3.1 BlenderBIM

Maarten Vroegindeweij

3BM Engineering

RADISSON BLU

LATVIJA

07 – 09 May 2024

Agenda

1. Welcome and introduction(5 min)
2. About Blender
3. About BlenderBIM
4. Ifc Viewing & Editing
5. Example projects made using BlenderBIM
6. Start of the lab
7. Ifc, IfcOpenShell and Python
8. Future of Blender & BlenderBIM
9. Questions

Requirements for the lab

https://blenderbim.org/docs/users/installation.html

- **Download Blender 4.1**
  https://www.blender.org/download/releases/4-1/
- **Download BlenderBIM v 0.0.240402**
  https://blenderbim.org/download.html

About the speaker

Ingenieursbureau 3BM
Co-founder, Structural Engineer, Programmer

Domera
Founder

Struct4U
Shareholder, PR

DORDRECHT ACADEMY

BBE: Maths, Mechanics

Maarten Vroegindeweij
https://www.linkedin.com/in/maarten-vroegindeweij-652ab418a/

About the co-speaker

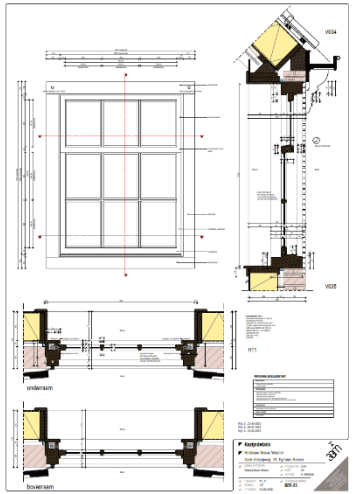
Ingenieursbureau 3BM
Graduation intern

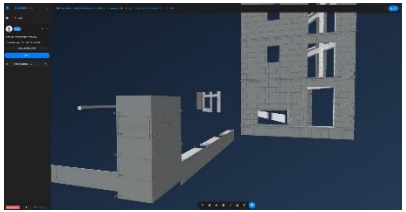
RoAn Bouwvergunningen
Architectural Draughsman/Modeller

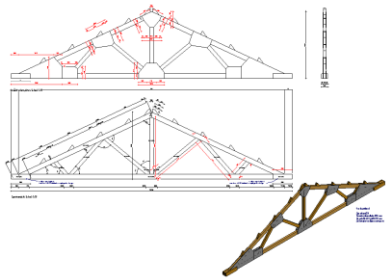
Jesse Roodhorst
https://www.linkedin.com/in/jesseroodhorst/

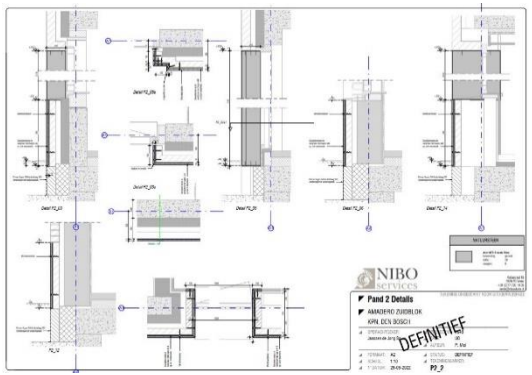
3BM Consulting Engineers

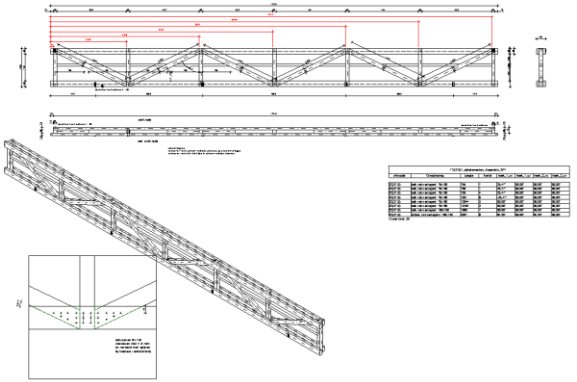
3BM

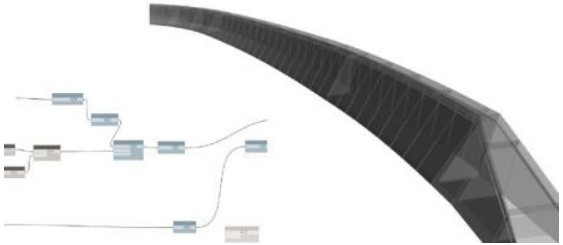


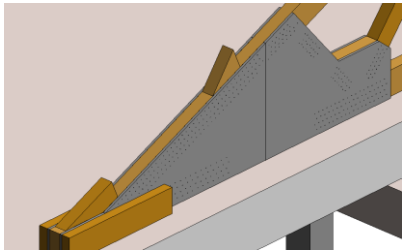












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Domera






Struct4U

XFEM4U

FEM software for 3D frames and plates

XFrame2D

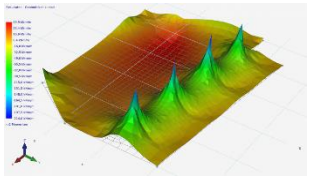
Powerful software for 2D frames

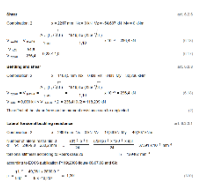
XBeam2D

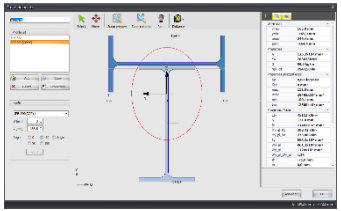
Beam calculation in steel, concrete and timber

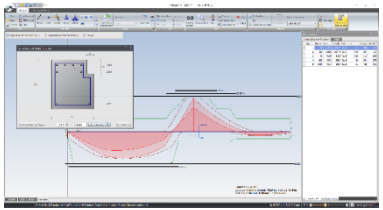
XConstruct

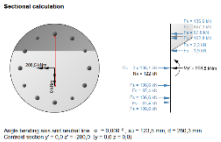
Modern calculation toolbox for the engineer

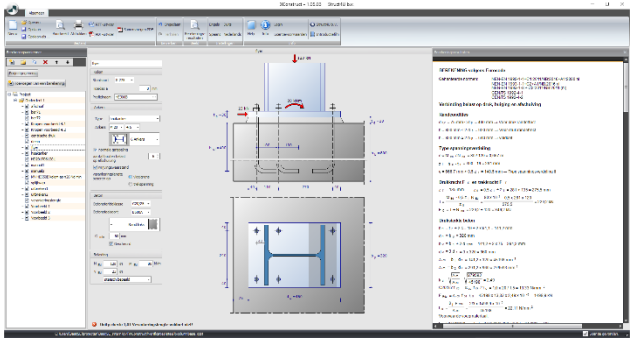


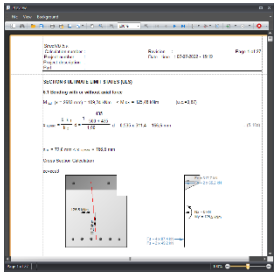


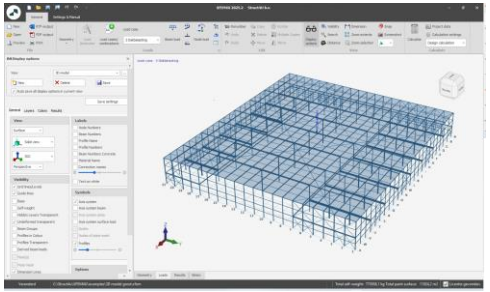












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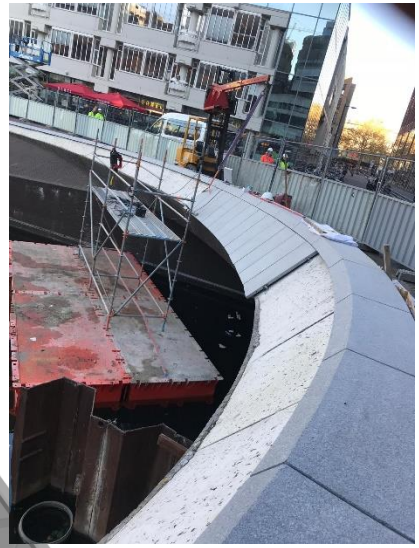
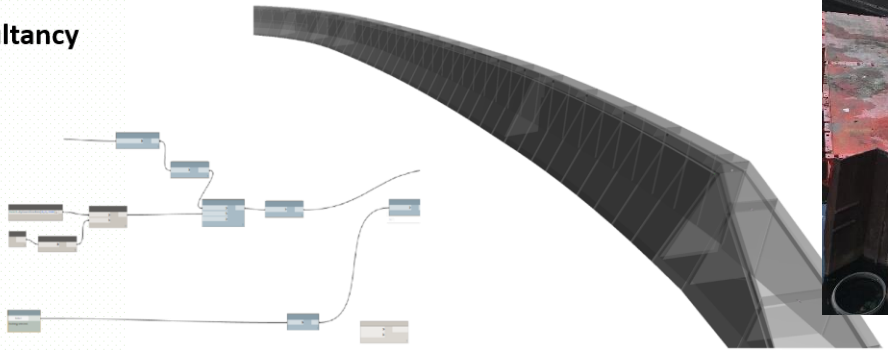
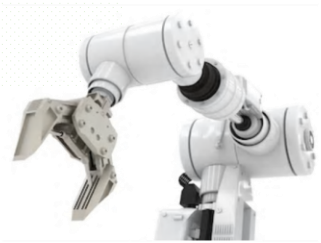
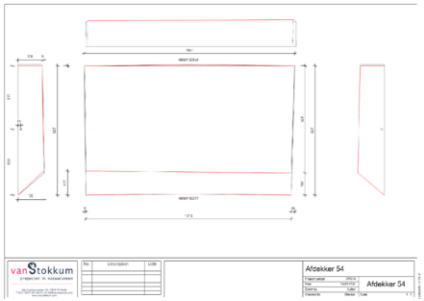
3BM Labs

- 3D Web
- 2D/3D GIS&BIM data Consultancy
- Computational Design
- Software Development
- Digital Fabrication





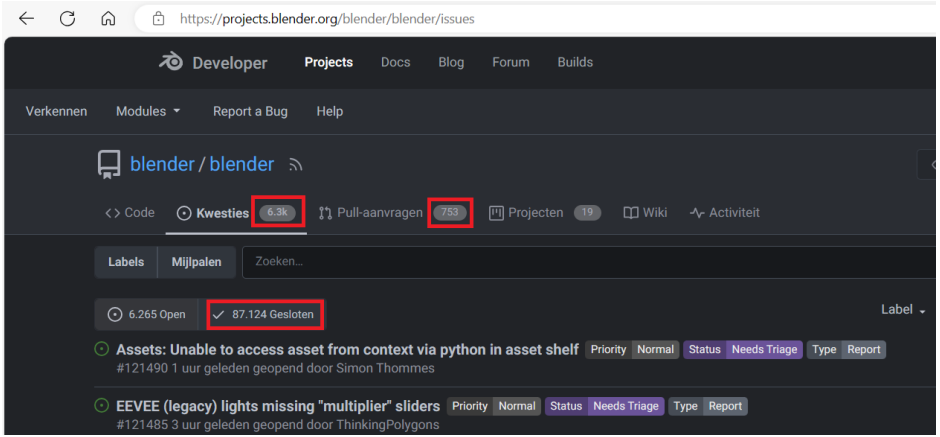




Blender: Open Source

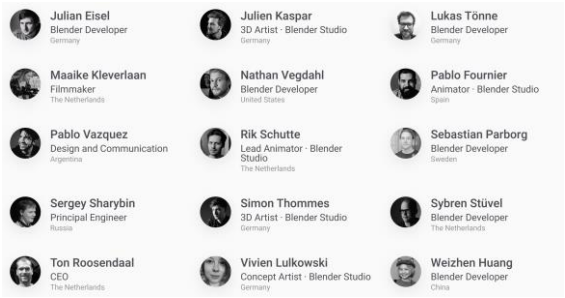
Open Source since 2002:
Founded by Ton Roosendaal:
Cross-platform
30 years old this year

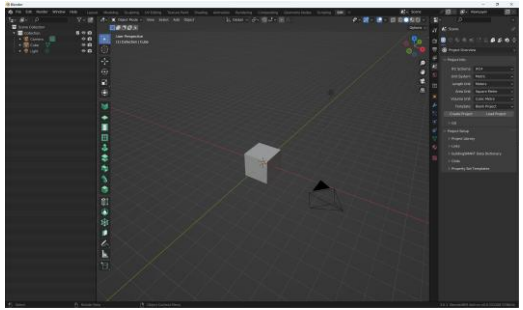
https://github.com/blender/blender
https://twitter.com/tonroosendaal



Blender

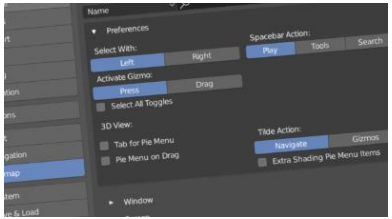

blender

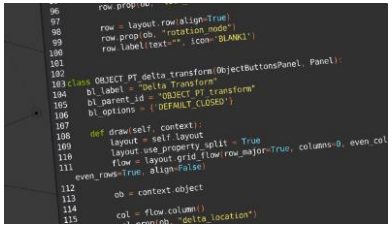

Julian Eisel
Blender Developer
Germany
Julien Kaspar
3D Artist · Blender Studio
Germany
Lukas Tönne
Blender Developer
Germany
Maaike Kleverlaan
Filmmaker
The Netherlands
Nathan Vegdahl
Blender Developer
United States
Pablo Fournier
Animator · Blender Studio
Spain
Pablo Vazquez
Design and Communication
Argentina
Rik Schutte
Lead Animator · Blender Studio
The Netherlands
Sebastian Parborg
Blender Developer
Sweden
Sergey Sharybin
Principal Engineer
Russia
Simon Thommes
3D Artist · Blender Studio
Germany
Sybren Stüvel
Blender Developer
The Netherlands
Ton Roosendaal
CEO
The Netherlands
Vivien Lulkowski
Concept Artist · Blender Studio
Germany
Weizhen Huang
Blender Developer
China

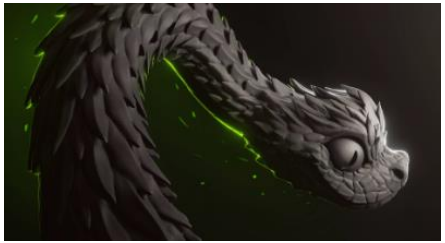


Blender

- Rendering
- Modelling
- Sculpting
- Animation & Rigging
- Story Artist
- VFX
- Simulation
- Pipeline
- Video Editing
- Scripting: Python API
- Interface fully customizable

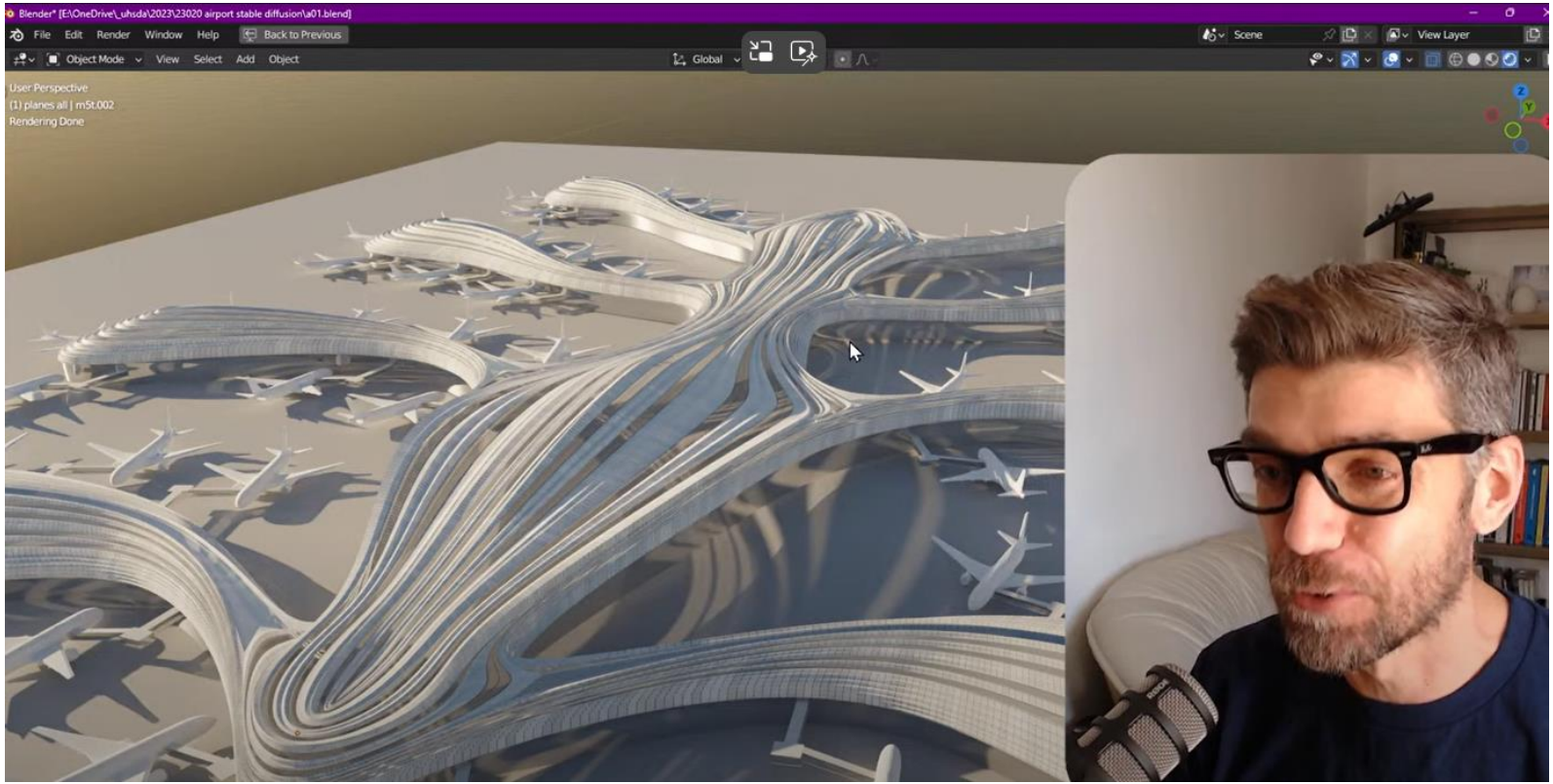






Blender for Architecture

Blender for Architecture



Dimitar Pouchnikov

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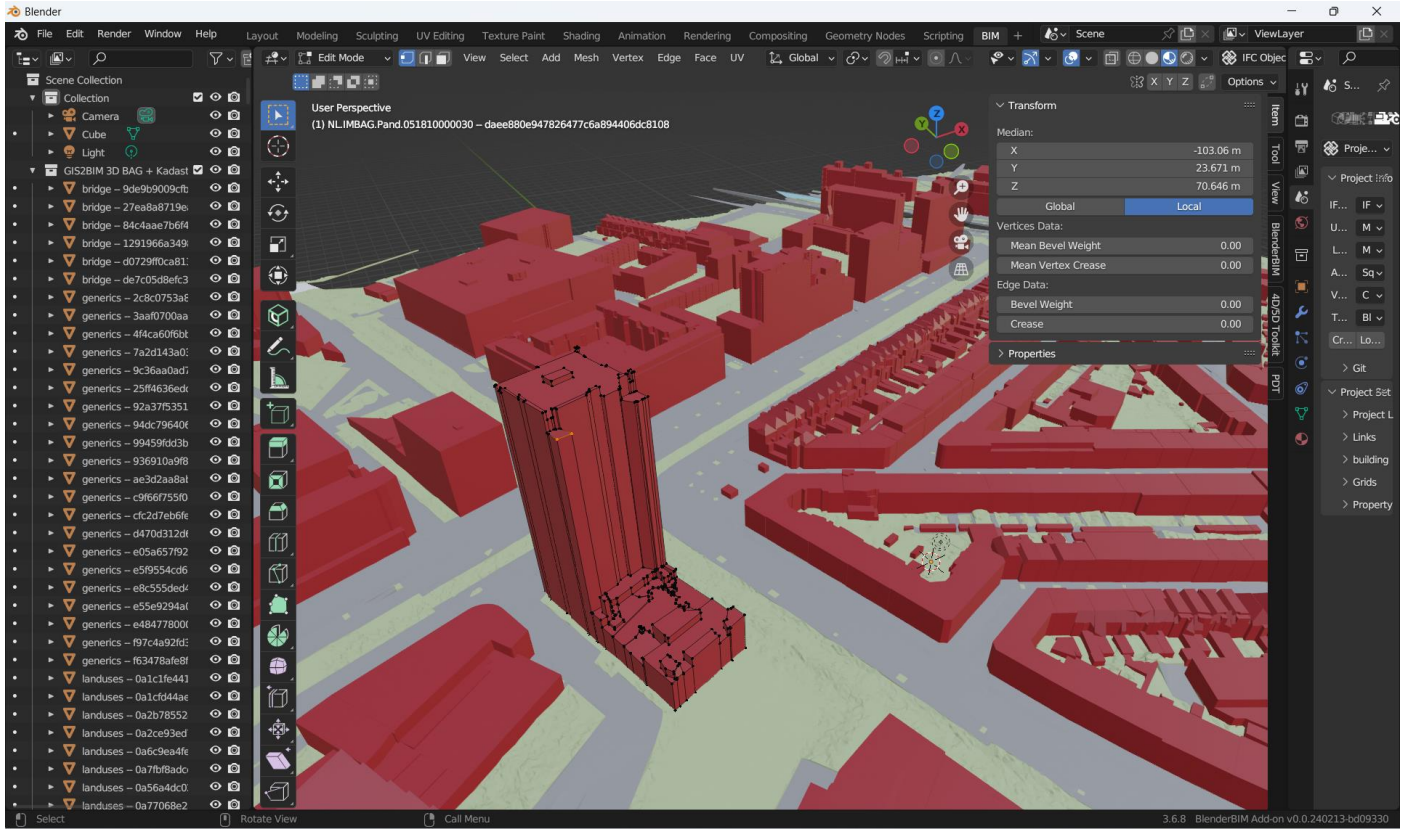
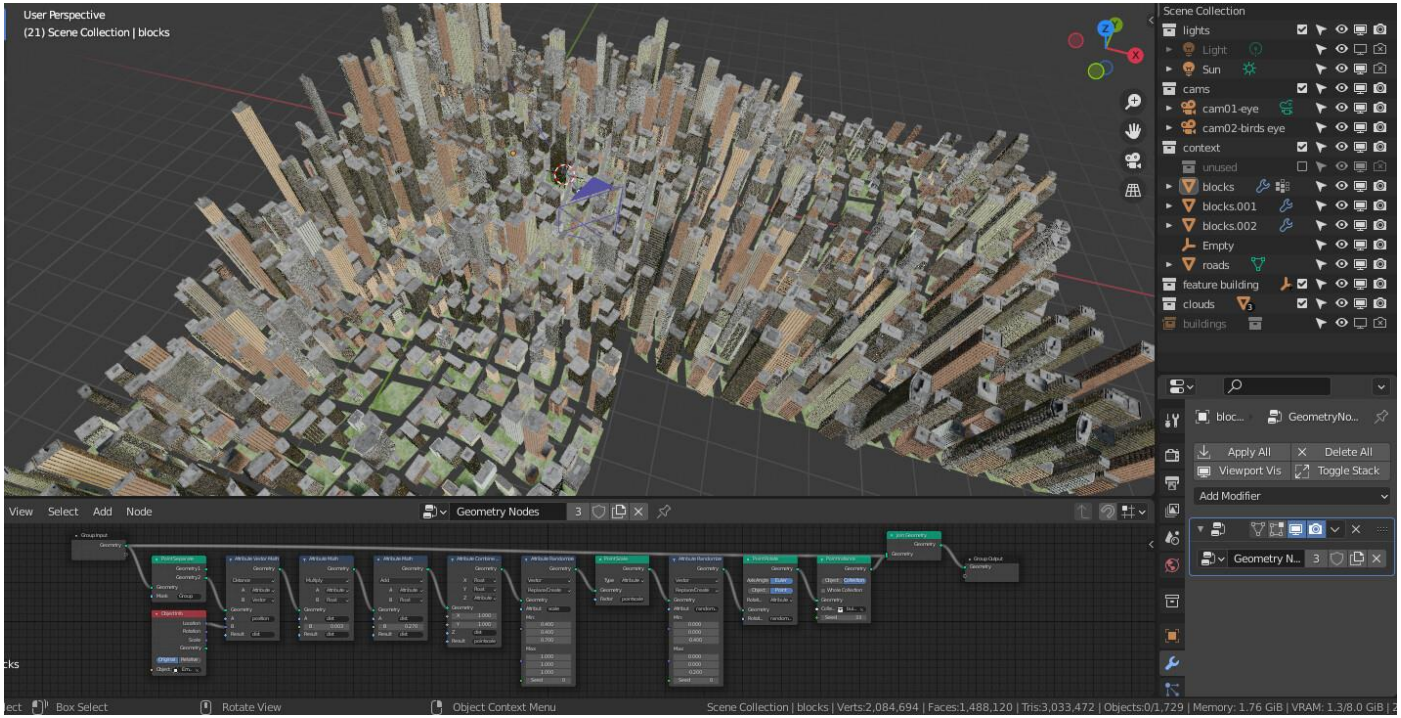
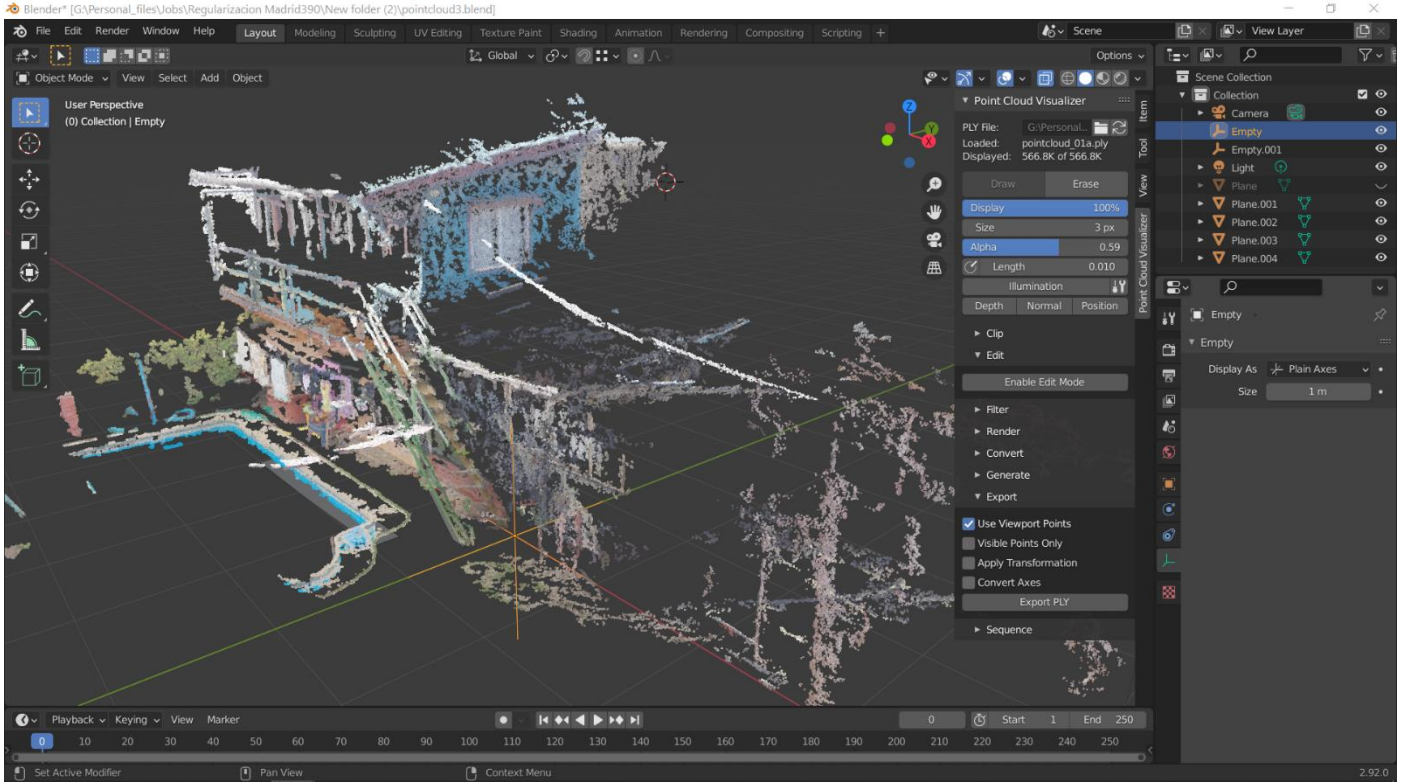
Demo blender mesh-editing



Blender Geometry Nodes



Point Cloud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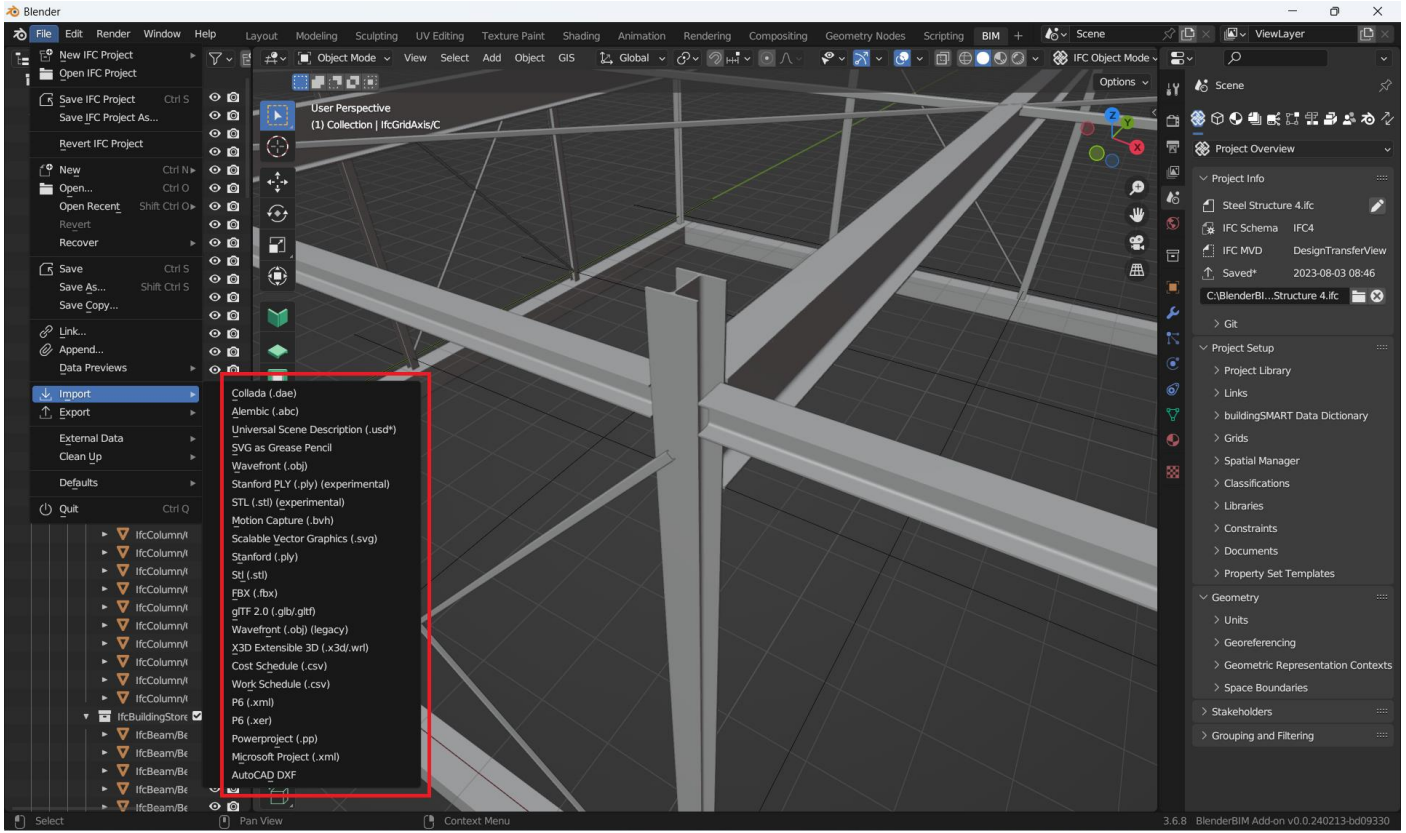
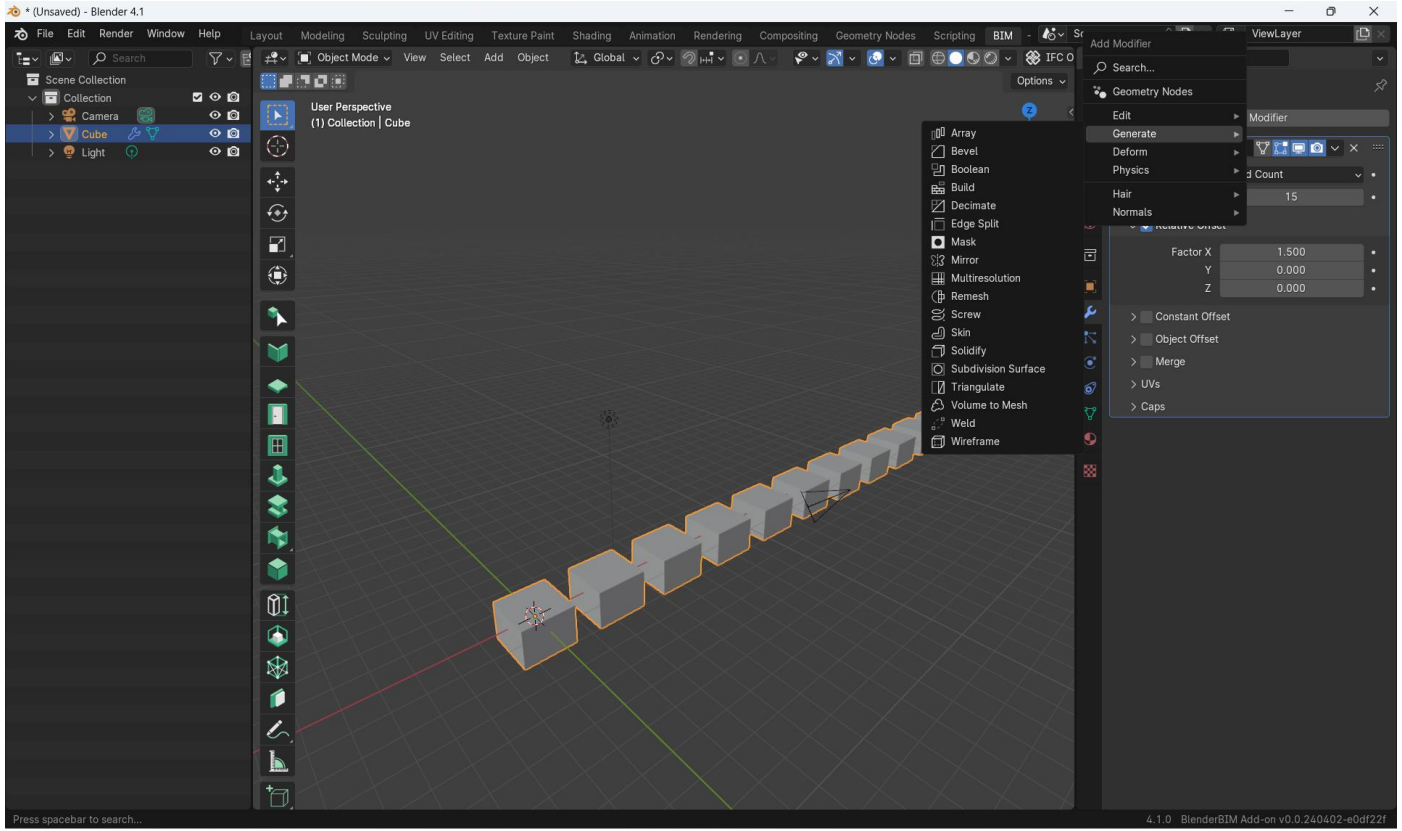
File Edit Render Window Help
Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Scripting
Scene
View Layer
Object Mode View Select Add Object
Global
Options
User Perspective
(0) Collection | Empty
Point Cloud Visualizer
PLY File: G:\Personal...
Loaded: pointcloud_01a.ply
Displayed: 566.8K of 566.8K
Draw Erase
Display 100%
Size 3 px
Alpha 0.59
Length 0.010
Illumination
Depth Normal Position
Clip
Edit
Enable Edit Mode
Filter
Render
Convert
Generate
Export
Use Viewport Points
Visible Points Only
Apply Transformation
Convert Axes
Export PLY
Sequence
Item Tool View Point Cloud Visualizer
Scene Collection
Collection
Camera
Empty
Empty.001
Light
Plane
Plane.001
Plane.002
Plane.003
Plane.004
Empty
Empty
Display As Plain Axes
Size 1 m
Playback Keying View Marker
Start 1 End 250
Set Active Modifier
Pan View
Context Menu
2.92.0

Import/Export

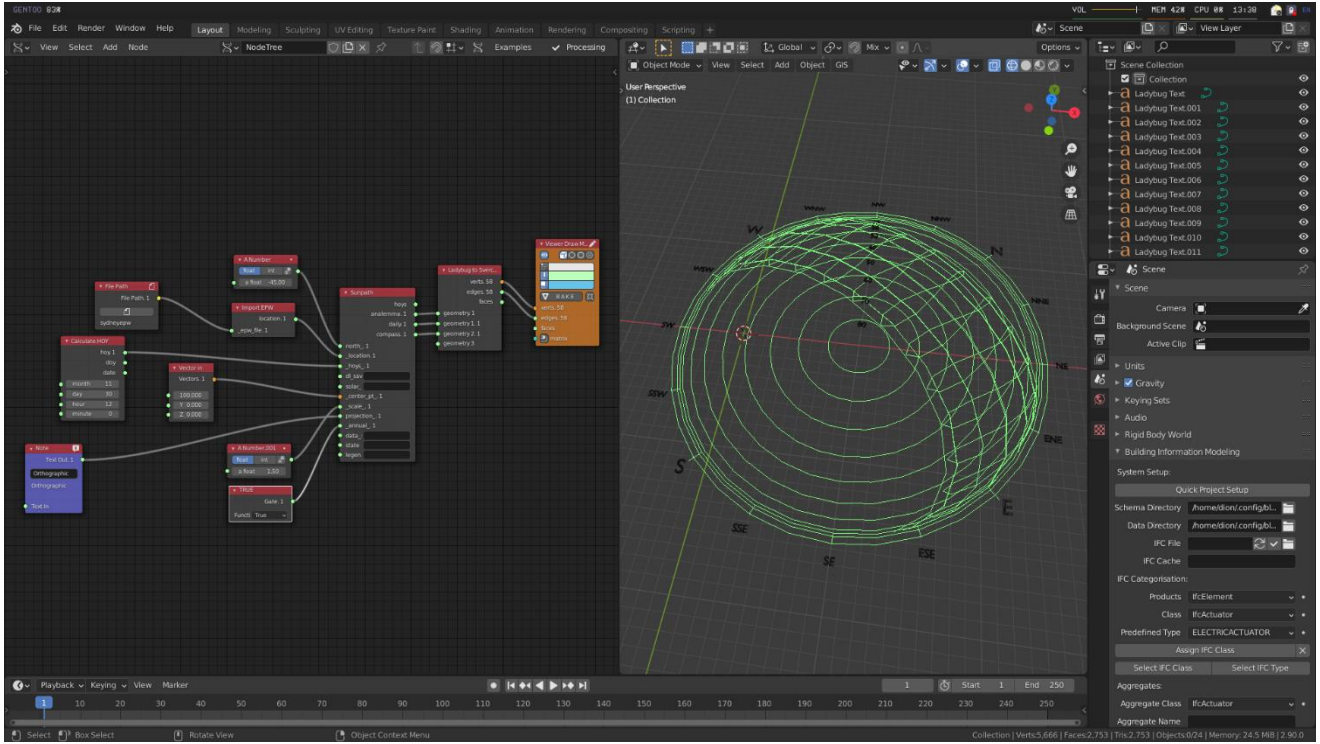


Modifiers



https://www.youtube.com/watch?app=desktop&v=idcFMhoSdIc

Sverchok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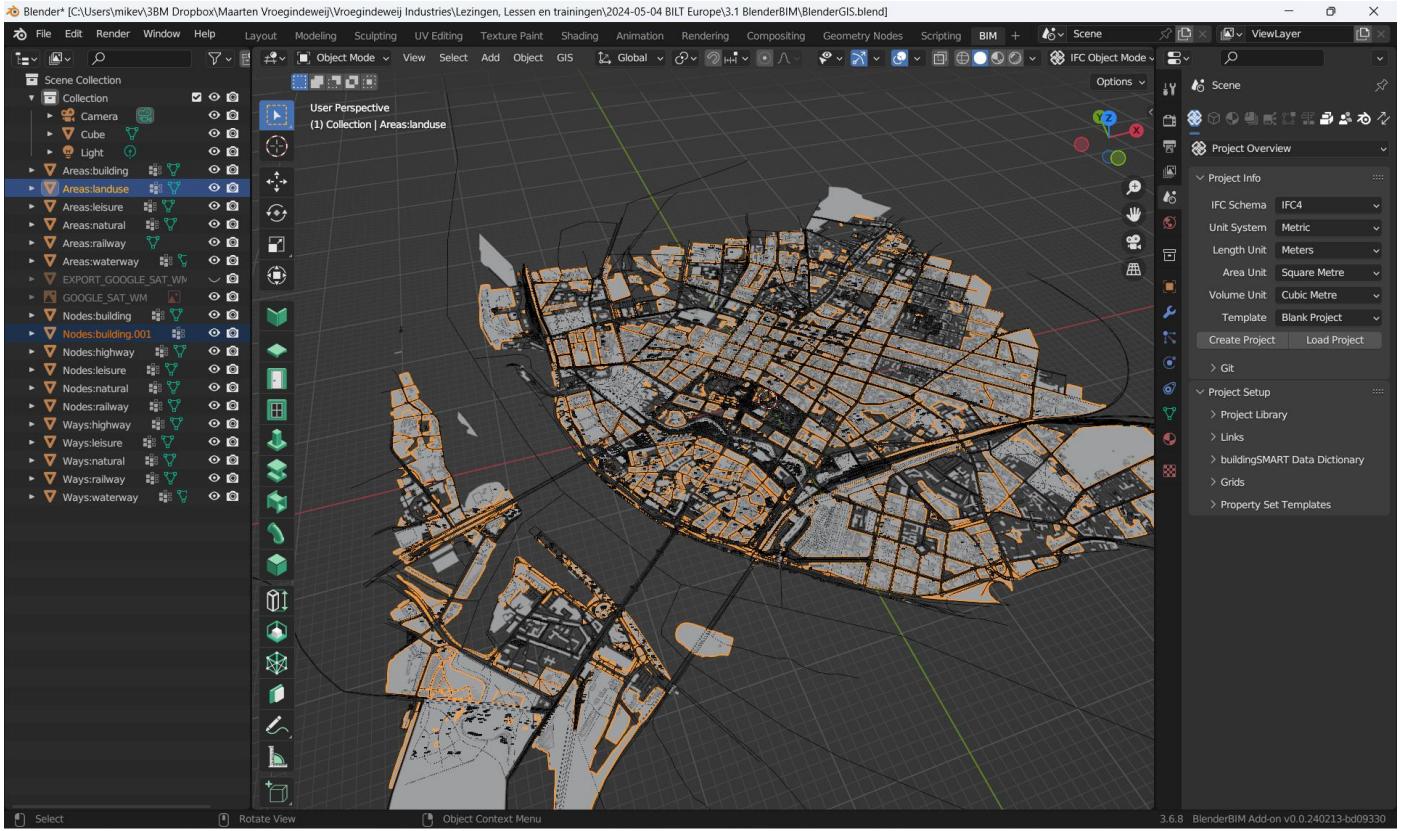
Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Scripting
View Select Add Node
NodeTree
Object Mode View Select Add Object GIS
User Perspective
(1) Collection
Scene
View Layer
Scene Collection
Collection
Ladybug Text
Ladybug Text.001
Ladybug Text.002
Ladybug Text.003
Ladybug Text.004
Ladybug Text.005
Ladybug Text.006
Ladybug Text.007
Ladybug Text.008
Ladybug Text.009
Ladybug Text.010
Ladybug Text.011
Camera
Background Scene
Active Clip
Units
Gravity
Keying Sets
Audio
Rigid Body World
Building Information Modeling
System Setup:
Quick Project Setup
Schema Directory
Data Directory
IFC File
IFC Cache
IFC Categorisation:
Products
Class
Predefined Type
Assign IFC Class
Select IFC Class
Select IFC Type
Aggregates:
Aggregate Class
Aggregate Name
Playback Keying View Marker
Start 1 End 250
Select Box Select Rotate View Object Context Menu

BlenderGIS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File Edit Render Window Help
Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Geometry Nodes Scripting BIM
Scene
ViewLayer
Object Mode View Select Add Object GIS
Global
IFC Object Mode
Options
User Perspective
(1) Collection | Areas:landuse
Scene Collection
Collection
Camera
Cube
Light
Areas:building
Areas:landuse
Areas:leisure
Areas:natural
Areas:railway
Areas:waterway
EXPORT_GOOGLE_SAT_WM
GOOGLE_SAT_WM
Nodes:building
Nodes:building.001
Nodes:highway
Nodes:leisure
Nodes:natural
Nodes:railway
Ways:highway
Ways:leisure
Ways:natural
Ways:railway
Ways:waterway
Project Overview
Project Info
IFC Schema IFC4
Unit System Metric
Length Unit Meters
Area Unit Square Metre
Volume Unit Cubic Metre
Template Blank Project
Create Project
Load Project
Git
Project Setup
Project Library
Links
buildingSMART Data Dictionary
Grids
Property Set Templates
Select
Rotate View
Object Context Menu
3.6.8 BlenderBIM Add-on v0.0.240213-bd09330

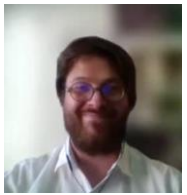
BlenderBIM

IfcOpenShell/BlenderBIM: key figures

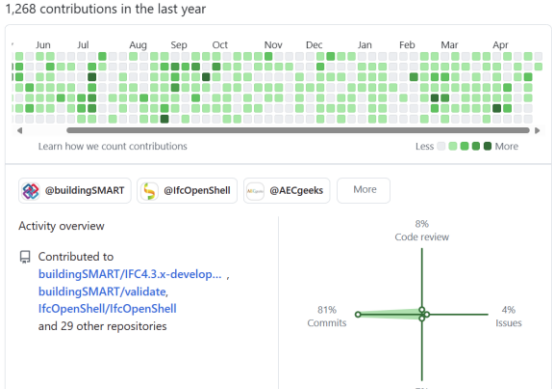
Thomas Krijnen(aothms)
https://github.com/aothms

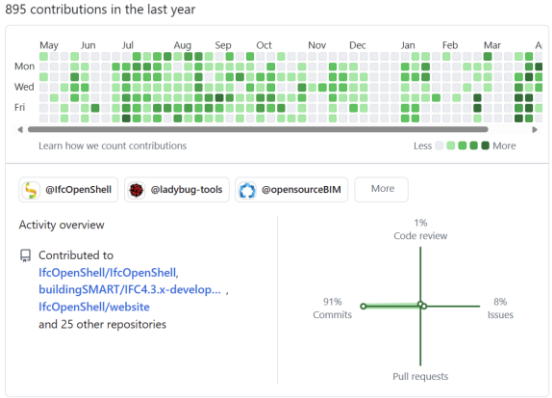
Dion Moult
https://github.com/Moult

Andrej
https://github.com/Andrej730

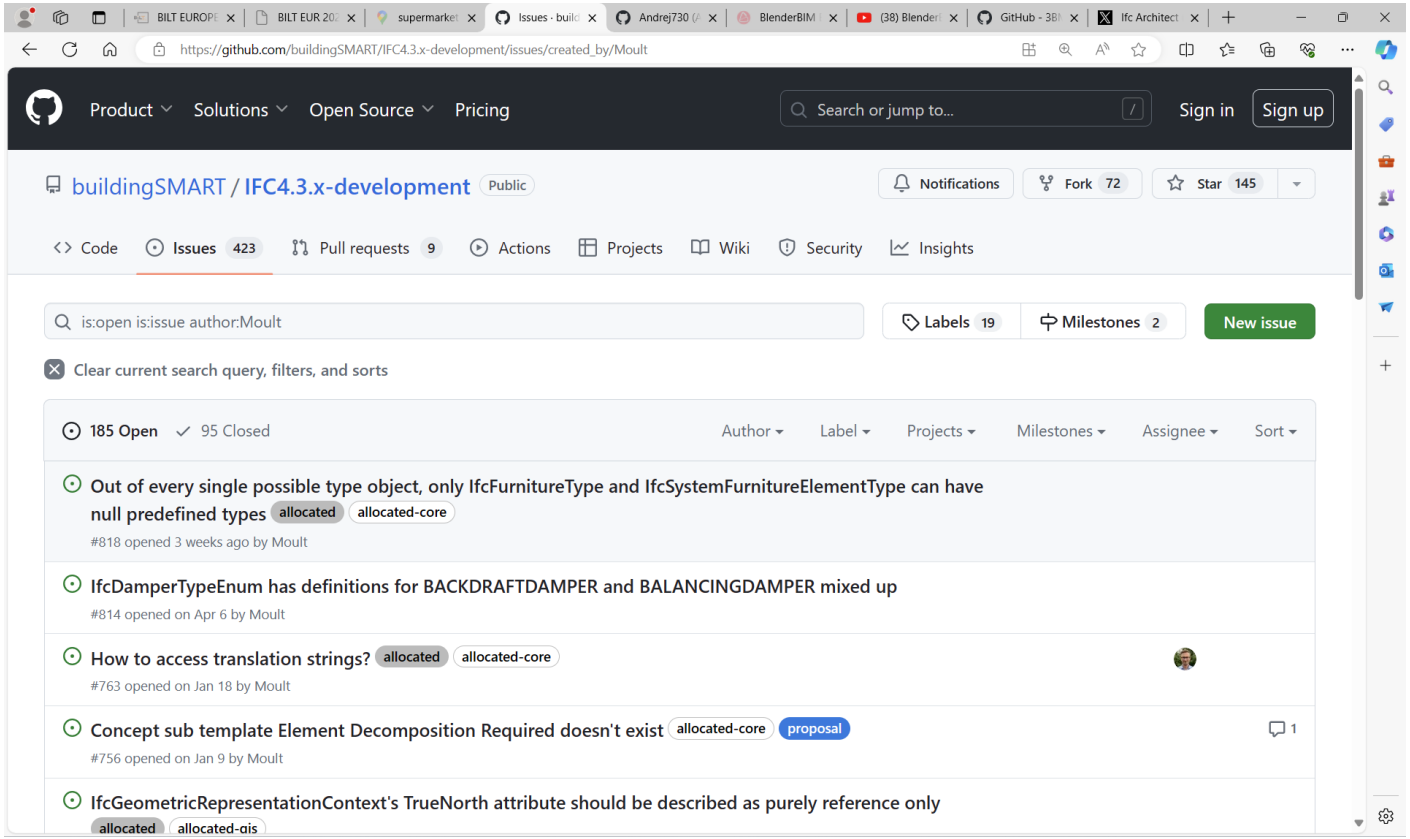


Lloyd Bussio
IFC Architect
https://www.youtube.com/@IfcArchitect

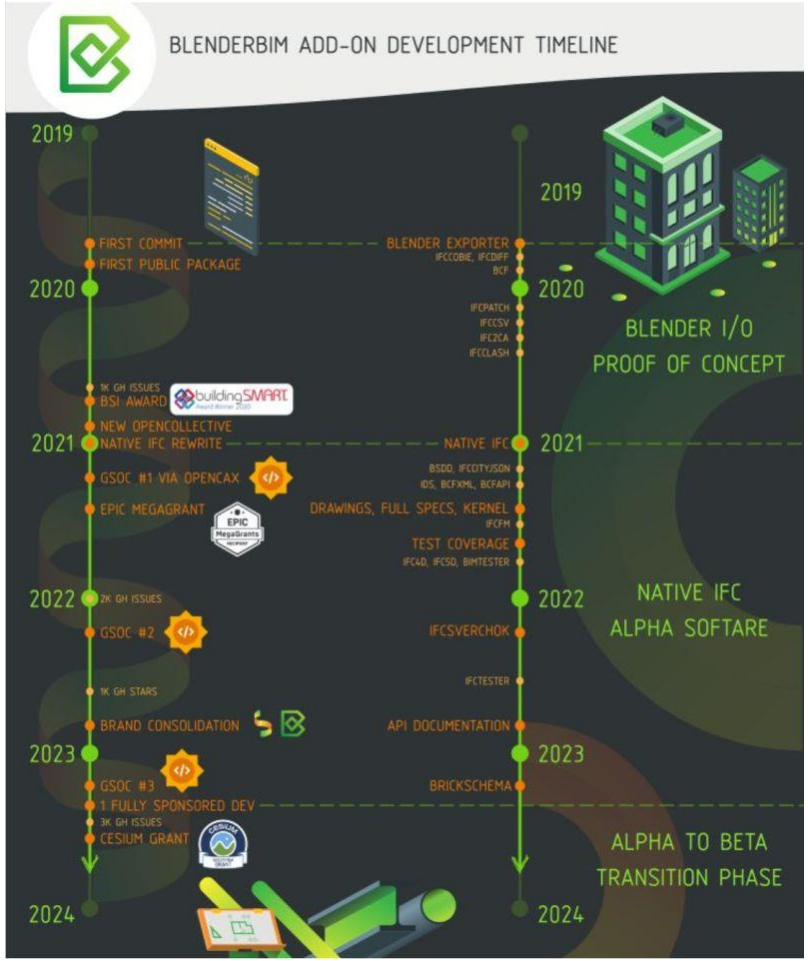




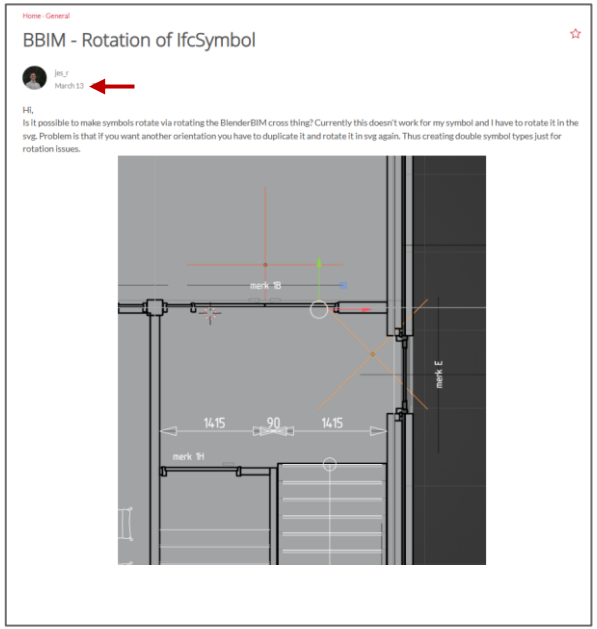
BlenderBIM


https://github.com/buildingSMART/IFC4.3.x-development/issues/created_by/Moult
Product
Solutions
Open Source
Pricing
Search or jump to...
Sign in
Sign up
buildingSMART / IFC4.3.x-development
Public
Notifications
Fork 72
Star 145
Code
Issues 423
Pull requests 9
Actions
Projects
Wiki
Security
Insights
is:open is:issue author:Moult
Labels 19
Milestones 2
New issue
Clear current search query, filters, and sorts
185 Open
95 Closed
Author
Label
Projects
Milestones
Assignee
Sort
Out of every single possible type object, only IfcFurnitureType and IfcSystemFurnitureElementType can have null predefined types
allocated
allocated-core
#818 opened 3 weeks ago by Moult
IfcDamperTypeEnum has definitions for BACKDRAFTDAMPER and BALANCINGDAMPER mixed up
#814 opened on Apr 6 by Moult
How to access translation strings?
allocated
allocated-core
#763 opened on Jan 18 by Moult
Concept sub template Element Decomposition Required doesn't exist
allocated-core
proposal
1
#756 opened on Jan 9 by Moult
IfcGeometricRepresentationContext's TrueNorth attribute should be described as purely reference only
allocated
allocated-gis

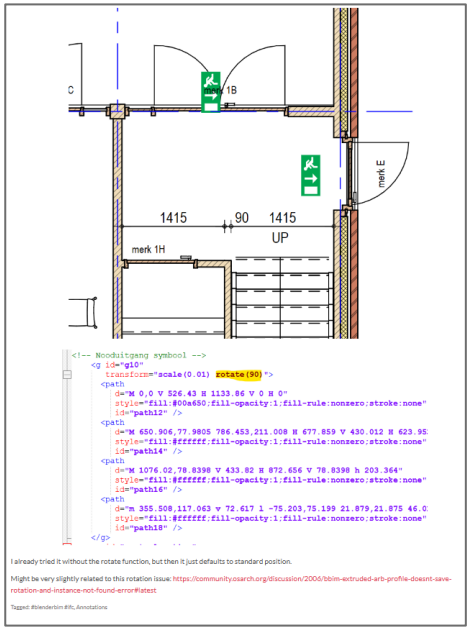
BlenderBIM timeline

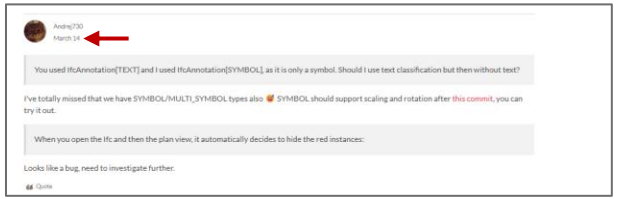


BlenderBIM Example of bug-fixing and development speed

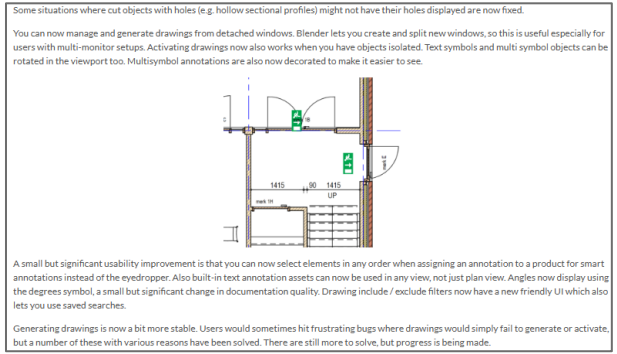


13 March



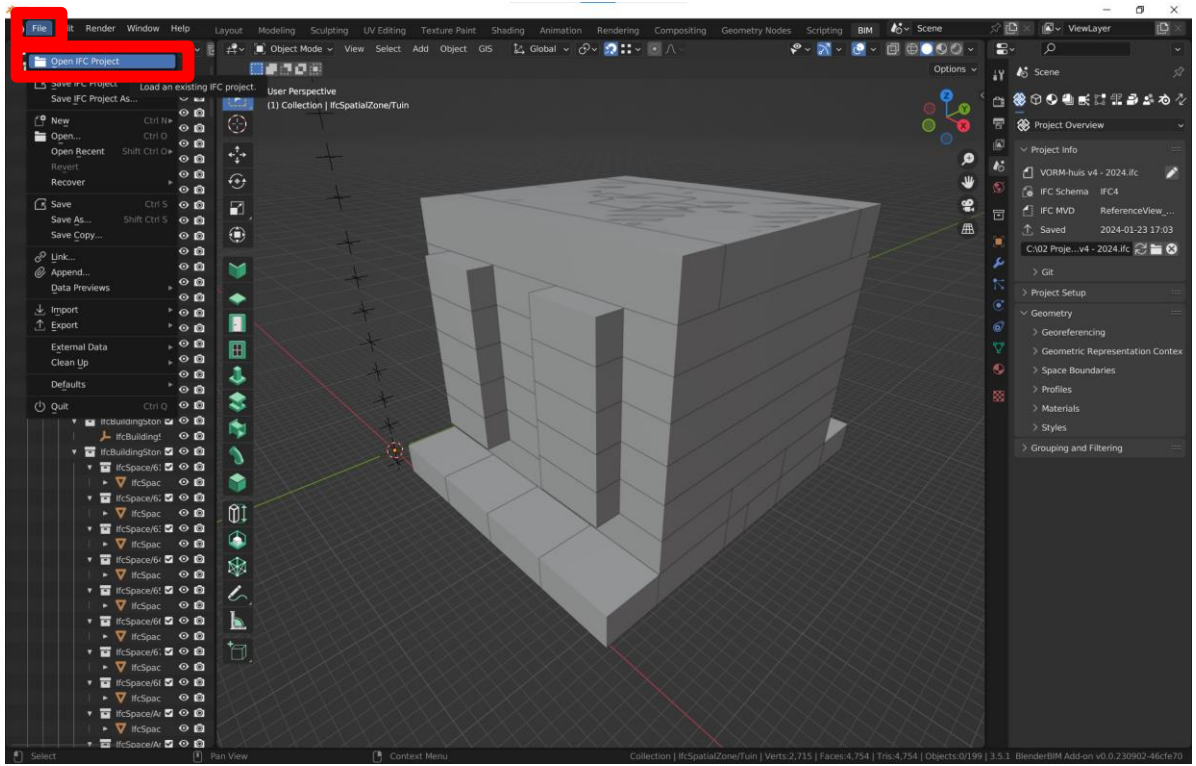


14 march solved

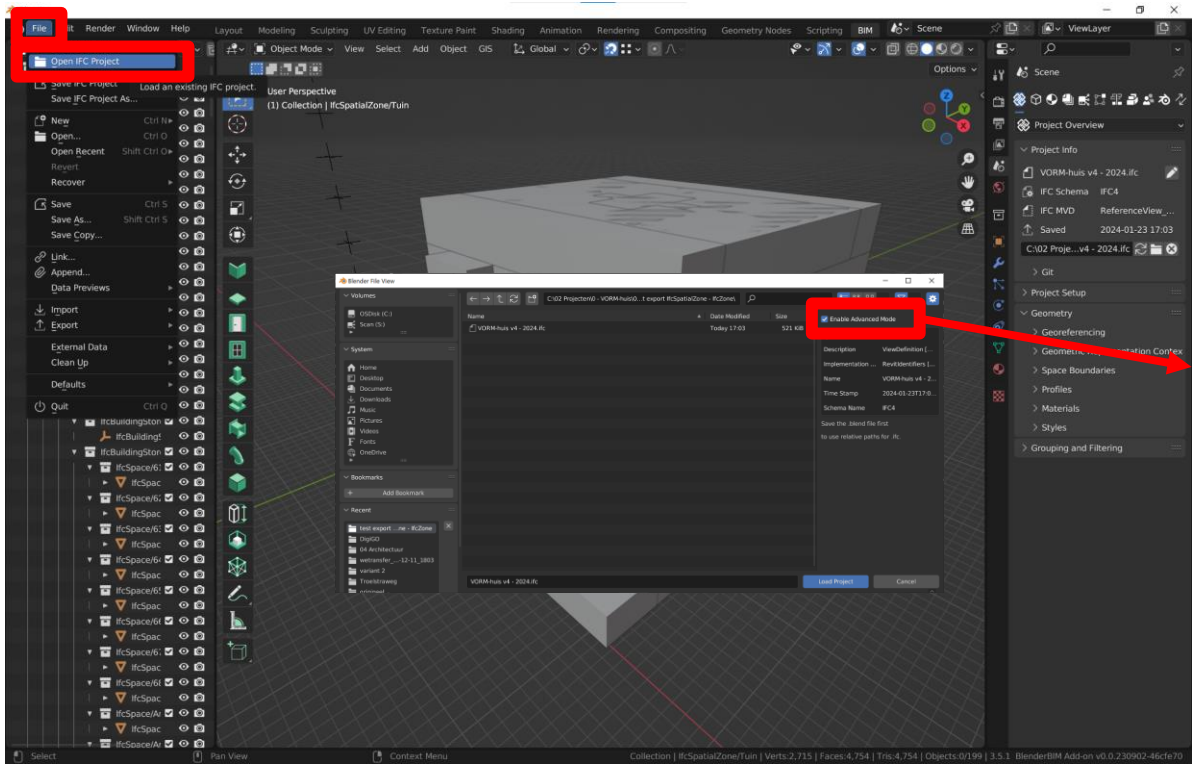


2 april in releasenotes

Open IFC(Slides from Paul Strokap of VORM(NL)

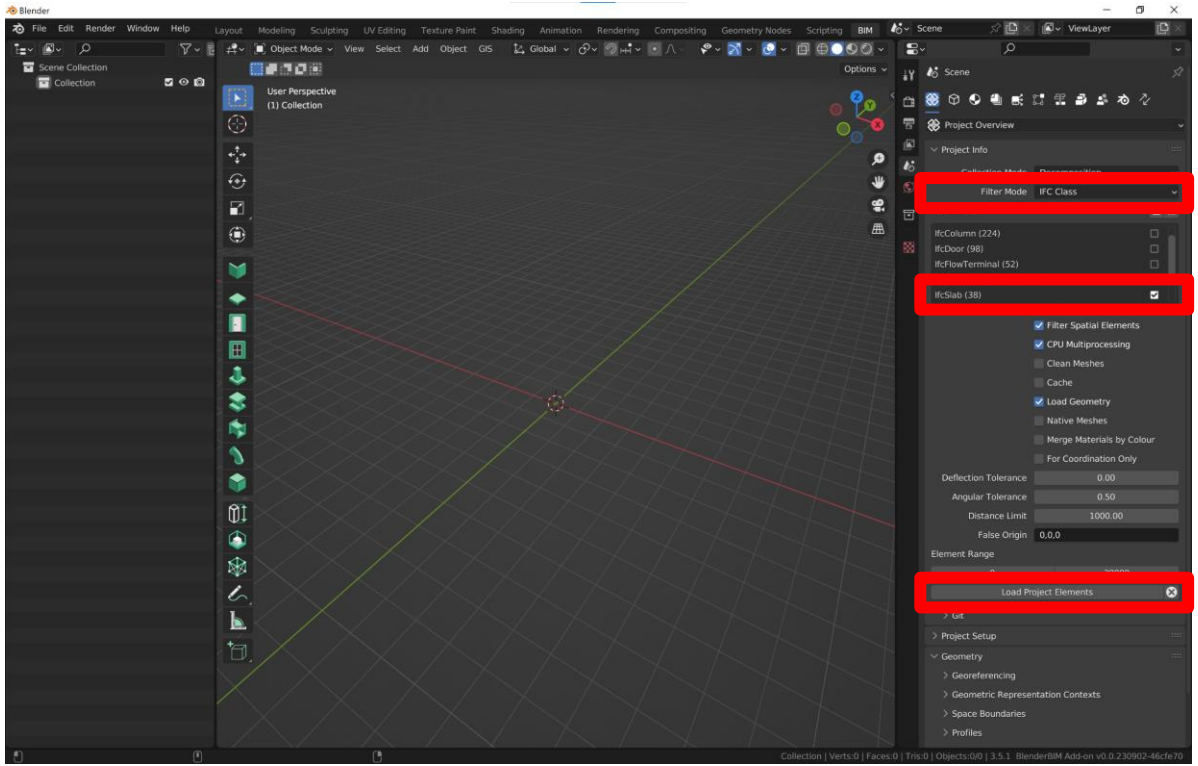


Open IFC partially



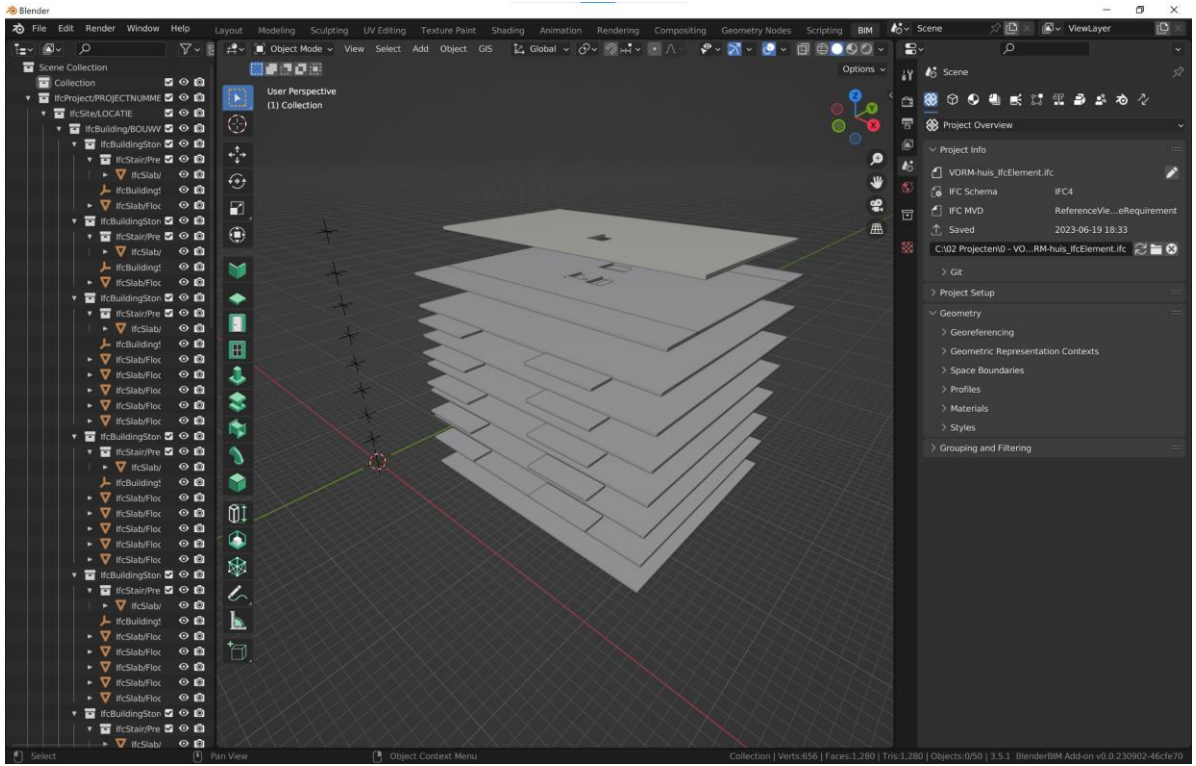
1: Select Advanced Mode

Open IFC partially



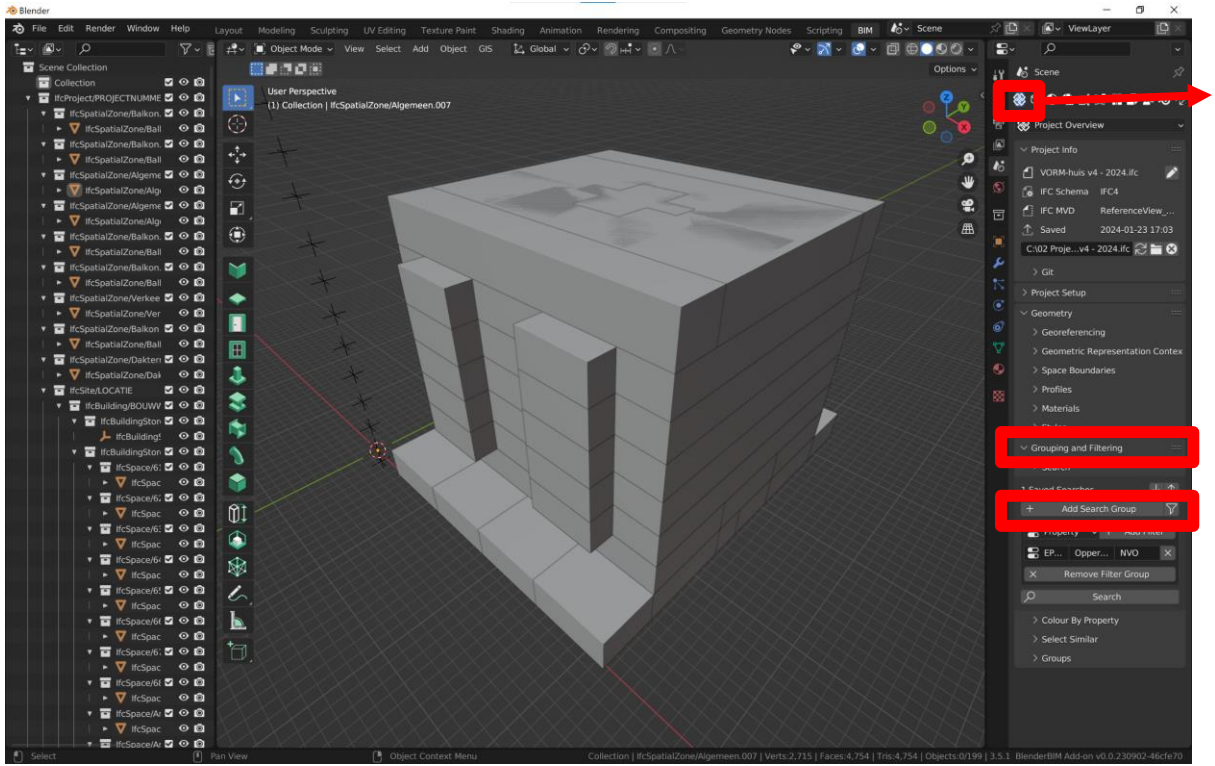
1: Select Filter
2: Select Elements
3: Load (open IFC)

Open IFC partially

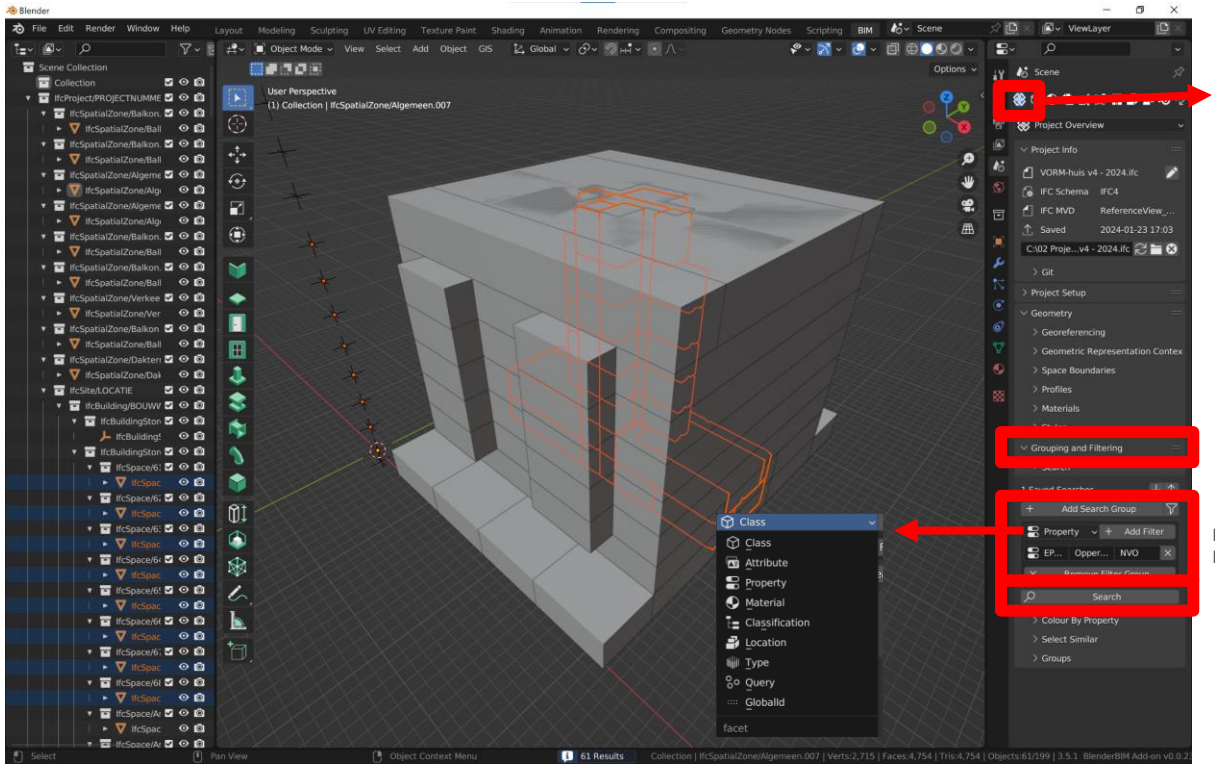


Only the IfcSlab is loaded.

