TIO

cubiCost®

Make Everything Count

TAS-TIO Training

CONTENTS

What is TIO?

T: Takeoff

I: Intelligent

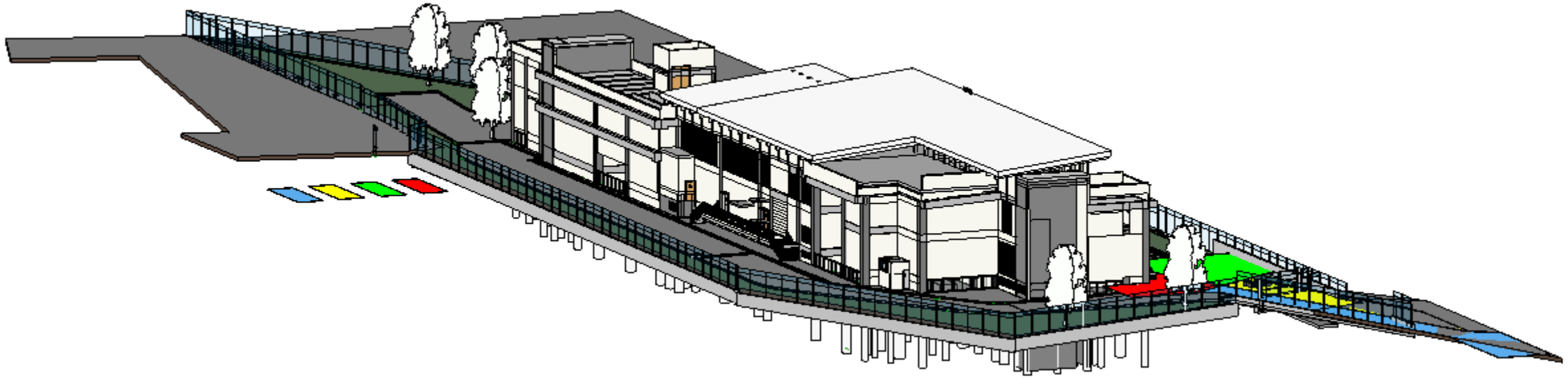
O: One-step

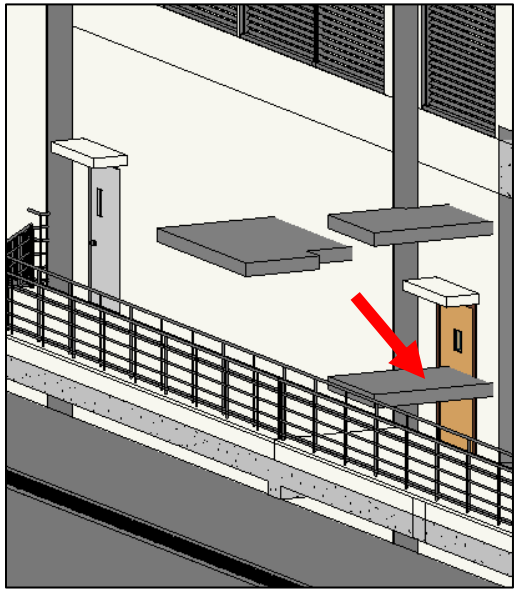
TIO, One-step Intelligent Take-off

What is TIO?

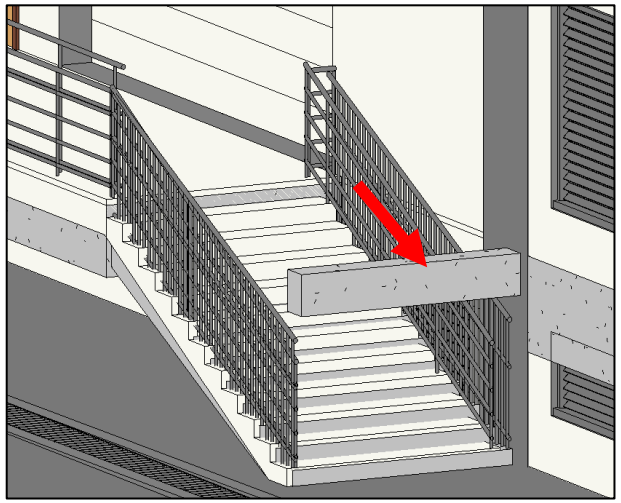
- Advanced Edition of TAS
- Subscribe product by year, no longer one-time purchase for permanent use
- Compared to the TAS Pro version, it adds import RVT functions
- It can exchange data with TRB/TAS/TBQ
  - ✓ If you have imported RVT projects in TIO edition, you **cannot** open the projects with Pro edition.
  - ✓ If you have not imported RVT projects in TIO edition, you can open the projects with Pro edition.
  - ✓ You can use TIO edition to open all projects created in Pro edition. You can exchange projects created in TIO edition with TRB.

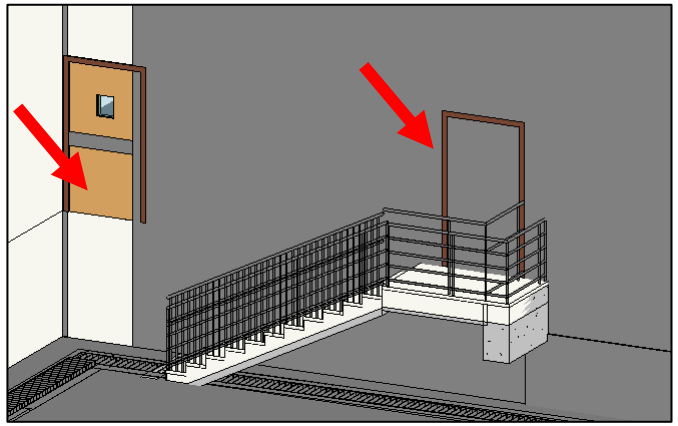
Is BIM Models fit for QTO?

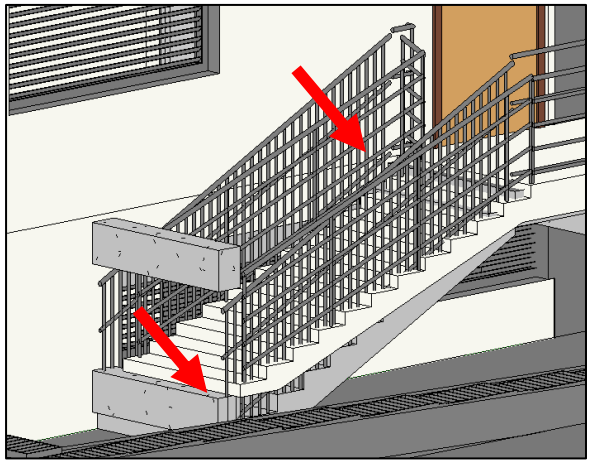




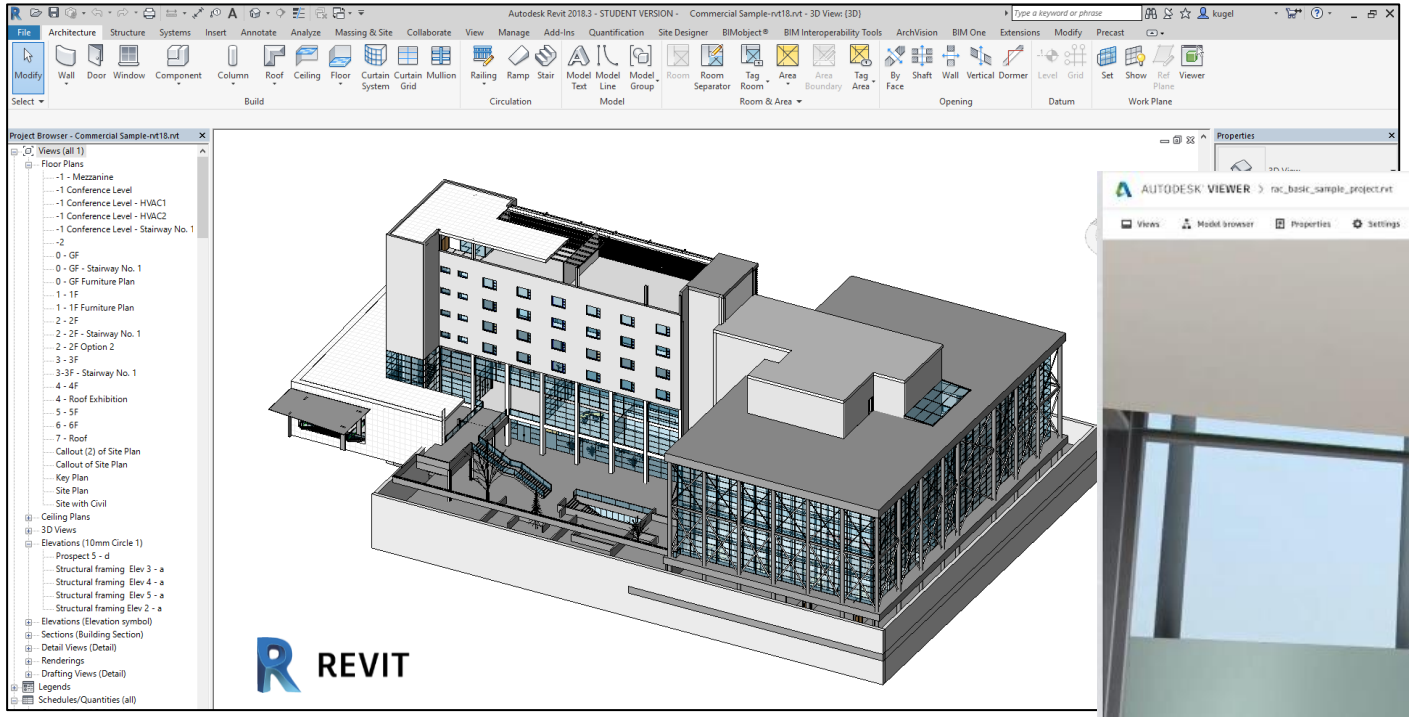
Study the model before QTO, to allow better preparation before QTO.

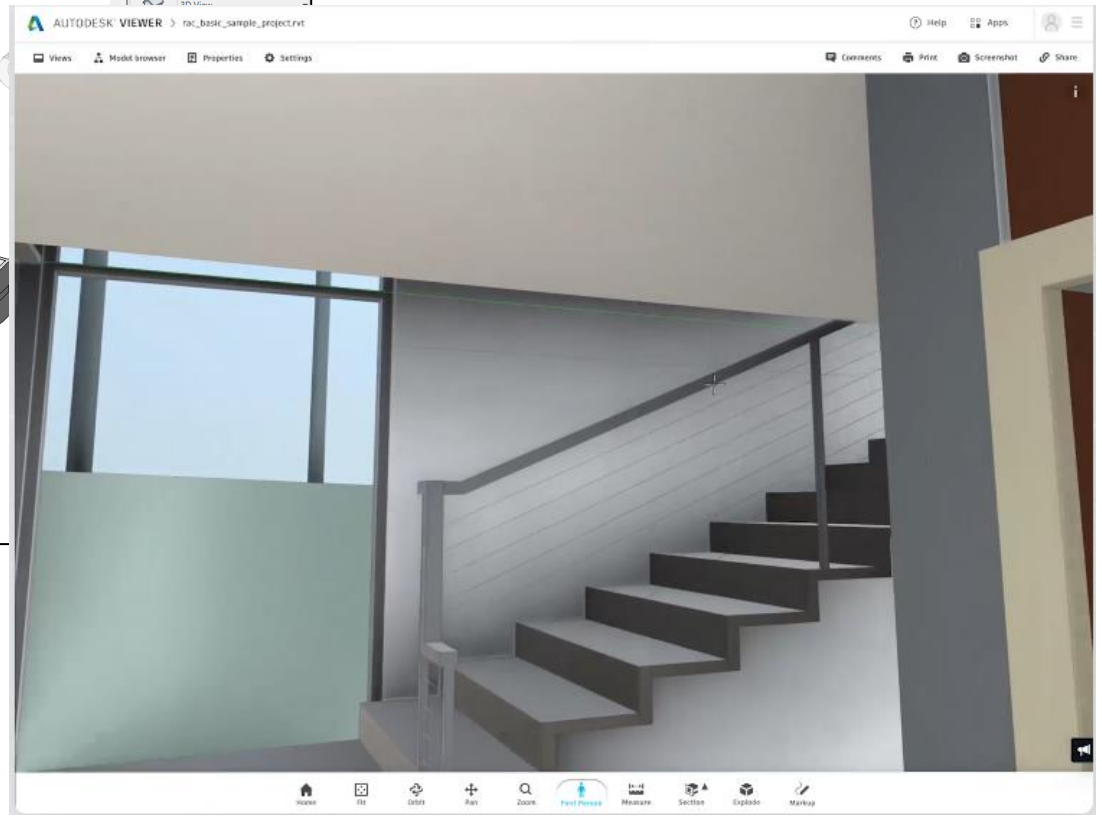






How to View BIM models?





Autodesk Viewer

Model viewing applications to open, view and check model elements.

How to View BIM models?

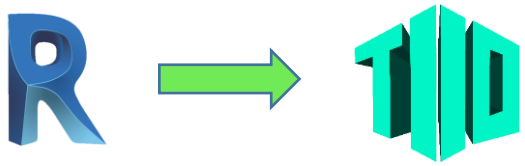
Viewing the Models – Checking & Understand ‘Model Content’.

1) Check Overall Model Nature
   - How many floors?
   - What is the building type, shape & size?
   - What are the element category & types?

2) Check Details
   - Check element geometry
   - Check interconnecting elements
   - Cross check with element ID

3) Plan which quantities are required to be extracted.
   - which quantities required **no, m run, m2 or m3?**
   - which elements should be measured and which element are not required to be measured?

Elements might not contain the quantities/dimension required for QTO



1 Import

Select File to Import

Element Settings

2 Calculate

Model Check

Calculate Quantity

Quantity Check

Import RVT Workflow

- ✓ Revit Version
- ✓ Multiple project importing

- ○ Set reference floor

- ❖ Element Match
- ❖ Material Match

- ○ Set insertion point

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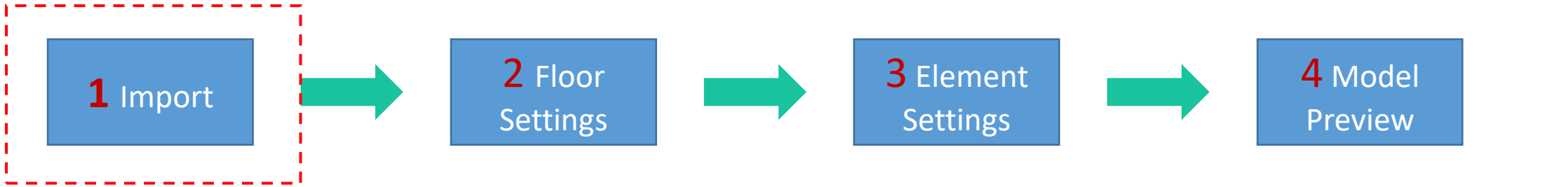
Import RVT Workflow



