4. Below is the origin of the Coordinate Base within the tool UI which will be the reference of the projected coordinate base system.



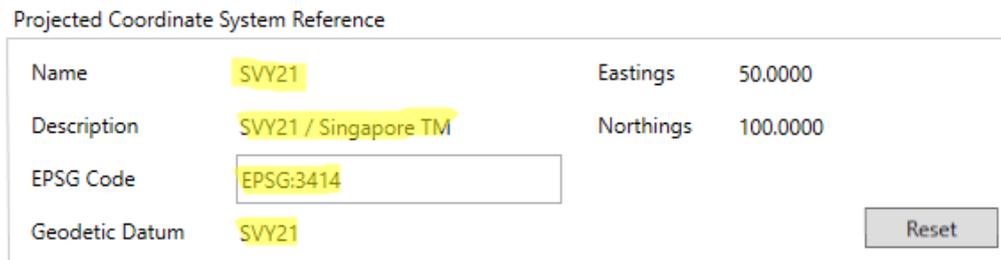
Coordinate Base

- After specifying and setting the origin of the Coordinate Base, under **Projected Coordinate System Reference** fill the **EPSG Code** with “**EPSG:3414**”, notice also that the Eastings and Northings were replicates of the specified data of Coordinate Base.



**EPSG Code Value, Eastings and Northings**

- Name, Description and Geodetic Datum** shall be automatically filled after EPSG Code was specified. See below example



**EPSG Code was successful, Information will be automatically loaded into the System**

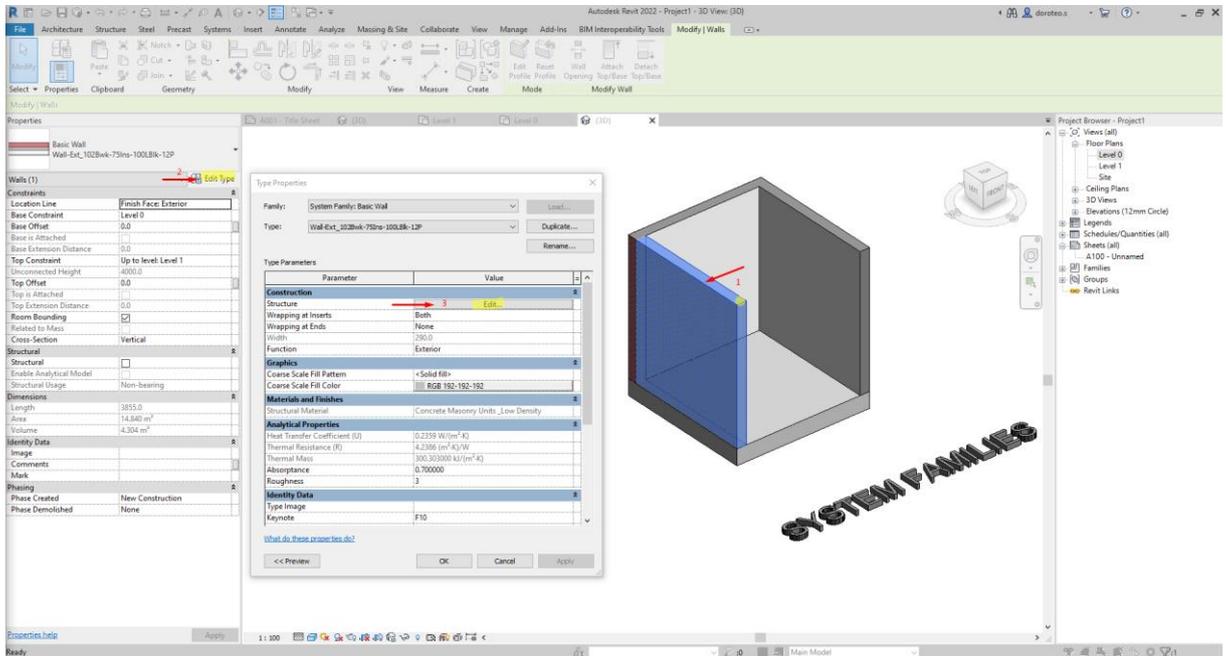
- Make sure to follow the IFC Export Setup Steps (refer to section 5/page number 16) to have correct result.

### 3.1.10 IfcMaterial/IfcMaterialLayer

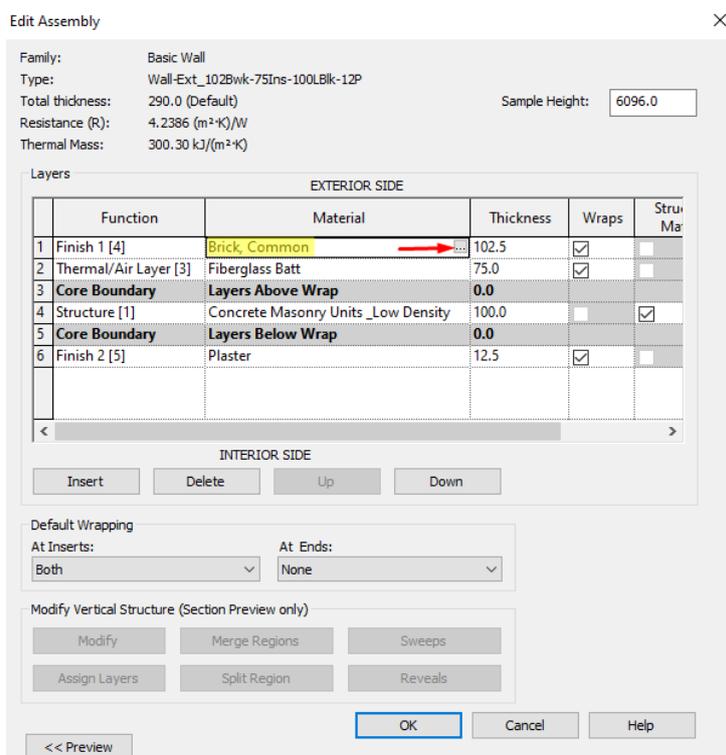
Applying for materials in Revit has many ways. It can be applied thru system families, loadable families and in-place families.

First, the system families:

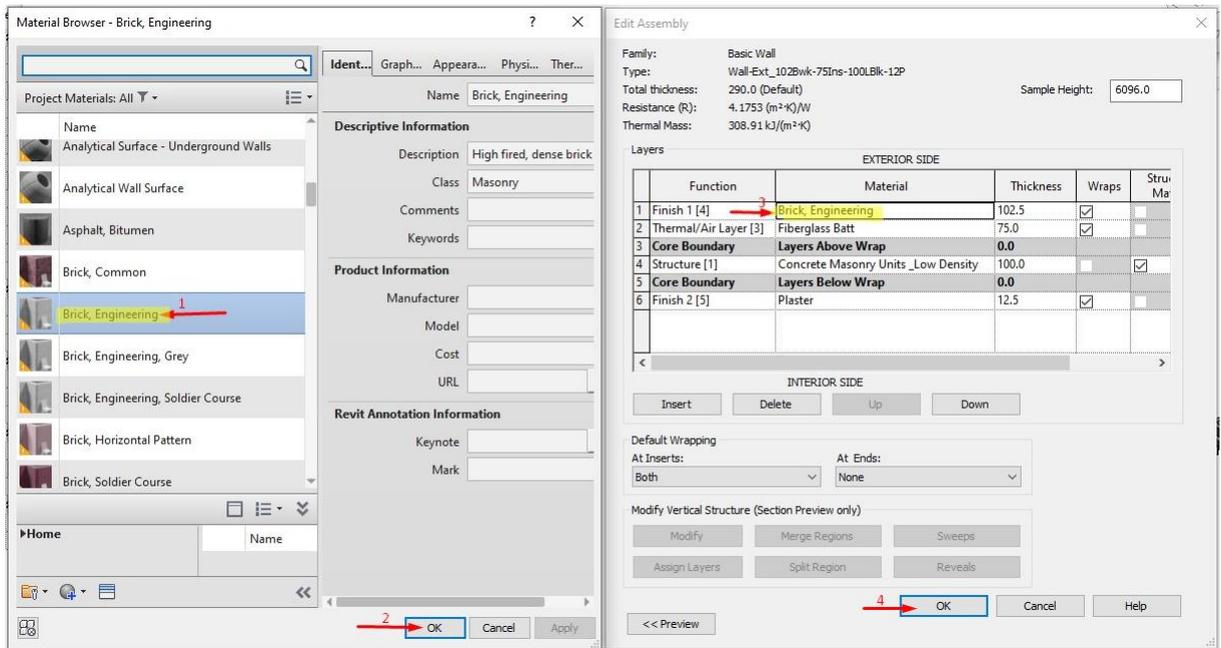
- Pick the wall > Click **Edit Type** > Click **Edit Structure**



After clicking Edit Structure, click the 3 dots and can now edit the materials needed.



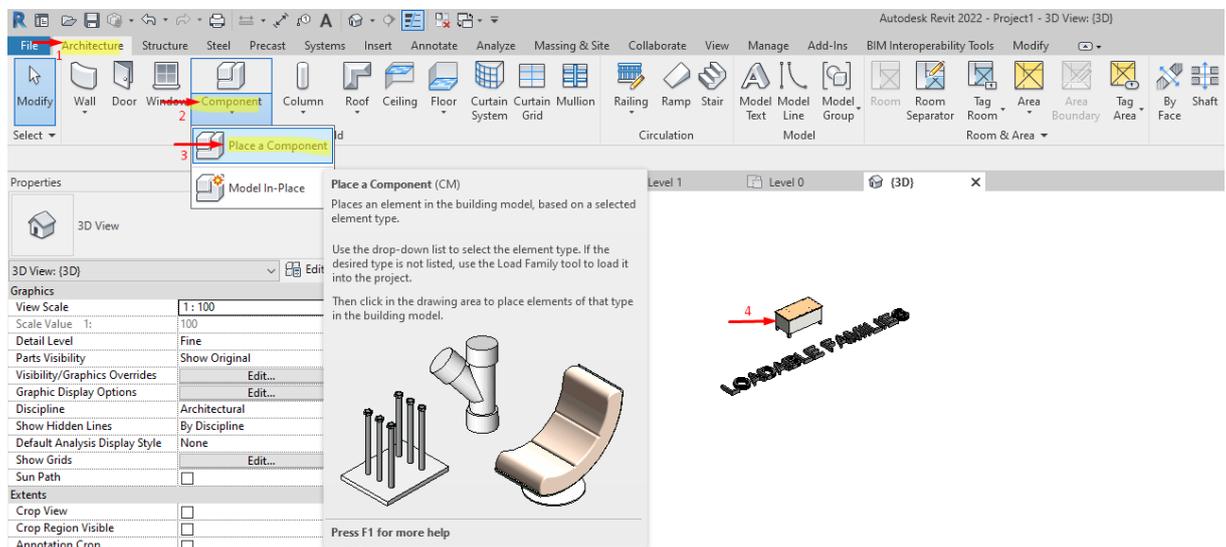
9. Ensure material of objects were selected in dialog box as shown below. Then click Ok.



Second, the loadable families:

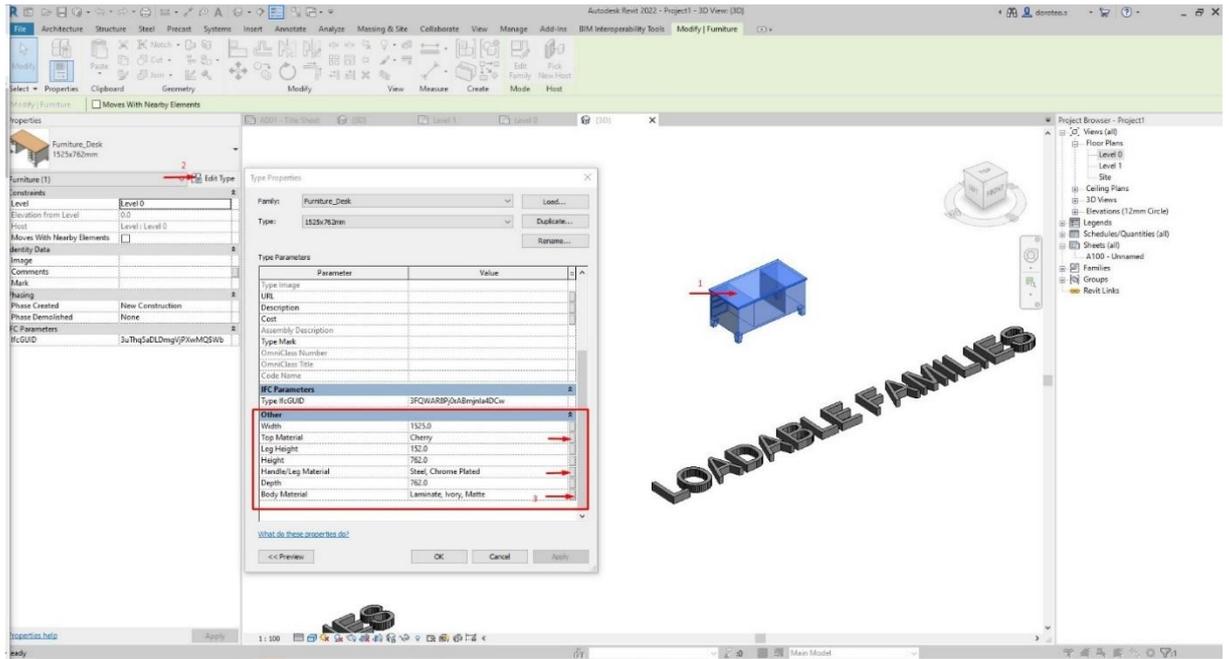
Component basically allows to insert any families that are not regular system families in Revit, so this are the component family.

When loading a component, go to **Architecture tab** > on the **Build tab**, click **Component** > then click **Place a Component**, then choose the loadable family

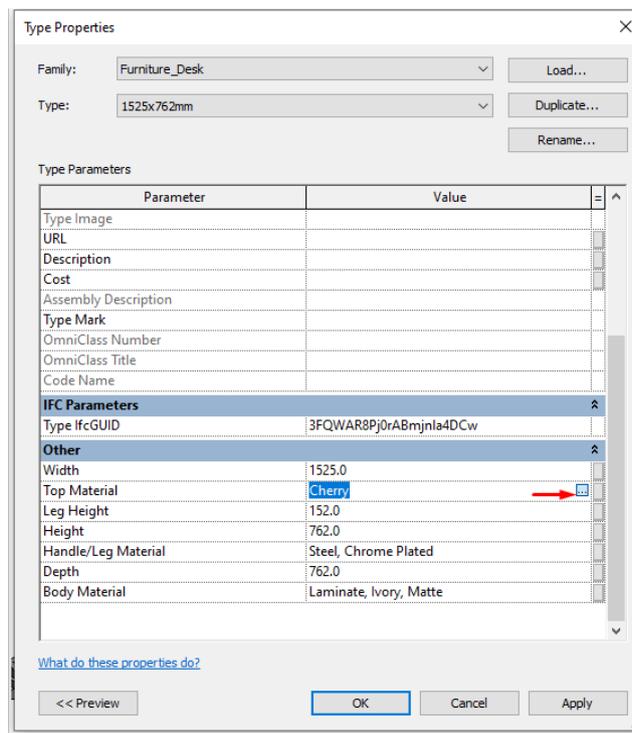


Pick the family > Click **Edit Type** > See to it, there is a material option which can be changed.

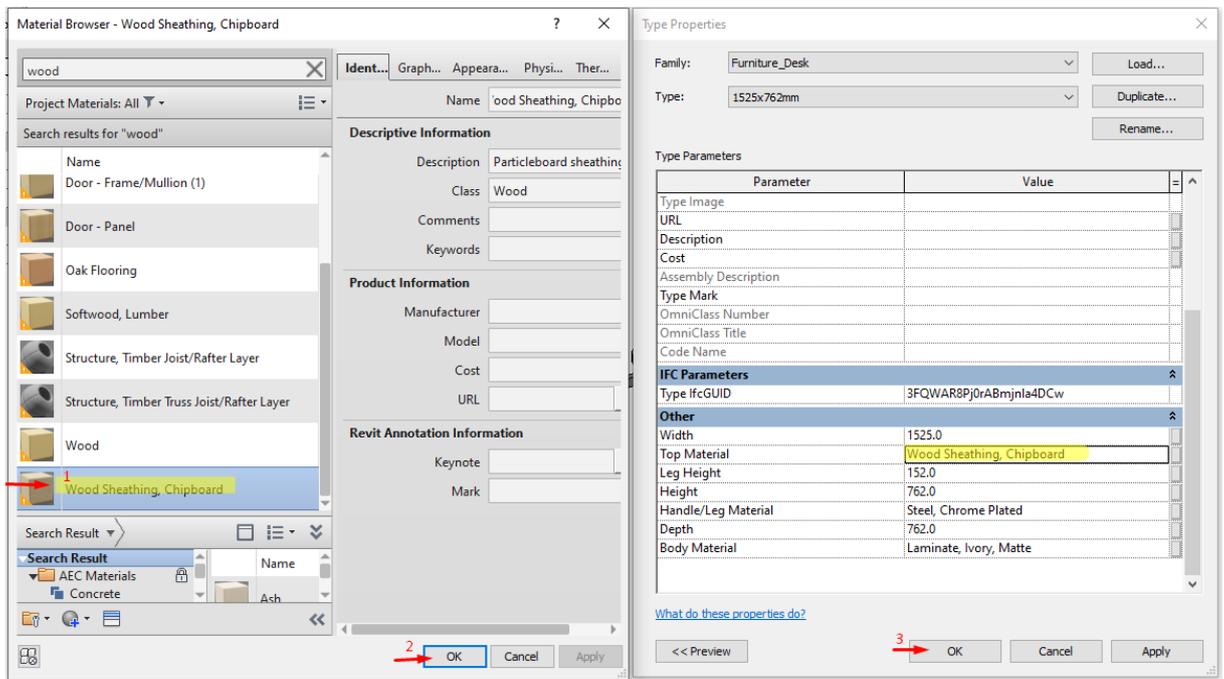
Let's say the top material, body material, handle/leg material.