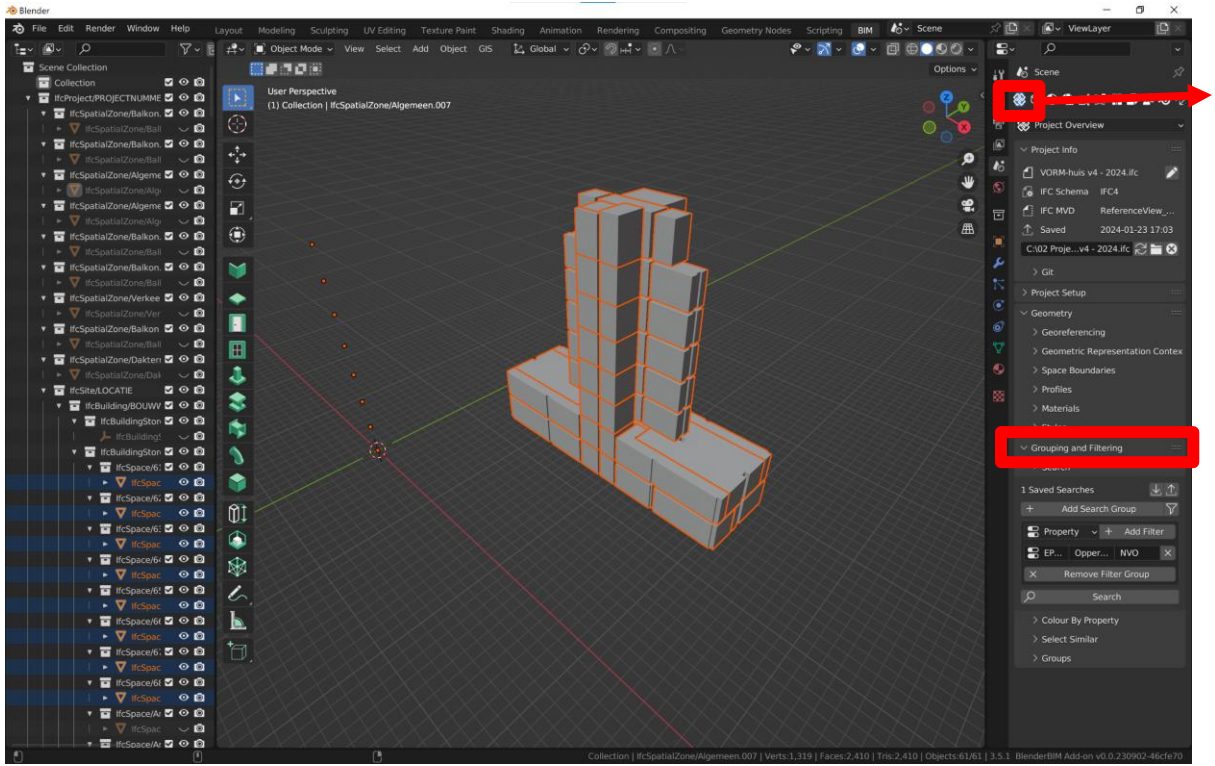
Grouping and filtering



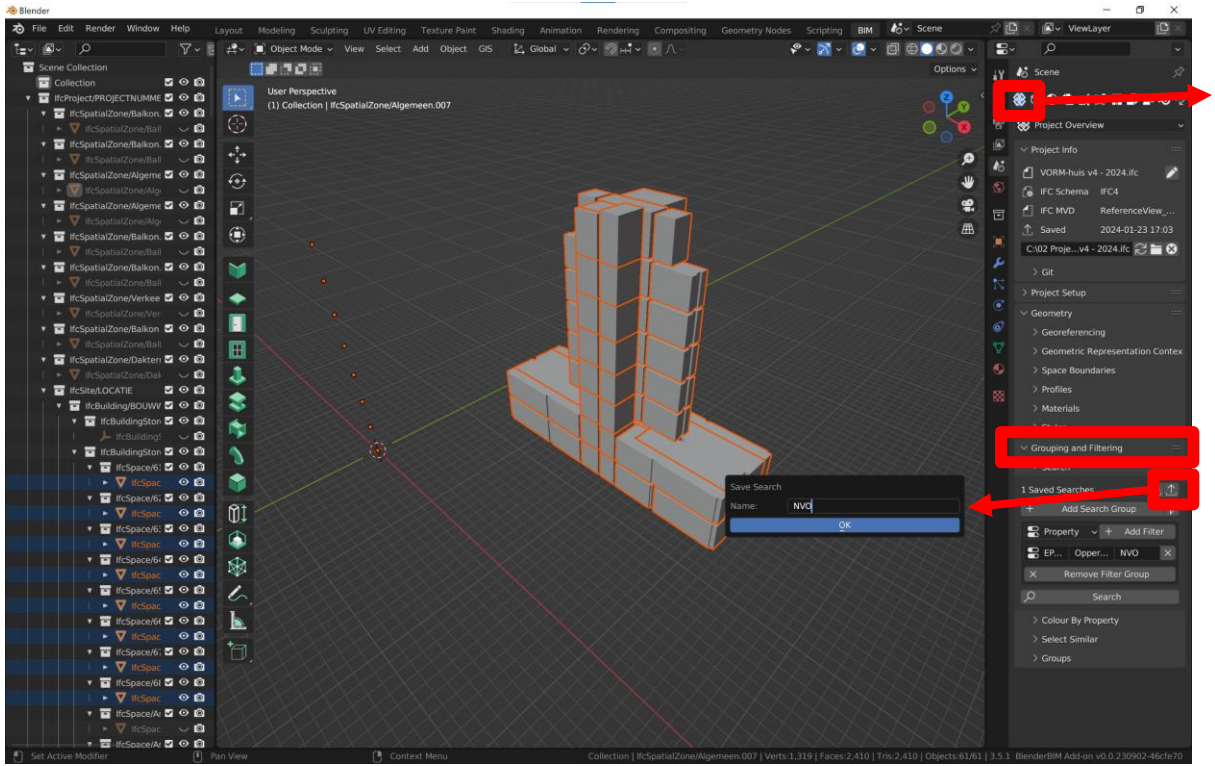
Grouping and filtering



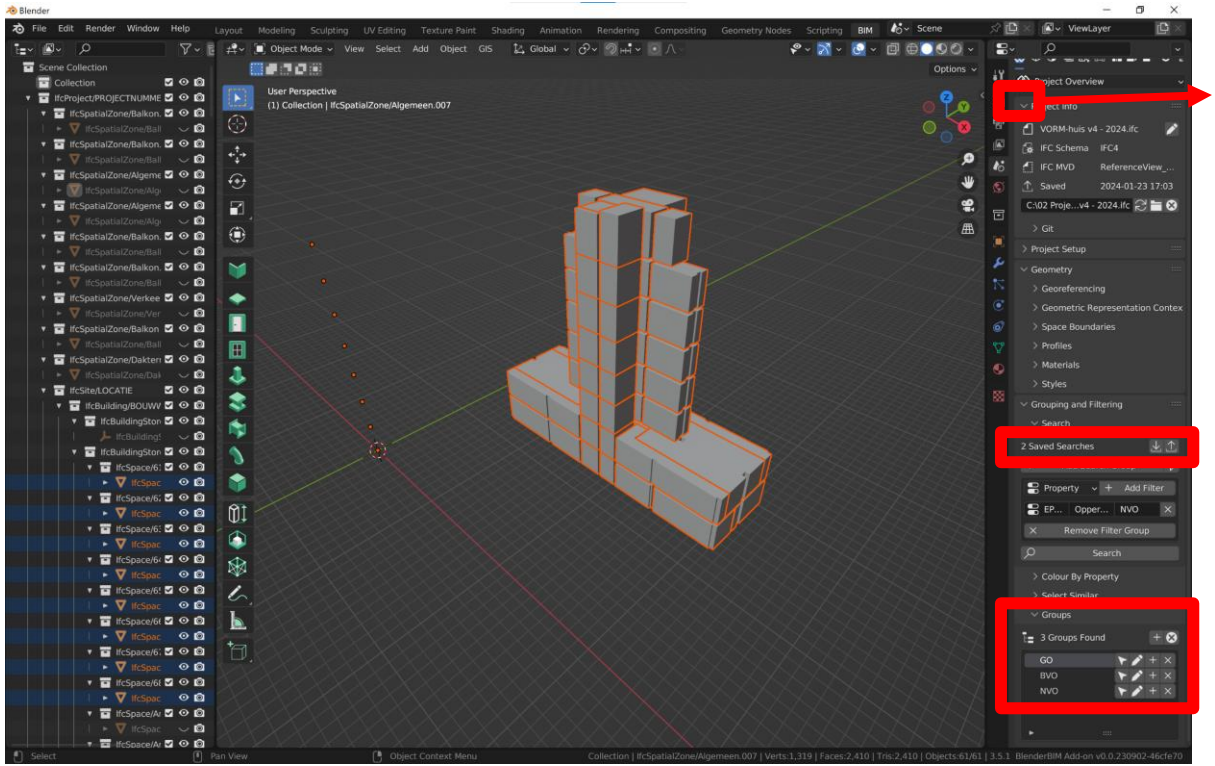
Grouping and filtering



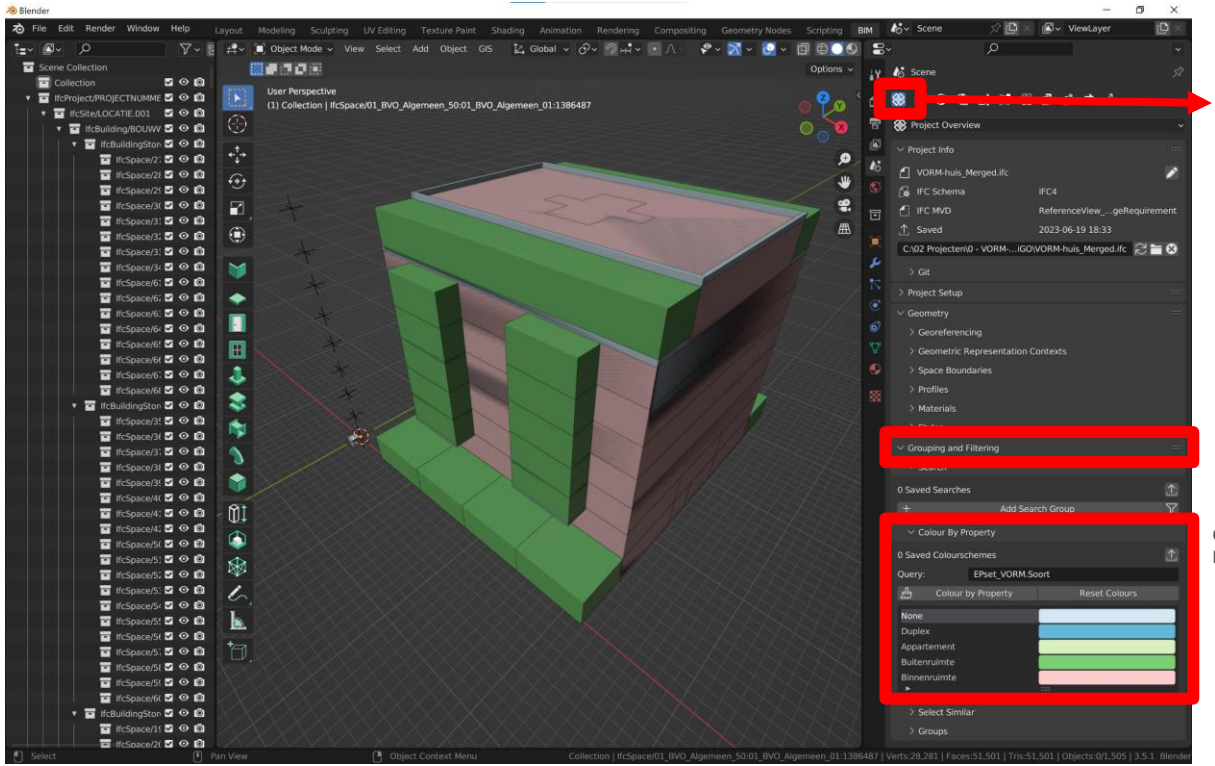
Grouping and filtering



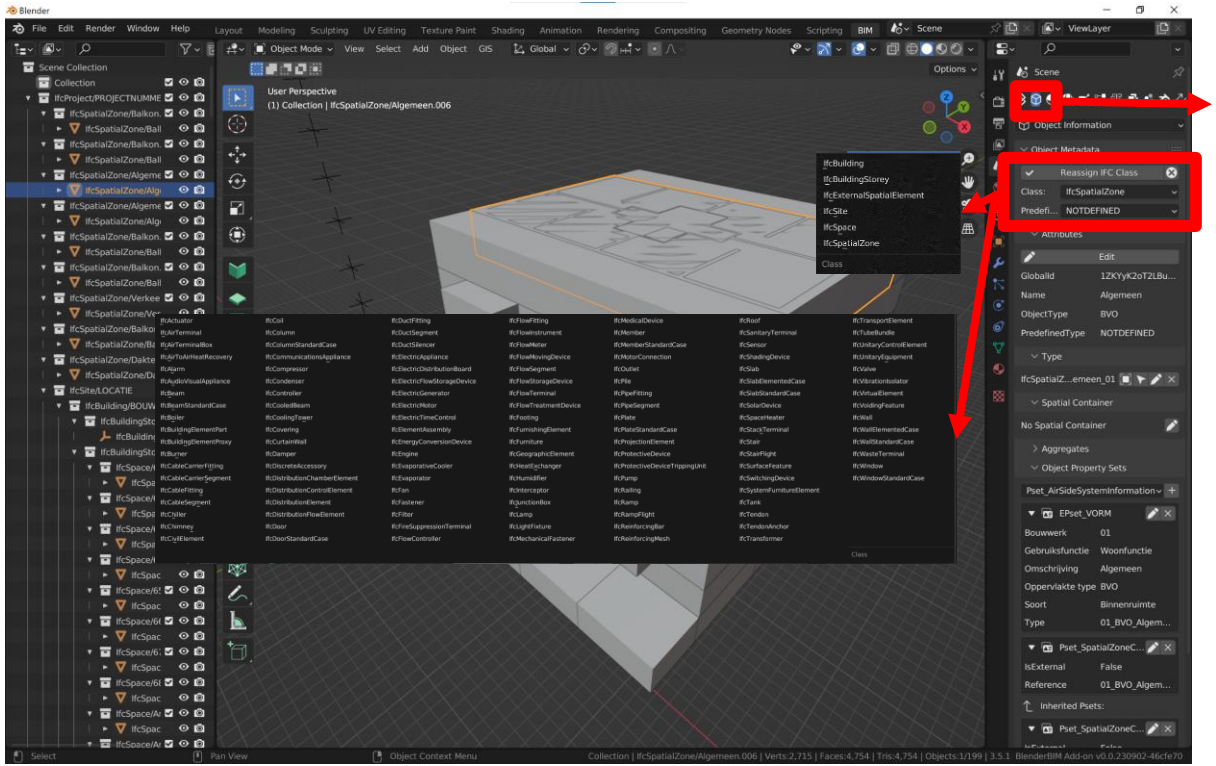
Grouping and filtering



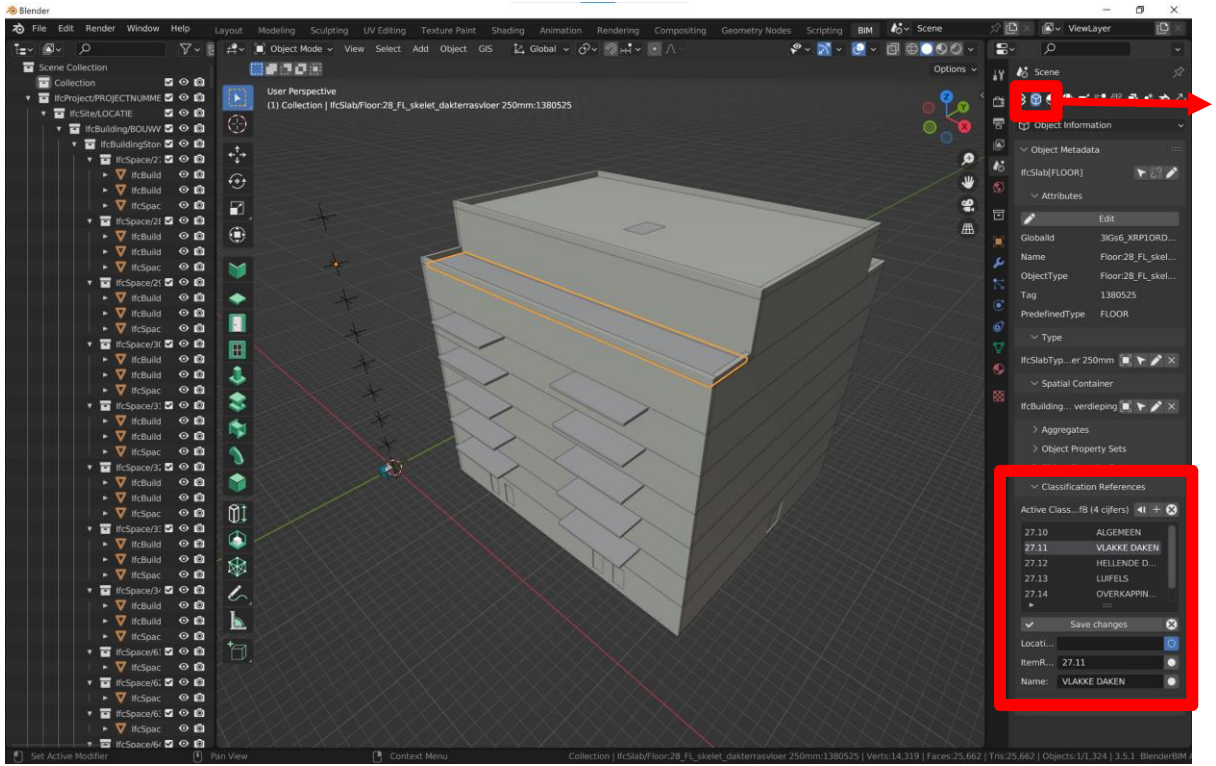
Grouping and filtering



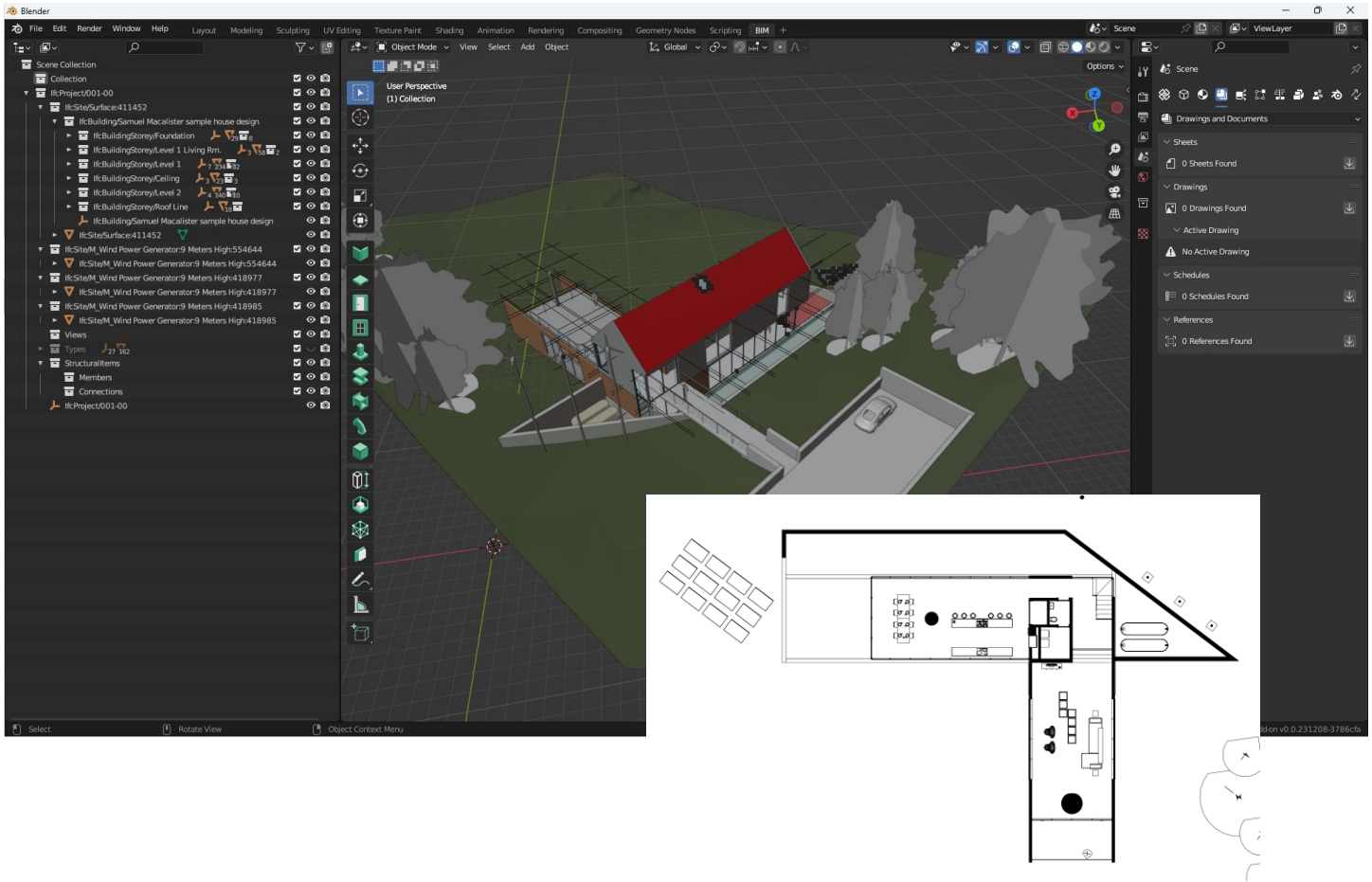
IFC Classes



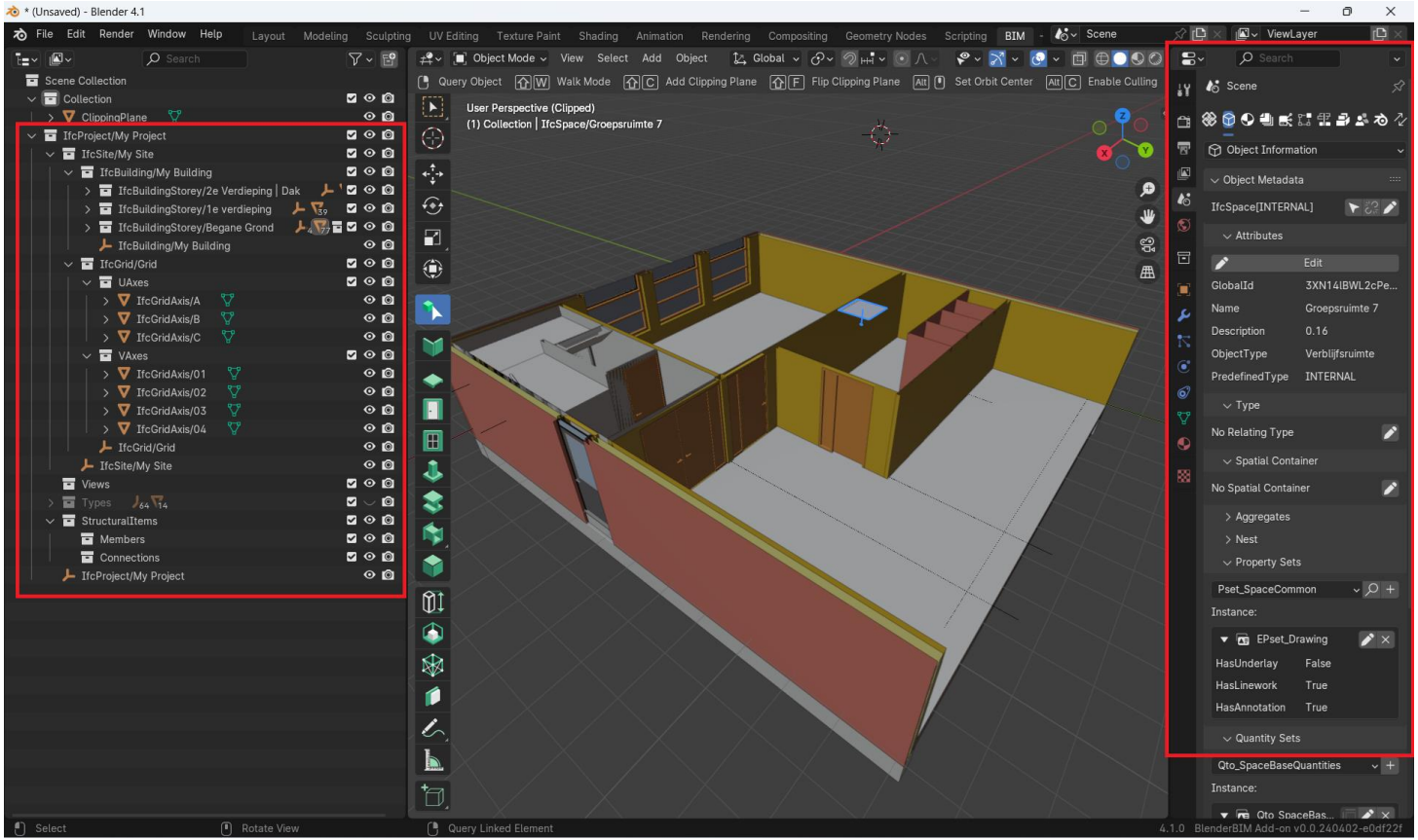
Classification



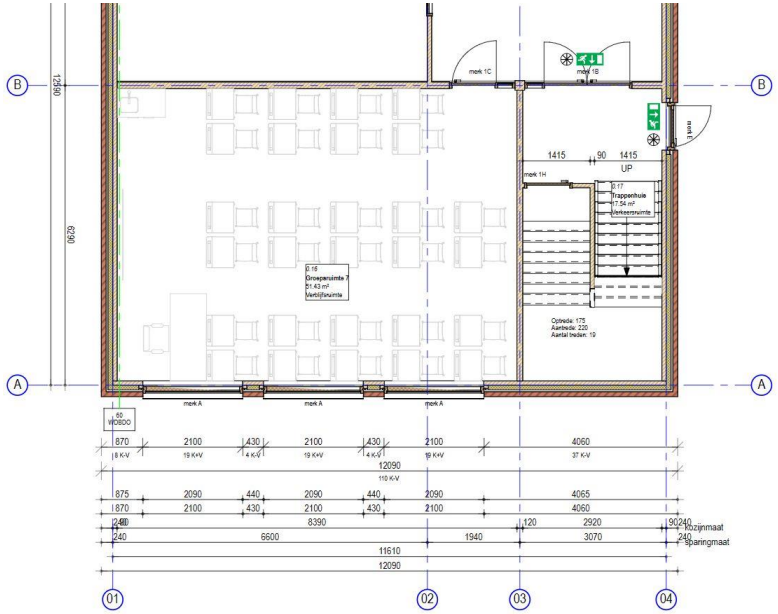
BlenderBIM examples

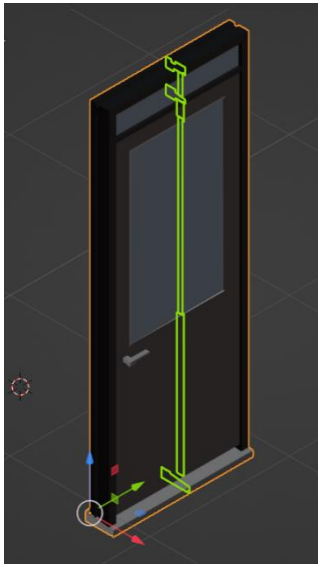


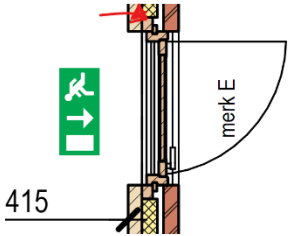
BlenderBIM examples

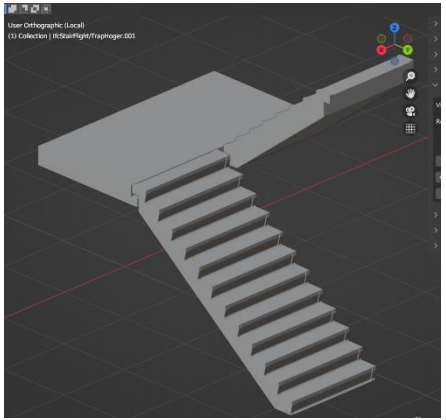


BlenderBIM examples

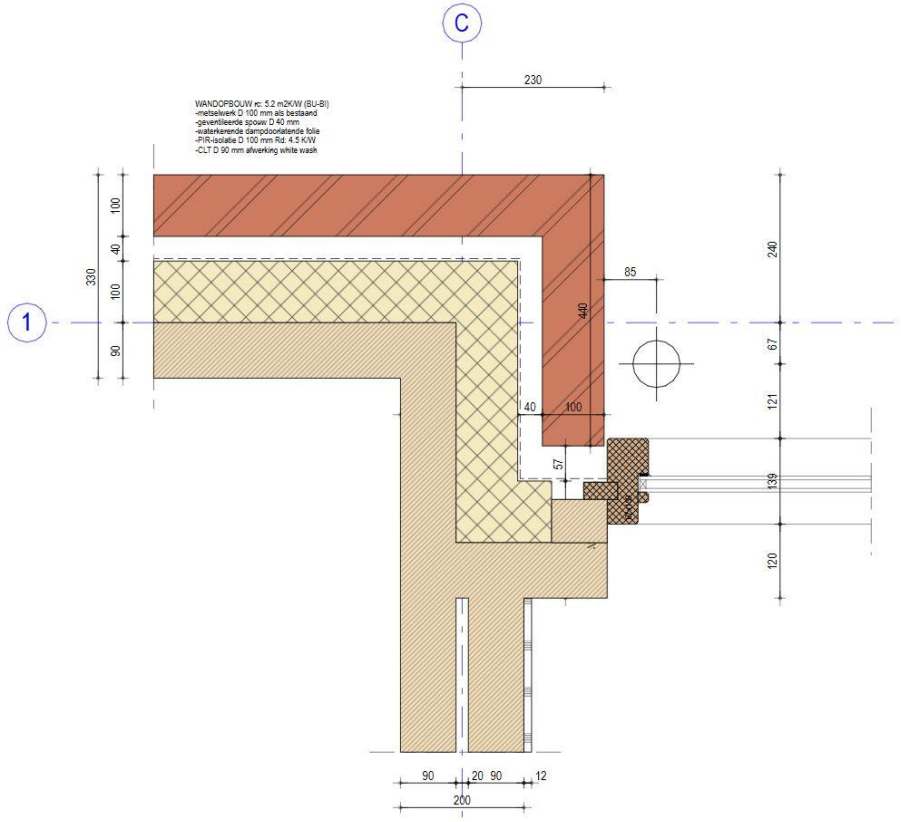




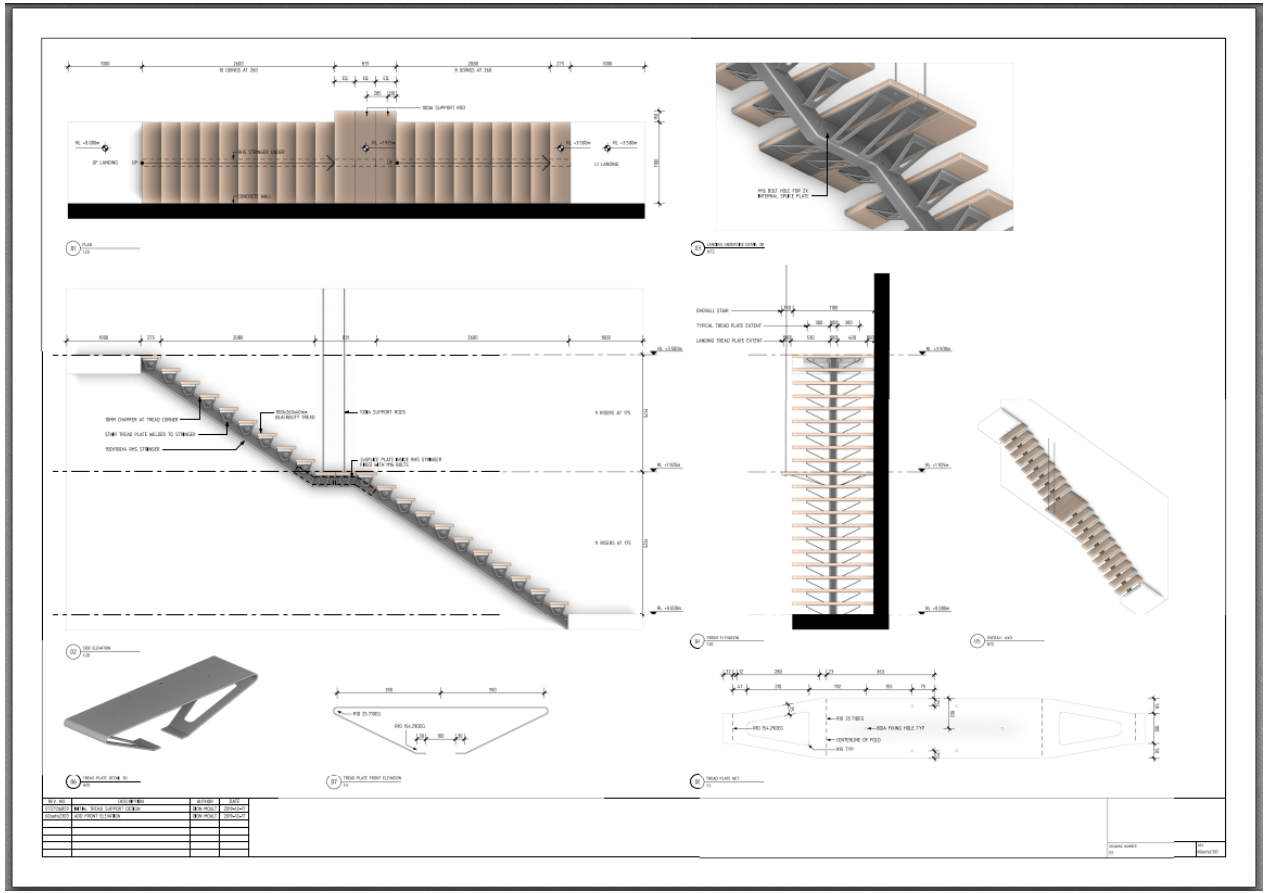




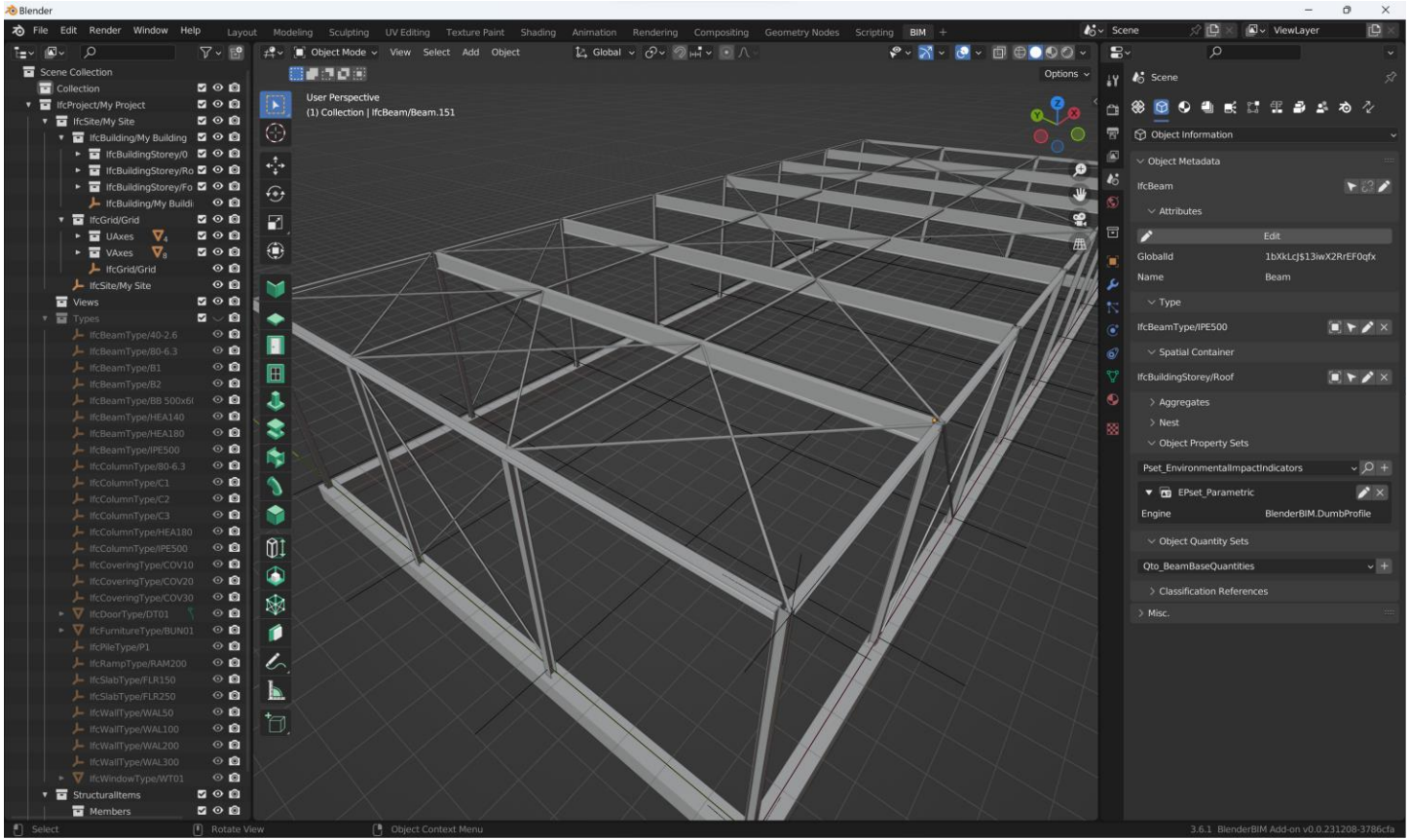
Examples


C
1
230
WANDOPBOUW rc: 5.2 m2K/W (BU-BI)
-metselwerk D 100 mm als bestaand
-geventileerde spouw D 40 mm
-waterkerende dampdoorlatende folie
-PIR-isolatie D 100 mm Rd: 4.5 K/W
-CLT D 90 mm afwerking white wash
330
100
40
100
90
85
440
240
67
121
139
120
40
100
57
90
20
90
12
200

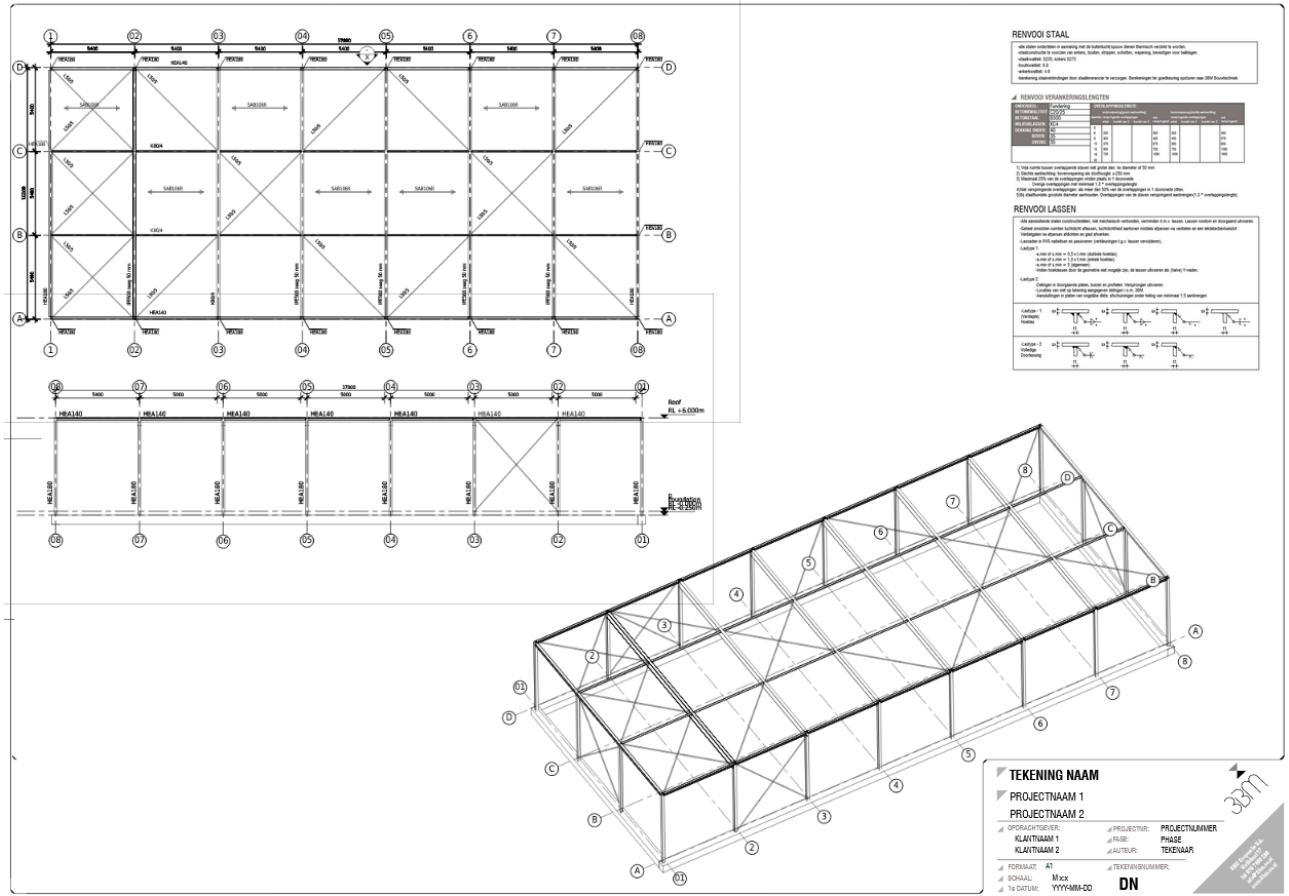
BlenderBIM examples



BlenderBIM examples



BlenderBIM examples



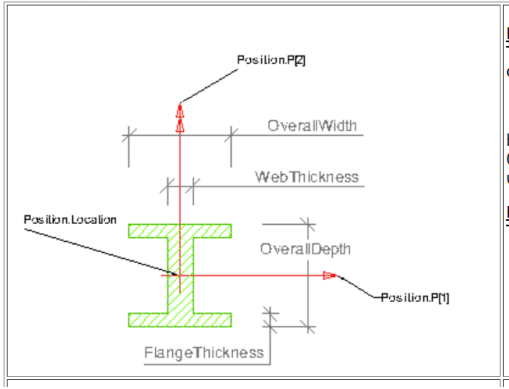
BlenderBIM examples

IfcIShapeProfileDef

Definition from buildingSMART: The *IfcIShapeProfileDef* defines a section profile that provides the defining parameters of a symmetrical 'I' section to be used by the swept surface geometry or the swept area solid. The I-shape profile has values for its overall depth, width and its web and flange thickness. Additionally a fillet radius may be given. It represents a I-section that is symmetrical about its major and minor axes; and that has both top and bottom flanges being equal and centred on the web.

HISTORY: New entity in IFC Release 2x.

Illustration:



Position
The parameterized profile defines its own position coordinate system. The underlying coordinate system is defined by the swept area solid that uses the profile definition. It is the xy plane of:

- *IfcSweptAreaSolid.Position*

by usi
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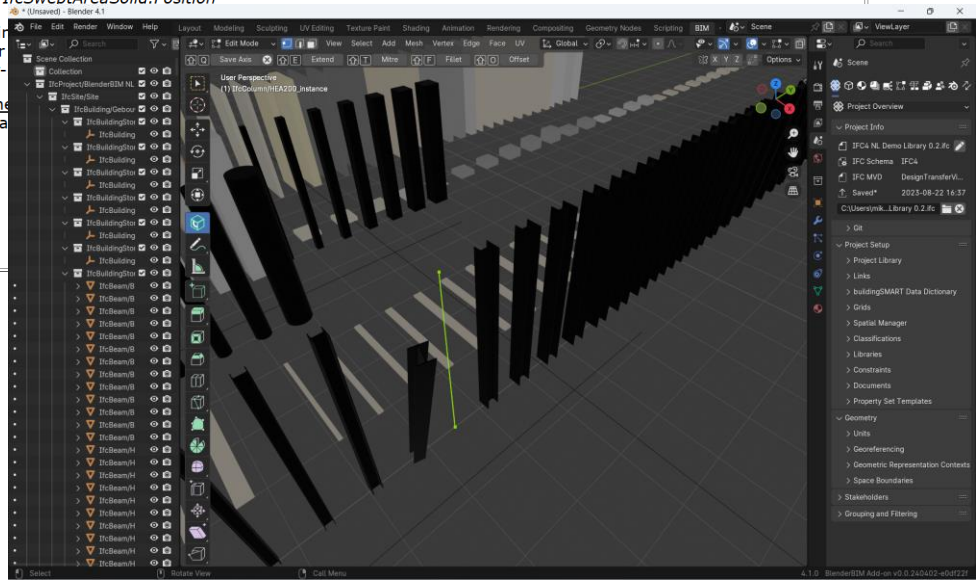
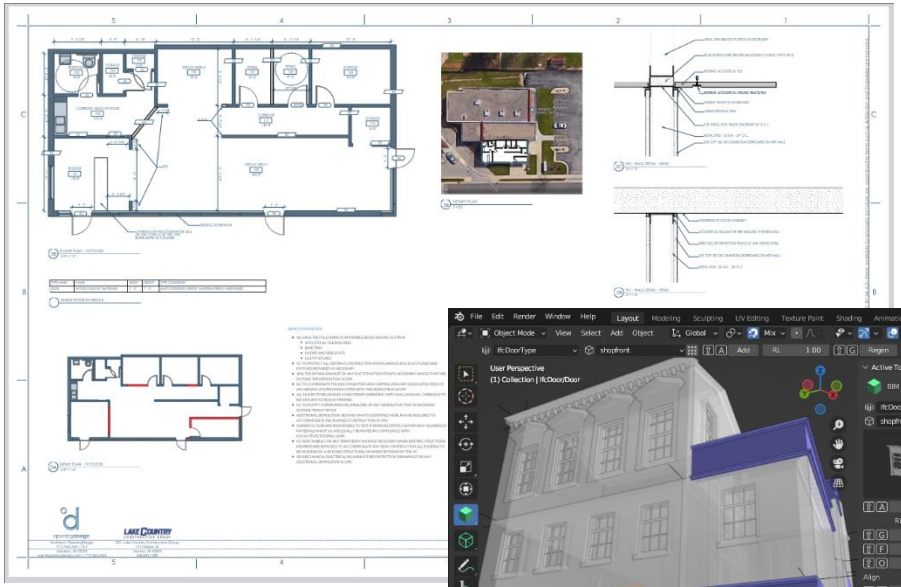
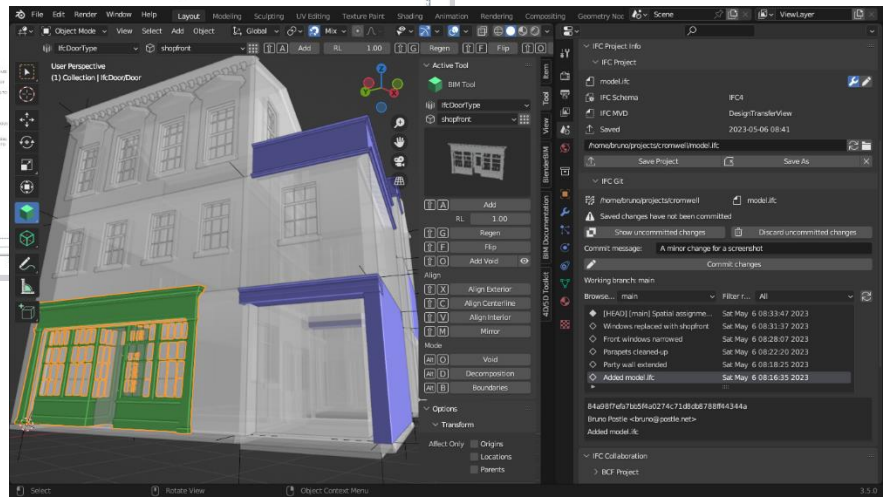
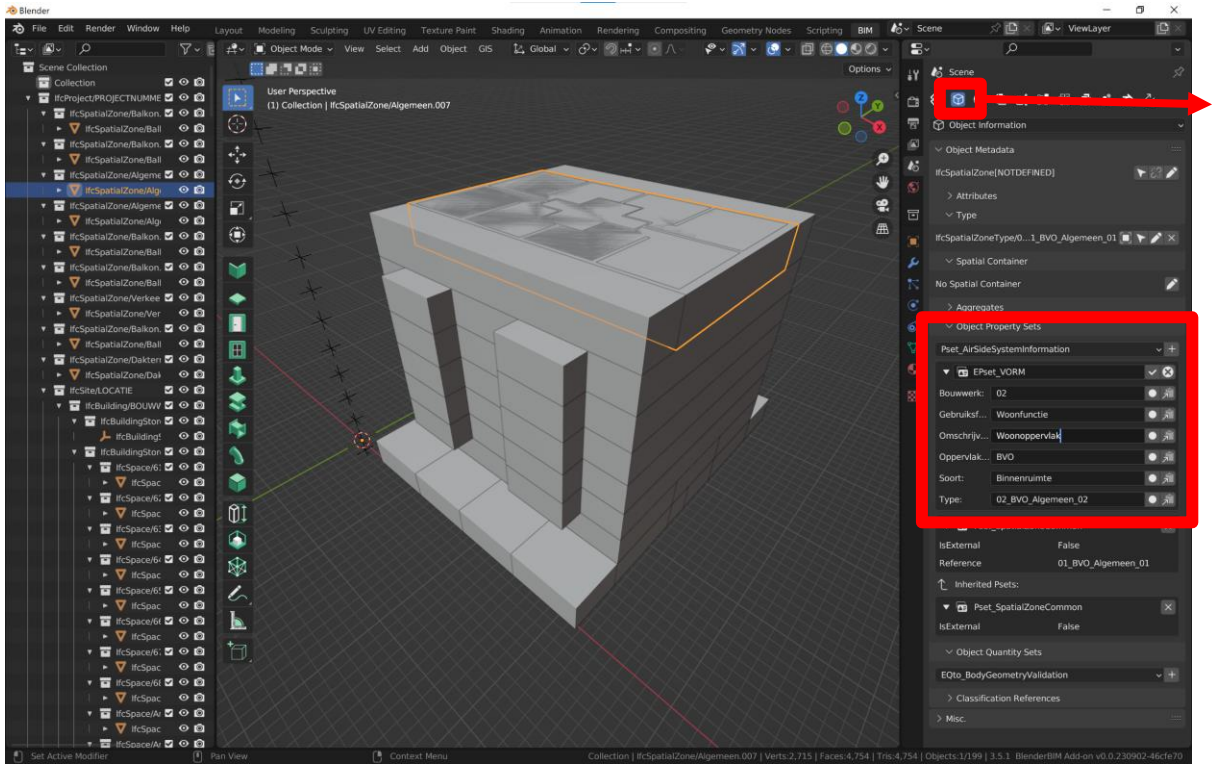


BlenderBIM examples



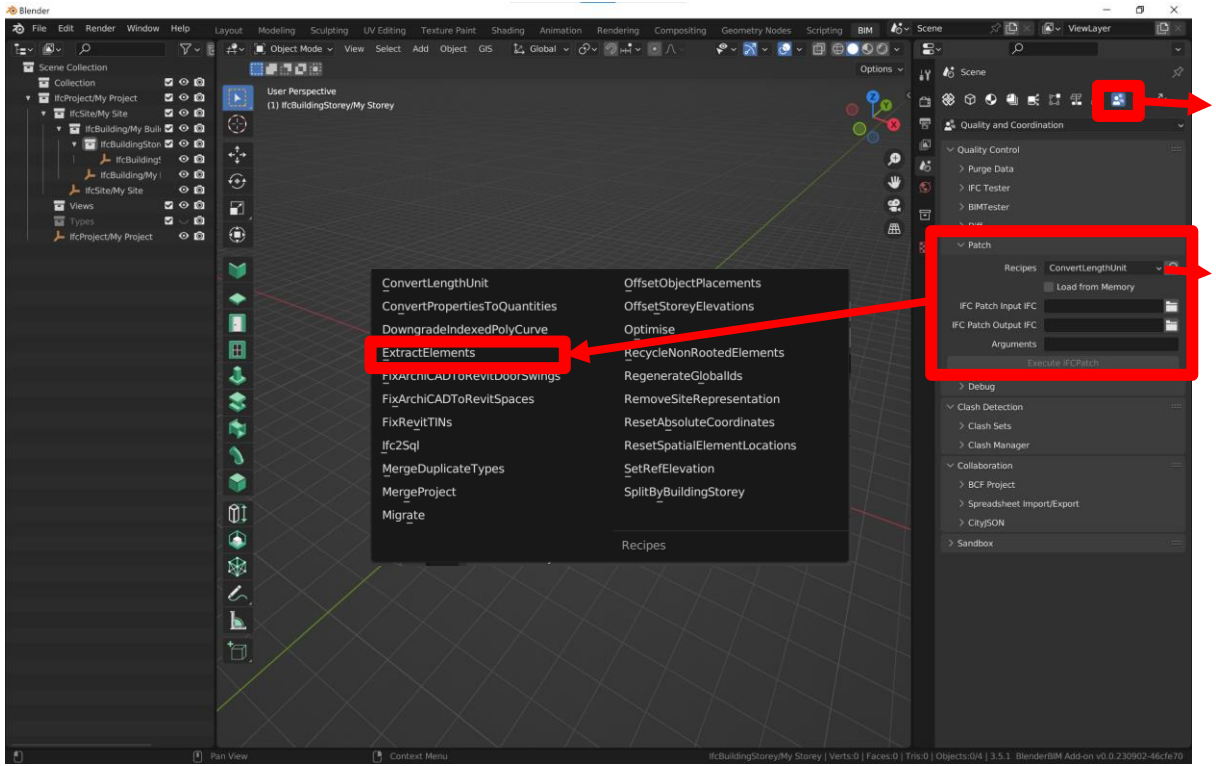


BlenderBIM Property Set in Ifc

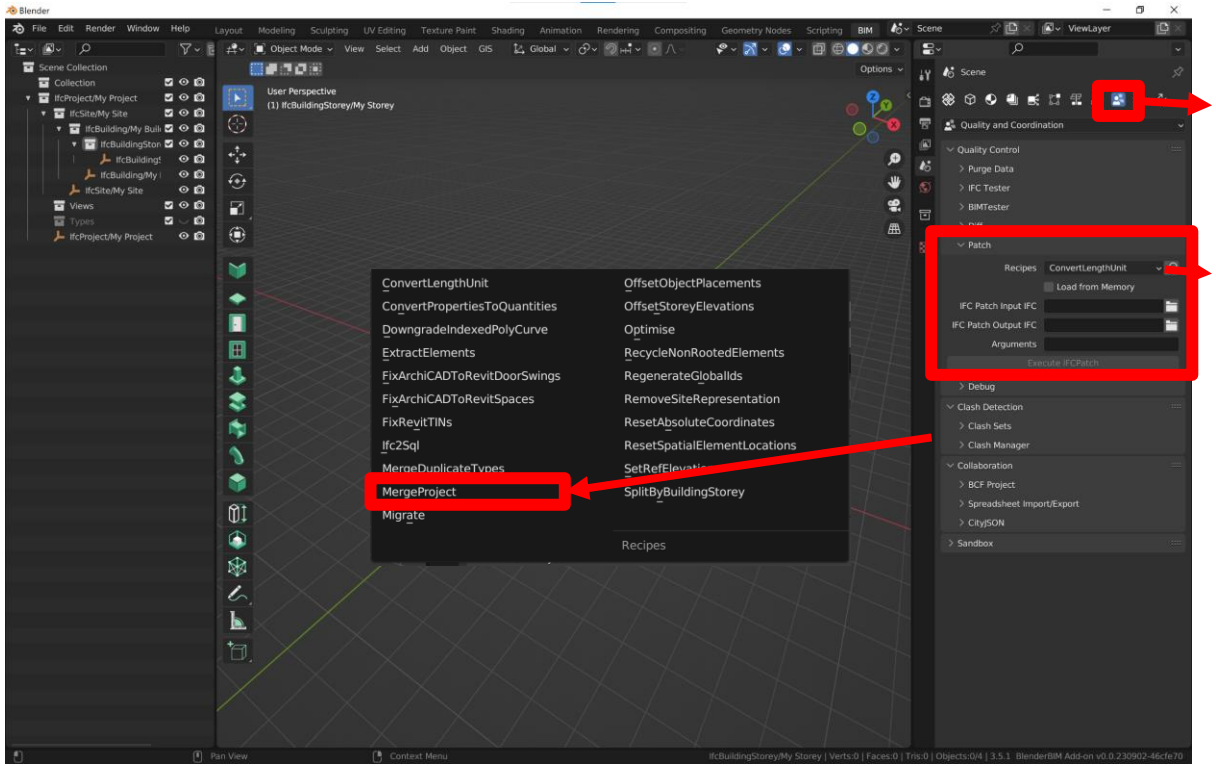


Thanks to Paul Strokap,VORM

Split Ifc


Quality and coördination
ConvertLengthUnit
ConvertPropertiesToQuantities
DowngradeIndexedPolyCurve
ExtractElements
FixArchiCADToRevitSpaces
FixRevitTINs
Ifc2Sql
MergeDuplicateTypes
MergeProject
Migrate
OffsetObjectPlacements
OffsetStoreyElevations
Optimise
RecycleNonRootedElements
RegenerateGlobalIds
RemoveSiteRepresentation
ResetAbsoluteCoordinates
ResetSpatialElementLocations
SetRefElevation
SplitByBuildingStorey
Recipes

Merge Ifc

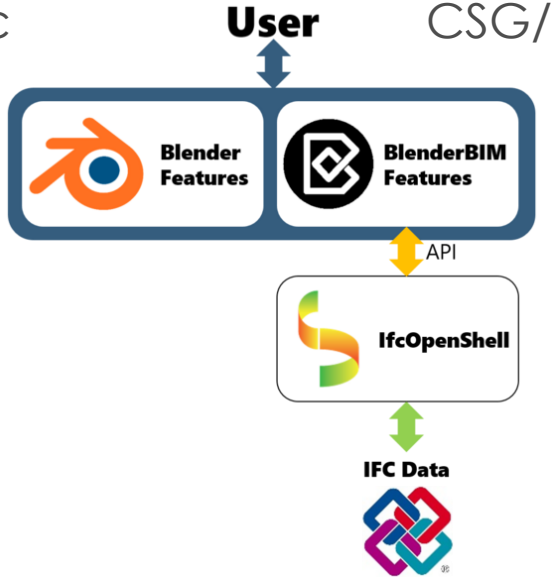

Quality and coördination
Choose recipe
ConvertLengthUnit
ConvertPropertiesToQuantities
DowngradeIndexedPolyCurve
ExtractElements
FixArchiCADToRevitDoorSwings
FixArchiCADToRevitSpaces
FixRevitTINs
Ifc2Sql
MergeDuplicateTypes
MergeProject
Migrate
OffsetObjectPlacements
OffsetStoreyElevations
Optimise
RecycleNonRootedElements
RegenerateGlobalIds
RemoveSiteRepresentation
ResetAbsoluteCoordinates
ResetSpatialElementLocations
SetRefElevation
SplitByBuildingStorey
Recipes