- ✓ Revit Version
- ✓ Multiple project importing

- ○ Set reference floor

- ❖ Element Match
- ❖ Material Match

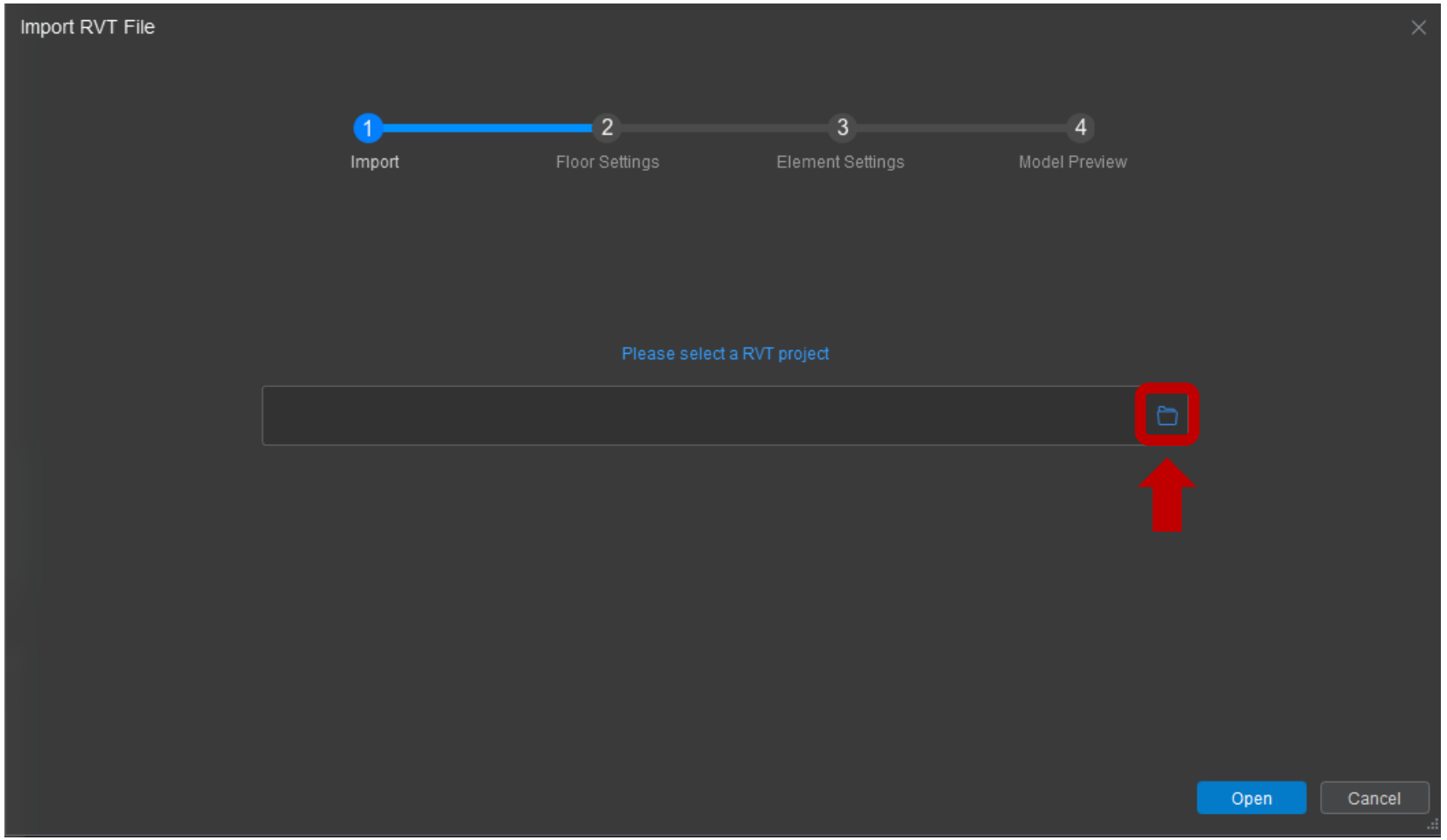
- ○ Set insertion point

Import RVT Workflow – Select File

1 Import

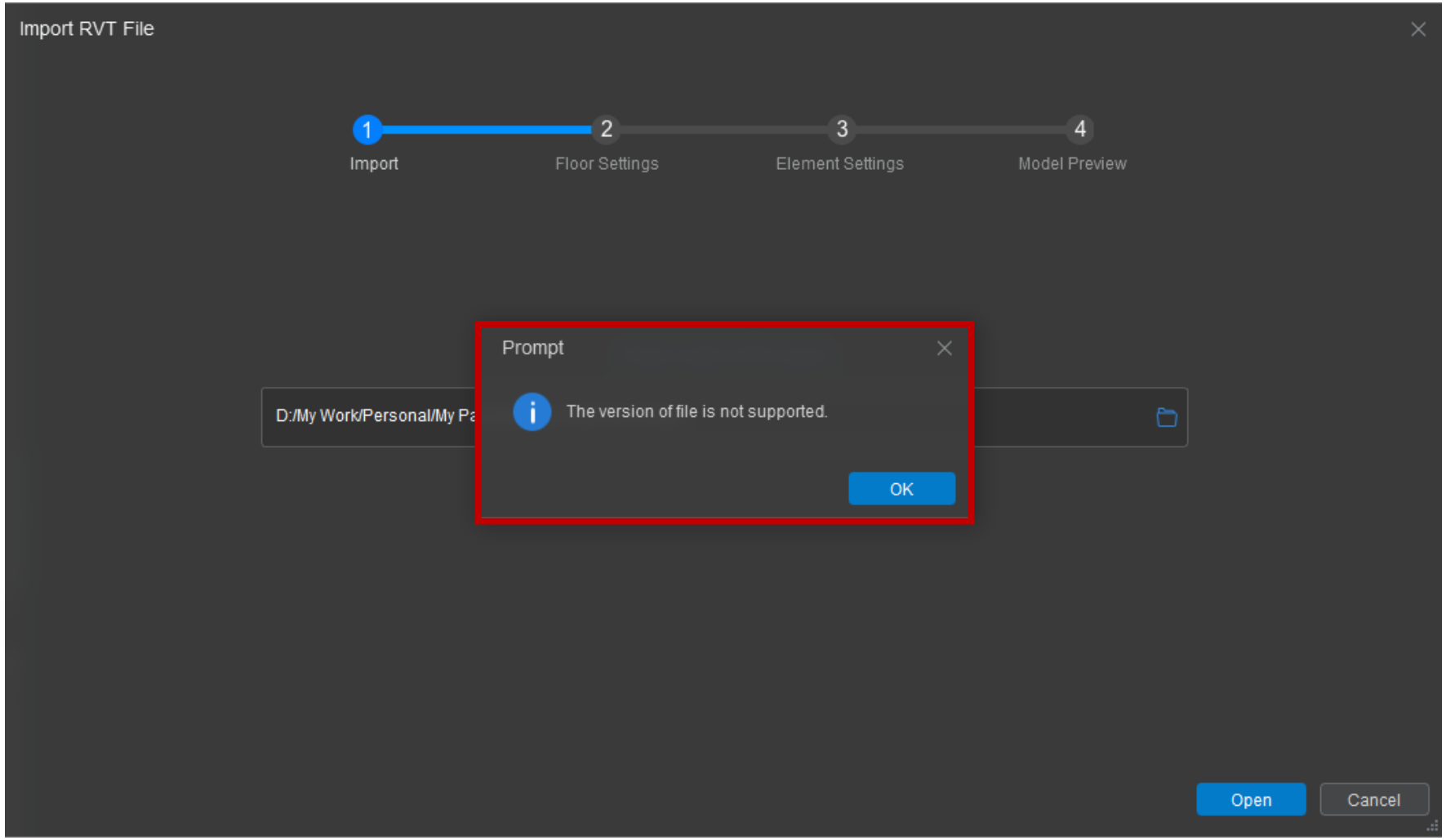
Click **Open**

Select Project File to Import

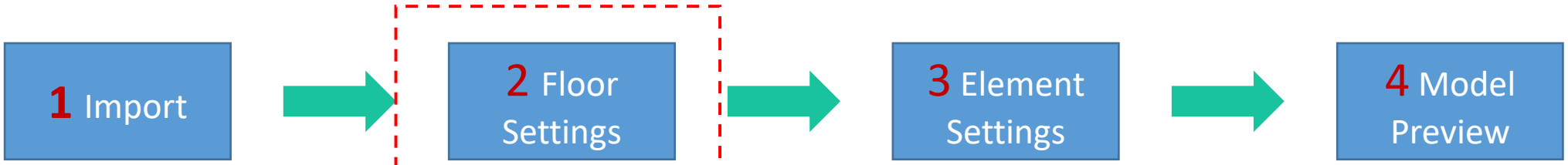


Import RVT Workflow – Select File

- When selecting files to import, if the error message appears, it is often because the file format fails to meet the requirements.



Import RVT Workflow



- ✓ Revit Version
- ✓ Multiple project importing

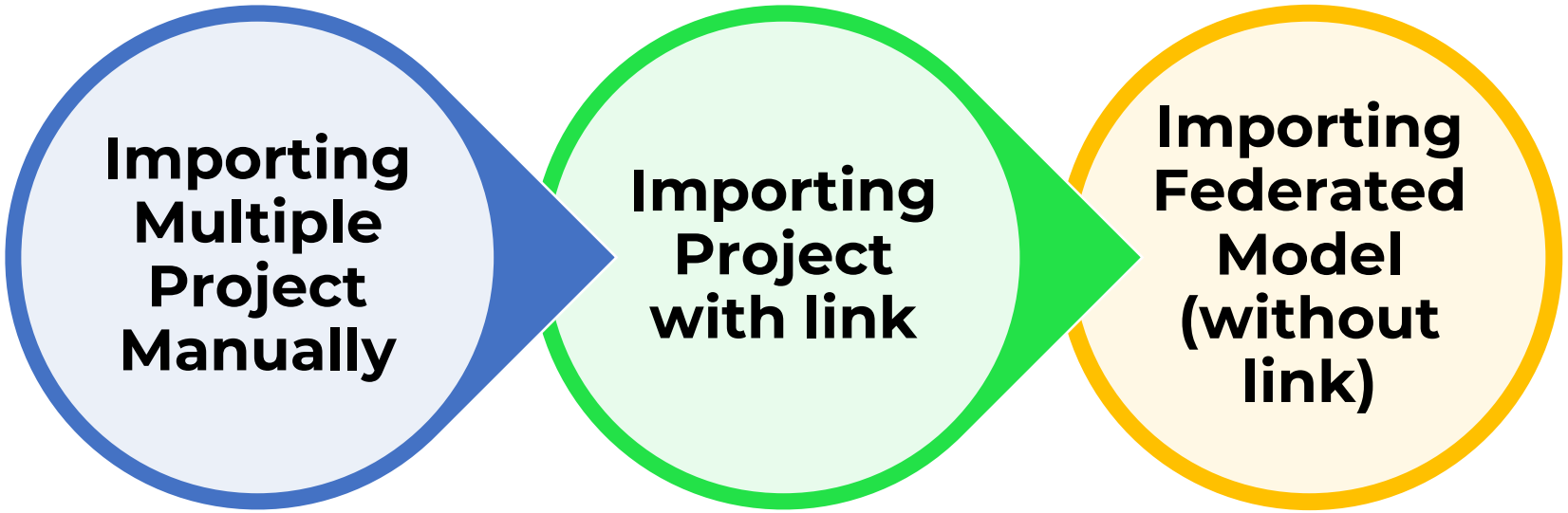
- ○ Set reference floor

- ❖ Element Match
- ❖ Material Match

- ○ Set insertion point

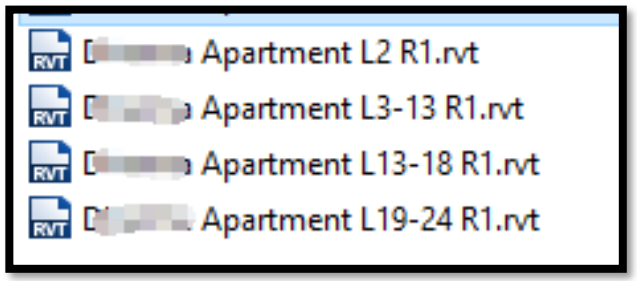
Import RVT Workflow – Select File

Scenarios in Importing Revit Project



Import RVT Workflow – Select File

- If a project is consisting of multiple RVT files, you can import each of them consecutively, and generate a complete model at the end.



Import it first

After importing the model of L2 level, choose to import this

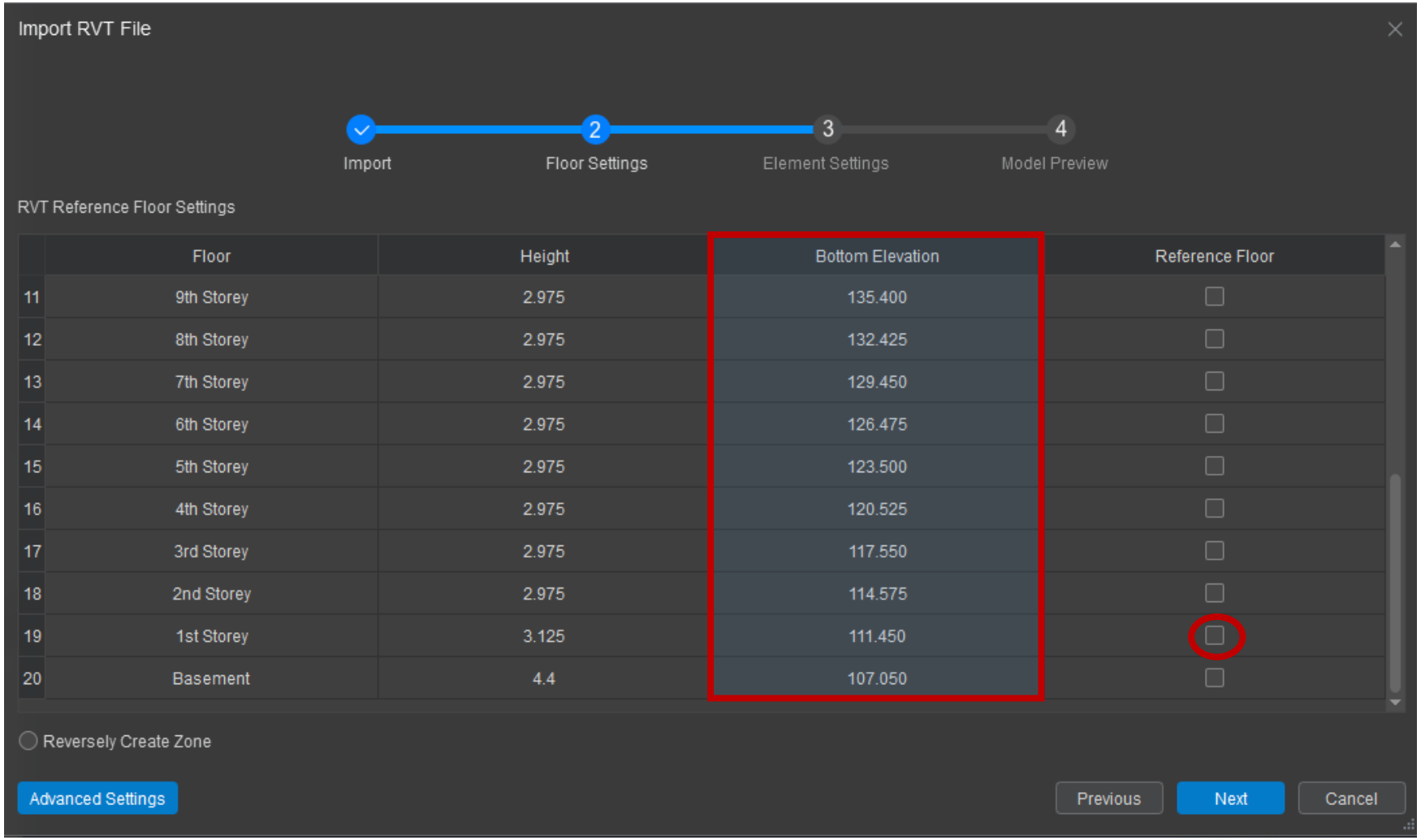
After importing the model of L3 level, choose to import this

After importing the model of L13 level, choose to import this

RVT ⇒ **TIO**

Import RVT Workflow – Floor Settings

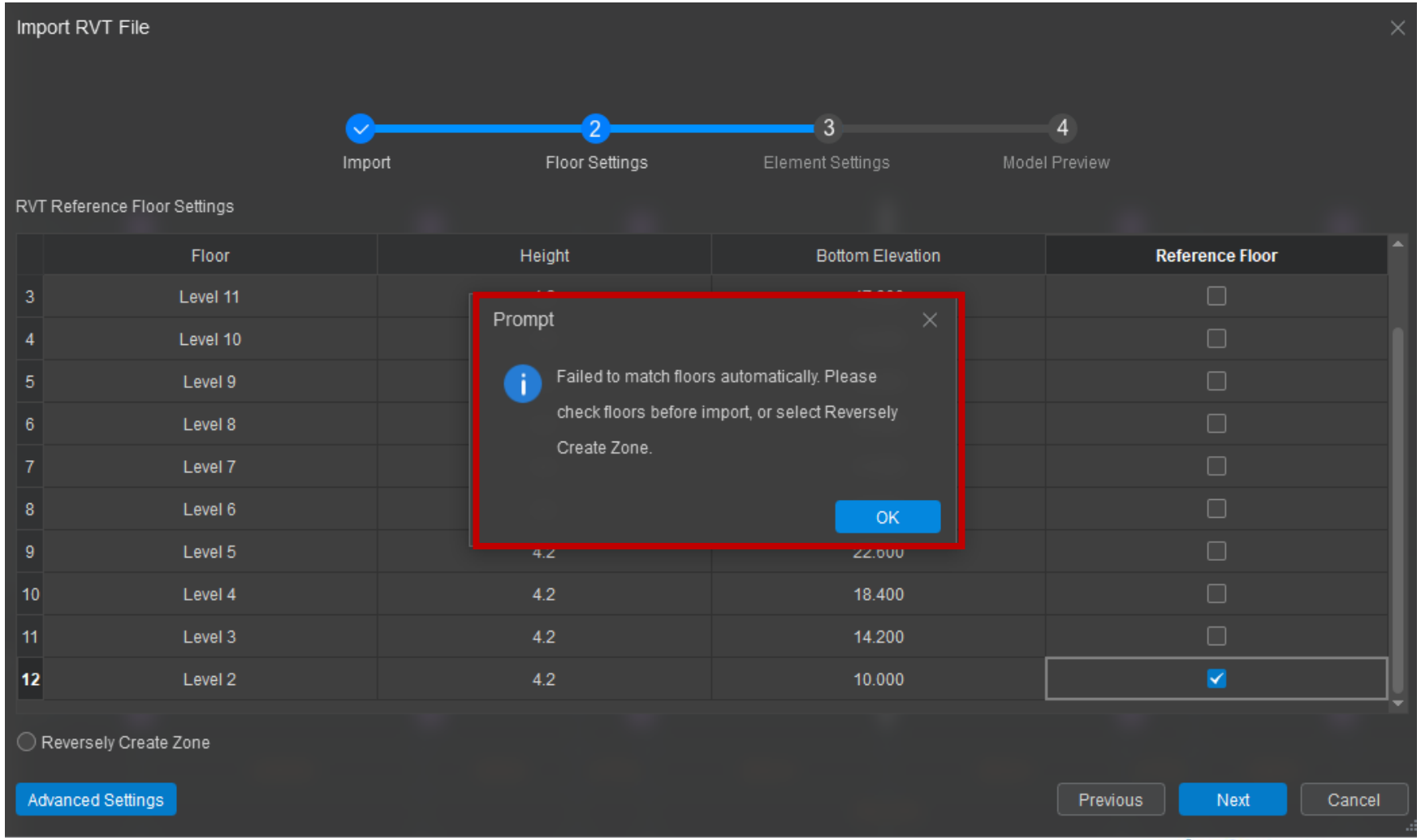
- If there is a floor whose **bottom elevation is *0***, the reference floor will be **selected automatically**.
- Otherwise, you need to select a specific floor manually as the Reference Floor.



	Floor	Height	Bottom Elevation	Reference Floor
11	9th Storey	2.975	135.400	
12	8th Storey	2.975	132.425	
13	7th Storey	2.975	129.450	
14	6th Storey	2.975	126.475	
15	5th Storey	2.975	123.500	
16	4th Storey	2.975	120.525	
17	3rd Storey	2.975	117.550	
18	2nd Storey	2.975	114.575	
19	1st Storey	3.125	111.450	
20	Basement	4.4	107.050	

Import RVT Workflow – Select File

- For subsequent project to be import, If the elevations (bottom elevation and floor height) of the two files are completely the same, continue to import them. If one of them is inconsistent, the box on the right will appear. To continue to import, select **Reversely Create Zone.**



Import RVT Workflow – Select File

- **Situation 1** : First project and subsequent project contain of same floor height and bottom elevation

RVT Reference Floor Settings

	Floor	Height	Bottom Elevation
1	Level 2		10.000
2	Level Mez2	3.325	6.675
3	Level Canopy	1.675	5.000
4	Level Mez	1.675	3.325
5	Level L1	3.325	-0.000

Project 1

=

RVT Reference Floor Settings

	Floor	Height	Bottom Elevation
1	Level 2		10.000
2	Level Mez2	3.325	6.675
3	Level Canopy	1.675	5.000
4	Level Mez	1.675	3.325
5	Level L1	3.325	-0.000

Project n

CAN proceed with next step without “REVERSELY CHECK ZONE”

Import RVT Workflow – Select File

- **Situation 2** : First project and subsequent project contain of different floor height and bottom elevation

RVT Reference Floor Settings

	Floor	Height	Bottom Elevation
1	Level 2		10.000
2	Level Mez2	3.325	6.675
3	Level Canopy	1.675	5.000
4	Level Mez	1.675	3.325
5	Level L1	3.325	-0.000