For example, click the 3 dots...



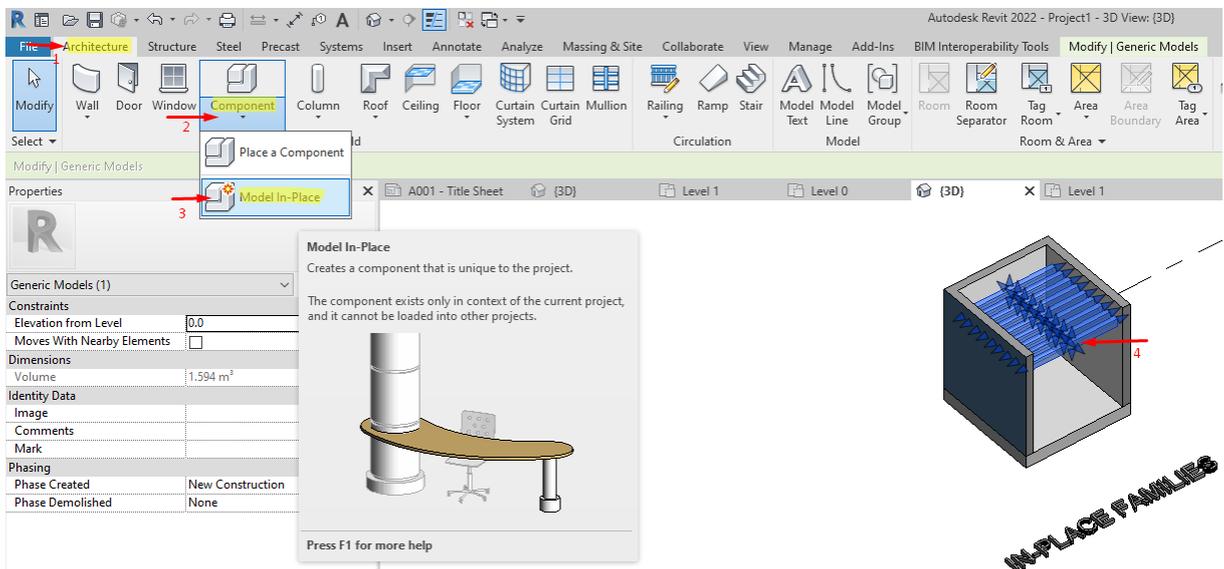
10. Ensure material of objects were selected in dialog box as shown below. Then click Ok.



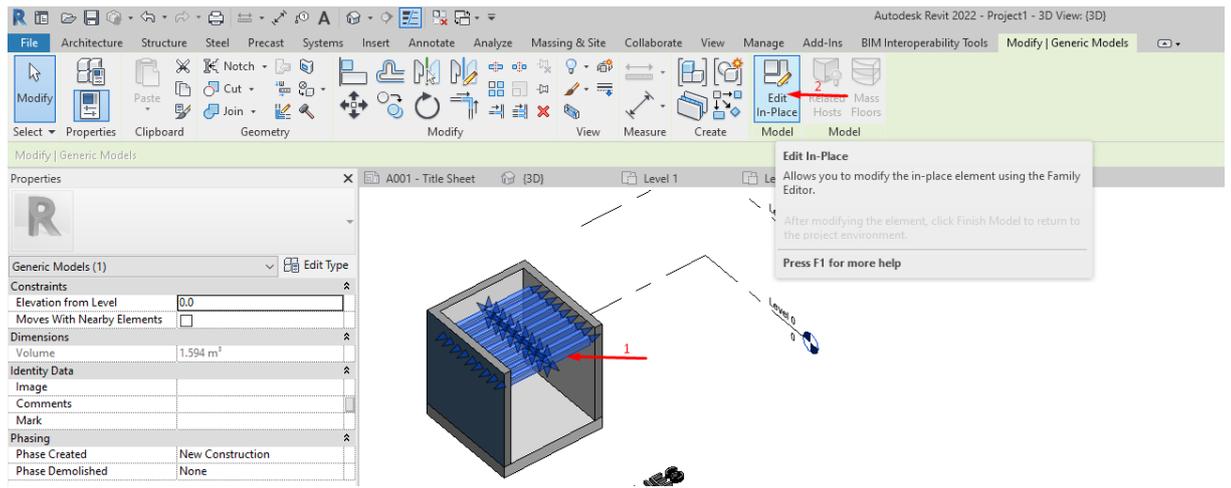
Third, In-place families:

Component basically allows to insert any families that are not regular system families in Revit, so this are the component family.

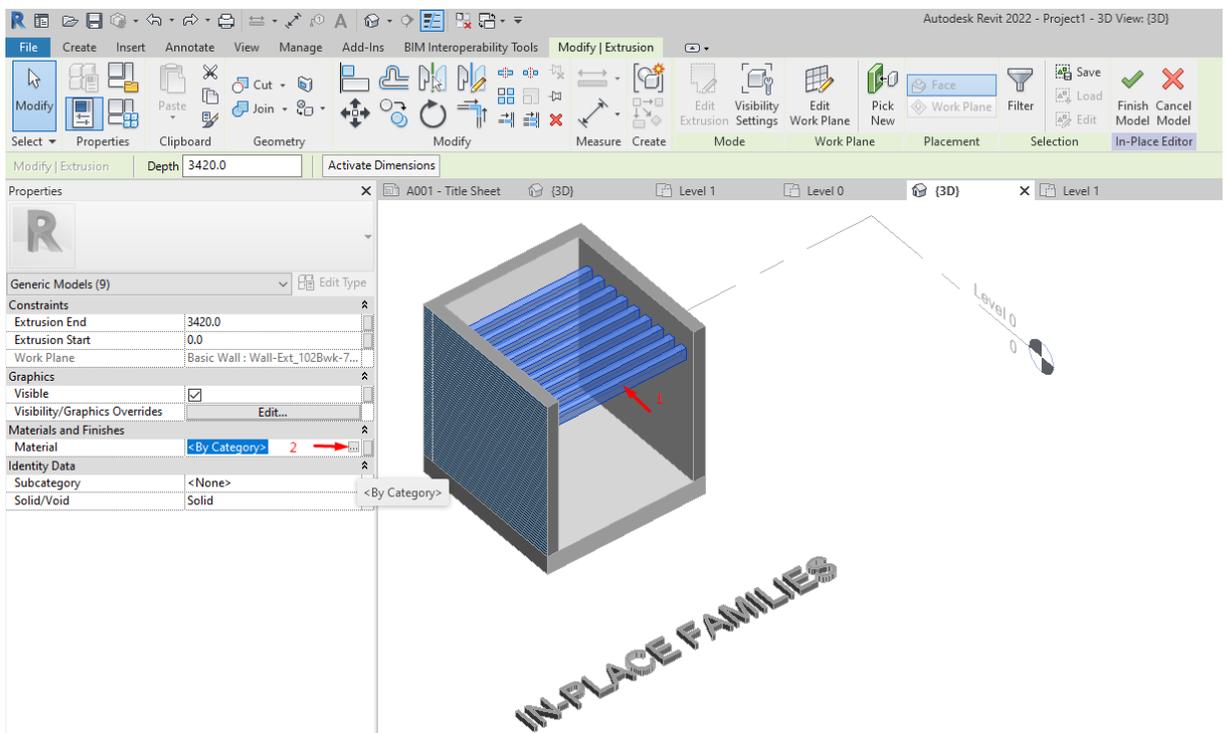
When loading a component, go to **Architecture tab** > on the **Build tab**, then click **Model In-Place**, then create an In-place family



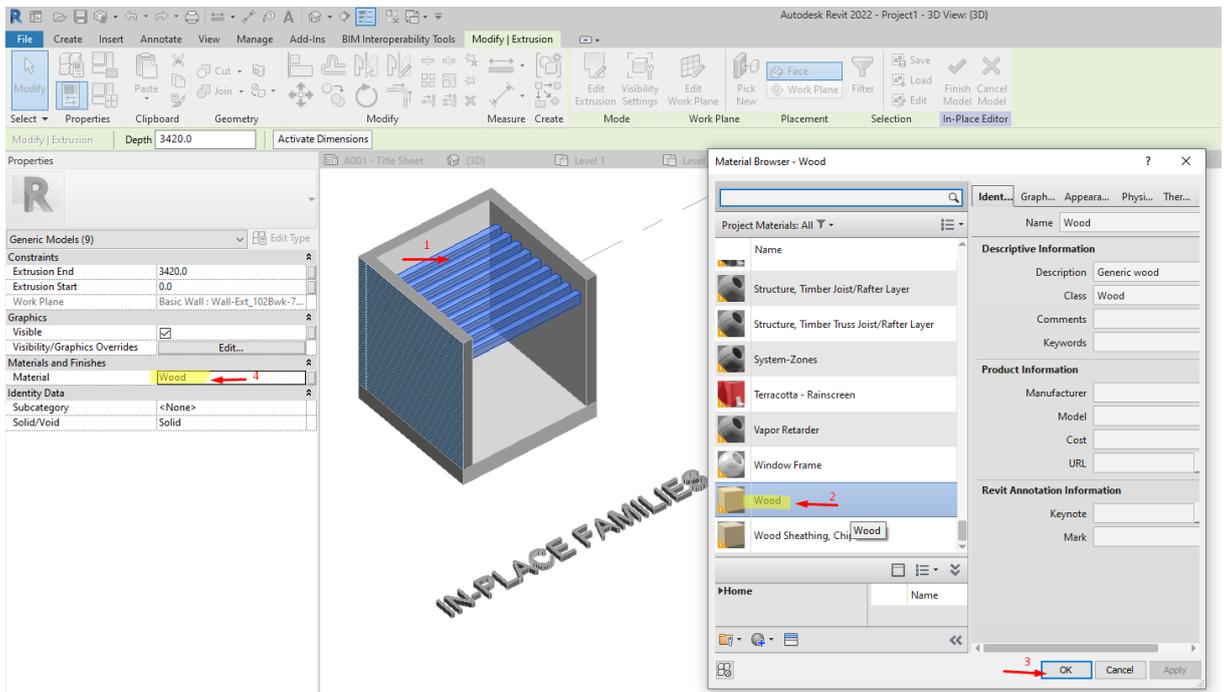
After creating, Click the **In-Place Model** > Click **Edit In-Place** >



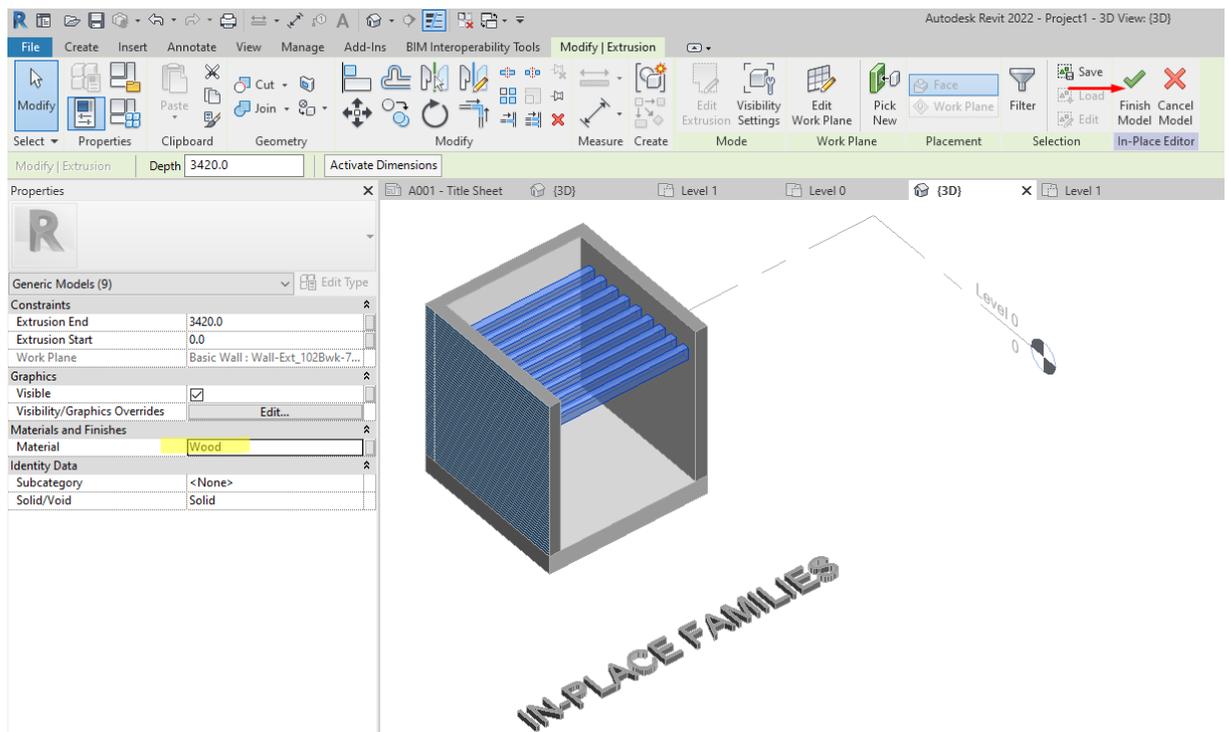
Under the Materials and Finishes, click the 3 dots in the Material property



Ensure material of In-place model were selected in dialog box as shown below. Then click Ok.

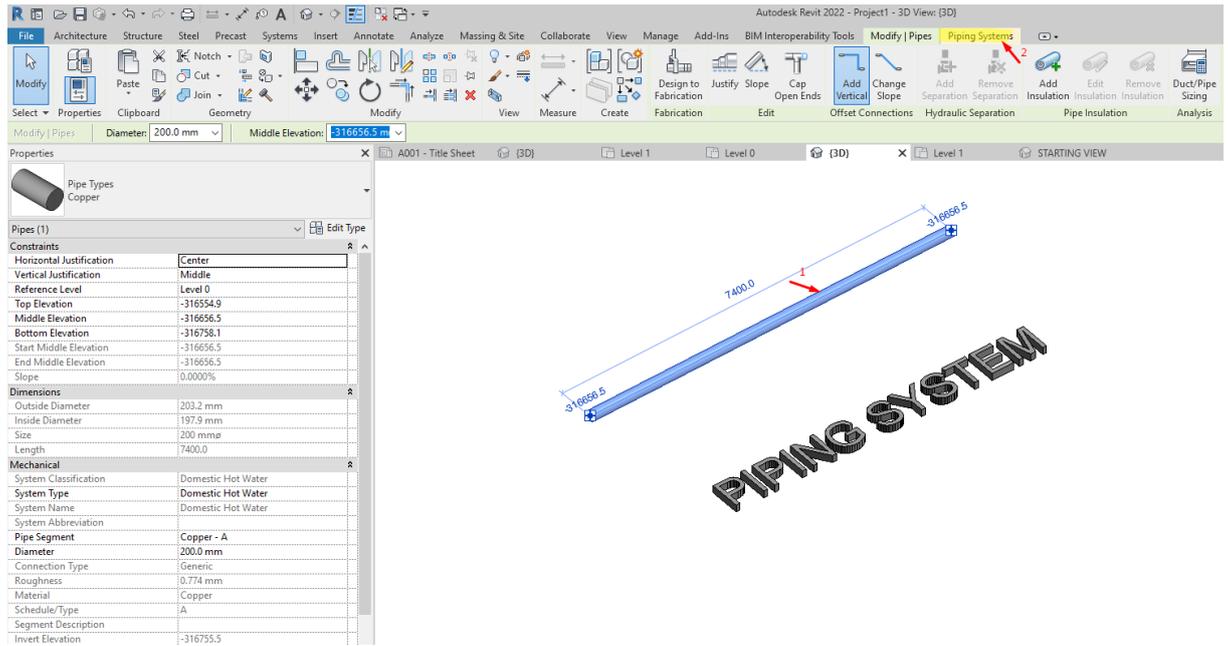


When the chosen material has been reflected on the material property, Click **Finish Model**

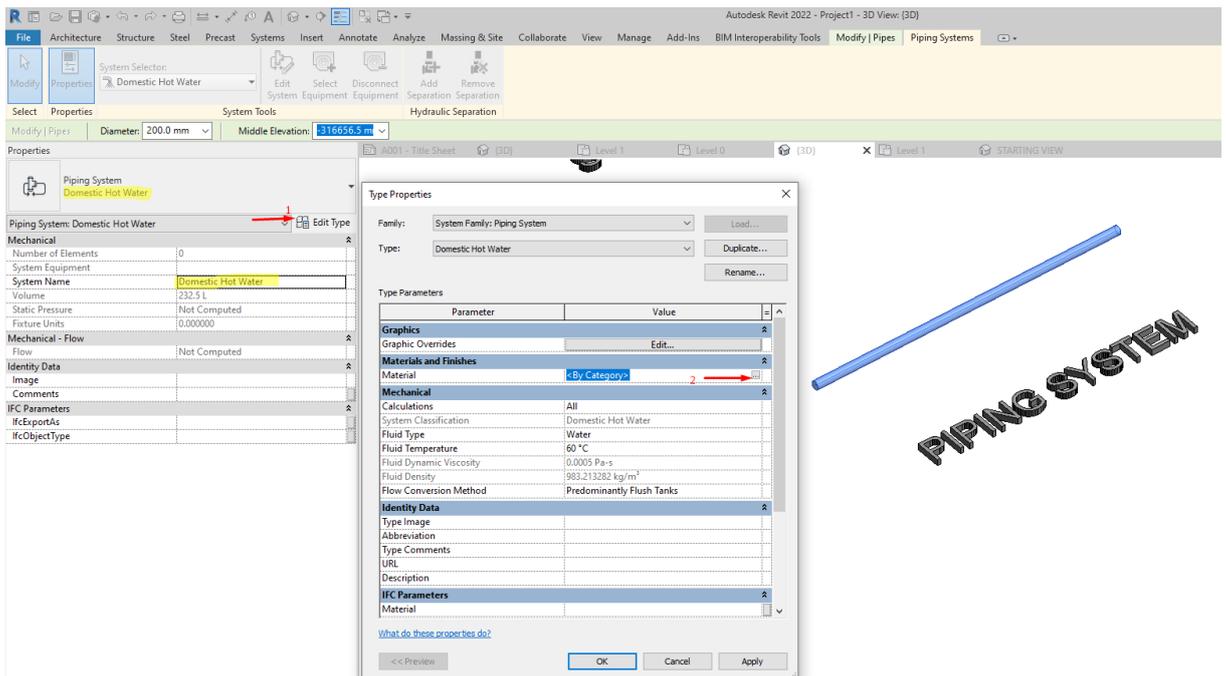


In addition, another way of putting materials in Revit is in the **Piping System Material**.