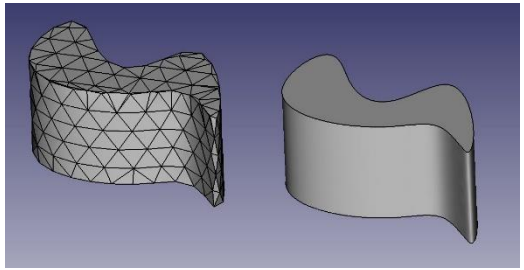
BlenderBIM concept

BLENDER **BLENDERBIM** **IfcOpenShell**

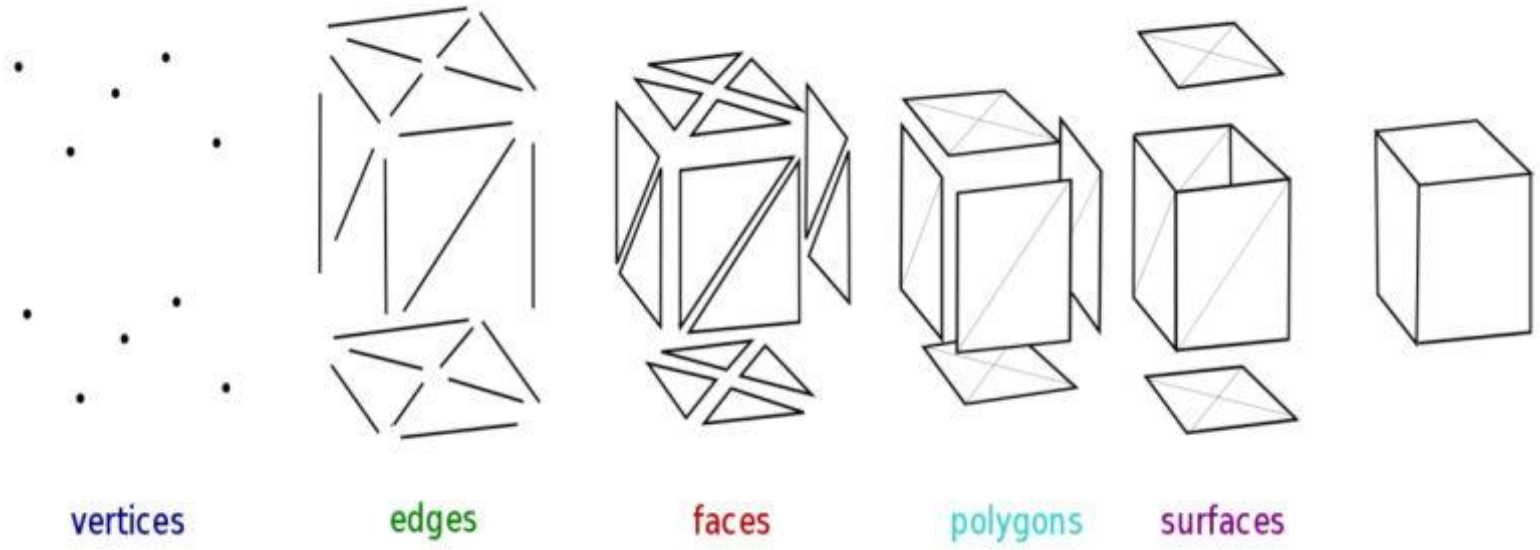
*.blend
Mesh,Nurbs
Bmesh etc

*.ifc
Mesh, Brep,
CSG/Boolean



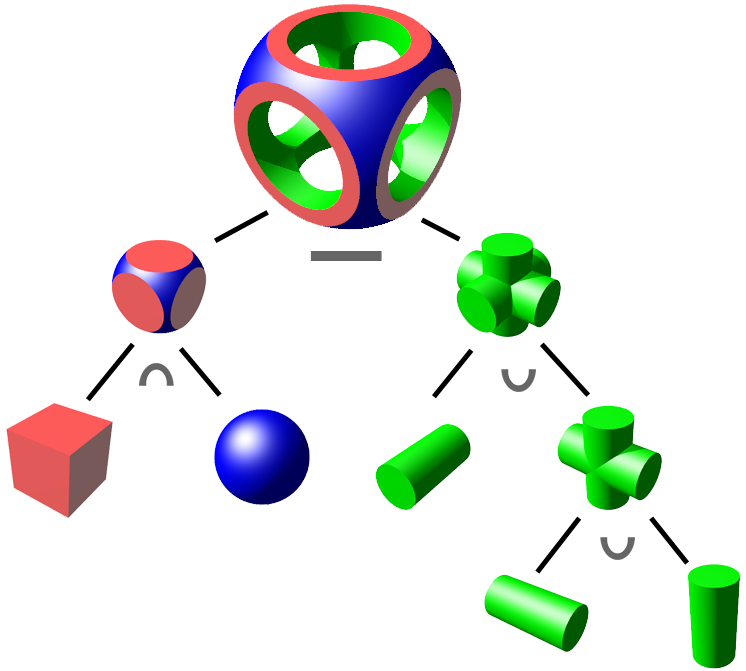


Brep

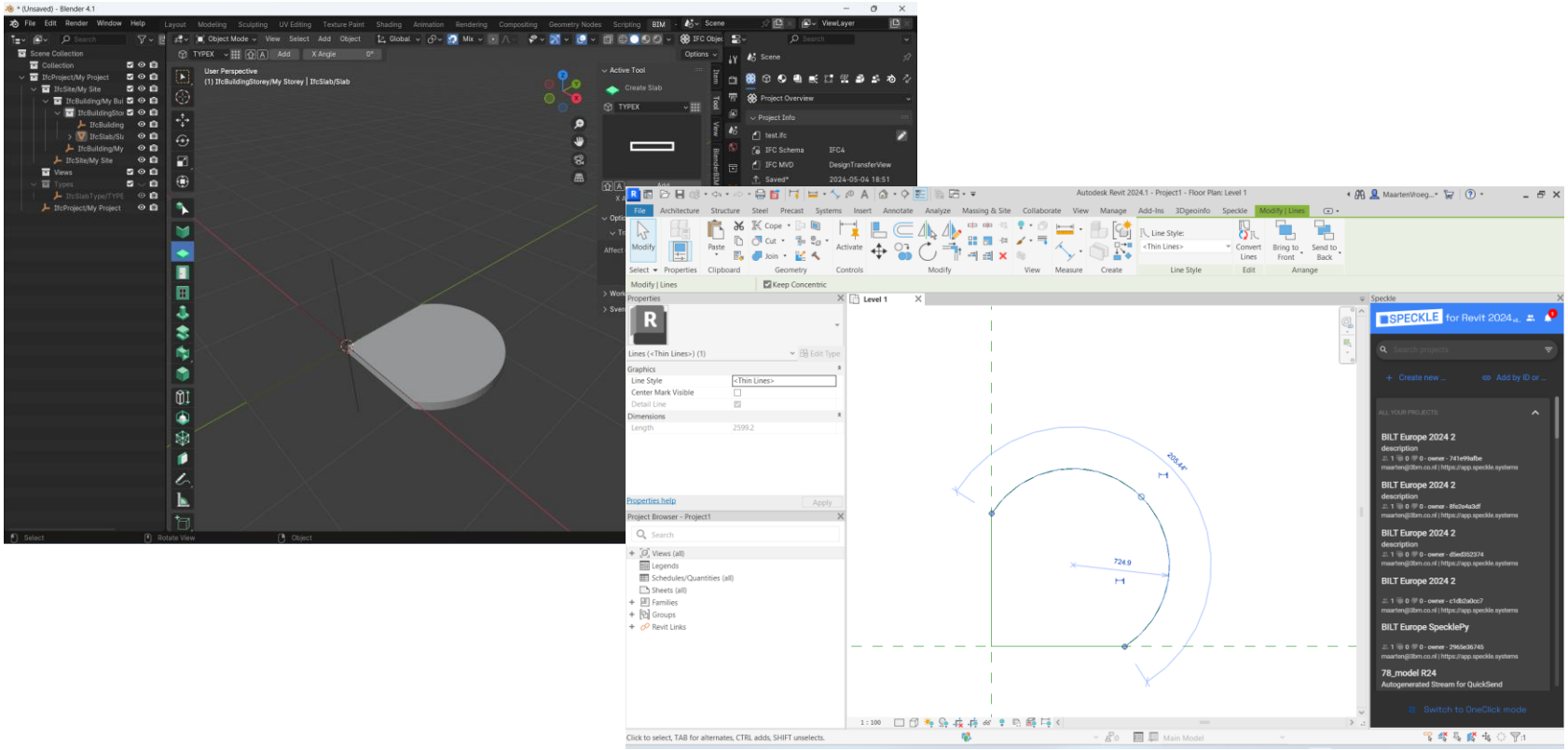


https://en.wikipedia.org/wiki/Boundary_representation

Constructive Solid Geometry /Boolean

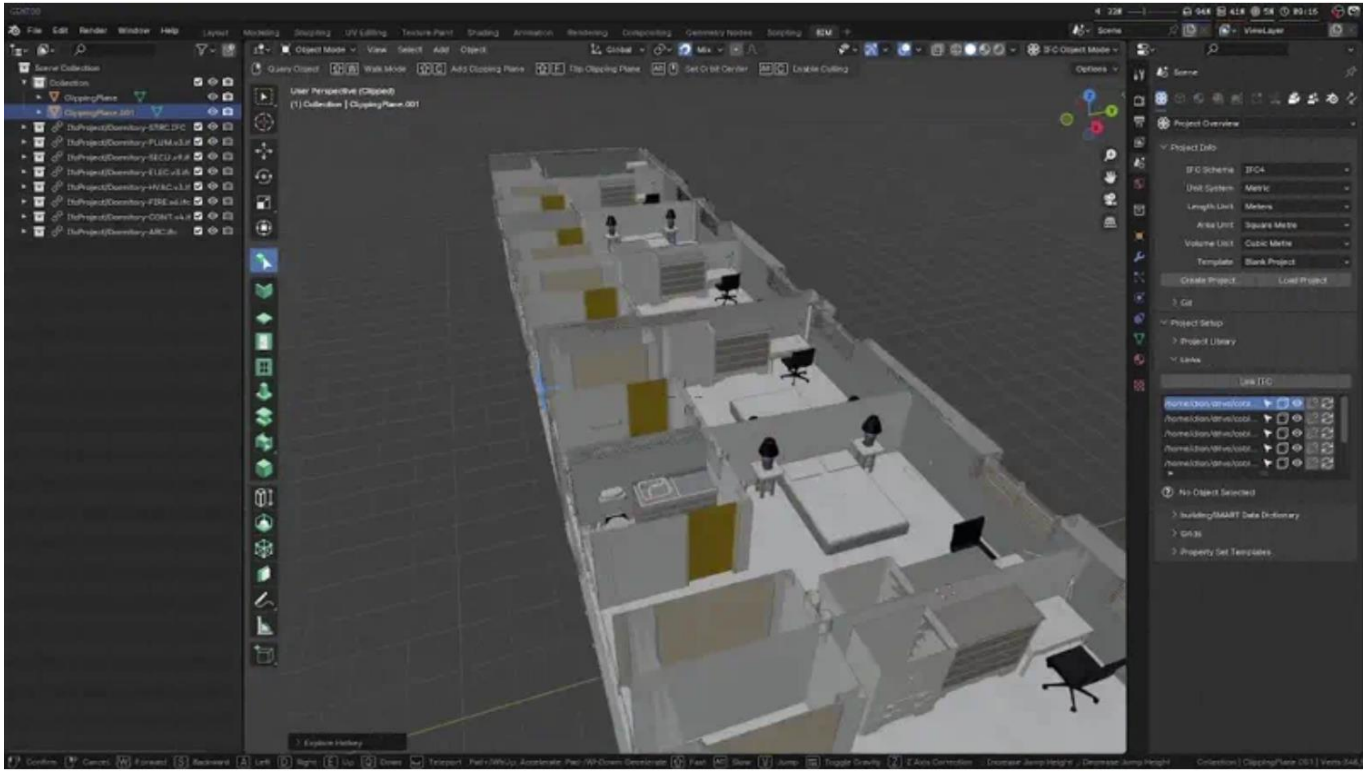


BlenderBIM Solids

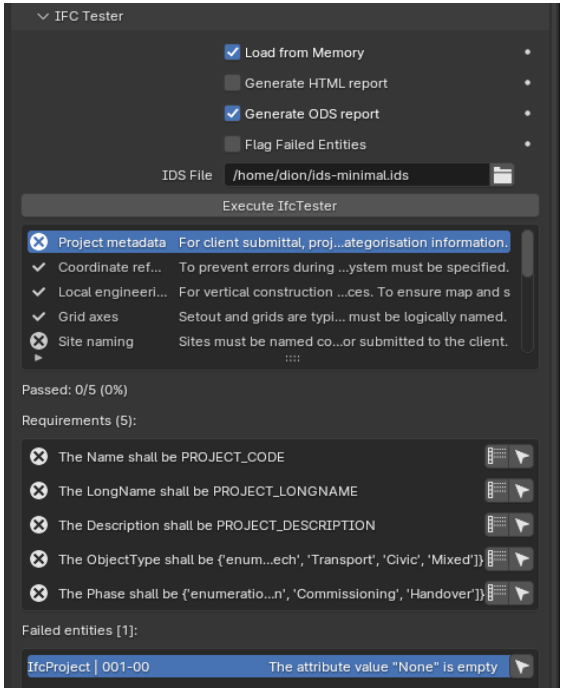


BlenderBIM: Link IFC & clipping

BlenderBIM Add-on v0.0.240402 has been released with 830 new features and fixes

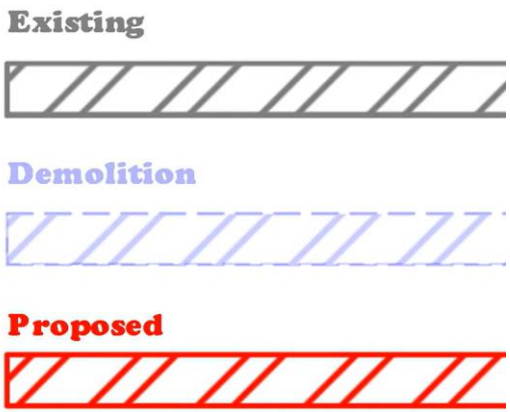


BlenderBIM: IfcTester: IDS v0.9.7



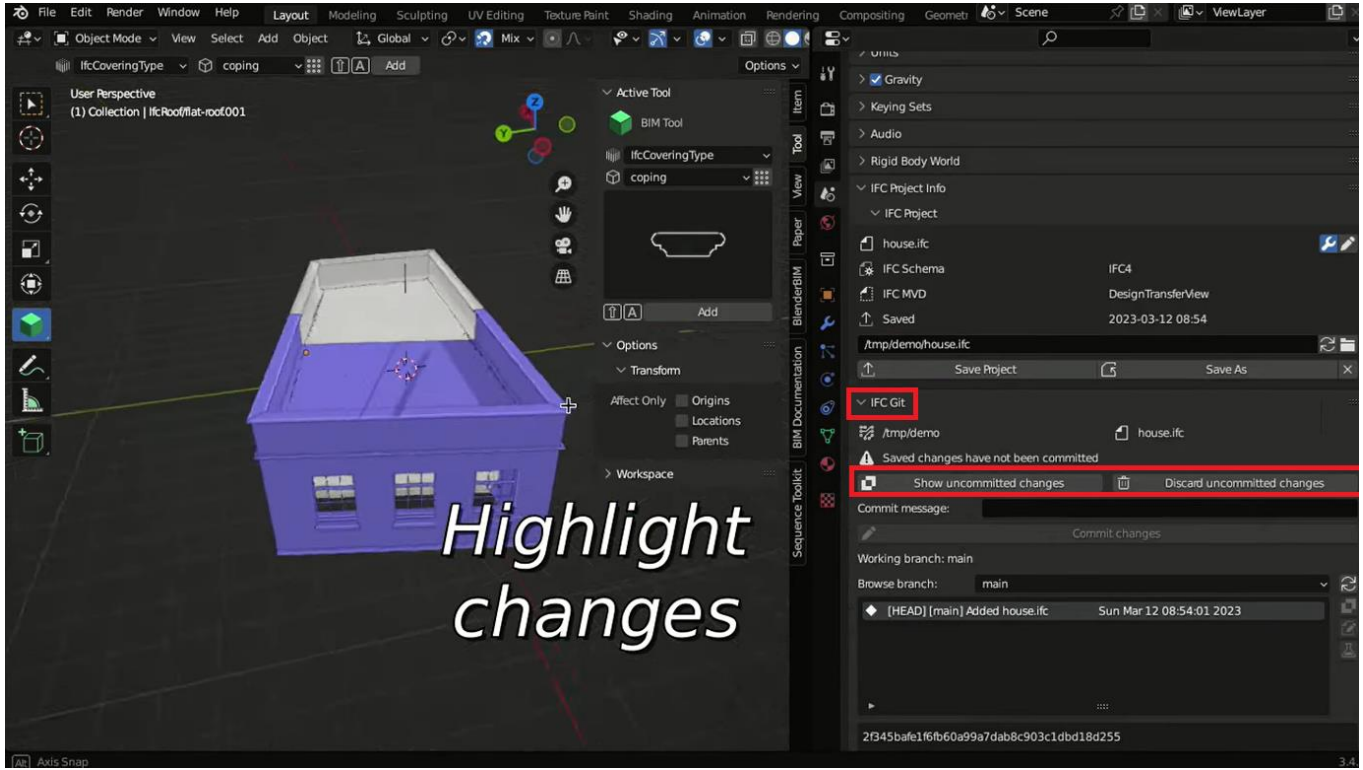
https://community.osarch.org/discussion/26/blenderbim-add-on-new-release/p12

Phasing



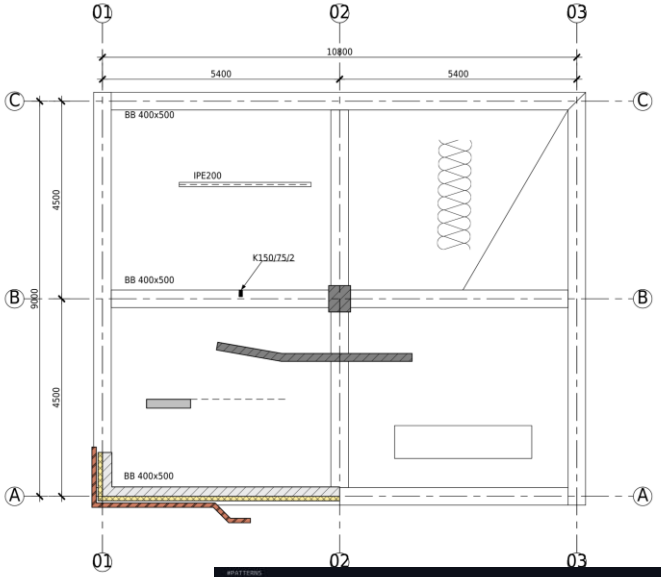
https://www.youtube.com/watch?v=_hADRIo-ma4

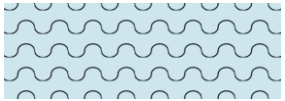
IfcGIT



Work together using IFC Git(experimental)

Examples





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SUFFIX_PATTERNS = '</svg>'

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    NEN47_1_metselwerk_baksteen_background\n' \
    <line x1="1" y1="0" x2="1" y2="3" style="stroke:black; stroke-width:0.15" />\n' \
    <line x1="1.5" y1="0" x2="1.5" y2="3" style="stroke:black; stroke-width:0.15" />\n' \
'</pattern>\n' \

NEN47_2_speciale_steenachtige_materialen = '<pattern id="NEN47_2_speciale_steenachtige_materialen" width="2" height="2" patternTransform="rotate(45 0 0) scale(1 1)" patternUnits="userSpaceOnUse">\n' \
    NEN47_2_speciale_steenachtige_materialen_background\n' \
    <line x1="0" y1="0" x2="2" y2="0" style="stroke:black; stroke-width:0.2" />\n' \
    <line x1="0" y1="0" x2="0" y2="2" style="stroke:black; stroke-width:0.2" />\n' \
'</pattern>\n' \

NEN47_3_metselwerk_niet_gebakken_kunststeen = '<pattern id="NEN47_3_metselwerk_niet_gebakken_kunststeen" width="1.5" height="1.5" patternTransform="rotate(45 0 0) scale(1 1)" patternUnits="userSpaceOnUse">\n' \
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NEN47_4_niet_dragende_lichte_scheidingswanden = '<pattern id="NEN47_4_niet_dragende_lichte_scheidingswanden" width="6" height="3" patternTransform="rotate(0 0 0) scale(1 1)" patternUnits="userSpaceOnUse">\n' \
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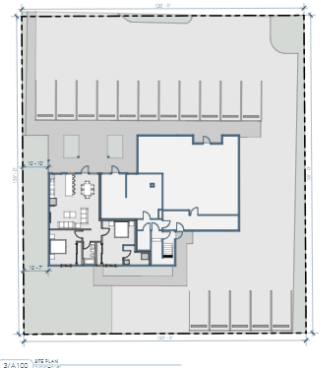
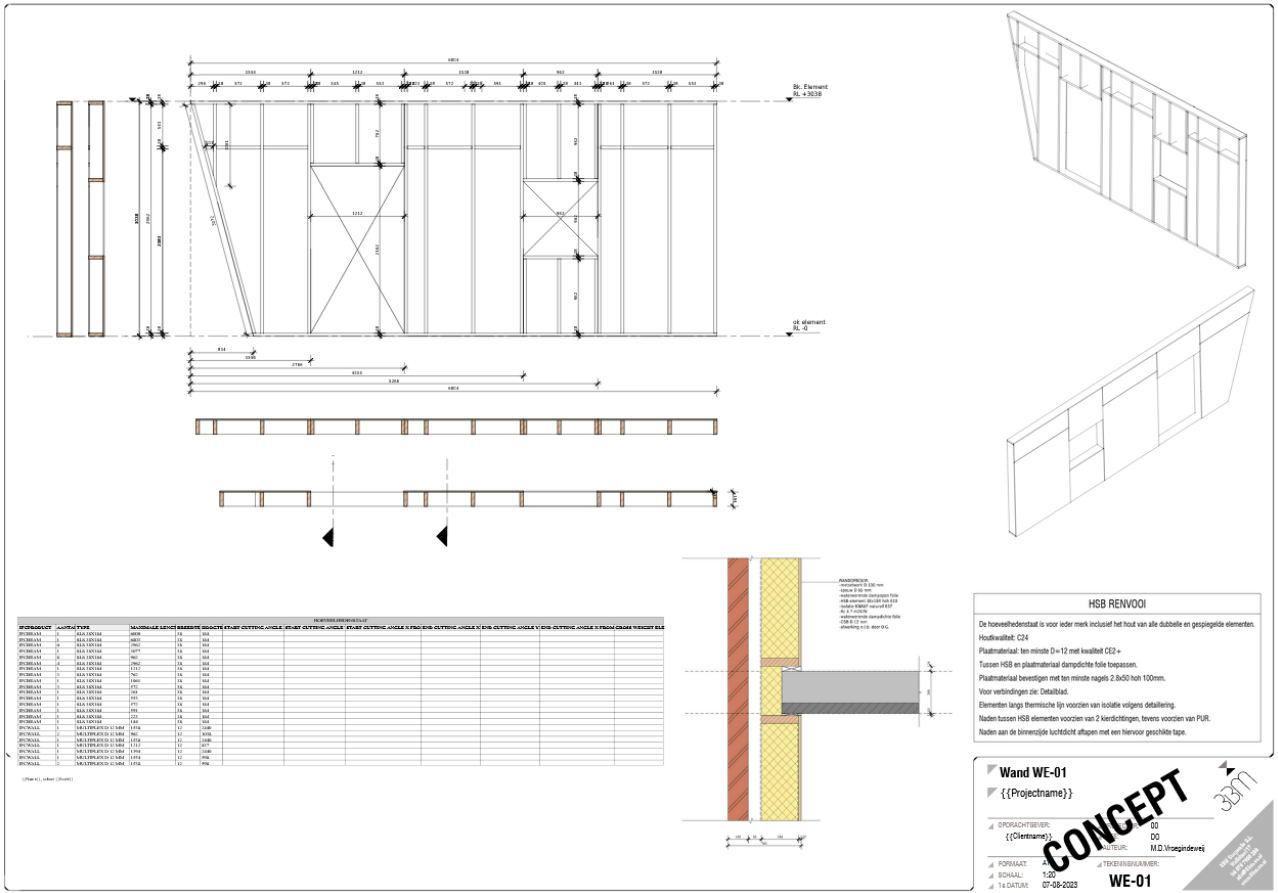
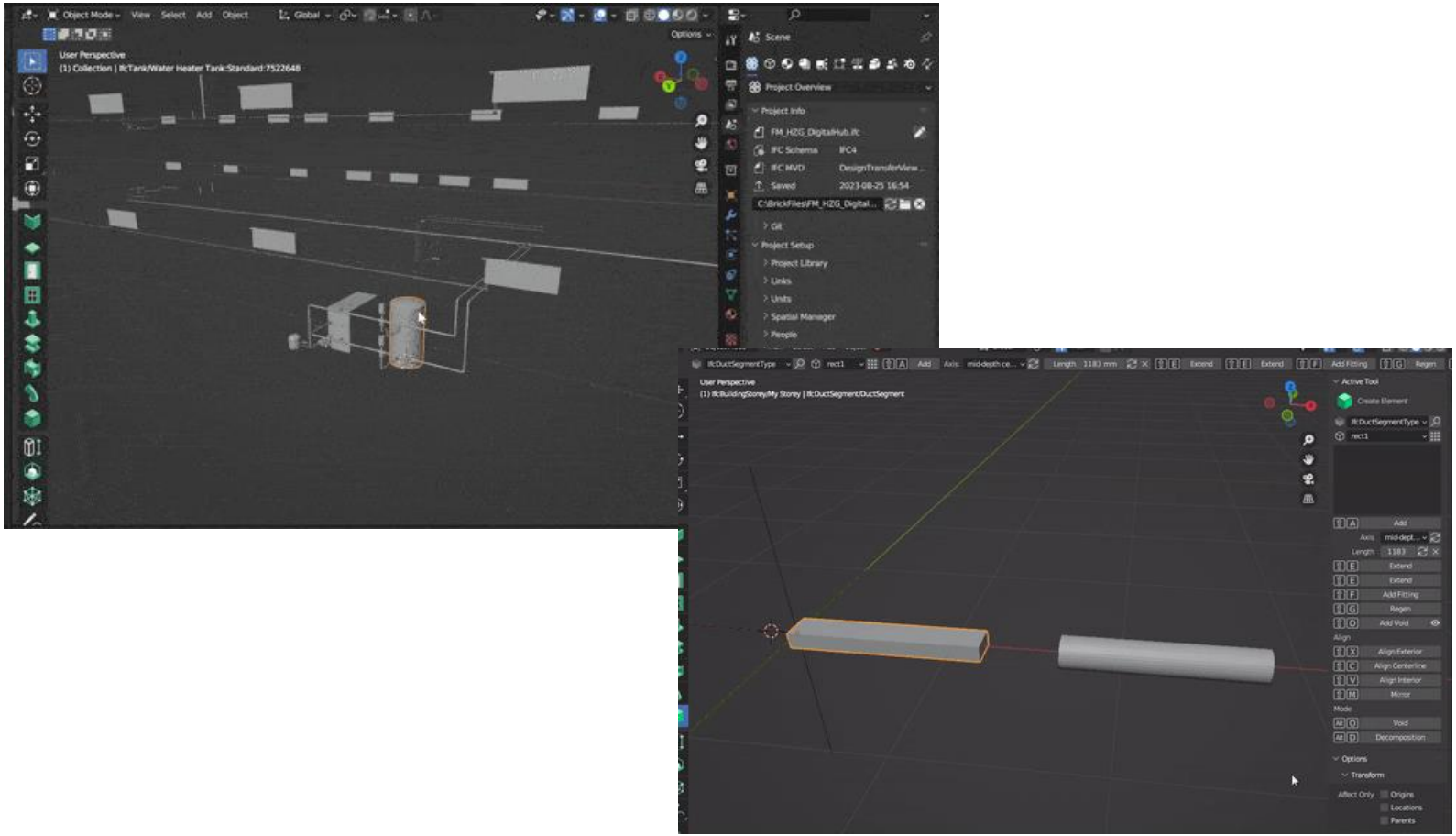


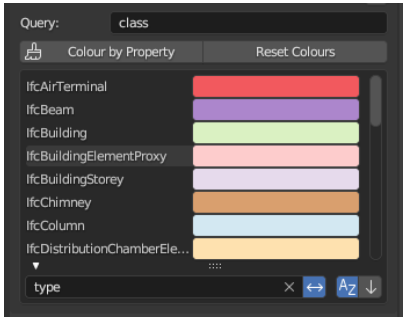
Examples

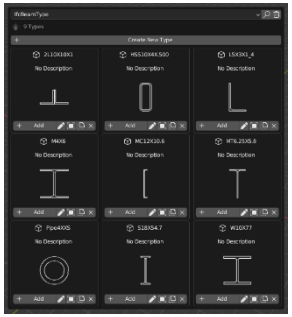

Bk. Element
RL +3638
ok element
RL 0
HSB RENVOOI
De hoeveelheidenstaat is voor ieder merk inclusief het hout van alle dubbele en gespiegelde elementen.
Houtkwaliteit: C24
Plaatmateriaal: ten minste D=12 met kwaliteit CE2+
Tussen HSB en plaatmateriaal dampdichte folie toepassen.
Plaatmateriaal bevestigen met ten minste nagels 2,8x50 hoh 100mm.
Voor verbindingen zie: Detailblad.
Elementen langs thermische lijn voorzien van isolatie volgens detailtering.
Naden tussen HSB elementen voorzien van 2 kierdichtingen, tevens voorzien van PUR.
Naden aan de binnenzijde luchtdicht aftapen met een hiervoor geschikte tape.
Wand WE-01
{{Projectname}}
CONCEPT
OPDRACHTGEVER:
{{Clientname}}
AUTEUR:
M.D.Vroegindeweij
FORMAAT:
A3
SCHAAL:
1:20
TEKENINGNUMMER:
WE-01
DATUM:
07-08-2023

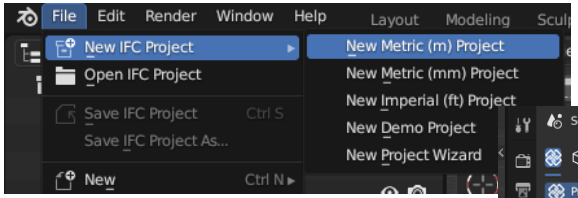
Features: MEP

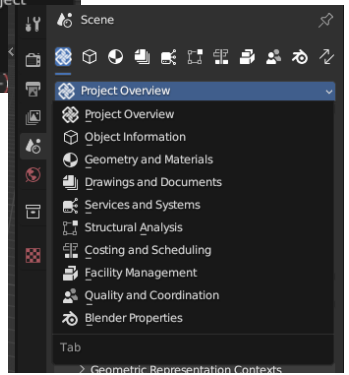


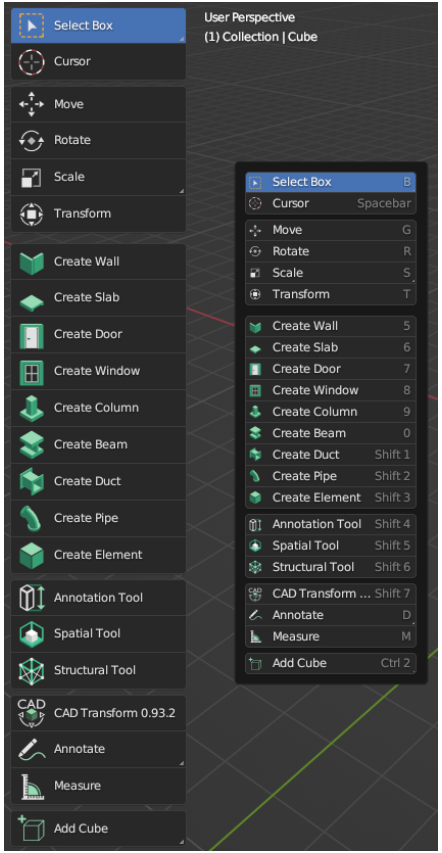
Features


Query:
class
Colour by Property
Reset Colours
IfcAirTerminal
IfcBeam
IfcBuilding
IfcBuildingElementProxy
IfcBuildingStorey
IfcChimney
IfcColumn
IfcDistributionChamberEle...
type

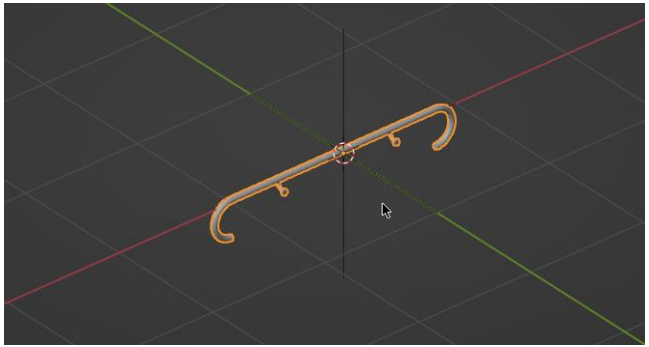


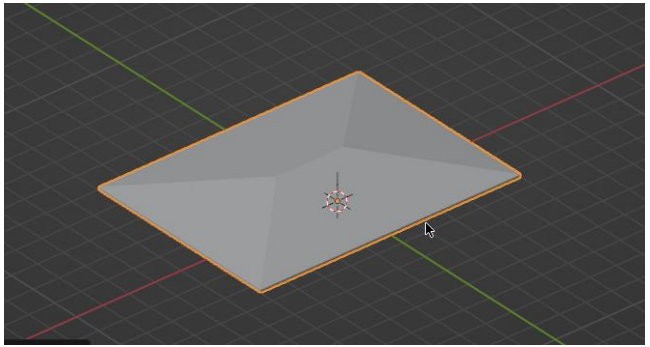

File
Edit
Render
Window
Help
Layout
Modeling
New IFC Project
Open IFC Project
Save IFC Project
Ctrl S
Save IFC Project As...
New
Ctrl N
New Metric (m) Project
New Metric (mm) Project
New Imperial (ft) Project
New Demo Project
New Project Wizard

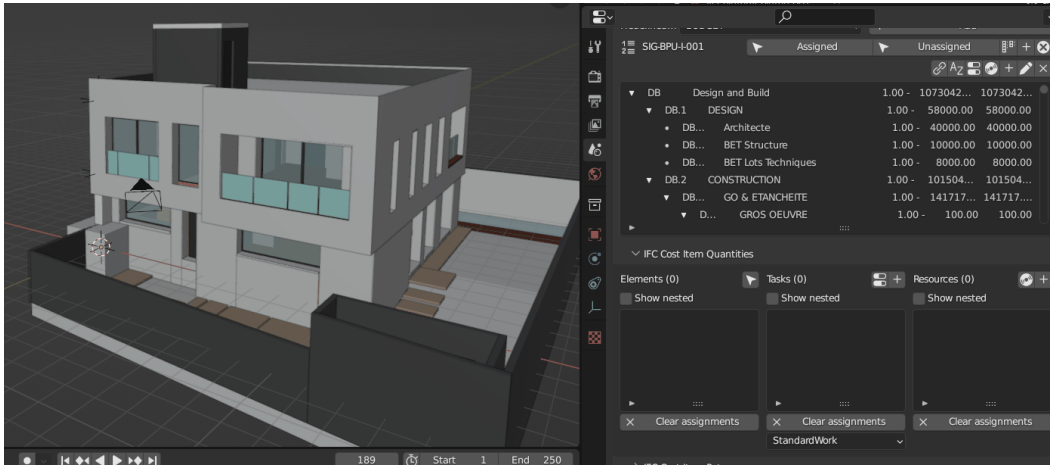

Scene
Project Overview
Project Overview
Object Information
Geometry and Materials
Drawings and Documents
Services and Systems
Structural Analysis
Costing and Scheduling
Facility Management
Quality and Coordination
Blender Properties
Tab
Geometric Representation Contexts


Select Box
Cursor
Move
Rotate
Scale
Transform
Create Wall
Create Slab
Create Door
Create Window
Create Column
Create Beam
Create Duct
Create Pipe
Create Element
Annotation Tool
Spatial Tool
Structural Tool
CAD Transform 0.93.2
Annotate
Measure
Add Cube
User Perspective
(1) Collection | Cube
Select Box B
Cursor Spacebar
Move G
Rotate R
Scale S
Transform T
Create Wall 5
Create Slab 6
Create Door 7
Create Window 8
Create Column 9
Create Beam 0
Create Duct Shift 1
Create Pipe Shift 2
Create Element Shift 3
Annotation Tool Shift 4
Spatial Tool Shift 5
Structural Tool Shift 6
CAD Transform ... Shift 7
Annotate D
Measure M
Add Cube Ctrl 2

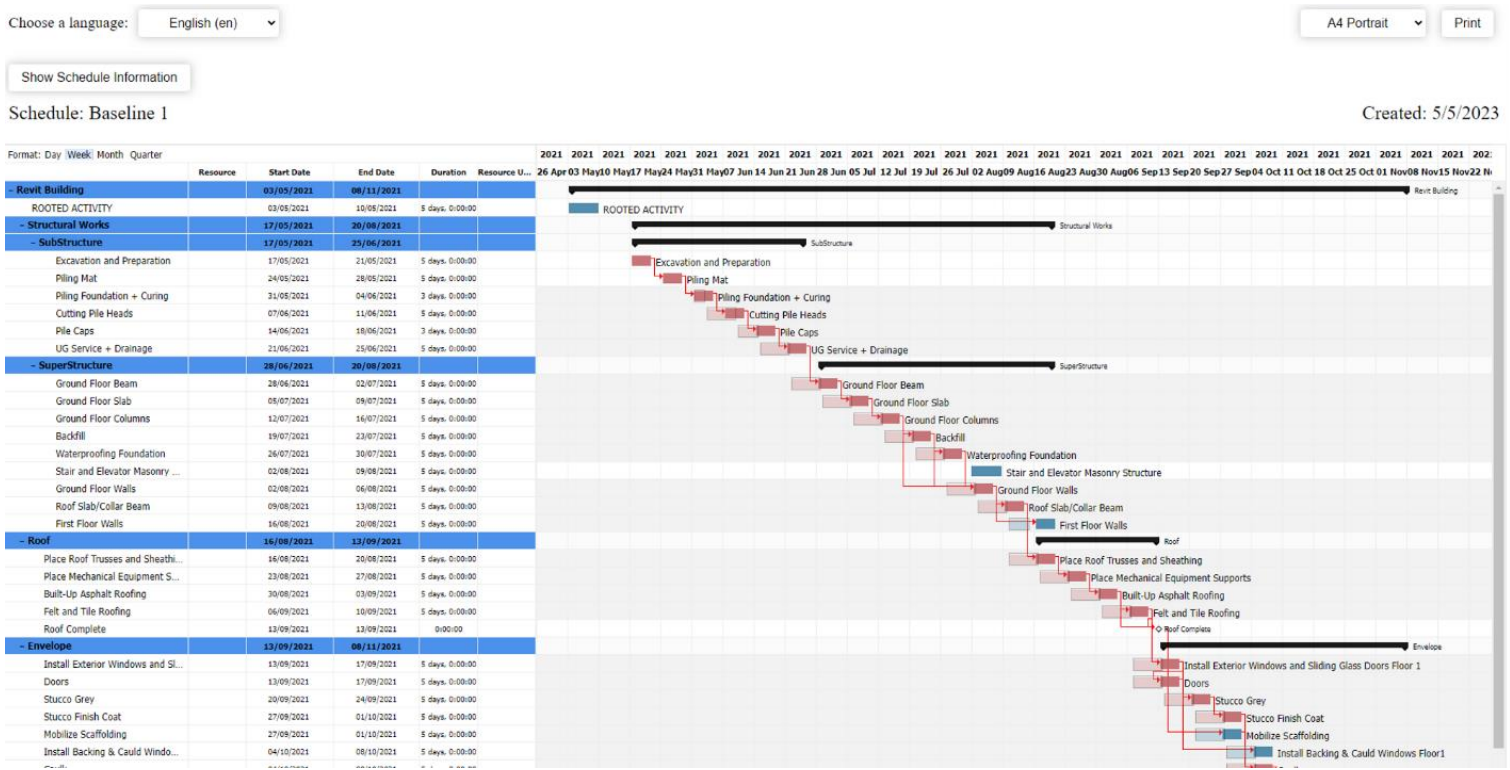
Features: Railings/Roof



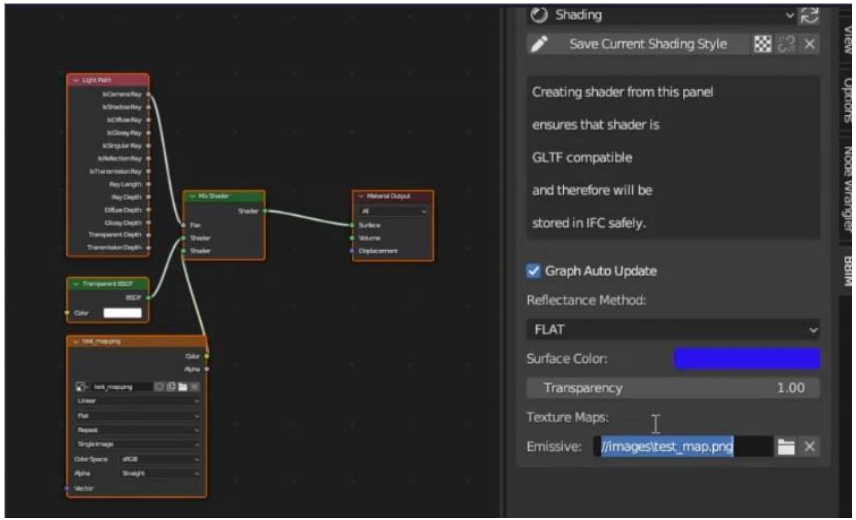


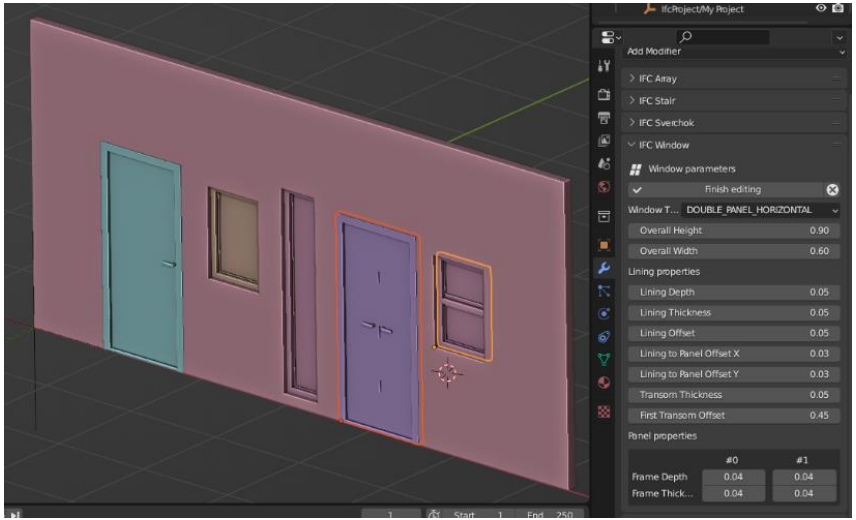


Features

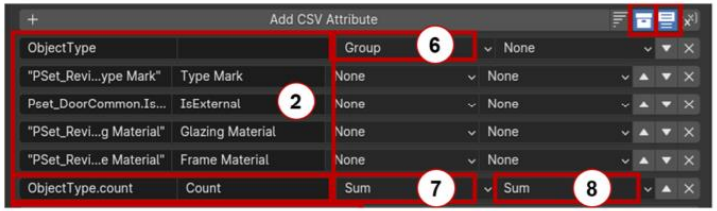

Choose a language: English (en)
A4 Portrait
Print
Show Schedule Information
Schedule: Baseline 1
Created: 5/5/2023
Format: Day Week Month Quarter
Resource
Start Date
End Date
Duration
Resource U...
- Revit Building 03/05/2021 08/11/2021
ROOTED ACTIVITY 03/05/2021 10/05/2021 5 days, 0:00:00
- Structural Works 17/05/2021 20/08/2021
- SubStructure 17/05/2021 25/06/2021
Excavation and Preparation 17/05/2021 21/05/2021 5 days, 0:00:00
Piling Mat 24/05/2021 28/05/2021 5 days, 0:00:00
Piling Foundation + Curing 31/05/2021 04/06/2021 3 days, 0:00:00
Cutting Pile Heads 07/06/2021 11/06/2021 5 days, 0:00:00
Pile Caps 14/06/2021 18/06/2021 3 days, 0:00:00
UG Service + Drainage 21/06/2021 25/06/2021 5 days, 0:00:00
- SuperStructure 28/06/2021 20/08/2021
Ground Floor Beam 28/06/2021 02/07/2021 5 days, 0:00:00
Ground Floor Slab 05/07/2021 09/07/2021 5 days, 0:00:00
Ground Floor Columns 12/07/2021 16/07/2021 5 days, 0:00:00
Backfill 19/07/2021 23/07/2021 5 days, 0:00:00
Waterproofing Foundation 26/07/2021 30/07/2021 5 days, 0:00:00
Stair and Elevator Masonry ... 02/08/2021 09/08/2021 5 days, 0:00:00
Ground Floor Walls 02/08/2021 06/08/2021 5 days, 0:00:00
Roof Slab/Collar Beam 09/08/2021 13/08/2021 5 days, 0:00:00
First Floor Walls 16/08/2021 20/08/2021 5 days, 0:00:00
- Roof 16/08/2021 13/09/2021
Place Roof Trusses and Sheathi... 16/08/2021 20/08/2021 5 days, 0:00:00
Place Mechanical Equipment S... 23/08/2021 27/08/2021 5 days, 0:00:00
Built-Up Asphalt Roofing 30/08/2021 03/09/2021 5 days, 0:00:00
Felt and Tile Roofing 06/09/2021 10/09/2021 5 days, 0:00:00
Roof Complete 13/09/2021 13/09/2021 0:00:00
- Envelope 13/09/2021 08/11/2021
Install Exterior Windows and Sl... 13/09/2021 17/09/2021 5 days, 0:00:00
Doors 13/09/2021 17/09/2021 5 days, 0:00:00
Stucco Grey 20/09/2021 24/09/2021 5 days, 0:00:00
Stucco Finish Coat 27/09/2021 01/10/2021 5 days, 0:00:00
Mobilize Scaffolding 27/09/2021 01/10/2021 5 days, 0:00:00
Install Backing & Cauld Windo... 04/10/2021 08/10/2021 5 days, 0:00:00
2021 Apr 26 03 May 10 May 17 May 24 May 31 May 07 Jun 14 Jun 21 Jun 28 Jun 05 Jul 12 Jul 19 Jul 26 Jul 02 Aug 09 Aug 16 Aug 23 Aug 30 Aug 06 Sep 13 Sep 20 Sep 27 Sep 04 Oct 11 Oct 18 Oct 25 Oct 01 Nov 08 Nov 15 Nov 22
Revit Building
ROOTED ACTIVITY
Structural Works
SubStructure
Excavation and Preparation
Piling Mat
Piling Foundation + Curing
Cutting Pile Heads
Pile Caps
UG Service + Drainage
SuperStructure
Ground Floor Beam
Ground Floor Slab
Ground Floor Columns
Backfill
Waterproofing Foundation
Stair and Elevator Masonry Structure
Ground Floor Walls
Roof Slab/Collar Beam
First Floor Walls
Roof
Place Roof Trusses and Sheathing
Place Mechanical Equipment Supports
Built-Up Asphalt Roofing
Felt and Tile Roofing
Roof Complete
Envelope
Install Exterior Windows and Sliding Glass Doors Floor 1
Doors
Stucco Grey
Stucco Finish Coat
Mobilize Scaffolding
Install Backing & Cauld Windows Floor1

Features


Shading
Save Current Shading Style
Creating shader from this panel
ensures that shader is
GLTF compatible
and therefore will be
stored in IFC safely.
Graph Auto Update
Reflectance Method:
FLAT
Surface Color:
Transparency 1.00
Texture Maps:
Emissive: //images\test_map.png


IfcProject/My Project
Add Modifier
IFC Array
IFC Stair
IFC Svetchok
IFC Window
Window parameters
Finish editing
Window T... DOUBLE_PANEL_HORIZONTAL
Overall Height 0.90
Overall Width 0.60
Lining properties
Lining Depth 0.05
Lining Thickness 0.05
Lining Offset 0.05
Lining to Panel Offset X 0.03
Lining to Panel Offset Y 0.03
Transom Thickness 0.05
First Transom Offset 0.45
Panel properties
#0 #1
Frame Depth 0.04 0.04
Frame Thick... 0.04 0.04

Features: Query IFC Model and export quantities

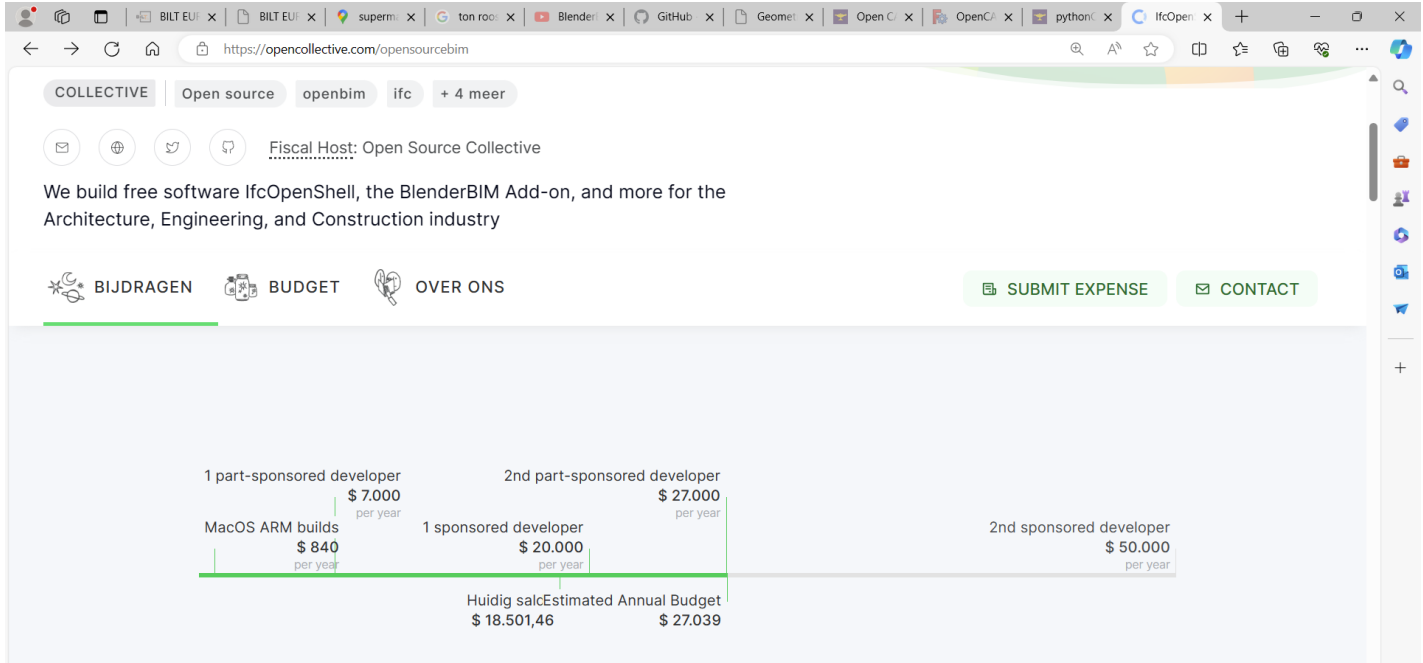


	A	B	C	D	E	F
1	**ObjectType**	**Type Mark**	**IsExternal**	**Glazing Material**	**Frame Material**	**Count**
2	0865 x 1500mm	56	NO	N/A	N/A	8
3	0915 x 2134mm	20	NO	N/A	Door - Frame	215
4	0915 x 2134mm Exterior	59	YES	N/A	Door - Frame	7
5	0915 x 2134mm Rated	61	NO	N/A	Door - Frame	5
6	1.220 x 2134mm	60	NO	N/A	Door - Frame	1
7	1.220 x 2134mm Exterior	34	YES	N/A	Door - Frame	1
8	1000 x 2134mm	33	NO	N/A	Door - Frame	1
9	1730 x 2134mm	40	NO	N/A	Door - Frame	1
10	1830 x 2134mm	42	NO	N/A	Door - Frame	1
11	1830 x 2134mm Exterior	58	YES	N/A	Door - Frame	4
12	M_Curtain Wall Dbl Chain Link	35	YES	Metal - Chain Link	Metal - Aluminum	4
13	M_Curtain Wall Dbl Glass	36	YES	Glass	N/A	2
14	M_Curtain Wall Sgl Glass	37	NO	Glass	N/A	4
15						Sum: 254.0

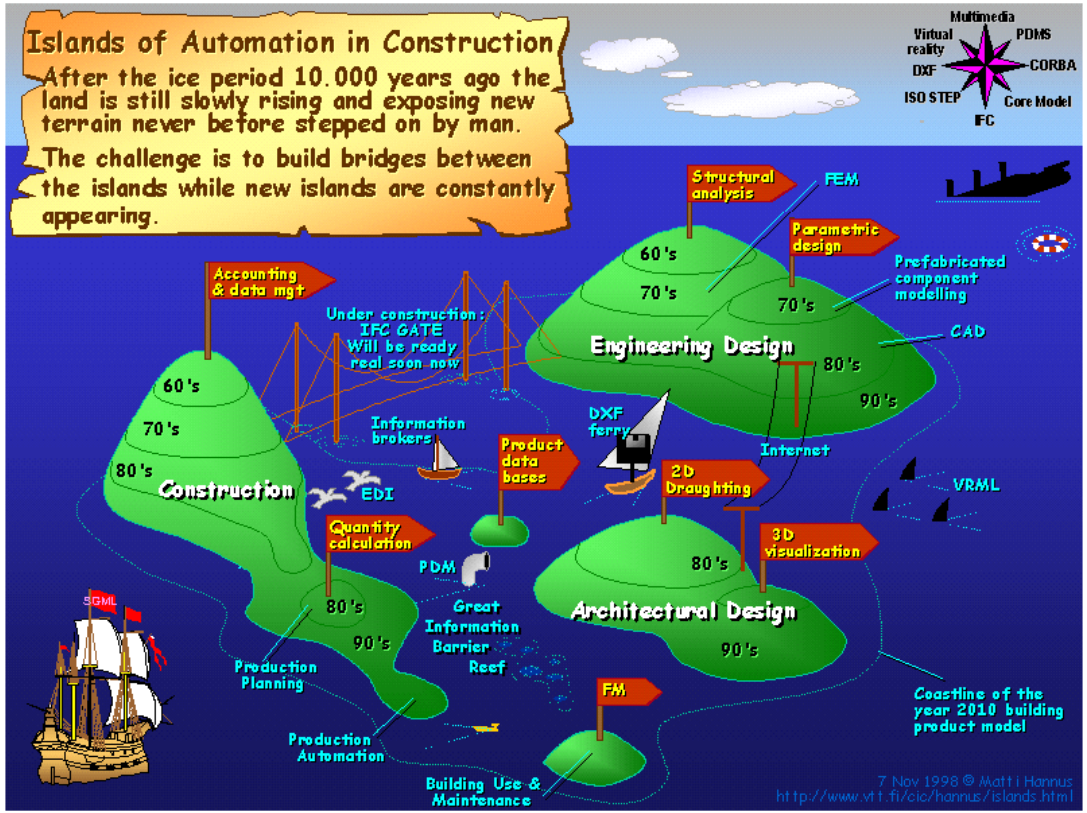
https://www.linkedin.com/feed/update/urn:li:activity:7193048994241986560/

Support

https://opencollective.com/opensourcebim



The deception of the current state of BIM



Developments within Blender

- Blender is growing incredible fast in the **Automotive & Aero industry**
- Last week it became known that Blender will have a **product manager** for the AEC
- **Income** of Blender Foundation will continue to grow > 3.7 million/year
- Later this year there will be a conference about Blender in the **AEC**
- The Blender Foundation stated that they will develop native tools for **Solid Modelling** and **Parametric Design**

Future of BlenderBIM

- **Full** BIM-modeler for the AEC
- **Architecture, Structural and MEP** features
- Better **sheet** & **drawing** integration
- A prototype of a client-server model for distributed, multi-user, cross-application simultaneous authoring
- Transition from **alpha** to **beta** phase
- Flexibility of Sketchup combined with the documentation robustness of Revit & Tekla

Future vision of BIM-software in the AEC

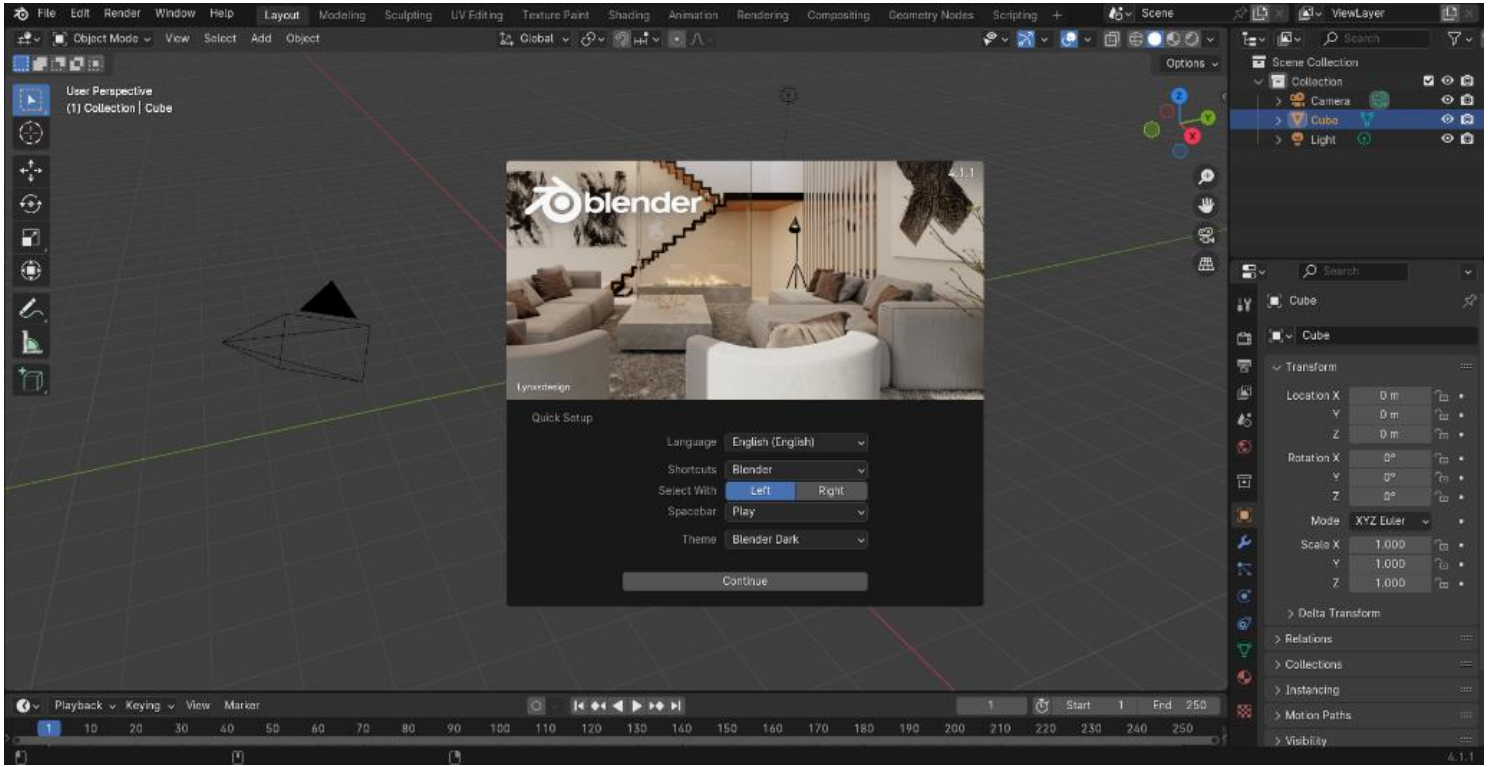
- Full Open Source built around IFC:
- IFC-library: IfcOpenShell & Opencascade
- BIM modeler(BlenderBIM, FreeCAD, IFC.JS)
- Online 3D Platforms(**Speckle**, IFC.JS)
- Libraries, standards(bSDD)
- (Structural) codes in software libraries
- Open Source ERP → ERPNext
- Own cloud platforum → NextCloud
- Share your code → BuildingPy
- Planning software
- Local AI

More information

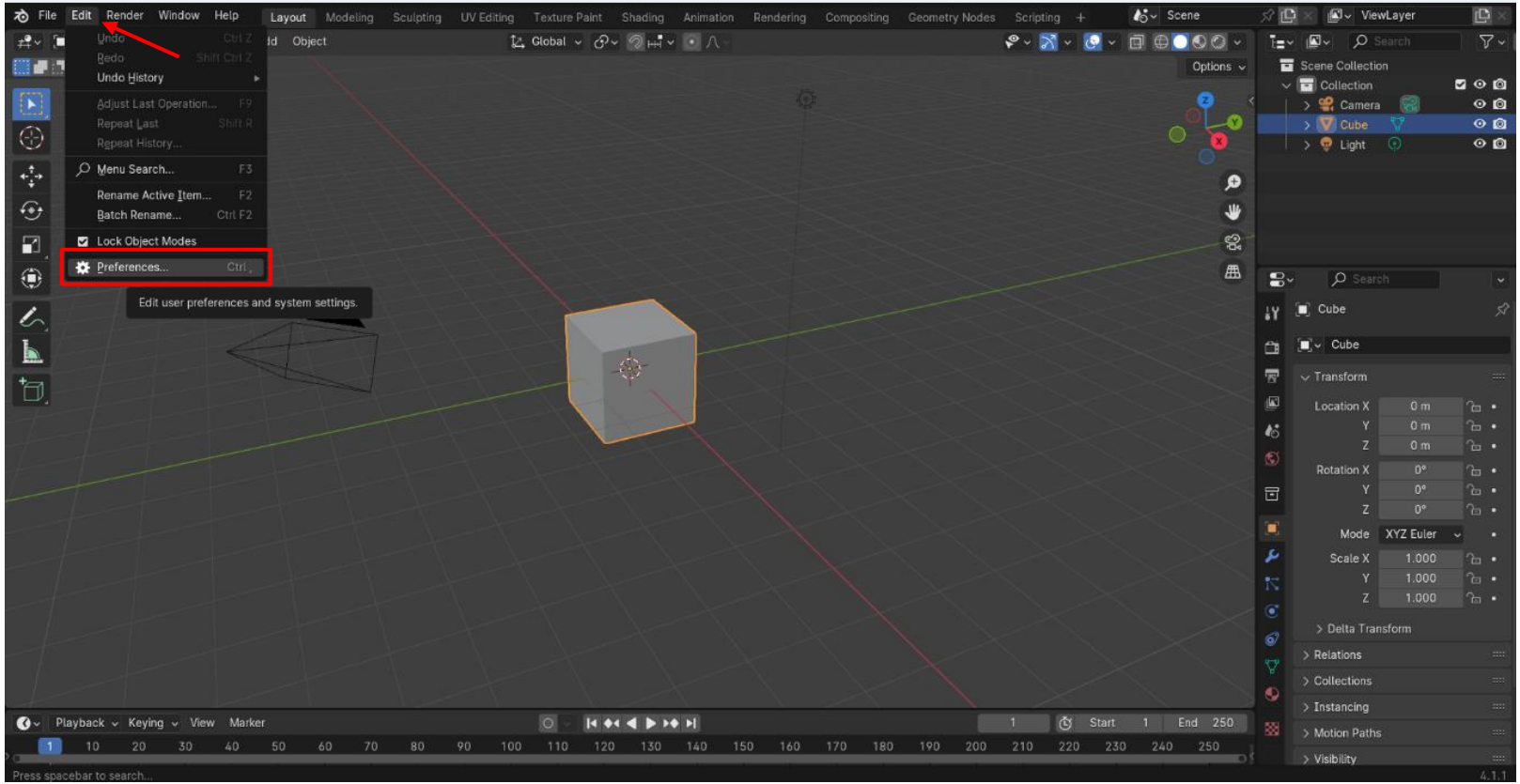
Part	Link
IFC Architect	https://www.youtube.com/@IfcArchitect
BlenderBIM Documentation	https://blenderbim.org/docs/
IfcOpenShell Library	https://docs.ifcopenshell.org/
Experimental IFC Dutch Template	https://github.com/DutchSailor/FOSS-BIM-Experiments/tree/main/BlenderBIM/Template NL test
OSArch	https://community.osarch.org/
Ryan Schultz	http://openingdesign.com/
Example models of Ryan	https://gitlab.com/openingdesign/milwaukee_st_4429/-/tree/2e60ca943a099d63a773013ee62913bf8a844955/Models/BlenderBIM
UH Studio Architectural Modelling in Blender (Blender Guru)	https://www.youtube.com/@UHStudio
OSArch	https://community.osarch.org/

Hands-on!

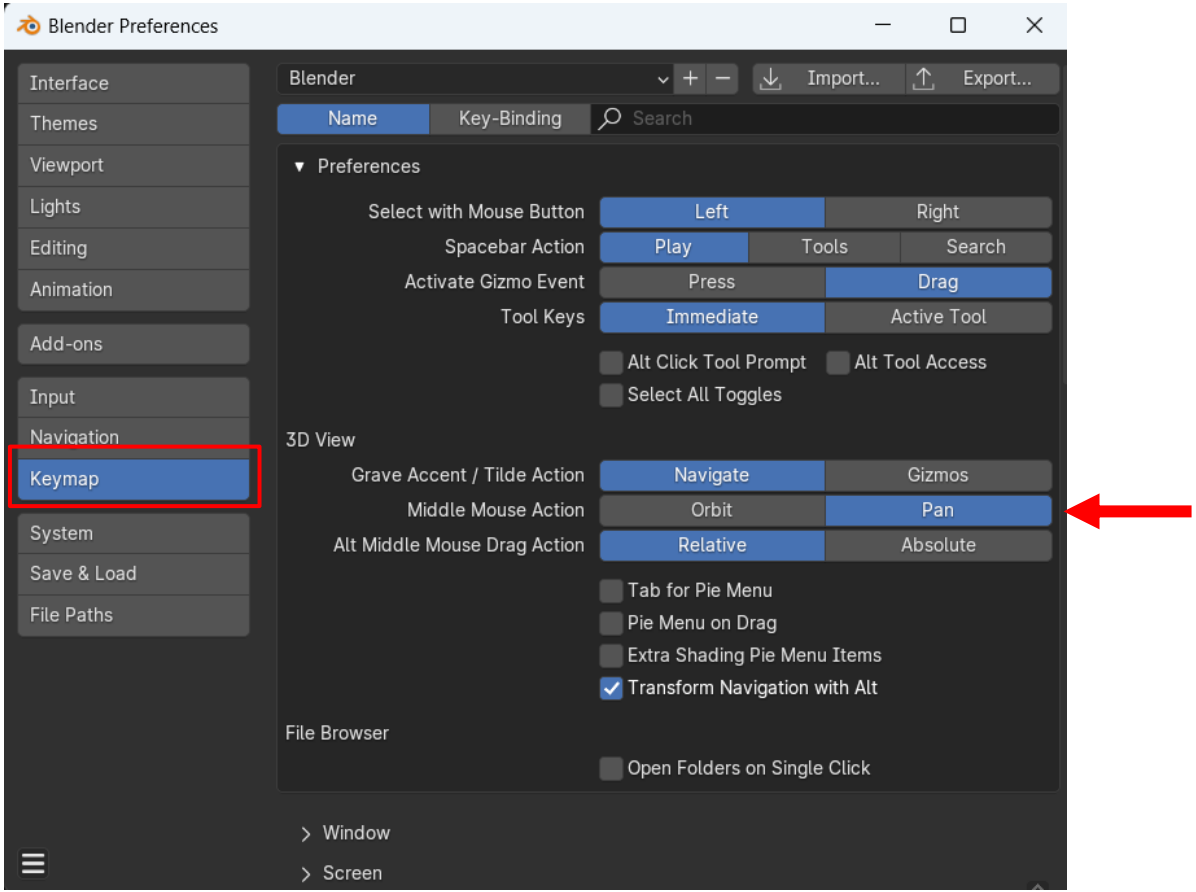
Install & Setup



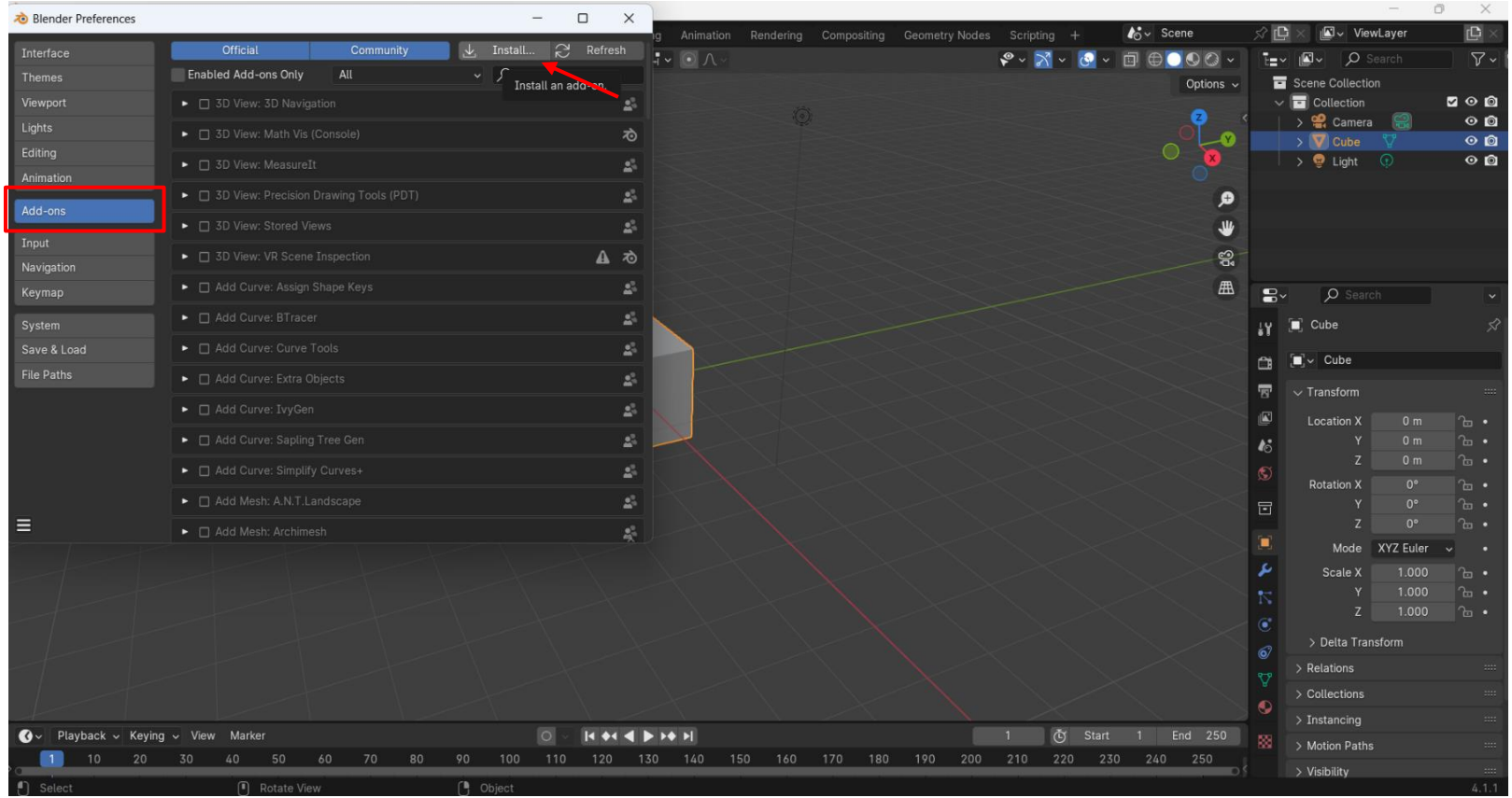
Blender 4.1 opened



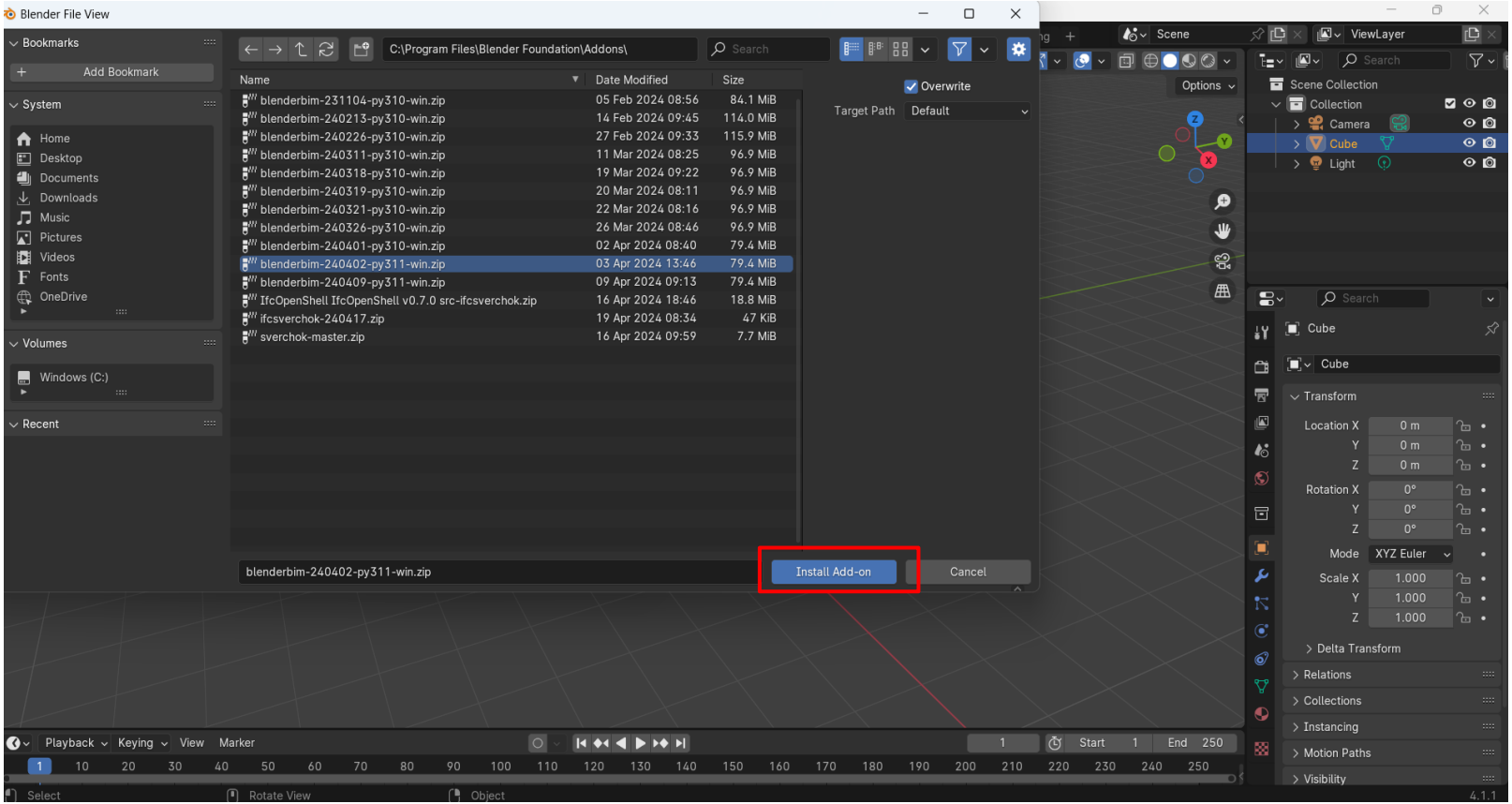
Edit > preferences



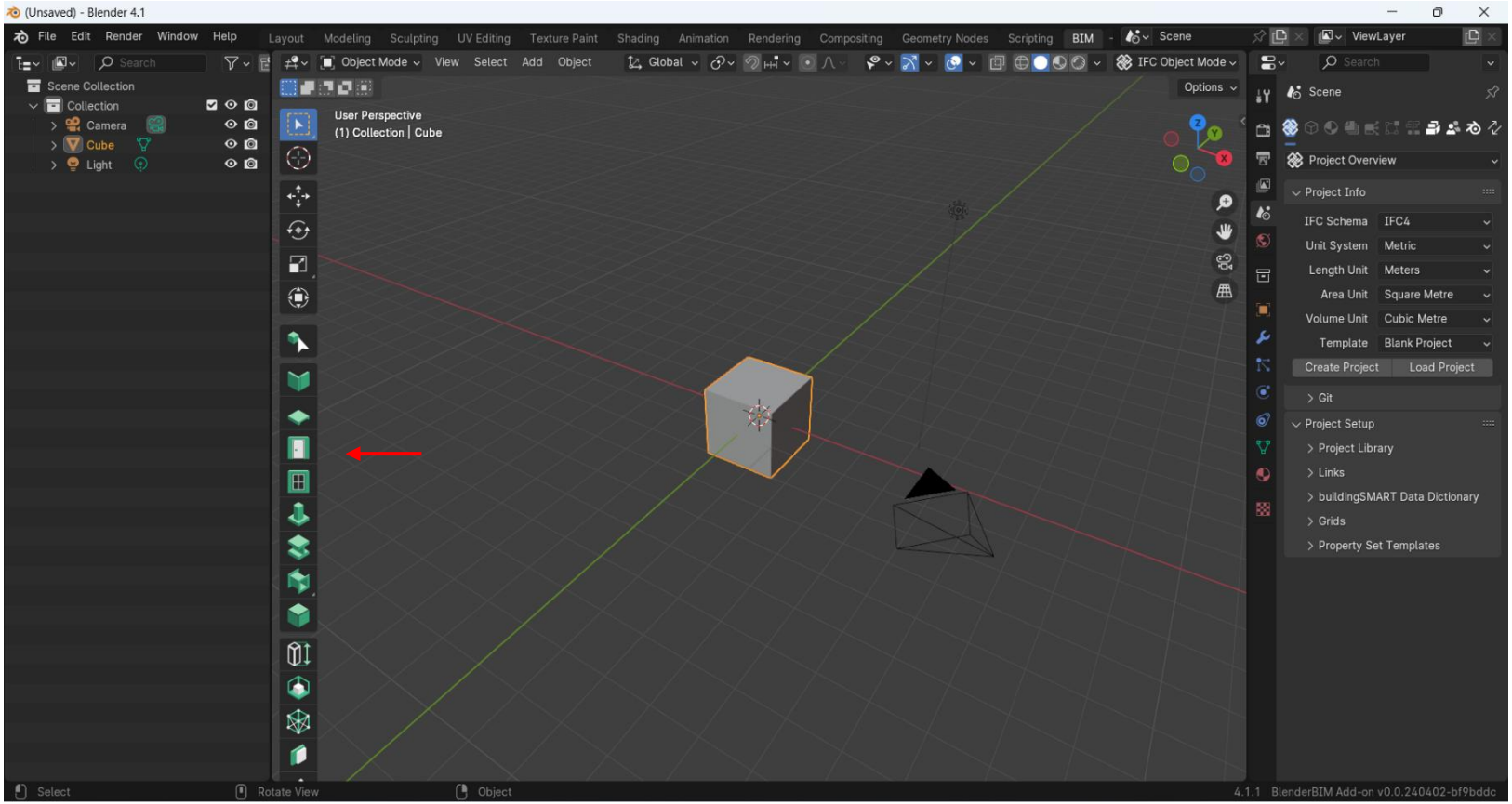
Easier 3D navigation



Installing BlenderBIM add-on

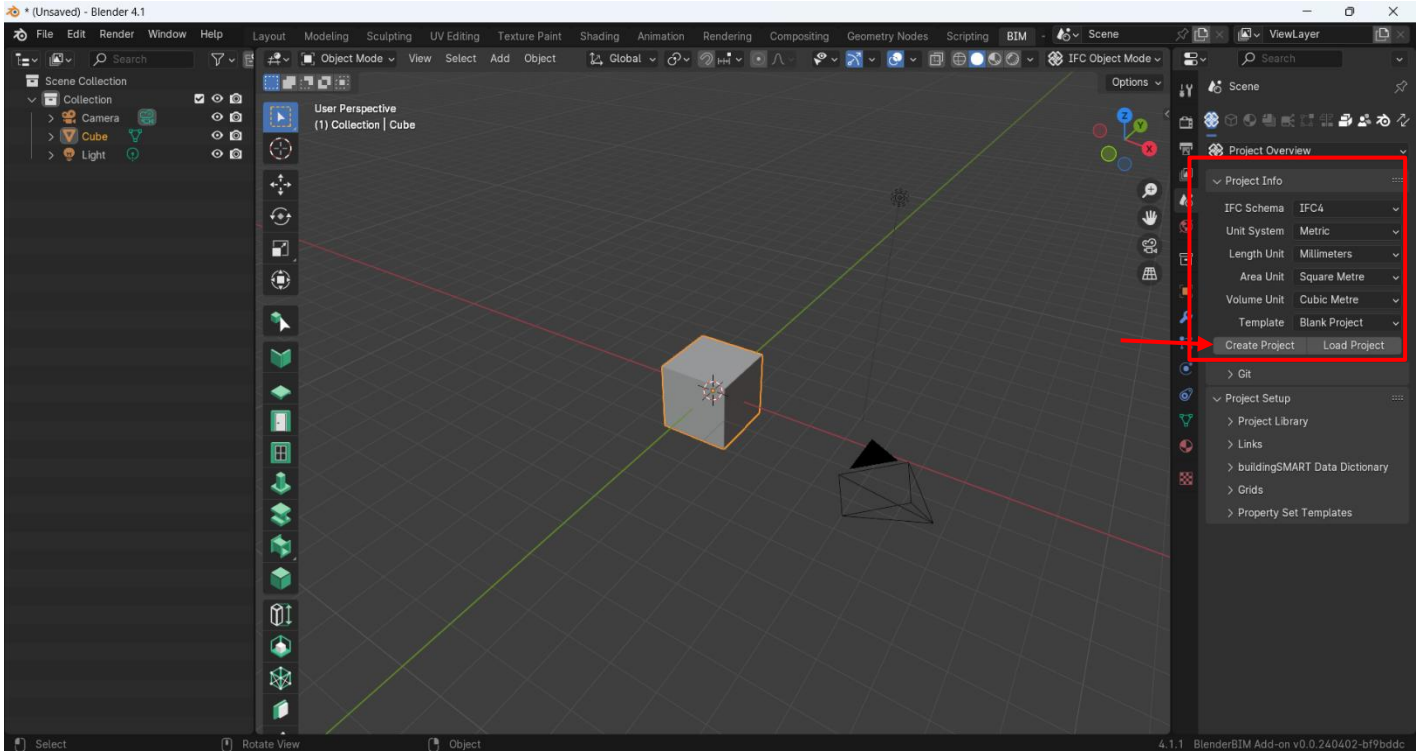


Select downloaded BlenderBIM .zip

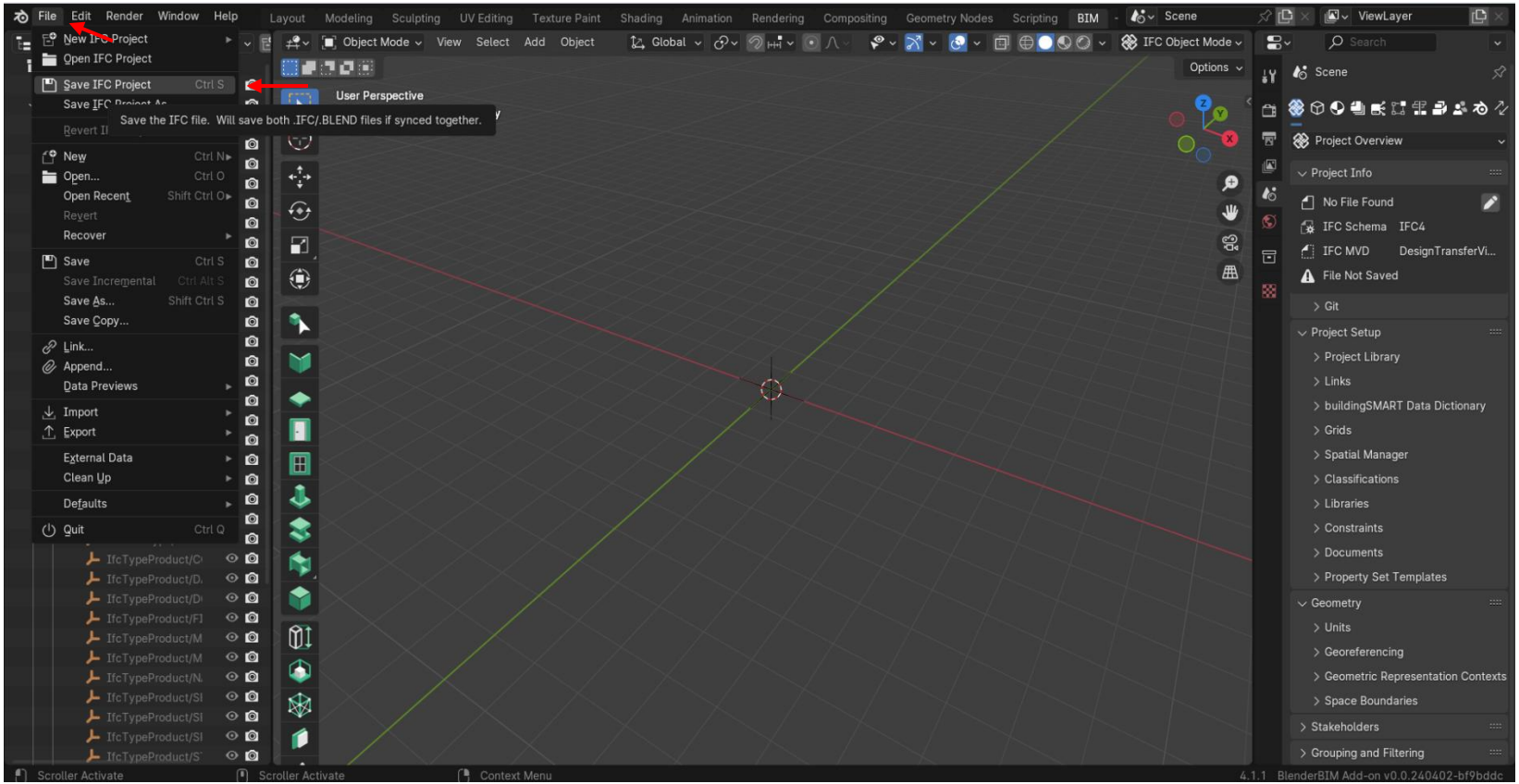


It's installed!