Project 1

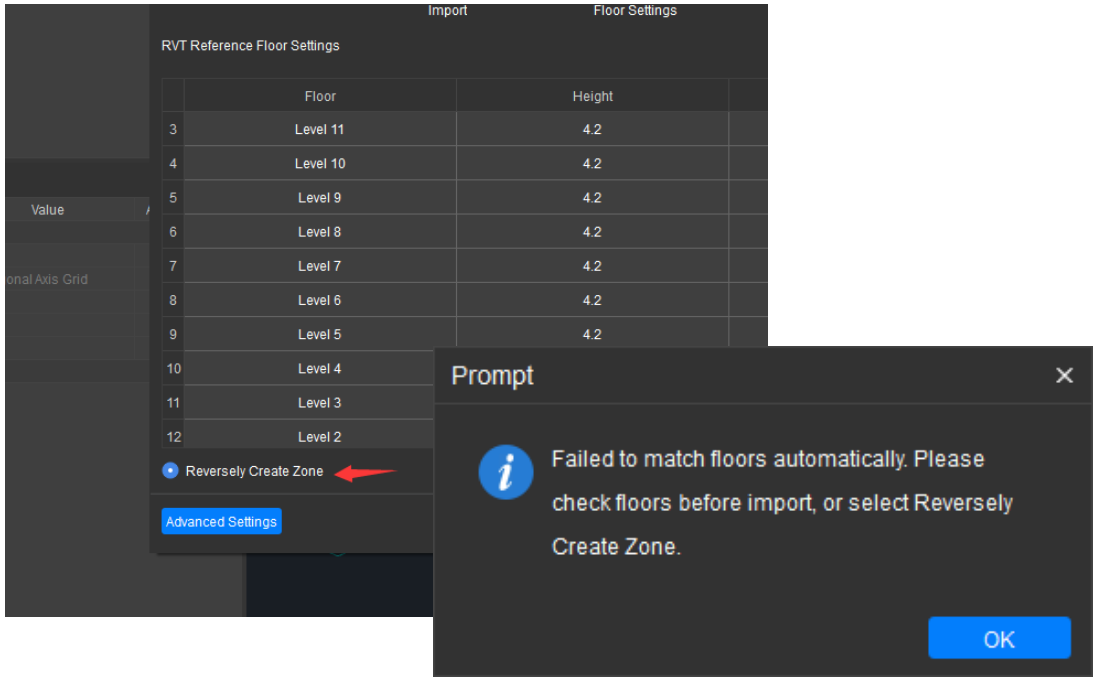
RVT Reference Floor Settings

	Floor	Height	Bottom Elevation
3	Level 11	4.2	47.800
4	Level 10	4.2	43.600
5	Level 9	4.2	39.400
6	Level 8	4.2	35.200
7	Level 7	4.2	31.000
8	Level 6	4.2	26.800
9	Level 5	4.2	22.600
10	Level 4	4.2	18.400
11	Level 3	4.2	14.200
12	Level 2	4.2	10.000

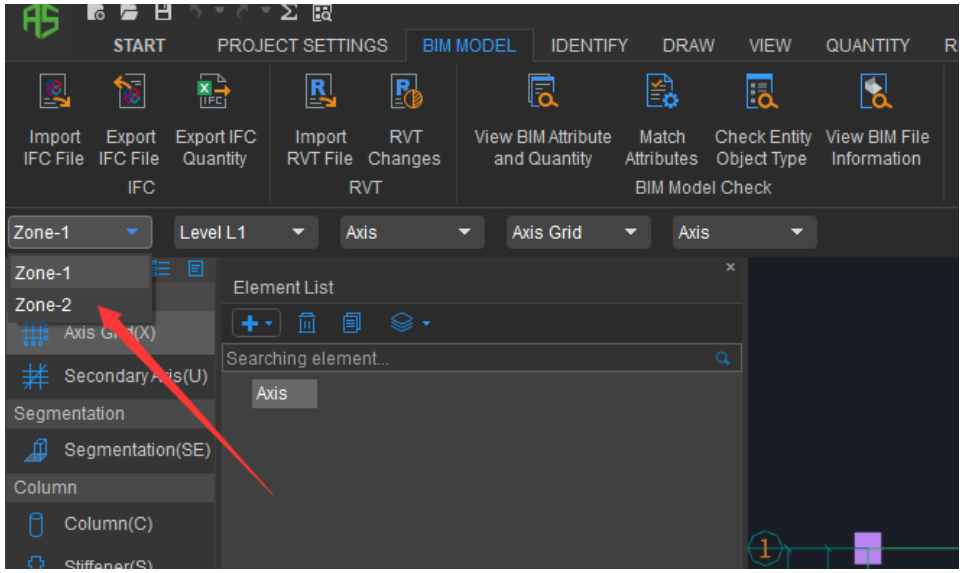
Project n

Cannot proceed with next step without “REVERSELY CHECK ZONE”

Import RVT Workflow – Select File

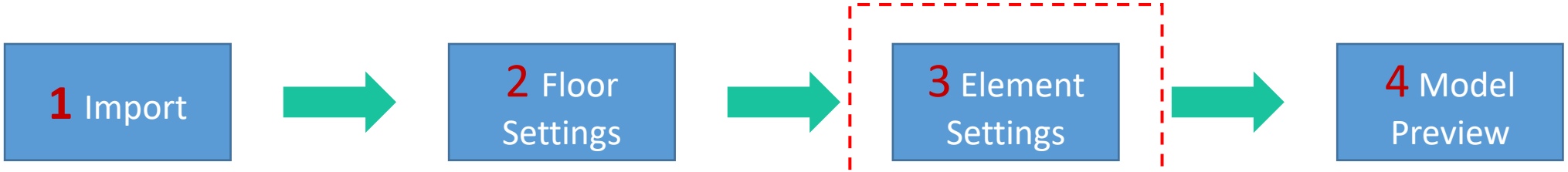


It will prompt message to click reversely create zone



It will import as 2 different zone

Import RVT Workflow



- ✓ Revit Version
- ✓ Multiple project importing

- ○ Set reference floor

- ❖ Element Match
- ❖ Material Match

- ○ Set insertion point

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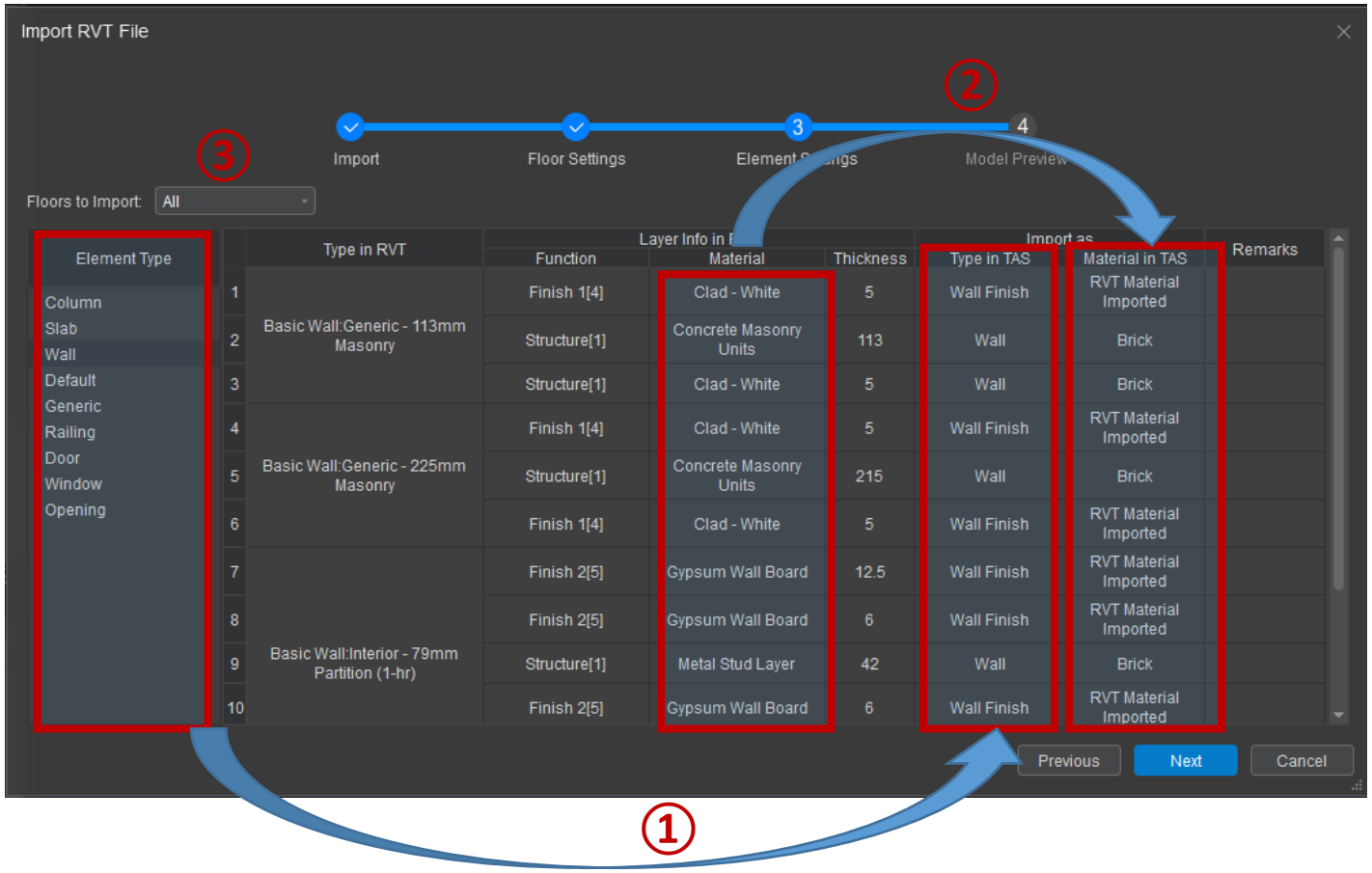
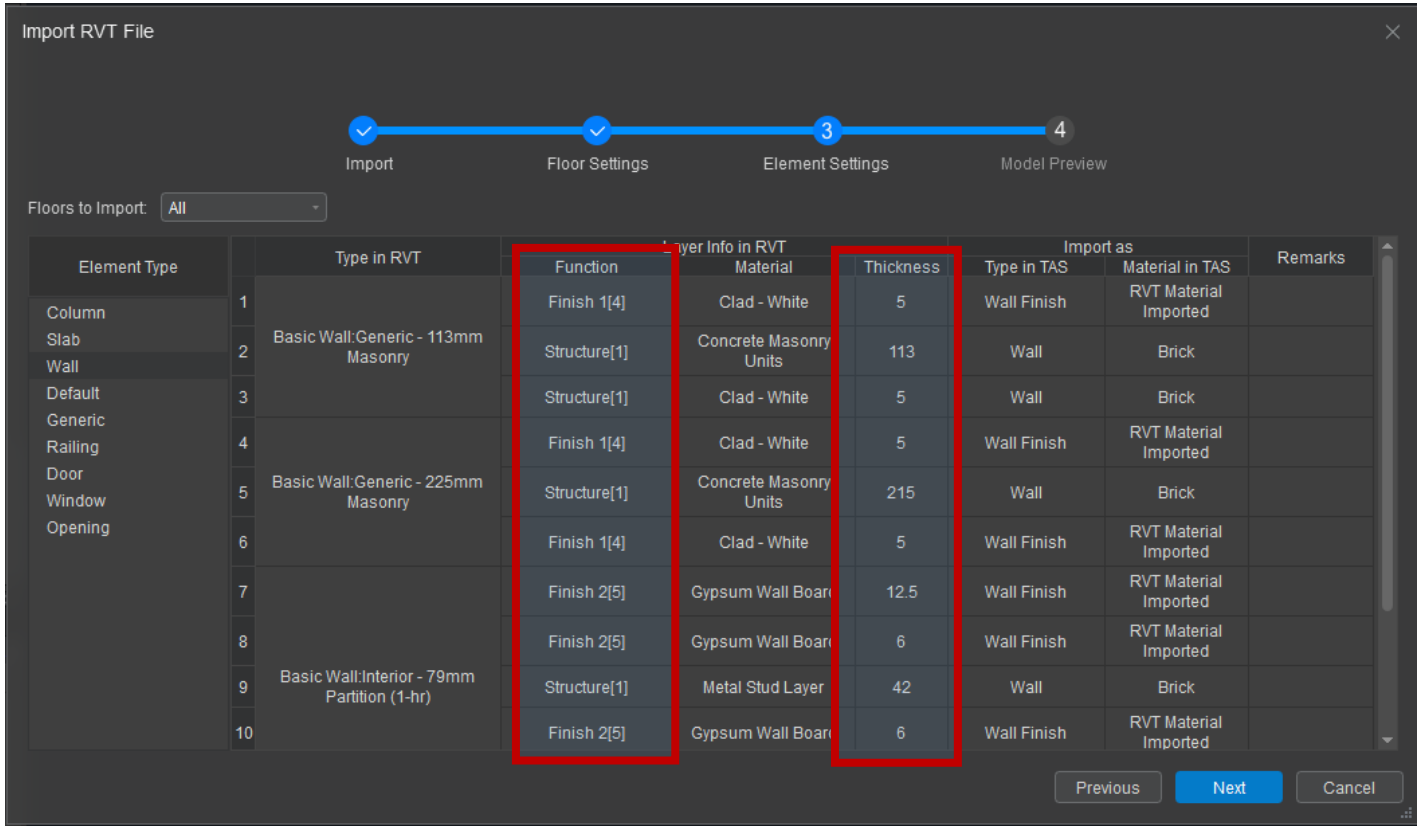
Import RVT Workflow – Element Settings

- According to the built-in match principle, the values in **Element Type** in RVT will be auto matched with that in **Type in TAS**. The details of the match principle will be introduced later. You can also modify the matched elements manually.
- According to the built-in match principle, the values in **Material in RVT** will be auto matched with that in **Material in TAS**. The details of the match principle will be introduced later. You can also modify the matched material manually.
- In the list of **Floors to Import**, you can choose which floors to import. By default, all floors will be imported.



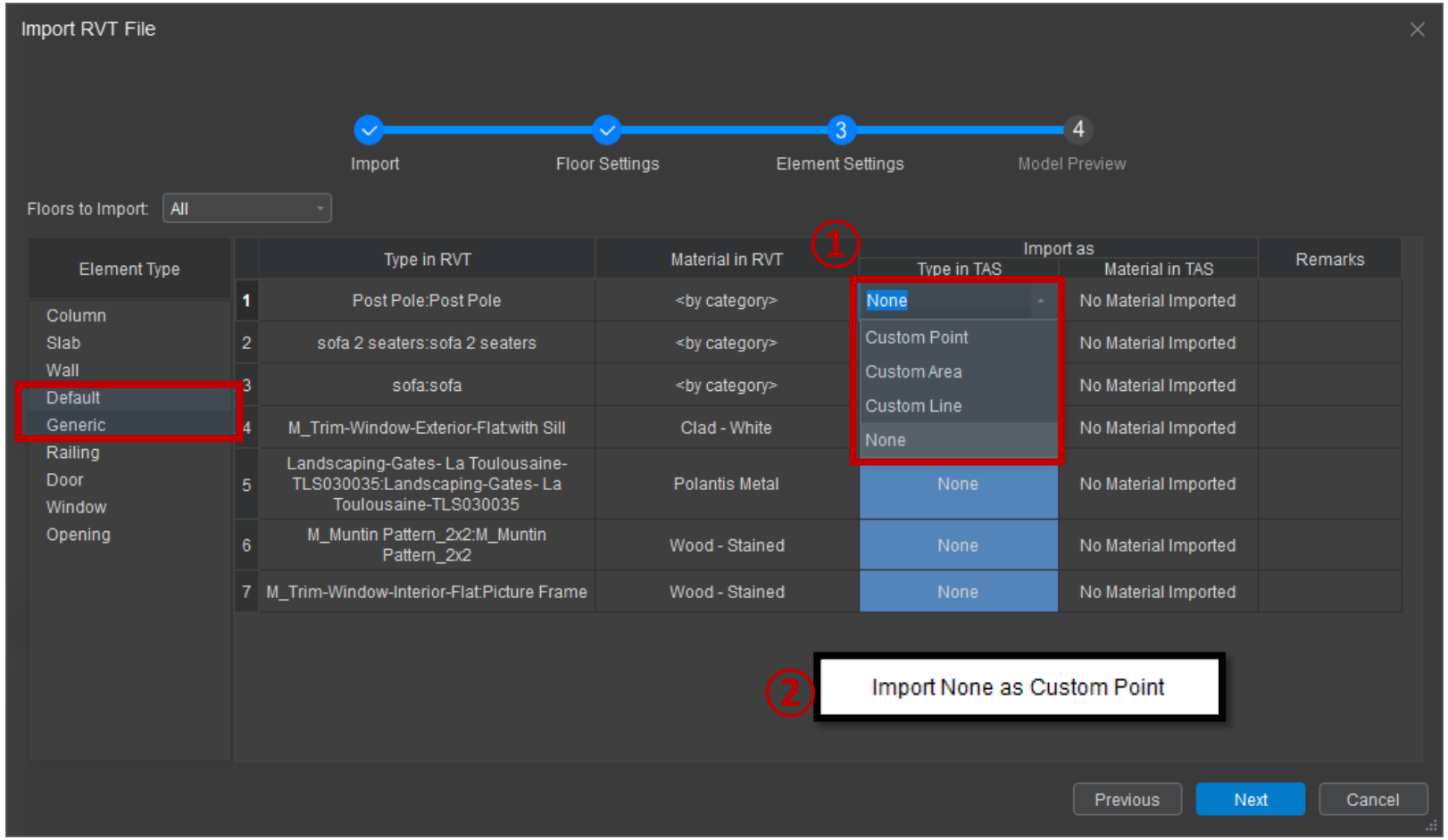
Import RVT Workflow – Element Settings

- Each layer set in Revit will be shown in this element settings together with the thickness. This to avoid any confusion to the users
- This layer can be shown in Layer Material in “Set classification and Quantity” in view quantity by category

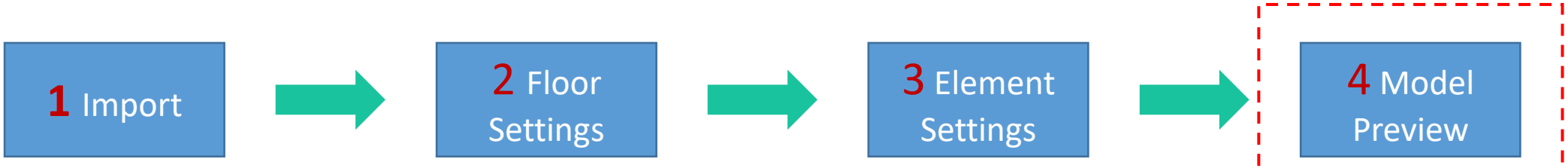


Import RVT Workflow – Element Settings

- By default, the element types of Default and Generic are not imported, because generally they don't belong to the architectural or structural field. If you want to import them, in the **Type in TAS** column, select Custom Point, Custom Area, or Custom Line. Or, you can select **Import None as Custom Point** in the right-click menu.