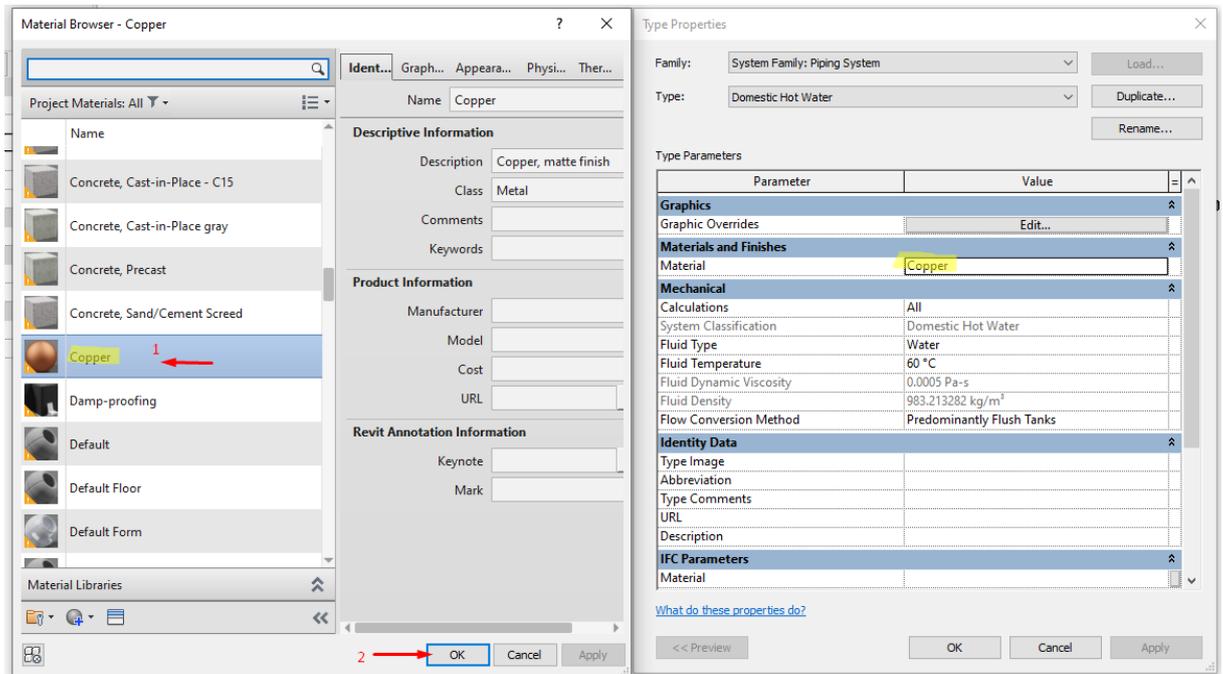
1. When editing the piping material, click the **Pipe** > then click the **Piping System** tab



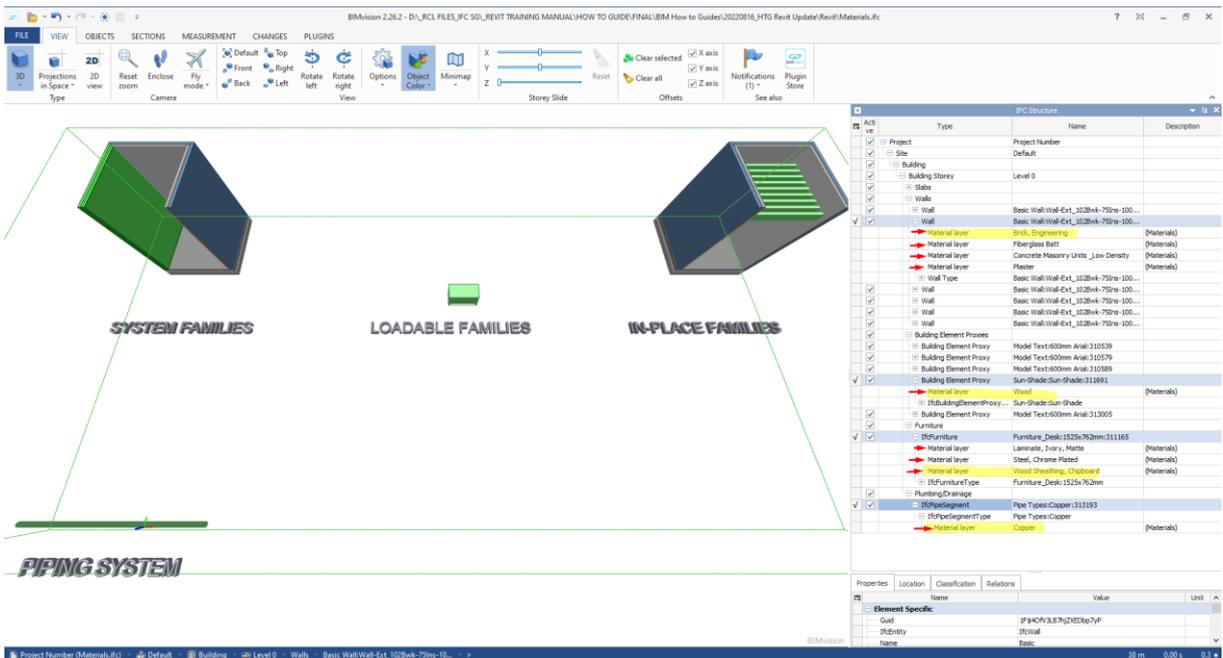
2. After clicking the Piping System tab, see to it that the Piping System Name is already set, then click **Edit Type**. On the Type Properties, click the 3 dots under the material property to set the desired material.



3. Ensure material of objects were selected in dialog box as shown below. Then click Ok.



These are now the exported file with the If Material/IfcMaterialLayer



### 3.2 REVIT SUPPORTED IFC CLASSES

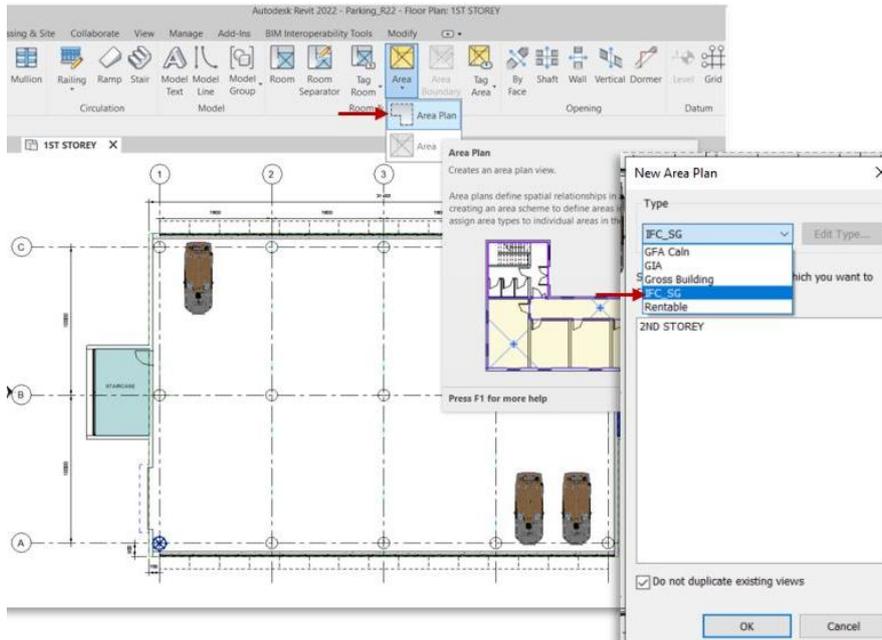
<https://help.autodesk.com/view/RVT/2022/ENU/?guid=GUID-EE6C0CF8-7671-4DCC-B0C7-EEA7513C90A9>

## 4 IFC-SG (Singapore specific requirements for Building Regulatory Submission)

Do note that BIM representations as stated in the document are for reference and not prescriptive, i.e. industry can continue to use their own object libraries and BIM tools as long as the IFC information that was exported is aligned with the Regulatory Requirements.

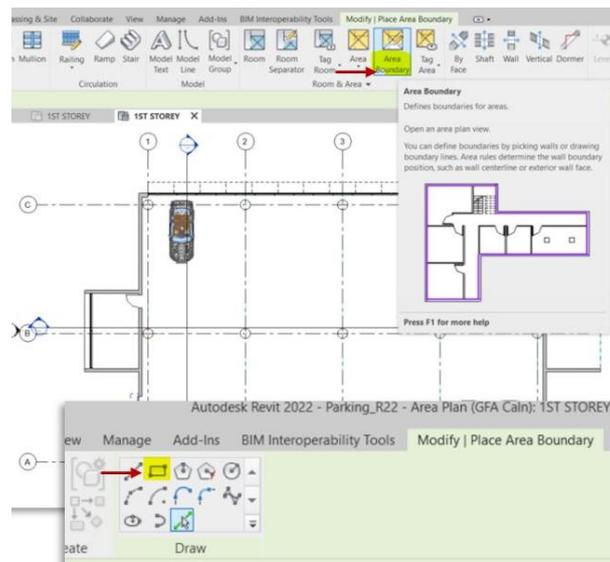
### 4.1 AREA, OBJECT AND ROOM DEMARCATION

1. Select Area Plan under Room & Area Ribbon Tab in Architecture tab > choose Type where to create the view > choose IFC SG >



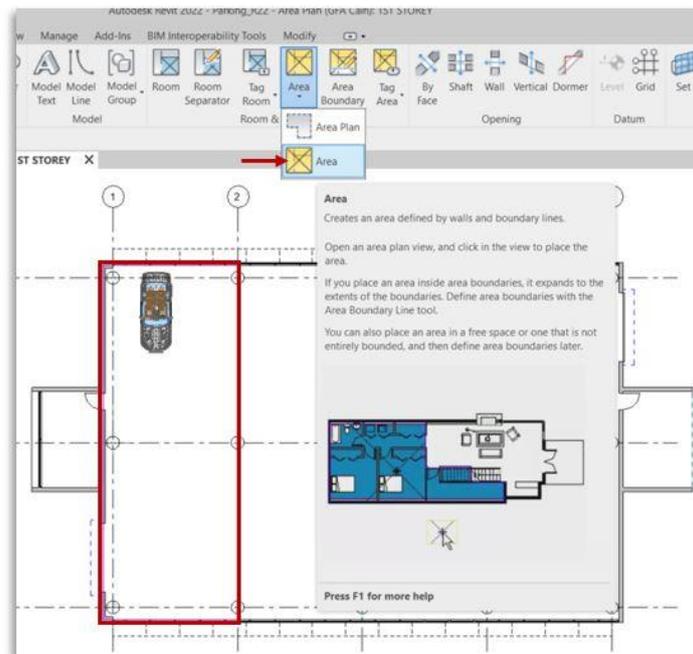
Setting up Area Plan

2. Click the Area Boundary > choose the rectangle line to pick the 2 opposite corners.



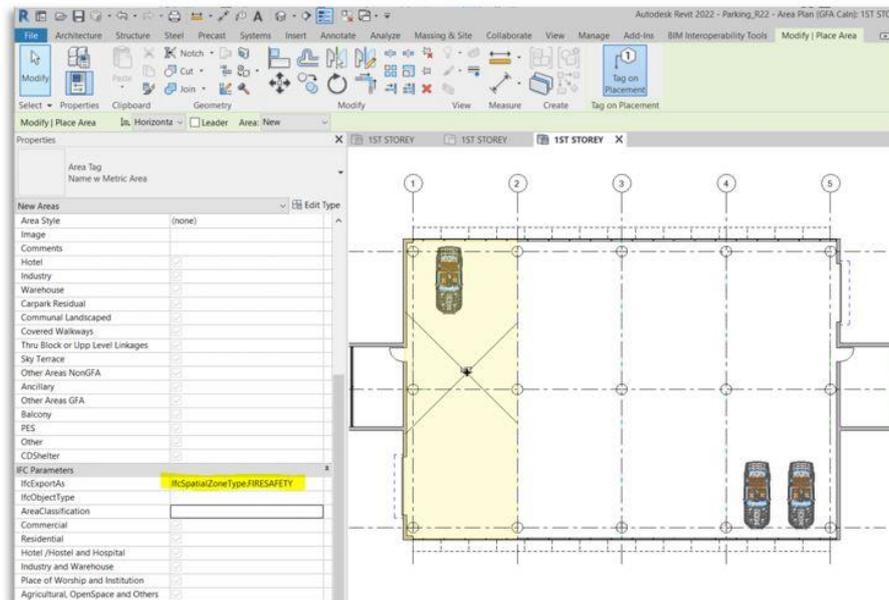
Area Boundary

3. Select Area > then click inside the Area that have created the boundary.



Creating an Area

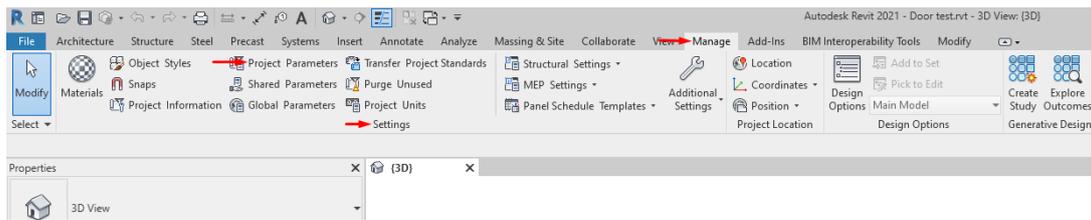
4. Click the Area and it could be identified by the input on the IfcExportAs into (For example: IfcSpatialZoneType.FIRESAFETY)



Input Value on the Area Zone

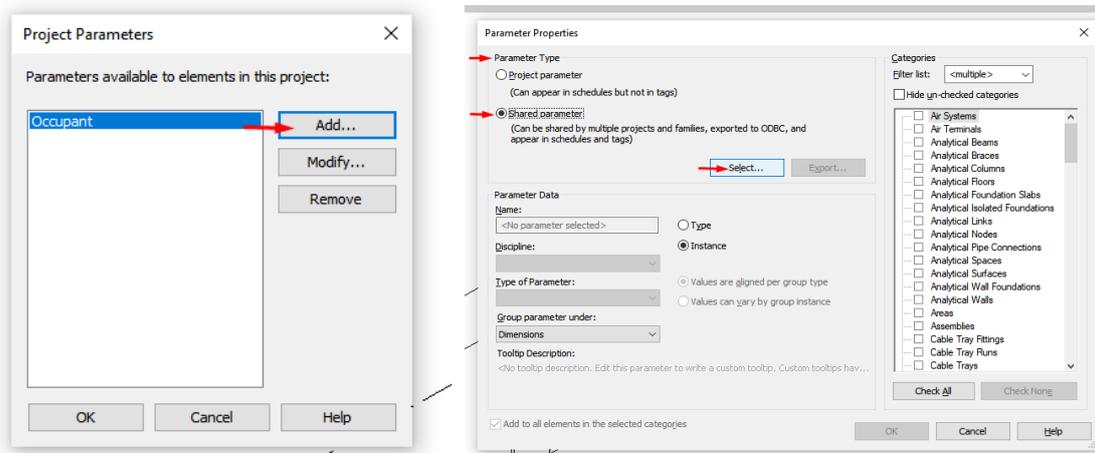
## 4.2 DOOR PROPERTIES Exporting IfcDoorLining Properties

1. When exporting door lining properties, the first thing to do is assign the project properties. Go to Manage ribbon tab, go to the Settings panel and select Project Parameters.