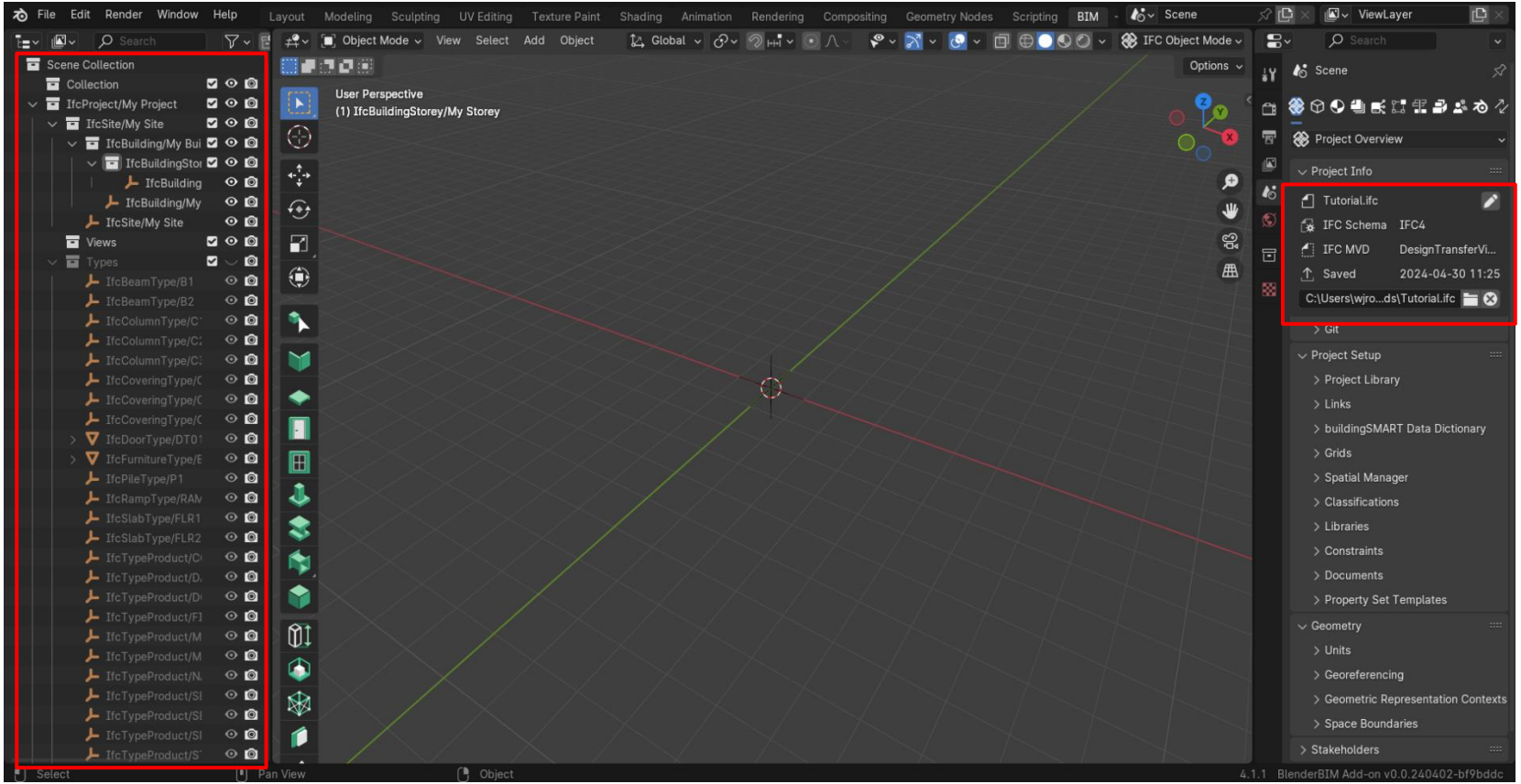
Setting up IFC project



Input units and create project (Choose Demo template)

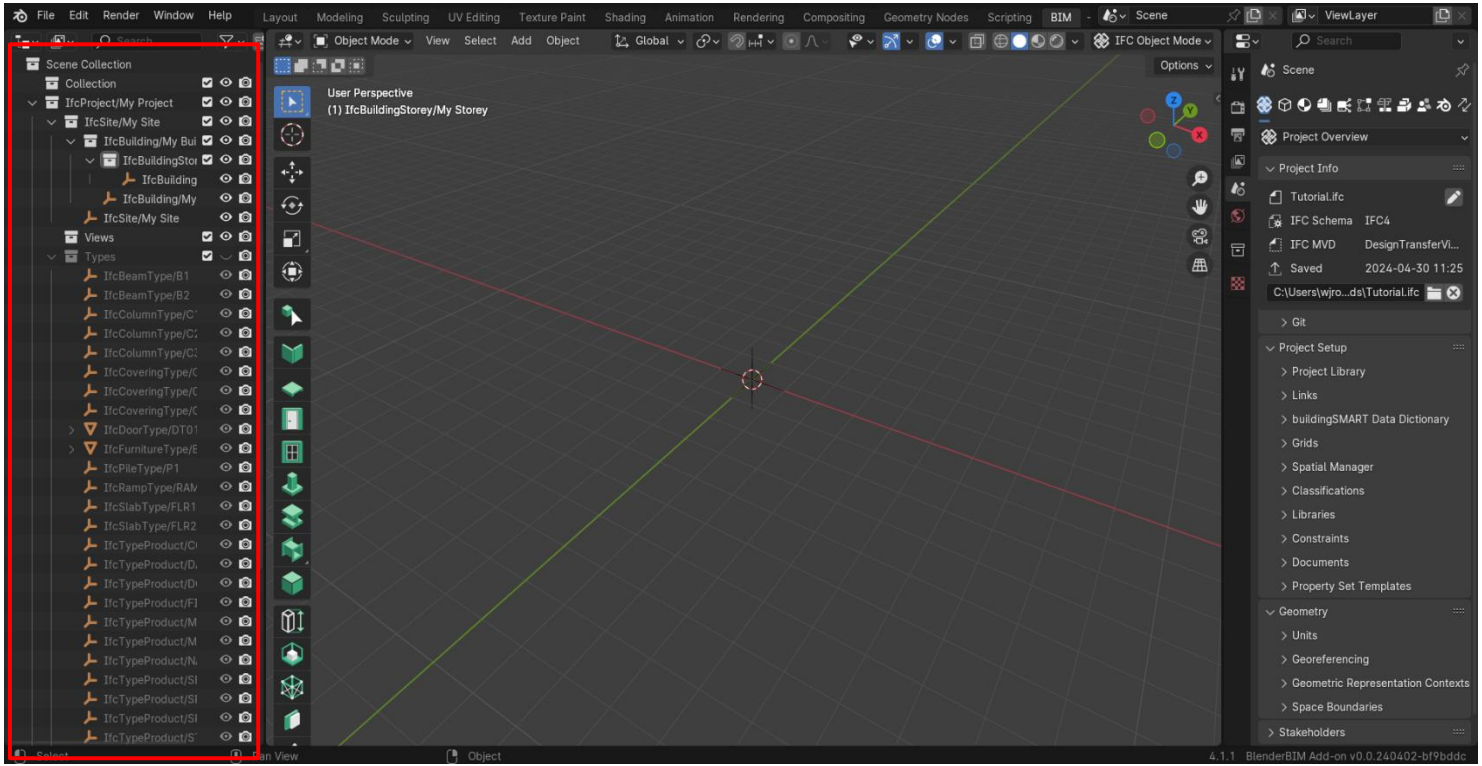


Save IFC: File>save IFC project (ctrl+S)

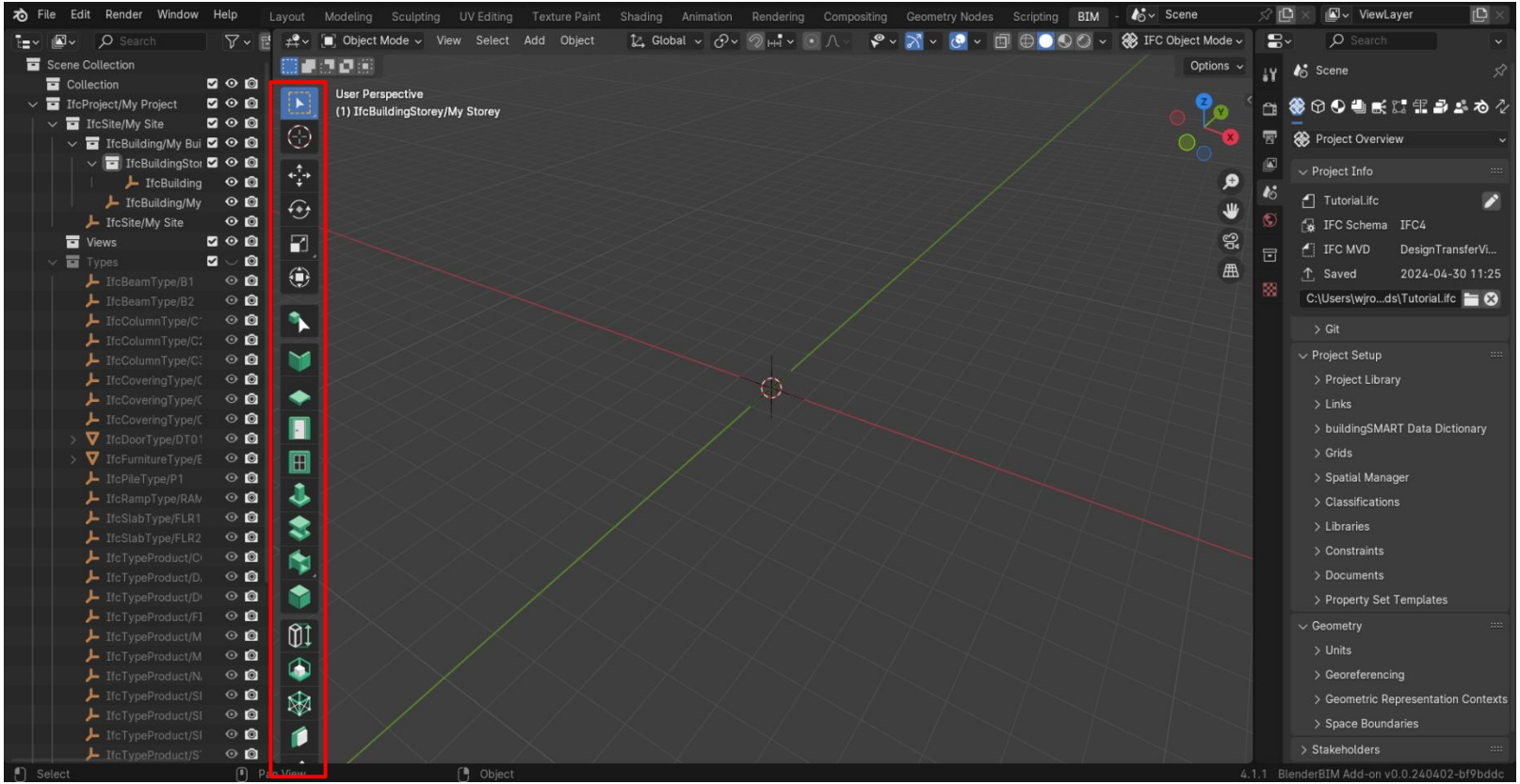


Your first native IFC project!

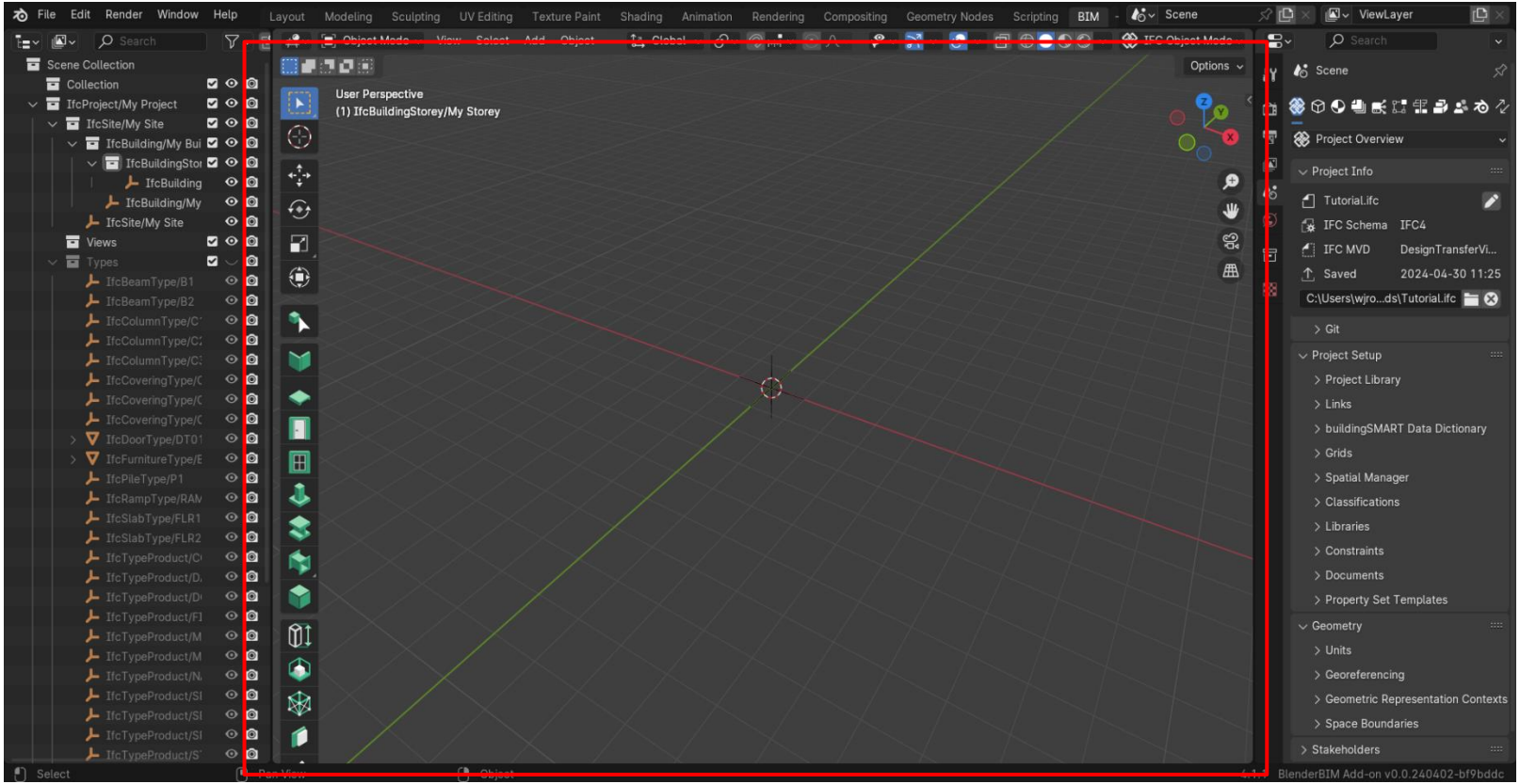
User Interface (UI)



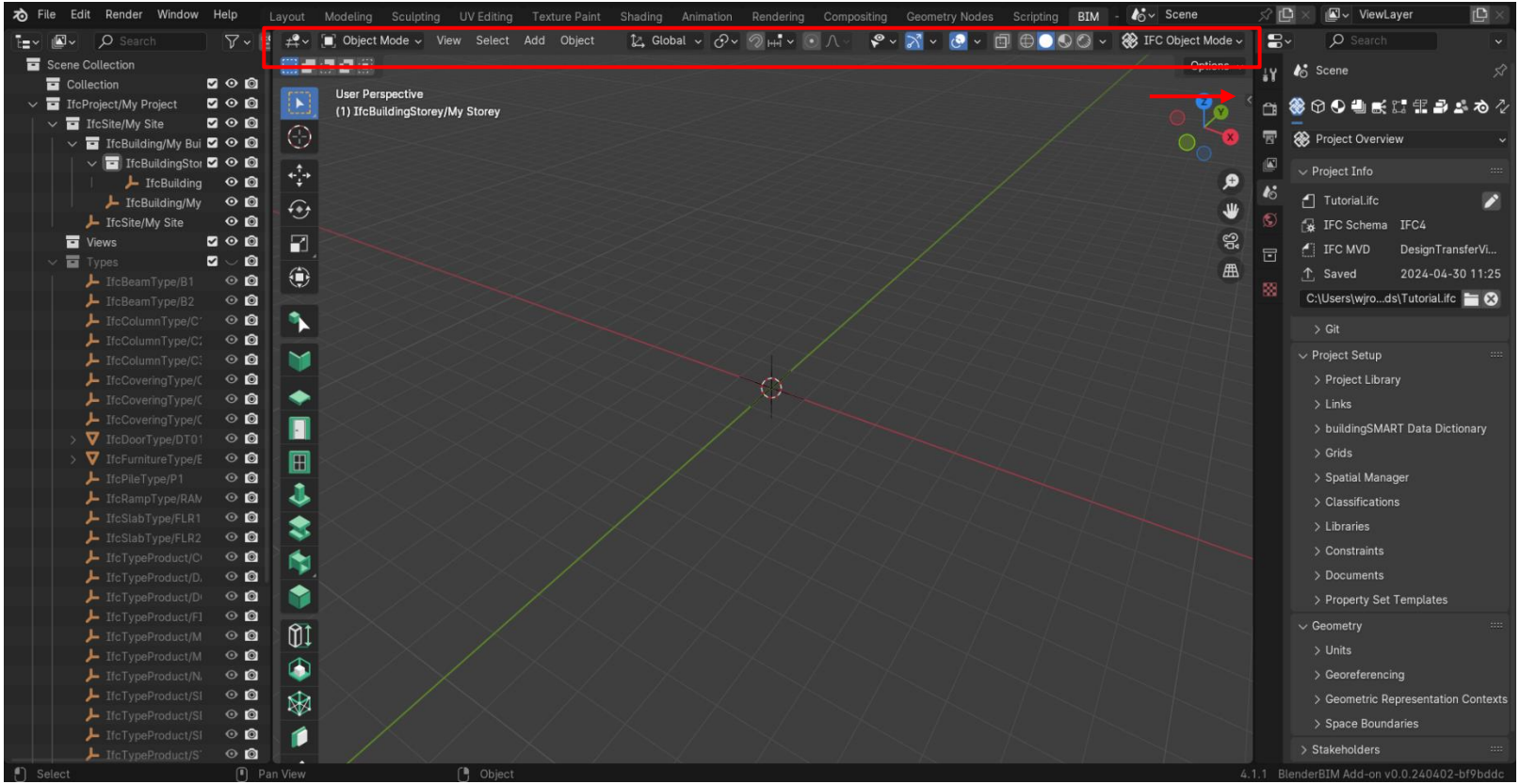
Project browser



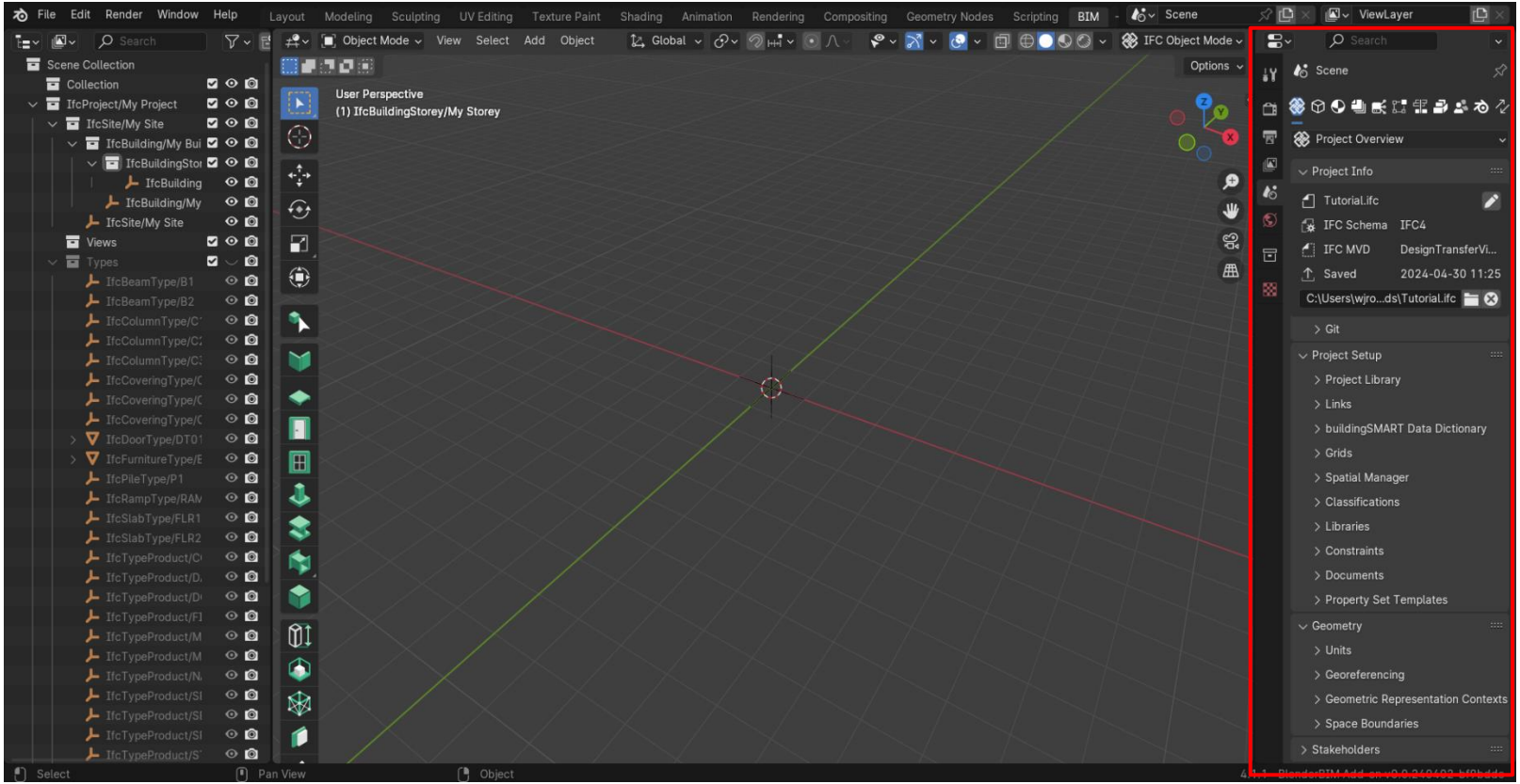
Modelling tools


File Edit Render Window Help
Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Geometry Nodes Scripting BIM
Scene
ViewLayer
Scene Collection
Collection
IfcProject/My Project
IfcSite/My Site
IfcBuilding/My Bui
IfcBuildingStor
IfcBuilding
IfcBuilding/My
IfcSite/My Site
Views
Types
IfcBeamType/B1
IfcBeamType/B2
IfcDoorType/DT01
IfcPileType/P1
IfcSlabType/FLR1
IfcSlabType/FLR2
User Perspective
(1) IfcBuildingStorey/My Storey
Options
Project Overview
Project Info
Tutorial.ifc
IFC Schema IFC4
IFC MVD DesignTransferVi...
Saved 2024-04-30 11:25
C:\Users\wjro...ds\Tutorial.ifc
Git
Project Setup
Project Library
Links
buildingSMART Data Dictionary
Grids
Spatial Manager
Classifications
Libraries
Constraints
Documents
Property Set Templates
Geometry
Units
Georeferencing
Geometric Representation Contexts
Space Boundaries
Stakeholders
Select
BlenderBIM Add-on v0.0.240402-bf9bddc

3D viewport

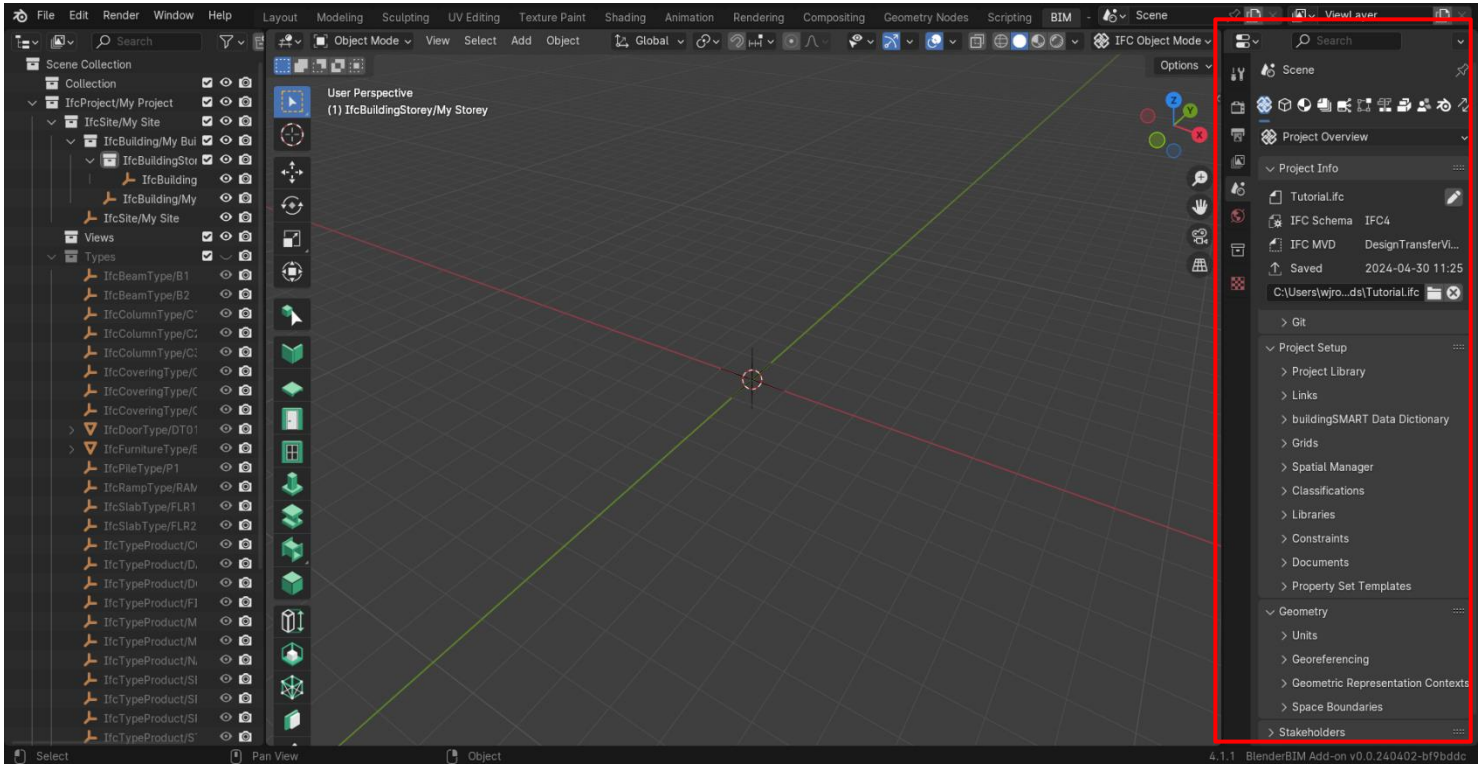


Info & tools (if an element is selected); Open extra tab with ‘N’



Properties & more

Additional settings

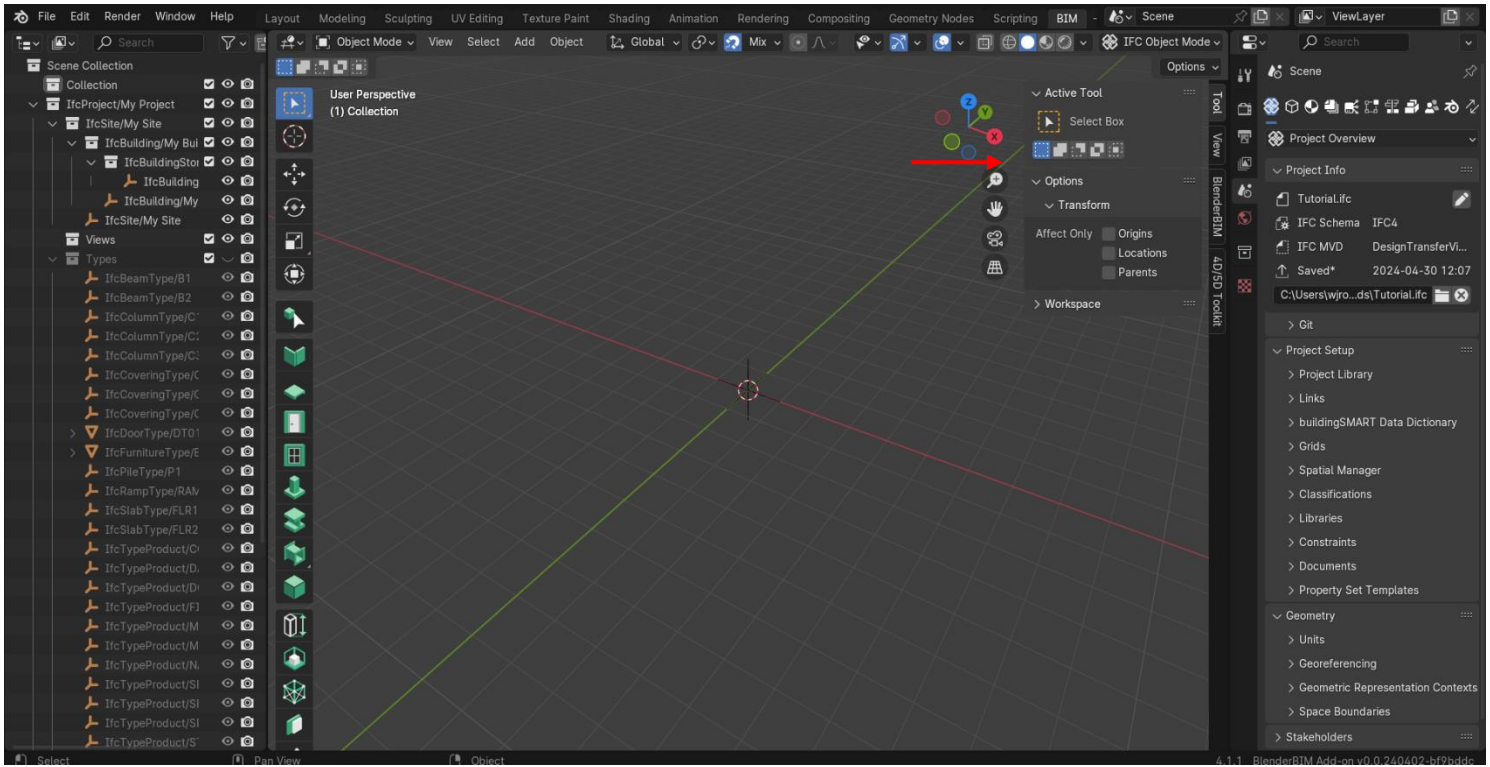


Set snapping and move default

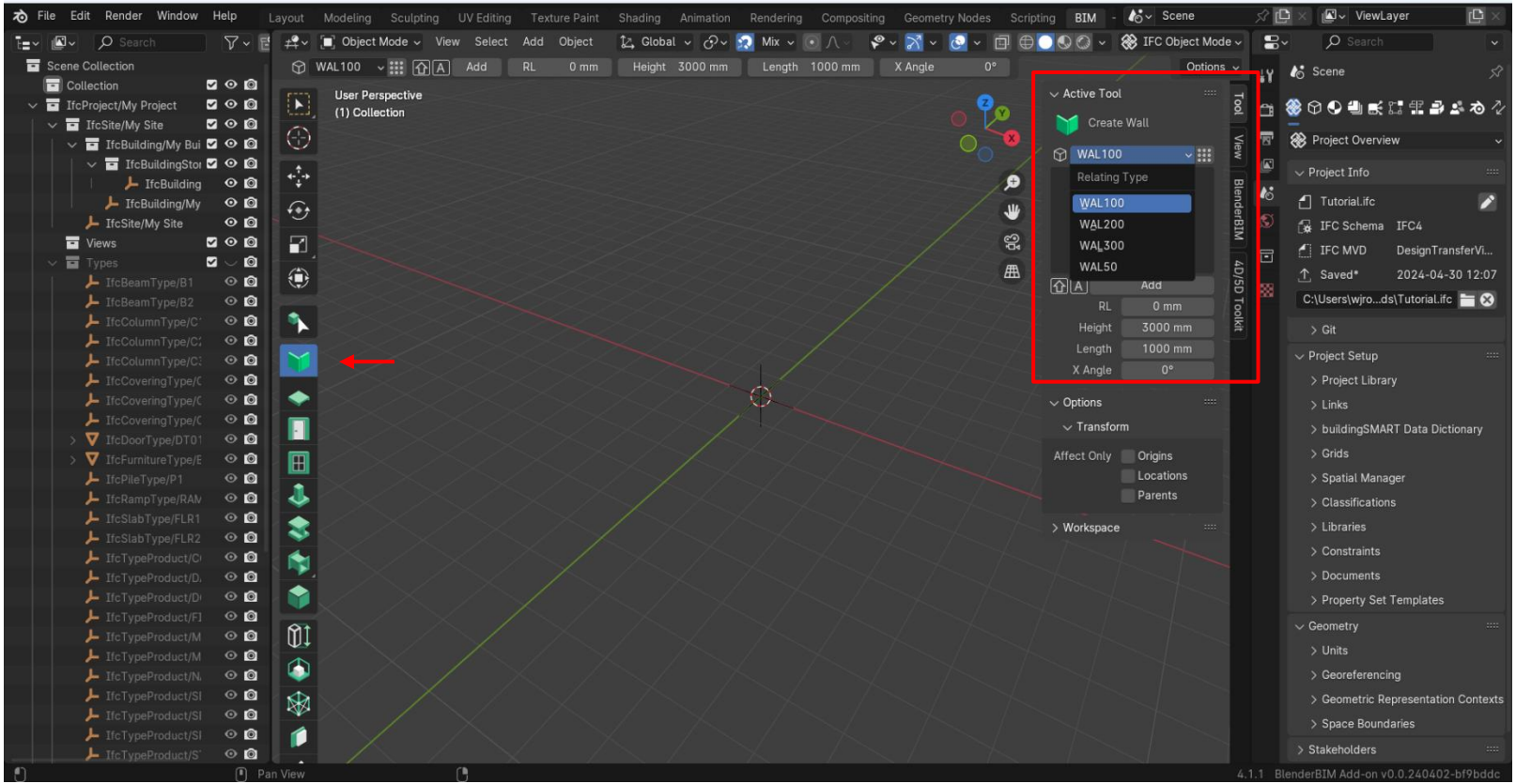
BlenderBIM & Blender

- BlenderBIM overrides some shortcuts
- FOSS add-on for Blender

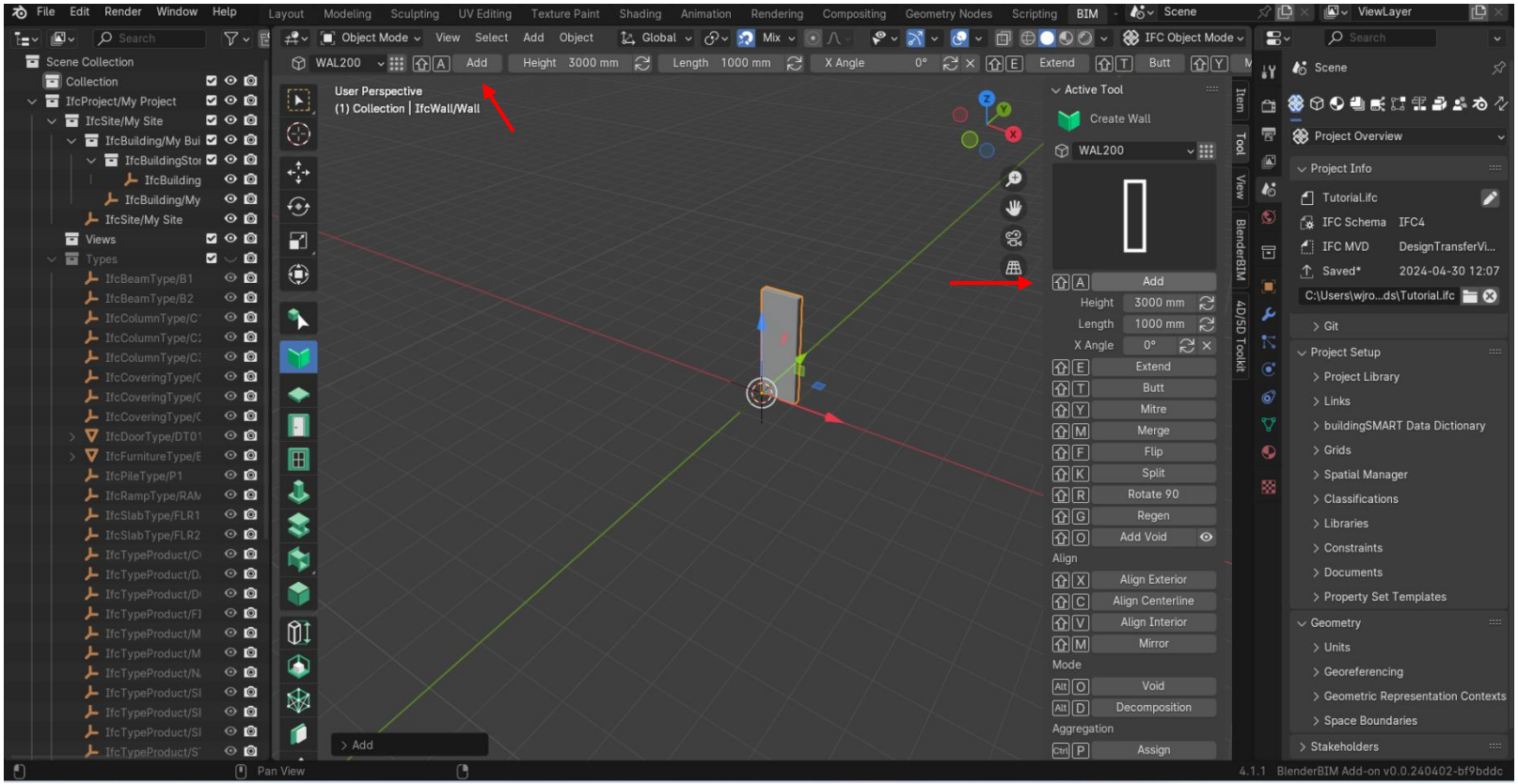
First IfcWall



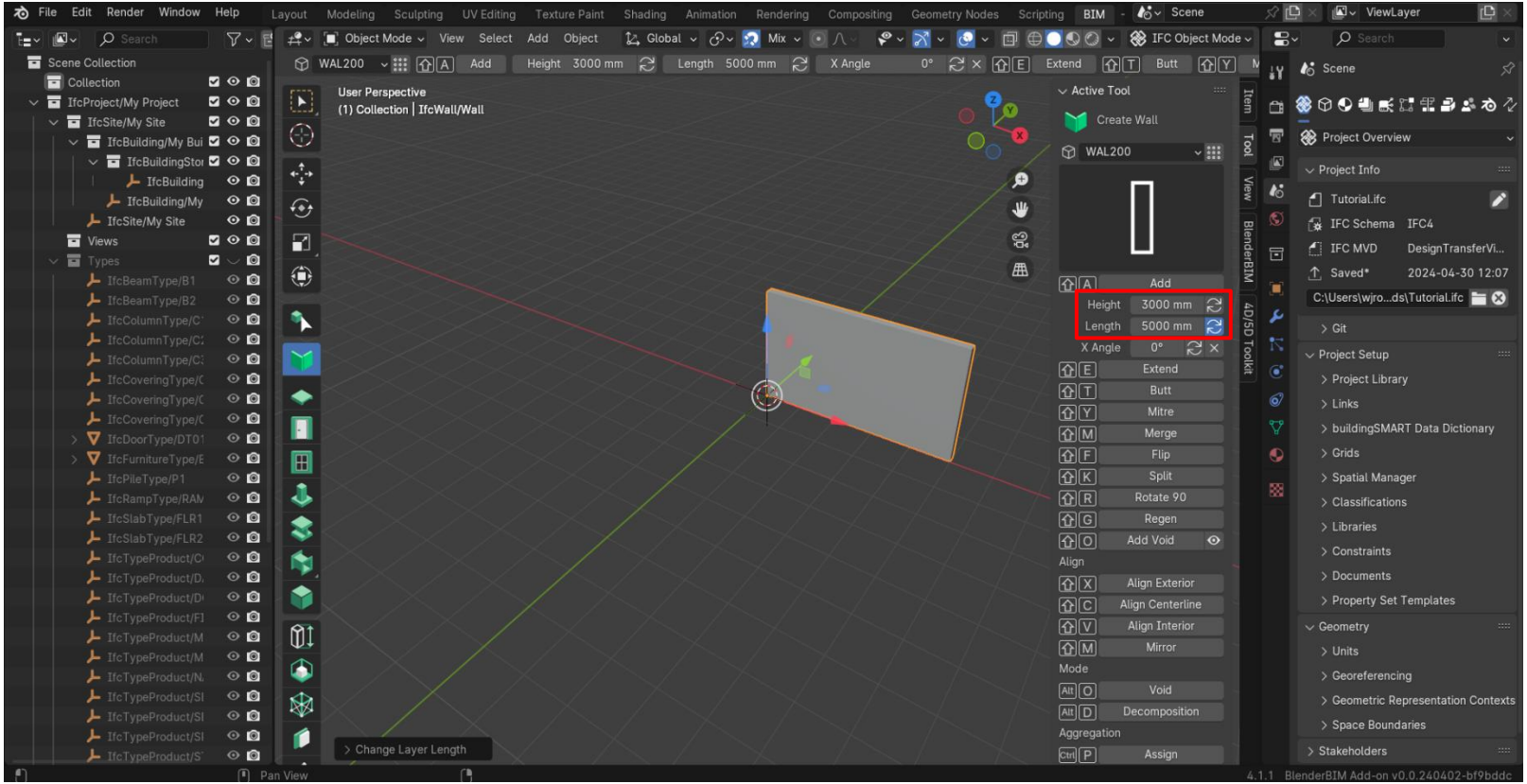
Open extra info tab (‘N’)



Select wall tool & select wall Type

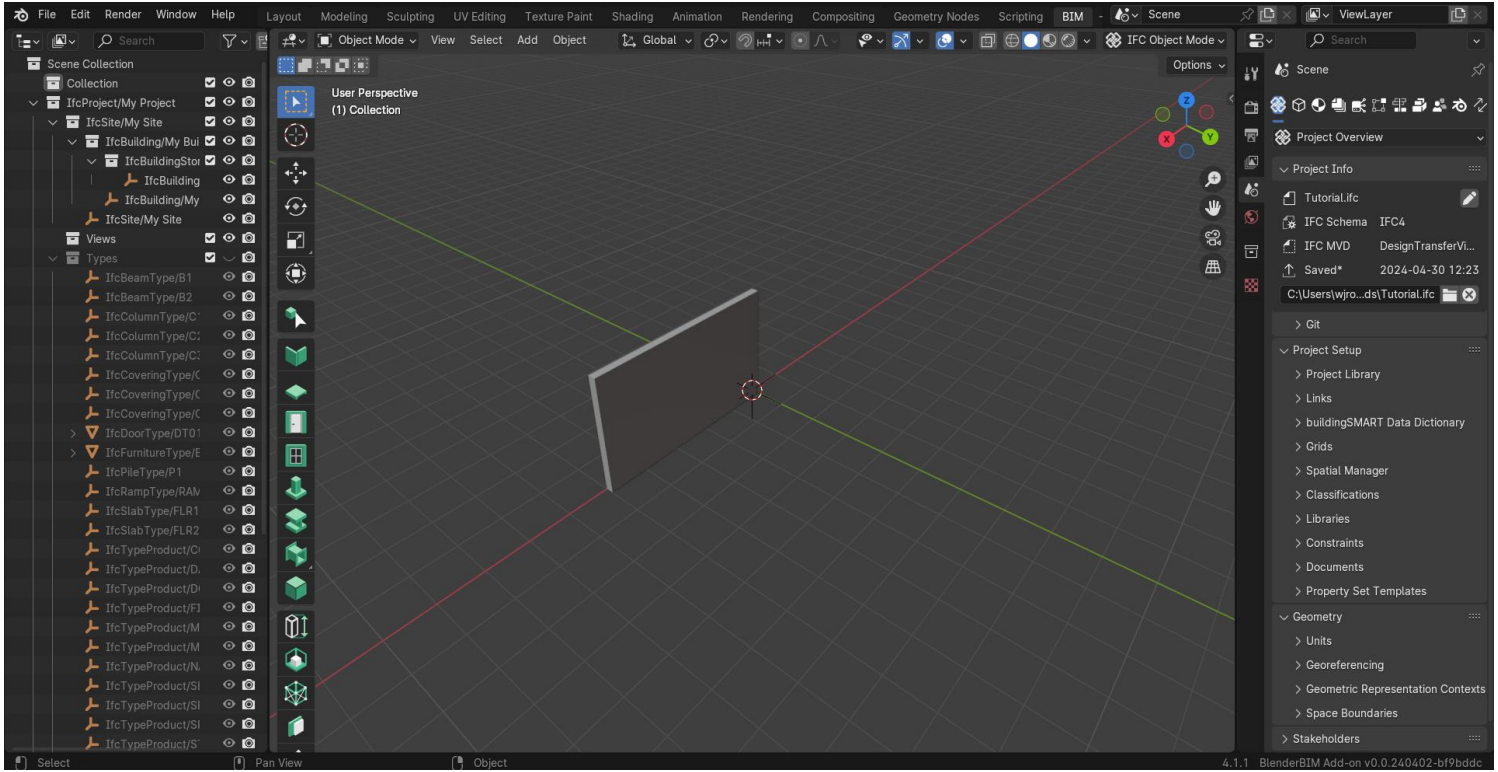


Click ‘Add’ to add wall (shift + ‘A’)

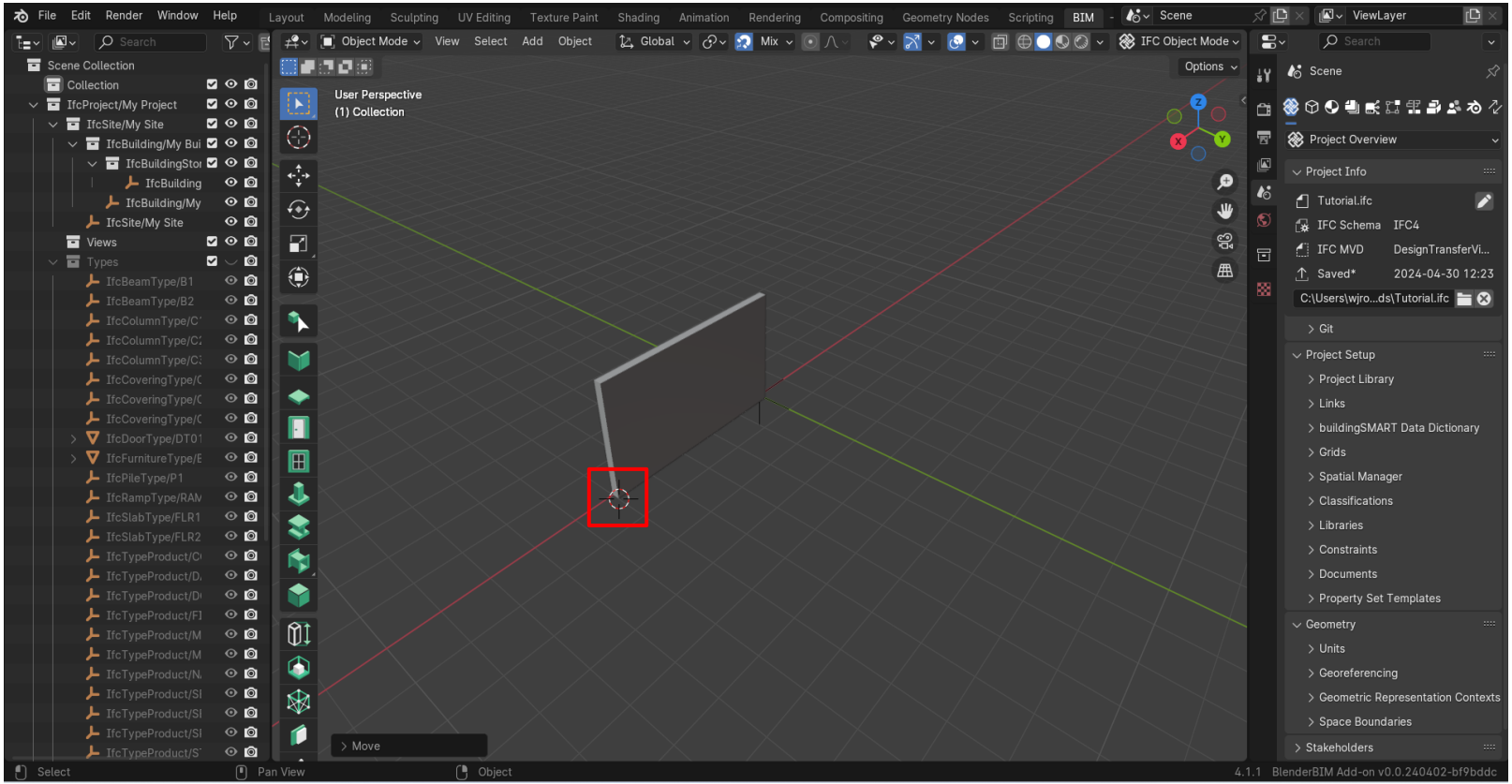


Change ‘Length’ and click refresh

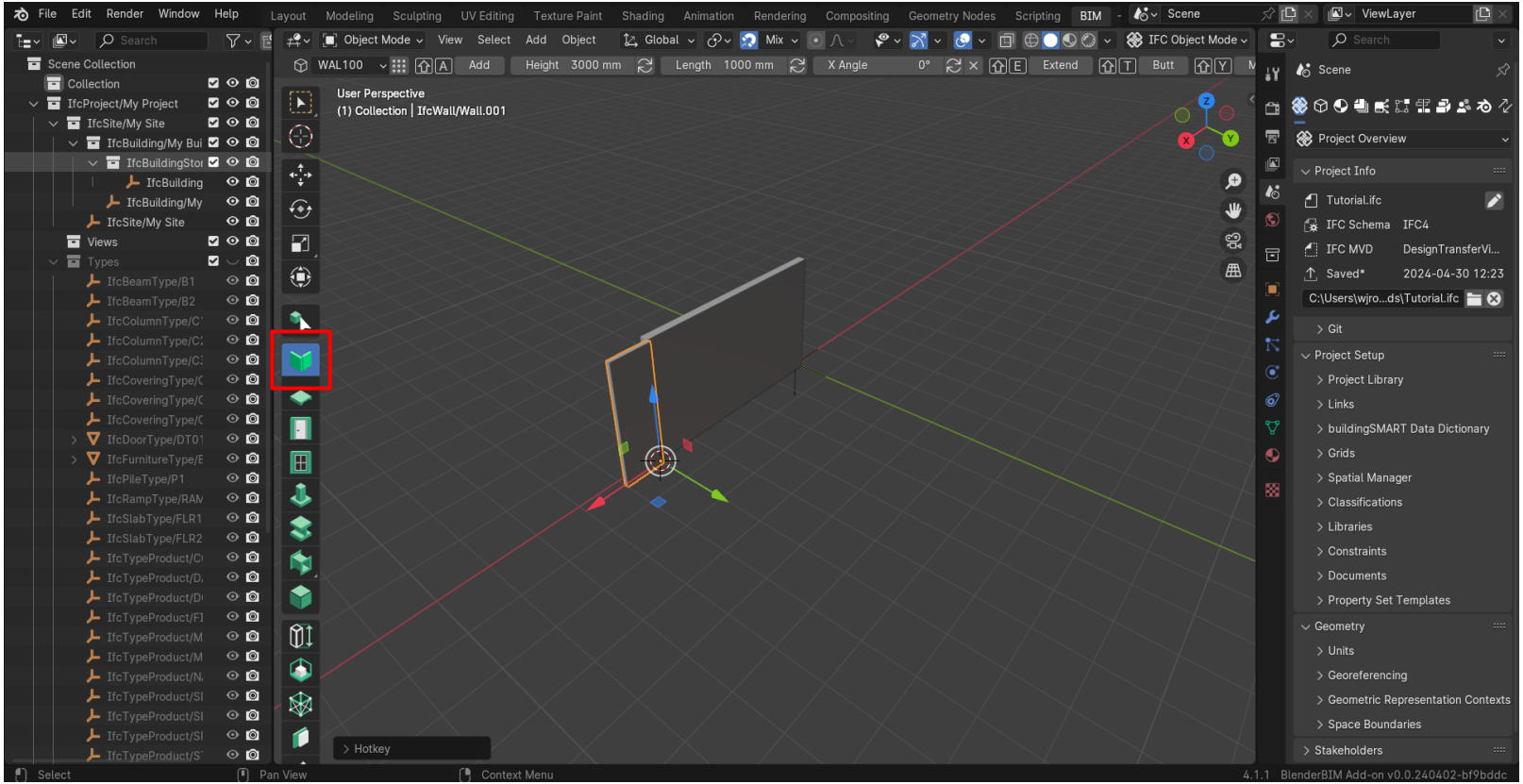
3D-cursor & navigating



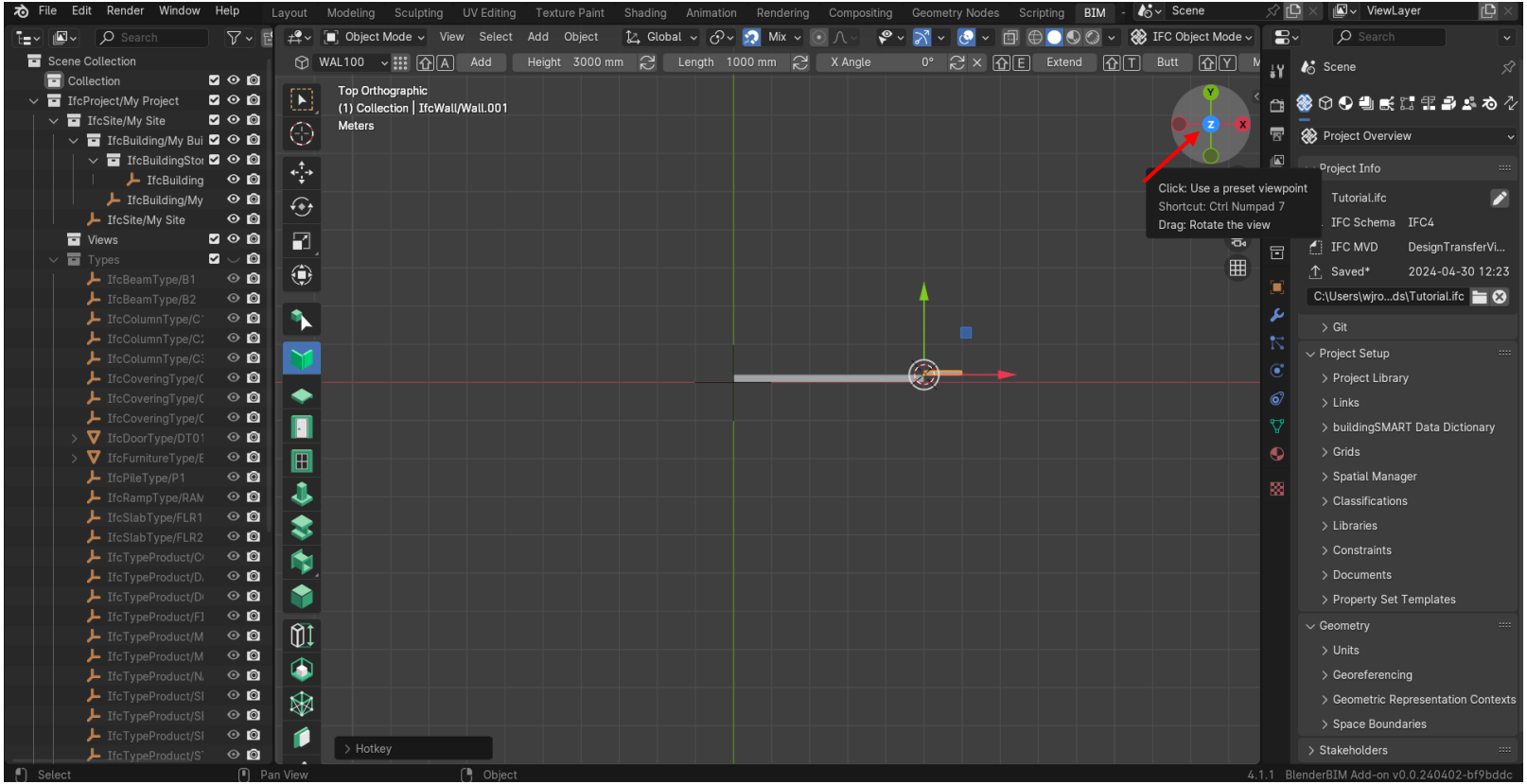
Pan with ‘MMB’; orbit with ‘shift+MMB’



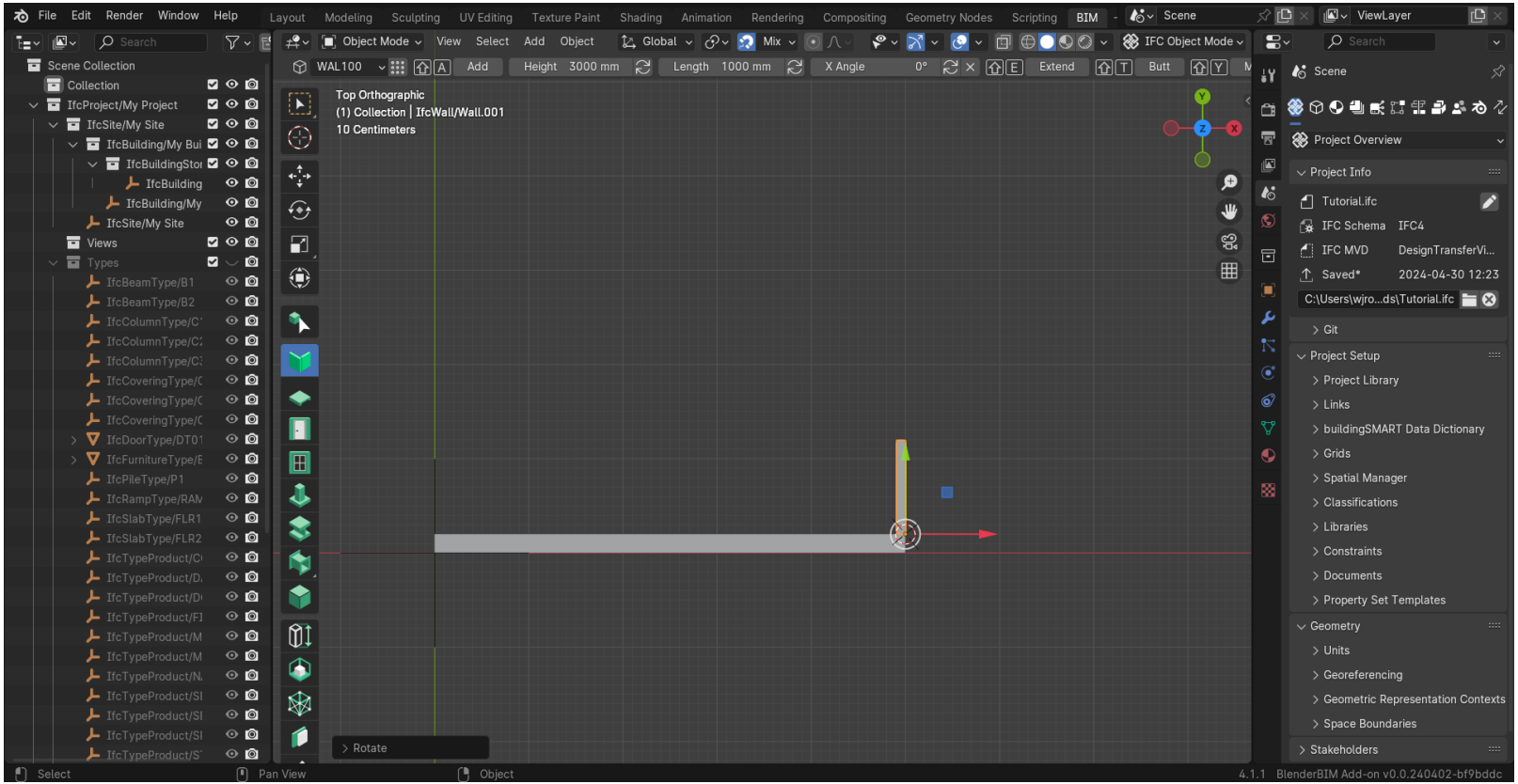
Move 3D-cursor with ‘shift+RMB’ (drag); snap to corner



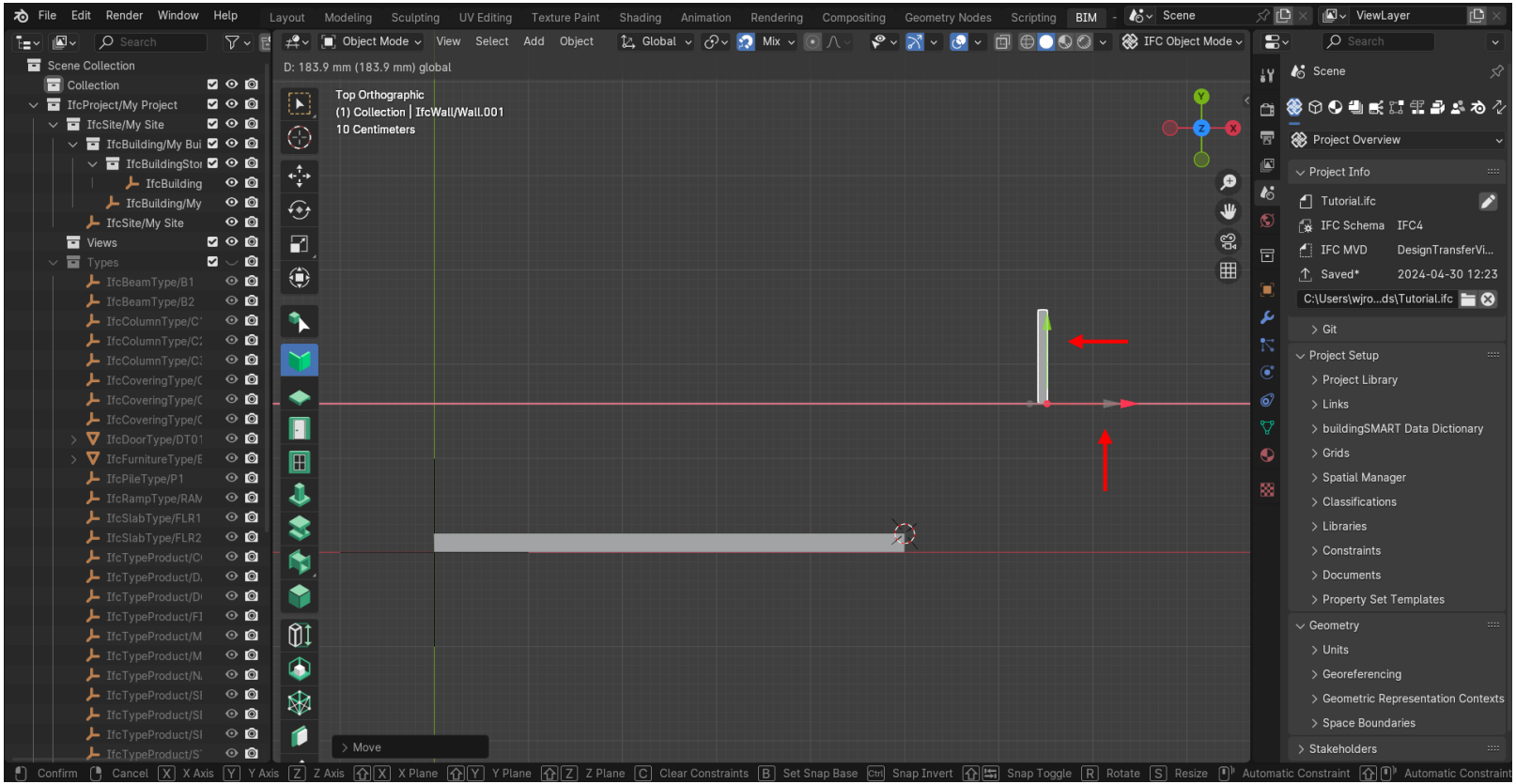
Add new wall with ‘shift+A’, the origin is where 3D-cursor is