Import RVT Workflow



- ✓ Revit Version
- ✓ Multiple project importing

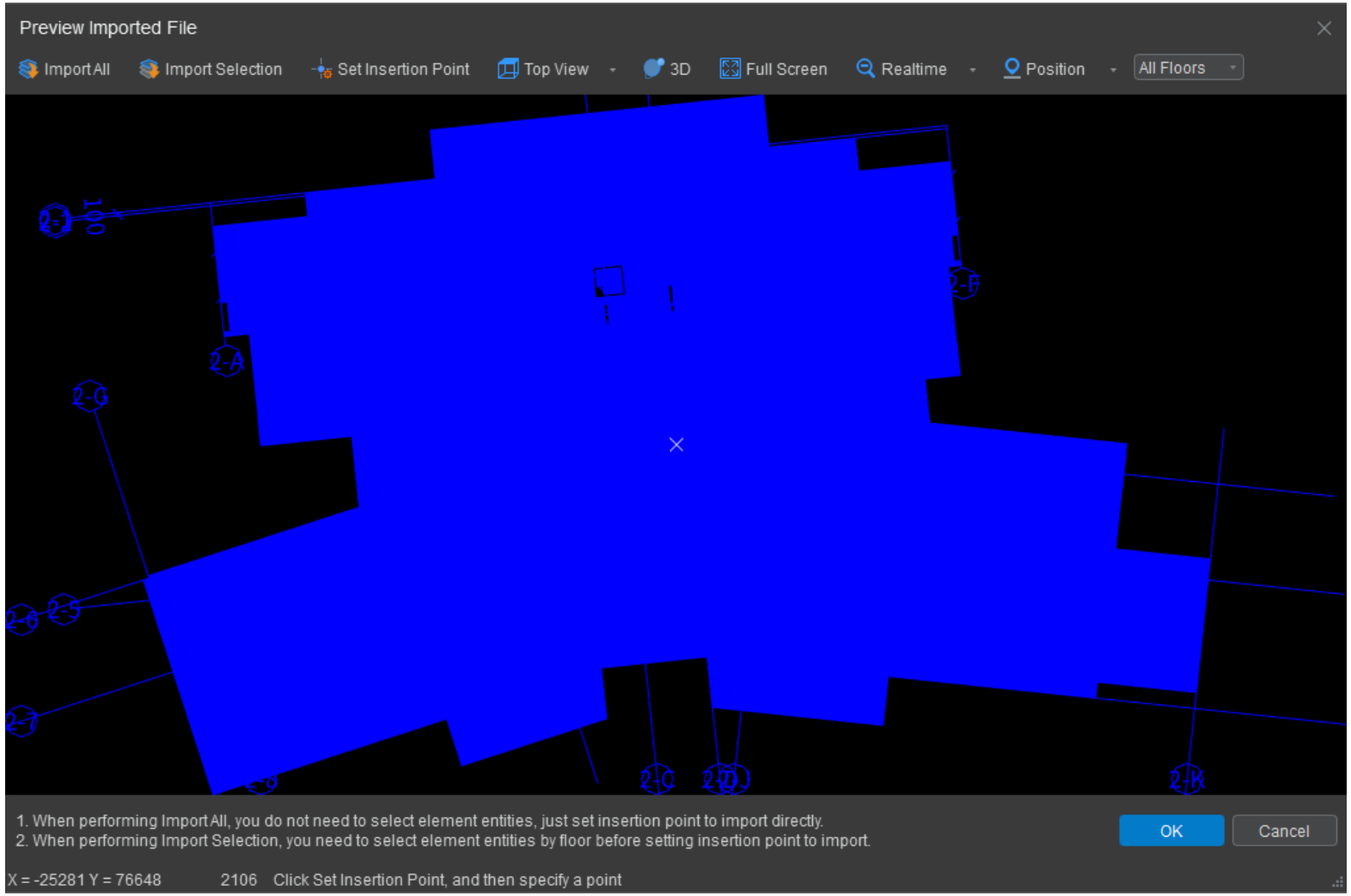
- ○ Set reference floor

- ❖ Element Match
- ❖ Material Match

- ○ Set insertion point

Import RVT Workflow – Element Settings

- TAS provides an insertion point by default. It is not suggested to make modifications here.



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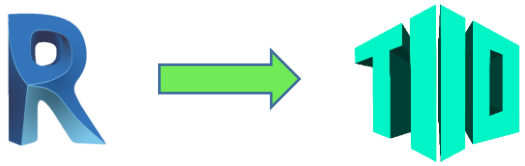


1 Import

Select File to Import

Element Settings

2 Calculate

Model Check

Calculate Quantity

Quantity Check

Calculate Quantity

1 Model Check

- Modeling Overlap

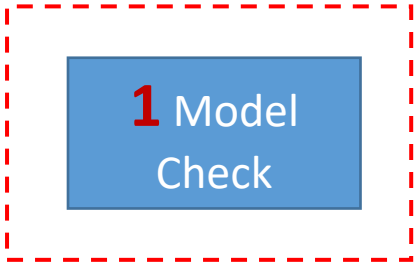
2 Calculate Quantity

- Force Calculate

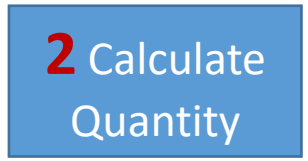
3 Quantity Check

- Read-Only Object
- Match Attributes

Calculate Quantity



❖ Modeling Overlap



❖ Force Calculate

❖ Read-Only Object

❖ Match Attributes

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Calculate Quantity - Model Check

Check Overlapping Entities

- Find out which entities are overlapping in RVT
- How to process these overlapping entities in TIO

Calculate Quantity - Model Check

- Find out which entities are overlapping in BIM files

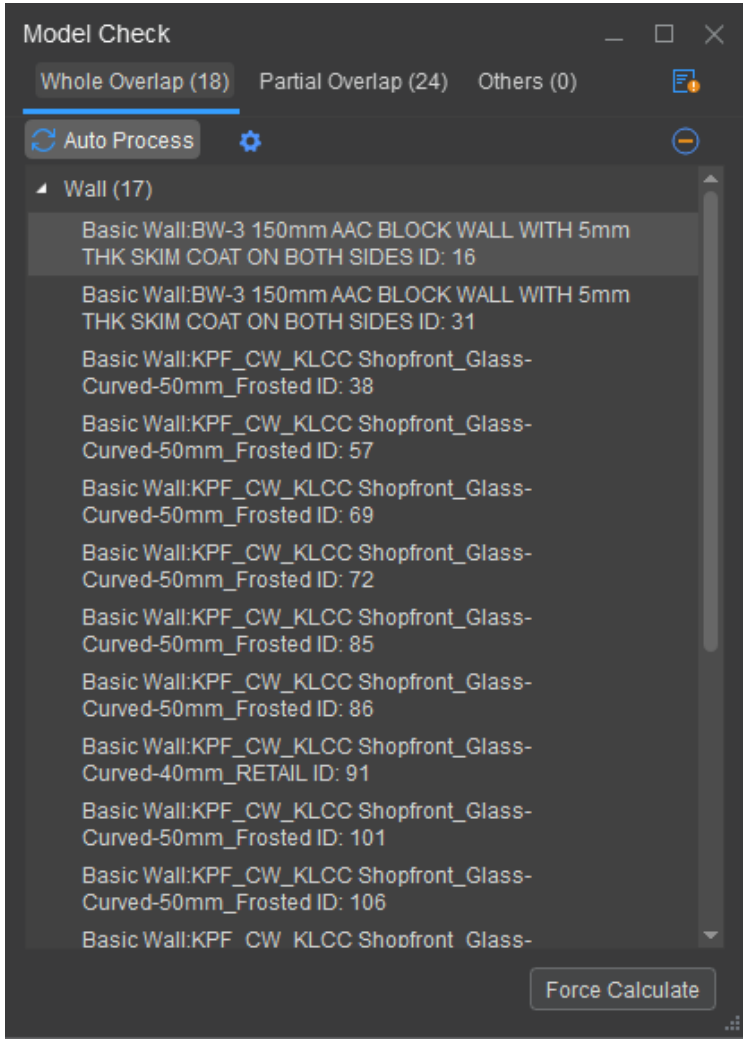
There are three tabs in total, namely:

Whole overlap, Partial overlap and Others.

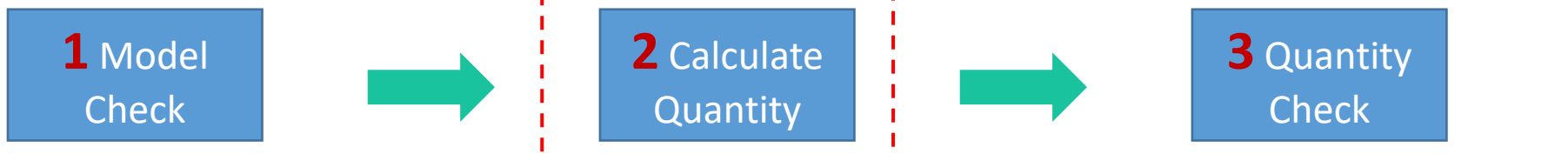
Whole Overlap: the elements are completely included, or the size of the elements are completely equal.

Partial Overlap: includes all overlaps except full overlap and full inclusion.

Others: includes other unreasonable information except for overlap, e.g., the bottom elevation of the entity is greater than the top elevation; the thickness of the entity is 0, etc.



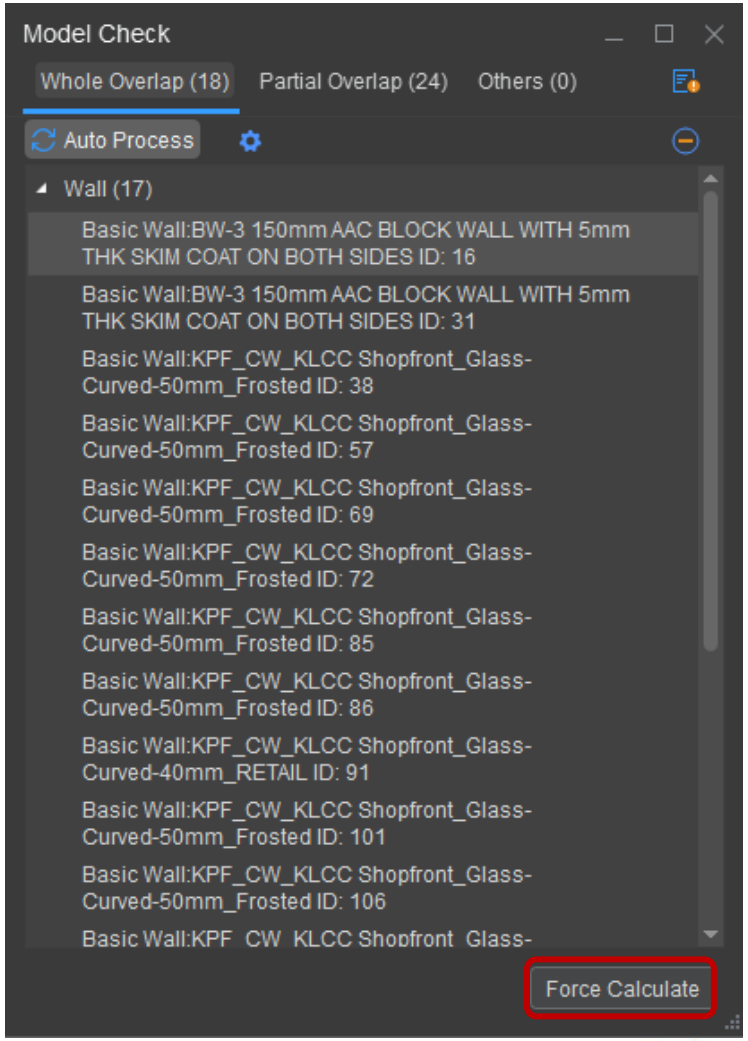
Calculate Quantity



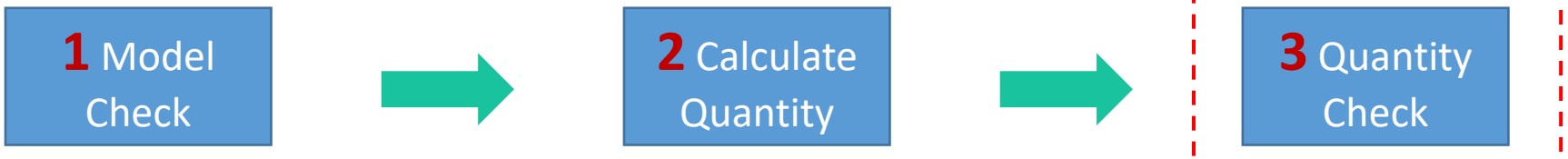
- ❖ Modeling Overlap
- ❖ Force Calculate
- ❖ Read-Only Object
- ❖ Match Attributes

Calculate Quantity

- When there are overlapping items, if you do not want deal with them one by one, you can use **Force Calculate**. With Force Calculate, no overlaps will be processed. That is to say, when entity A is overlapping with entity B, the overlapping part will be calculated in both entity A and entity B.
- According to our case study, there is only a tiny difference between the results of processing all overlapping entities and using Force Calculate directly.



Quantity Check



- ❖ Modeling Overlap
- ❖ Force Calculate
- ❖ Read-Only Object
- ❖ Match Attributes

Quantity Check

- After importing RVT, there are usually TWO object types: **NORMAL OBJECT and READ ONLY OBJECT**
- The differences among them regarding Edit, Check and Calculate are listed in the table on the right.

Entity Object Type	Entity Edit
Normal Object	√
Read-only Object	√(Copy, Move, Delete...) × (Extend, into TRB, Apply Finishes)

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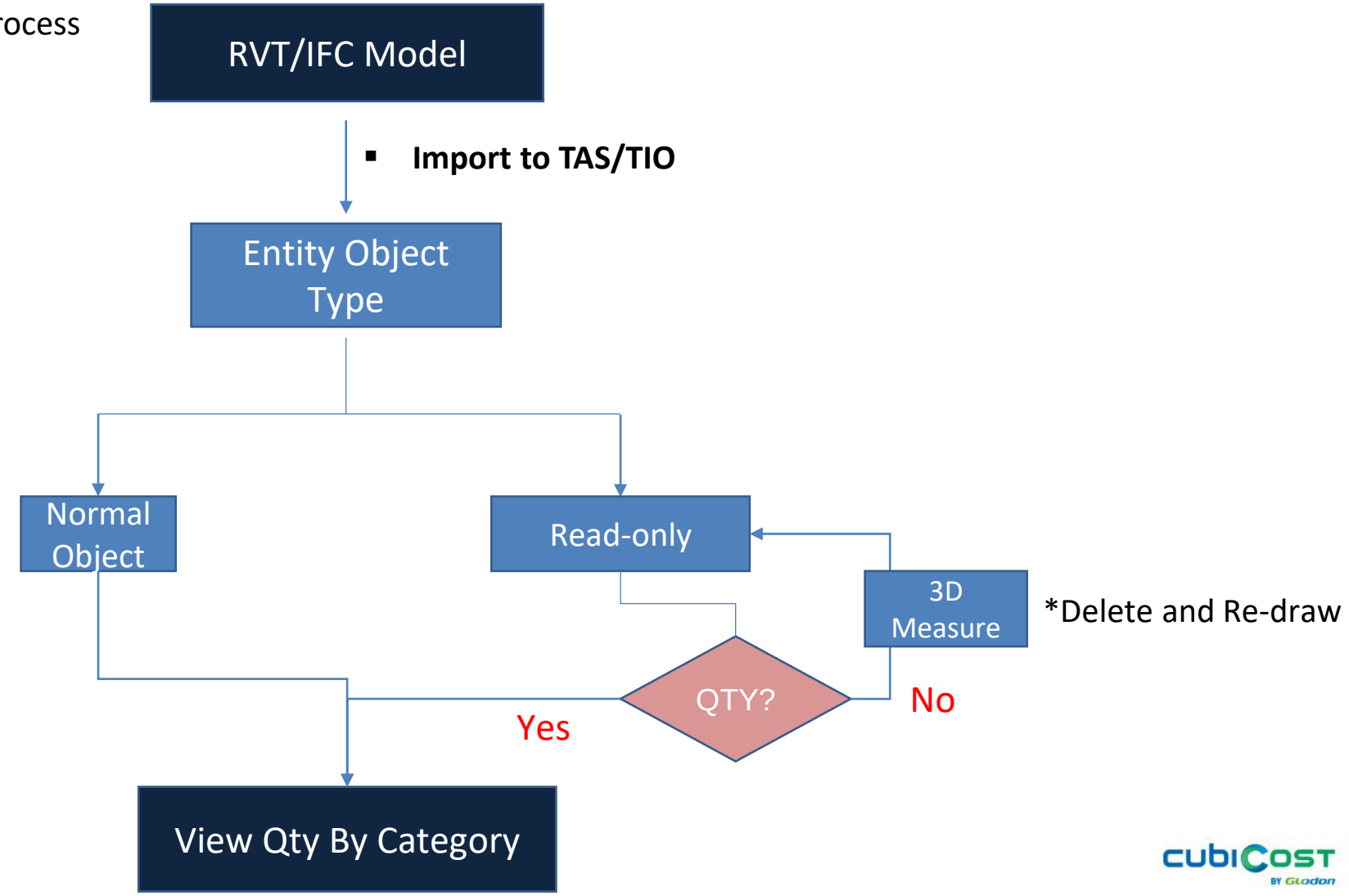
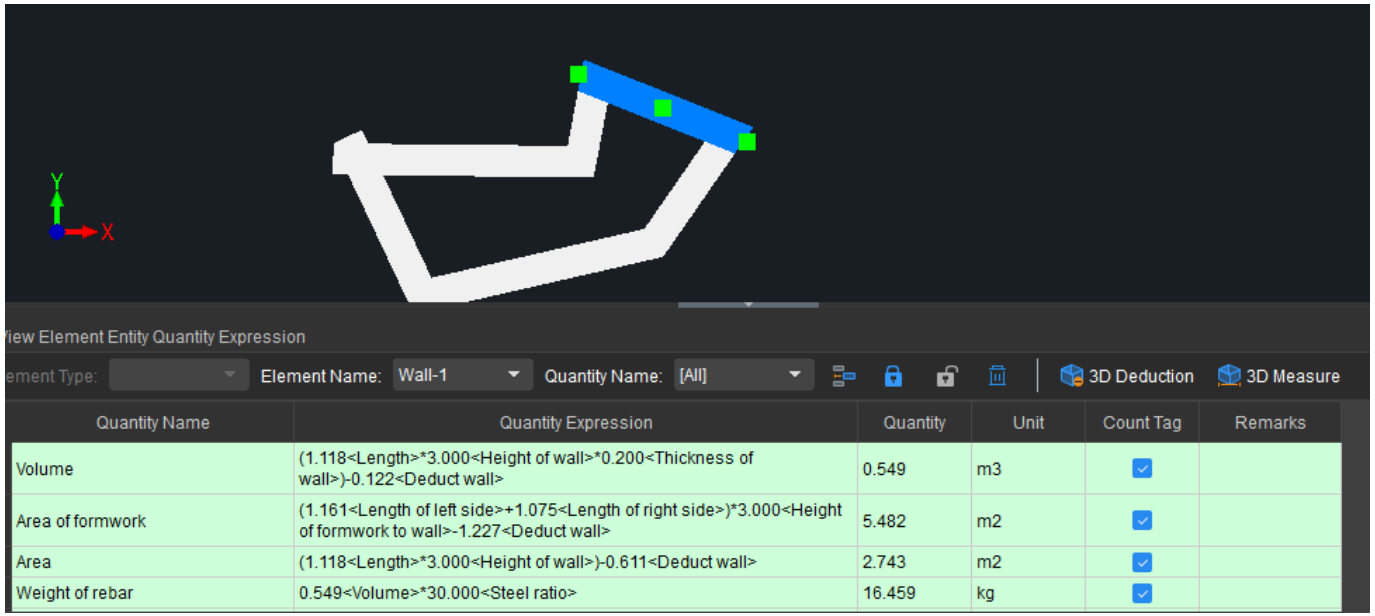
Quantity Check