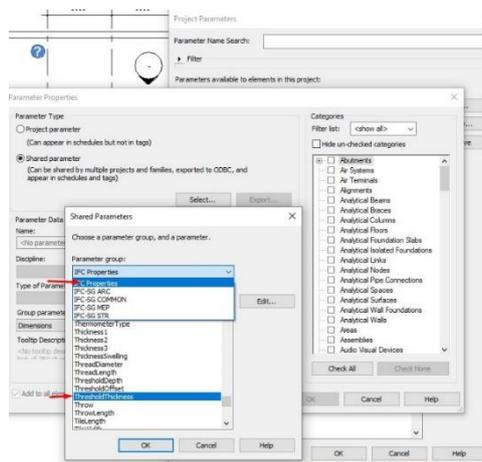
Project Parameters under Manage Tab

2. Select Add, and under Parameter Type, select Shared parameter > Select



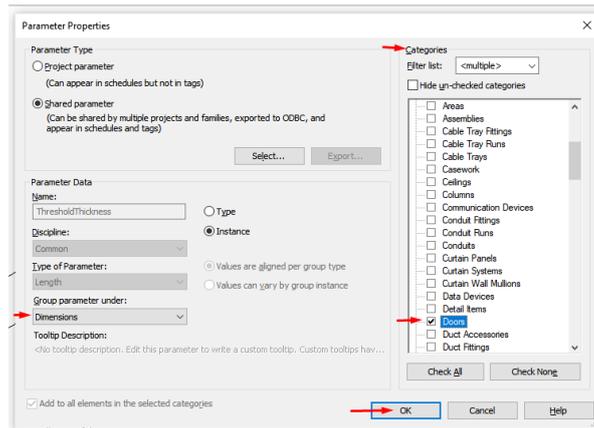
Add Parameter and Select Shared Parameter as Parameter Properties

3. Select IFC Properties as the parameter Properties group and look for the door lining properties. In this case, ThresholdThickness is the property of the selected door lining. Select it and then OK.



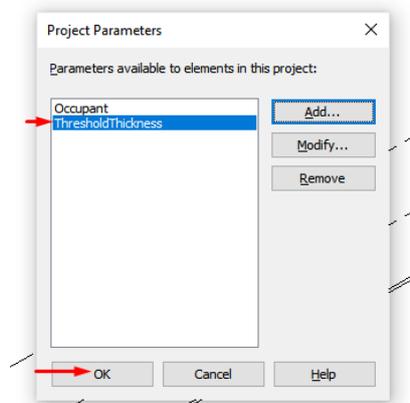
Adding the ThresholdThickness

- After selecting **door lining property**, let the **group parameter** under be retained then move and select the door as a **category**.



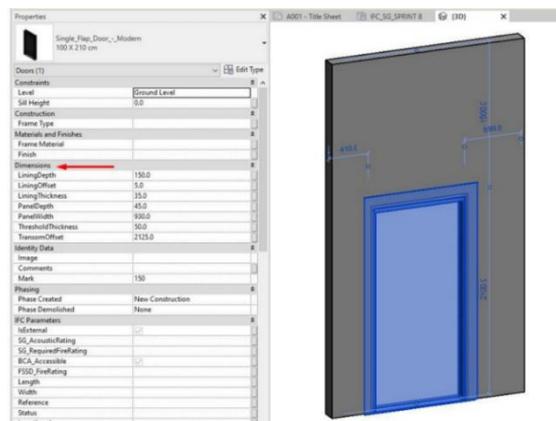
Adding the Property to the Category

- Once the **door lining properties** have been added, they will be displayed in the **project parameter** panel. Click **OK** to complete the added parameter and see it in the identified component.



Adding the Property Successfully

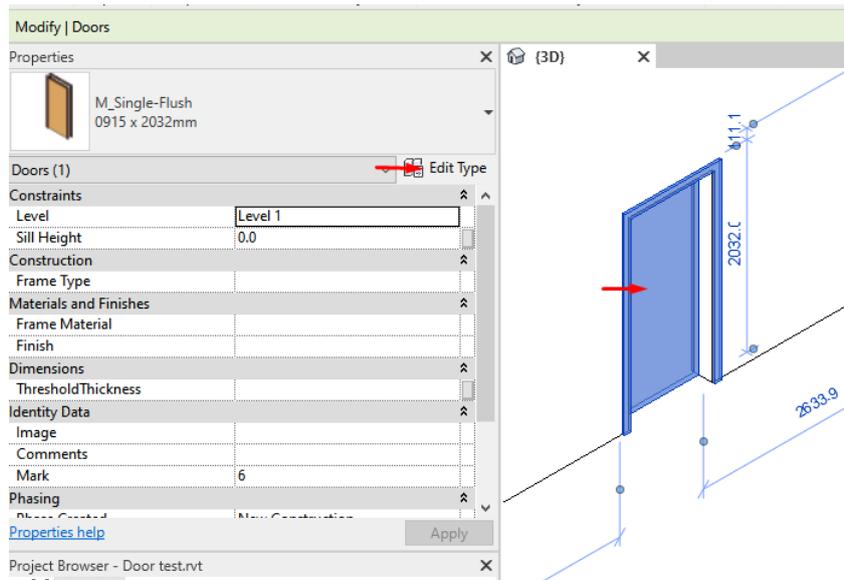
- Find the group parameter to which the property will be added. In this example, the selected door has a property whose group property is below the dimension. Add that value to the door panel properties, export it and validate it.



Lining Property under the Dimension

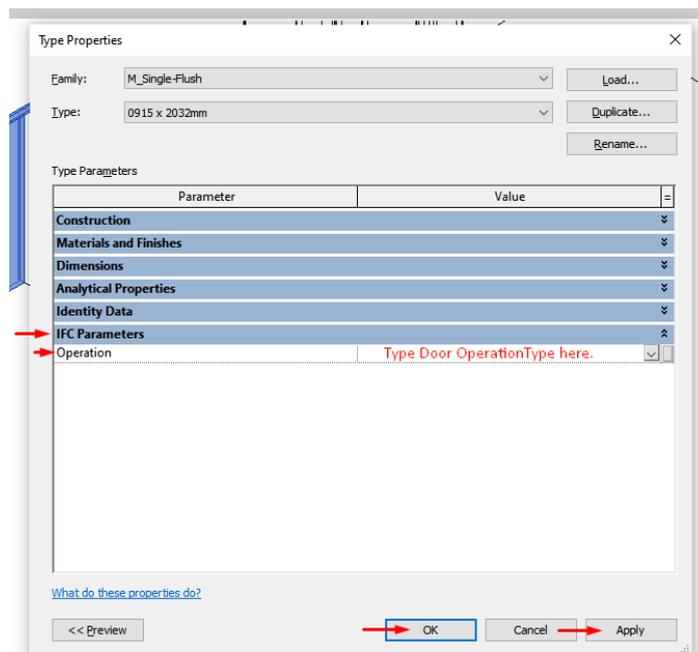
## 4.2.2 Exporting IfcDoor OperationType

1. In general, the **OperationType** parameter is native to the Door family. To specify a specific operation type, select the **Door** object, then go to **Edit Type**



Edit Type Under the Object Properties

2. Under **Type Parameters**, go to **IFC Parameters** and specify a value for **Operation**, once specified, click **Apply** and then **OK**.



Adding Property Operation Type under IFC Parameters

\*\*note: Below is the list of Door Operation Type which can be used and exported.

### 4.2.3 List of Basic Door Operation Type

---

<b>BIM Representation</b>	<b>Operation Type</b>
Door	1. SINGLE_SWING_LEFT
	2. SINGLE_SWING_RIGHT
• Door Style	3. DOUBLE_DOOR_SINGLE_SWING
○ Operation	4. DOUBLE_DOOR_SINGLE_SWING_OPPOSITE_LEFT
	5. DOUBLE_DOOR_SINGLE_SWING_OPPOSITE_RIGHT
	6. DOUBLE_SWING_LEFT
	7. DOUBLE_SWING_RIGHT
	8. DOUBLE_DOOR_DOUBLE_SWING
	9. SLIDING_TO_LEFT
	10. SLIDING_TO_RIGHT
	11. DOUBLE_DOOR_SLIDING
	12. FOLDING_TO_LEFT
	13. FOLDING_TO_RIGHT
	14. DOUBLE_DOOR_FOLDING
	15. REVOLVING
	16. ROLLINGUP
	17. SWING_FIXED_LEFT
	18. SWING_FIXED_RIGHT

---

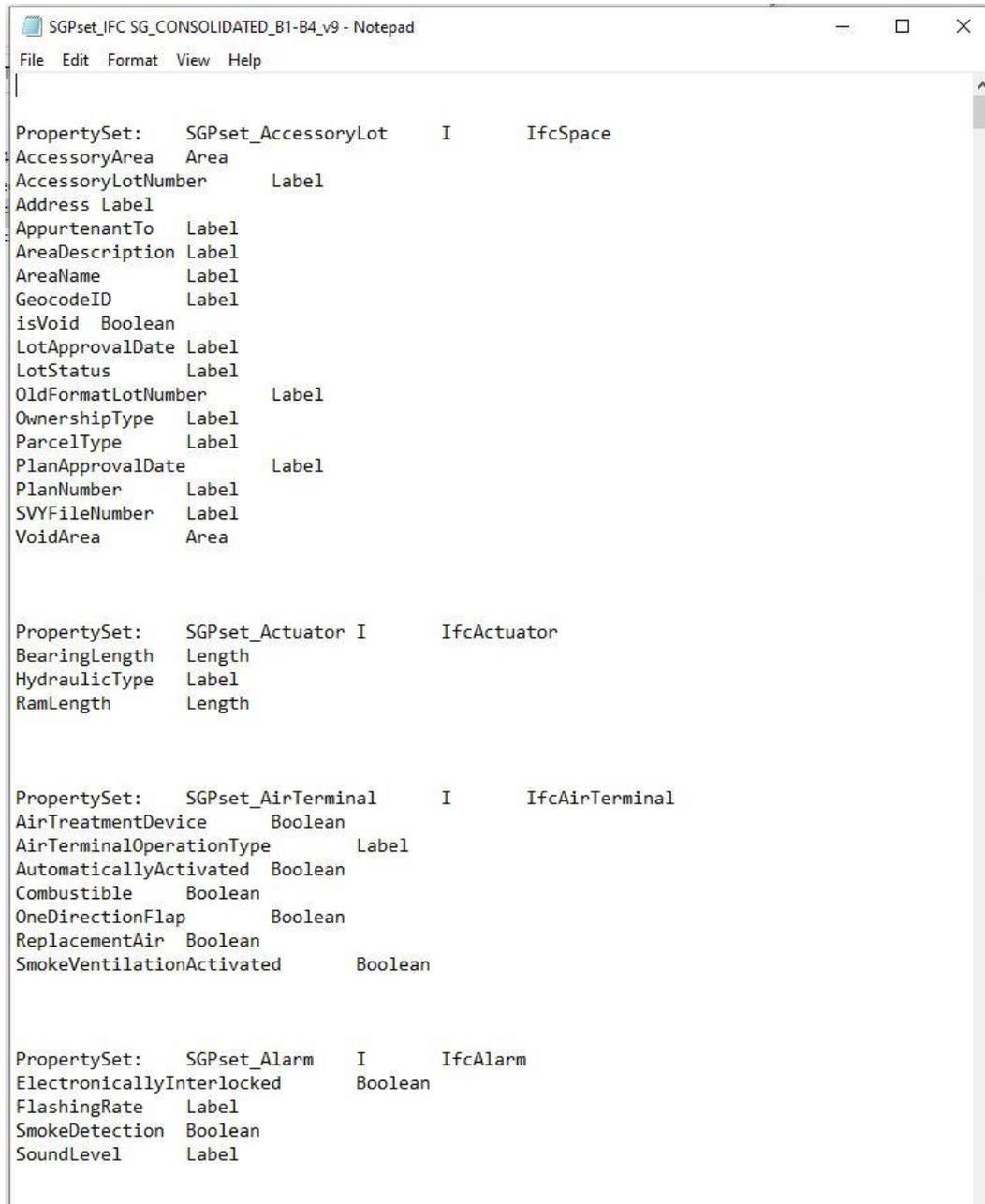
#### Basic Door Operation Type

## 5 Advanced Users

### 5.1 MODIFYING CONFIGURATION FILES

#### 5.1.1 Property Sets

1. Below is a sample copy of the IFC-SG Revit configuration file used during the export.
2. Before exporting, make sure all required IFC4 (USERDEFINED), IFC-SG PropertyName are present. If not, add a property and save the updated version.



```
SGPset_IFC_SG_CONSOLIDATED_B1-B4_v9 - Notepad
File Edit Format View Help
PropertySet: SGPset_AccessoryLot I IfcSpace
AccessoryArea Area
AccessoryLotNumber Label
Address Label
AppurtenantTo Label
AreaDescription Label
AreaName Label
GeocodeID Label
isVoid Boolean
LotApprovalDate Label
LotStatus Label
OldFormatLotNumber Label
OwnershipType Label
ParcelType Label
PlanApprovalDate Label
PlanNumber Label
SVYFileNumber Label
VoidArea Area

PropertySet: SGPset_Actuator I IfcActuator
BearingLength Length
HydraulicType Label
RamLength Length

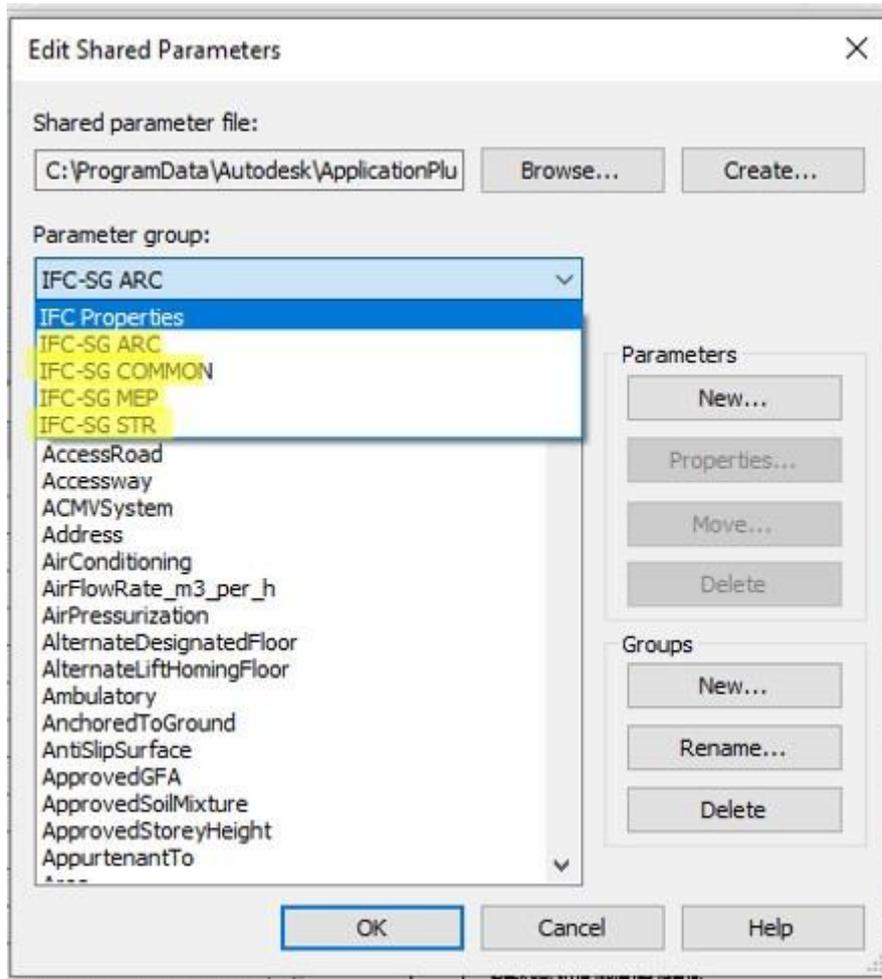
PropertySet: SGPset_AirTerminal I IfcAirTerminal
AirTreatmentDevice Boolean
AirTerminalOperationType Label
AutomaticallyActivated Boolean
Combustible Boolean
OneDirectionFlap Boolean
ReplacementAir Boolean
SmokeVentilationActivated Boolean

PropertySet: SGPset_Alarm I IfcAlarm
ElectronicallyInterlocked Boolean
FlashingRate Label
SmokeDetection Boolean
SoundLevel Label
```

Compilation of Userdefined Property Set

## 5.1.2 Shared Parameters

1. Group the properties based on the Domain. Groups were divided into three domains: **IFC-SG ARC**, **IFC-SG MEP**, **IFC-SG STR**. **IFC-SG COMMON** was added for all other properties that are common to the three domains.



Property Group divided by Property Domain

### 5.1.3 Revit Classification Manager

1. This Revit Classification Manager is used for BIM Interoperability. This is a Microsoft excel file that needs to be uploaded to the Revit tool. The following is an overview of the excel file.