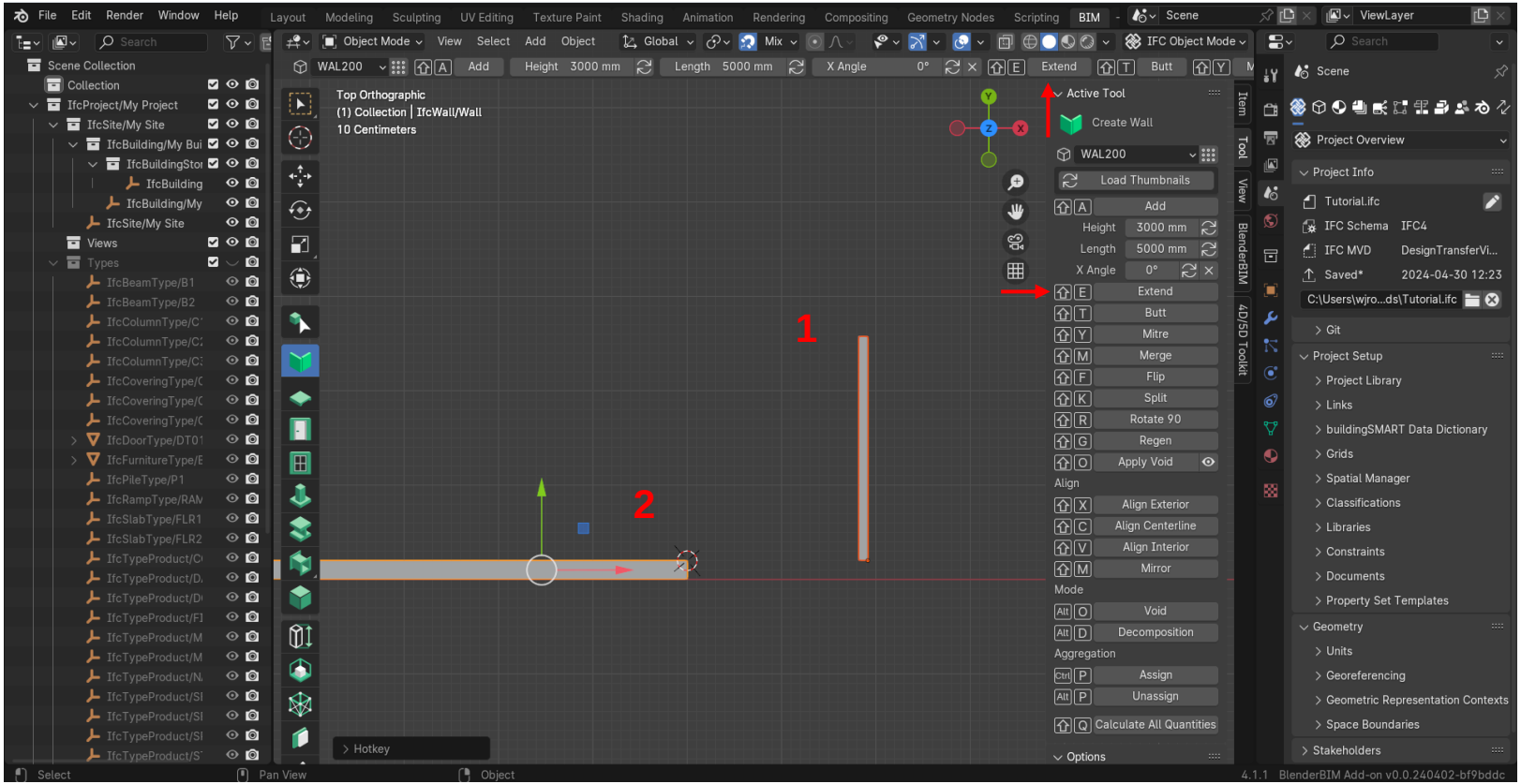
Take a better look: top-down view by pressing the Z (‘nump 7’)



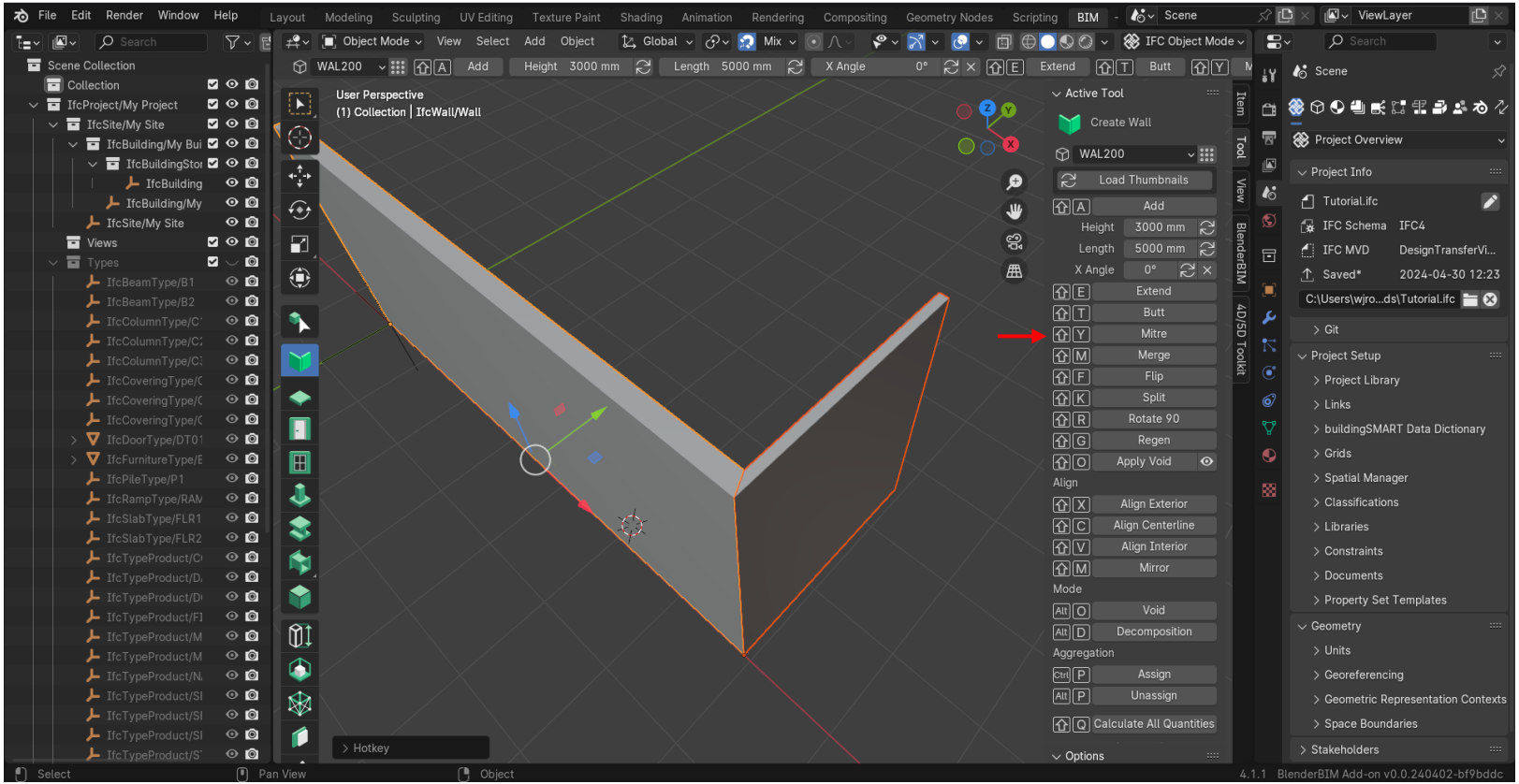
Rotate 90 deg: ‘R+X/Y/Z (axis)+ 90’



Move wall with gizmo (‘G+X/Y/Z + distance’)



Select both and click extend (hold shift for multiple select, ‘shift+E’)

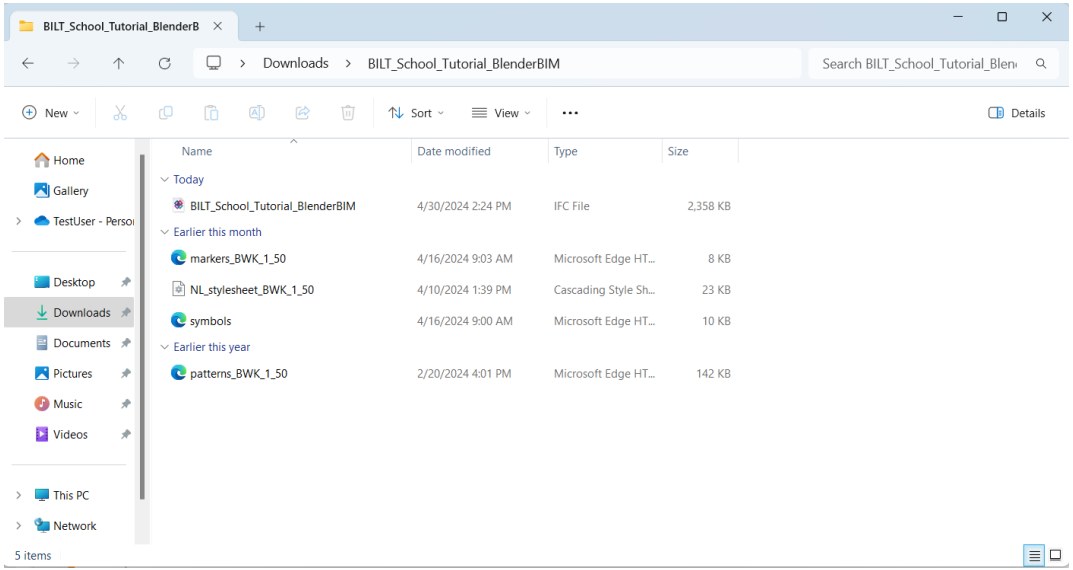


Now click ‘Mitre’ (‘shift+Y’), awesome! Scroll in top row for the other options, ‘N’ for side panel

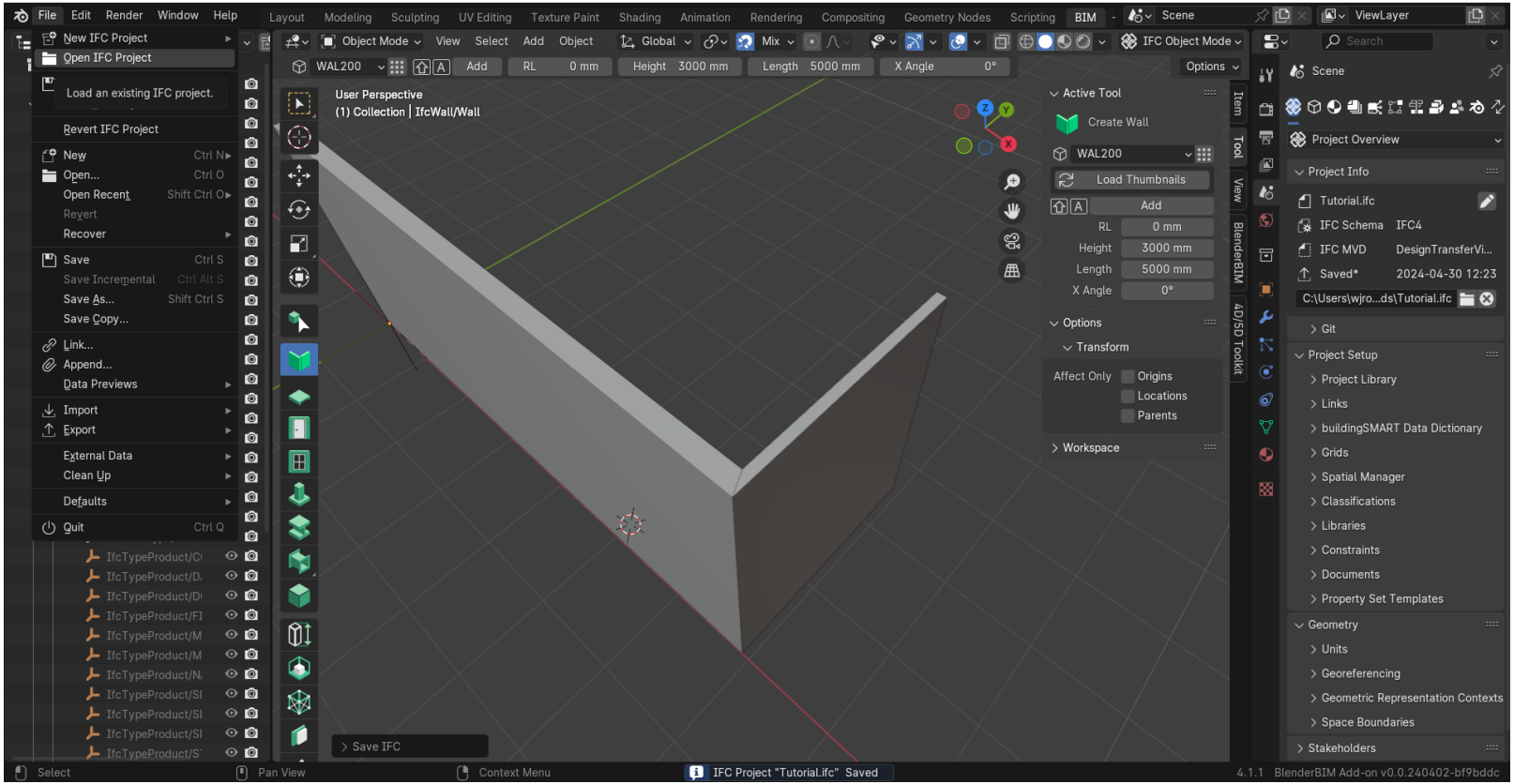
Floor
Column
Door
Wall
Drawing

Opening an Ifc project

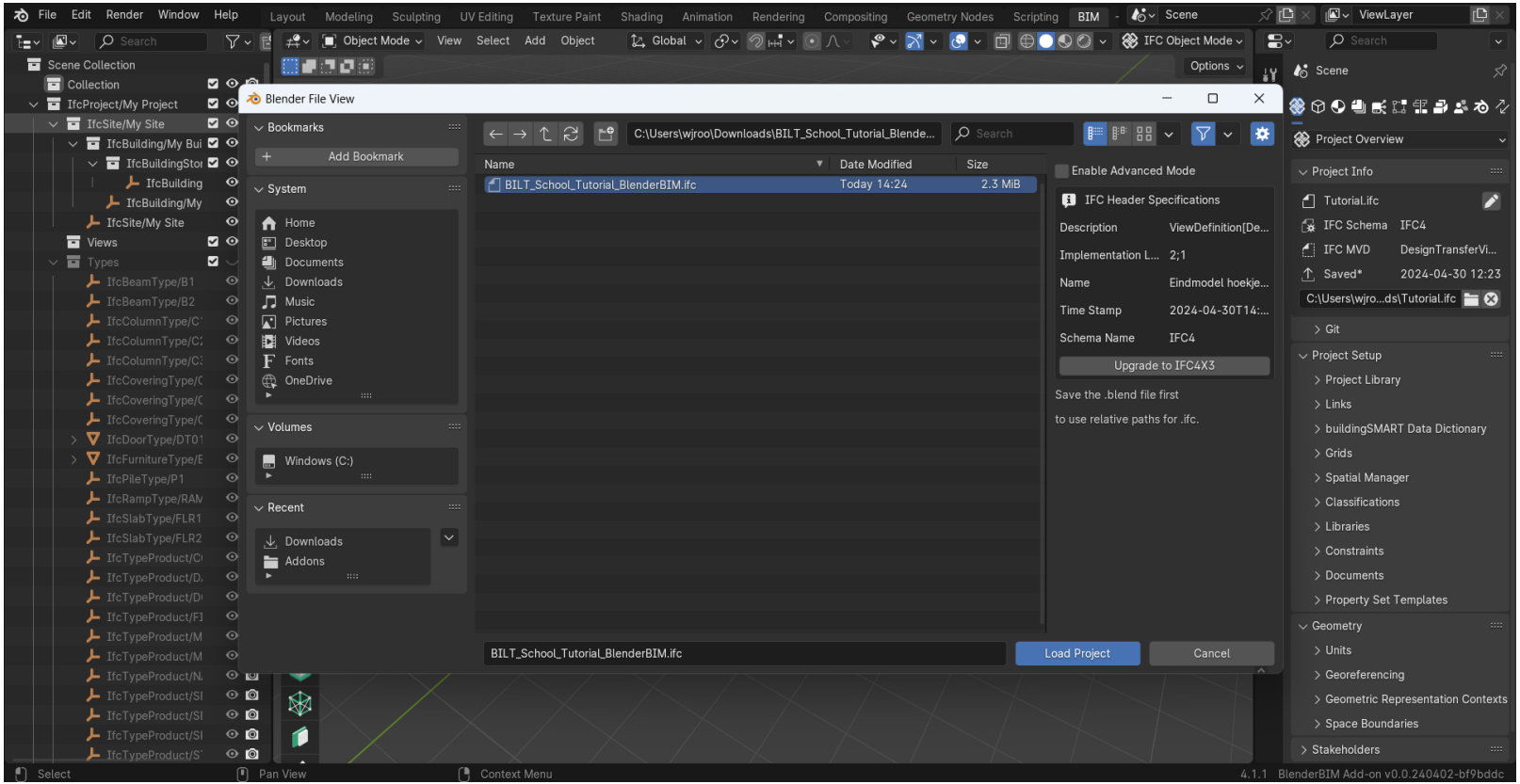
Now let’s try it in an example IFC project!



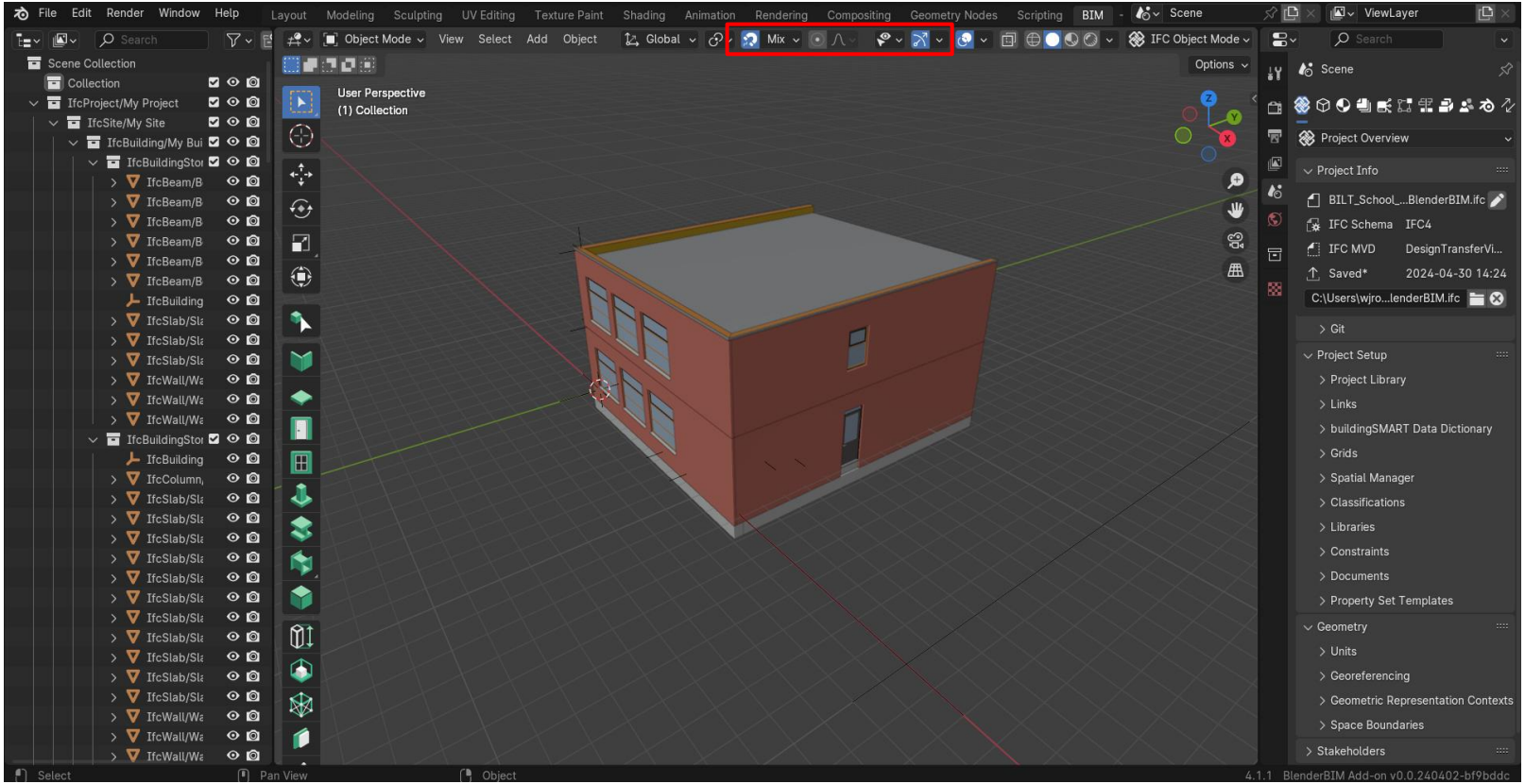
Extract downloaded tutorial .zip, should have these files



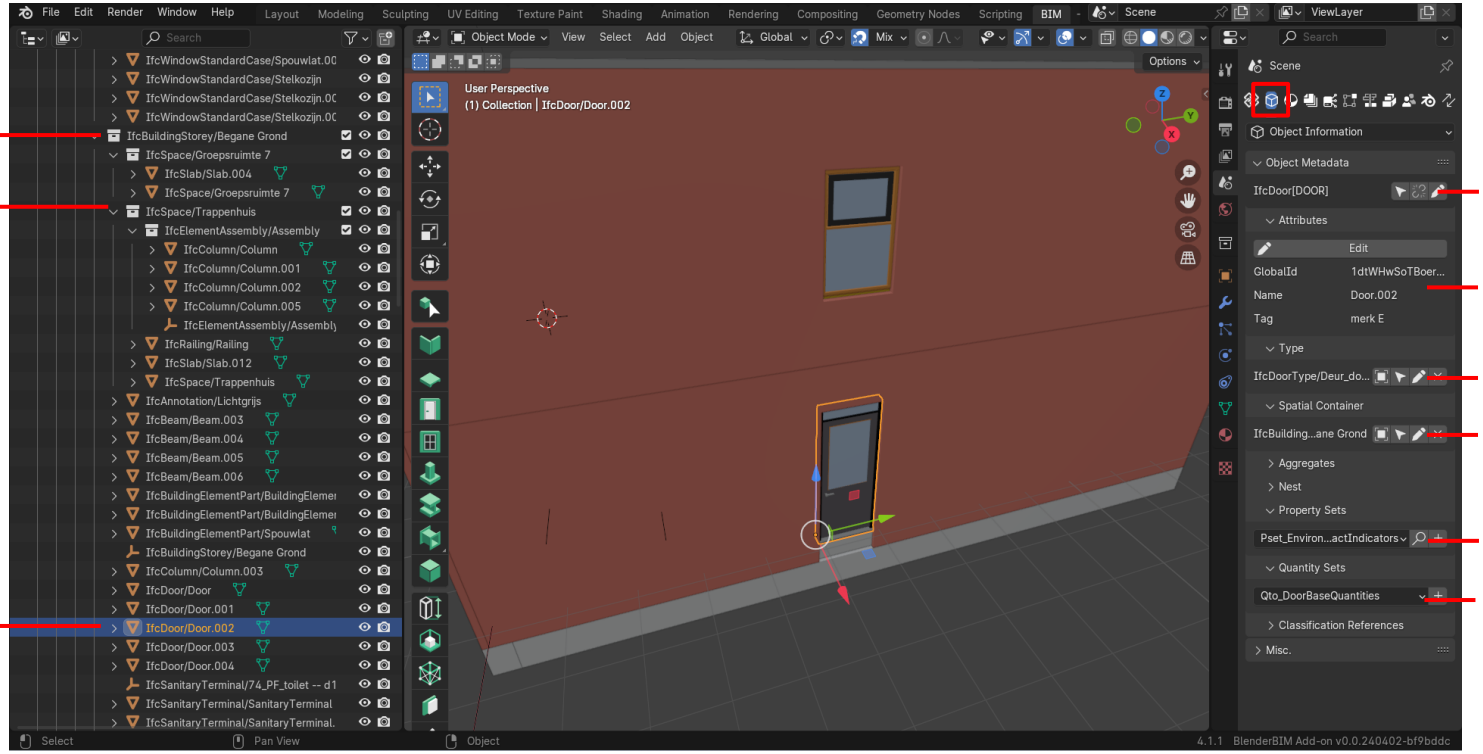
File>Open IFC Project (save this one first with ‘ctrl+S’)



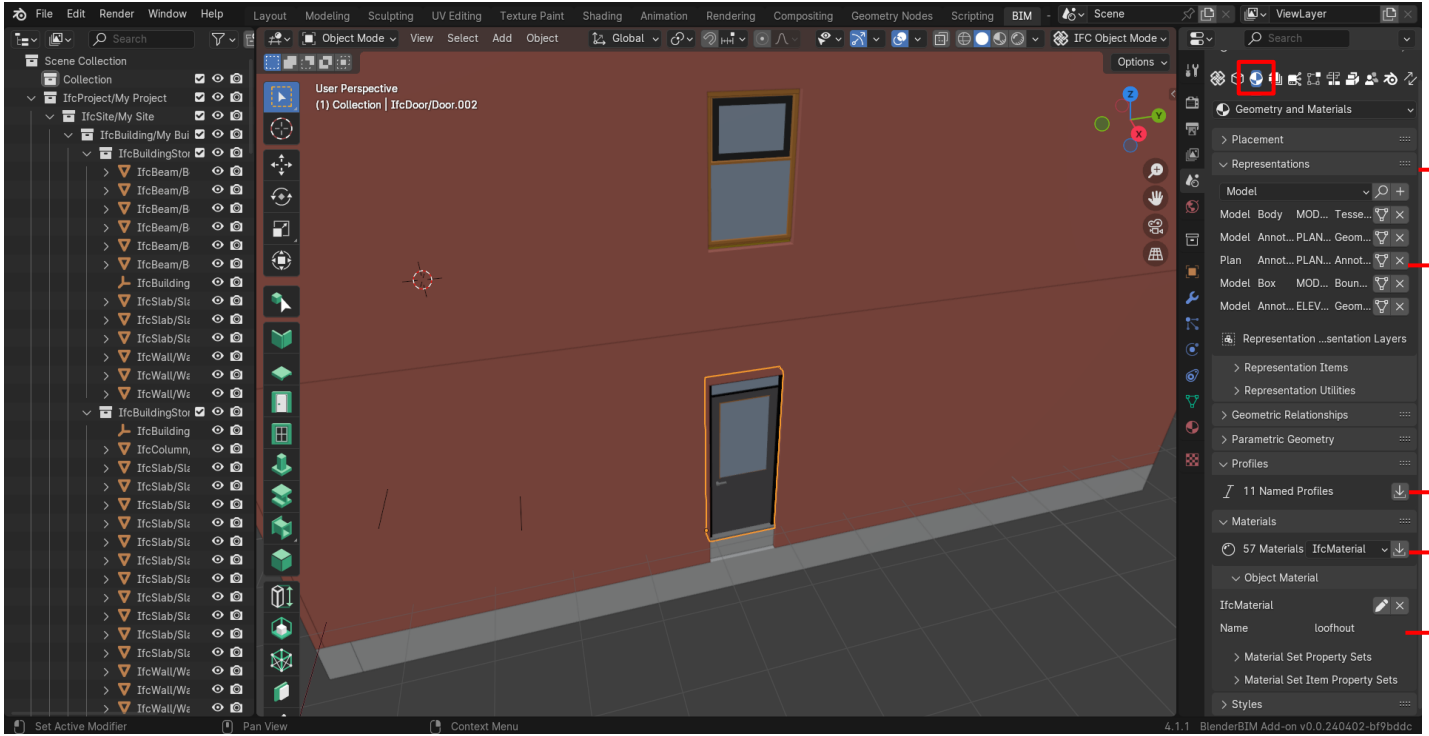
Open ‘BILT_School_Tutorial_BlenderBIM.ifc’



Don’t forget to turn on Snapping & Move gizmo



Select door and see info



Element

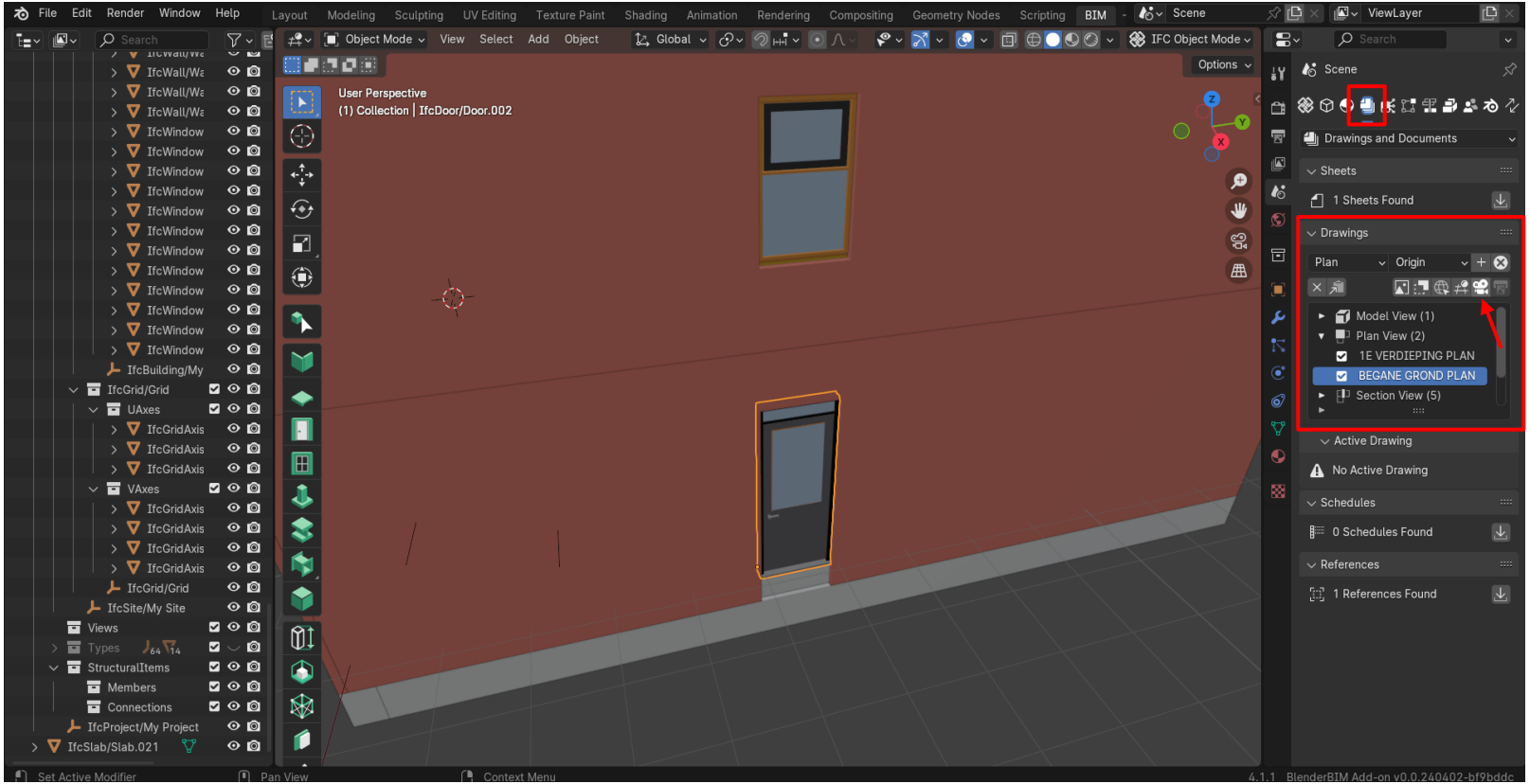
Representations (floor plan, elevations etc.)

All profiles in file

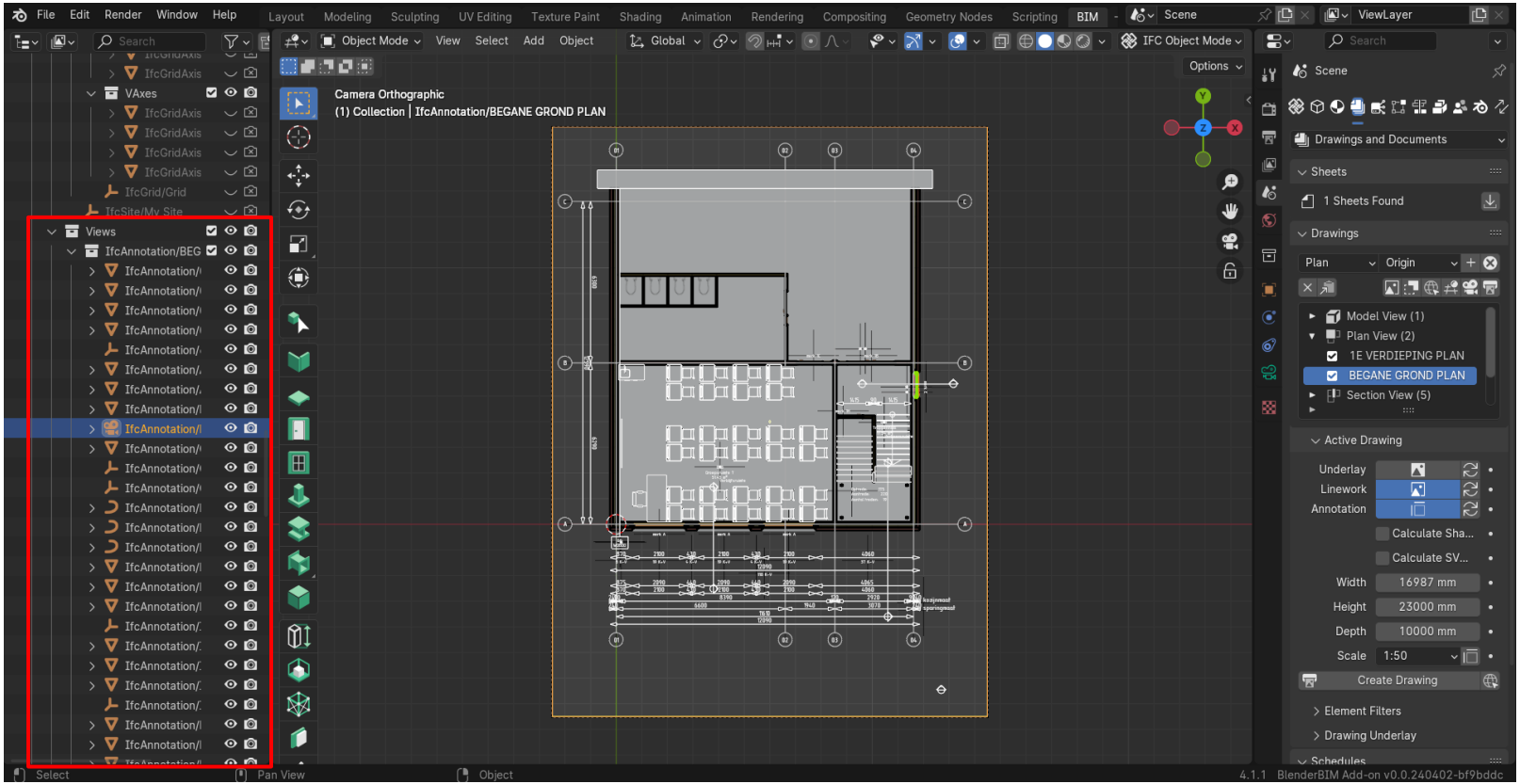
All materials in file

Assigned material(s); Sometimes thickness or profile

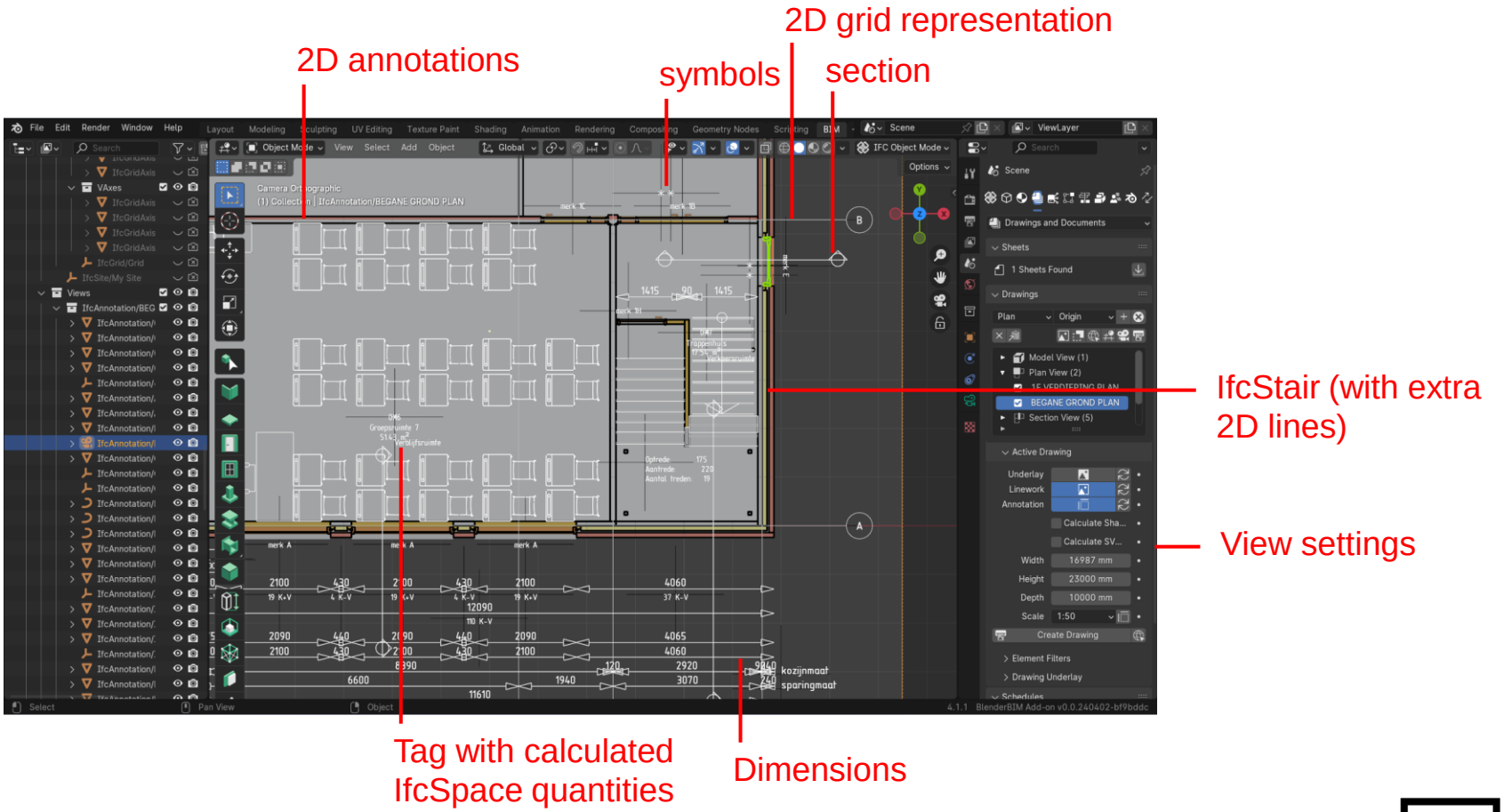
Select door and see info



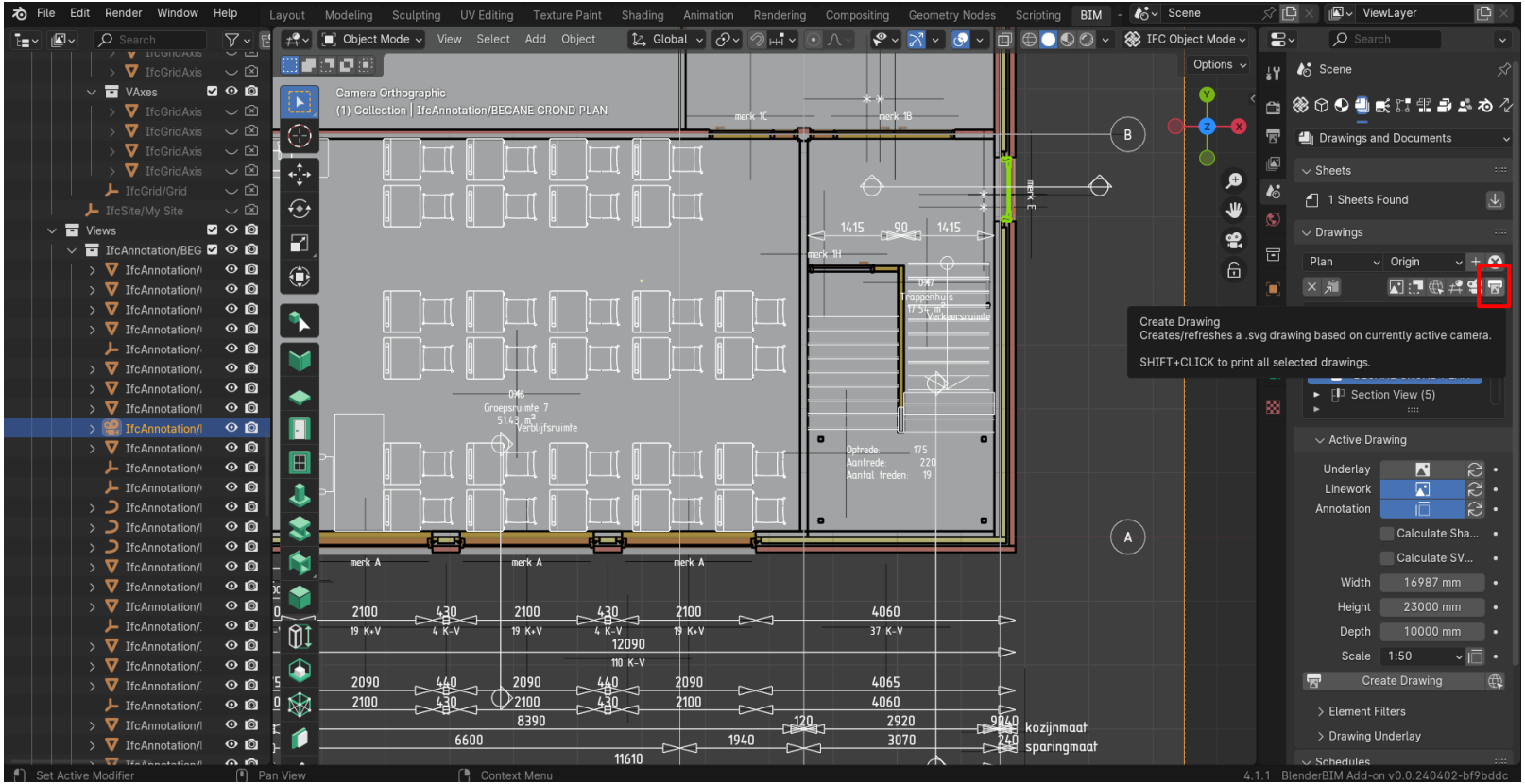
Drawings and Documents: click the download button, select drawing and then press movie cam icon



The view/floor plan is ‘generated’ into the project browser

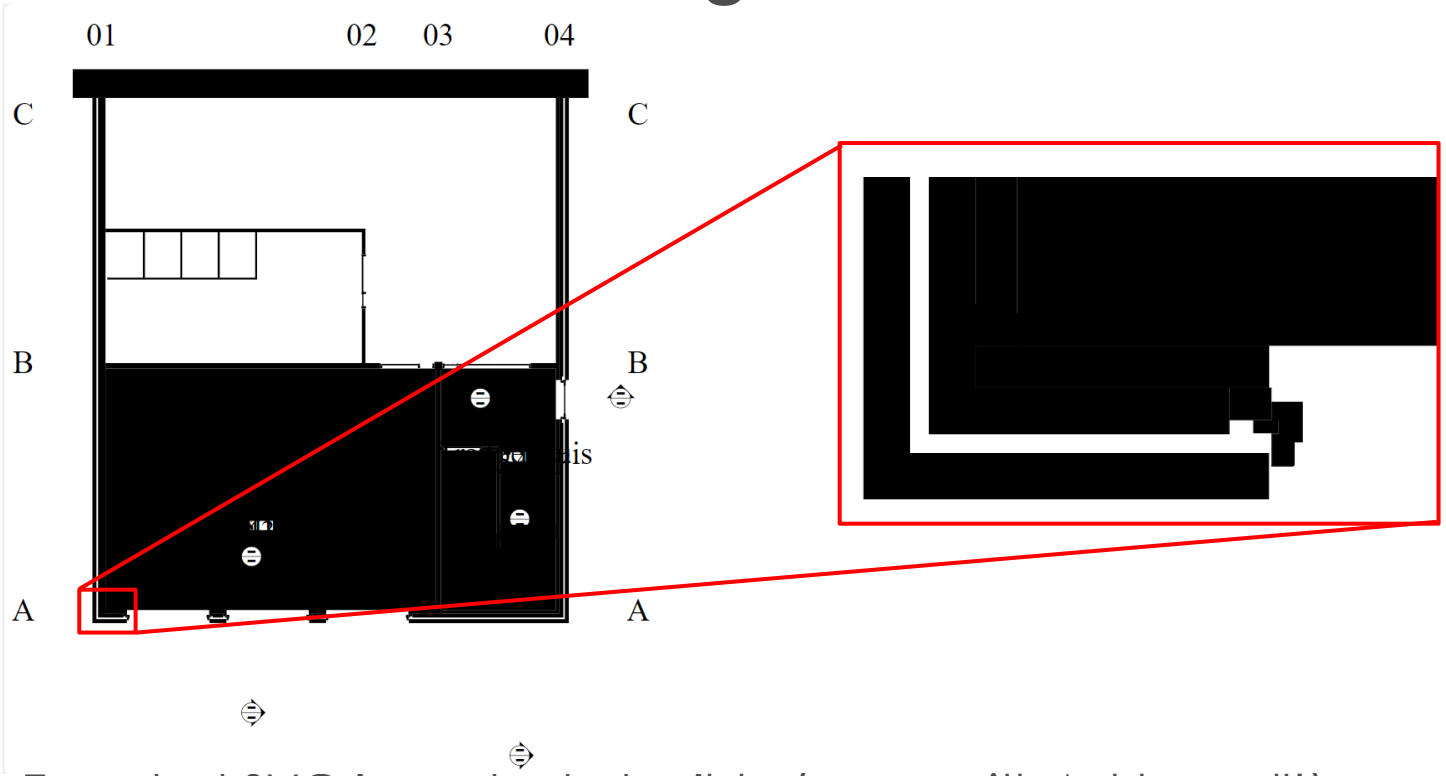


Drawings and Documents: click the download button, select drawing and then press movie cam icon

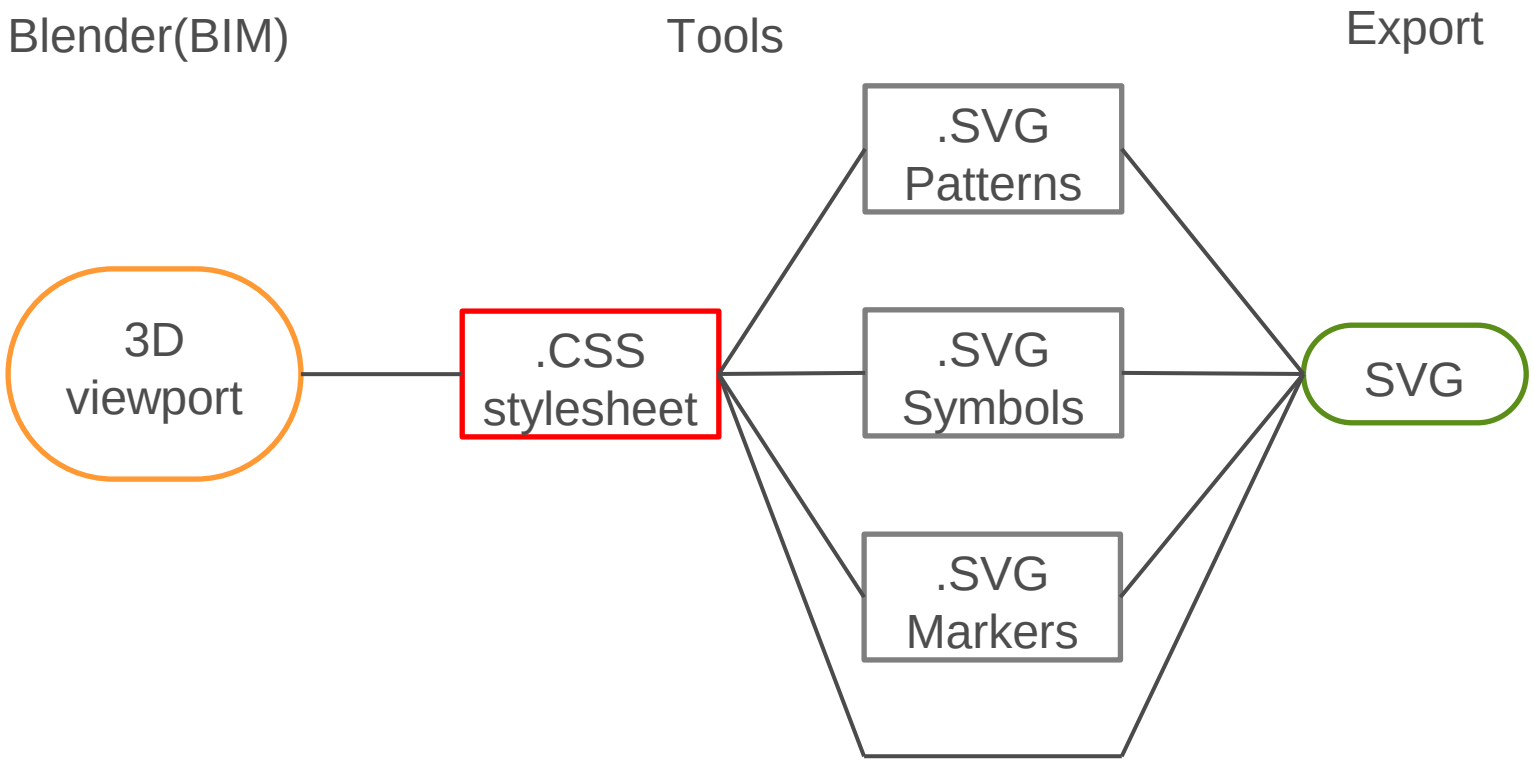


Press printer icon to generate floor plan drawing

Generating documentation



Exported SVG issue: looks terrible (zoom with ‘ctrl+scroll’)



How exporting works

Annotation

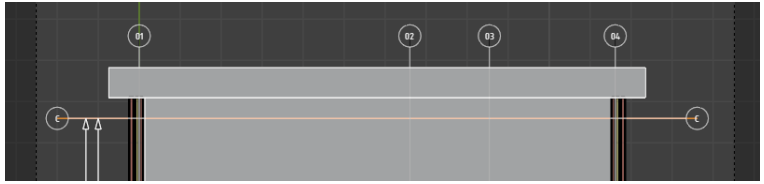
.CSS stylesheet

.SVG Symbols

.SVG Markers

.SVG Patterns

SVG

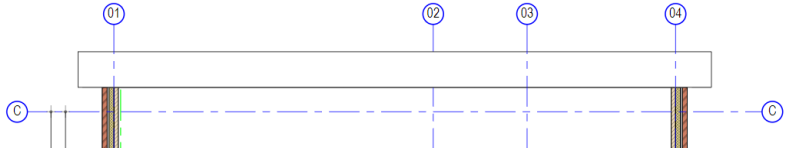



```
34  .PredefinedType-LINEWORK.thick { stroke-width: 0.5; }
35  .PredefinedType-LINEWORK.strong { stroke-width: 1; }
36  .PredefinedType-BACKGROUND { stroke: black; stroke-width: 0.10; }
37  .PredefinedType-GRID { marker-start: url(#grid-marker); marker-end: url(#grid-marker); Stroke: blue; }
38  .PredefinedType-SECTIONLEVEL { marker-start: url(#section-level-marker); stroke-dasharray: 12.5, 5, 5, 5; }
39  .PredefinedType-PLANLEVEL { marker-end: url(#plan-level-marker); }
40  .PredefinedType-DIMENSION { marker-start: url(#dimension-marker-start); marker-end: url(#dimension-marker-end); }
```

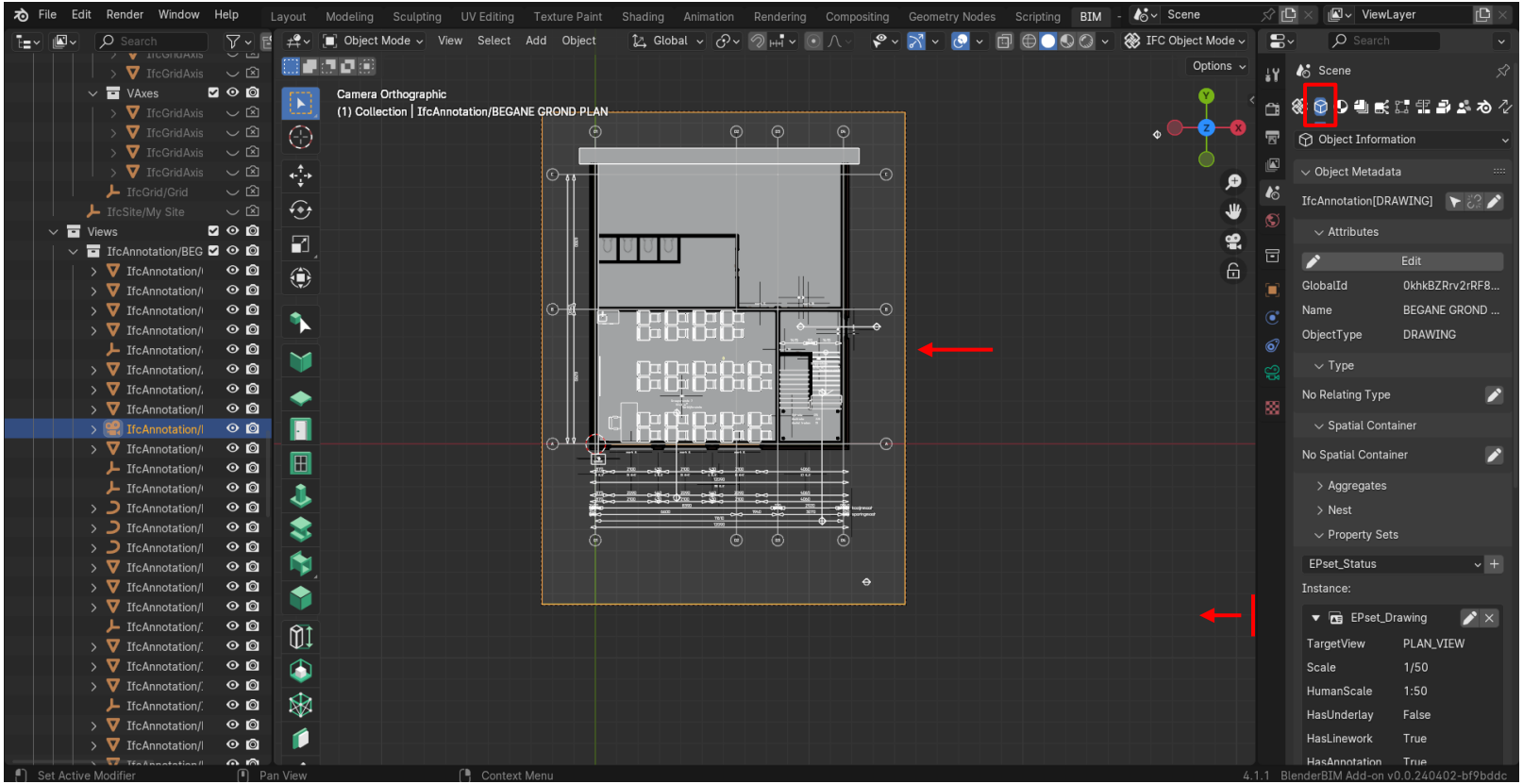
```
94      </marker>
95      <marker id="grid-marker" markerHeight="40" markerWidth="40" orient="auto" refX="20" refY="20">
96          <circle cx="20" cy="20" fill="white" stroke="blue" r="17" style="stroke-width: 2"/>
97      </marker>
```

Not needed for Grid

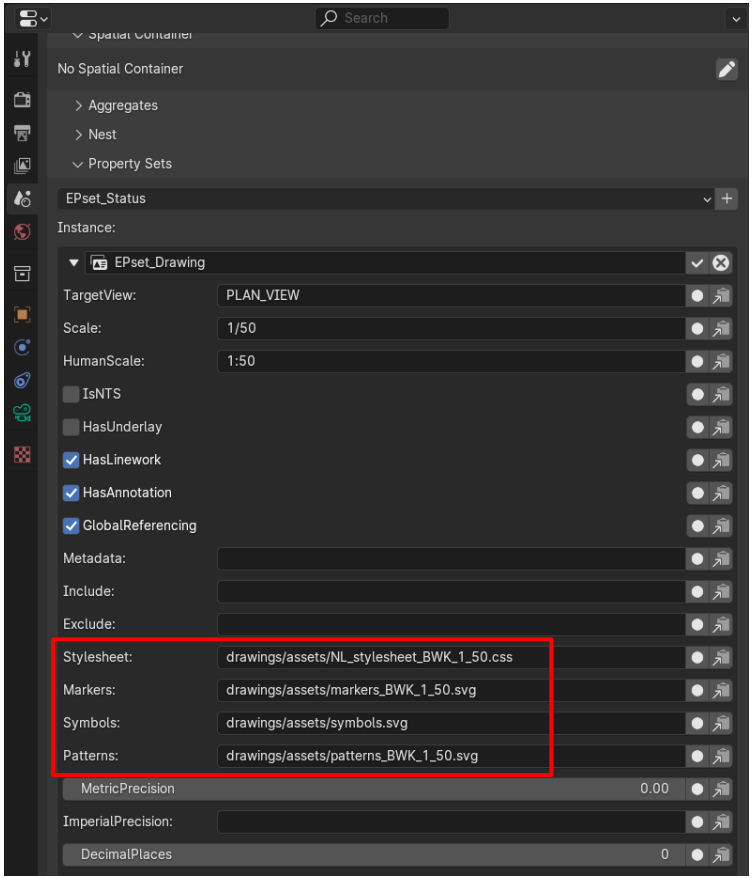
Not needed for Grid

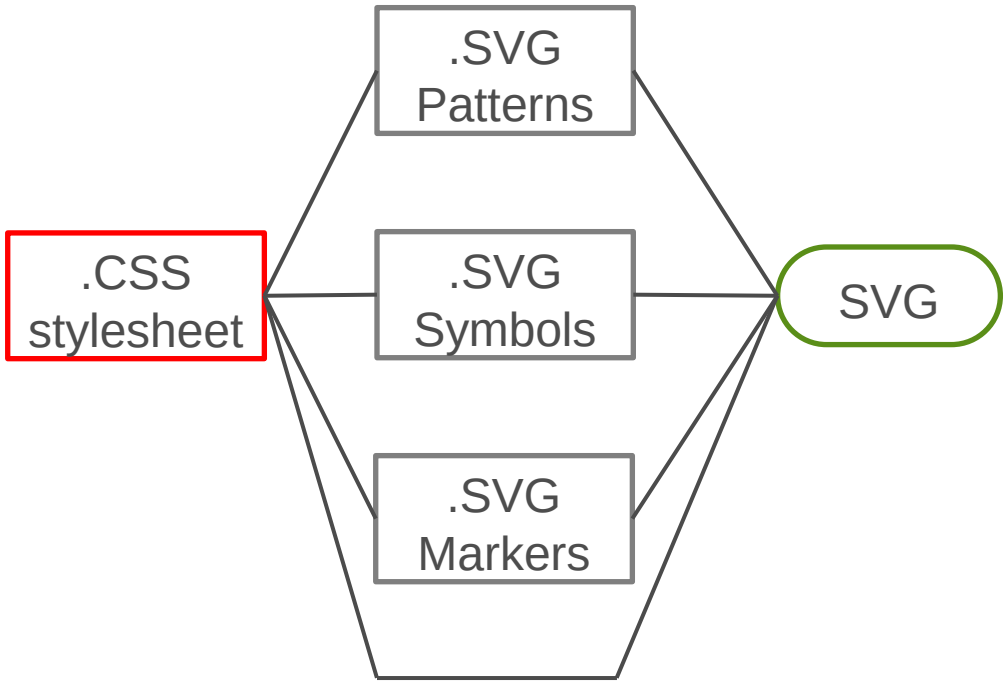


How exporting works

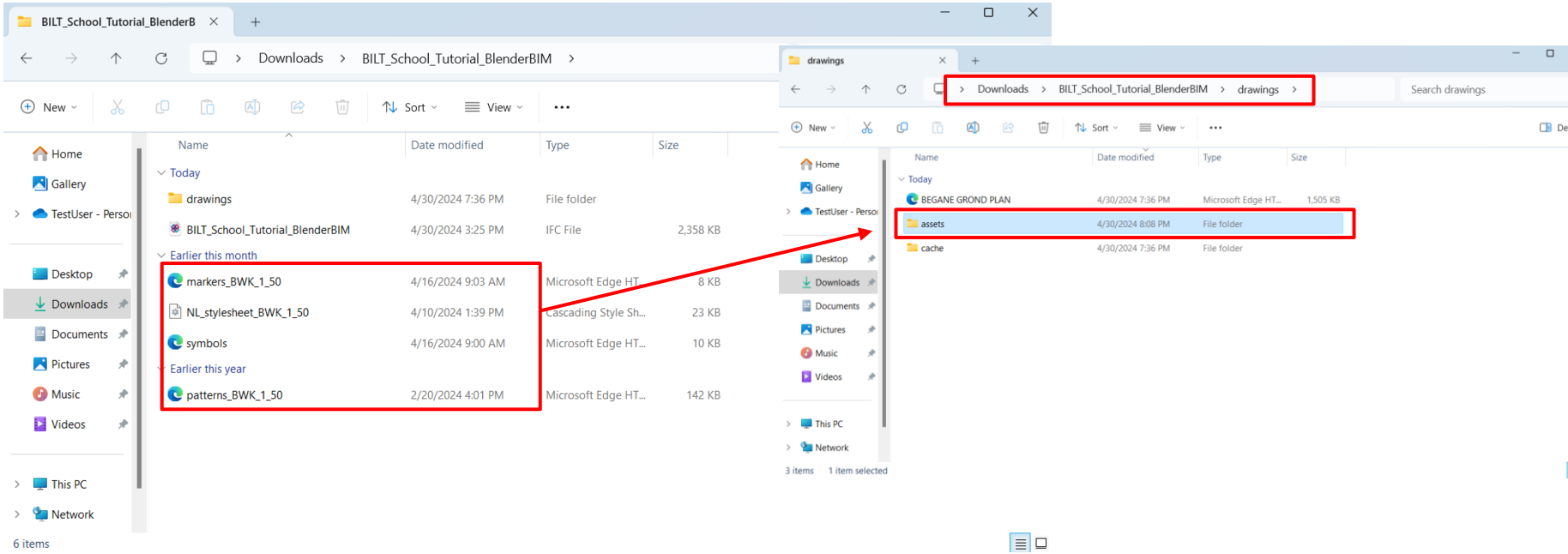


Select view border, then drag this panel to make it bigger

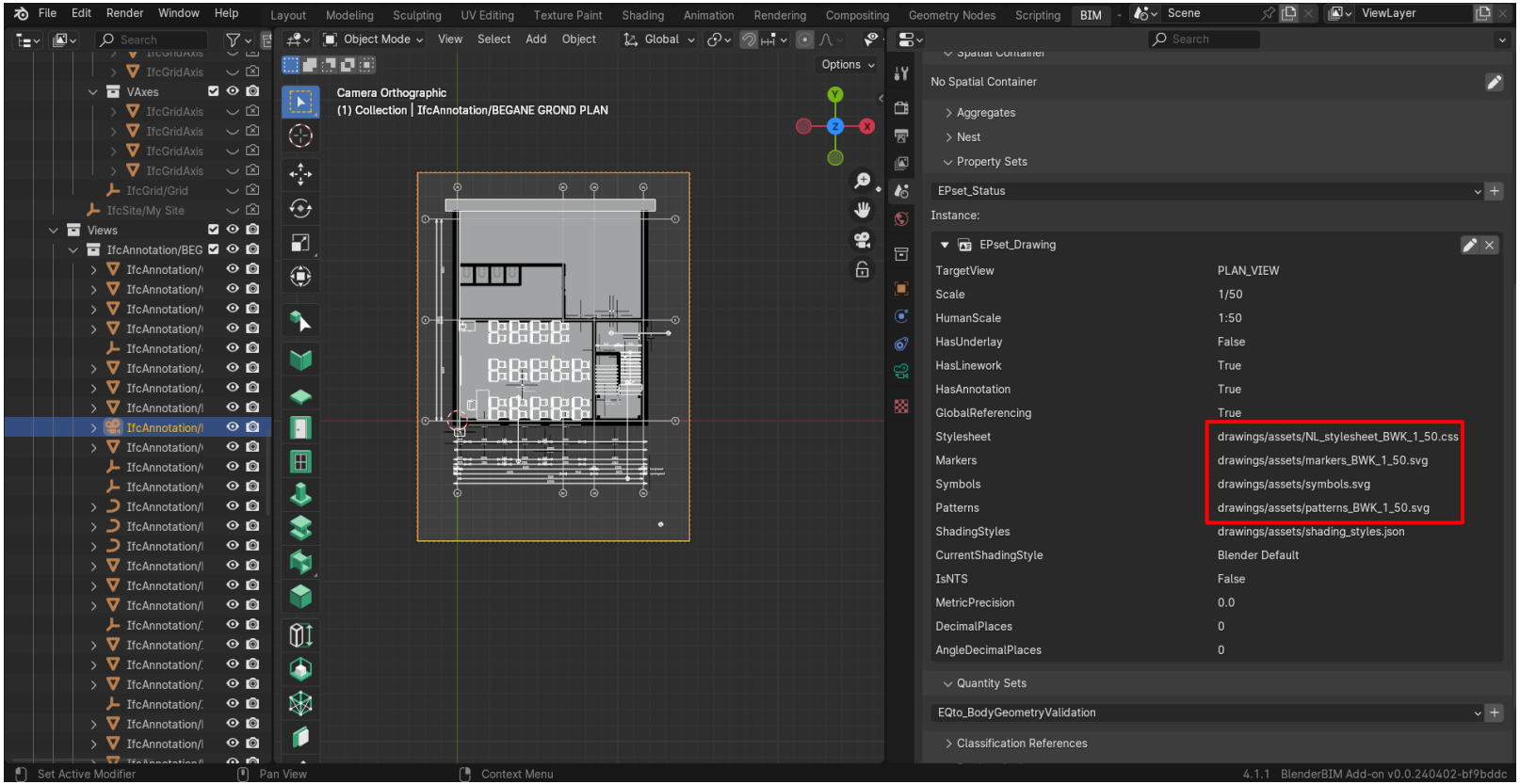




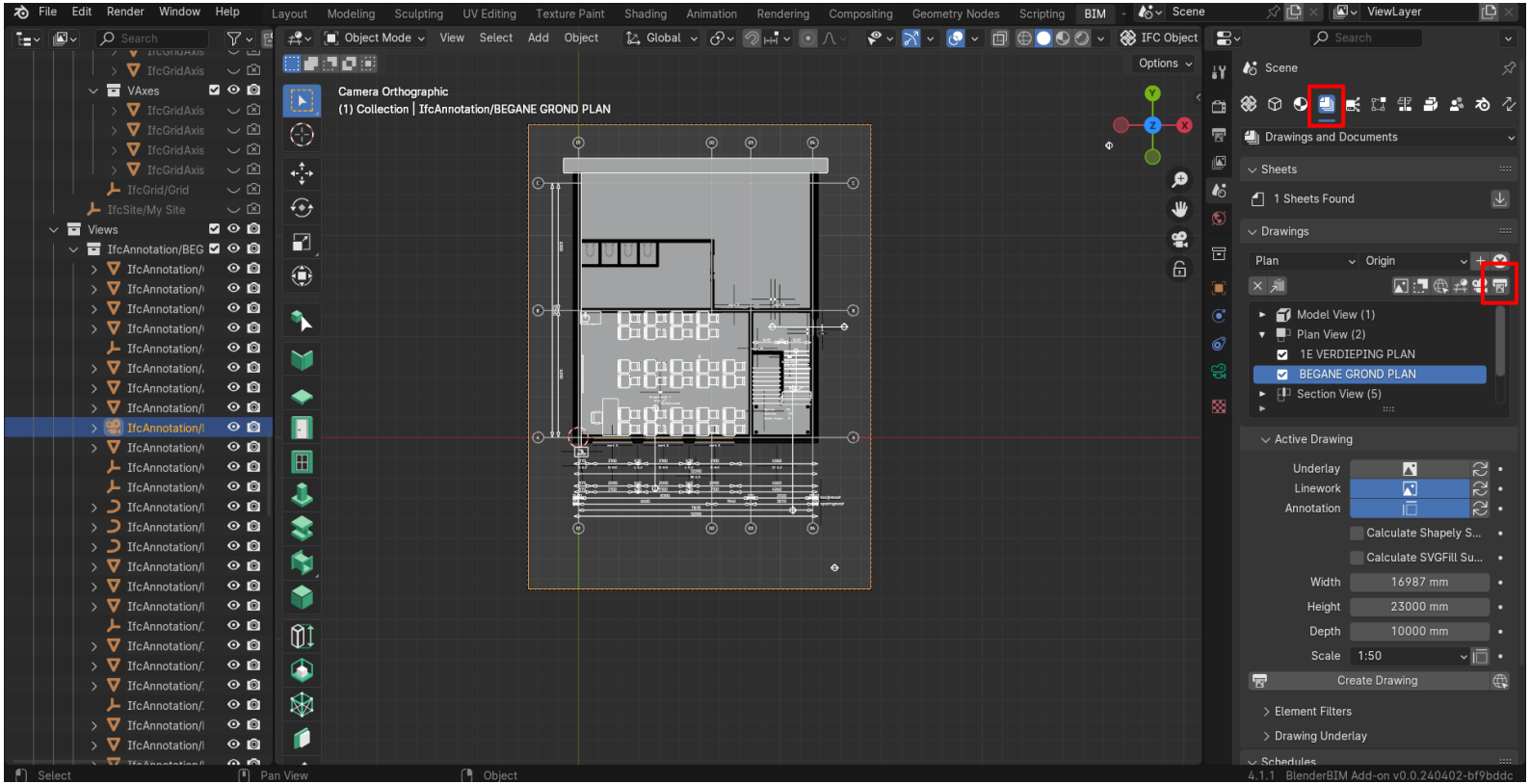
These files have to be linked correctly



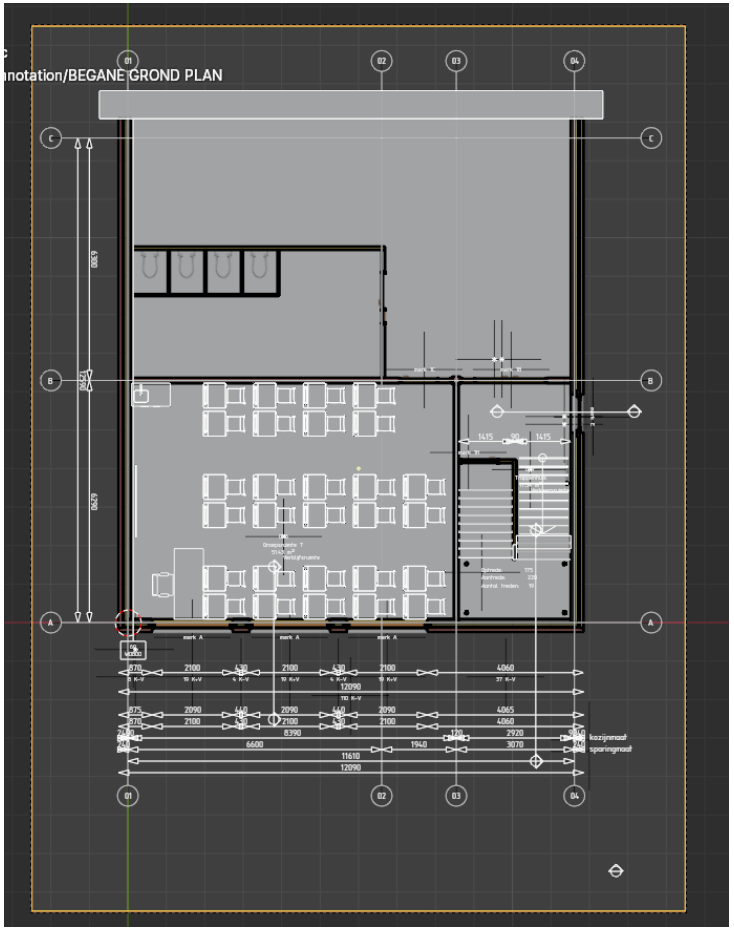
New folder generated when drawing was created; move files into the folder '/drawings/assets'



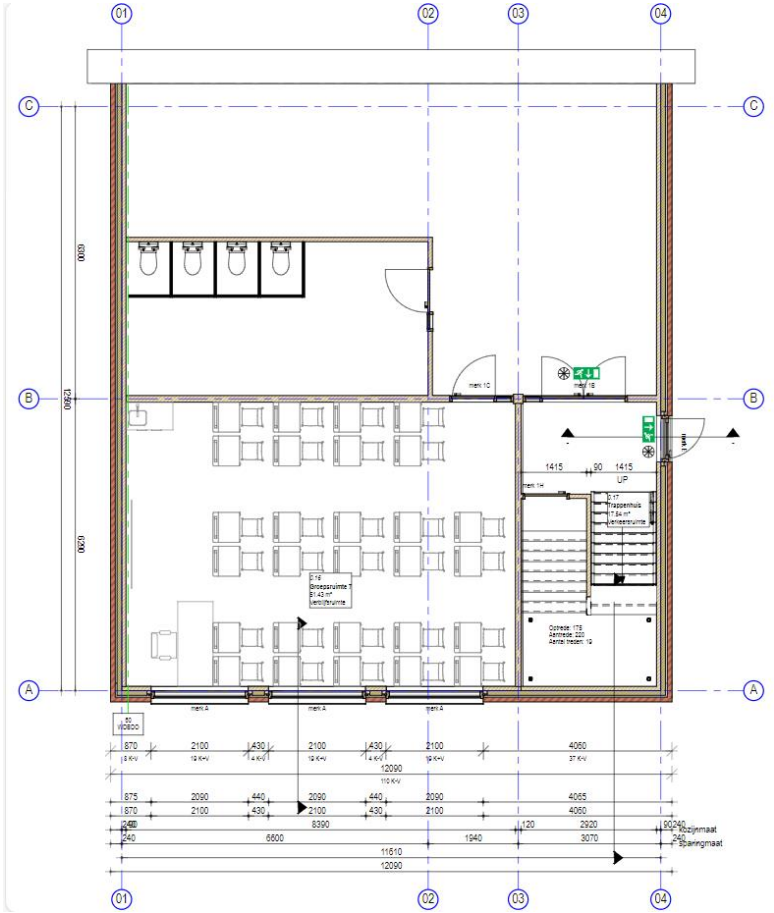
These are now correctly linked, print again!