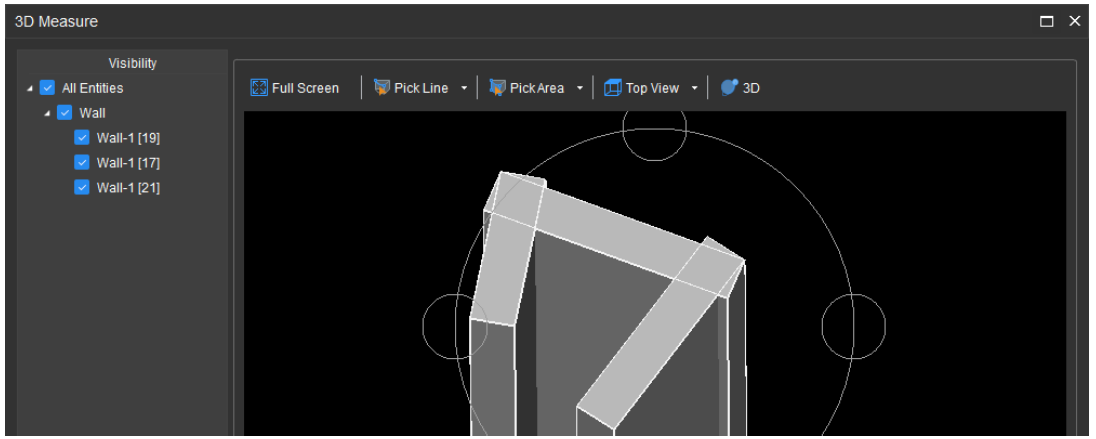
- Recommended QTY Check Process



Quantity Check

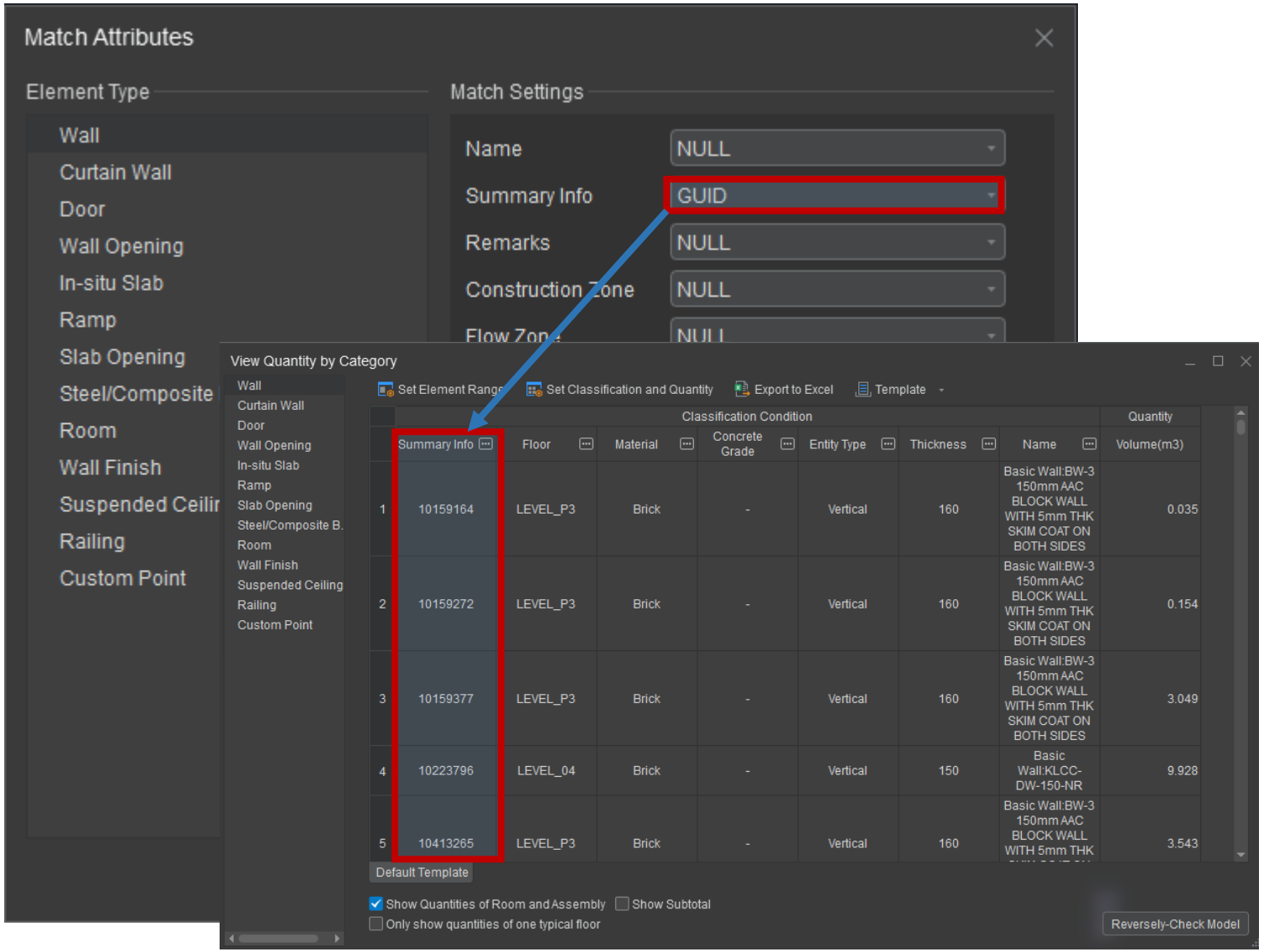
- For read-only objects without quantities, can be dealt as follows:
  1) **Delete and draw** by using TAS/TIO Object.
  2) Use **3D Measure** to get the quantity





Quantity Check

- To use the BIM attributes as classification conditions, you can use **Match Attributes**.



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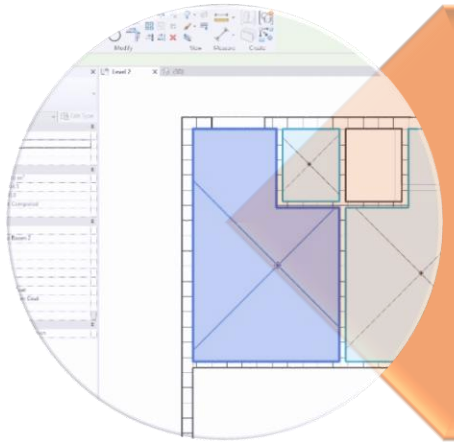
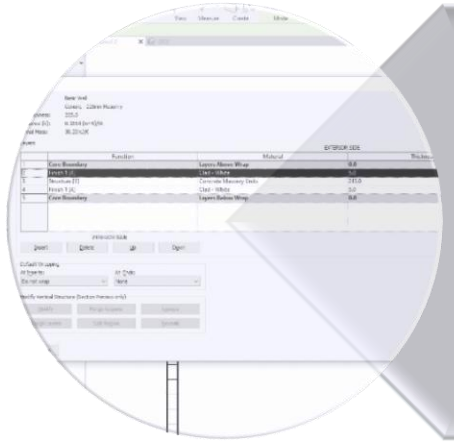
Architectural Quantification



Import with Room



Import with Layering

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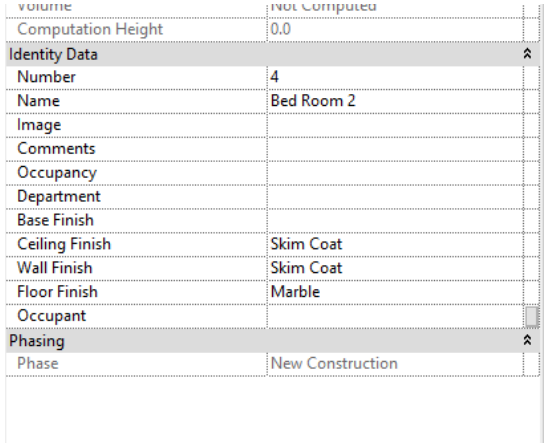
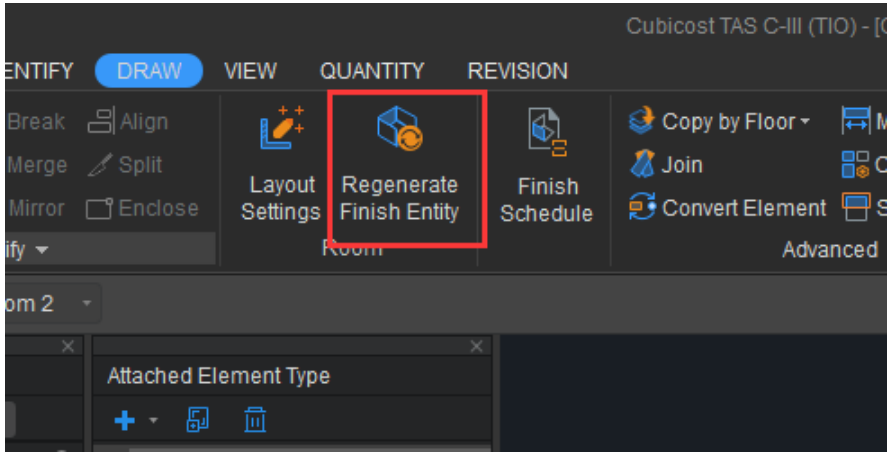
Import Revit with Room

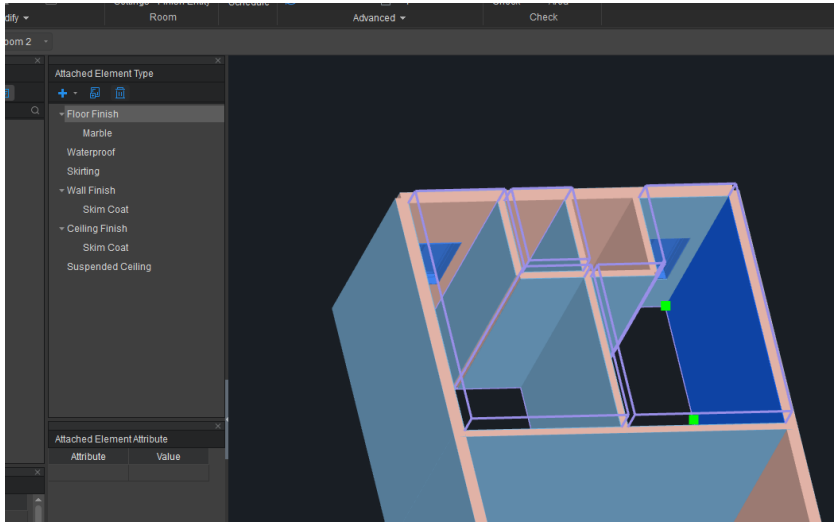


Volume	Not Computed
Computation Height	0.0
Identity Data	
Number	4
Name	Bed Room 2
Image	
Comments	
Occupancy	
Department	
Base Finish	
Ceiling Finish	Skim Coat
Wall Finish	Skim Coat
Floor Finish	Marble
Occupant	
Phasing	
Phase	New Construction

Using Revit attribute to apply finishes



Re-generate Finish Entity



The finishes will appear accordingly

- Suitable if the model consisted of ONE type finish for each elements e.g. one wall has one finish. If consisted of more than one finishes, suggested to use by “Layering”

Import Revit with Layering

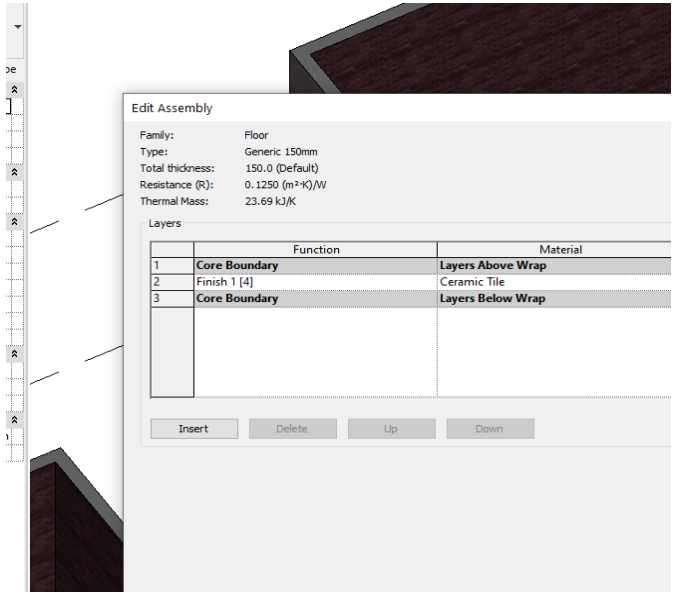
RVT

Family:	Basic Wall
Type:	Generic - 8"
Total thickness:	203.2
Resistance (R):	0.0000 (h·ft²·°F)/BTU
Thermal Mass:	0.0000 BTU/°F

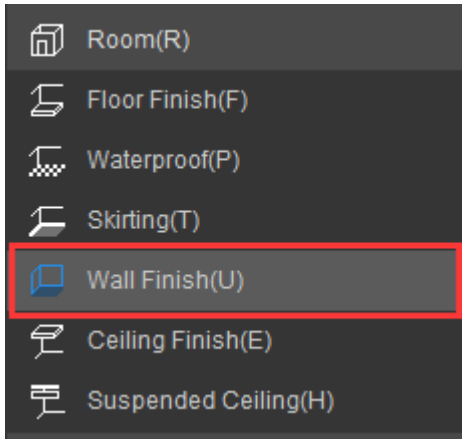
Layers

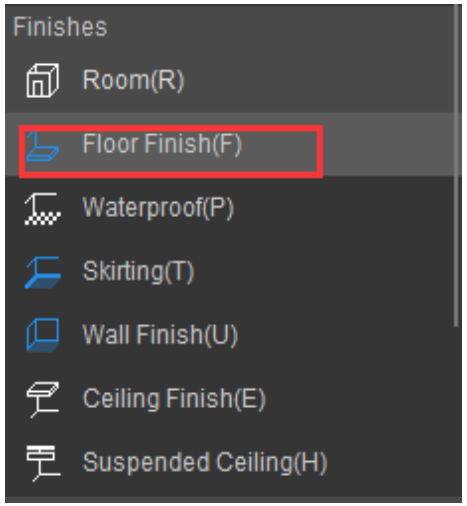
EXTERIO

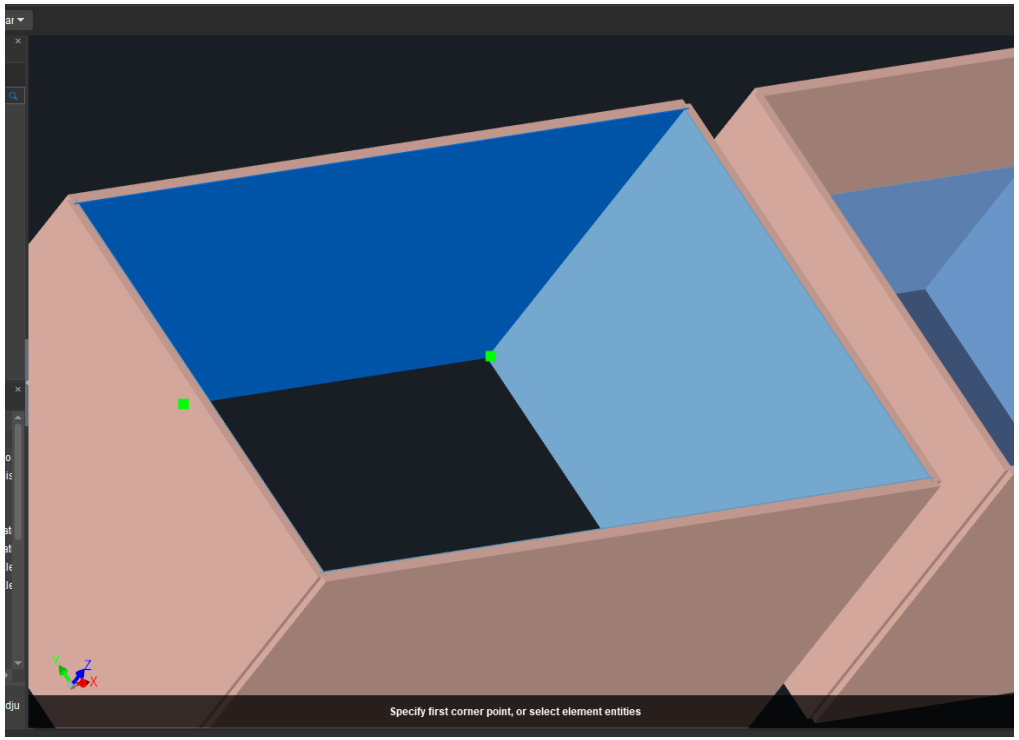
	Function	Material
1	Core Boundary	Layers Above Wrap
2	Finish 1 [4]	<By Category>
3	Core Boundary	Layers Below Wrap



Cubicost

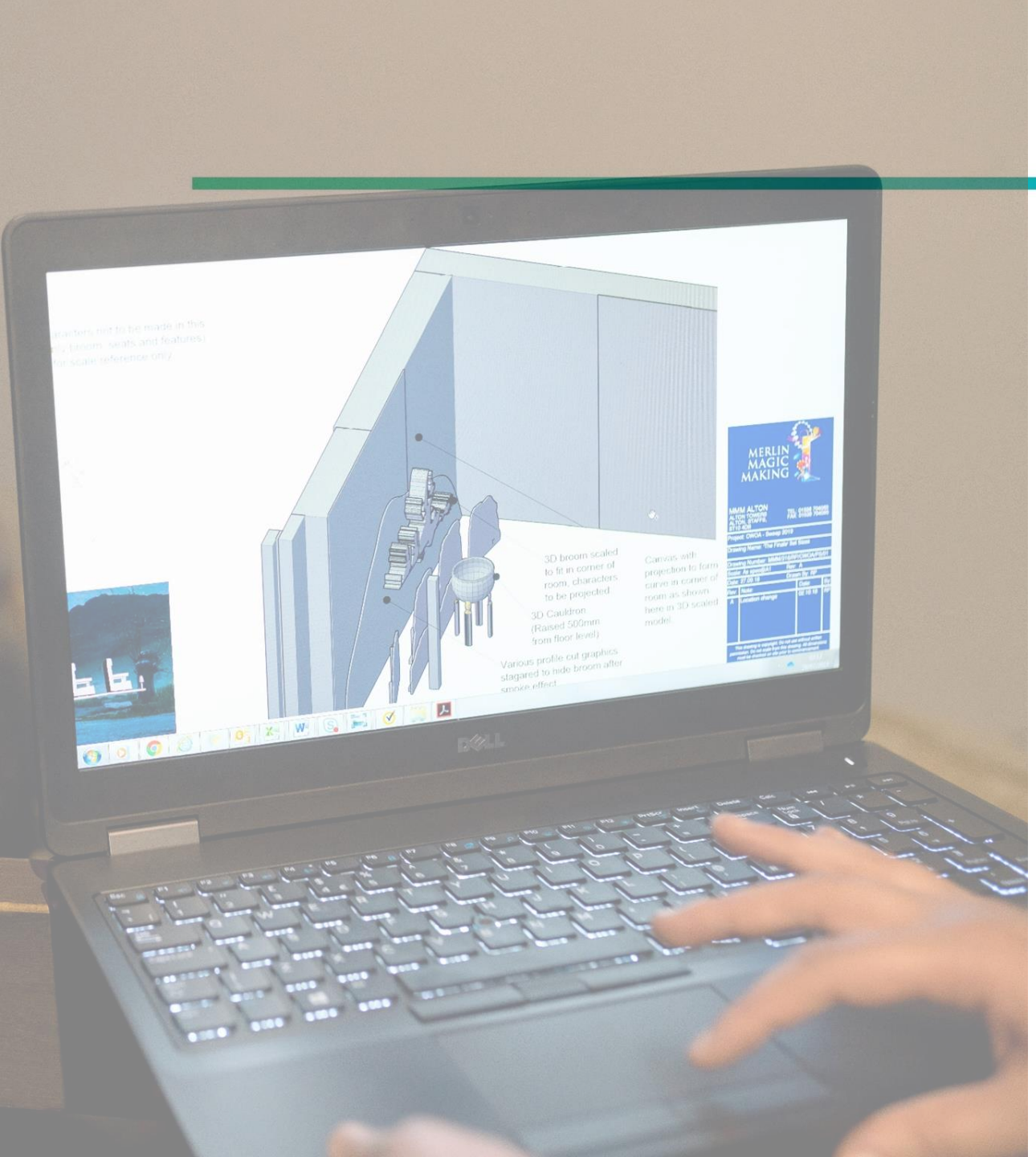






- Suitable if the element consisted of multiple layer of finishes e.g. C&S and Tiles

cubiCOST BY Glodon

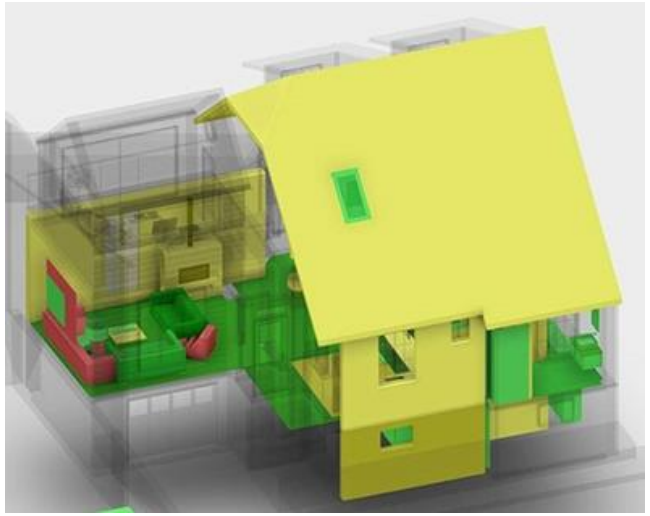


RVT Changes

cubiCOST BY Glodon

RVT Changes

1 Import Changed Model



15 Added

24 Modified

8 Deleted

Item	Description	Base QTY	VO QTY	Remarks
1	C35 CONCRETE	9666.83	33.15	Modified
2	C40 CONCRETE	4578.9	155.57	Added
3	BRICK WALL	1359.8	-21.86	Deleted
4	Staircase	532.12	532.12	