1	TITLE	IFC-SG ObjectType		
2	DESCRIPTION			
3	VERSION	IFC-SG Official		
4	FUNCTION	Element		
5	NUMBER PARAMETER			
6	DESCRIPTION PARAMETER	IfcObjectType		
7	NUMBER	DESCRIPTION	LEVEL	REVIT CATEGORY
8	<b>IFC-SG Identified Component</b>	<b>IFC-SG ObjectType</b>	<b>1</b>	
9	IfcBuildingElement	IfcBuildingElement	2	
10	IfcAlarm	IfcAlarm	2	
11	Home Fire Alarm Device	HOMEFIREALARMDEVICE	3	
12	Visual Indicator	VISUALINDICATOR	3	
13	IfcAudioVisualAppliance	IfcAudioVisualAppliance	2	
14	Loudspeaker	LOUDSPEAKER	3	
15	IfcBeam	IfcBeam	2	
16	PT Beam	PRESTRESSED_BEAM	3	
17	Transom (Beam)	TRANSOM	3	
18	Trellis	TRELLIS	3	
19	IfcBuildingElementProxy	IfcBuildingElementProxy	2	
20	Accessible Route	ACCESSIBLEROUTE	3	
21	Adjacent Building	SURROUNDINGBUILDING	3	
22	Advertisement Signage	SIGNAGE	3	
23	Air Conditioning Tray	AIRCONDITIONINGTRAY	3	
24	Autosampler	AUTOSAMPLER	3	
25	Backfill	BACKFILL	3	
26	Balancing Weight	LIFT_BALANCINGWEIGHT	3	
27	Bicycle Parking Lot	BICYCLELOT	3	
28	Bicycle Parking Rack	BICYCLERACK	3	
29	Bicycle Route	BICYCLEROUTE	3	
30	Borehole	BOREHOLE	3	
31	Breathing Apparatus	BREATHINGAPPARATUS	3	
32	Breeching Inlet Signage	SIGNAGE_BREECHINGINLET	3	
33	Buffer	LIFT_BUFFER	3	
34	Buggy	BUGGY	3	
35	Buggy Parking	LORRYLOT	3	
36	Building Date Signage	SIGNAGE	3	
37	Building Mass	CONCEPT_BUILDINGMASS	3	
38	Bus Bay	2D_BUSBAY	3	
39	Bus Parking Lot	BUSLOT	3	
40	Business Signage	SIGNAGE	3	
41	Car Parking Deck	CARPARKINGDECK	3	
42	Car Parking Lot	CARLOT	3	
43	Car Parking Platform	CARPARKINGPLATFORM	3	
44	Caution label	SIGNAGE_BIOHAZARDCAUTION	3	
45	Chemical Feeder	CHEMICALFEEDER	3	

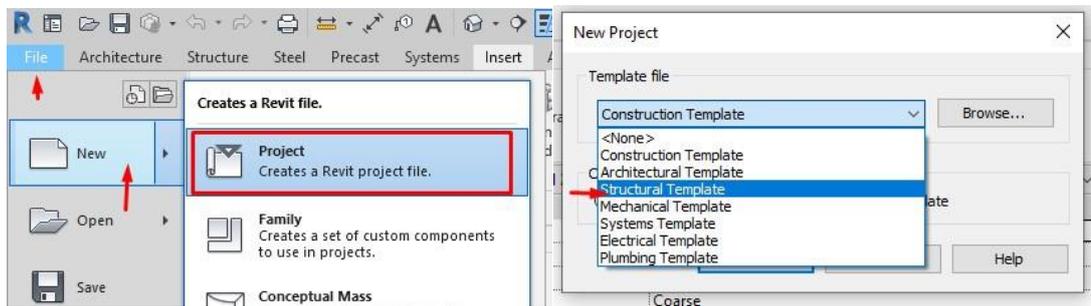
Sample view of Revit Classification Manager used in BIM Interoperability.

## 5.2 ADDITIONAL HOW-TO MODEL GUIDES

### 5.2.1 How-to Model IfcGrid

For you to export the IfcGrid, create the grid by using Structural Template in Revit when starting a project.

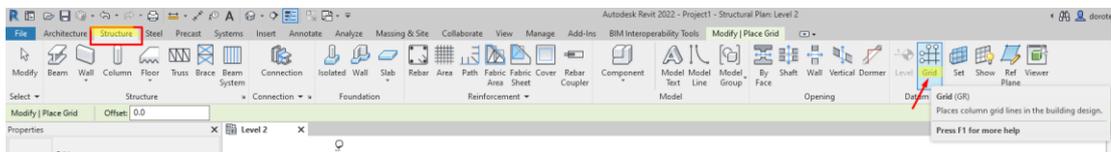
1. After creating a new project, choose the Structural Template.



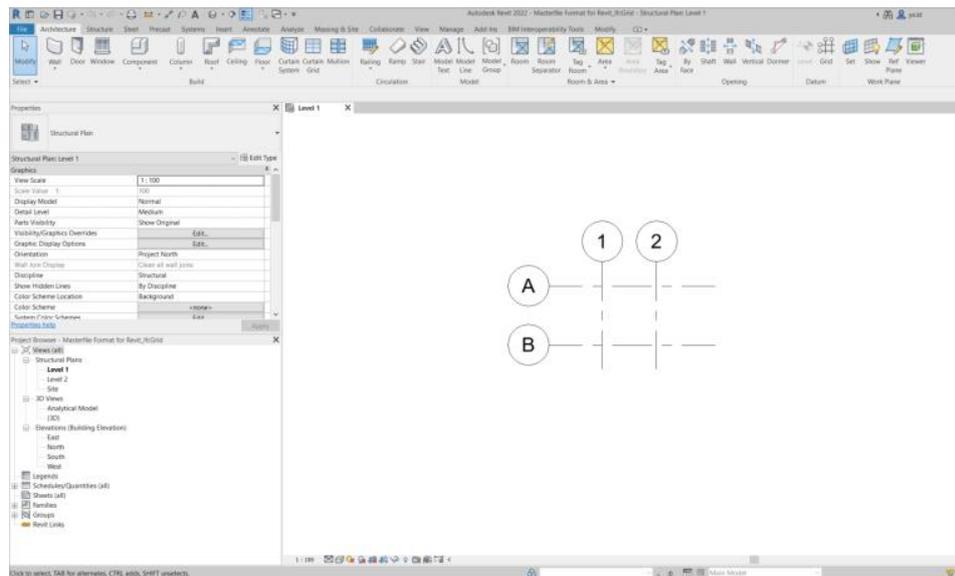
Creating New Project

Structural Template File

2. Under Structure ribbon tab, in Datum panel, click Grid and start creating grid.

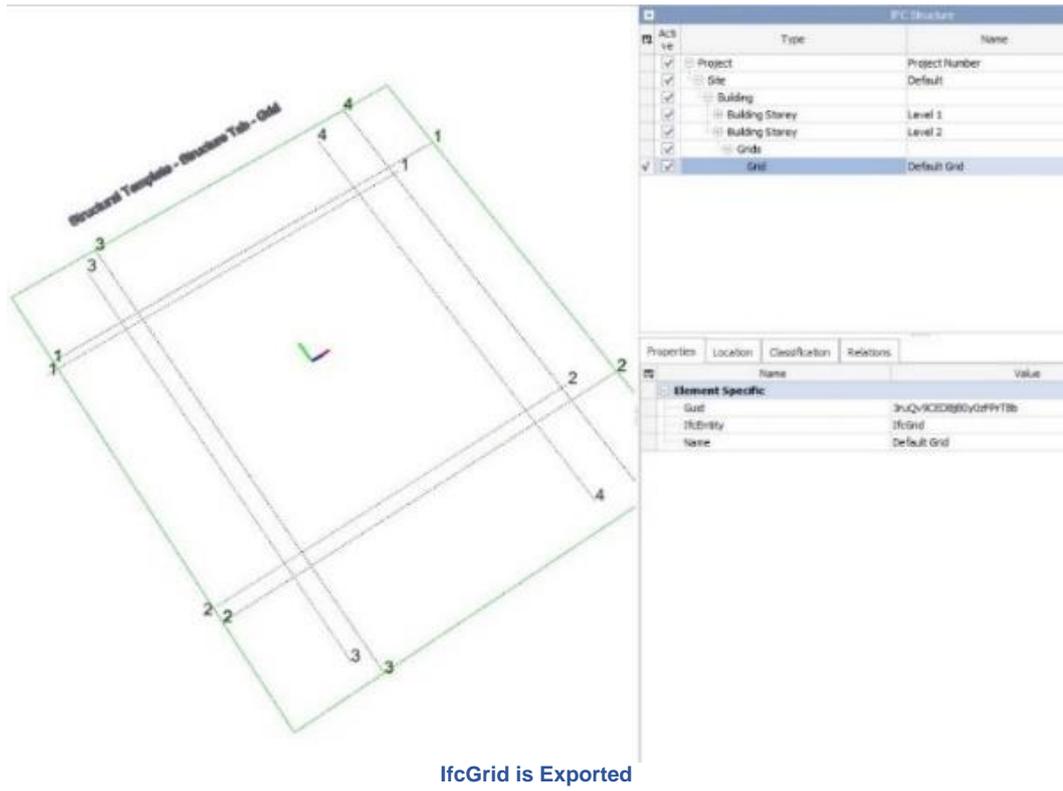


Placing Grid



Creating Grid

- To export it based on the IFC Export Setup Steps (refer to section 5 /page number 15) to have correct result.



**IFC Structure**

Active	Type	Name
<input checked="" type="checkbox"/>	Project	Project Number
<input checked="" type="checkbox"/>	Site	Default
<input checked="" type="checkbox"/>	Building	
<input checked="" type="checkbox"/>	Building Storey	Level 1
<input checked="" type="checkbox"/>	Building Storey	Level 2
<input checked="" type="checkbox"/>	Grids	
<input checked="" type="checkbox"/>	Grid	Default Grid

Properties	Location	Classification	Relations	Name	Value
<b>Element Specific</b>					
				Grid	3uQvKCEB86yGdPPTB
				Id/Idity	IfcGrid
				Name	Default Grid

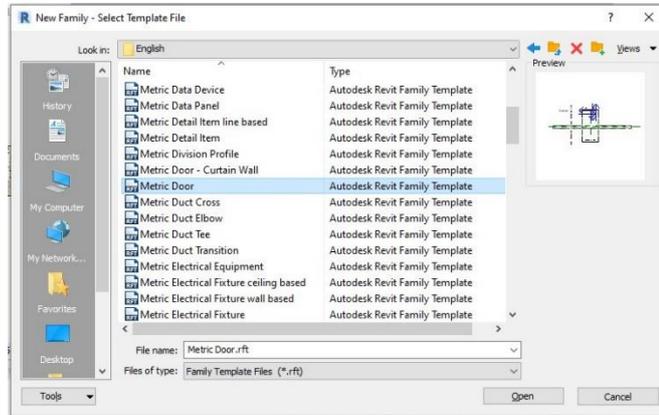
IfcGrid is Exported

## 5.2.2 Missing Door lining Properties How to Model

In Revit, the default door has no available IfcDoorLiningProperties. To add the Door Lining and Door Panel Properties, some configurations are required.

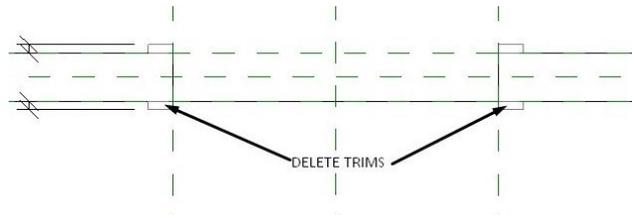
1. Create new family with the default template.

Create a new family. Use the Metric – Door default Autodesk template.

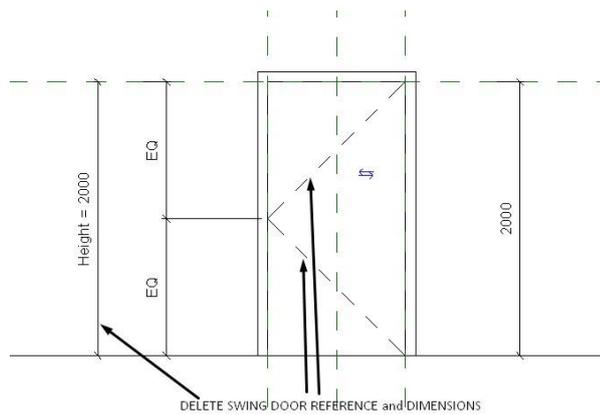


Creating New Door Family

This door family template is made for a residential wooden door family by default. When creating a parametric door with door lining properties and door panel properties, delete a few elements that is not much needed. Go to the plan view. Delete the unnecessary elements.



Delete Trim Elements



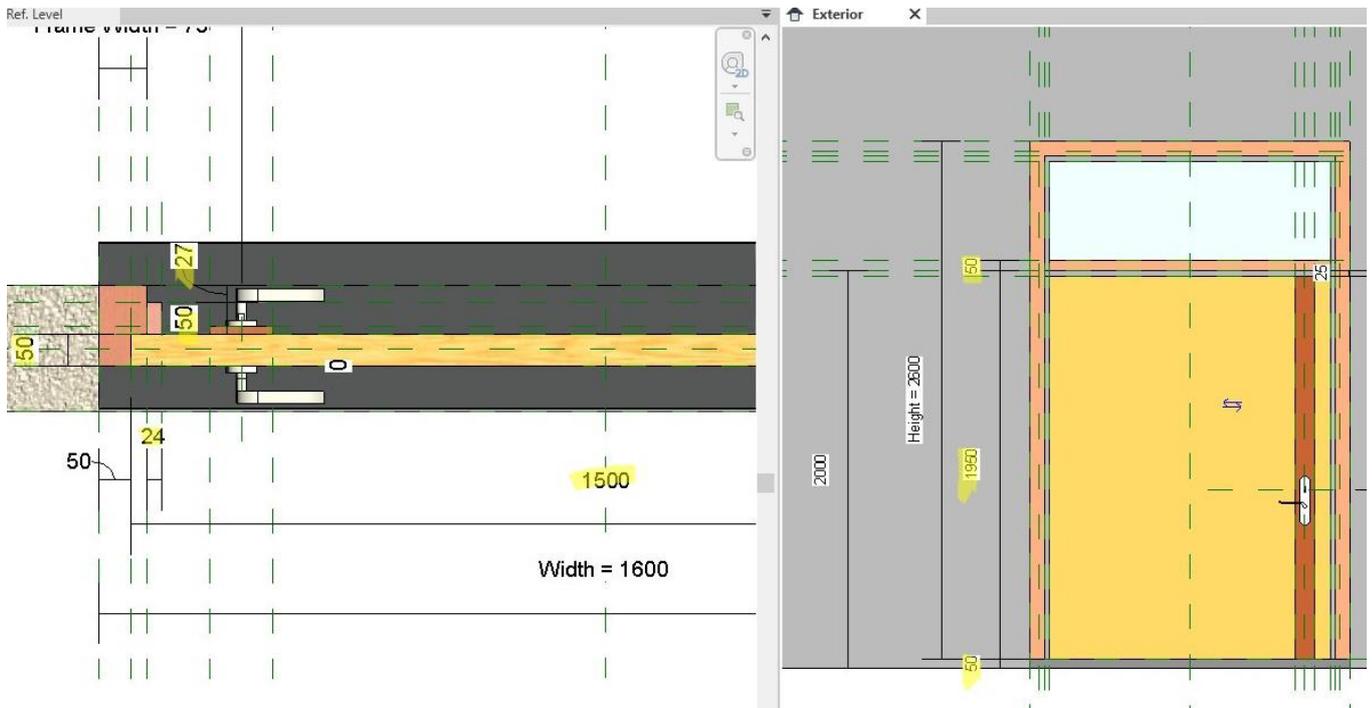
Delete Dimensions & Swing Door Reference

2. Create rough dimensions reference planes



Create a Rough Dimensions Reference Planes

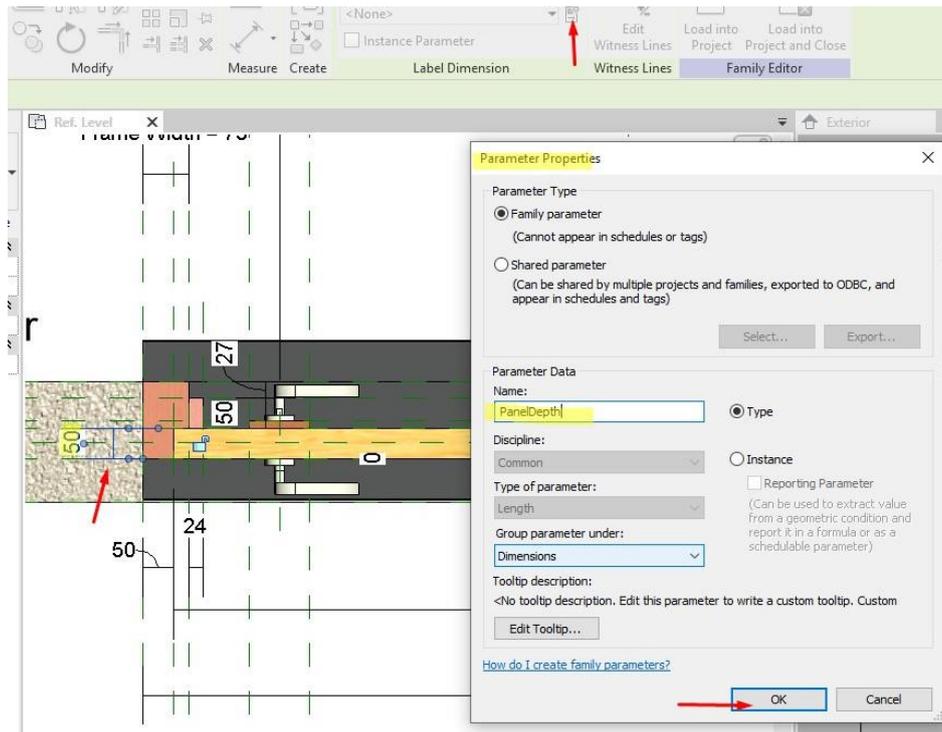
3. Start Creating the parametric door with all the dimensions of the parameter properties needed for door lining and door panel.