These are now correctly linked, print again!

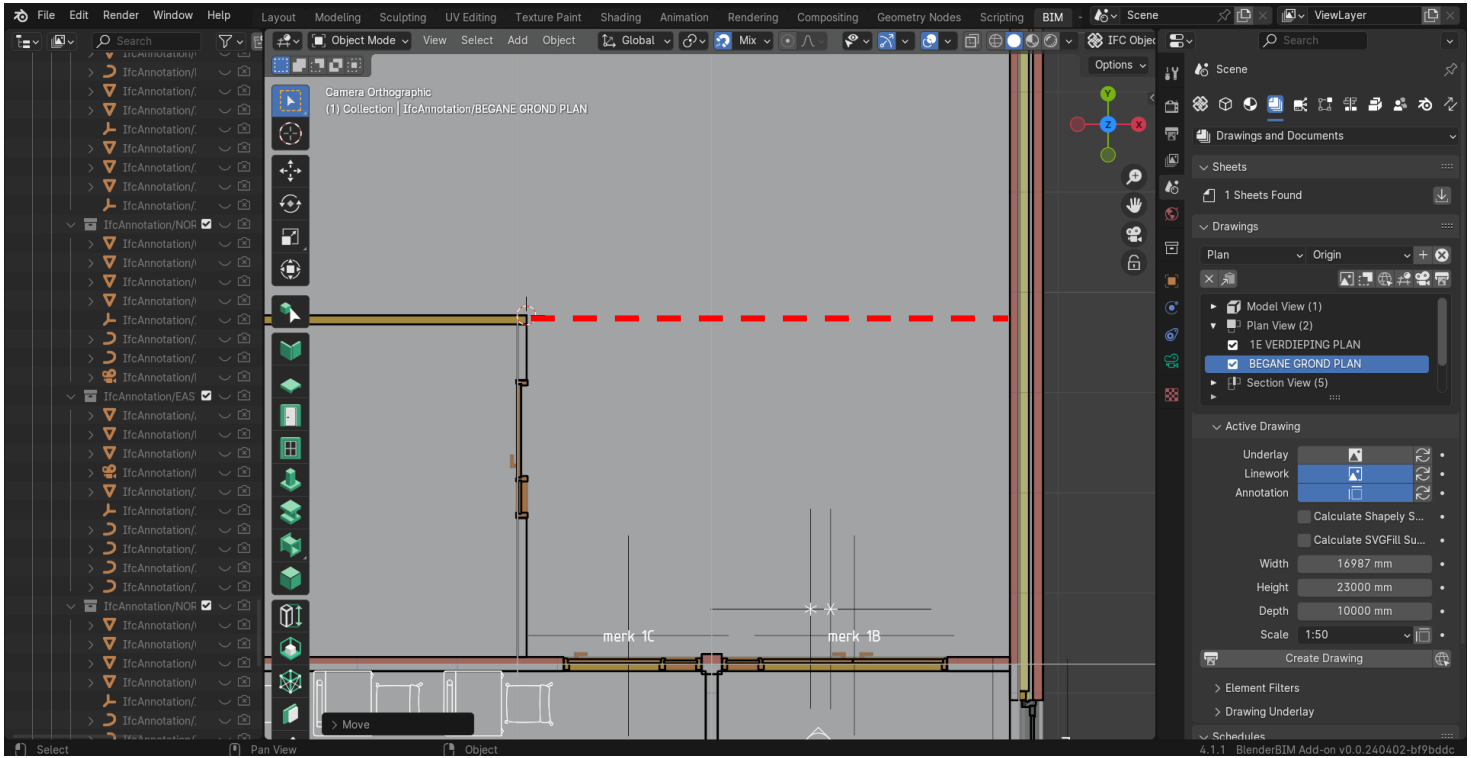


≠

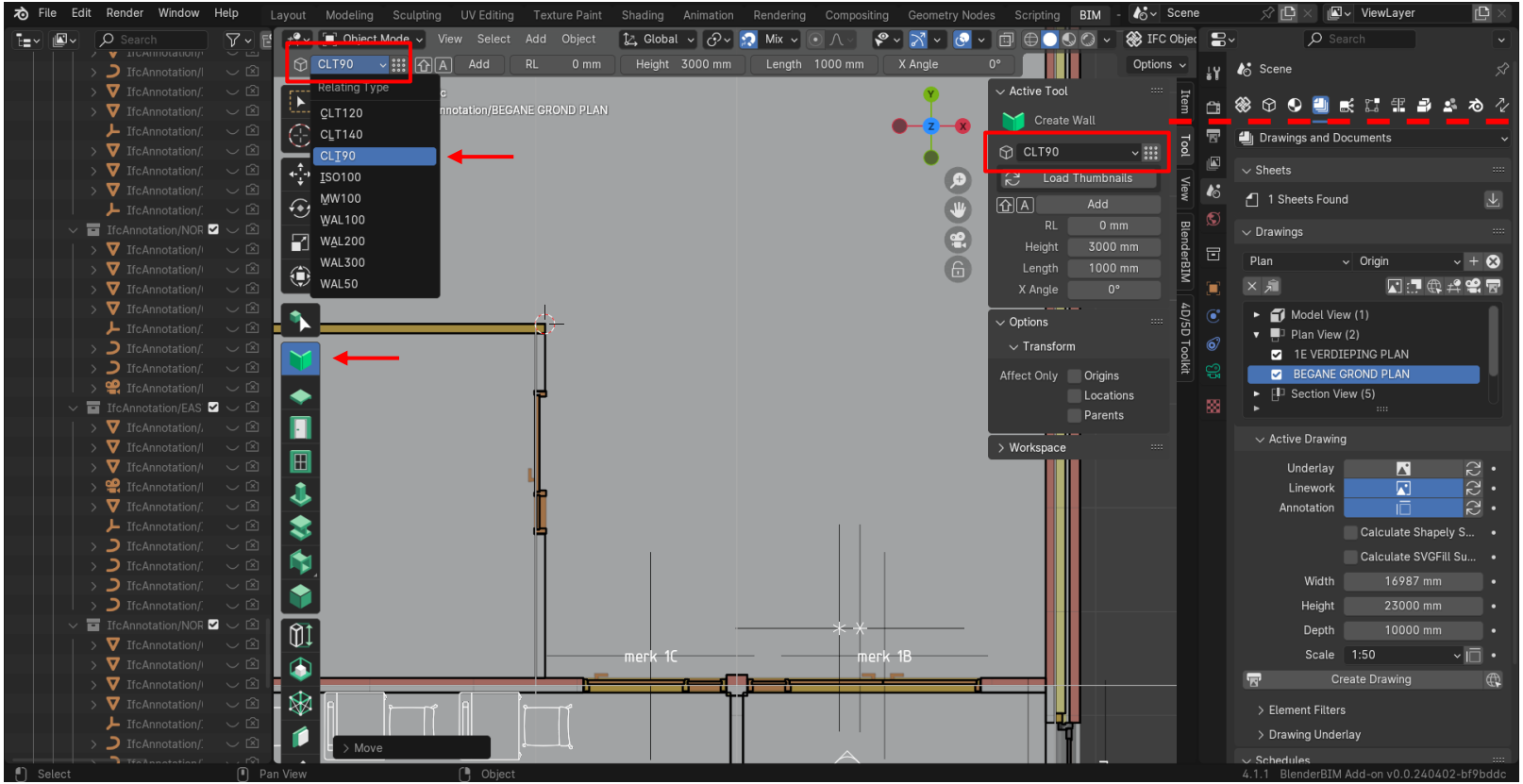


Awesome! Note that Blender and export don't match up

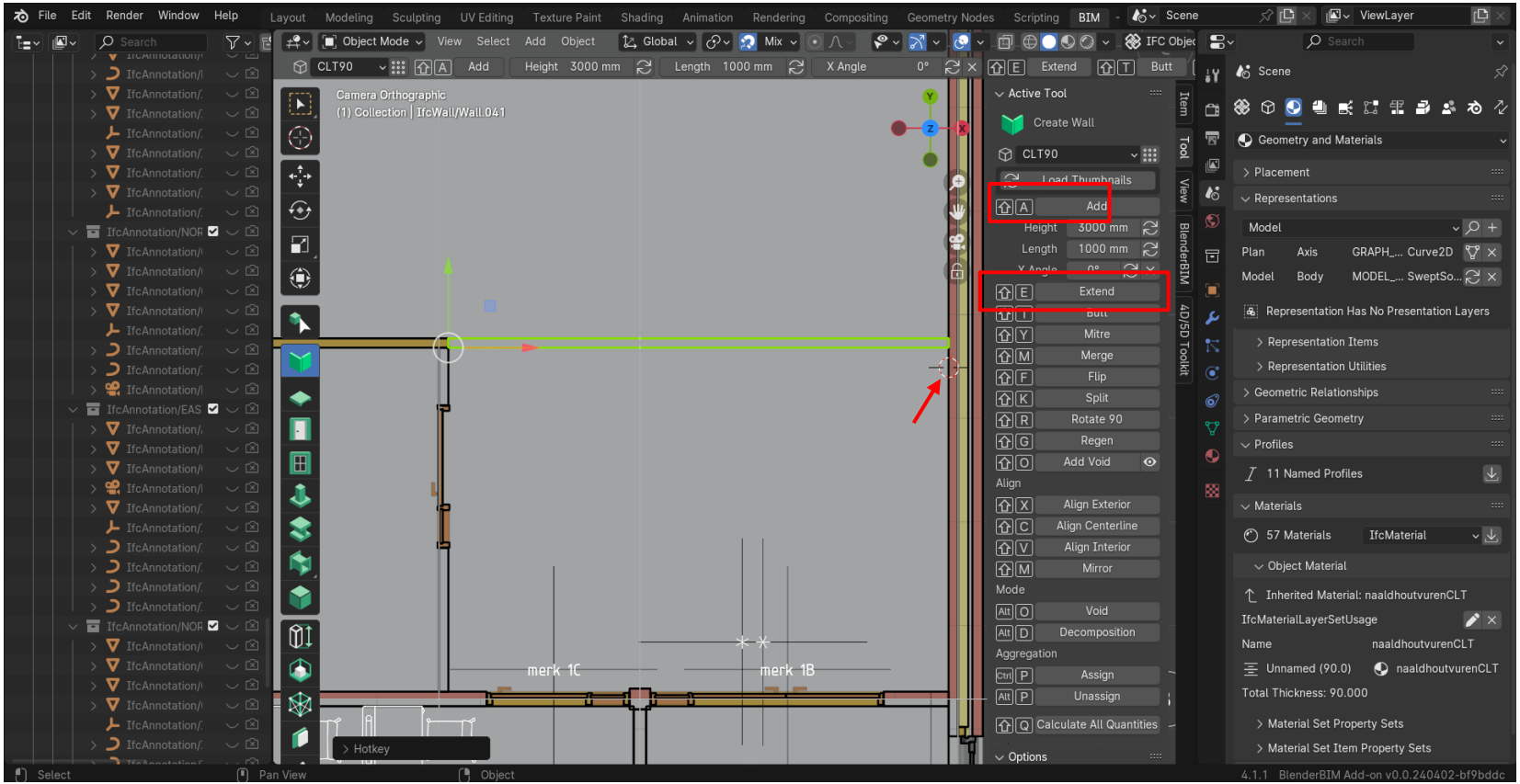
IfcWall



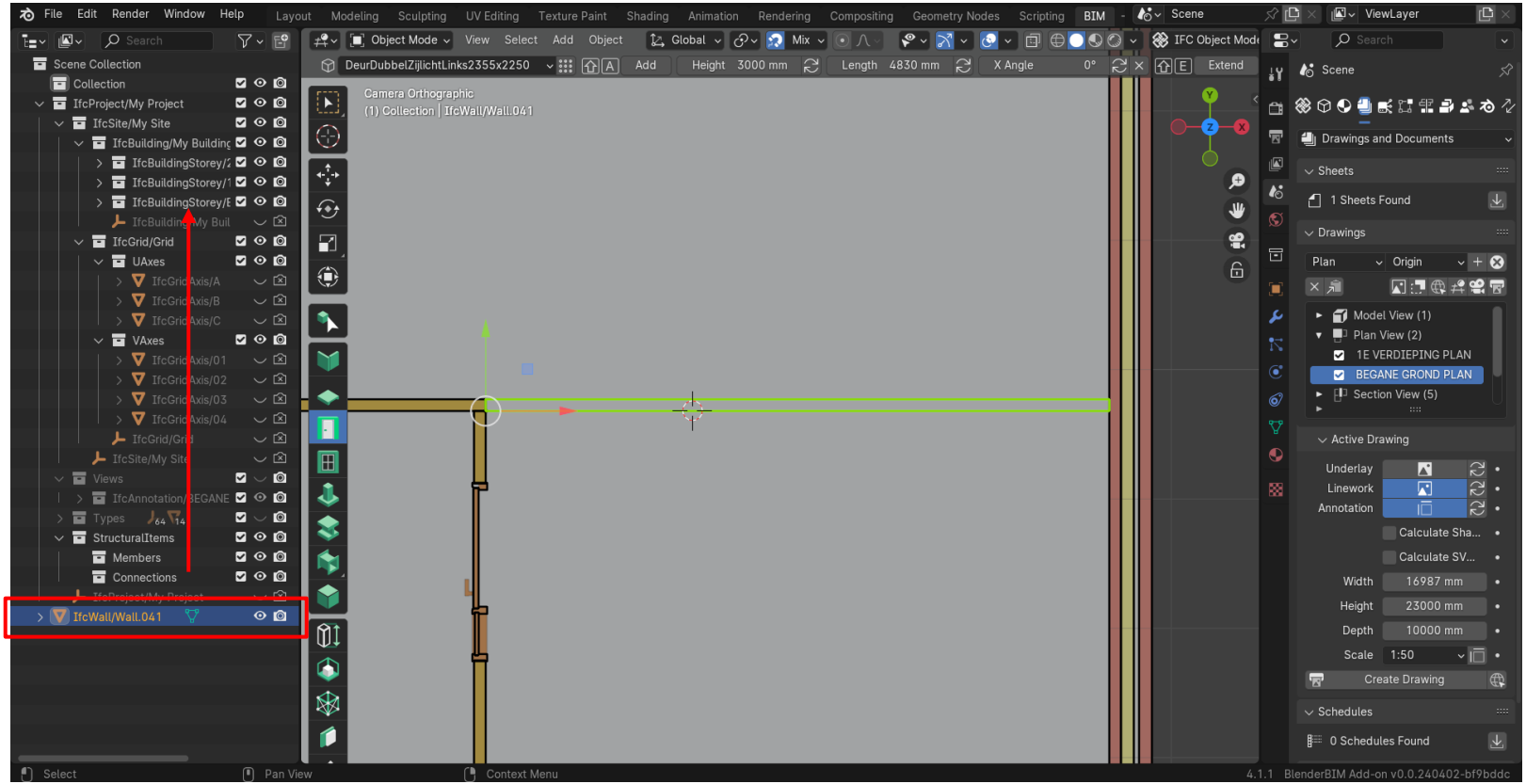
Now try to place a wall on your own; (3D cursor: ‘shift+RMB drag’)



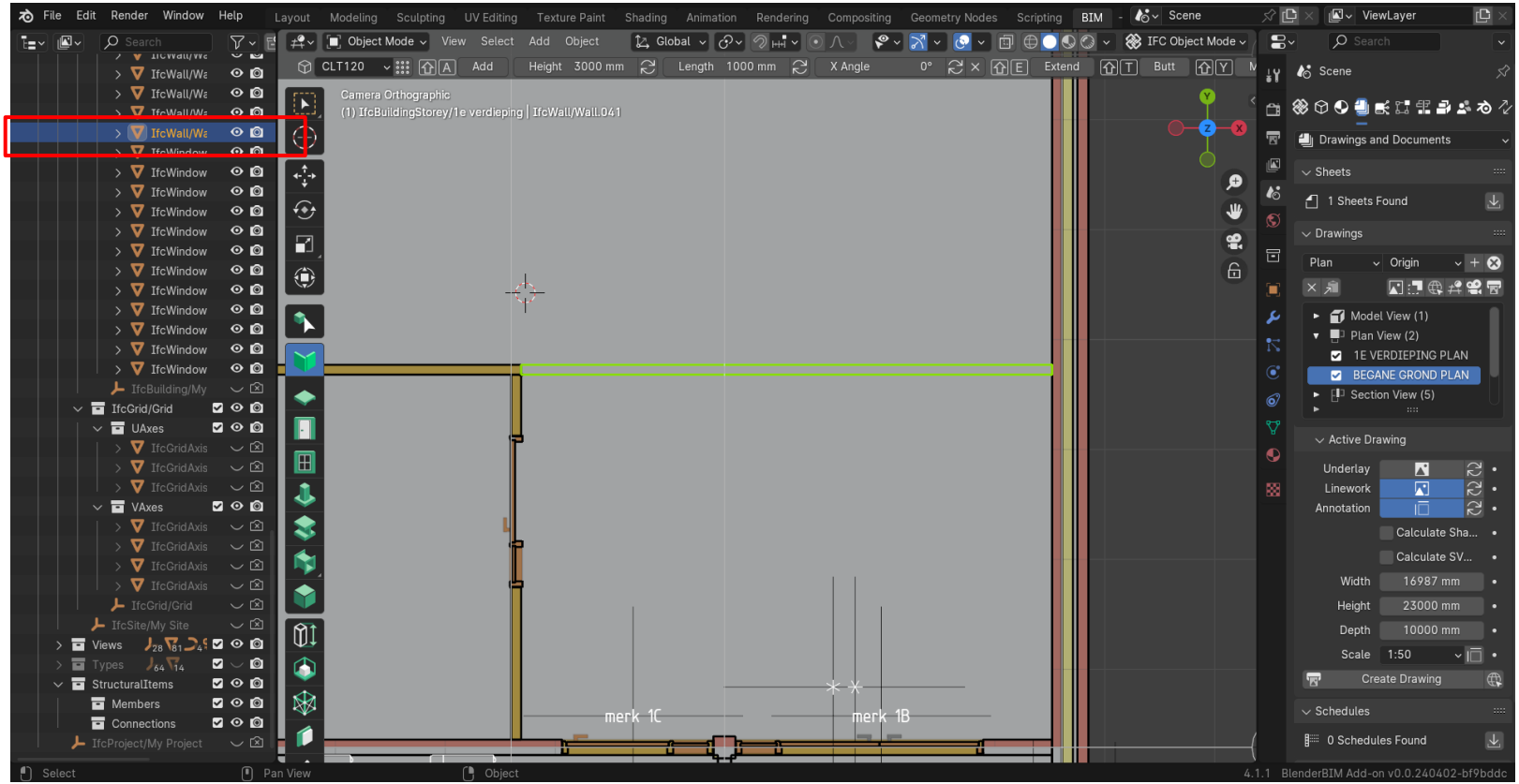
Select wall



Add wall ('shift+A') and extend ('shift+E'); if only 1element is selected, it will extend to the **3D-cursor**

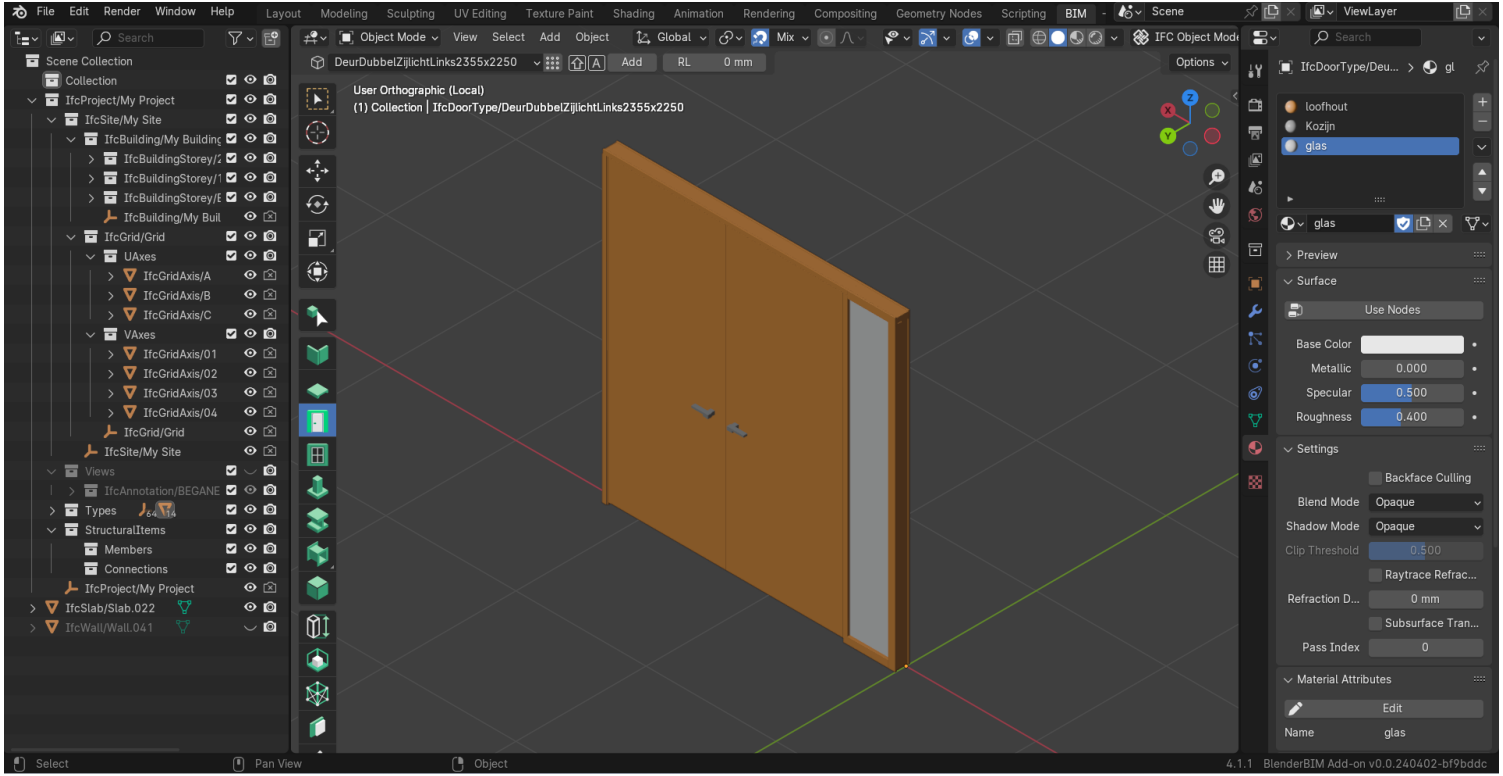


Oops! The wall isn't correctly placed in the IFC Schema, so drag it to the correct level (collection)

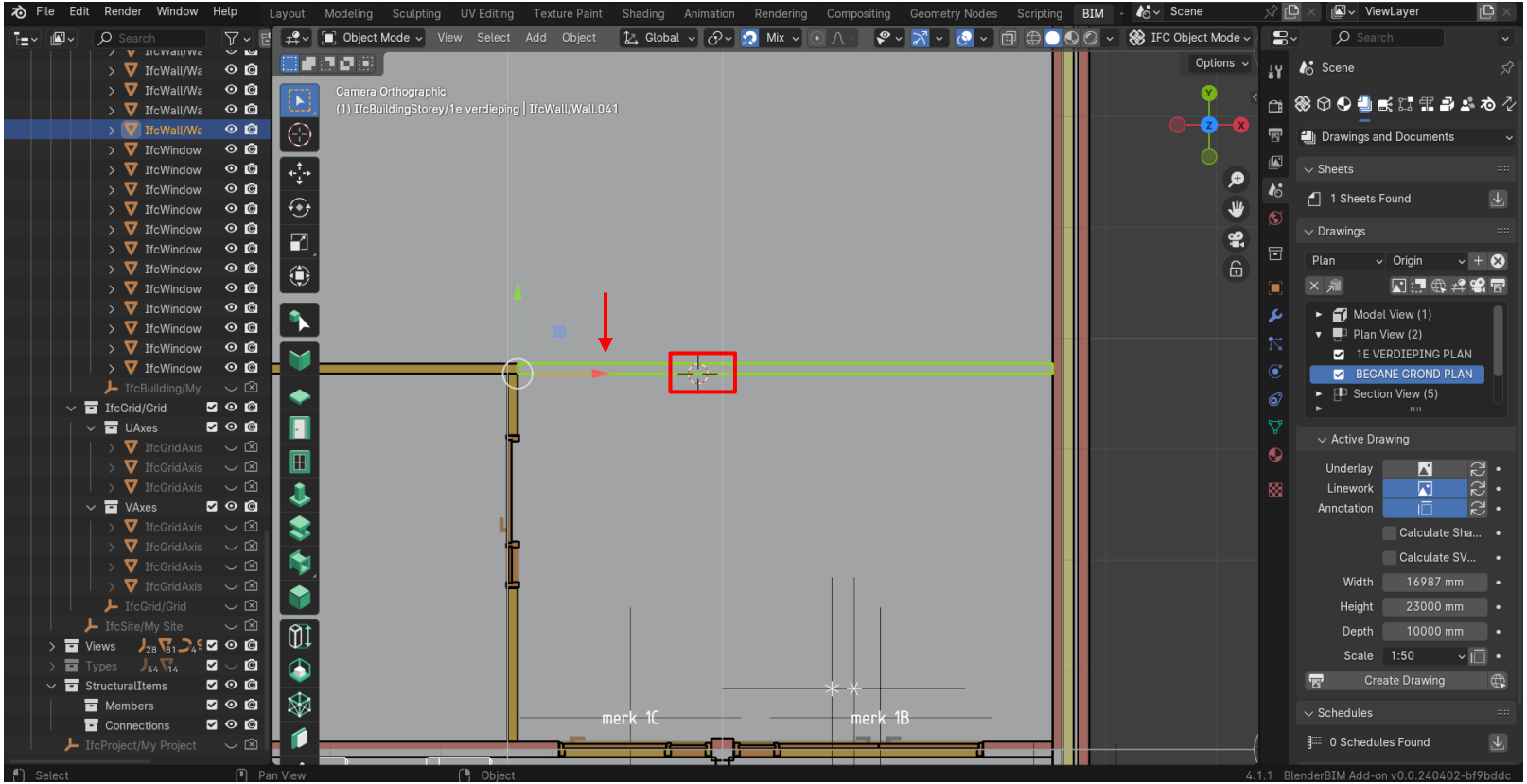


Next time select correct story **before** adding IfcElement; it will be placed inside

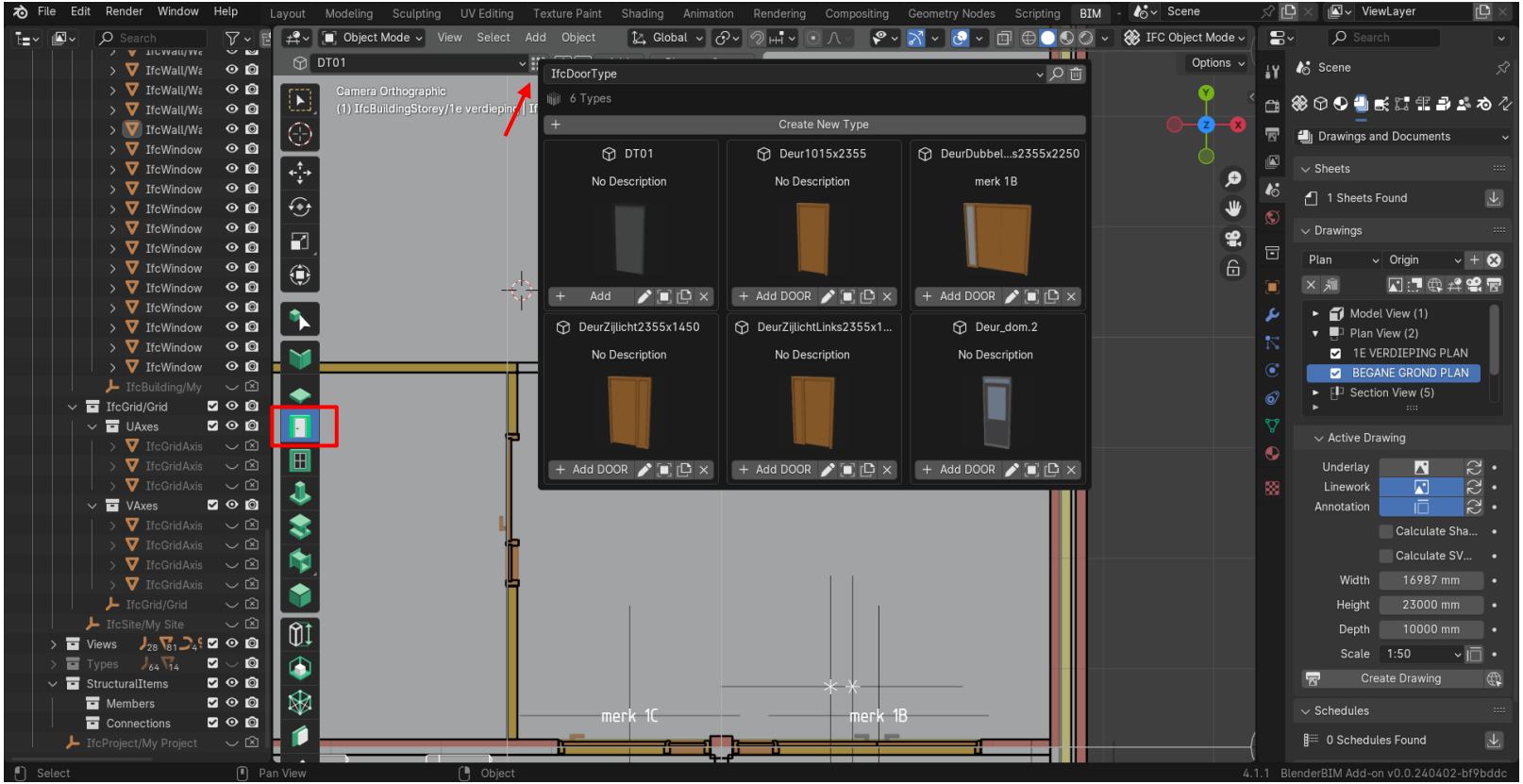
IfcDoor



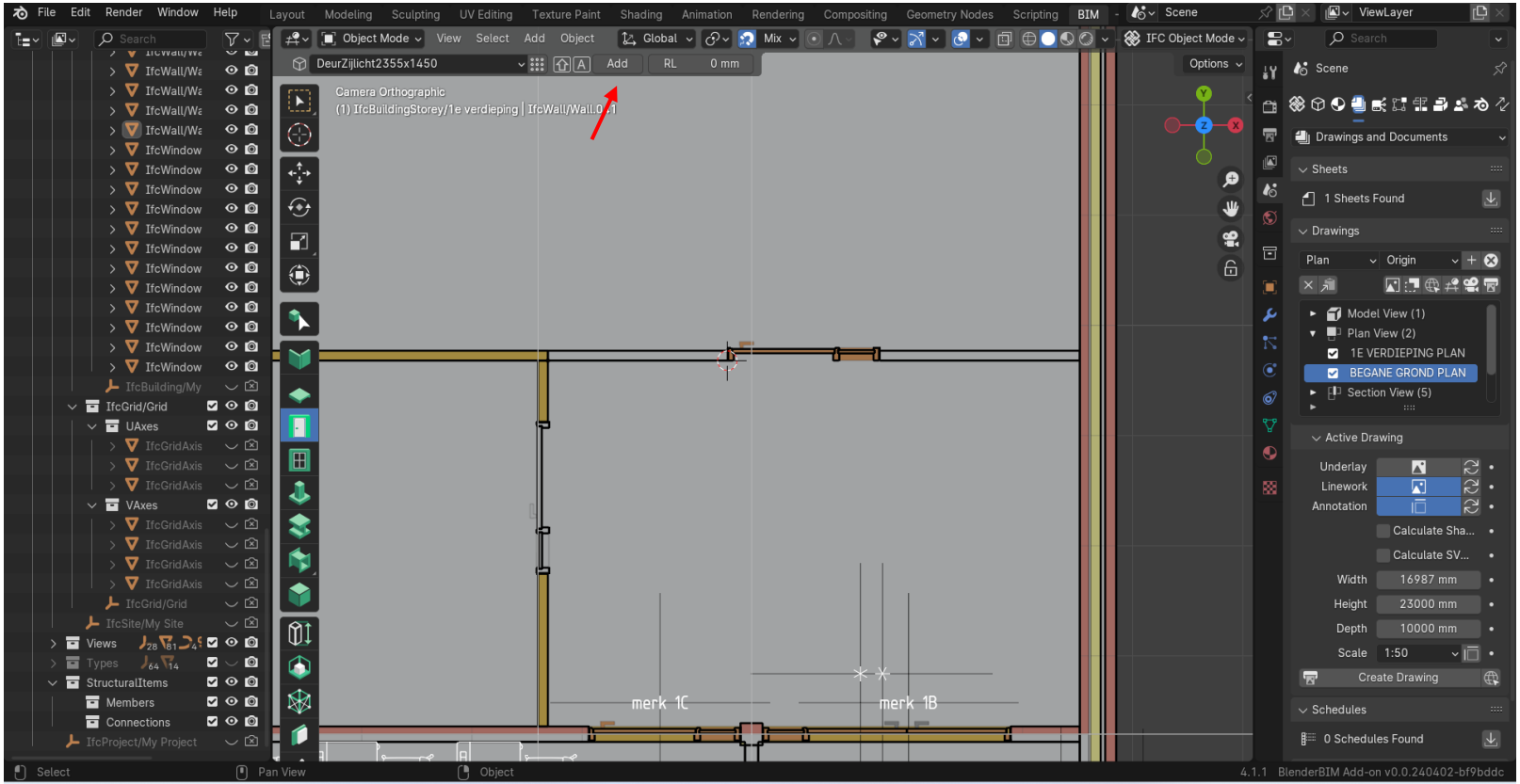
Now let's try to add this door to the new wall



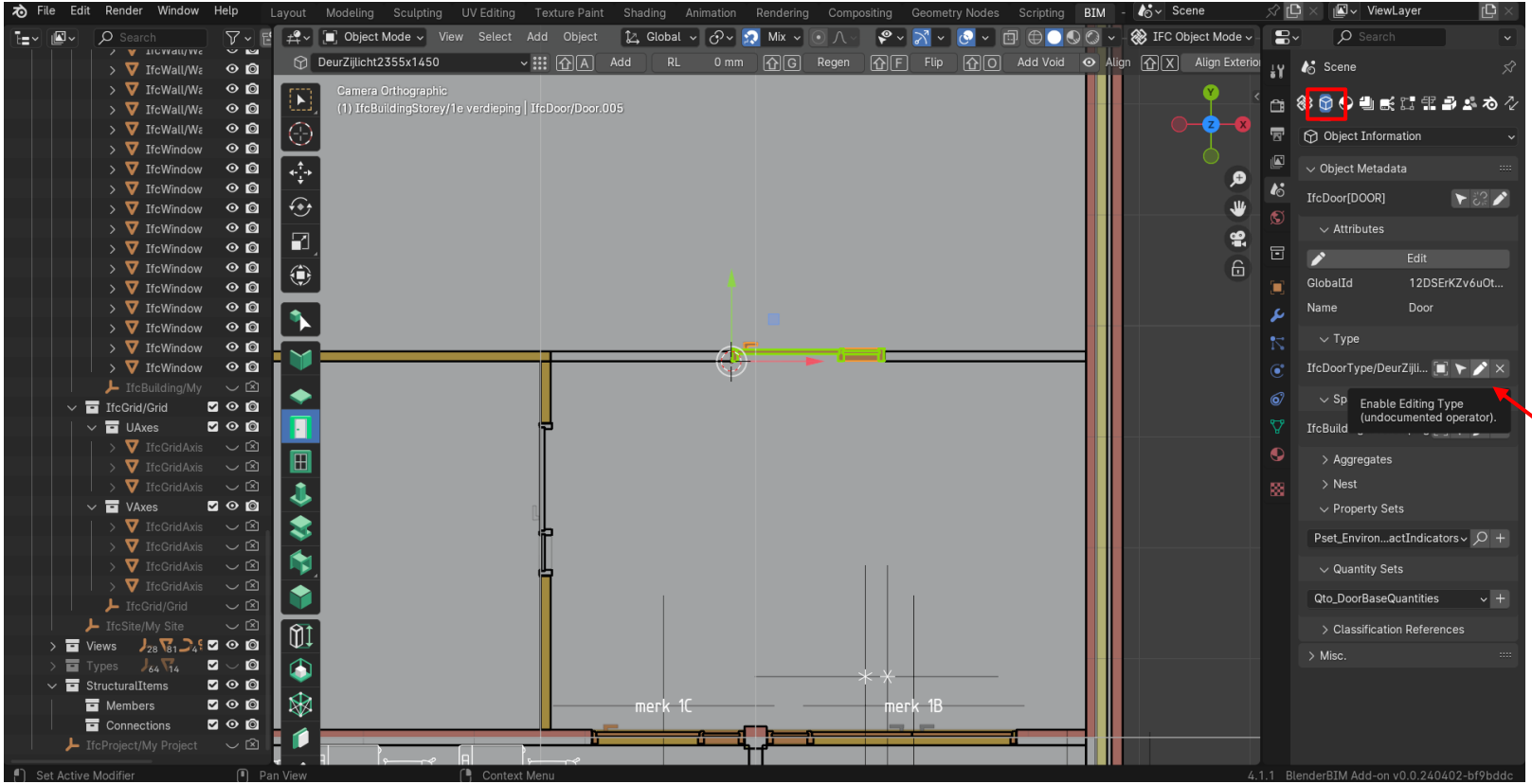
Drag 3D-cursor to snap to the wall where the door will be placed. Select the wall the door will be added to



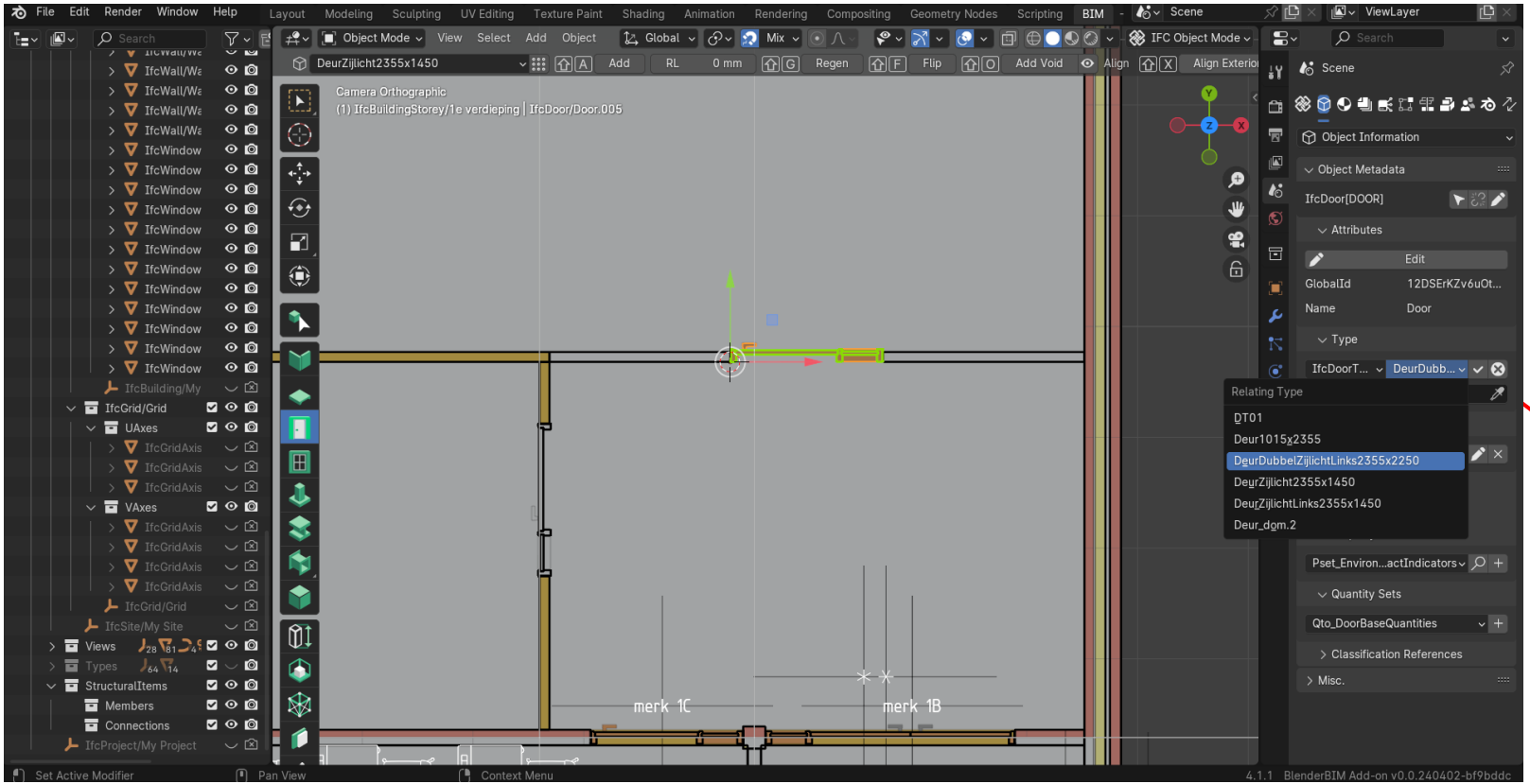
Select Door tool and click the 9 dots to see all Types visually



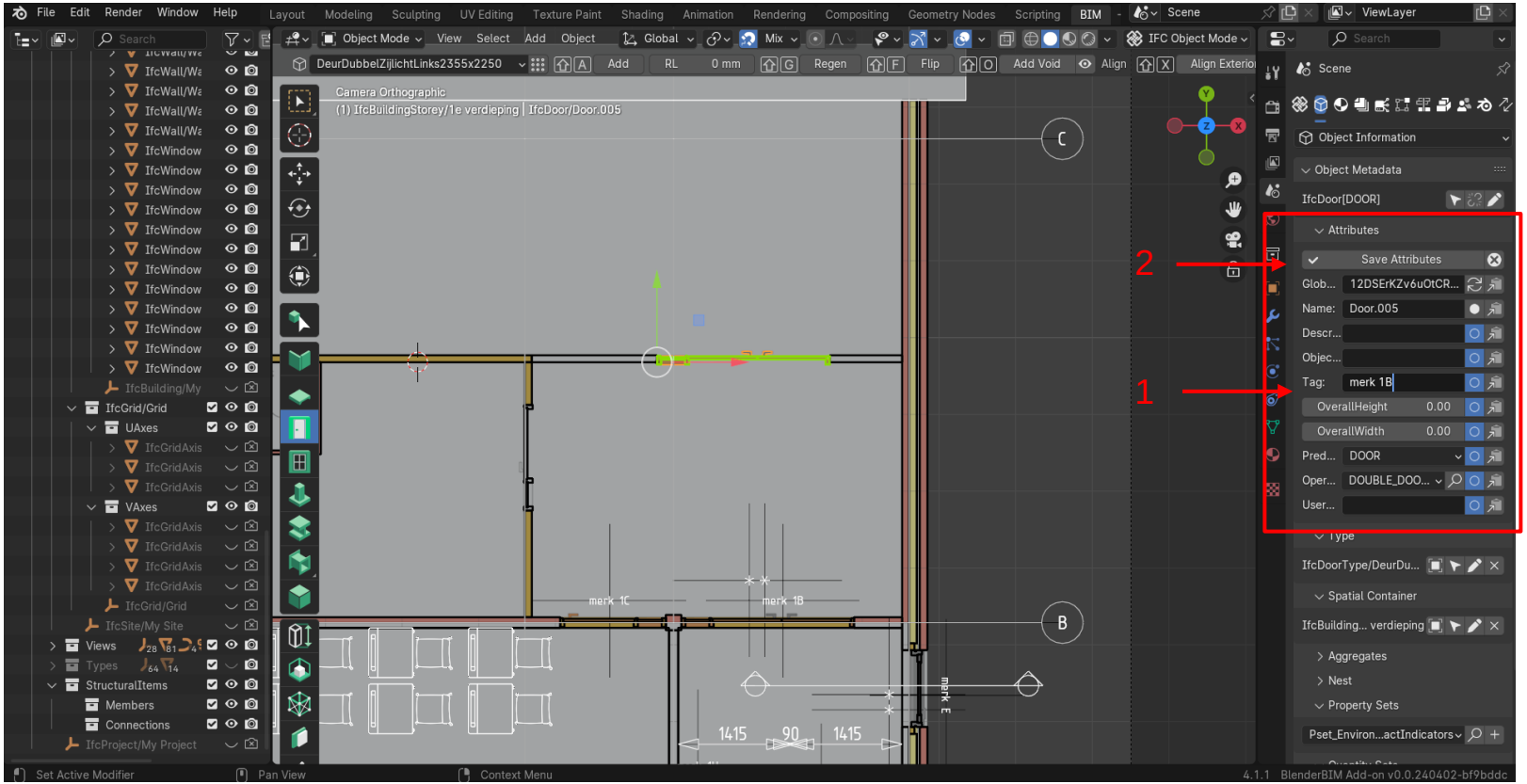
Click ‘Add’ on the IfcDoorType you want (‘shift+A’)



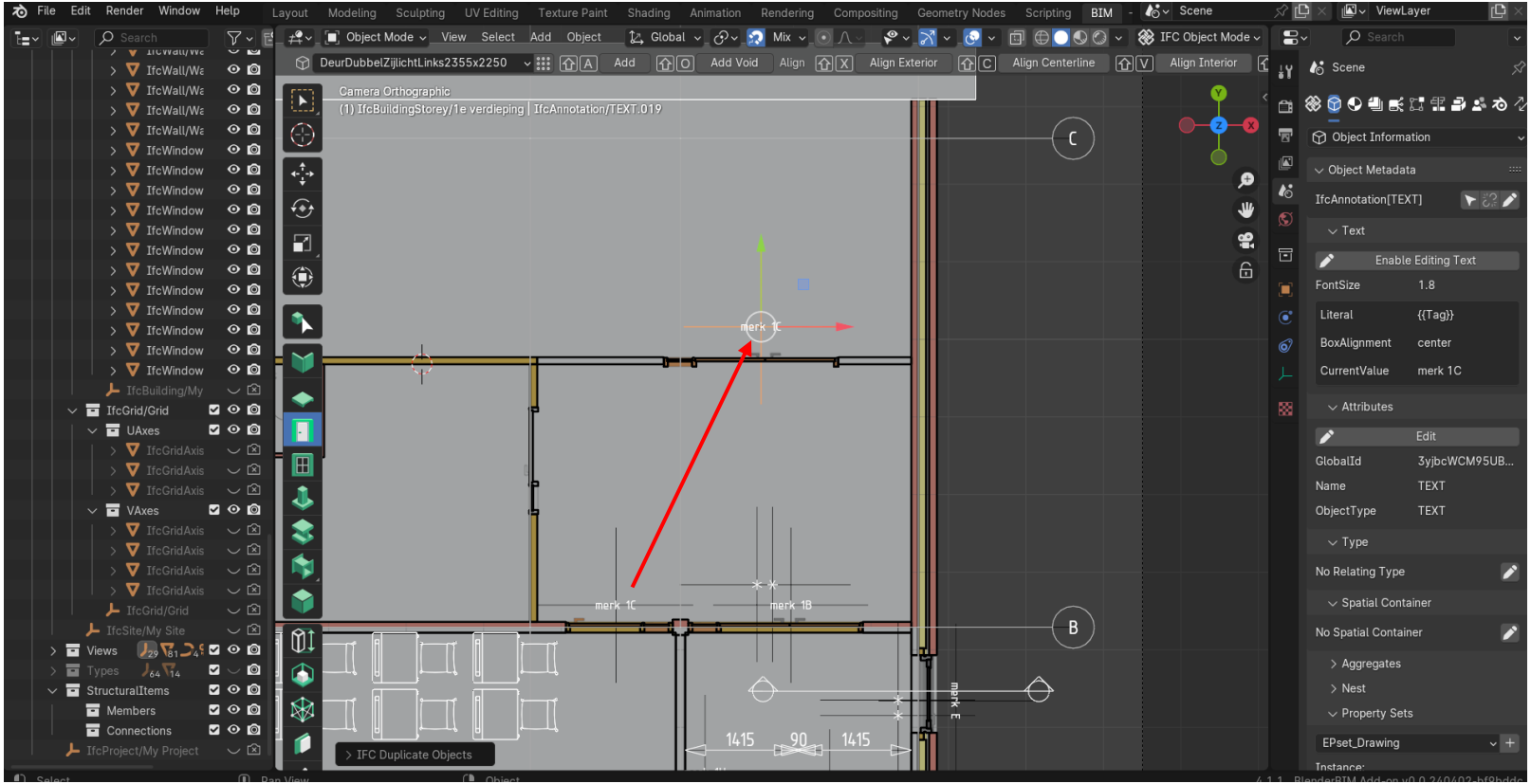
Oops! Wrong type, let's **replace** it with another; Head to the second tab (Object info) and click the pencil at 'Type'



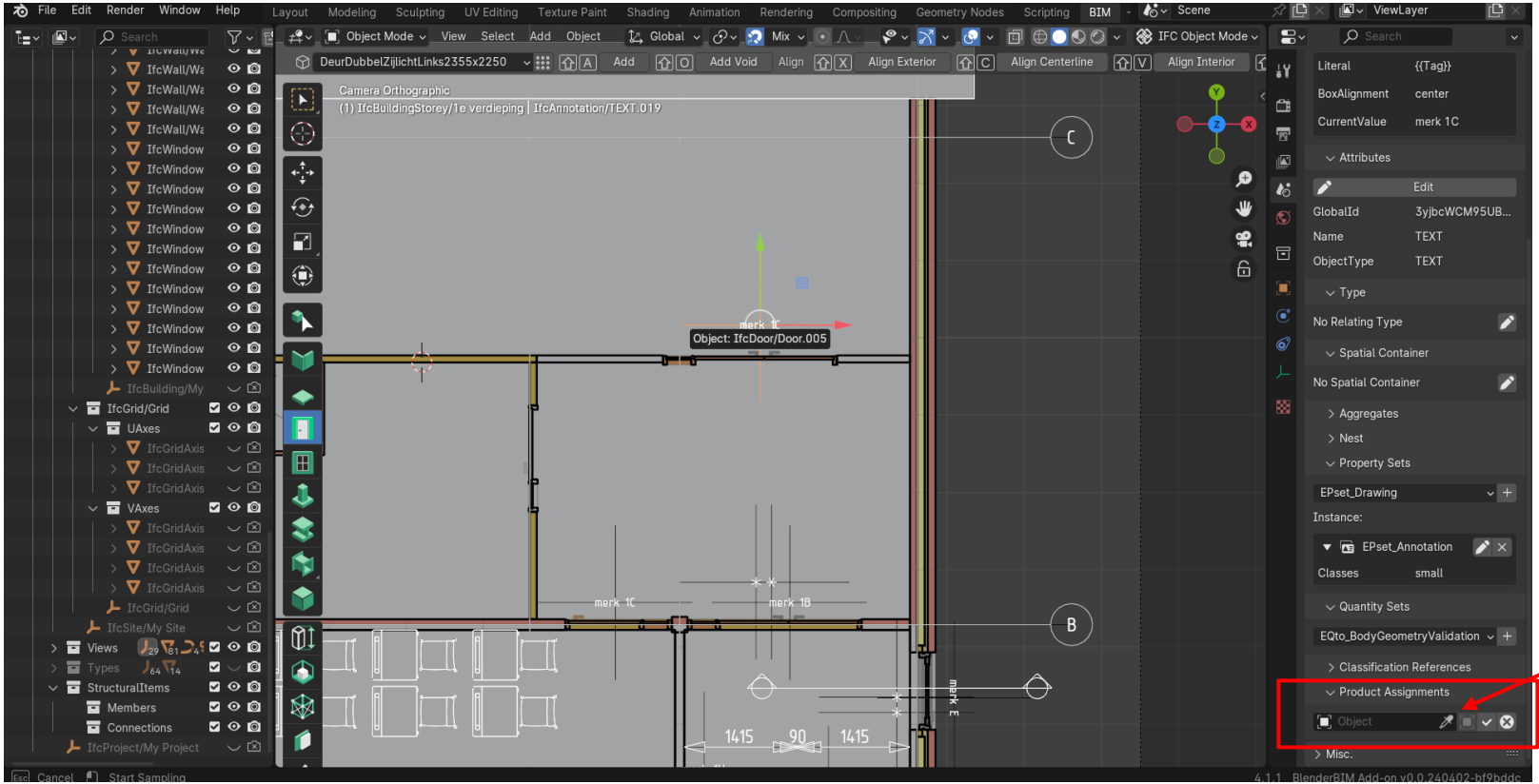
Choose the 3rd and click the checkmark



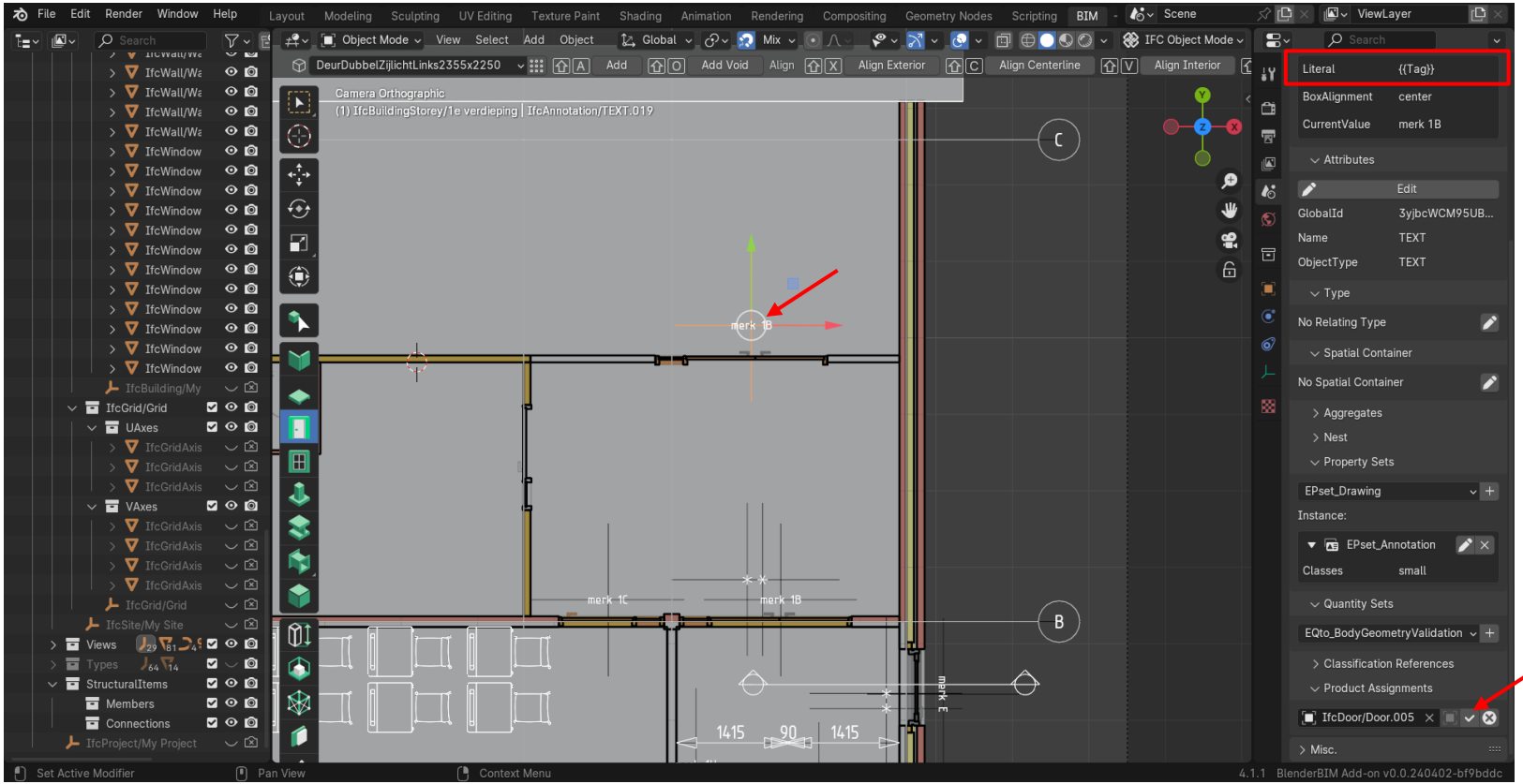
Great, now let's add a Tag 'Attribute' (something like instance properties). Click edit, add text and then **Save Attributes**



Now **duplicate** this IfcAnnotationText with ‘shift+D’ (**Not** ‘ctrl+C’ & ’ctrl+V’)

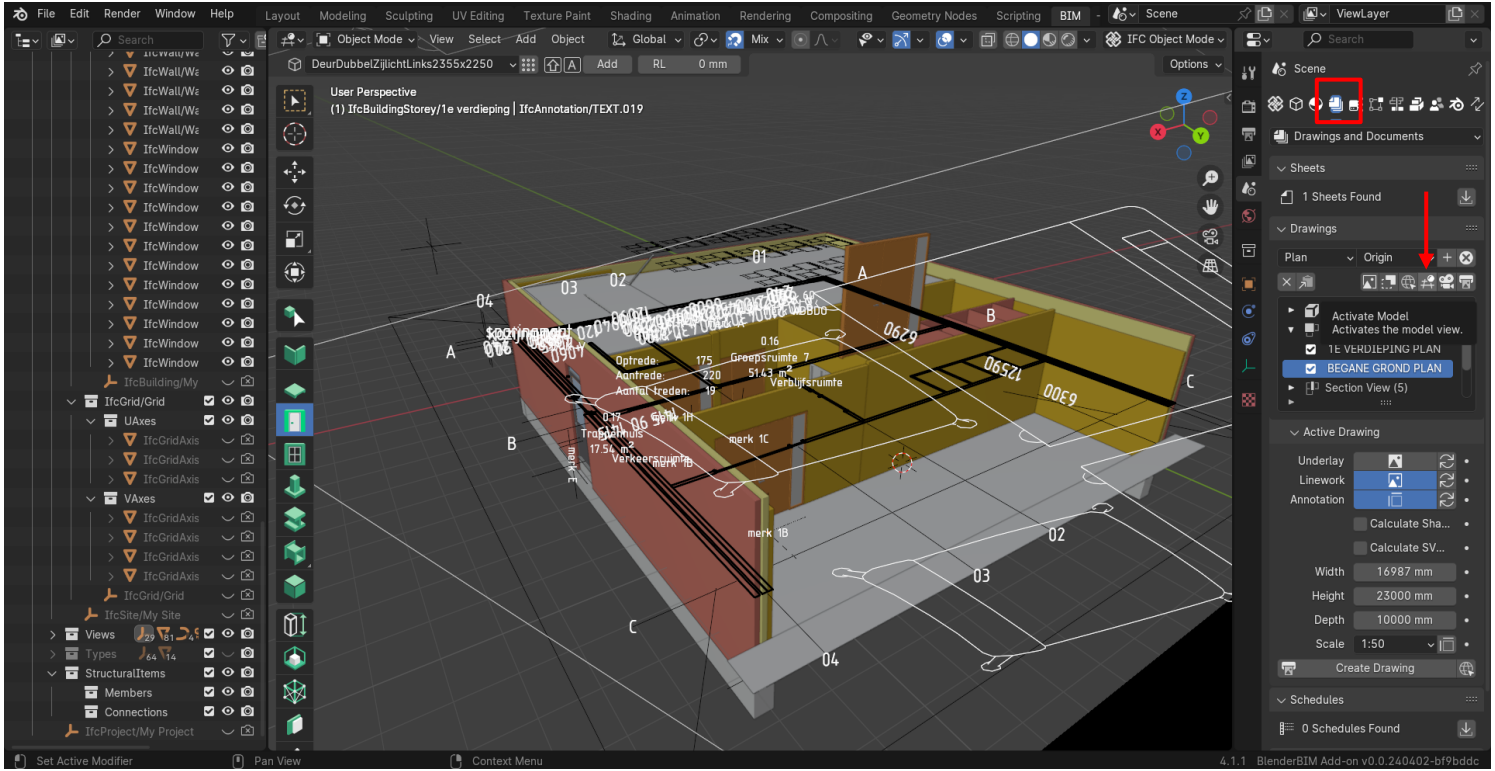


Scroll down to ‘Product Assignments’, edit, click the cross and select the new door with **eyedropper**

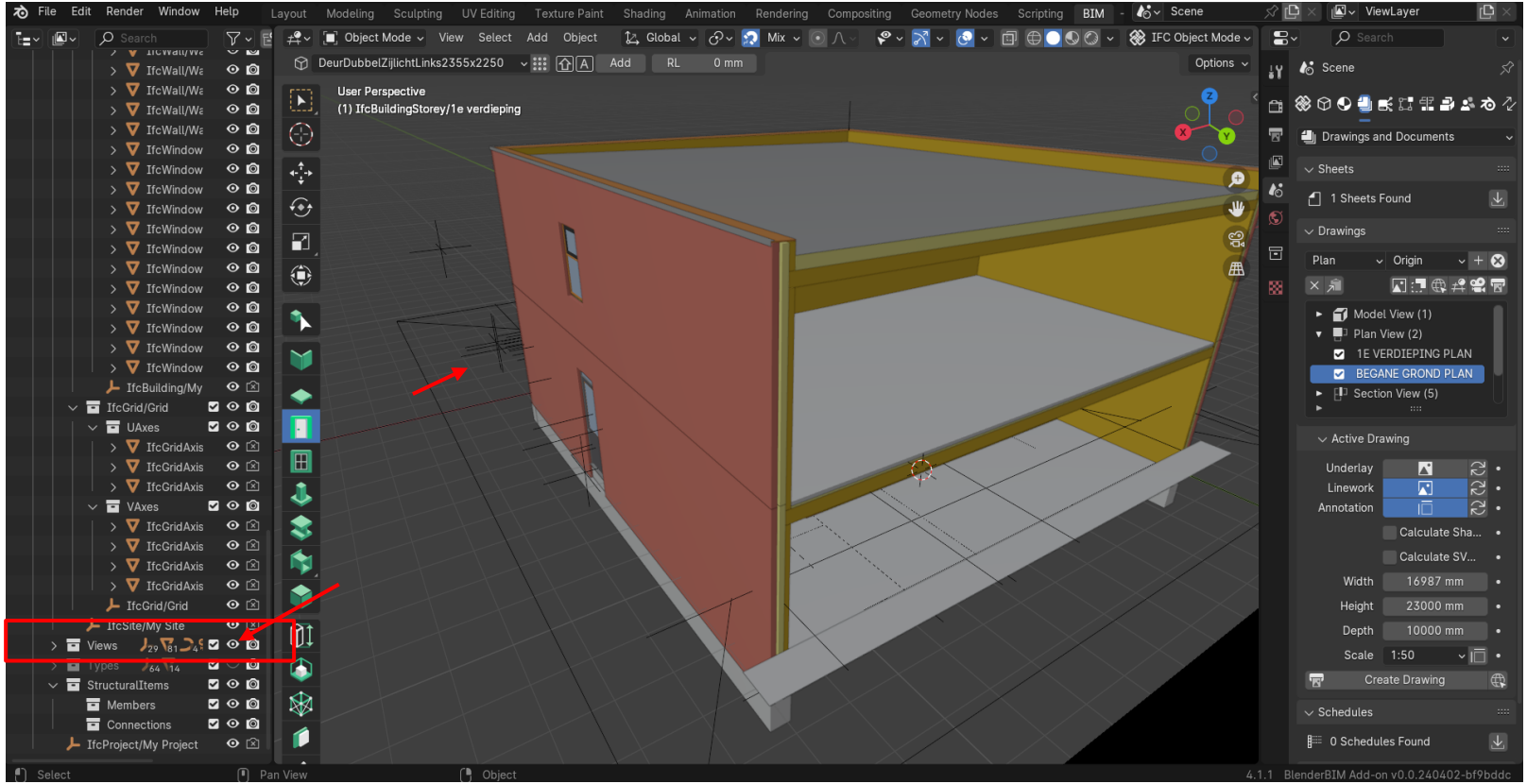


Notice how the displayed text has changed to the new 'Tag Attribute' via the {{Tag}} line. Don't forget to **save changes**