Variation Quantity

RVT Changes

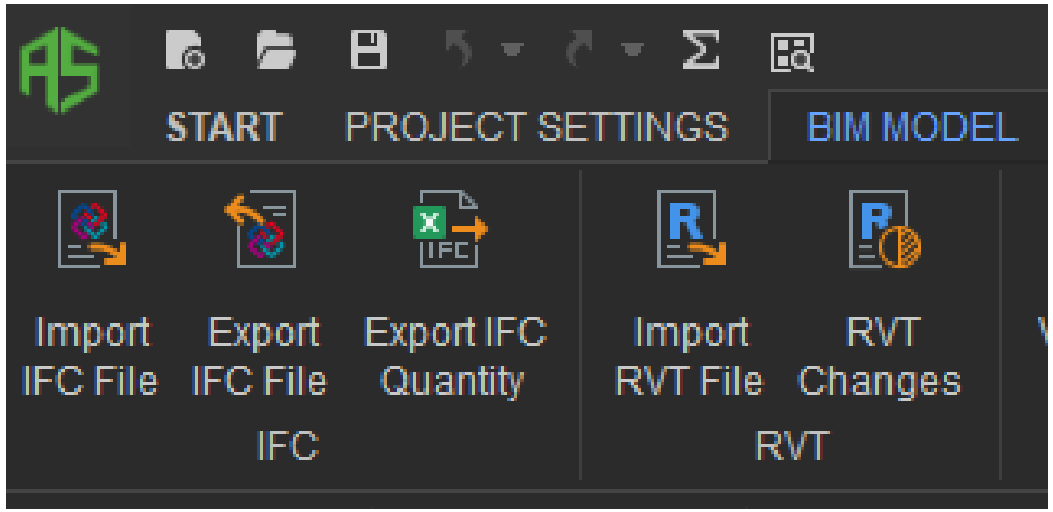
With **RVT Changes**, you can find out the differences of two RVT models.

Which entities are added?

Which entities are deleted?

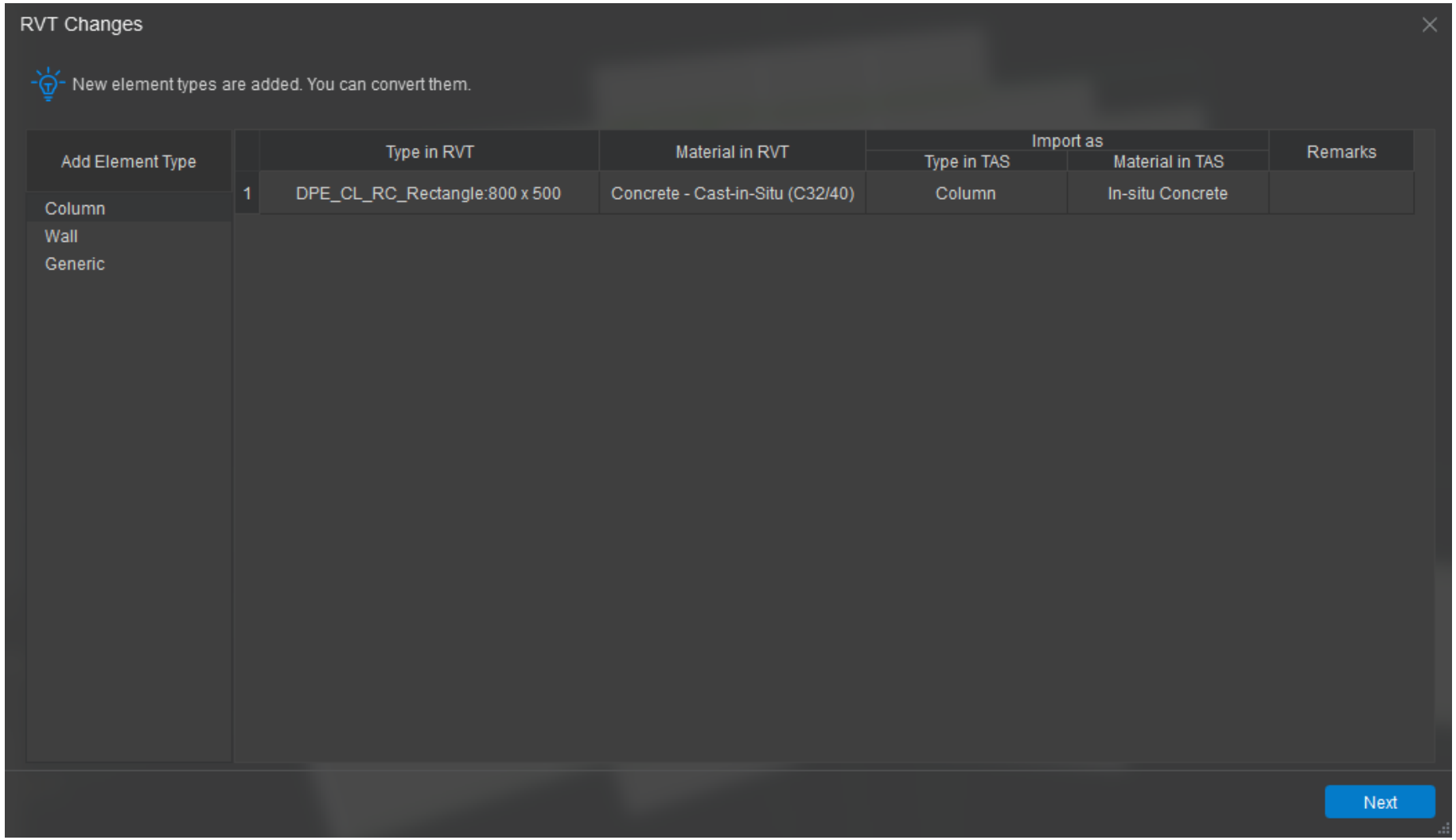
Which entities are modified?

And the result will be shown on models.



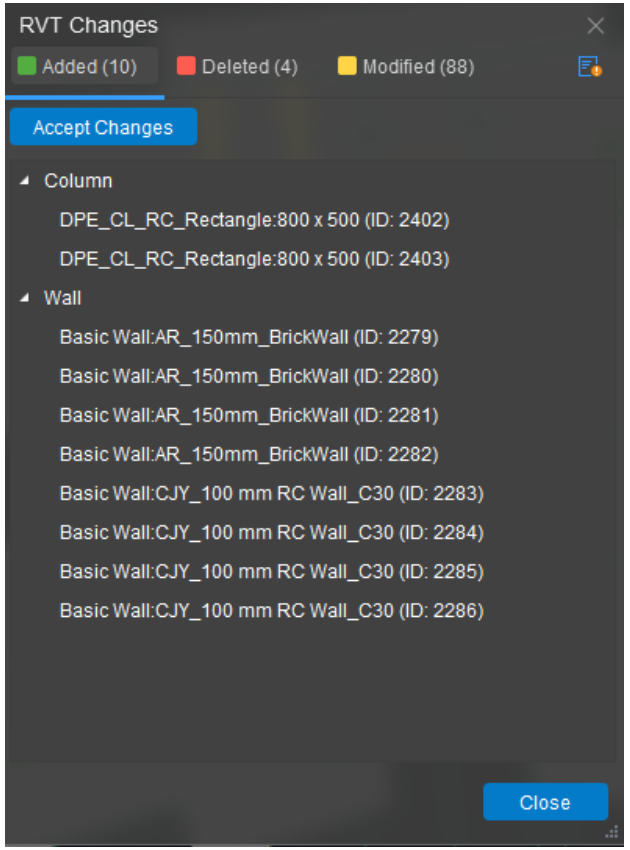
RVT Changes

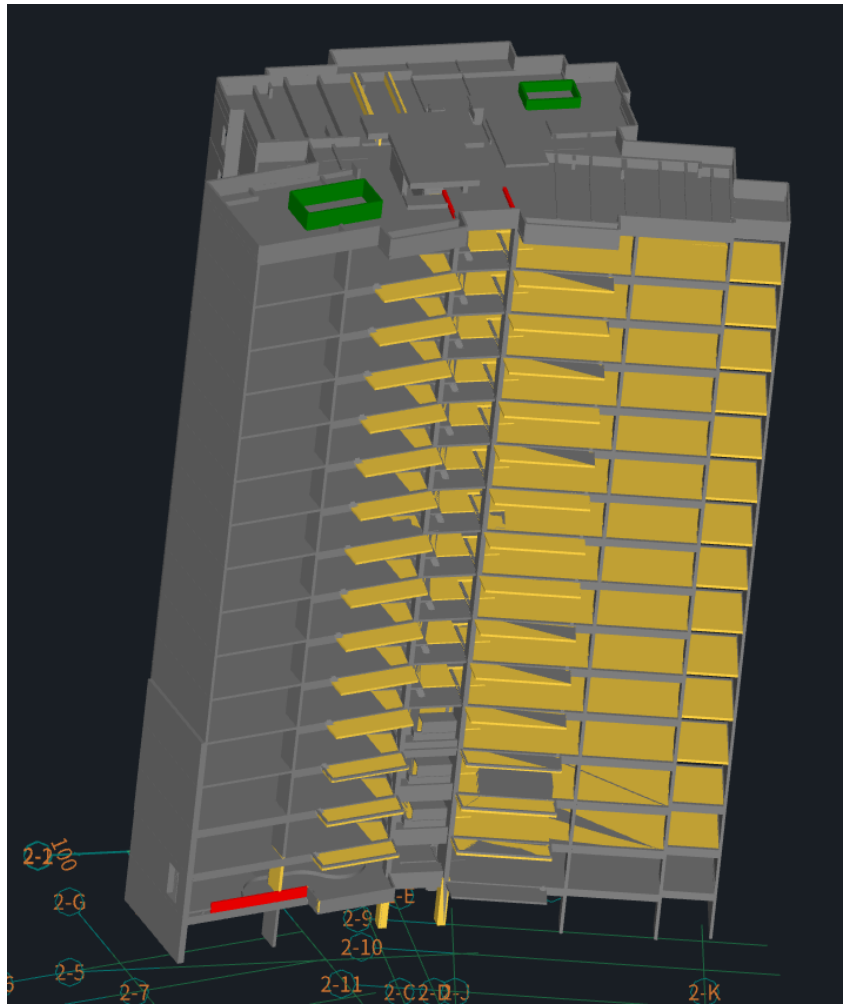
- If there is a newly added elements, a window will pop up, and you can do the element type mapping.



RVT Changes

- For added, deleted and modified entities, you can auto import them by clicking Accept Changes.





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BY Glodon

Relevant Principles

- Case 1: If there are some changes happened in the original RVT File, you can use **RVT Changes** to display the difference.
- Case 2: If you just change the element type or element material in the process of importing RVT file, the difference will not be displayed when you use **RVT Changes**.
- Case 3: If you change the RVT element in TAS after it is imported, you can then use **RVT Changes** to display the difference.
- Case 4: If you don’t change the RVT elements in TAS and just change the TAS elements, the difference will not be displayed when you use **RVT Changes**.

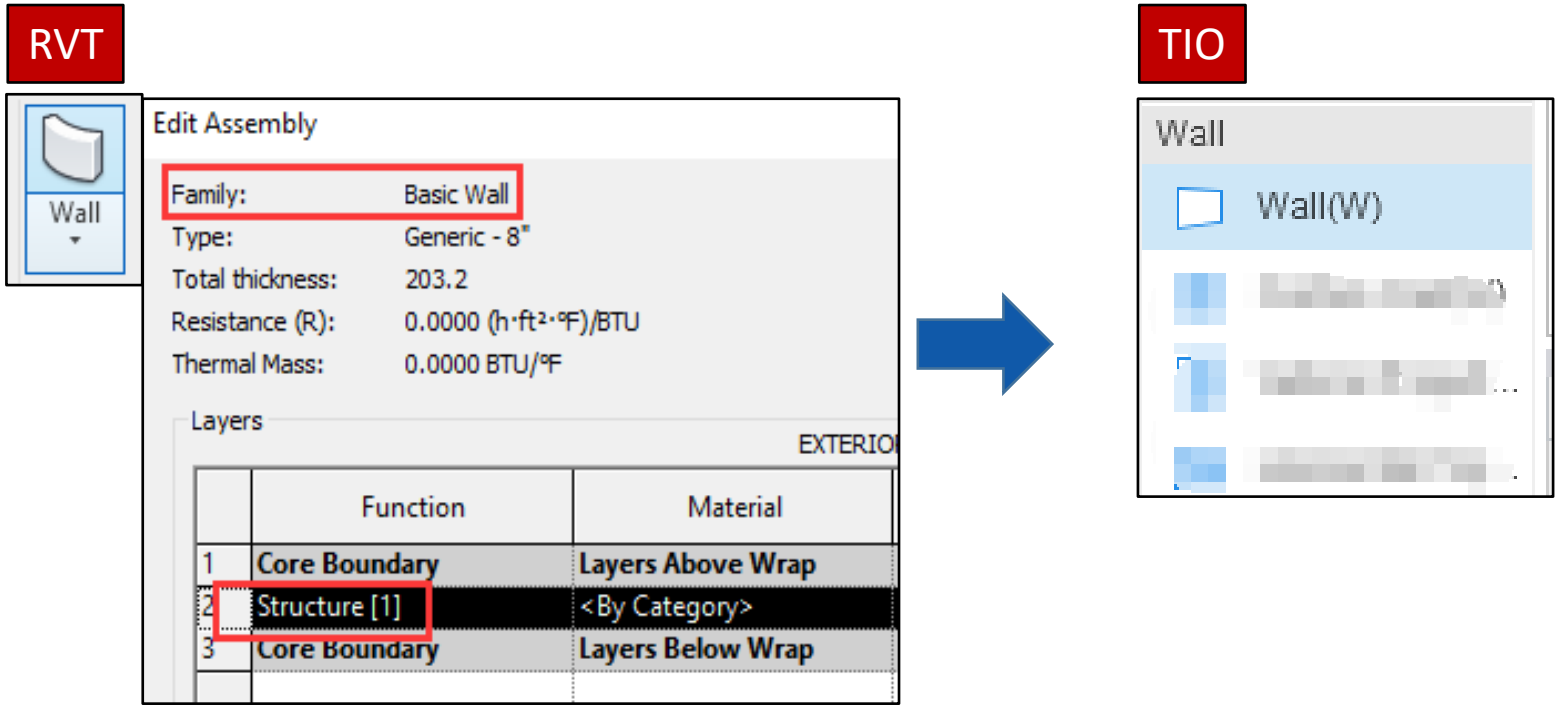
Basic Principle

3.1 Element Settings - Wall

Wall

Wall

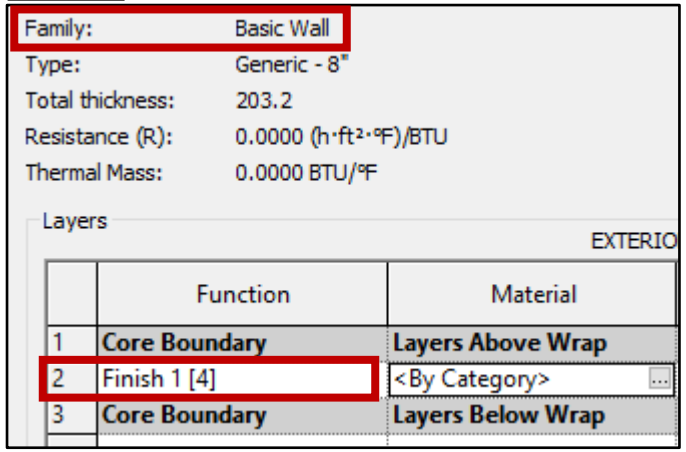
- For a RVT wall, if its Family is Basic Wall, and its Layer Function is Structure, it will be matched with Wall in TIO.



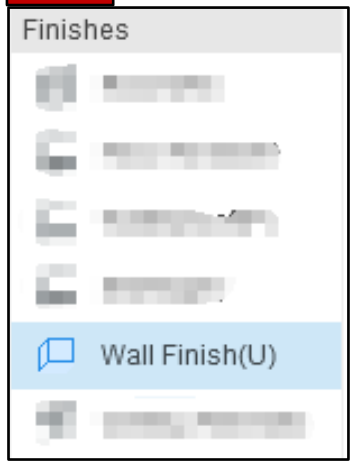
Wall

- For a RVT wall, if its Family is Basic Wall, and its Layer Function is others except Structure, it will be matched with Wall Finish in TIO.