Parametric Door with Dimensions

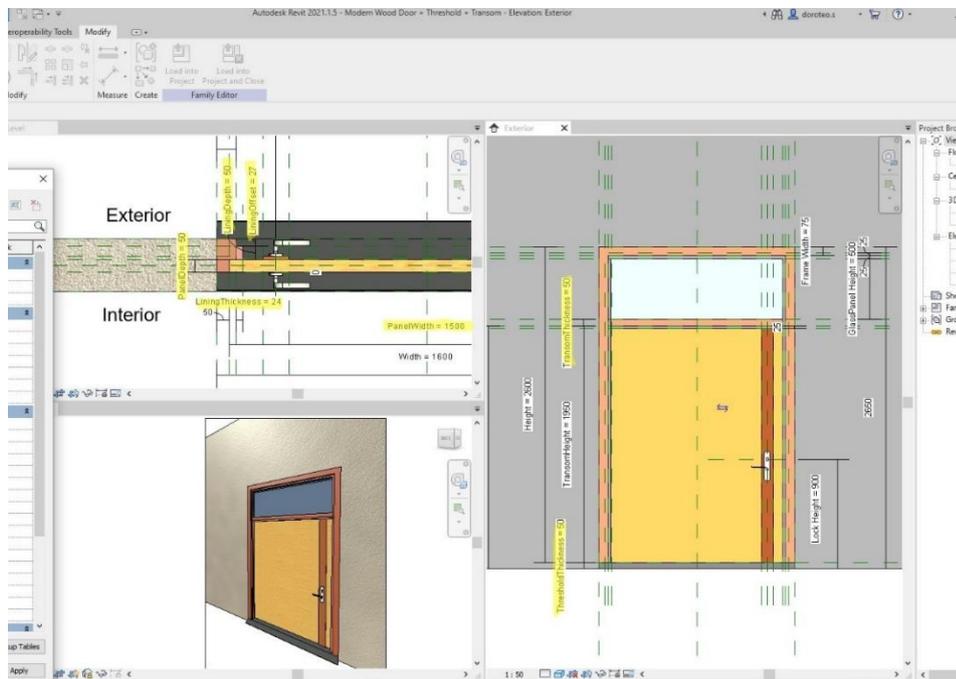
#### 4. Assign in each dimension, the parameter properties.

Click on the dimension, then click create parameter icon. Create the parameter name, then click OK.



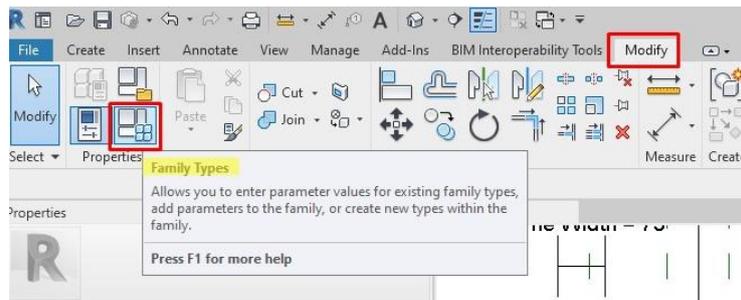
Assigning Parameter Name in Each Dimension

#### 4. Provide all the necessary parametric properties.

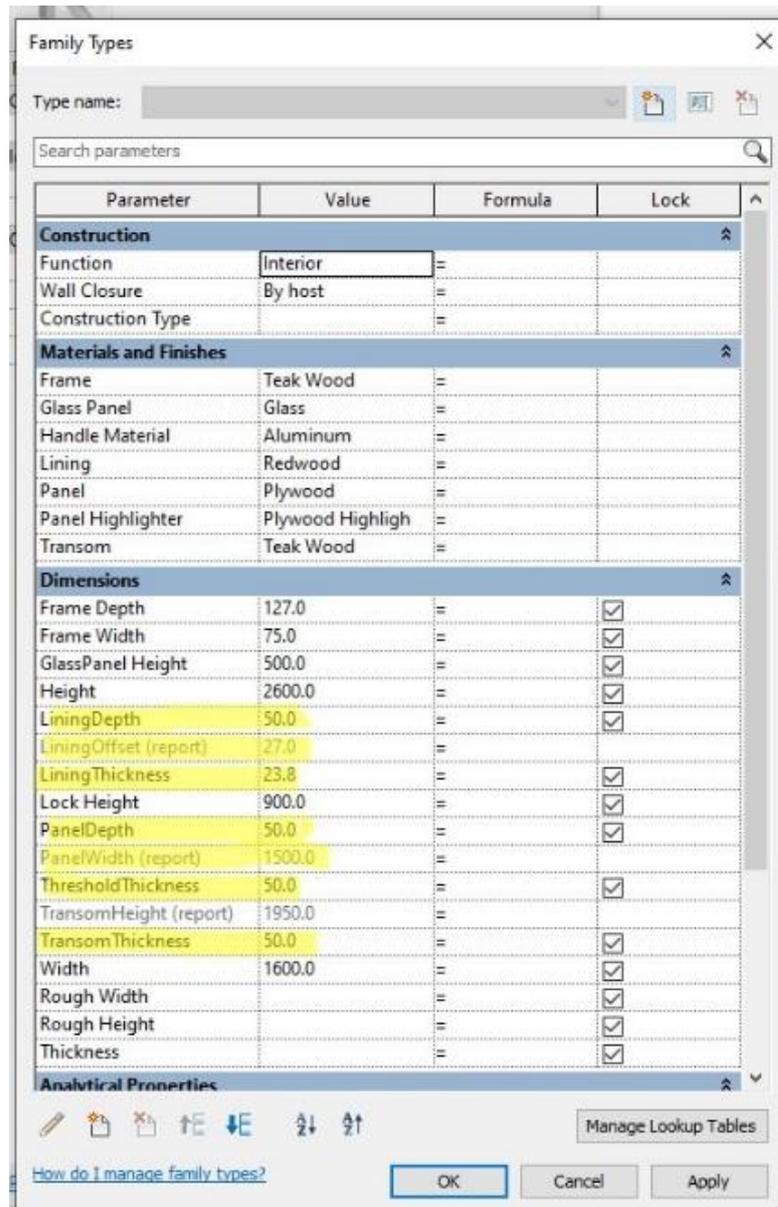


Provide all the Parameter Properties

- After assigning all the parameter properties, check the properties in the 'Family Type' panel under Modify tab.

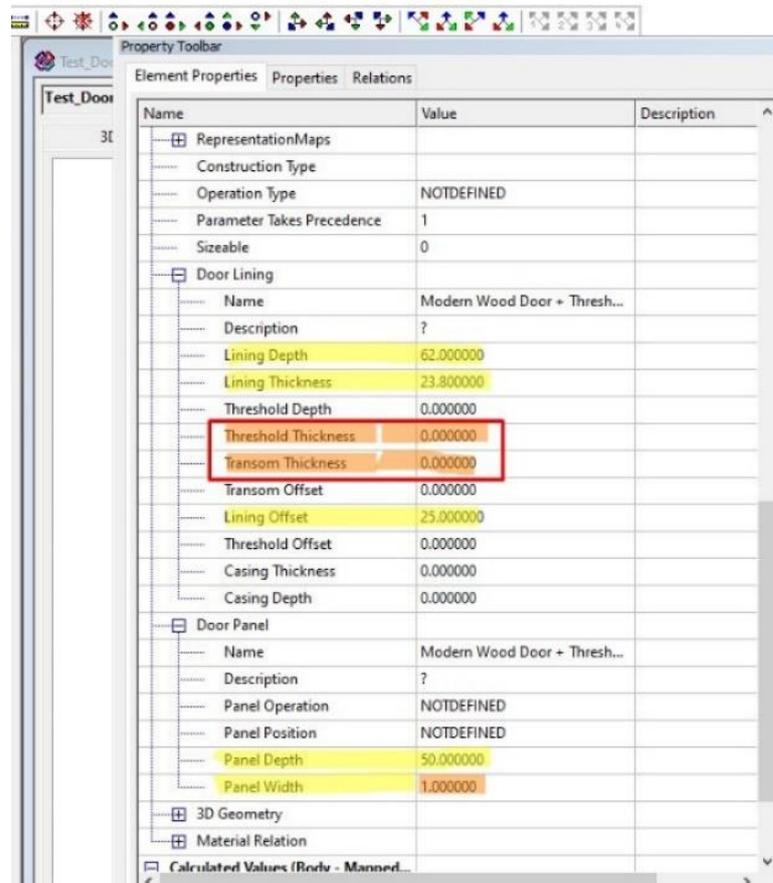


Family Types Tab



Family Types Properties

6. To export it based on the IFC Export Setup Steps (refer to section 5 /page number 15) to have correct result.



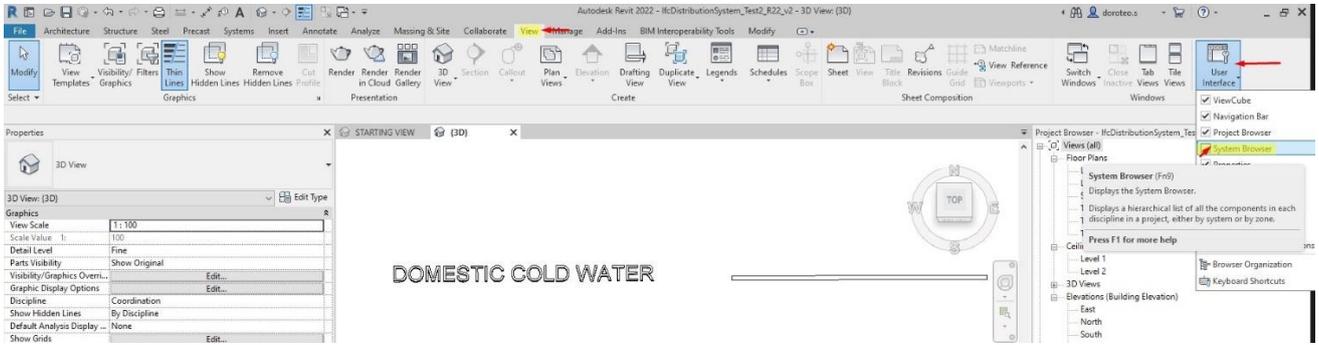
Upon Exporting Value becomes 0 on the Threshold Thickness and Transom Thickness

### 5.3 HOW-TO ADD DISTRIBUTION SYSTEM INFORMATION IN PIPING SYSTEM

When adding Distribution System Information in Piping System in Revit MEP, do not just click on pipes and add the Predefined/Userdefined property value. Or else, it will export into IfcPipeSegment instead of IfcDistributionSystem.

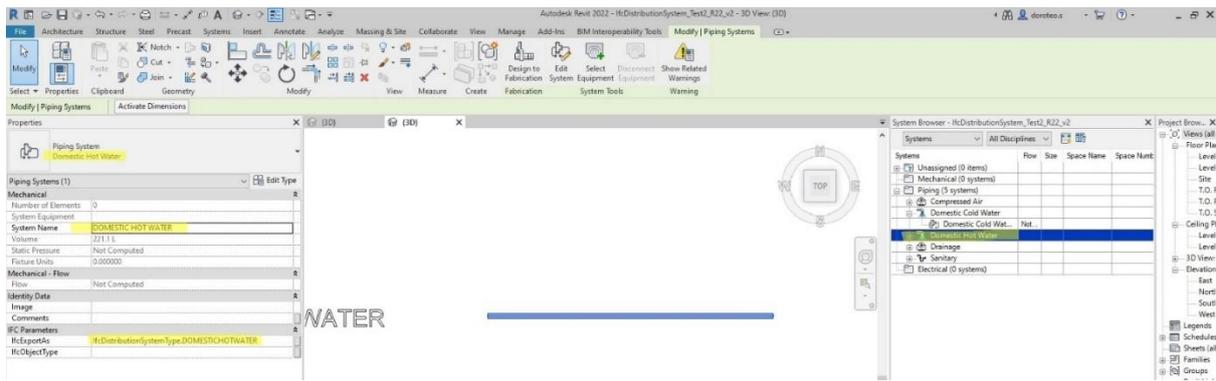
Before assigning IfcDistributionSystem, **“IfcExportAs”** and **“IfcObjectType”** should be pre-created under IFC Parameters group and assign to the Piping System Group.

7. On the View Tab > Drop down the User Interface Tab > Check the System Browser to show the IfcDistributionSystem in the model

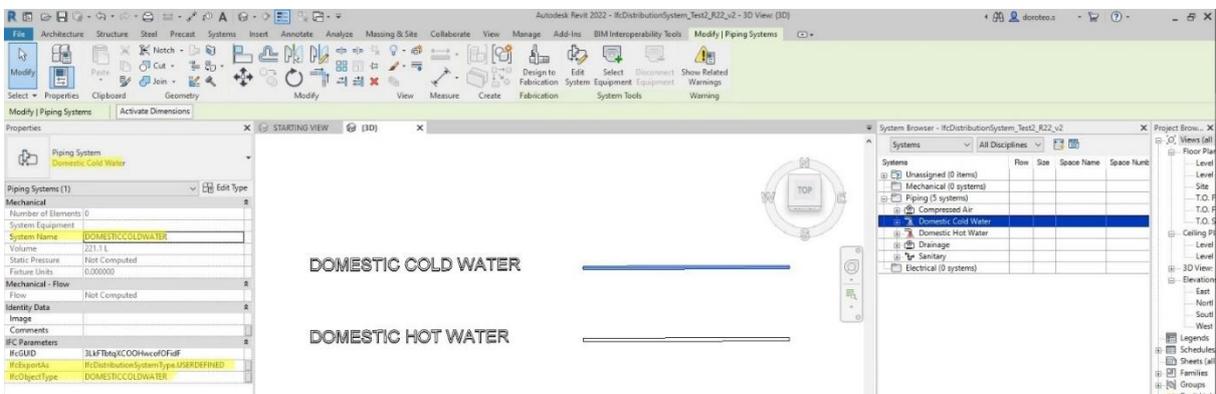


Location of System Browser

8. Go to the 3D View > Go to the System Browser > Select a System > It will automatically highlight the piping system > When in Modify|Piping System tab > Modify the Predefined/ Userdefined properties under Ifc Parameters



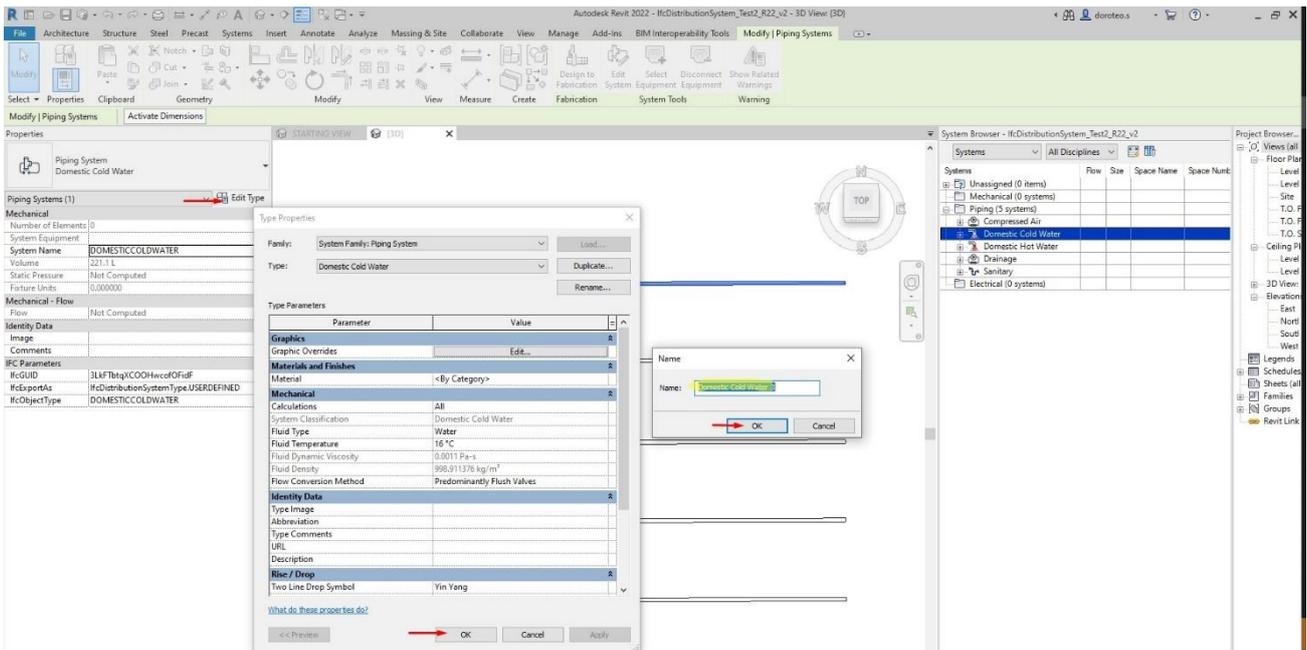
Modifying Predefined Property of Piping System



Modifying Userdefined Property of Piping System

9. Make sure the property type name is correct in the specific use.

Click “Edit Type” and duplicate if need to change the property type name > then click Ok.