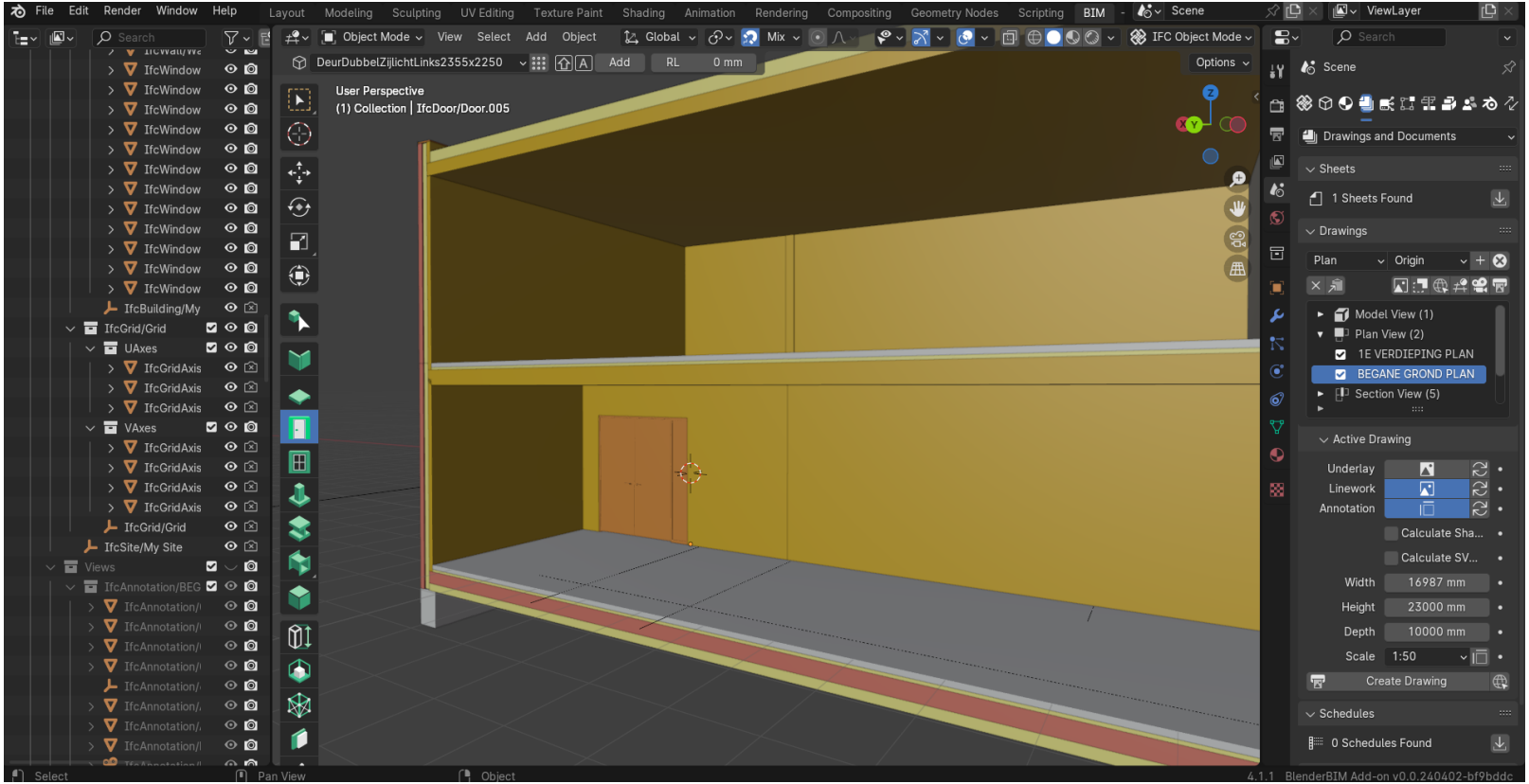
Navigation



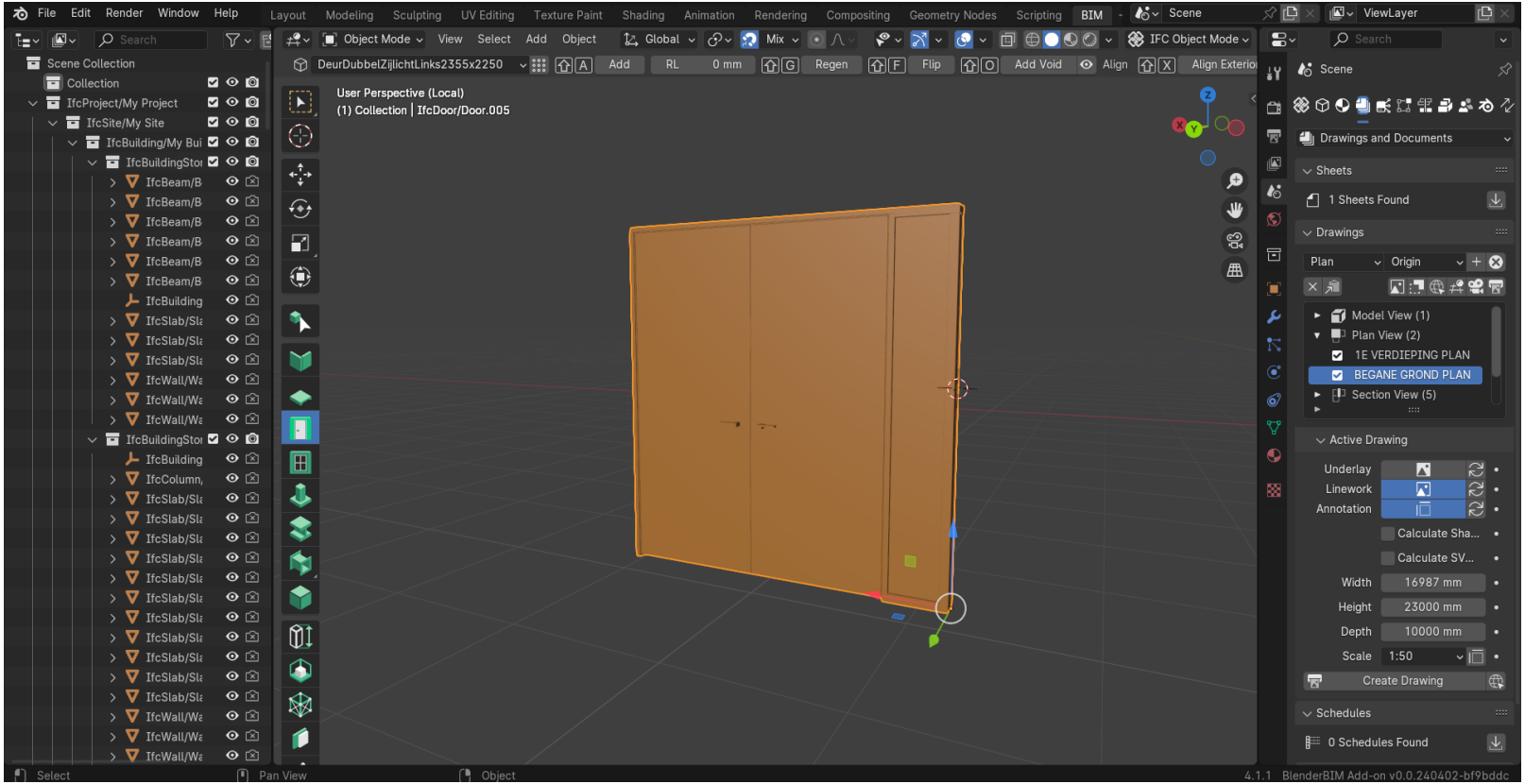
Let's get a better look of the new door in 3D; Orbit around ('shift+MMB'), looks horrible! Click this button in the 4th tab



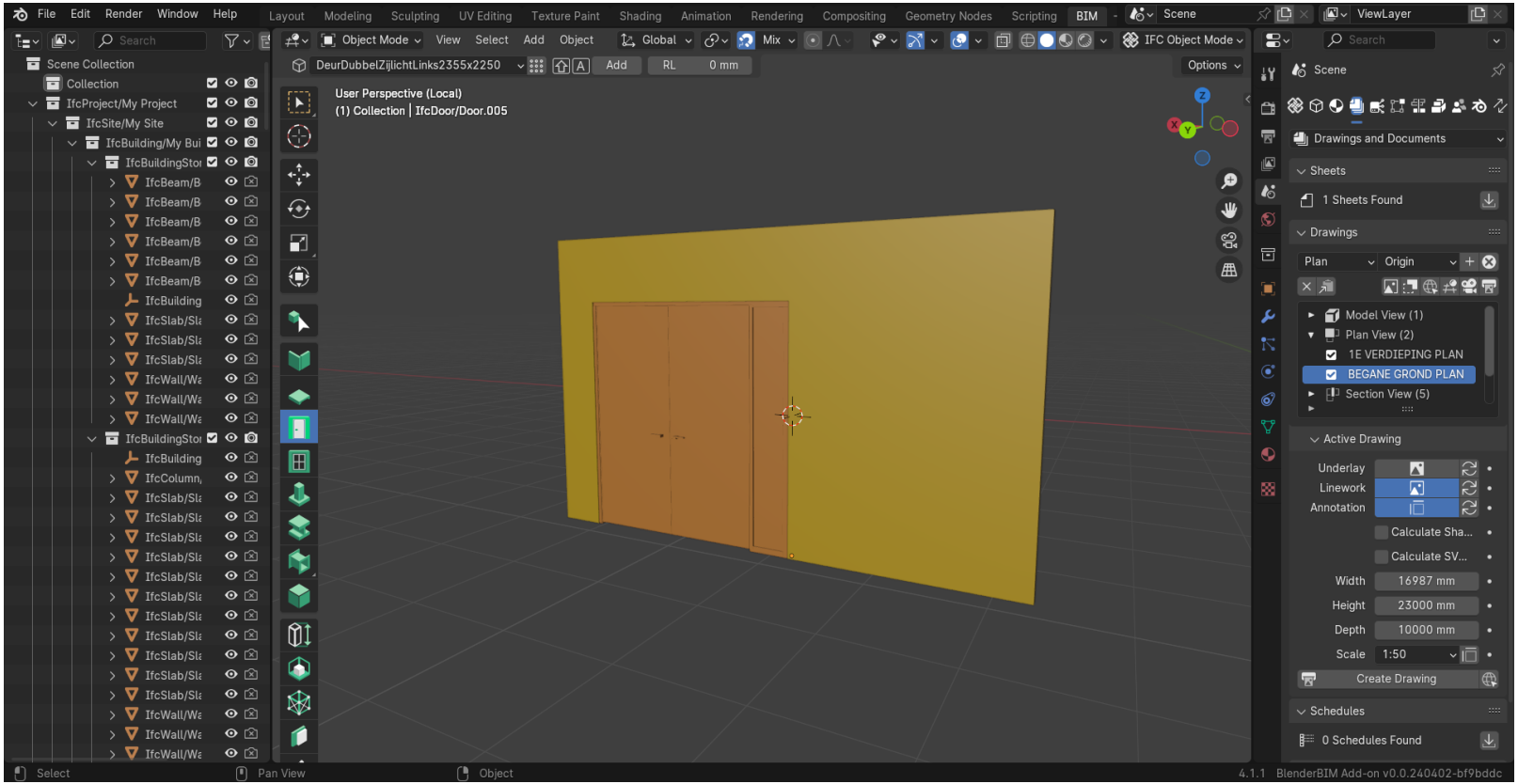
Better, but not the best. Notice how everything happens in the same 3D window; click ‘Views’ eye icon to **hide** the 2D annotations



Orbit (‘shift+MMB’) until you see the door, then press ‘alt+MMB’ on the door. Now orbit again and zoom (‘scroll’) again

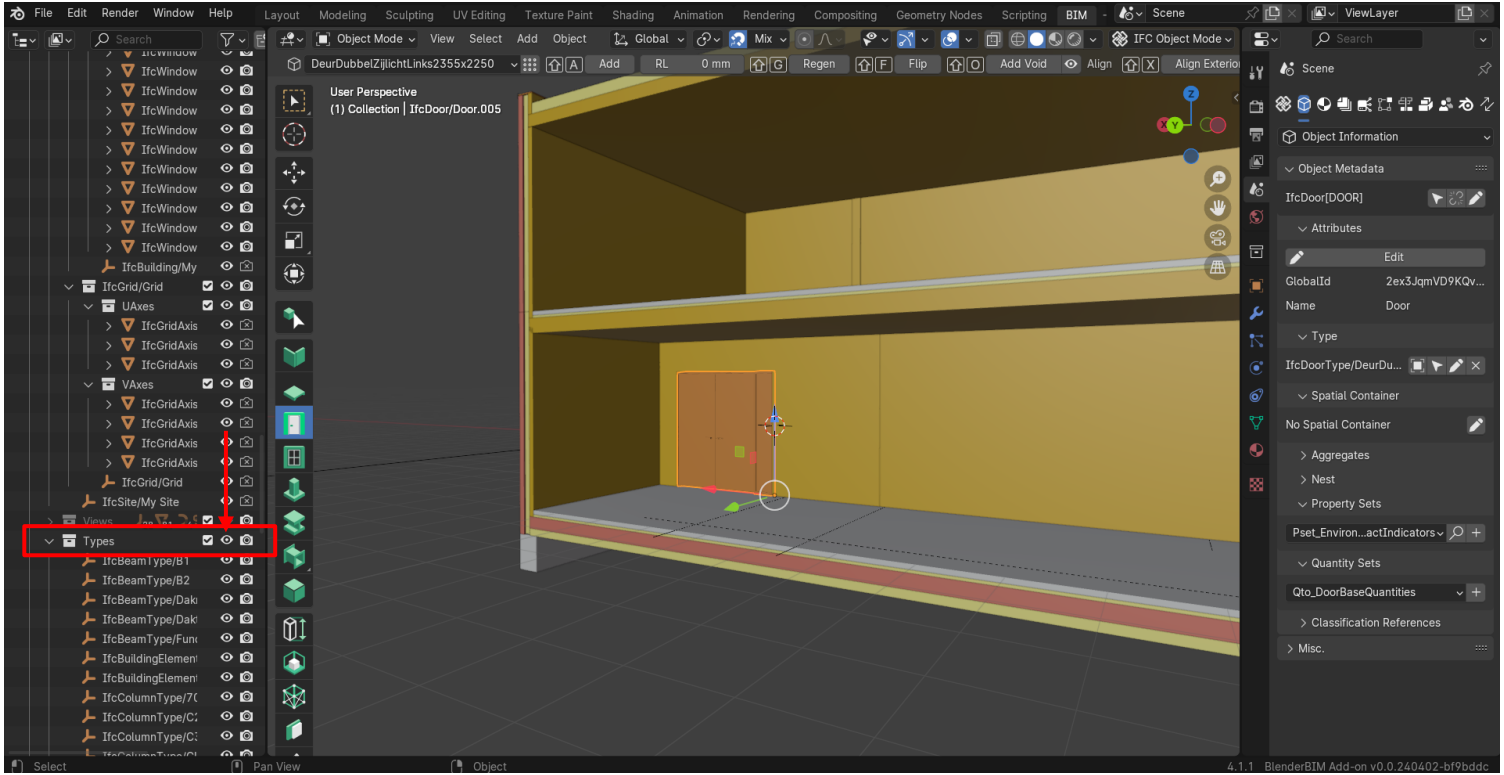


Get a closer look: select the door and press ‘/’ (something like ‘isolate elements’)

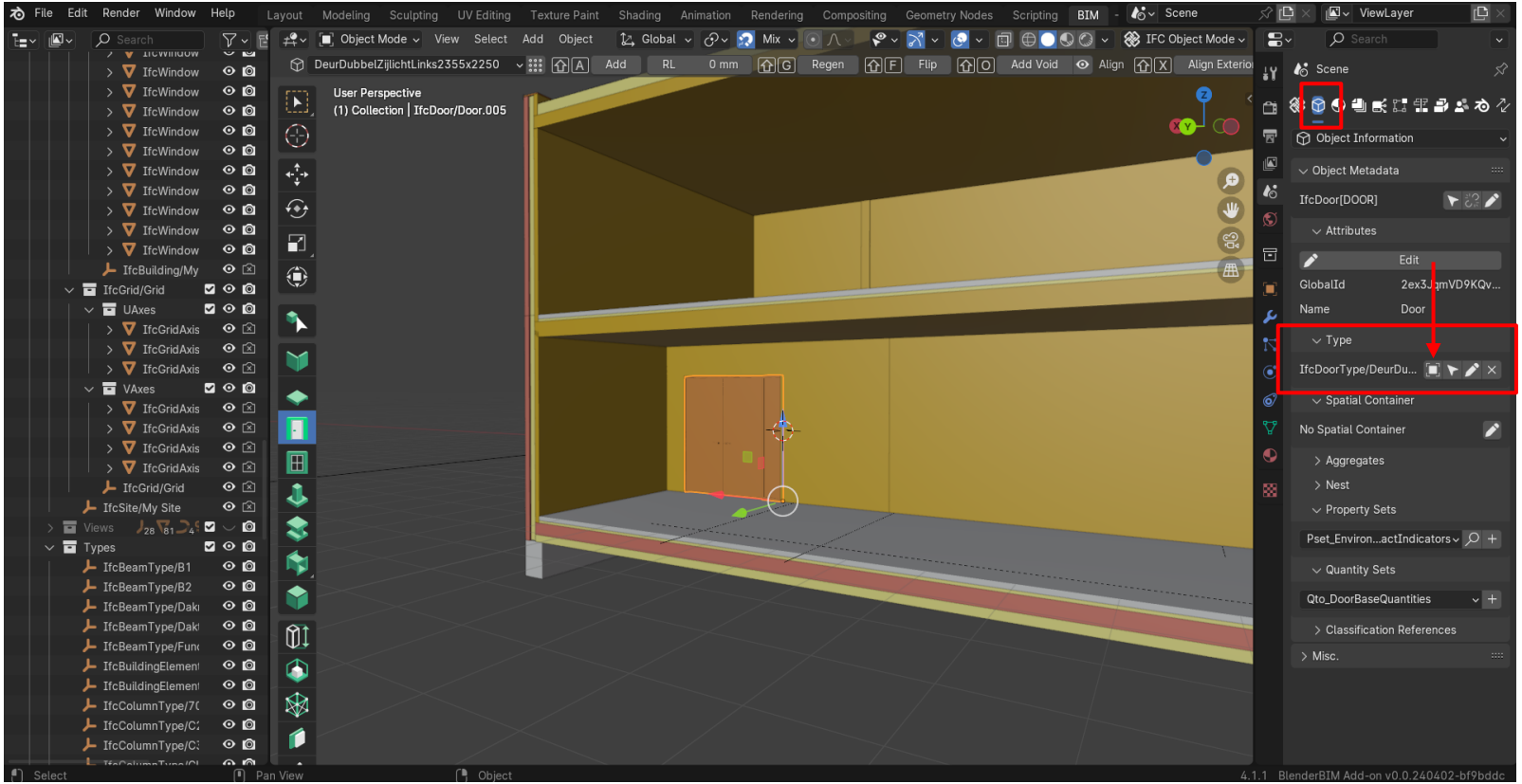


Oh, we want the wall too: press '/', select **both** the wall and the door and press '/' again; Your mouse must be in the **3D viewport**

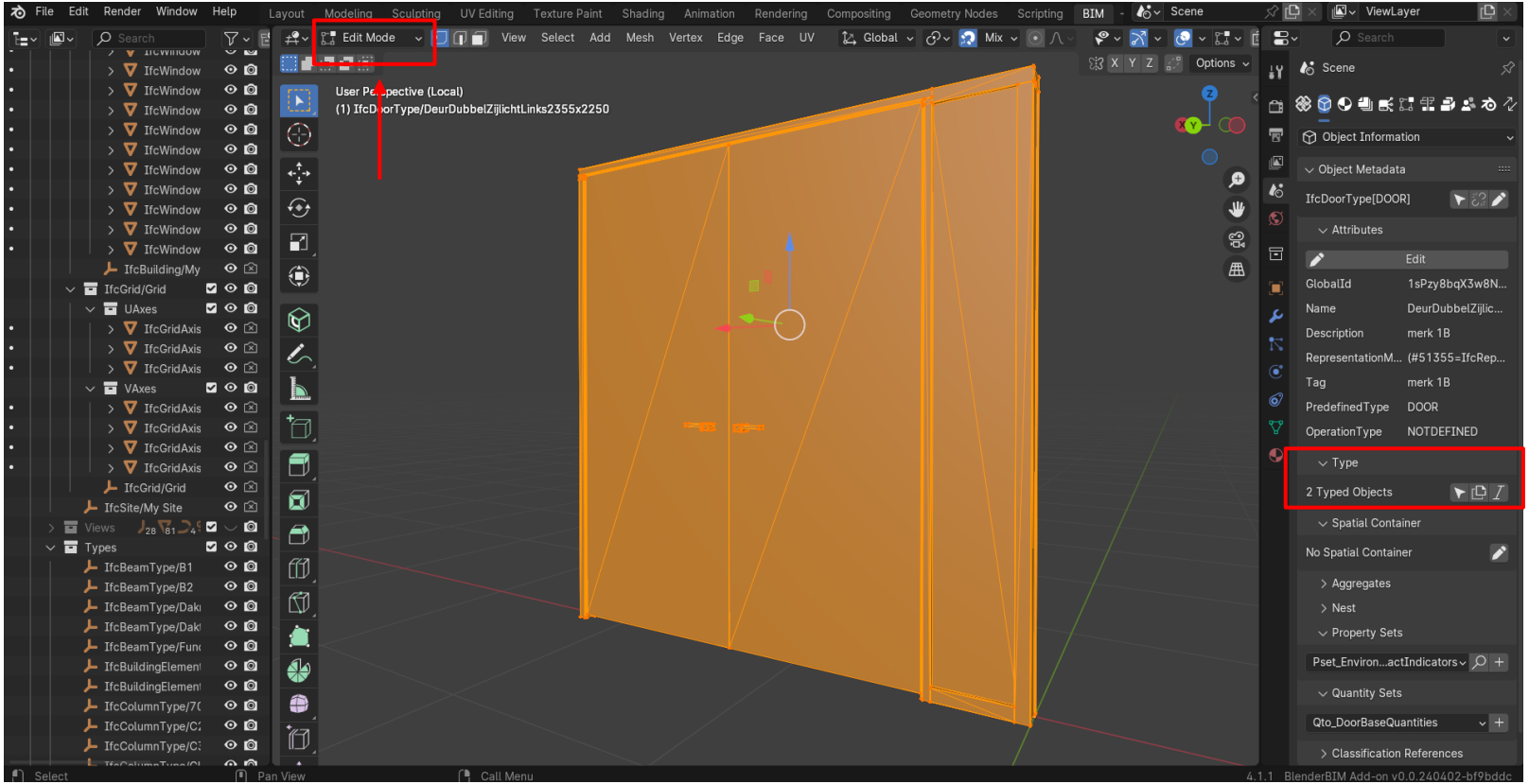
Edit Type (≈ RvtFamily)



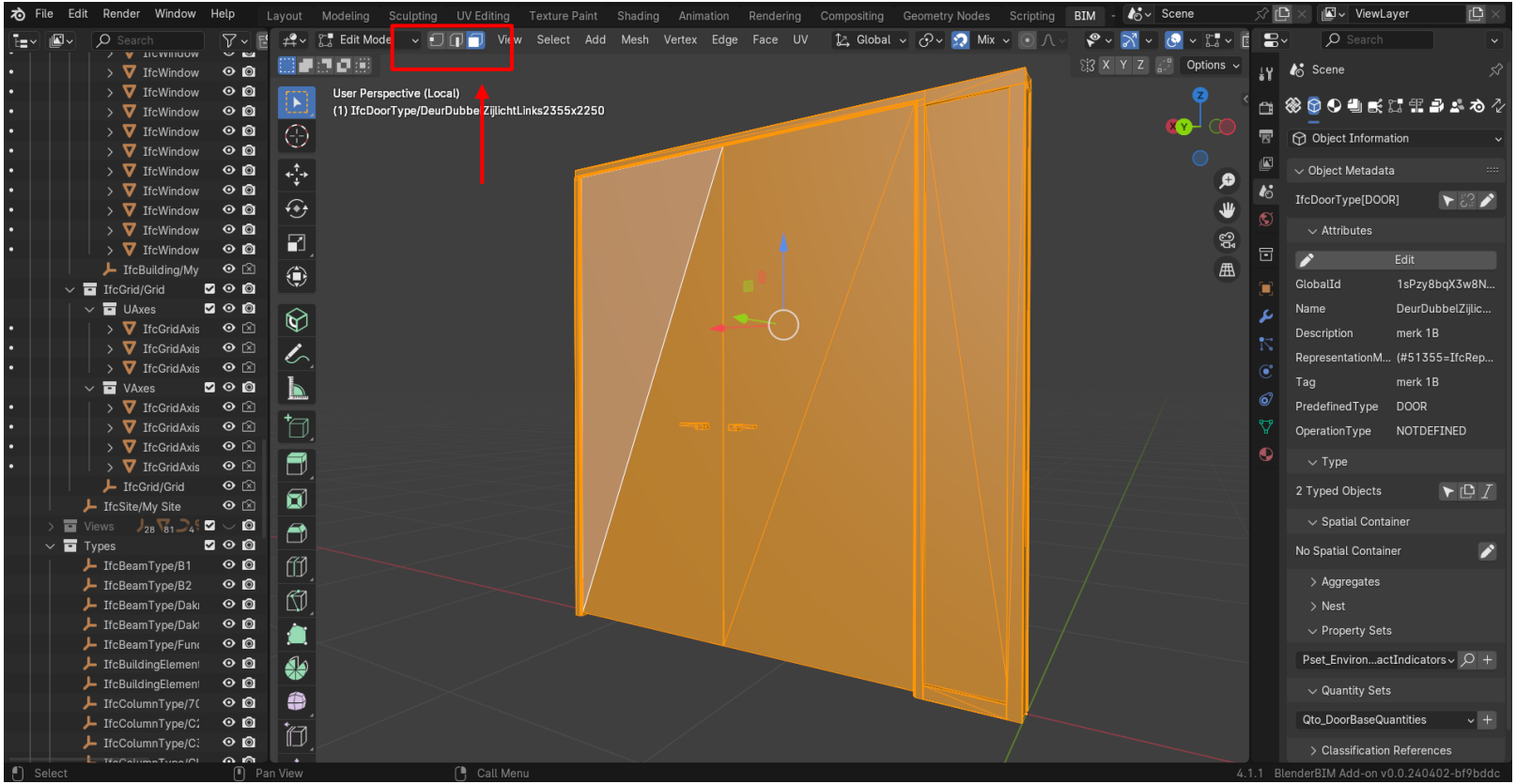
Let's give the door other colors for better visibility; Show 'Types' by clicking the **eye** icon



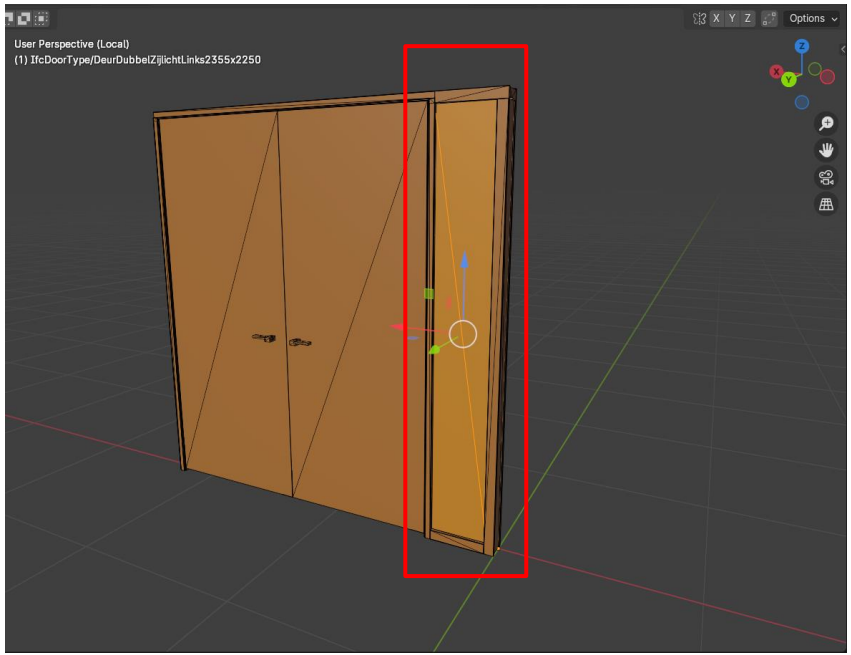
Go to the ‘Object Information’ tab (2nd) and select the **first** button from ‘Type’, this selects the original Type. Then press ‘/’

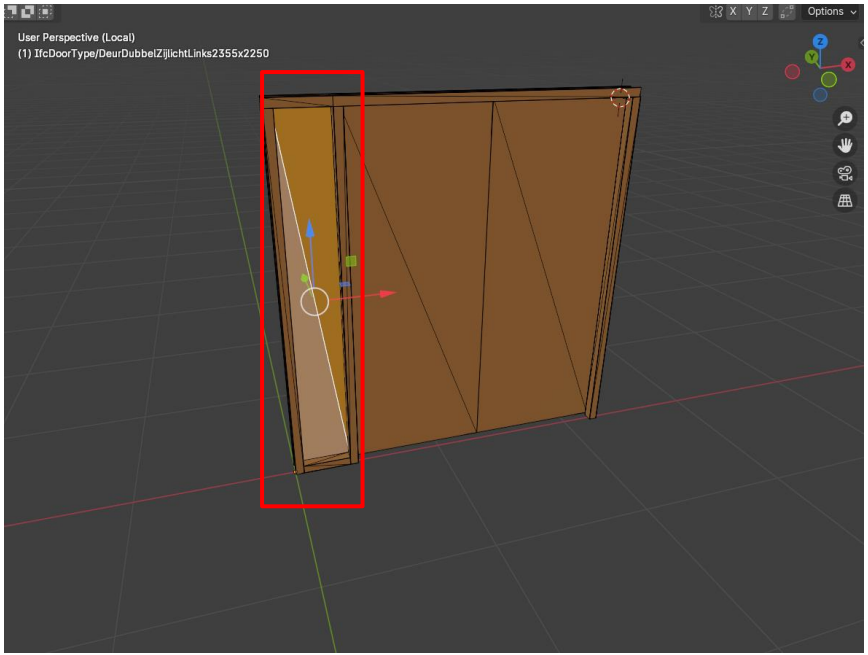


We can see how many Objects with that Type are in the project.
Press this button and select '**Edit mode**' ('Tab')

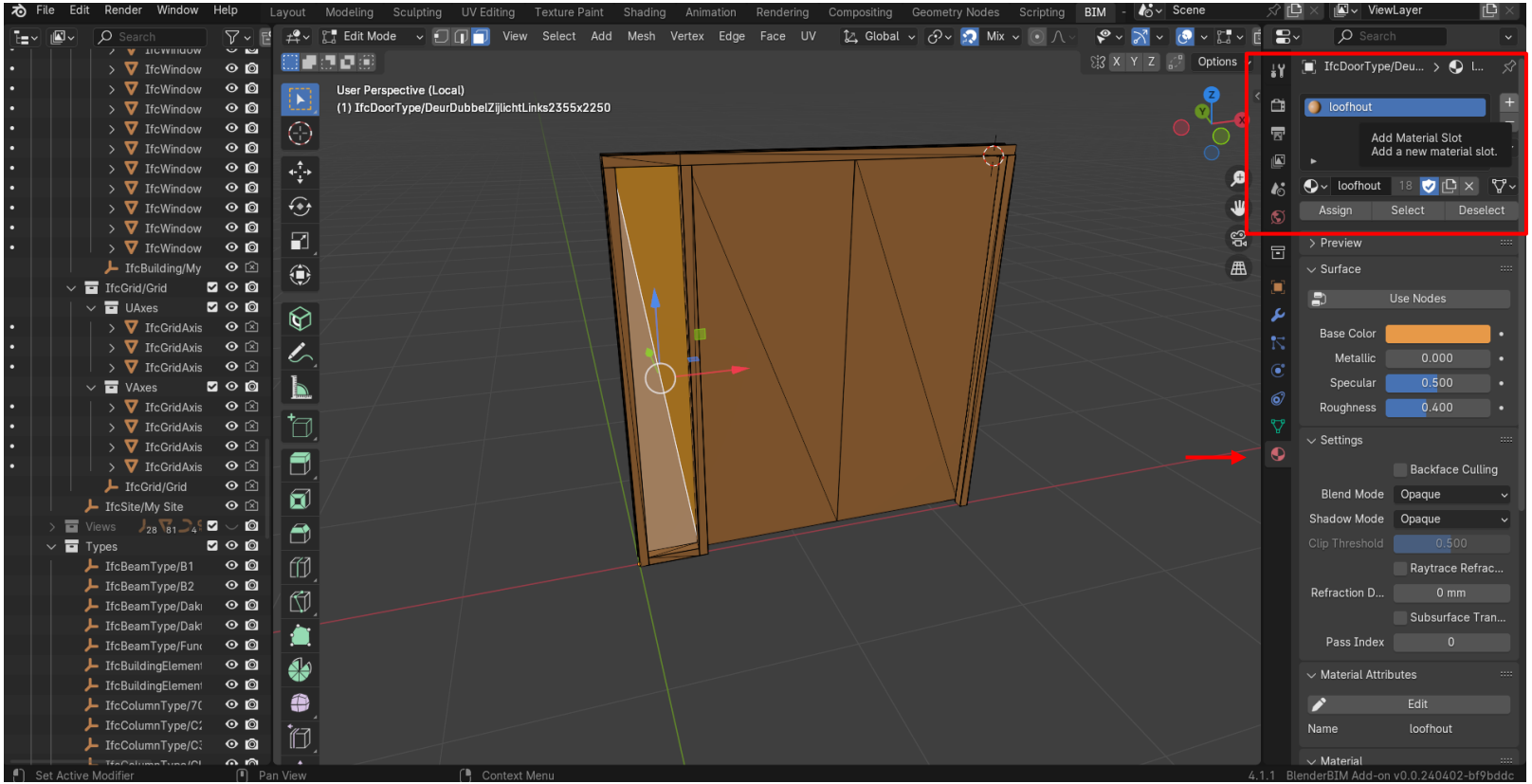


These buttons determine what we can edit: Vertices (‘1’), Edges (‘2’) or Faces (‘3’). Go to **Face Select** by pressing 3rd button (‘3’)

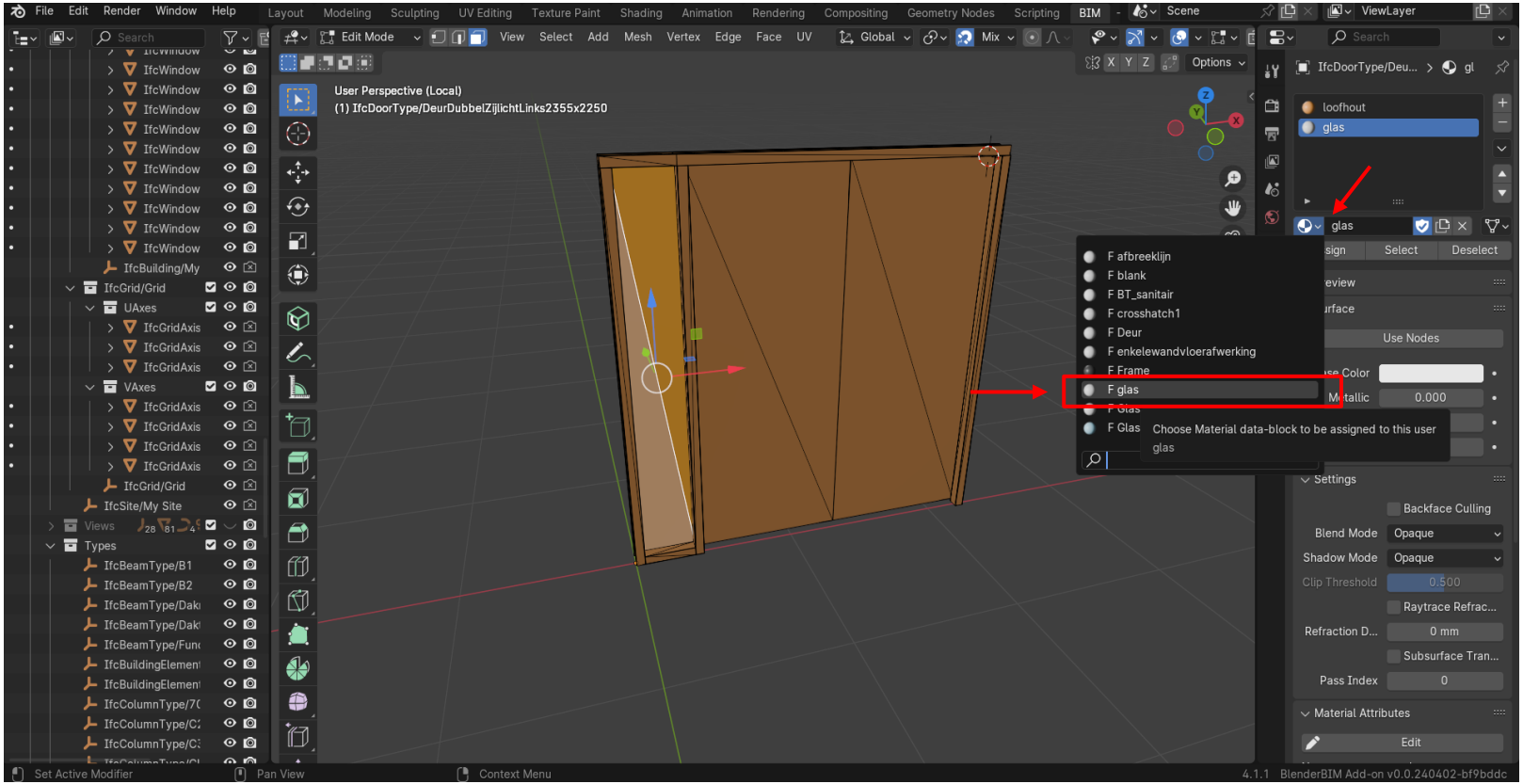




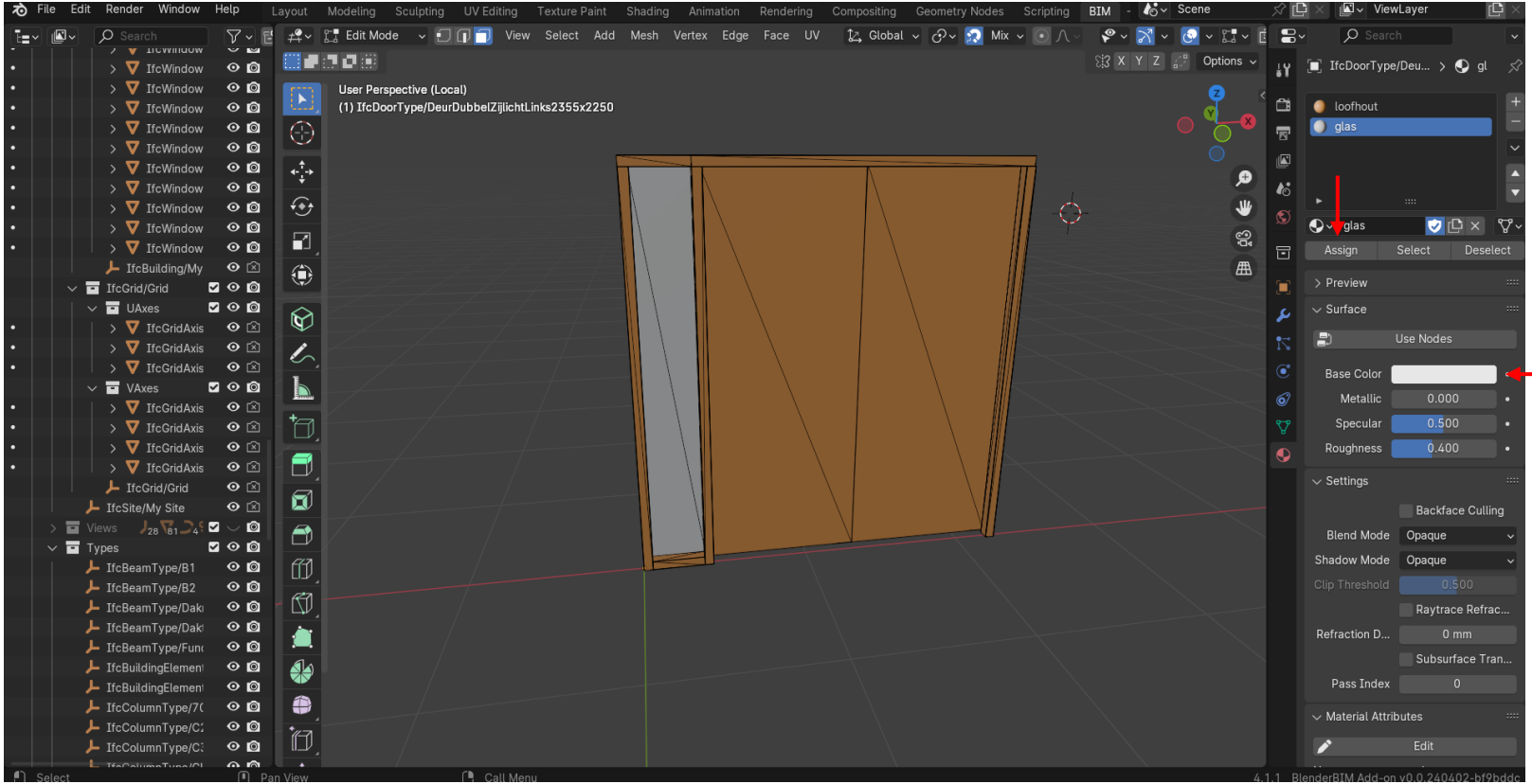
What we change here, changes for all instances. Try to select all faces that should be glass, front **and** back ('shift+LMB')



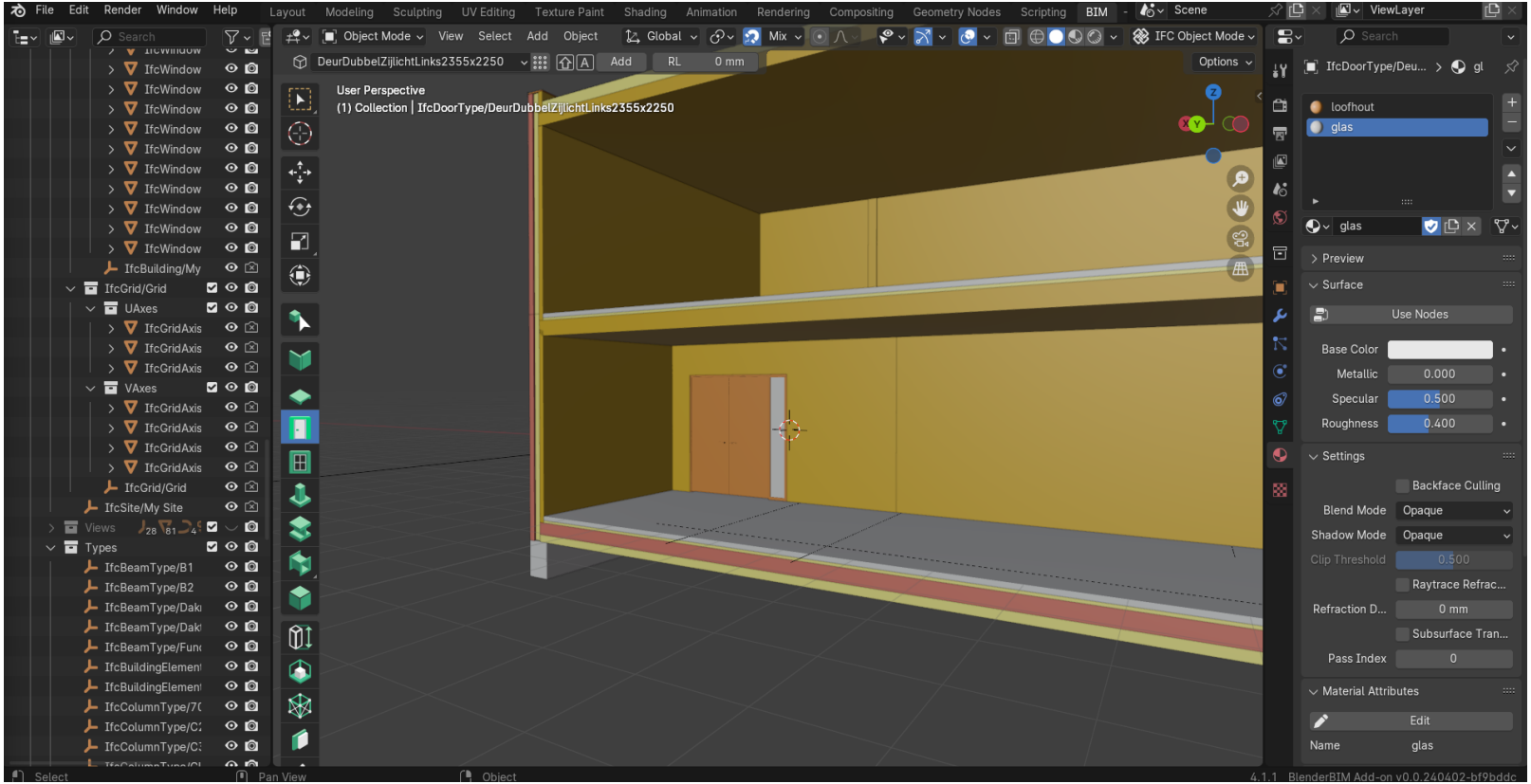
Go to the Blender ‘Material’ tab and add a new material to this Type here



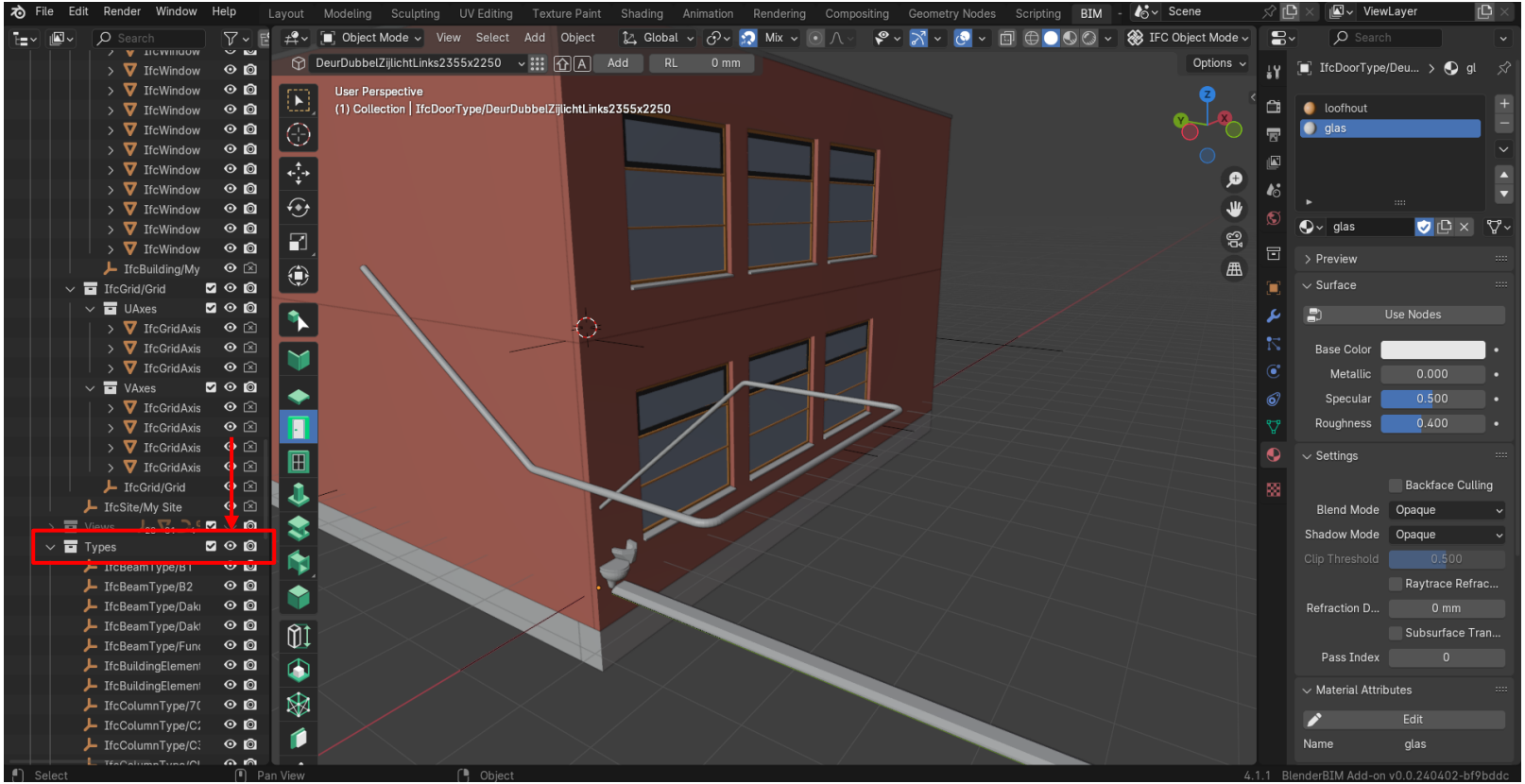
Select the black and white circle icon and choose ‘glas’



Press ‘Assign’ with the faces **still selected** to assign the material. The color has now changed! You can change ‘Base color’ if wanted.

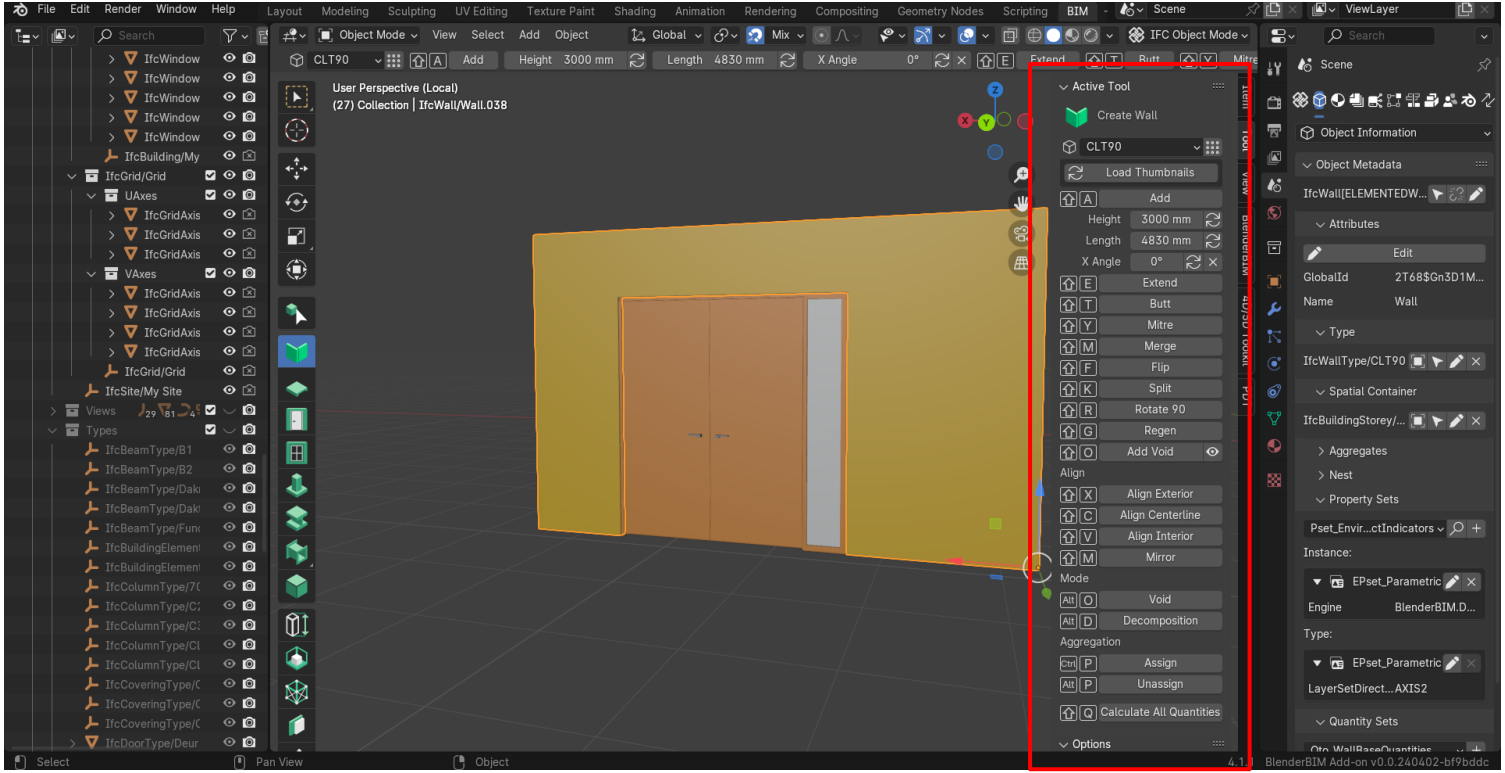


Switch back to ‘Object mode’ (‘Tab’), and press ‘/’ to see the changed IfcDoor in the wall.

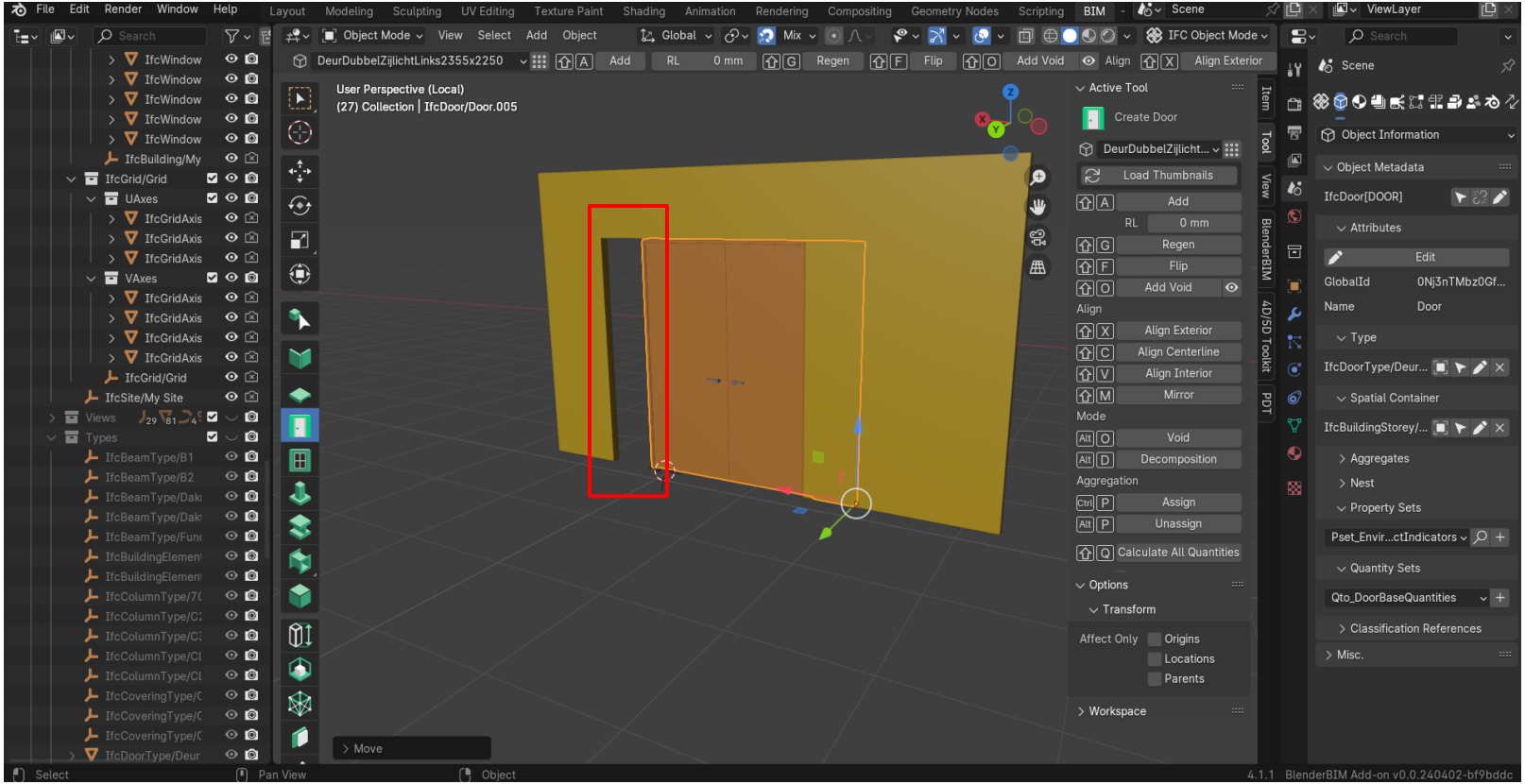


Toggle the Eye icon again to hide these types. Save project regularly ('ctrl+S') to save progress; BlenderBIM **crashes** sometimes

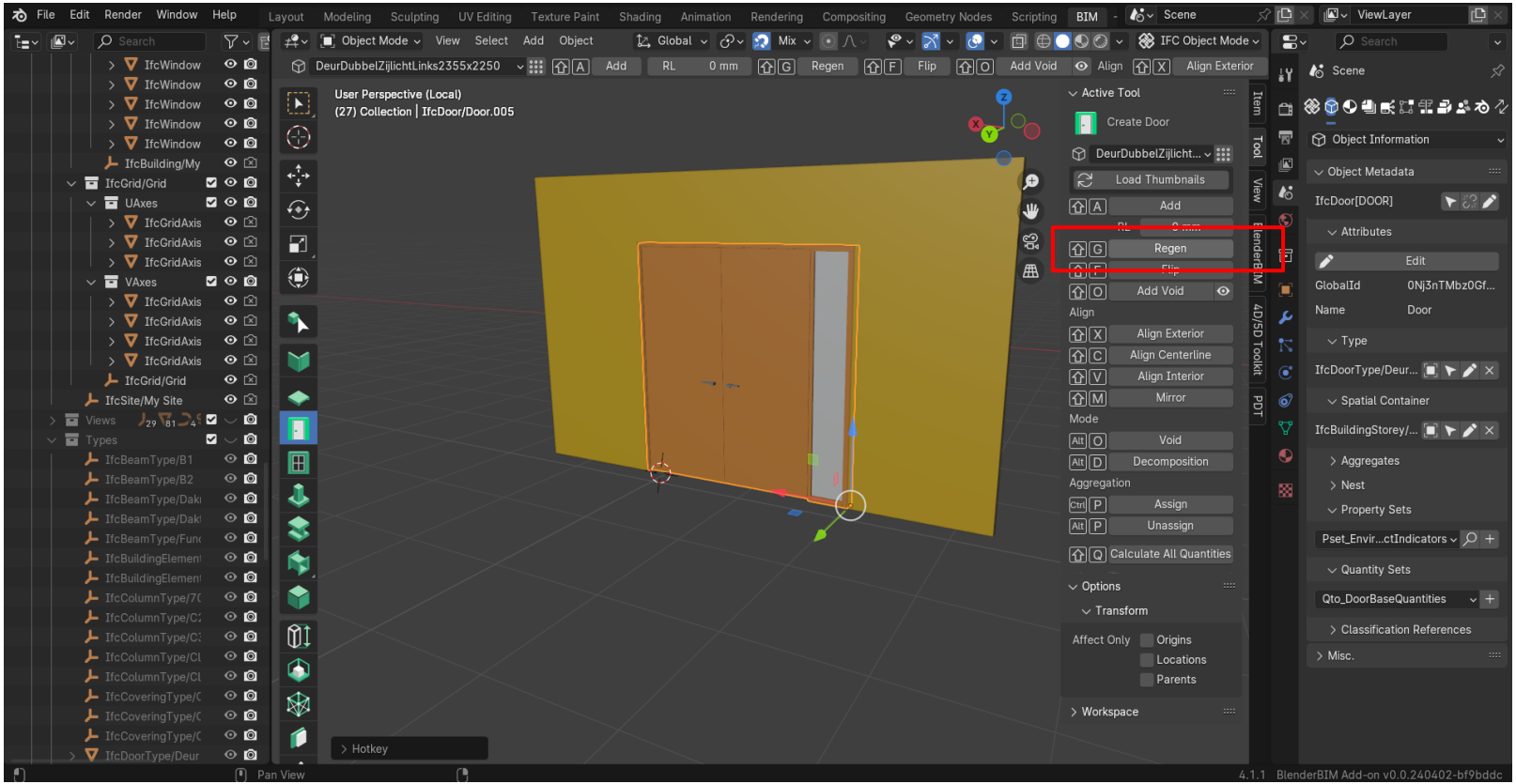
IfcOpeningElement



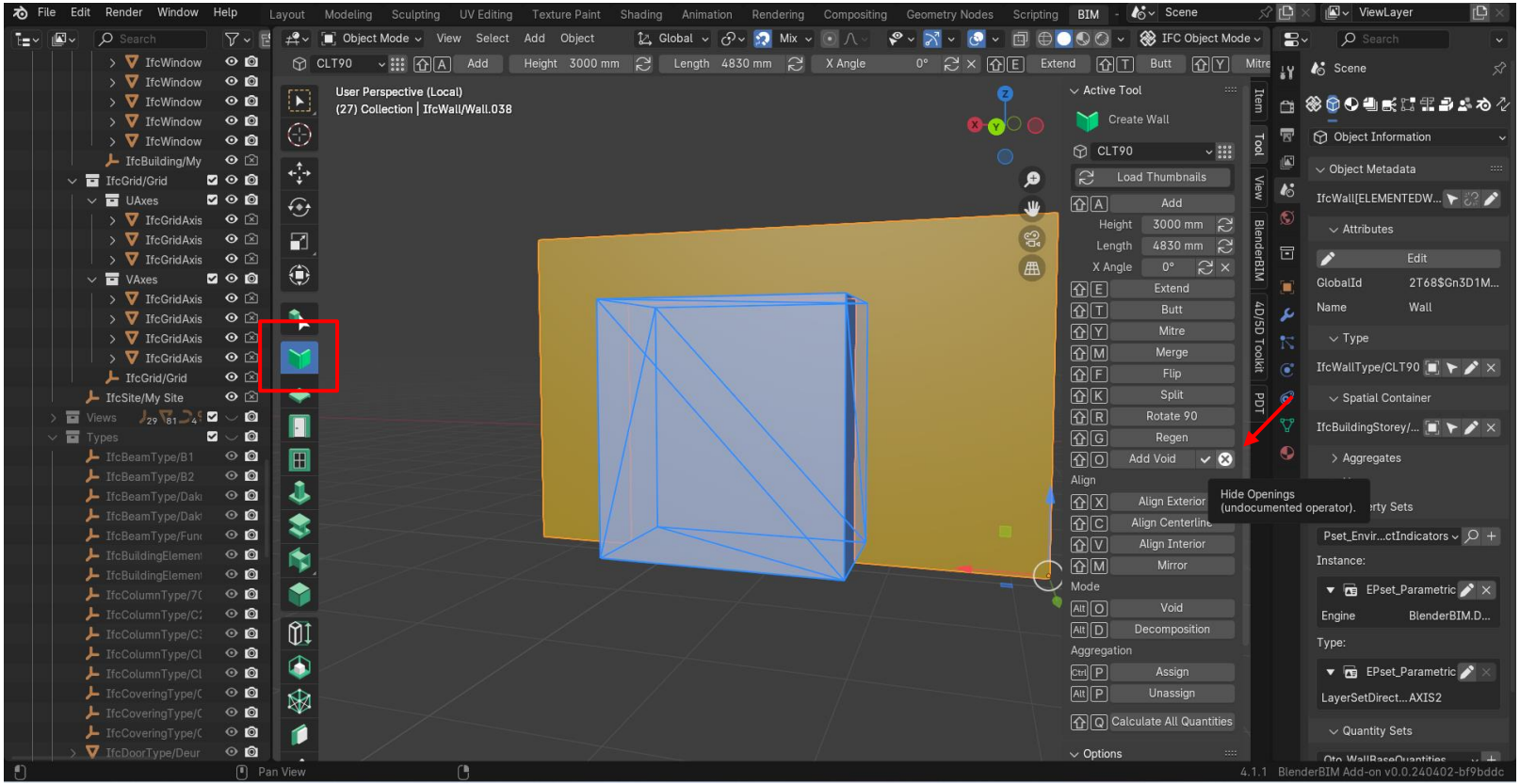
The opening is automatically added, but the door should move just 500 mm to the side. Open extra info tab ‘N’



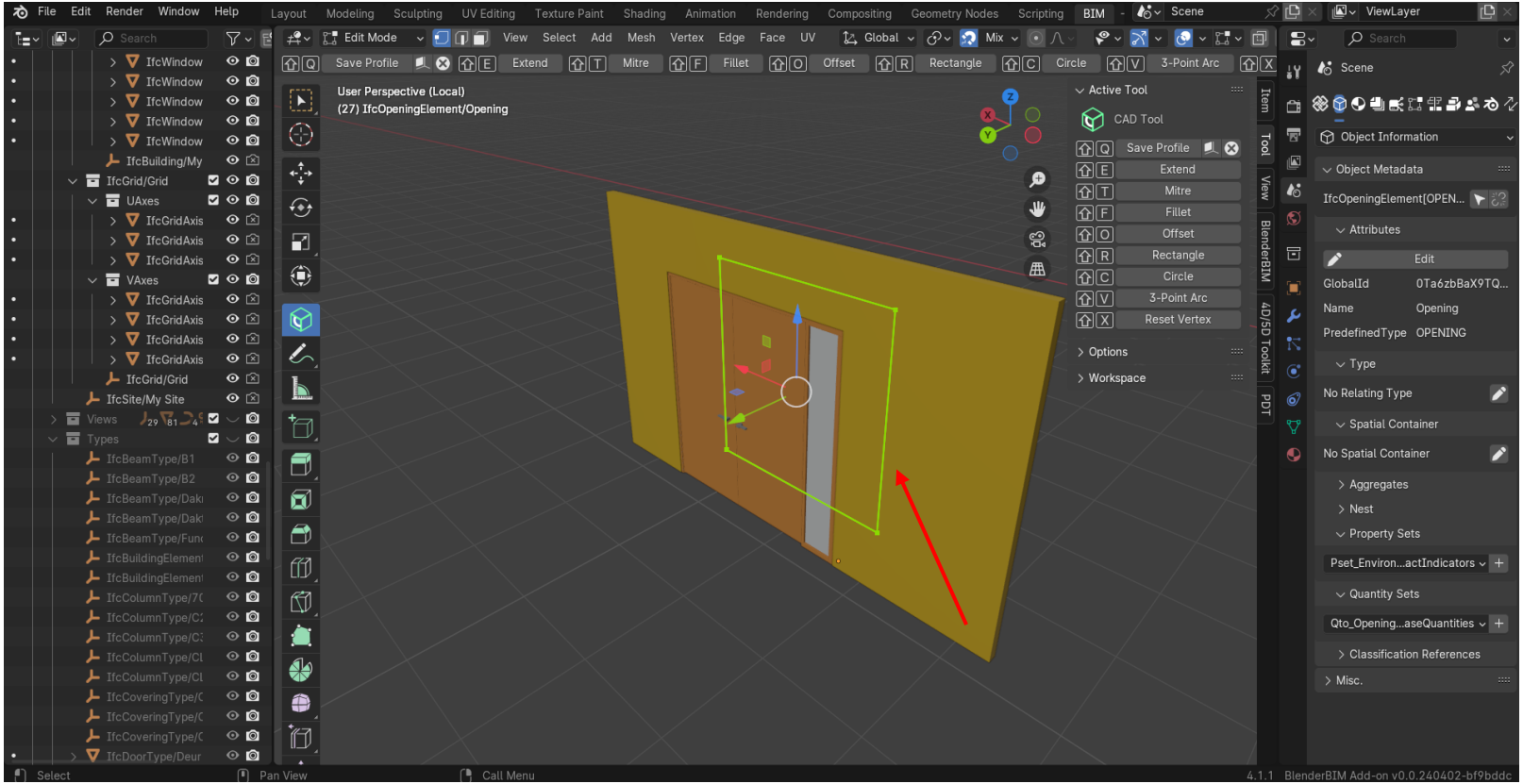
Select door and move it 500 mm to the side. The void stays in place! These elements are **not** constantly updating



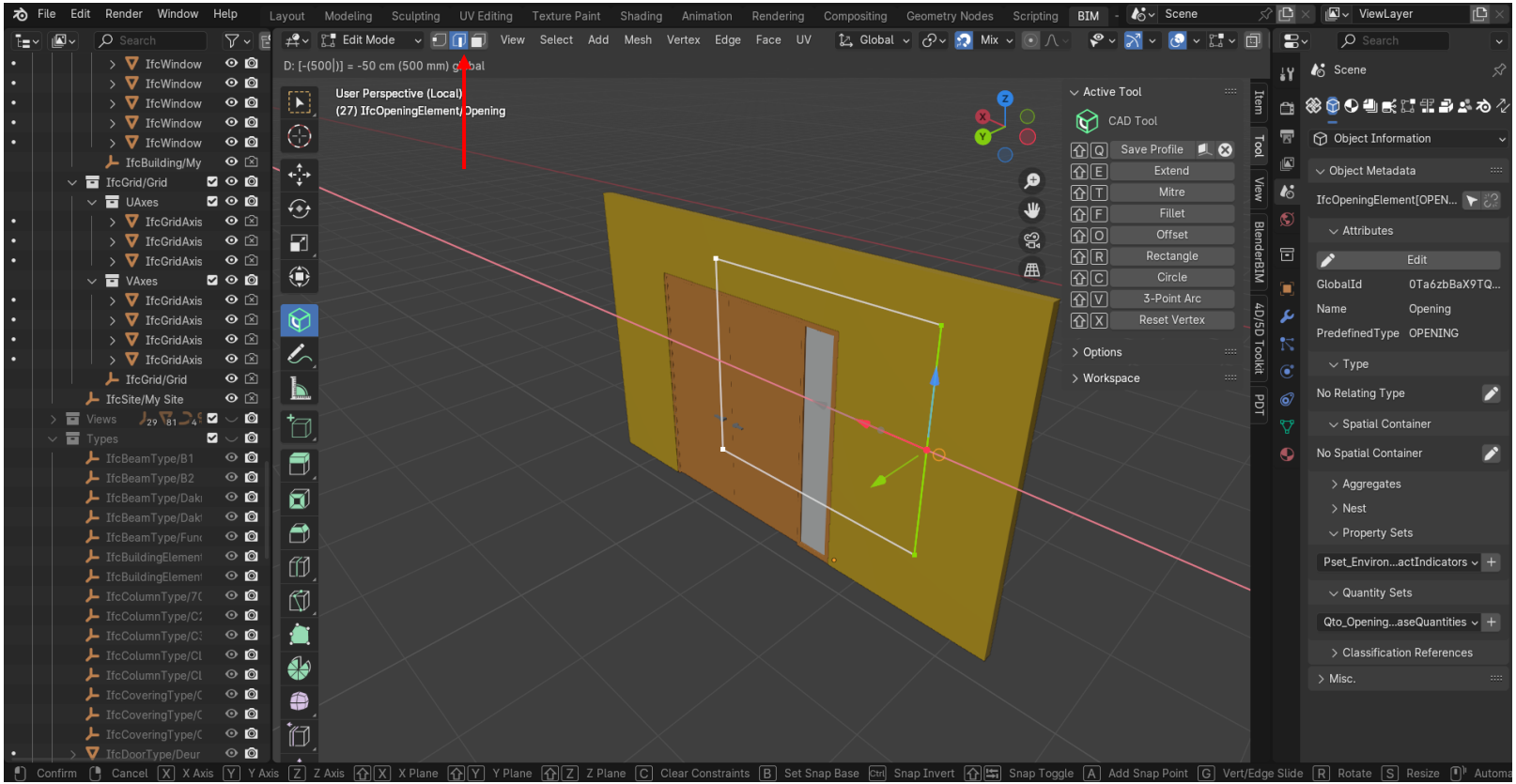
Clicking Regen (‘shift+G’) updates the link between Void and Element



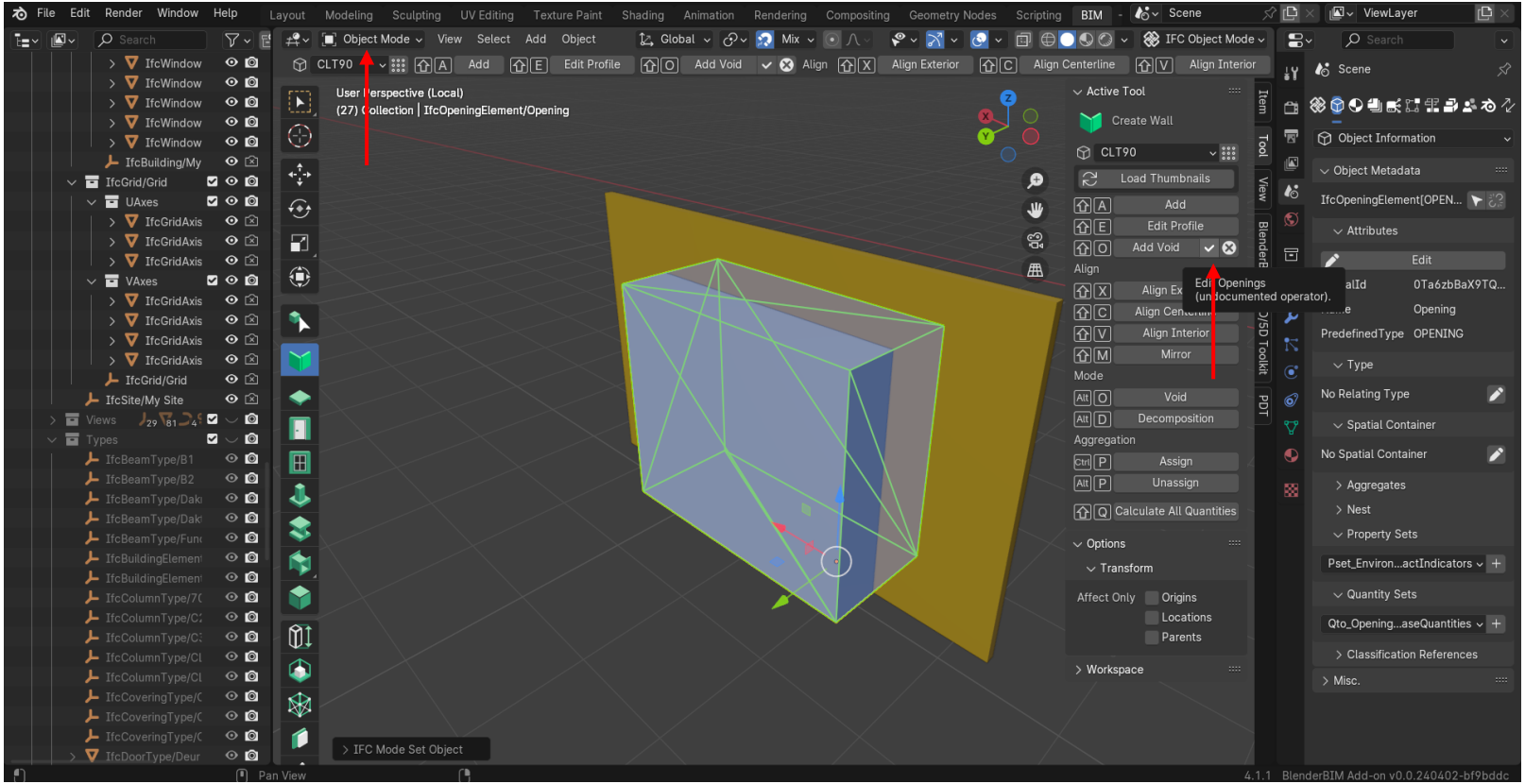
But we want a bigger void! Select wall & wall tool and click the eye icon (‘alt+O’) to enter **Void mode**.