RVT

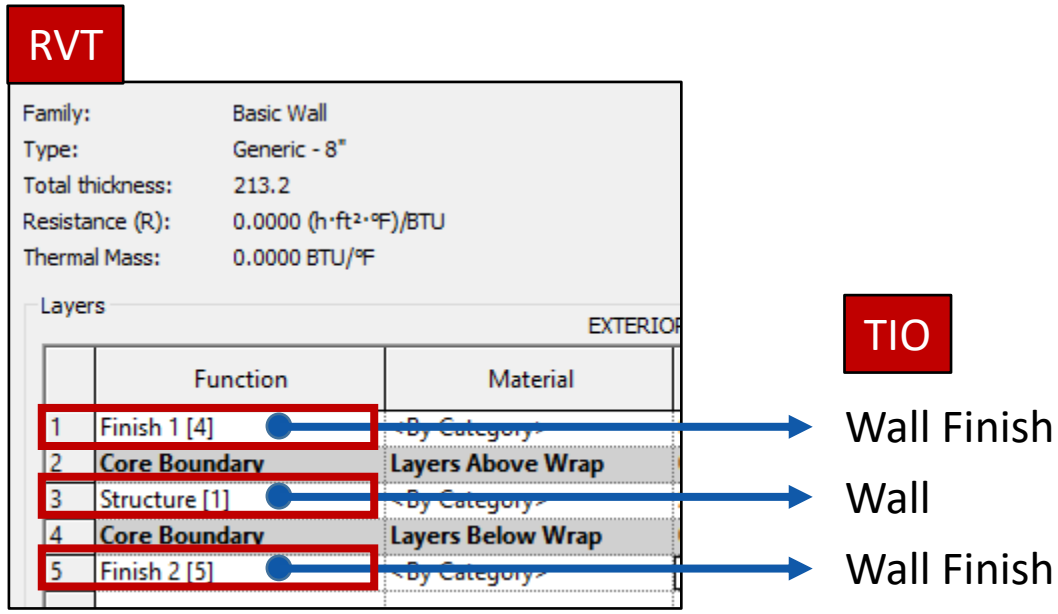


TIO



Wall

- For a RVT wall, if its Family is Basic Wall, and its Layer Function contains both Structure and others, after being imported into TIO, it will be matched with different element types based on different layers.



Wall

- For a RVT wall, if its Family is Stacked Wall, after being imported into TIO, it will be matched with corresponding wall or wall finish based on its sub elements.

Material

Function	Material
Core Boundary	**Layers Above Wrap**
Structure [1]	precast concrete
Core Boundary	**Layers Below Wrap**

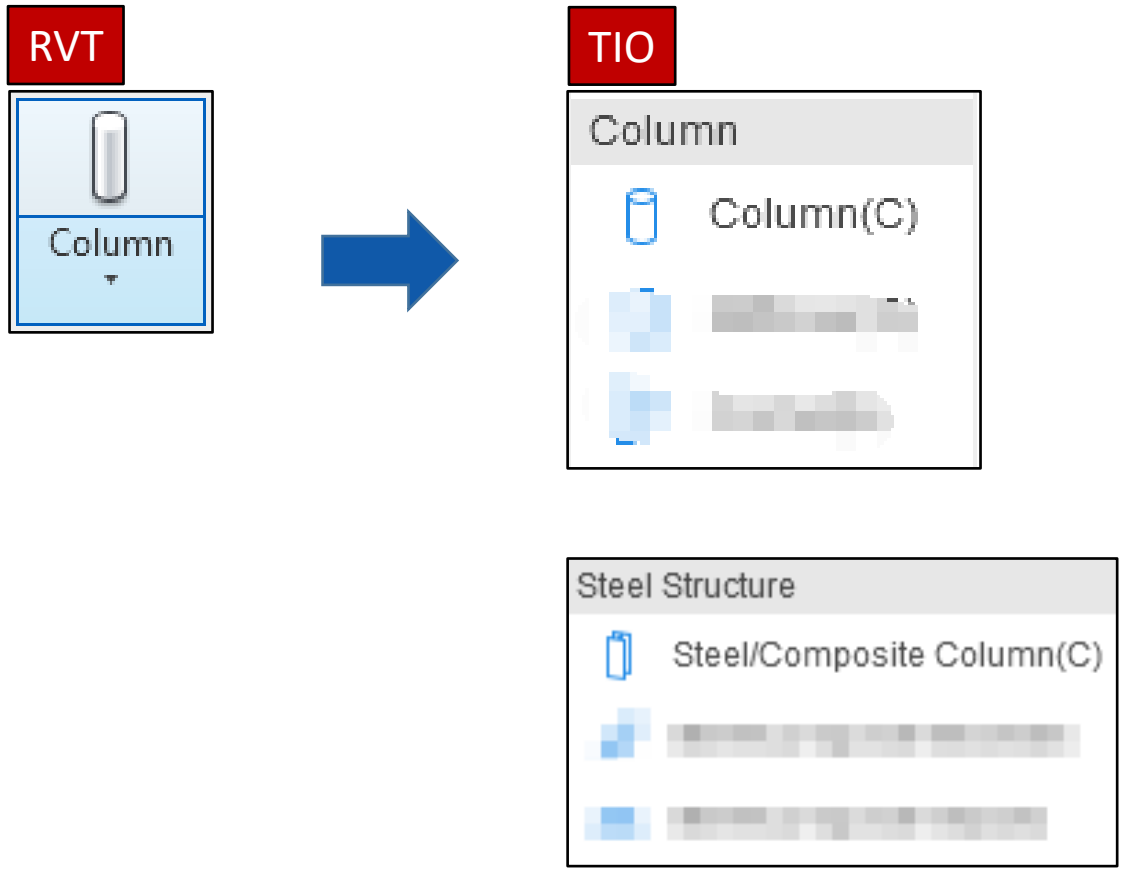
		nt	Condition (Given...)	Name elements with material of RVT	Remarks
1	Wall		Brick Wall	Brick	1. Manage to name elements by choosing these 8 materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than these 8 materials, in TIO, they will be matched with the default material used when creating elements. You need to check and modify them in Element Settings.
			Block wall	Block	
			Precast wall	Precast	
			Stone wall	Stone	
			Light Panel wall	Light Panel	
			Color Steel Plate wall	Color Steel Plate	
			Wooden Partition wall	Wooden Partition	
			Glass wall	Glass	
			For walls of materials rather than these mentioned above	name them with actual materials	

3.1 Element Settings - Column

Column

Column

- For RVT columns, they will be matched with Column or Steel Column in TIO after import.



Material

Function	Material
Core Boundary	Layers Above Wrap
Structure [1]	precast concrete
Core Boundary	Layers Below Wrap

		Condition (Given...)	Name elements with material of RVT	Remarks
2	Column	Precast Column	Precast	1. Manage to name elements by choosing these 4 materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than these 4 materials, in TIO, they will be matched with the default material used when creating elements, that is, In-situ Column. You need to check and modify them in Element Settings.
		Brick Column	Brick	
		Stone Column	Stone	
		Steel Column	Steel	

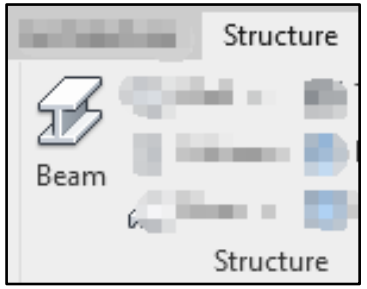
3.1 Element Settings - Beam

Beam

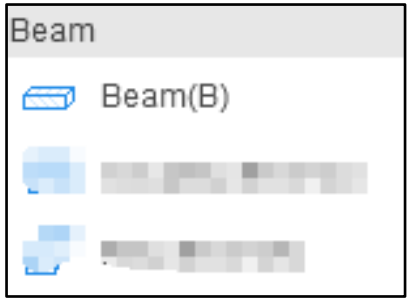
Beam

- For RVT beams, they will be matched with Beam or Steel Beam in TIO after import.

RVT



TIO



Material

Function	Material
Core Boundary	Layers Above Wrap
Structure [1]	precast concrete
Core Boundary	Layers Below Wrap

		Condition (Given...)	Name elements with material of RVT	Remarks
3	Beam	Precast Beam	Precast	1. Manage to name elements by choosing these 2 materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than these 2 materials, in TIO, they will be matched with the default material used when creating elements, that is, In-situ Beam. You need to check and modify them in Element Settings.
		Steel Beam	Steel	

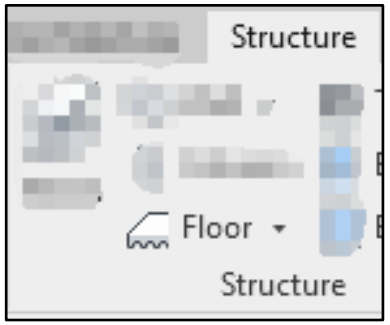
3.1 Element Settings - Slab

Slab

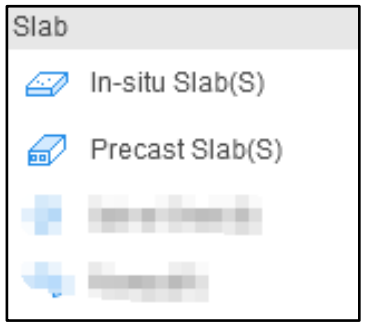
Slab

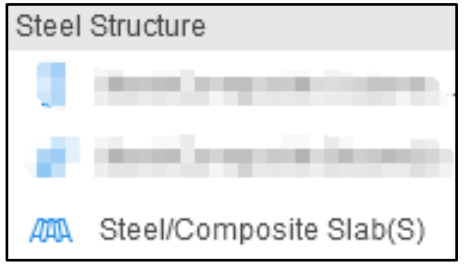
- For RVT slabs, they will be matched with Slab or Steel Slab in TIO after import.

RVT



TIO





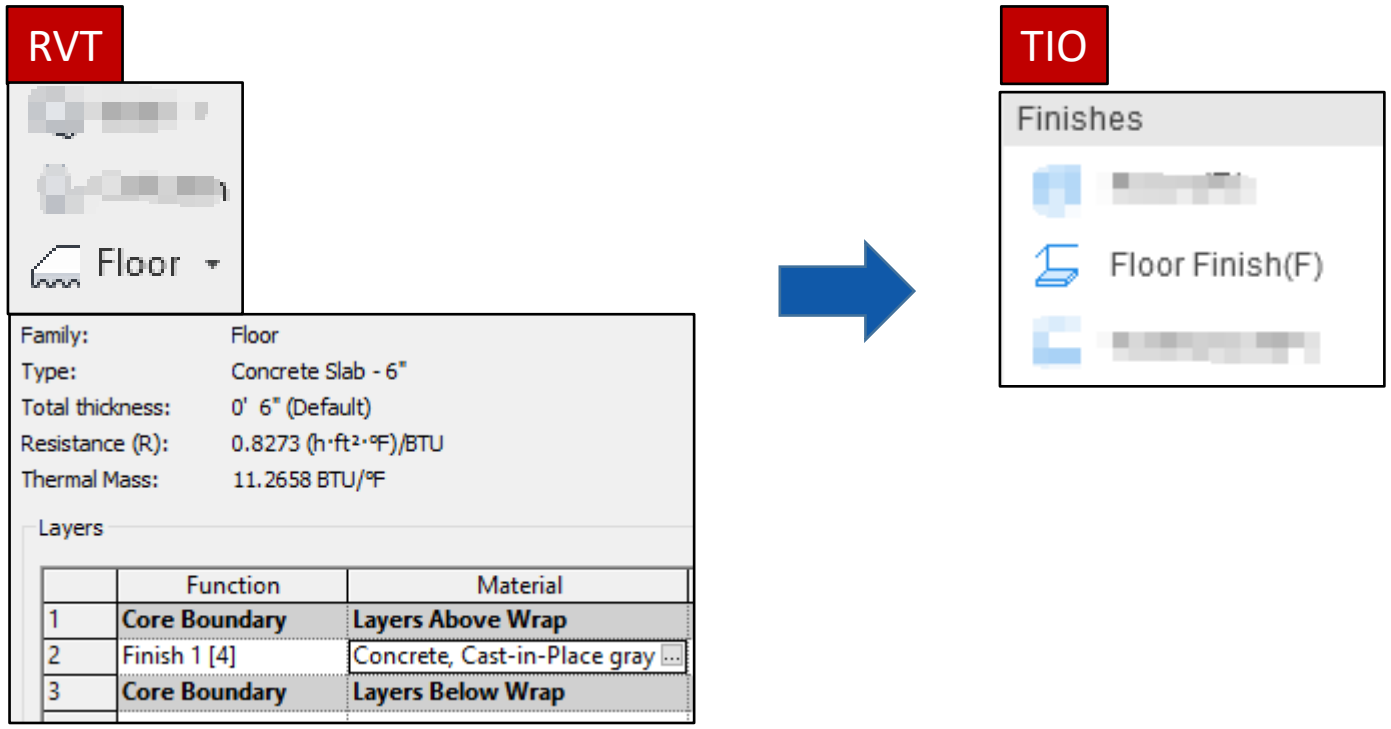
Material

Function	Material
Core Boundary	**Layers Above Wrap**
Structure [1]	precast concrete
Core Boundary	**Layers Below Wrap**

		Condition (Given...)	**Name elements with material of RVT**	**Remarks**
4	Slab	Precast Slab	Precast	1. Manage to name elements by choosing these 2 materials in Revit. In this way, they could be matched with Precast Slab in TIO automatically after import, though they will be shown as In-situ Slab in Element Settings. 2. If you choose other materials, in TIO, they will be matched with In-situ Slab. You need to check and modify them in Element Settings.
		Steel Slab	Steel	

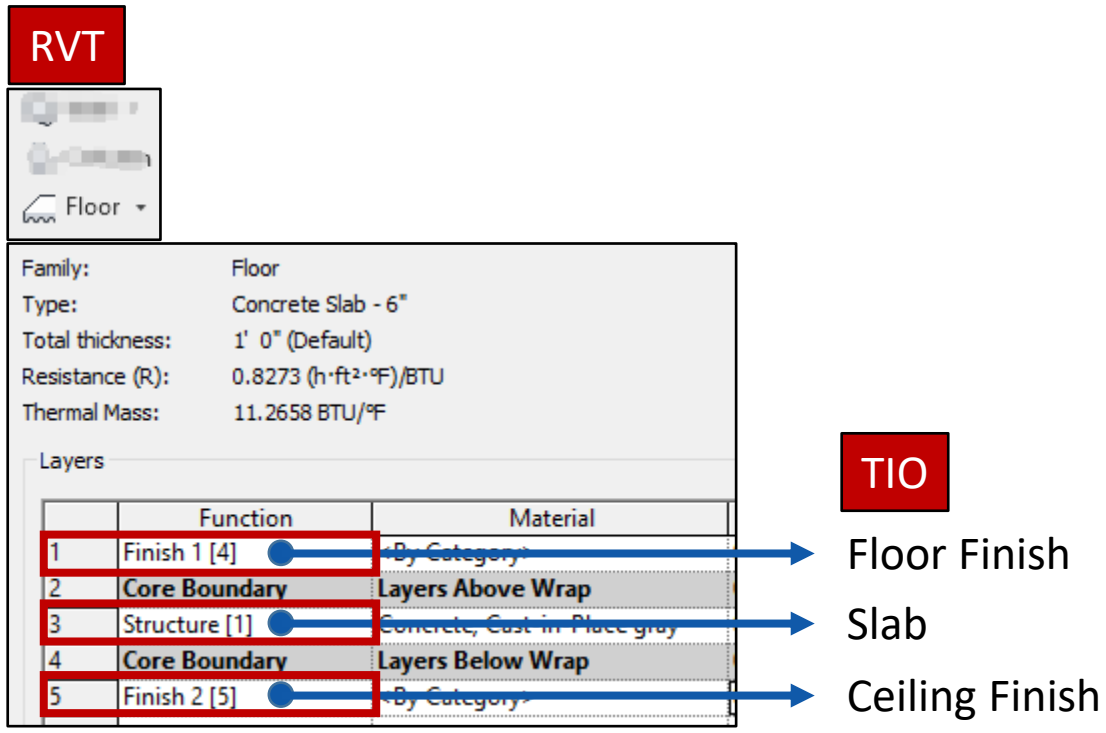
Slab

- For a RVT slab, if its Layer Function is others rather than Structure, it will be matched with Floor Finish in TIO.



Slab

- For a RVT slab, if its Layer Function contains both Structure and others, the layers above Structure will be imported as Floor Finish, and the layers below Structure will be imported as Ceiling Finish.

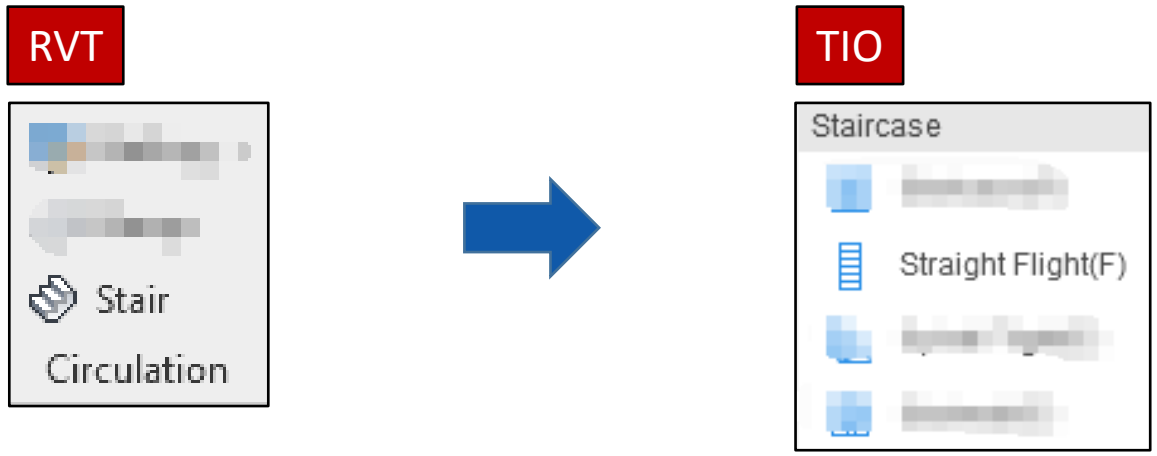


3.1 Element Settings - Stair

Stair

Stair

- For a RVT stair, it will be imported as Straight Flight in TIO after import.