Editing Type Properties

10. To export it based on the IFC Export Setup Steps (refer to section 5 /page number 15) to have correct result.

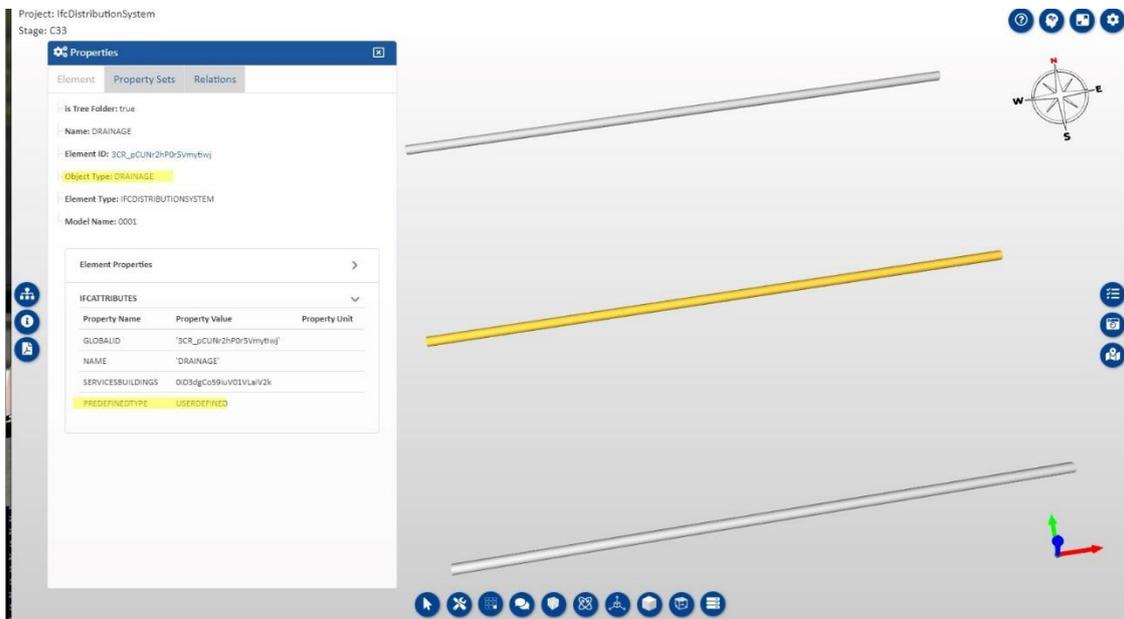
Here is the sample result generated using Revit 2022 IFC exporter.

The system gets the value for the Predefined Type of the value of Object Type



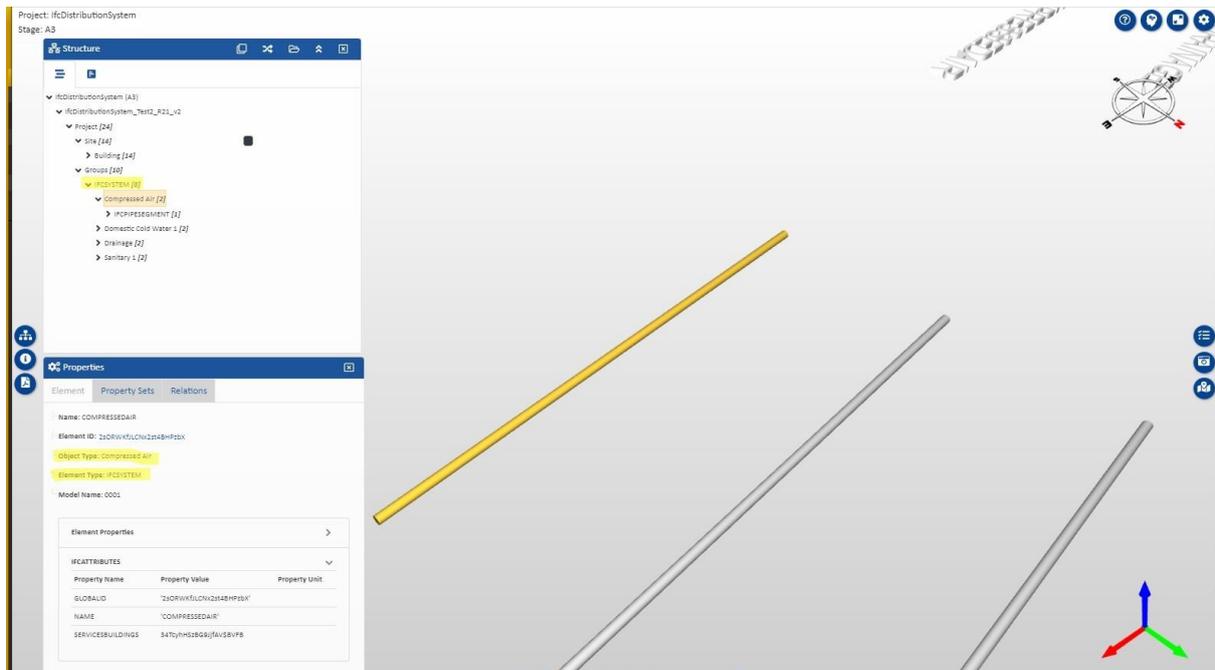
Exported Predefined Type

Note: If the system has predefined type value in the IFC4 documentation, even if the user defines it to a userdefined type, its predefined type value will be generated.



Exported Userdefined Type

## 11. For Revit 2021 and below, IFC4 Entity to be represented as "IfcSystem."



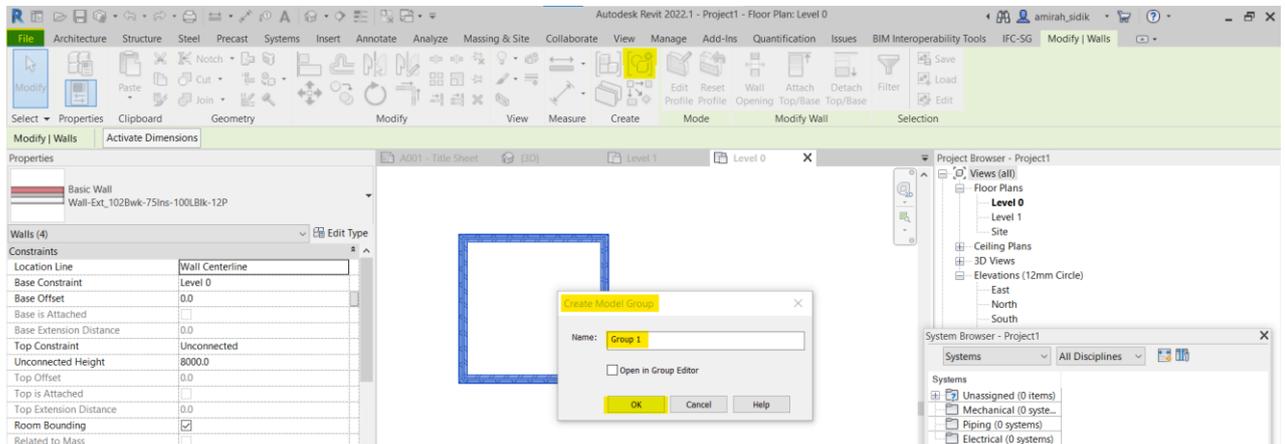
Exported IFCSYSTEM Element Type in Revit 2021

When applying the mapping in the BIM authoring tools, character limits in user-defined property sets, property names, and values were encountered. QA testers had documented these issues and made them available to both the mapping team and BIM team in case properties appeared to exceed the character limit. Additionally, the character limit issue was brought to the GovTech team's attention, to highlight to the relevant agencies and seek feedback from the representatives regarding how the property names would be amended to.

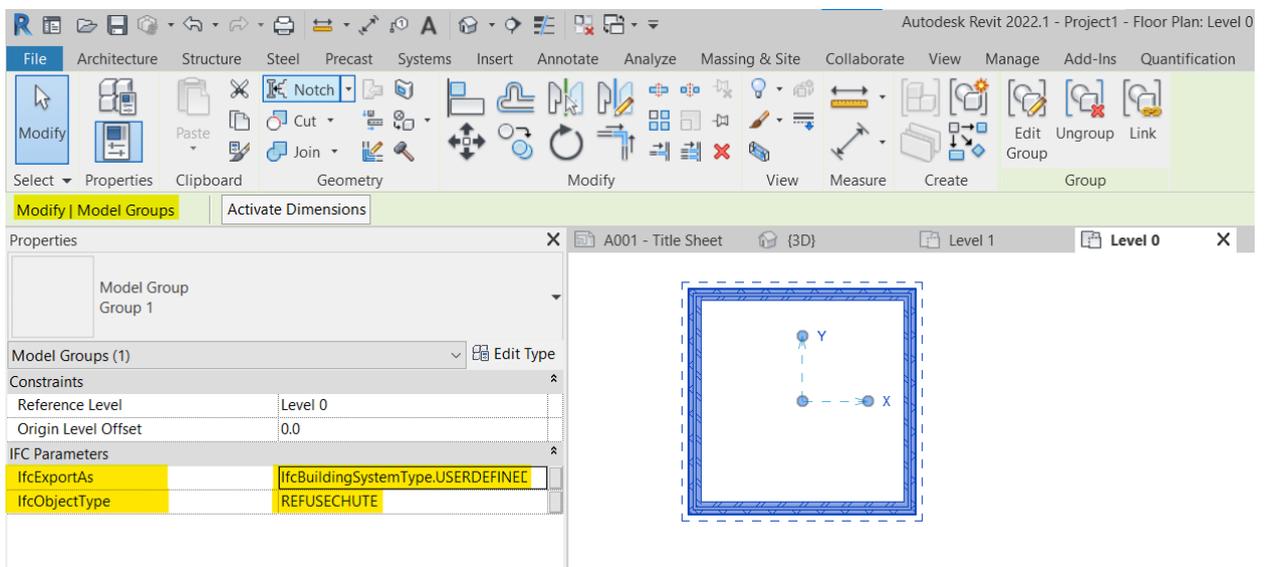
## 5.4 HOW-TO ADD BUILDING SYSTEM INFORMATION

When adding Building System Information in Revit, ensure **“IfcExportAs”** and **“IfcObjectType”** should be pre-created under IFC Parameters group and assigned to **Model Groups**.

1. When creating a building system, the individual elements are to be combined into model groups to for assignment to IfcBuildingSystem as its IFC representation. Select the individual elements modelled for the purpose > Head to file Tab > Select “Create Group” > Input in the name of the Model group in the dialog popup box.



2. Once grouped, select the Model group > Modify the Predefined/ Userdefined properties under Ifc Parameters.



3. Once assigned, proceed to export it based on the IFC Export Setup Steps (refer to section 5).

## 5.5 HOW-TO REMAP EXISTING PARAMETERS TO MATCH CX SUBMISSION PARAMETERS

One option for the export of IFC files is to remap existing parameters by the userdefined parameter name to match in CX Submission Parameters.

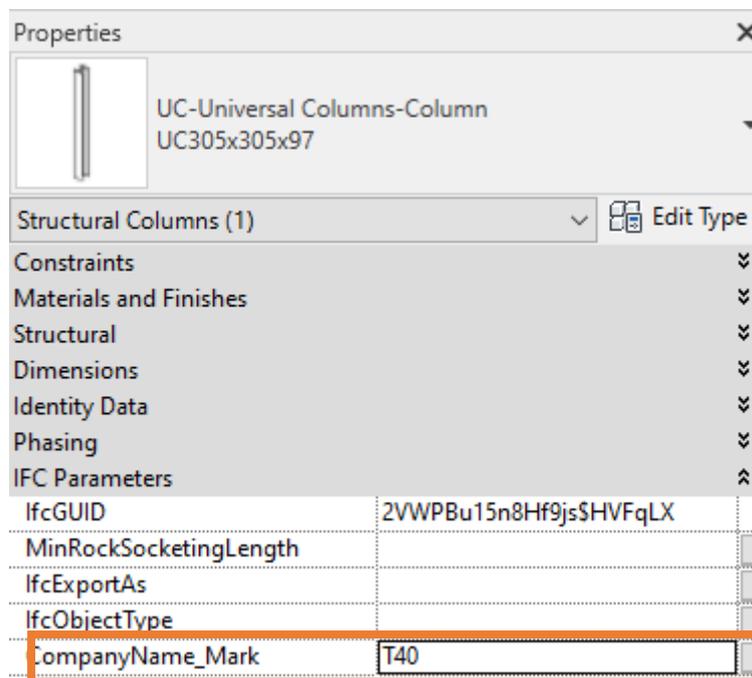
In the Property Set Mapping/ Revit Configuration File, everything between <TAB> is replaced.

For example, the Userdefined IFC-SG Property name need to be replaced into another parameter name.

1. Find the correct Property Set where the property resides. Without changing the parameter used in the model, replace "CompanyName\_Mark" after the Property Type with <TAB>, the exported parameter that will be replaced.

```
PropertySet:   SGPset_ColumnDimension I      IfcColumn
Breadth Length
Diameter      Length
EndStorey     Label
Height Length
Mark Label    CompanyName_Mark
MemberSection Label
StartingStorey Label
Width Length
```

Property Set Mapping/ Revit Configuration File



Sample Revit with Existing Parameter

SGPset_ColumnDimension	
Height	307.9
Mark	T40
Width	305.3

### Exported File after property mapping

30

OPTIONS FOR THE EXPORT OF IFC FILES

Everything between <> is replaced:

<Pset Name>: Name of the Pset, don't use Pset\_ as Prefix as this is reserved for standard IFC Psets

I[instance]/I[type]: used to specify Instance or Type properties, obsolete in current versions as the selection happens automatically, use either I or T

<element list separated by '>;>: this is the place where either one or more IFC classes for which this Pset will be applied are listed, e.g. IfcWall, IfcSlab, IfcColumn. If the Pset should be applied to all elements, use the next higher entity { with - IfcBuildingElement building elements like walls, doors etc. or IfcElement to include also Civil and Distribution elements. This can be checked in the IFC documentation by searching for Entity inheritance.

<Property Name>: property name as displayed in Revit

<Data type>: the supported IFC data types are listed in the template file, the most commonly used are Text, Integer, Real, Length, Volume, Boolean. There are currently 40 IFC property types that are supported in the Revit IFC export. Not every property type in Revit can be mapped directly to the IFC type, as IFC uses a different way of specifying some of the units. When mapping Revit data type that does not have a direct mapping to the IFC data type, it can be mapped to a primitive type, e.g. Real or Integer. This will export the value unconverted using Revit internal units.

<[opt] Revit parameter name, if different from IFC> is an optional field and can be omitted, if the name of the Revit property should also be used for the IFC property. If the IFC property should have a different name, it can be entered here.

**Note: All entries are separated by a <TAB> and the file should be saved in the UTF-8 format.**

Example:

```
PropertyDef: My Pset I IfcWall
Phase Created Text Phase
Base Constraint Text
Room Bounding Boolean
Length Length
```

My Pset	
Base Constraint	Level: Level 1
Length	5000 [mm]
Phase	New Construction
Room Bounding	TRUE

**Entity inheritance**

- ↳ IfcElement
- ↳ IfcBuildingElement
- ↳ IfcColumn
- ↳ IfcSubdividedElement
- ↳ IfcCurtainElement
- ↳ IfcCurtainWallElement
- ↳ IfcElementAssembly
- ↳ IfcElementComponent
- ↳ IfcFurnitureElement
- ↳ IfcLandscapeElement
- ↳ IfcGeographicElement

Source from Autodesk Revit Guide

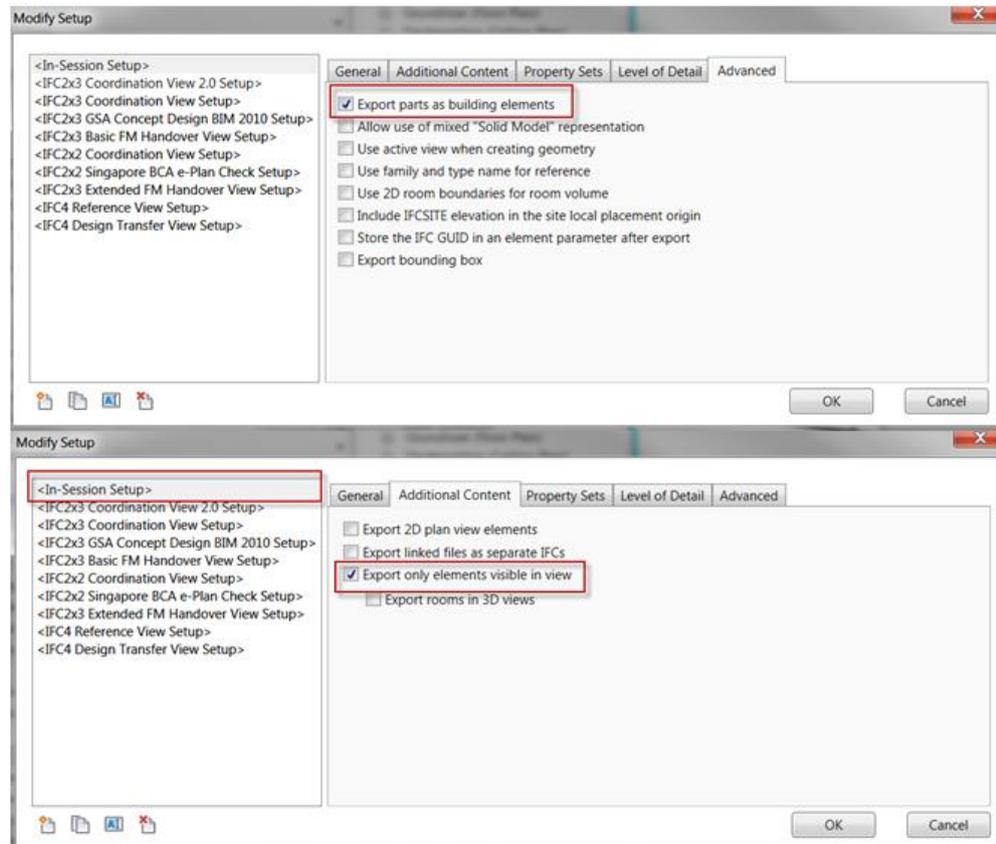
## 6 Frequently Asked Questions

Questions	Responses from Autodesk
<p>In Revit, is it ok to create 2 types of categories for IfcExportAs parameters? – i.e. As a type category and instance category. The type parameter is a project parameter.</p>	<p>It is advisable to keep to 1 type of category for IfcExportAs Parameter. Having 2 types of category will not allow both information to be exported as the instance category will override the type category parameter. It is also advisable to use “instance Category” for IfcExportAs as it allows more flexibility and enables users to modify the parameter values separately for every instance. Type Parameter on the other hand is associated with the system and object family type. When changes are made to this parameter value, it will apply to all the elements of the same family type.</p>
<p>I have family that I would like to prepopulate its IFC properties and sub types, how can I apply IfcObjectType as Type Attributes?</p>	<p>For advance users who are familiar with modifying Shared Parameter files, please add the line below to populate IfcObjectType[Type] property.</p> <pre>PARAM 54f49c86-bf8c-4689-830a-54bc73fa0ab2 IfcObjectType[Type] TEXT 2 1 Special Parameter to set the Instance ObjectType attribute from the Type 1 0</pre>
<p>How can Civil 3D elements like drain and Road be exported to IFC-SG?</p>	<p>Road is represented as IfcGeographicElement, whilst Drain, Drainage System, Drainage Reserves has different representations in IFC-SG. Users can refer to the IFC-SG mapping for the respective IFC representation.</p> <p>Additionally, IFC 4.3 for Infra and Railway are under deployment by Building smart and Autodesk is working on the integration with Civil3D and Revit. Roadmap info should follow by End of 2022.</p> <p><a href="http://ifc43-docs.standards.buildingsmart.org/">http://ifc43-docs.standards.buildingsmart.org/</a></p>
<p>How is the project boundary represented in IFC-SG? Can lines be used</p>	<p>Project, Site boundaries are represented as a topography in Revit. The revit representations can be found on the IFC-SG mapping where users can refer to.</p>

<b>Questions</b>	<b>Responses from Autodesk</b>
Which version of BIM interoperability tools should I use?	Users should update & use the latest versions that is available for the respective versions of Revit accordingly. Update the apps via Autodesk Desktop App
Will the federated IFC export be available on older versions of Revit 2020 or 2021?	Autodesk is exploring the options. Autodesk has already submitted this as a Requirement for 3 versions (internally). This is a big data challenge and would require cloud integration so depending on the API
When does one need to use dynamo when assigning IFC-SG parameters? Are the IFC-SG configurator files enough?	<p>Dynamo could support and accelerate the populating of IFC-SG properties in Revit – it is an alternative workflow to the BIM Interoperability tools.</p> <p>With the use of Dynamo Player, the scripts can be automated for regular Revit users to run and populate IFC-SG parameters.</p>

Can Revit parts (split from walls, slabs etc) be exported to IFC-SG?

1. In Revit, Go to “File” & head to the “Export” tab.
2. Select “IFC” Option & modify the setup
3. Access the “Advanced” tab
4. Check the box that indicates “Export parts as building elements”
5. Access the “Additional Content” Tab & check the box that indicates “Export only elements visible in view”



Questions	Responses from Autodesk
<p>For linked models Revit, is it recommended to export each file individually or export one time via the master model files?</p>	<p>Exporting of the linked files with the master file or exporting the link files as a separate IFC would vary depending on the file size &amp; users preference. The larger the file sizes are, the amount of time taken will differ.</p>
<p>For project typical units that need to be blocked / celled and then repeated / array / mirrored in the main block model, is this still possible for the workflow when exporting the Revit model to IFC?</p>	<p>Yes, users can refer to the guides provided for the available options for exporting linked files. (See Section 6.1)</p>
<p>Objects set to “Demolished” status isn’t shown in IFC export.</p>	<p>This program behavior corresponds to the current product design of Revit.</p> <p>Exporting multiple project phases into one IFC model is not supported in the file format IFC 2x3.</p> <p>While the IFC4 file format supports this, there is still no related Model View Definition (MVD) that would support this workflow. -<a href="#">Autodesk Source</a></p> <p>Refer to 6.2 for localized solution for setting of element status.</p>

## 6.1 RECOMMENDED APPROACH TO EXPORT LINKED FILES

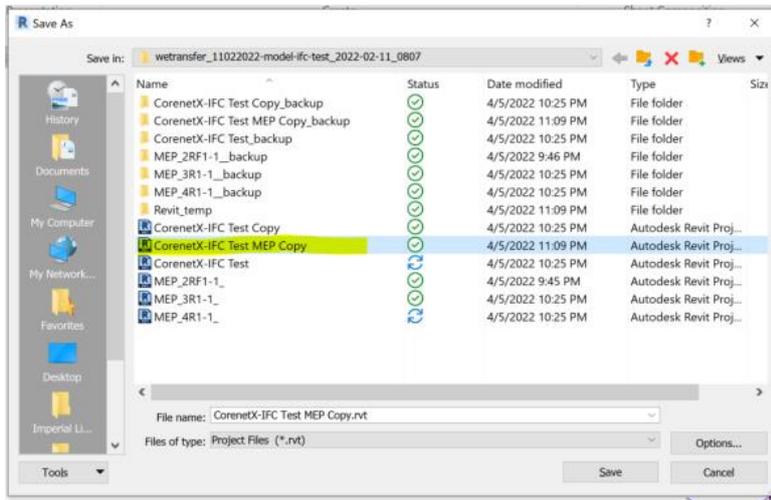
### Exporting multiple linked files with the host file into a unique IFC file

Users can export linked files in a project along with the host file to one IFC data file.

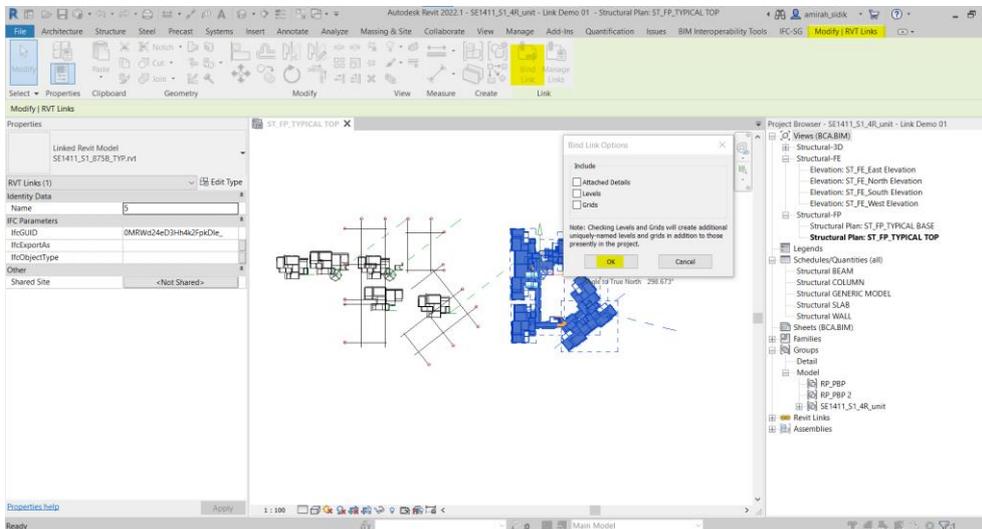
To do so, Users can bind the links in the existing project to the host file.

The linked files will be merged to the host file, onto which, once exported to IFC, you would be able to retrieve the data in one IFC data file along with the linked files in the models merged as one.

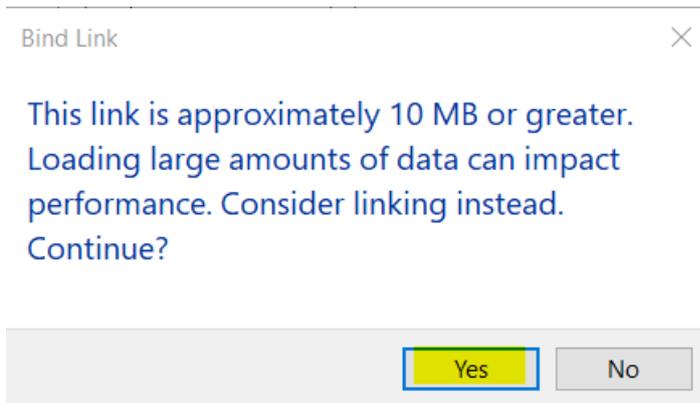
1. Audit, purge the unused models and clean all warnings before starting the binding process. This is done to avoid issues when binding a linked model to the host file.
2. Open the current host model and use Save As to make a copy of it.



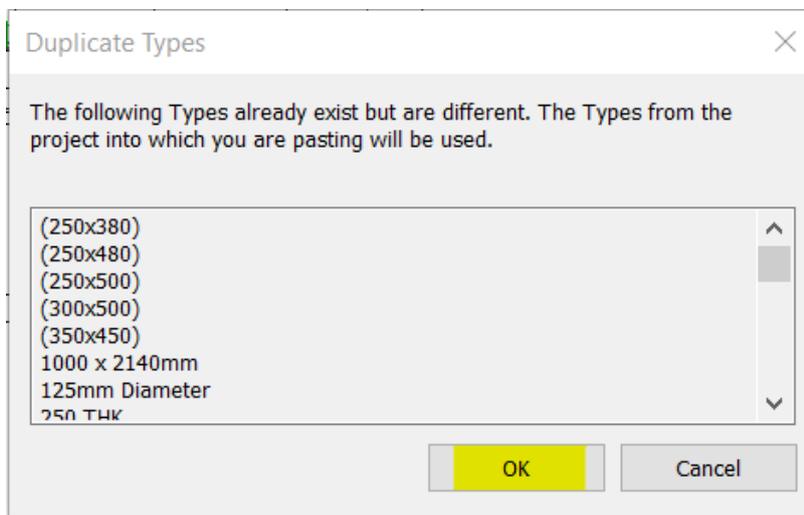
3. In the copied file, select each link and choose "Bind Links". Ensure that none of the options are selected in the pop-up dialog box and select OK.



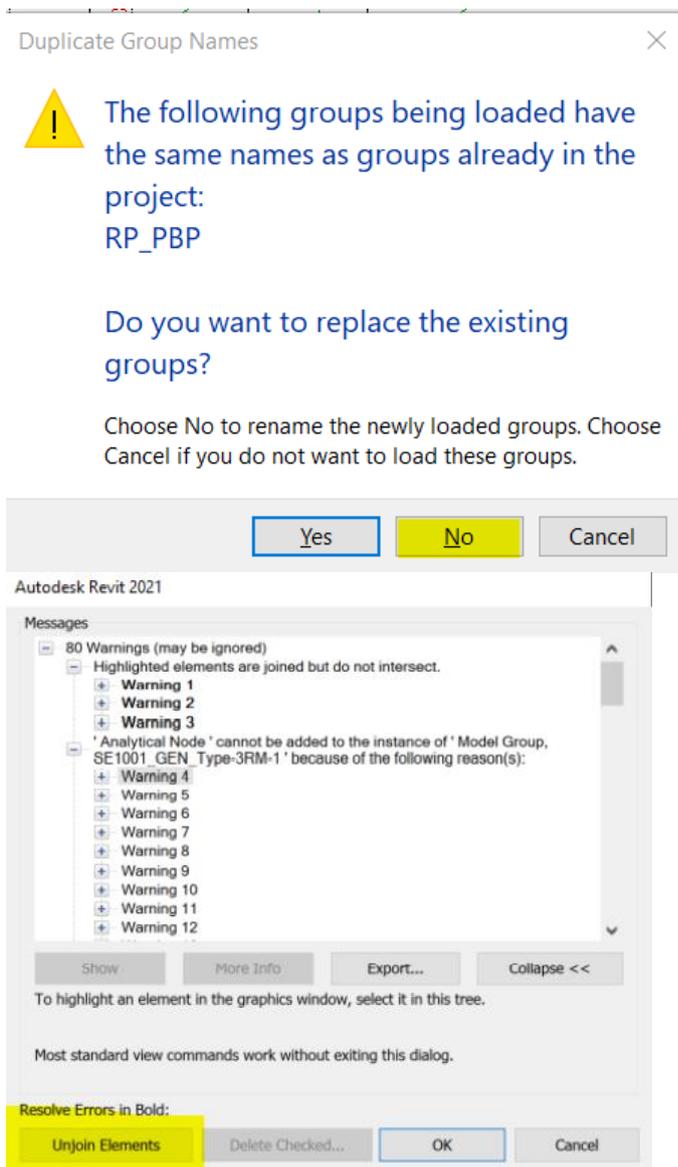
4. Select "Yes" to continue to bind link



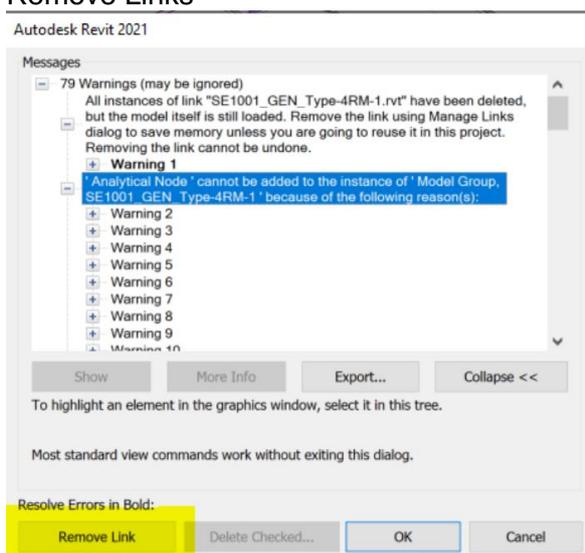
5. Select "ok" to duplicate types



6. Select "No" to duplicate group types & Unjoin / Disconnect Elements



7. Remove Links

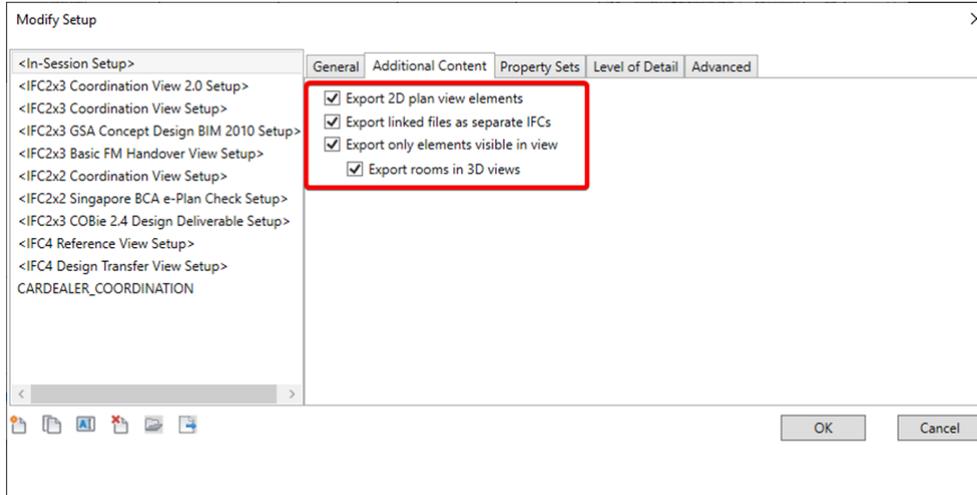


8. Once the links is bind,export the Revit model to IFC accordingly.

## Exporting linked files with the host file into separate IFC files

Users can also export linked files in an existing project, with the host file and retrieve separate IFC files

1. In Revit Interface, Go to “File”, head to the “Export” tab & select “IFC” Option
2. Modify the Setup & access the “Additional Content” tab.
3. Check the box that indicates “Export linked files as separate IFCs” and proceed to export the files accordingly. Note that if this function is not selected, the Revit linked files will not be exported



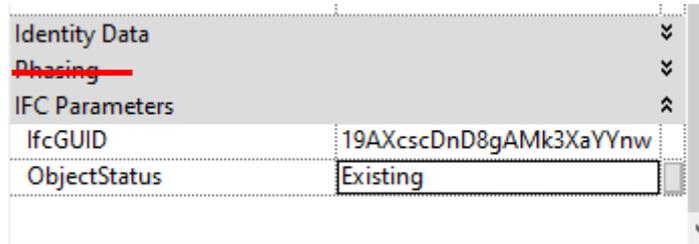
4. Once exported, users are advised to check the separated IFC files in an IFC viewer to ensure that it has been federated.

Alternatively, Users may refer to the guide on exporting the linked files provided in the FAQ answers.

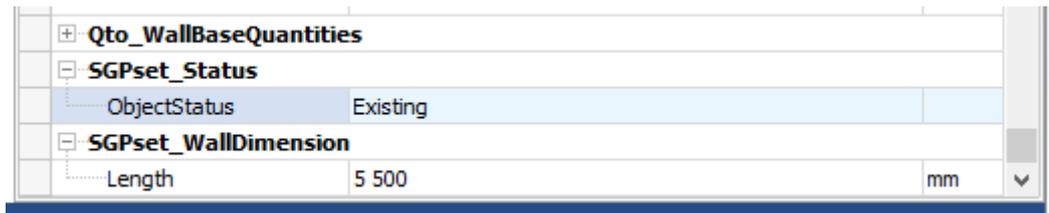
## 6.2 HOW TO SET AND EXPORT ELEMENT STATUS TO IFC

For submission purposes, do not use the native Revit Phasing tool as it will affect the IFC export.

The alternative proposed method is to load and use the shared parameter "ObjectStatus", populating it with the sample values: "Existing", "Demolished" or "Proposed".



Do not use the native Revit Phasing tool, Use "ObjectStatus"



IFC Export

## 7 Resource Link

[buildingSMART Documentation - IFC 4 Reference View](#)

[Revit IFC Open BIM Manual](#)

## 8 Change Log

<b>Date</b>	<b>Description</b>
May 2023	Added FAQ, Predefined Type workflow for Revit 23 and newer
Nov 2022	Added section for advance users who wish to merge IFC-SG shared parameter into company existing shared parameter file
Oct 2022	Updated Section 4.5 on Property Mapping (Configuration to map existing parameters to match Corenet X parameters
May 2022	Base Version completed
Aug 2022	Added FAQ
Feb 2022	Added Preface section and updated screenshots