Material

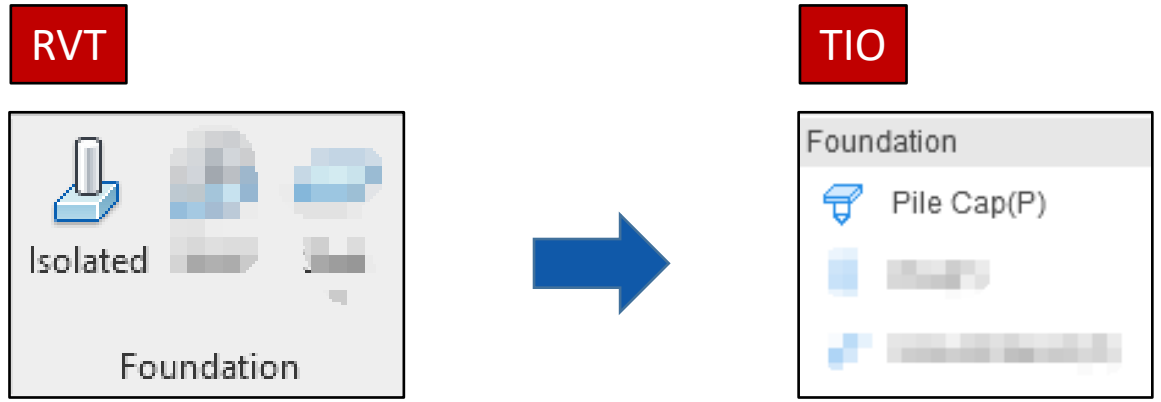
Function	Material
Core Boundary	Layers Above Wrap
Structure [1]	precast concrete
Core Boundary	Layers Below Wrap

		Condition (Given...)	Name elements with material of RVT	Remarks
5	Stair	Precast Stair	Precast	1. Manage to name elements by choosing these 4 materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than these 4 materials, in TIO, they will be matched with the default material used when creating elements, that is, In-situ Concrete Straight. You need to check and modify them in Element Settings.
		Metal Stair	Metal	
		Wood Stair	Wood	
		Glass Stair	Glass	

Pile Cap

3.1 Element Settings - Pile Cap

- For a RVT isolated foundation, it will be imported as Pile Cap in TIO.



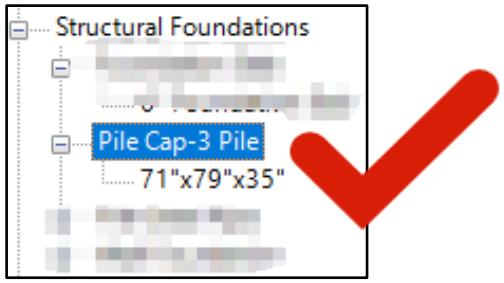
Material

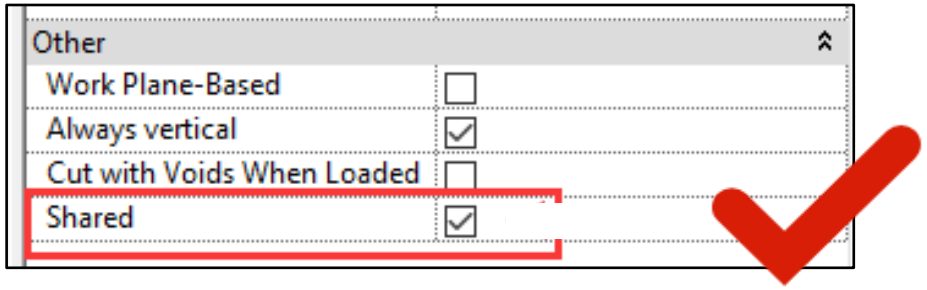
Function	Material
Core Boundary	Layers Above Wrap
Structure [1]	precast concrete
Core Boundary	Layers Below Wrap

		Condition (Given...)	Name elements with material of RVT	Remarks
6	Pile Cap	Precast Pile Cap	Precast	1. Manage to name elements by choosing these 3 materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than these 3 materials, in TIO, they will be matched with the default material used when creating elements. You need to check and modify them in Element Settings.
		Brick Pile Cap	Brick	
		Stone Pile Cap	Stone	

Pile Cap

- In RVT, if you think the element should be classified as Pile Cap, please use **Isolated** in the **Foundation** group on the **Structure** tab, and its value for Type Name should contain *Pile Cap*.
- It is recommended to model pile cap separately from pile. However, if it is needed to be modeled as a family, it can be modeled as a shared nested family. Check the Shared properties in the nested family.



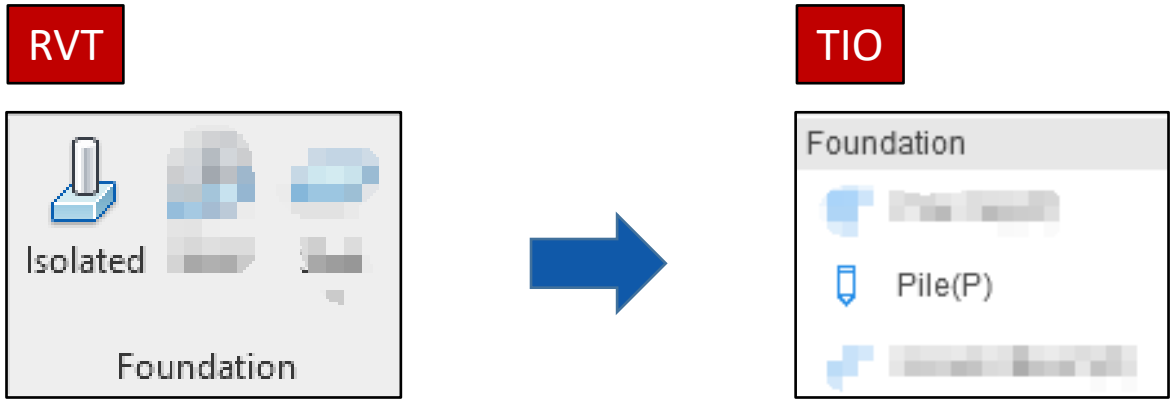


3.1 Element Settings - Pile

Pile

Pile

- For a RVT isolated foundation, it will be imported as Pile in TIO.



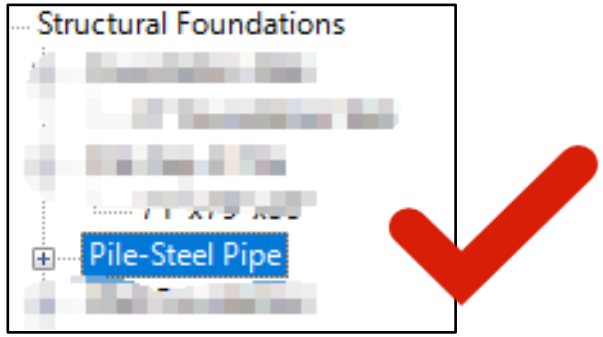
Material

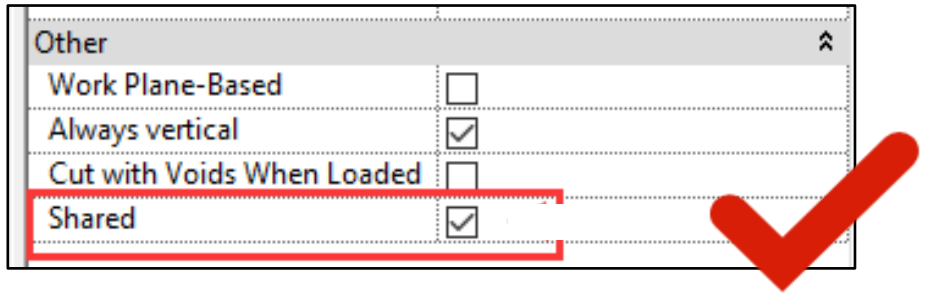
Function	Material
Core Boundary	**Layers Above Wrap**
Structure [1]	precast concrete
Core Boundary	**Layers Below Wrap**

		Condition (Given...)	**Name elements with material of RVT**	**Remarks**
7	Pile	Precast Pile	Precast	1. Manage to name elements by choosing this materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than this material, in TIO, they will be matched with the default material used when creating elements, that is, In-situ Concrete Pile. You need to check and modify them in Element Settings.

Pile

- In RVT, if you think the element should be classified as Pile, please use **Isolated** in the **Foundation** group on the **Structure** tab, and its value for Type Name should contain *Pile*.
- It is recommended to model pile separately from pile cap. However, if it is needed to be modeled as a family, it can be modeled as a shared nested family. Check the Shared properties in the nested family.

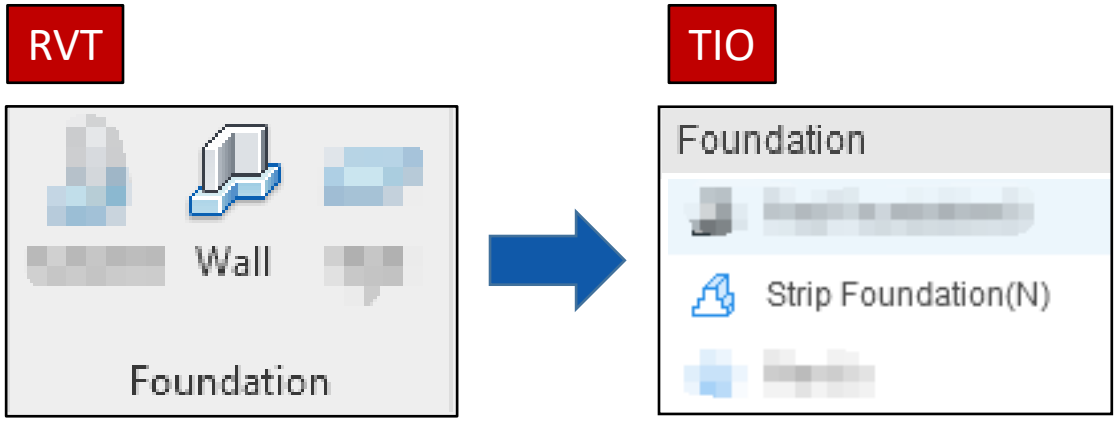




Strip Foundation

Strip Foundation

- In RVT, if you think the element should be classified as Strip Foundation, please use **Wall** in the **Foundation** group on the **Structure** tab,



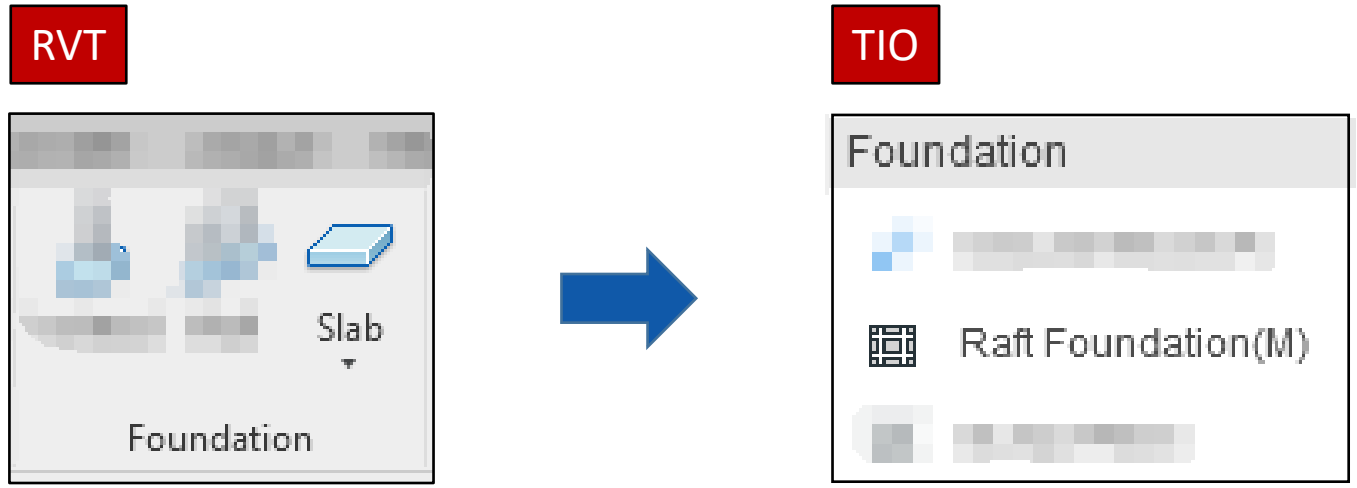
Material

Item	Element	Condition (Given...)	Name elements with material of RVT	Remarks
11	Strip Foundation	Precast Strip Foundation	Precast	1. Manage to name elements by choosing these 3 materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than these 3 materials, in TIO, they will be matched with the default material used when creating elements, that it, In-situ Concrete Strip Foundation. You need to check and modify them in Element Settings.
		Brick Strip Foundation	Brick	
		Rubble Strip Foundation	Rubble	

Raft Foundation

Raft Foundation

- In RVT, if you think the element should be classified as Raft Foundation, please use **Slab** in the **Foundation** group on the **Structure** tab.



Material

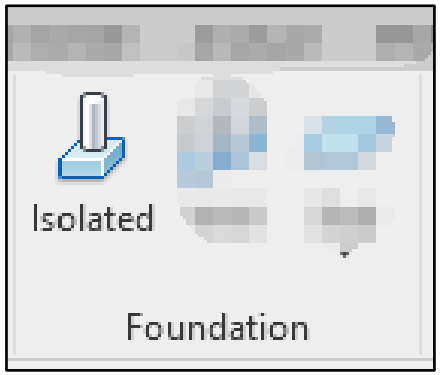
Item	Element	Condition (Given...)	Name elements with material of RVT	Remarks
9	Raft Foundation	——	——	No matter what material it is used in Revit, it will be imported as In-situ concrete raft foundation in TIO.

Pad Foundation

Pad Foundation

- In RVT, if you think the element should be classified as Pad Foundation, please use **Isolated** in the **Foundation** group on the **Structure** tab, and its value for Type Name should contain *Pad Foundation*.

RVT

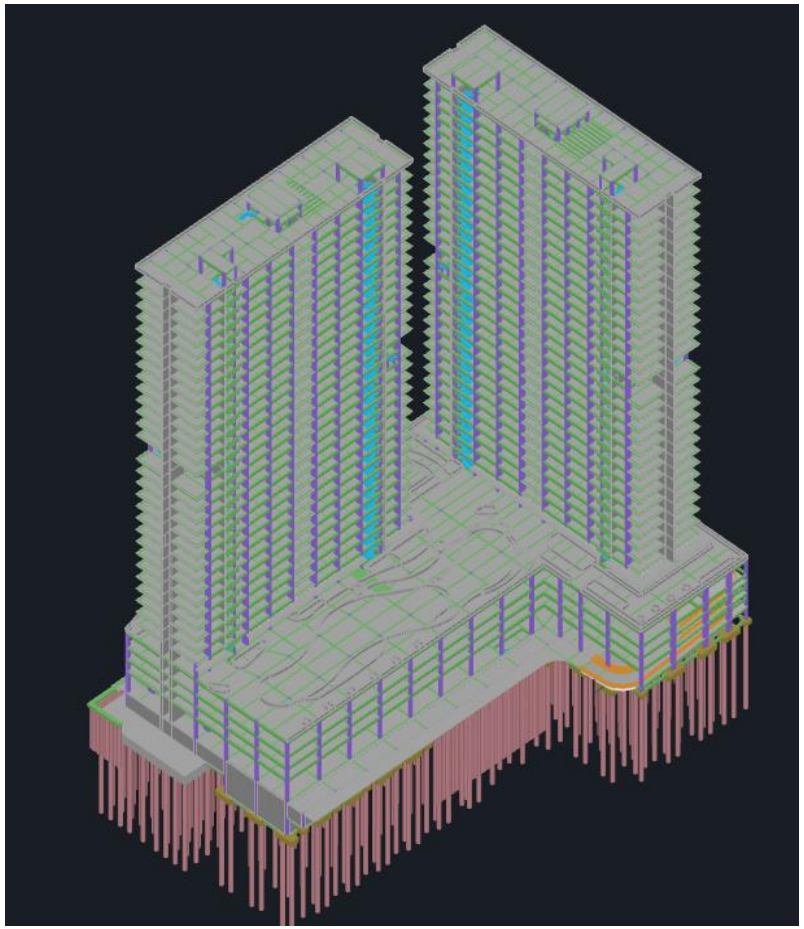


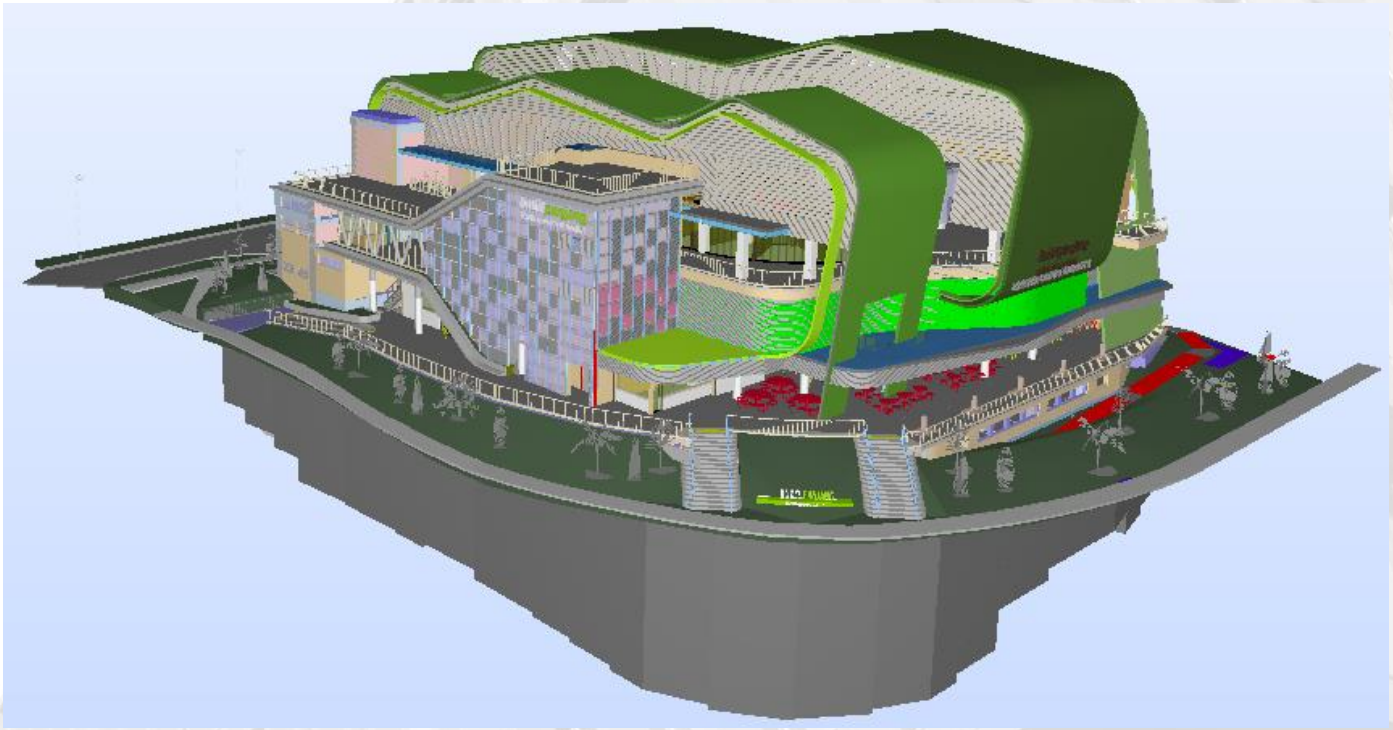
TIO

Material

Item	Element	Condition (Given...)	Name elements with material of RVT	Remarks
10	Pad Foundation	Precast Pad Foundation	Precast	1. Manage to name elements by choosing these 3 materials in Revit. In this way, they could be matched with materials in TIO automatically after import. 2. If you choose other materials rather than these 3 materials, in TIO, they will be matched with the default material used when creating elements, that it, In-situ Concrete Pad Foundation. You need to check and modify them in Element Settings.
		Brick Pad Foundation	Brick	
		Rubble Pad Foundation	Rubble	

Sample project





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Make Everything Count

Thank You