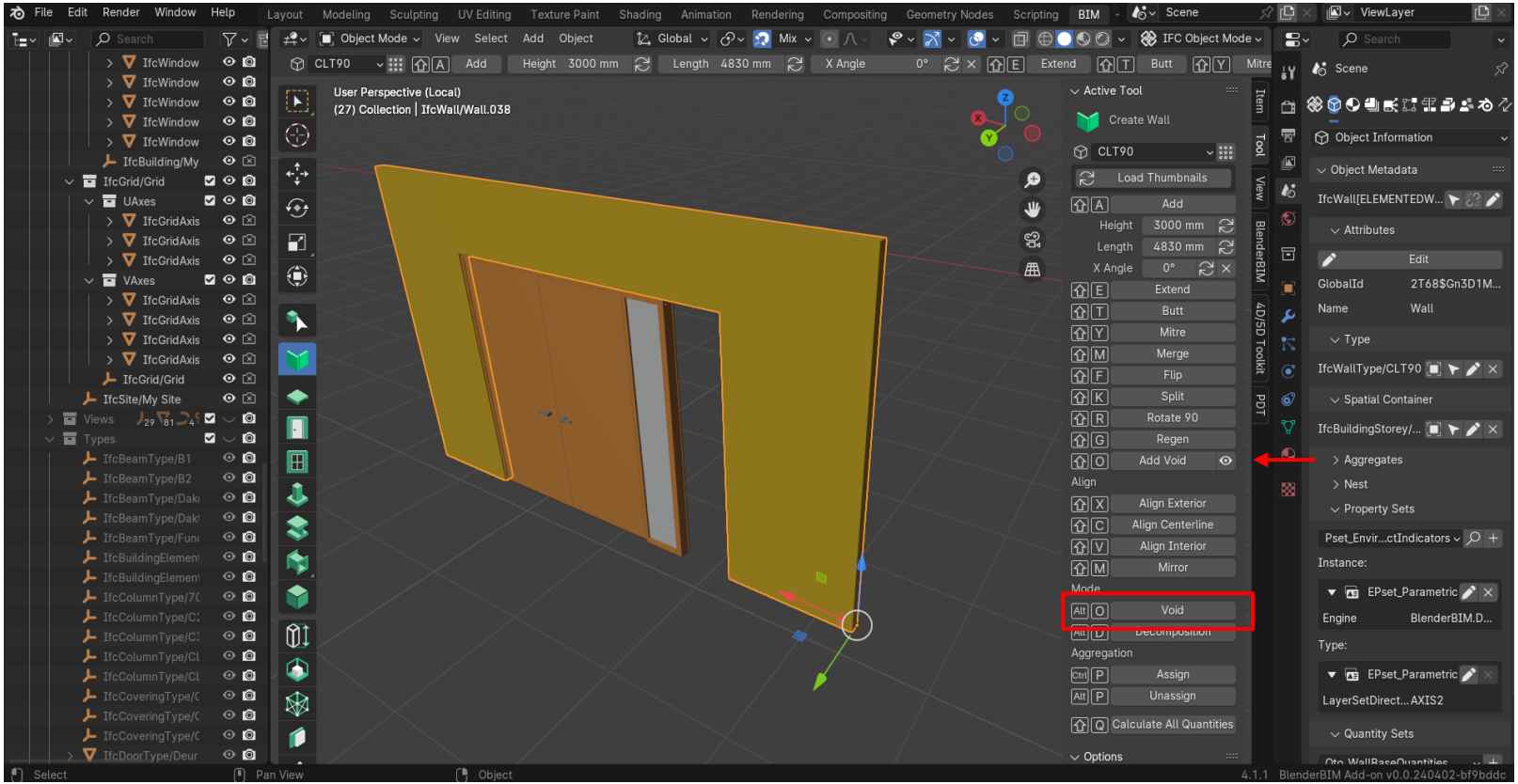
Select the void and enter **Edit mode** by using ‘tab’. You see the default void is created by extruding the outlines of the door.



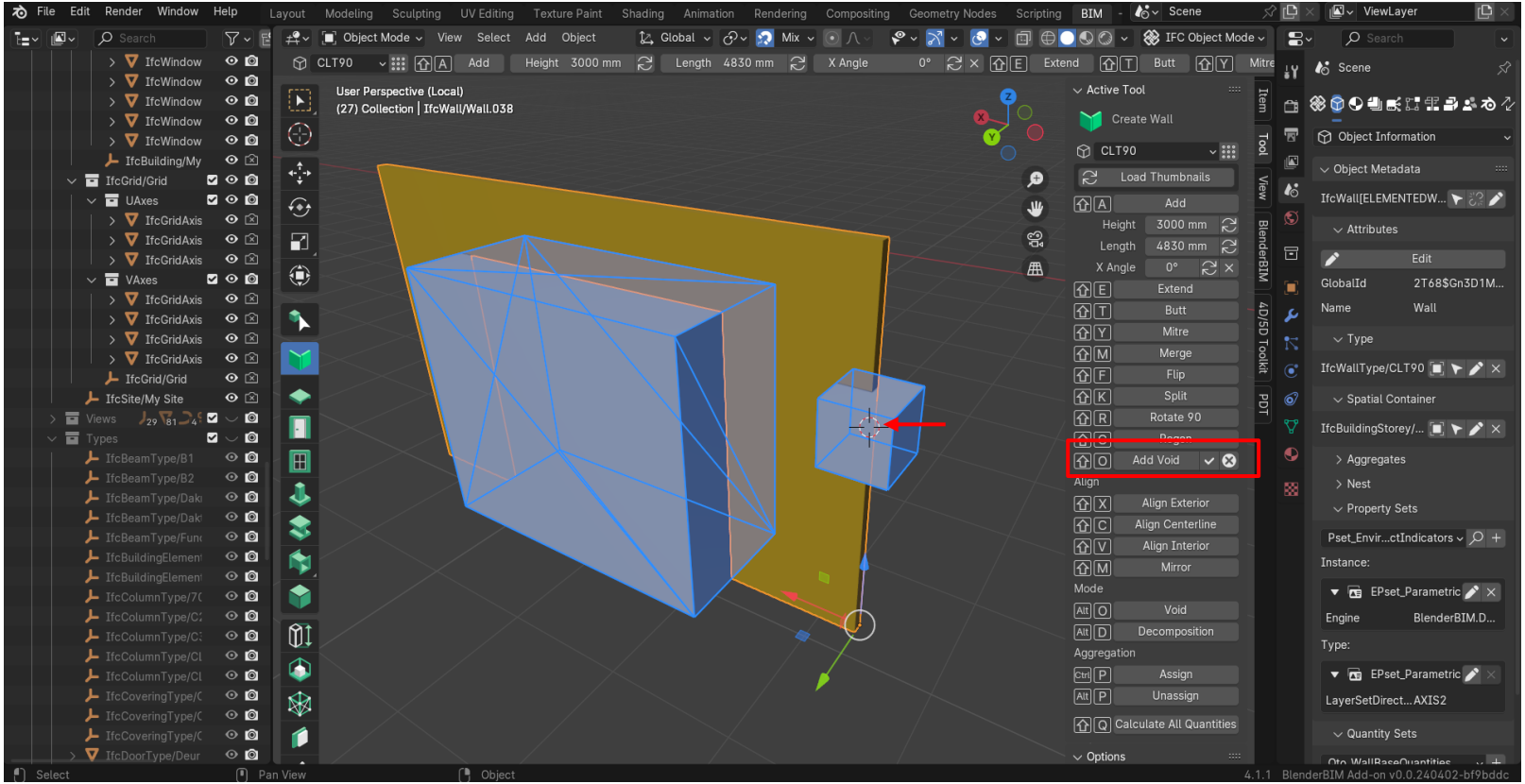
Go into ‘Edge Select’ mode (‘2’) and move the edge e.g. 500 mm to the right (‘G+X+500’)



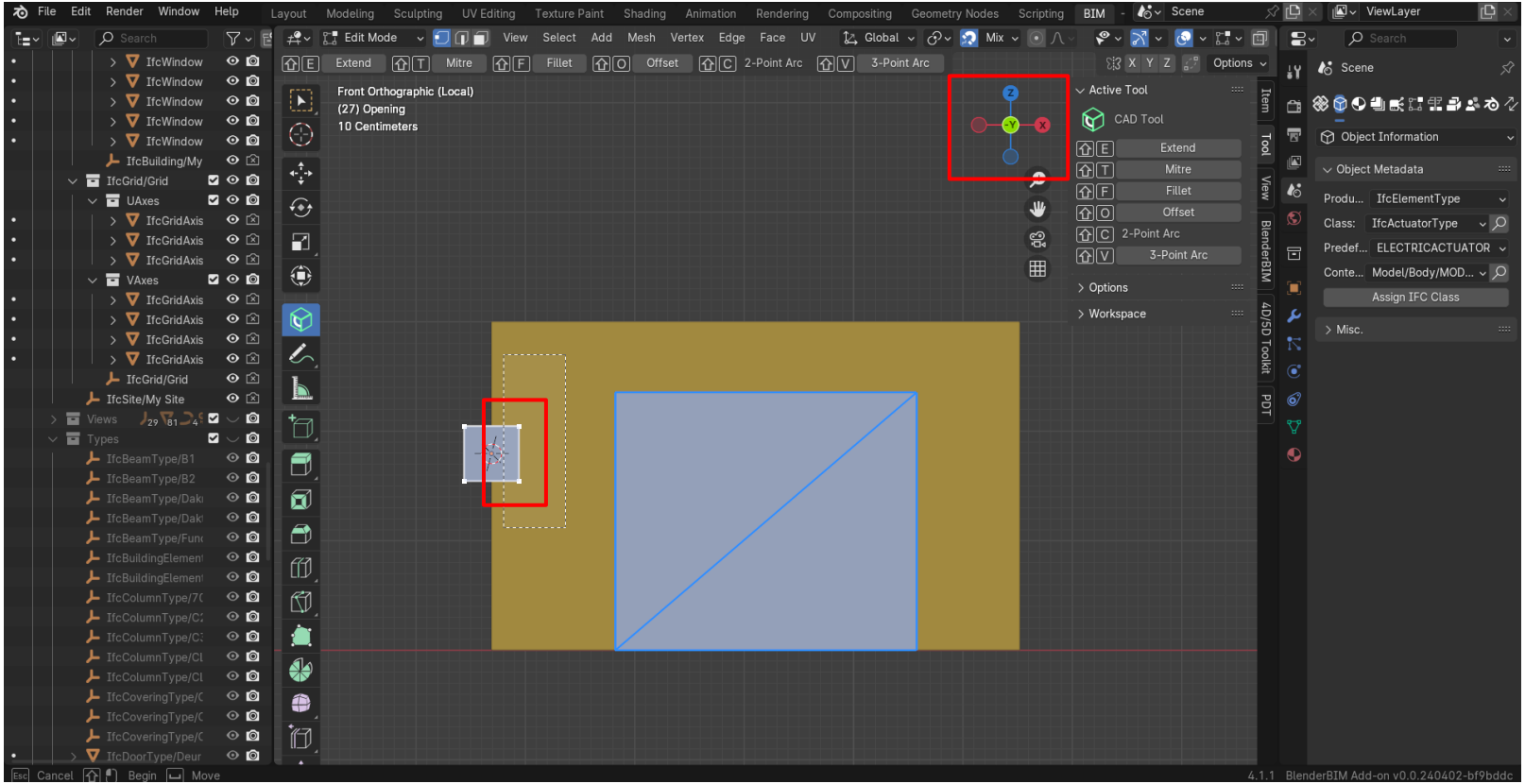
Go back to Object mode with ‘tab’ and click the checkmark to apply the void and leave Void mode



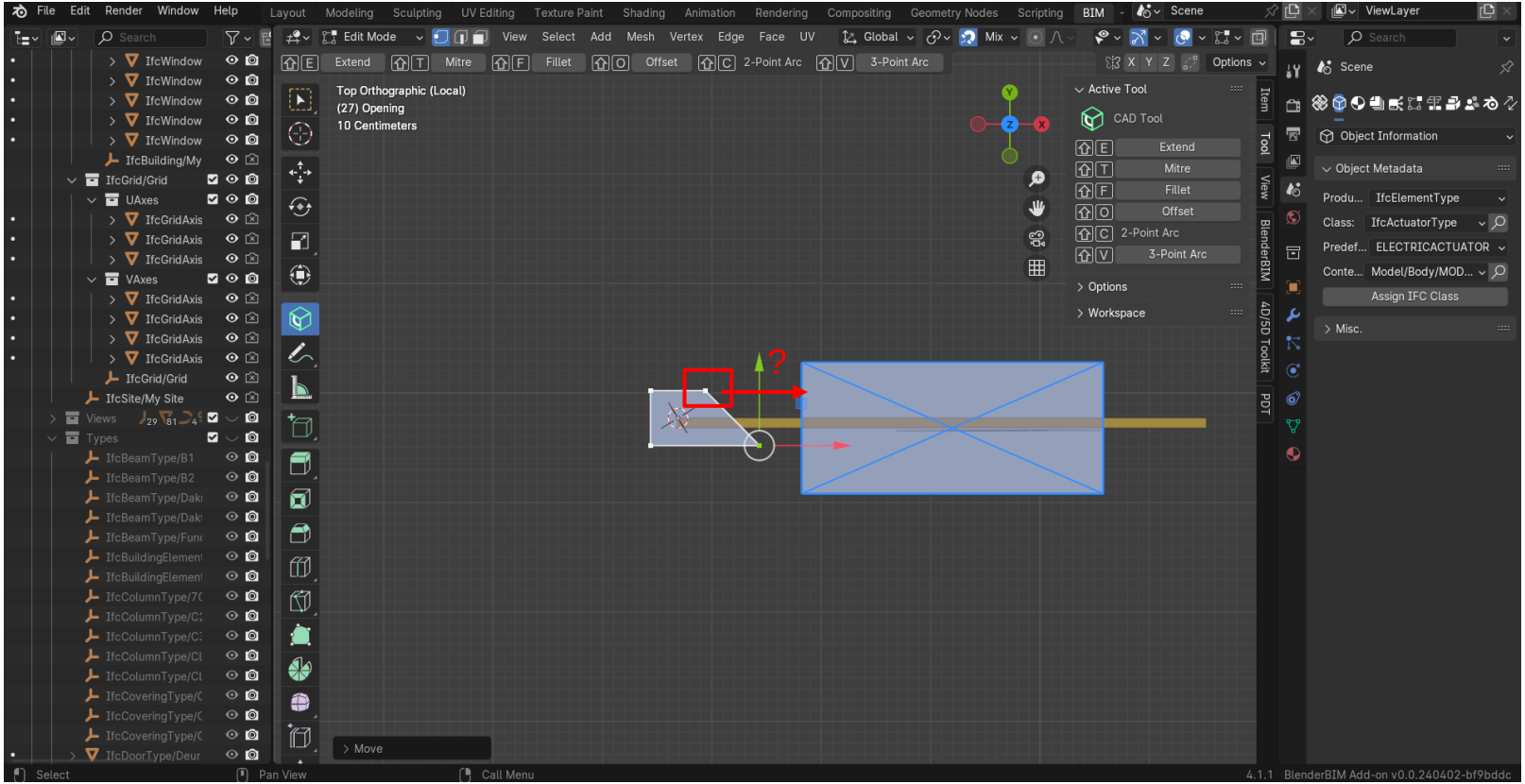
Cool, now go back to Void Mode via the eye icon or the other button (‘alt+O’) to add a custom void.



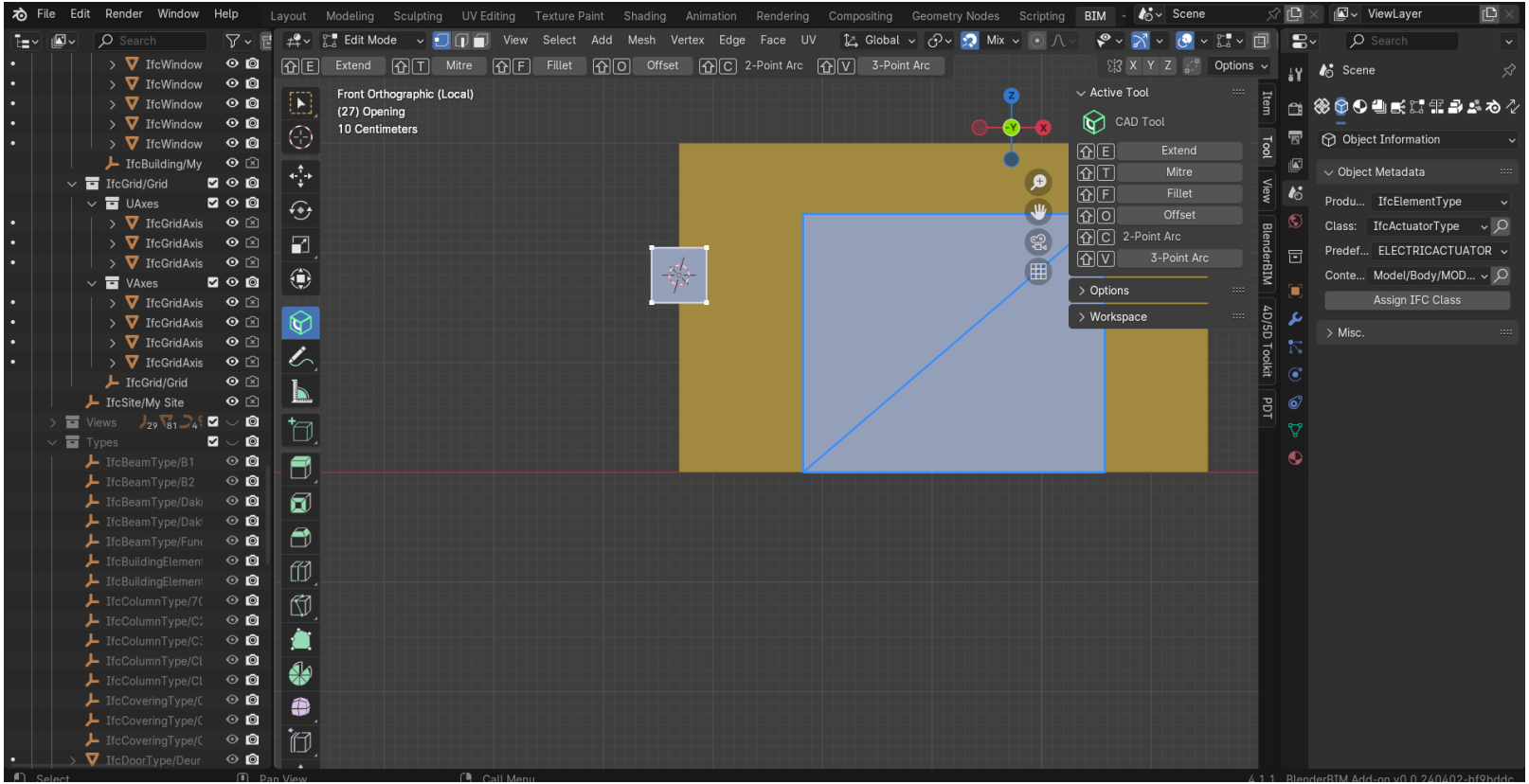
Place the 3D-cursor on the wall (‘shift+RMB+drag’) and click Add Void (‘shift+O’)



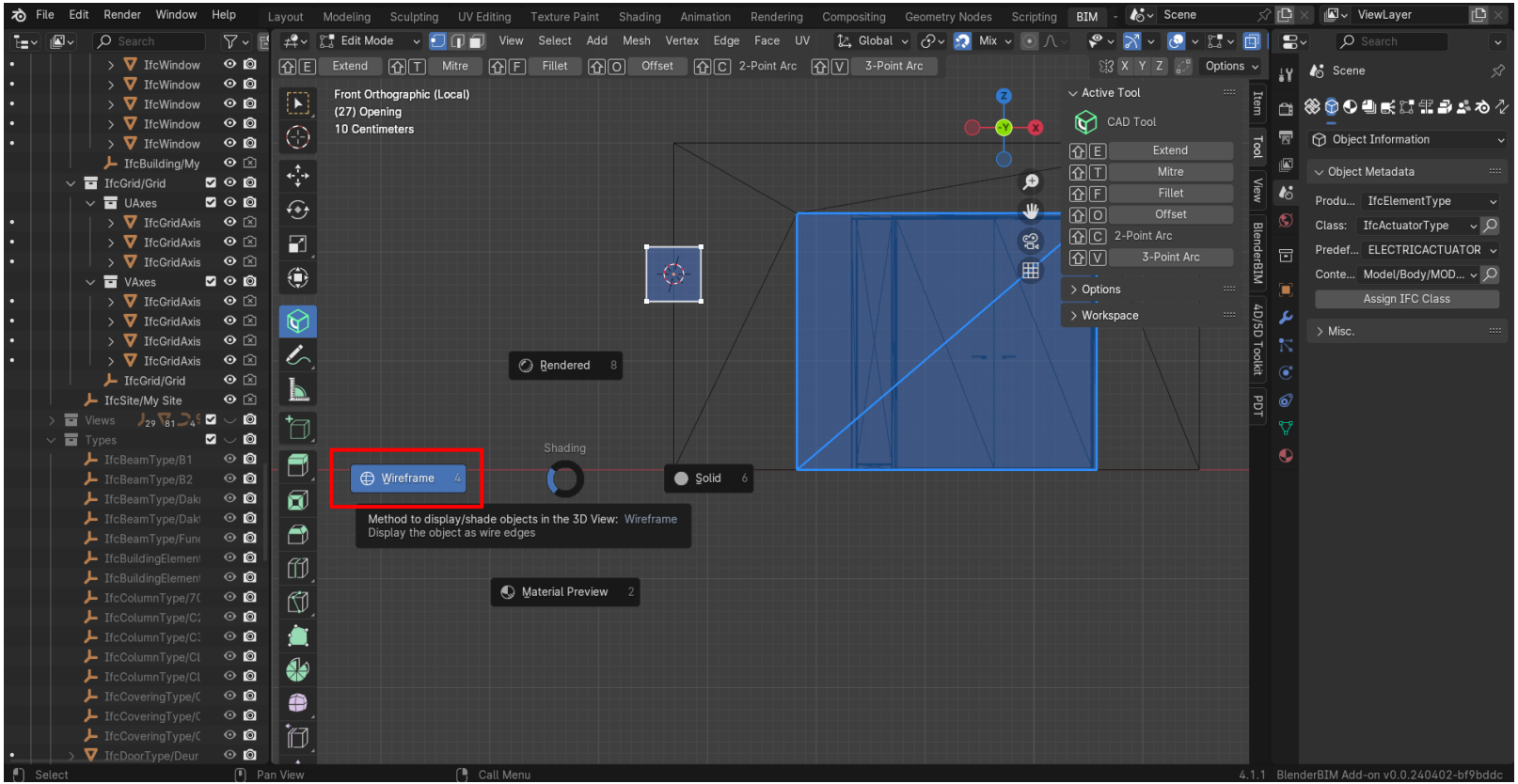
Get a better view by pressing ‘NUMP 1’, ‘tab’ into Edit Mode and drag to select the vertices on one side



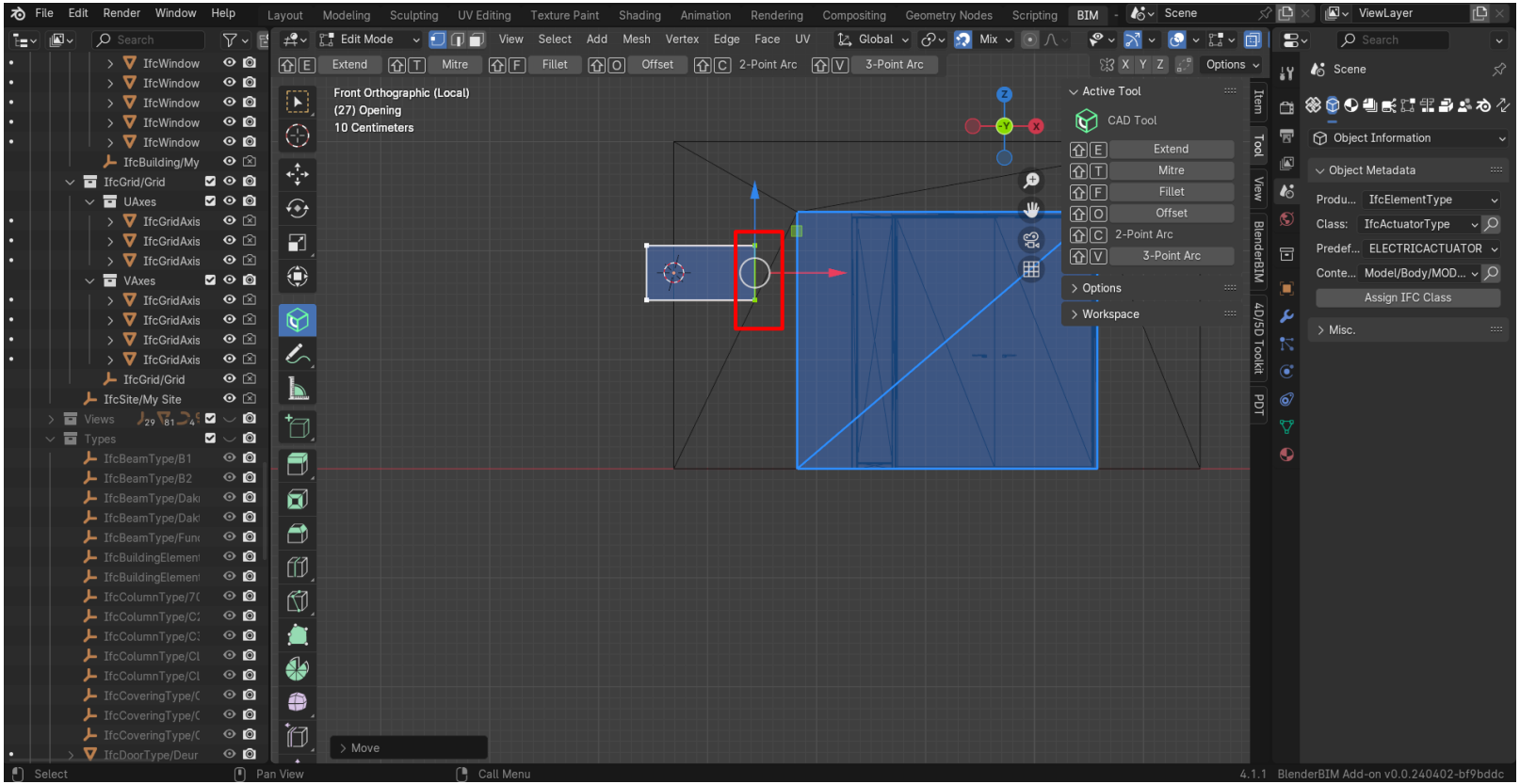
Drag them to the side; Press ‘NUMP 7’ and you see that the 2 vertices in the back **didn’t get selected** and thus didn’t move



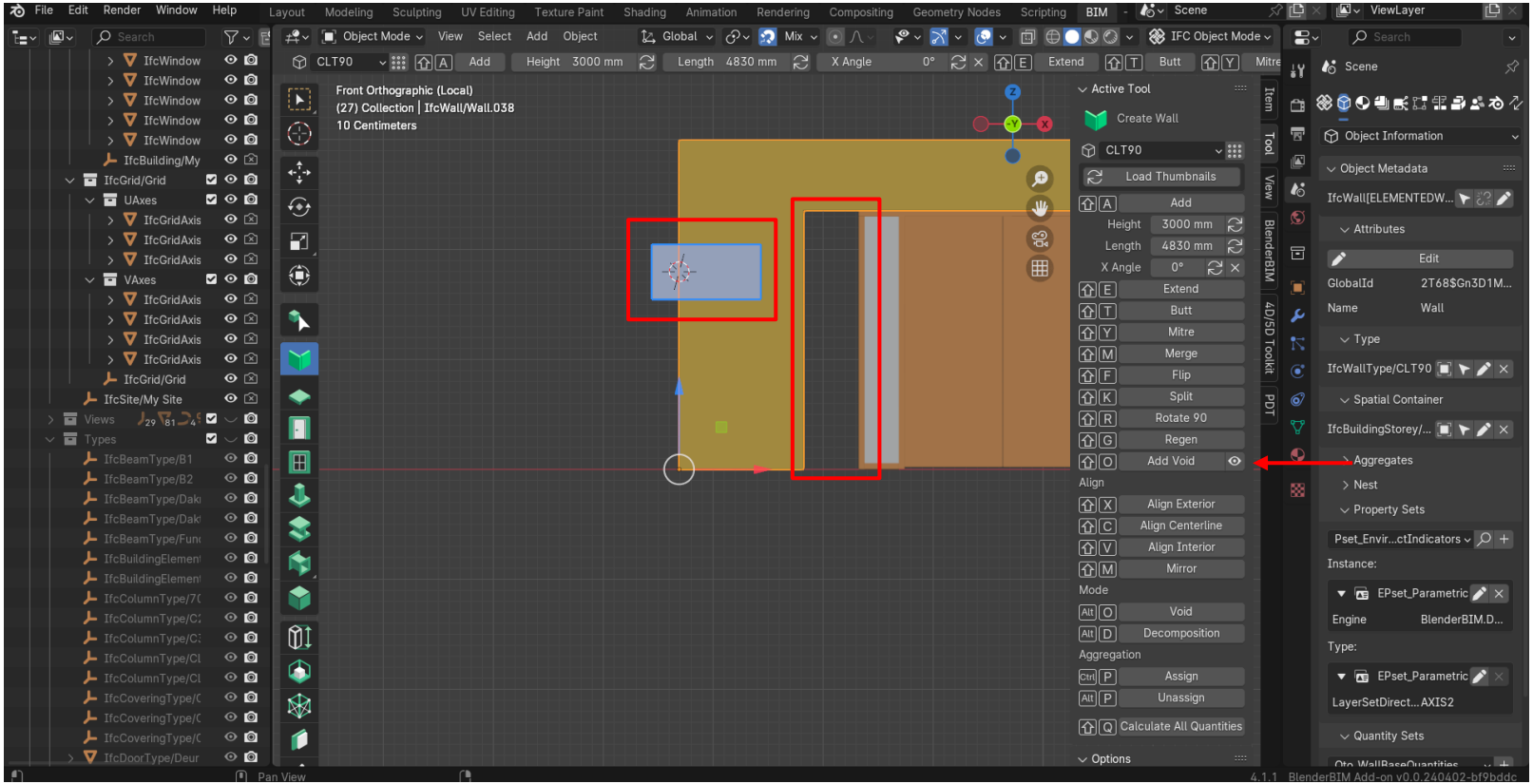
Go back to side view ('NUMP 1') and press 'ctrl+Z' 2 times, as (de)selecting counts as an action



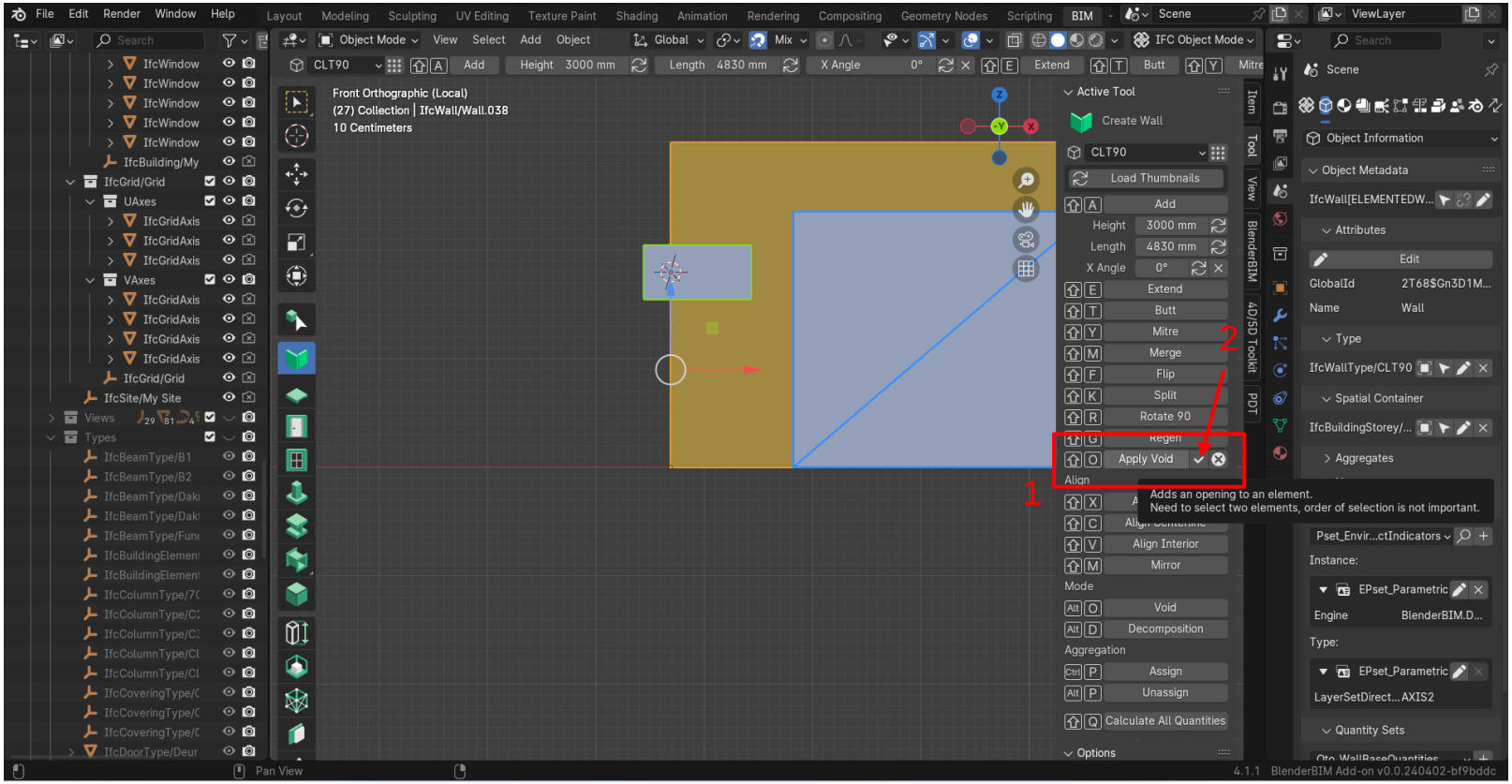
Now press ‘Z’ to switch between **Display Modes** and go for Wireframe
This mode doesn’t calculate what items are before the other



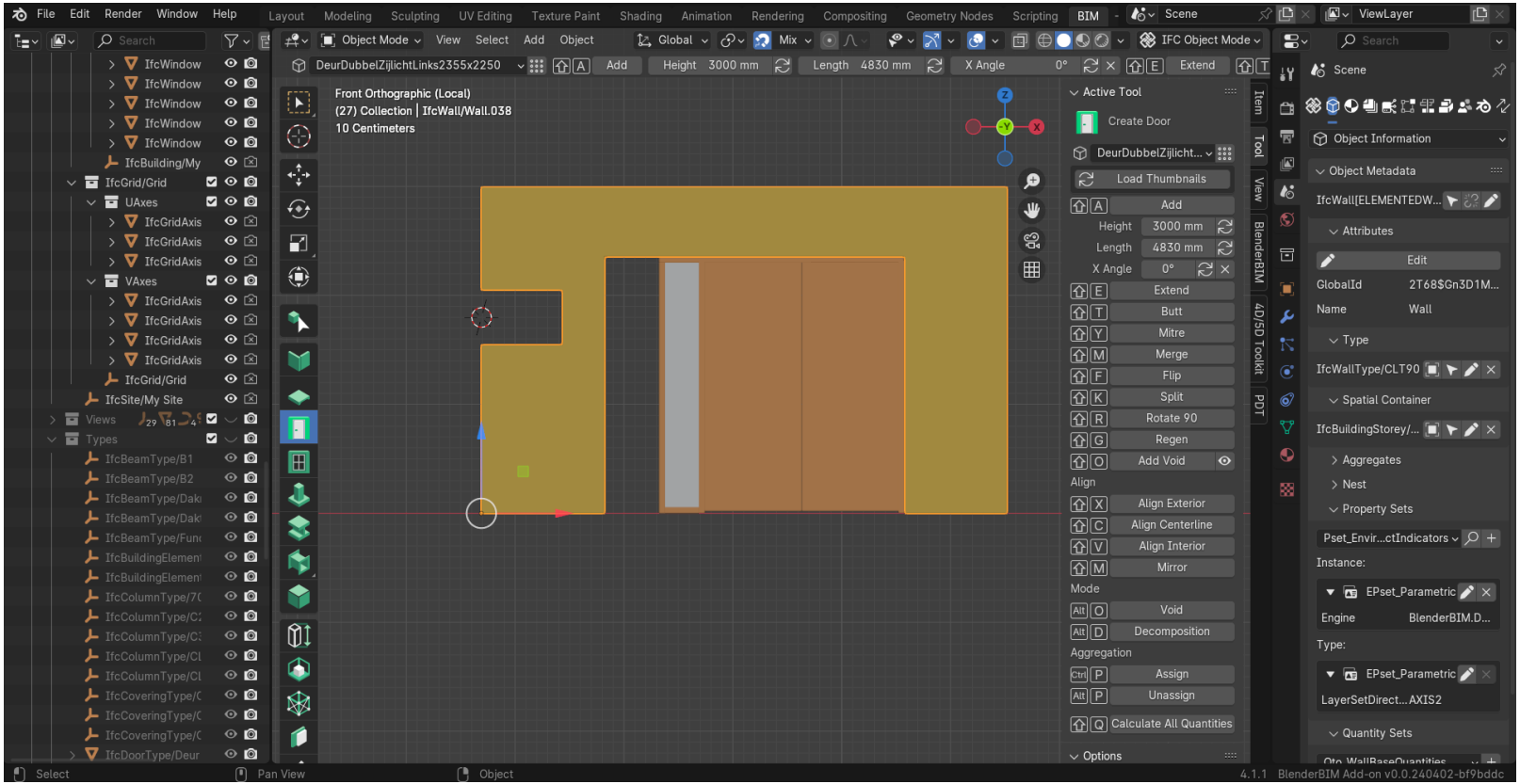
Select & drag again to see the vertices in the back have also moved.
Switch back to Solid Mode (‘Z’) and into Object Mode (‘tab’)



Select the wall and click the checkmark. Note that the void isn't **applied** to the wall yet! Go back to Void Mode ('alt+O')



Select the void **first** and the wall **second**, otherwise you get less options. Then press 'Apply Void' and **then** the checkmark

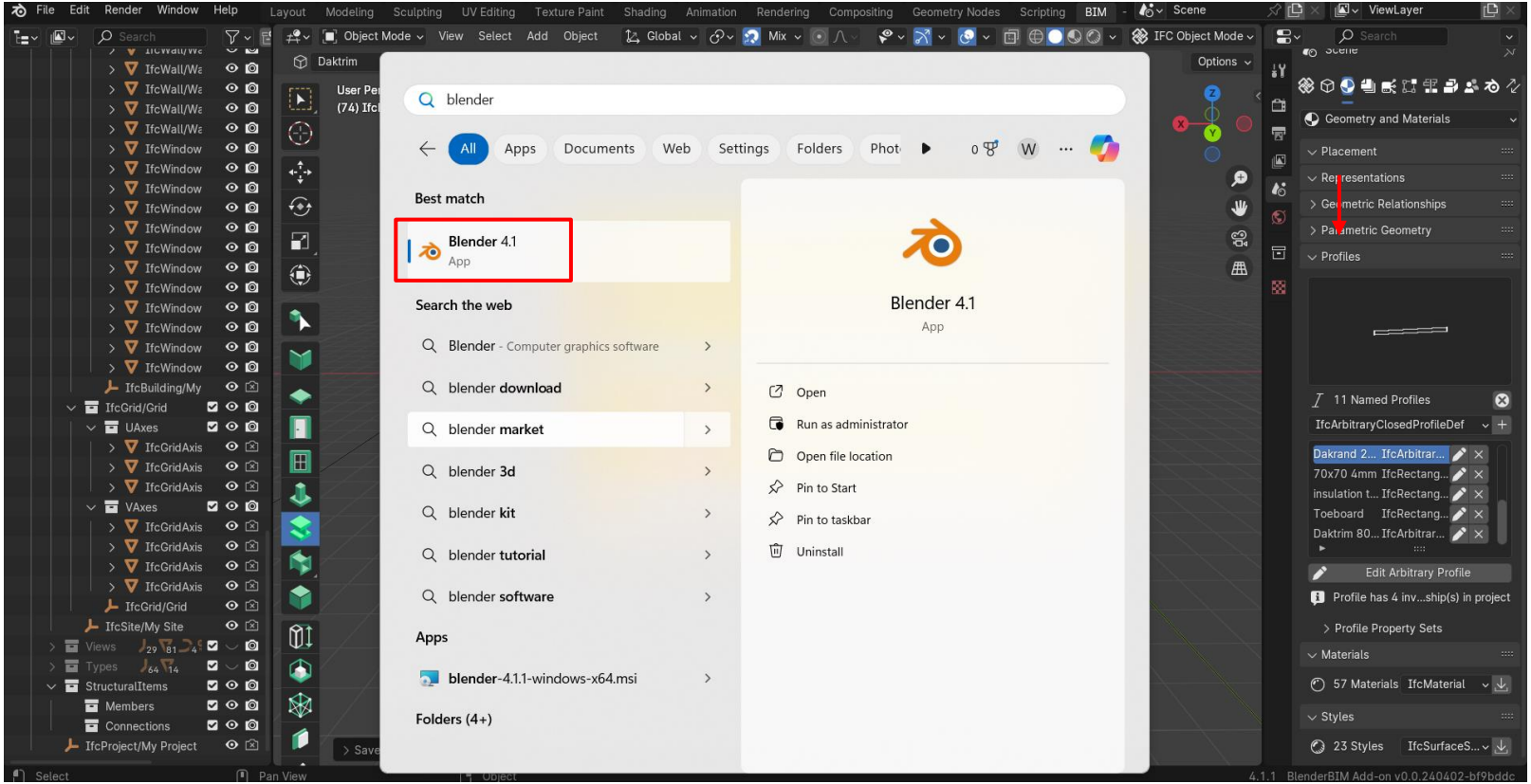


Awesome, custom void, check! This part is finished now!

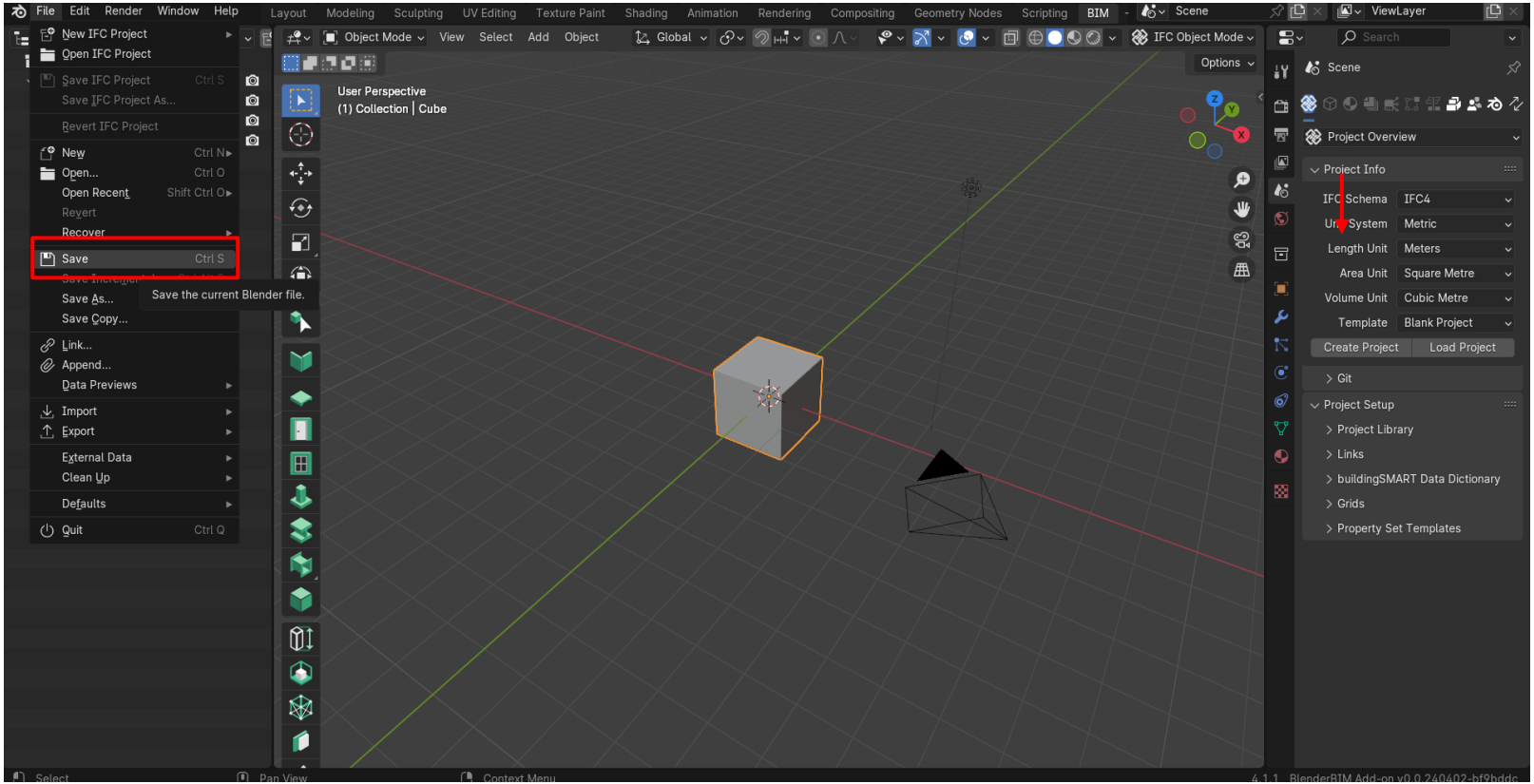
Create & link library

- Now let’s create a simple 3D chair to link into our project
- Start of your own **library**
- Learn editing and more

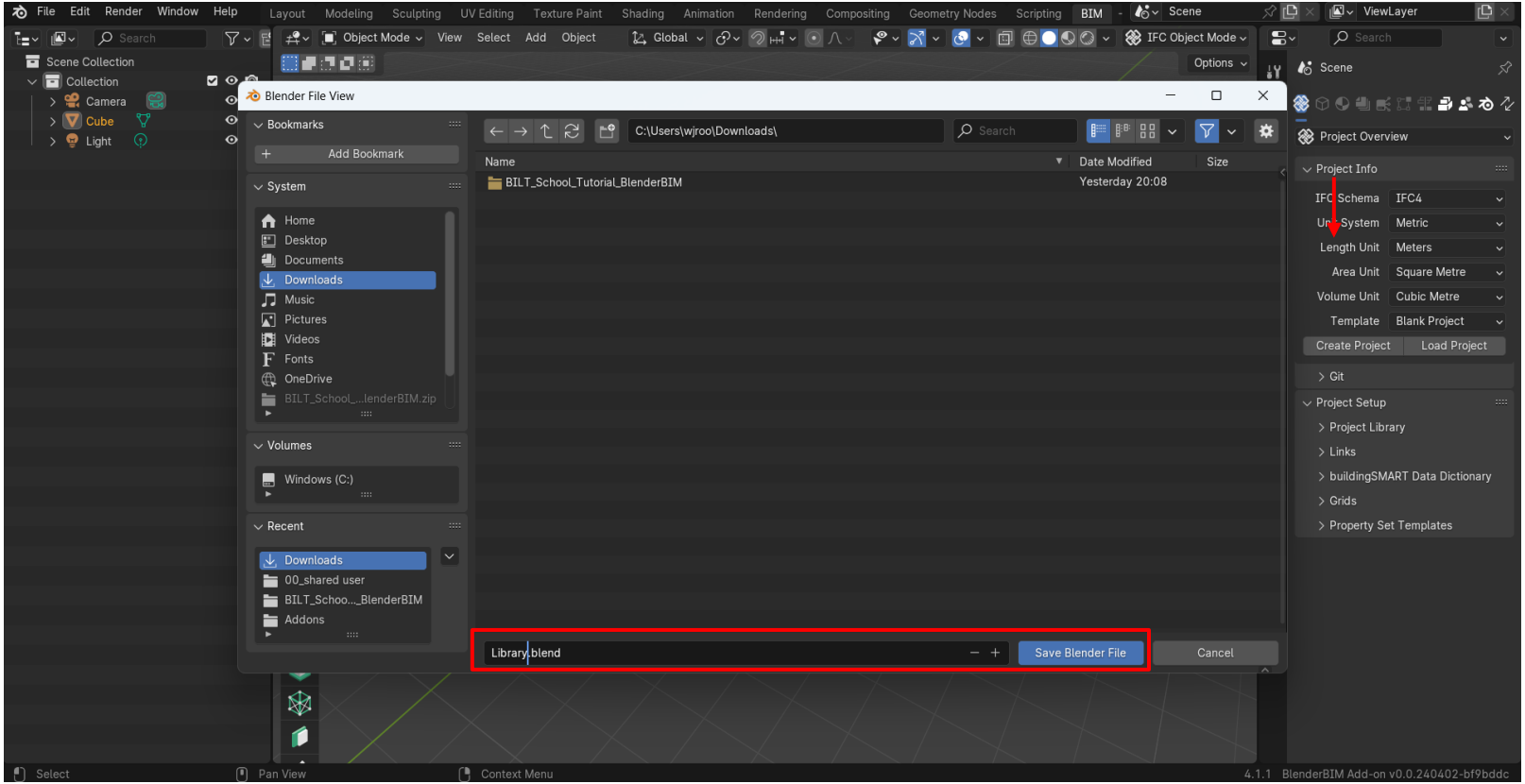
Creating a library object and linking it



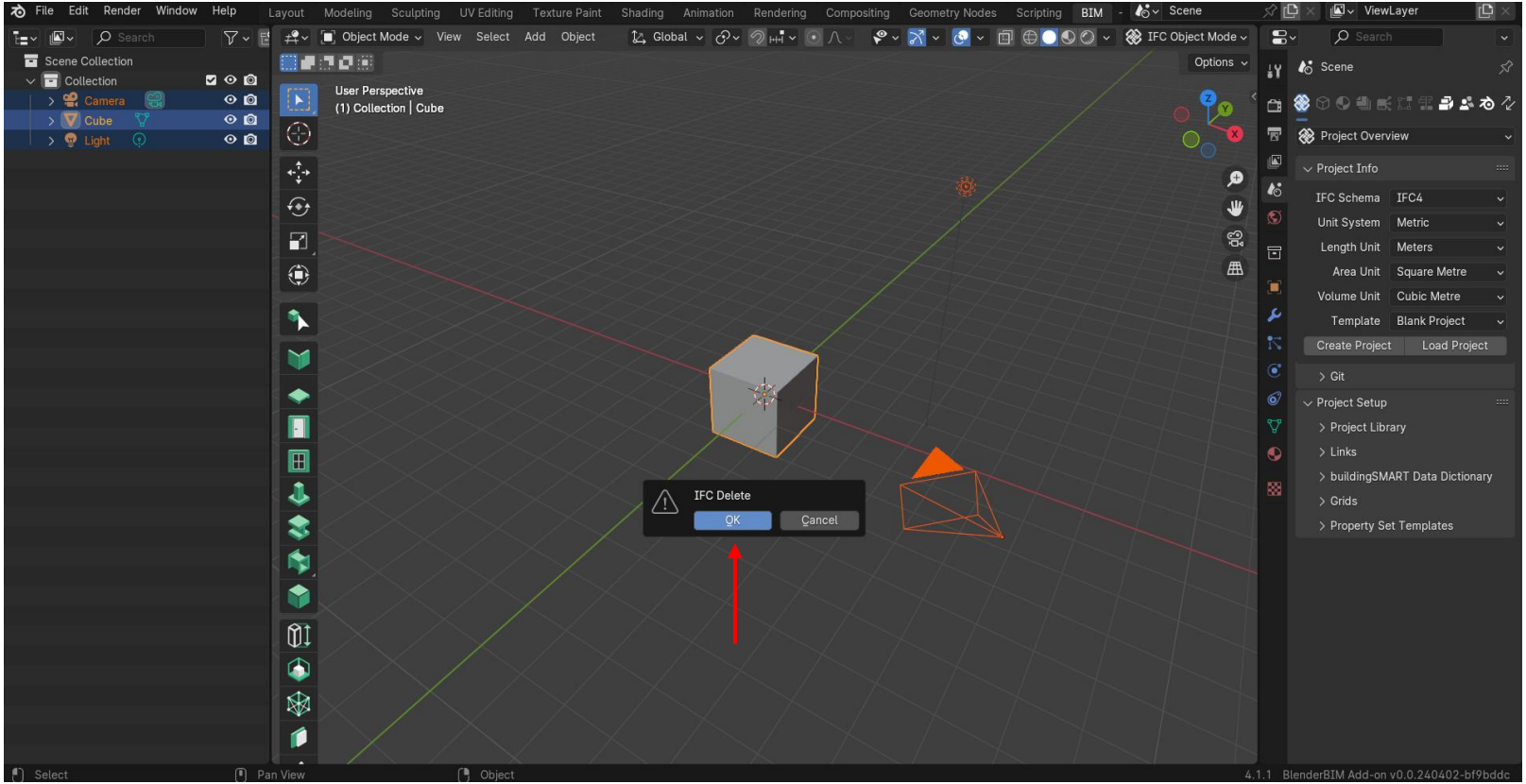
Open **another** Blender instance



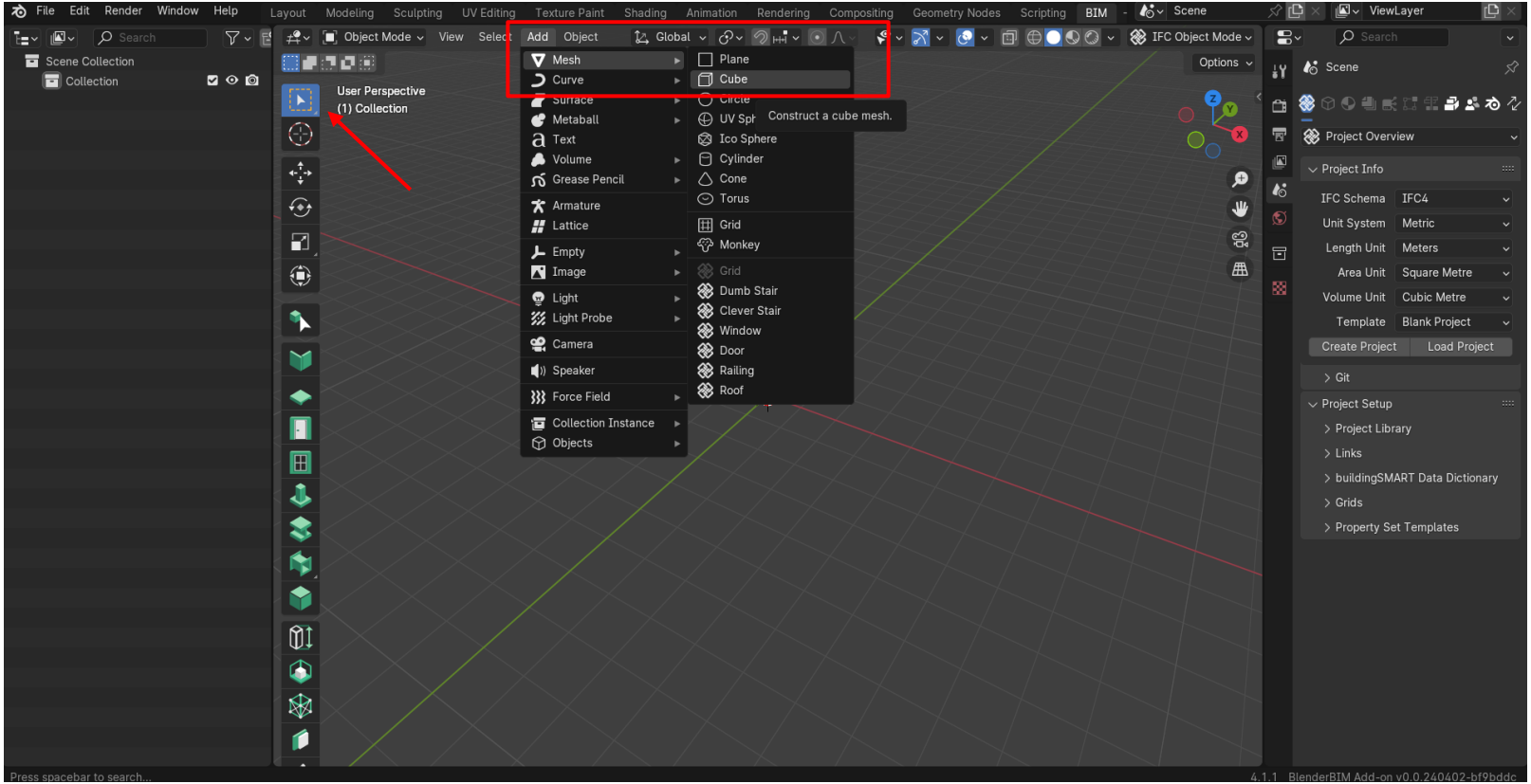
Save the **Blender** file (non IFC elements **aren't** saved in .ifc, that's why we create a .blend save)



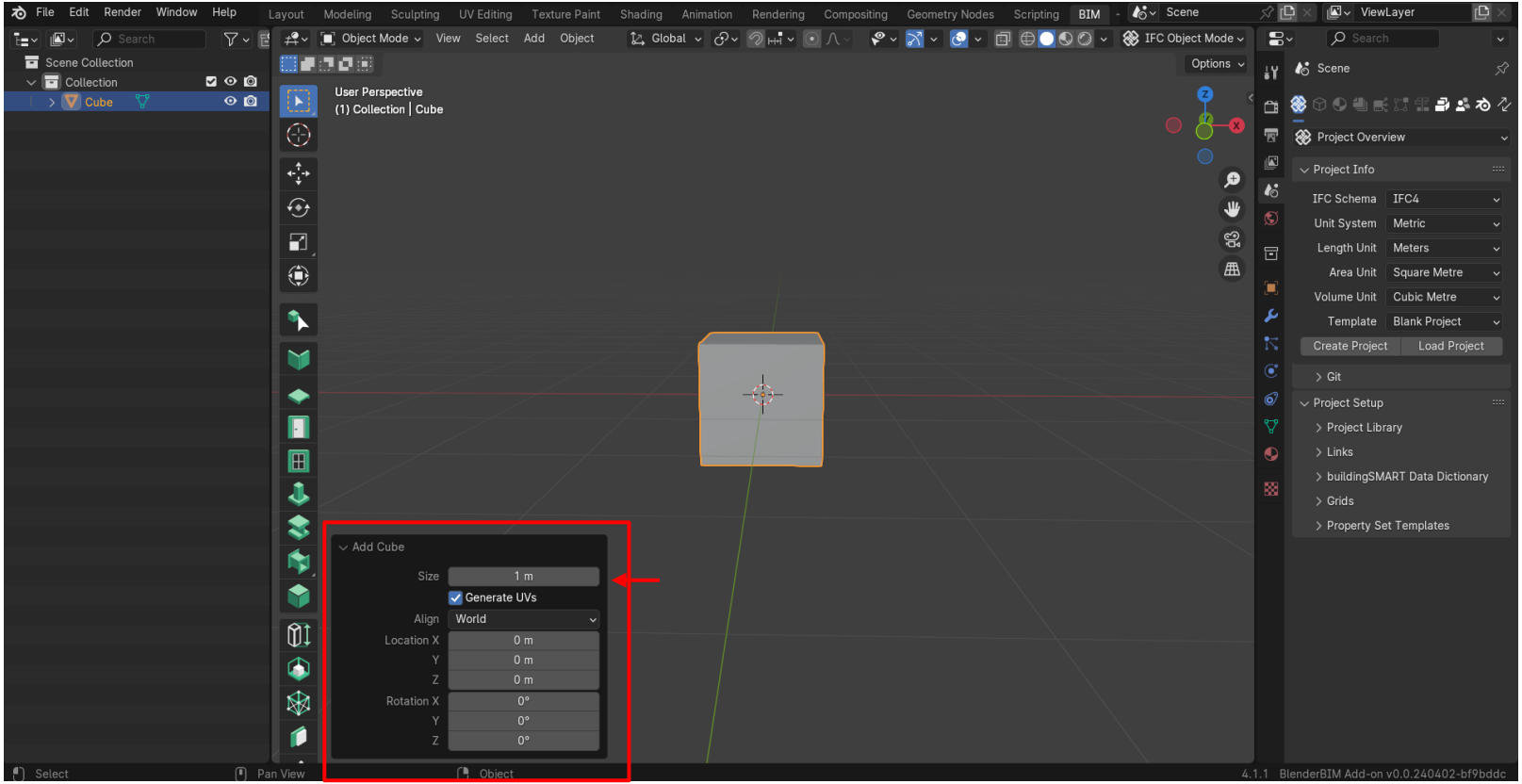
I call it Library.**blend**



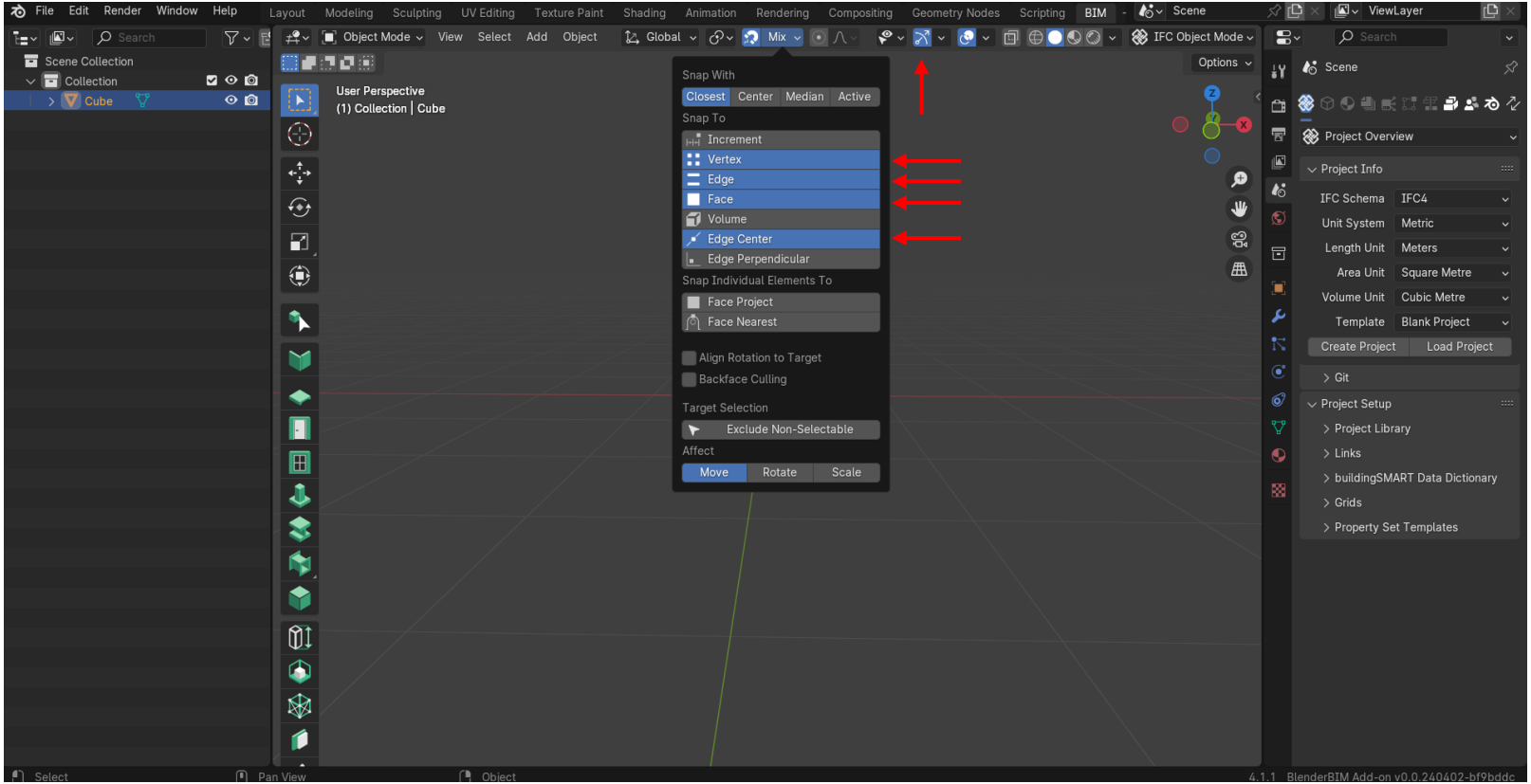
Select all ('A') and delete ('X'). Using 'X' is **important** to remember, as you should always use this in an IFC file



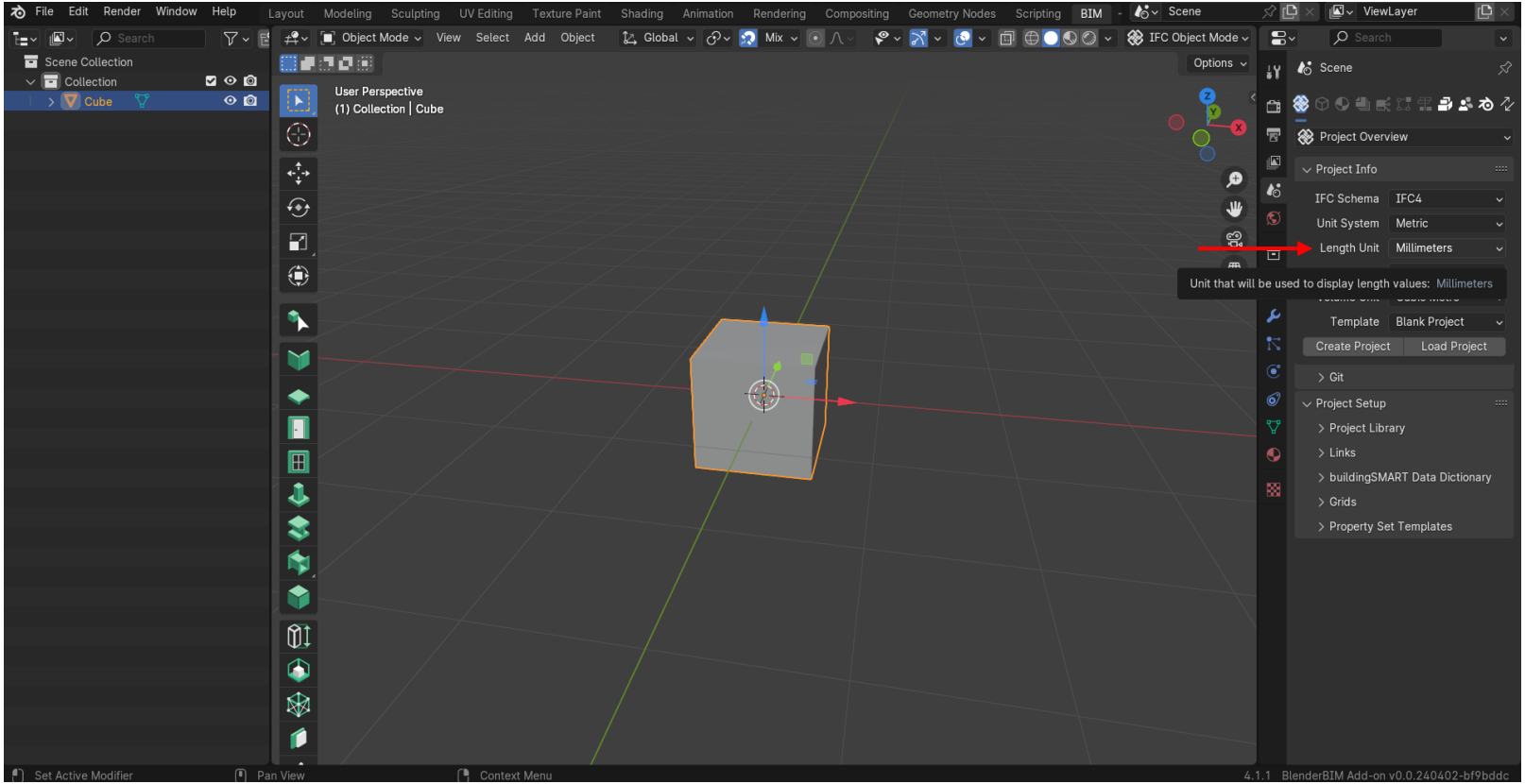
Press the select tool and add a **Blender (mesh)** ‘Cube’ (‘shift+A’)



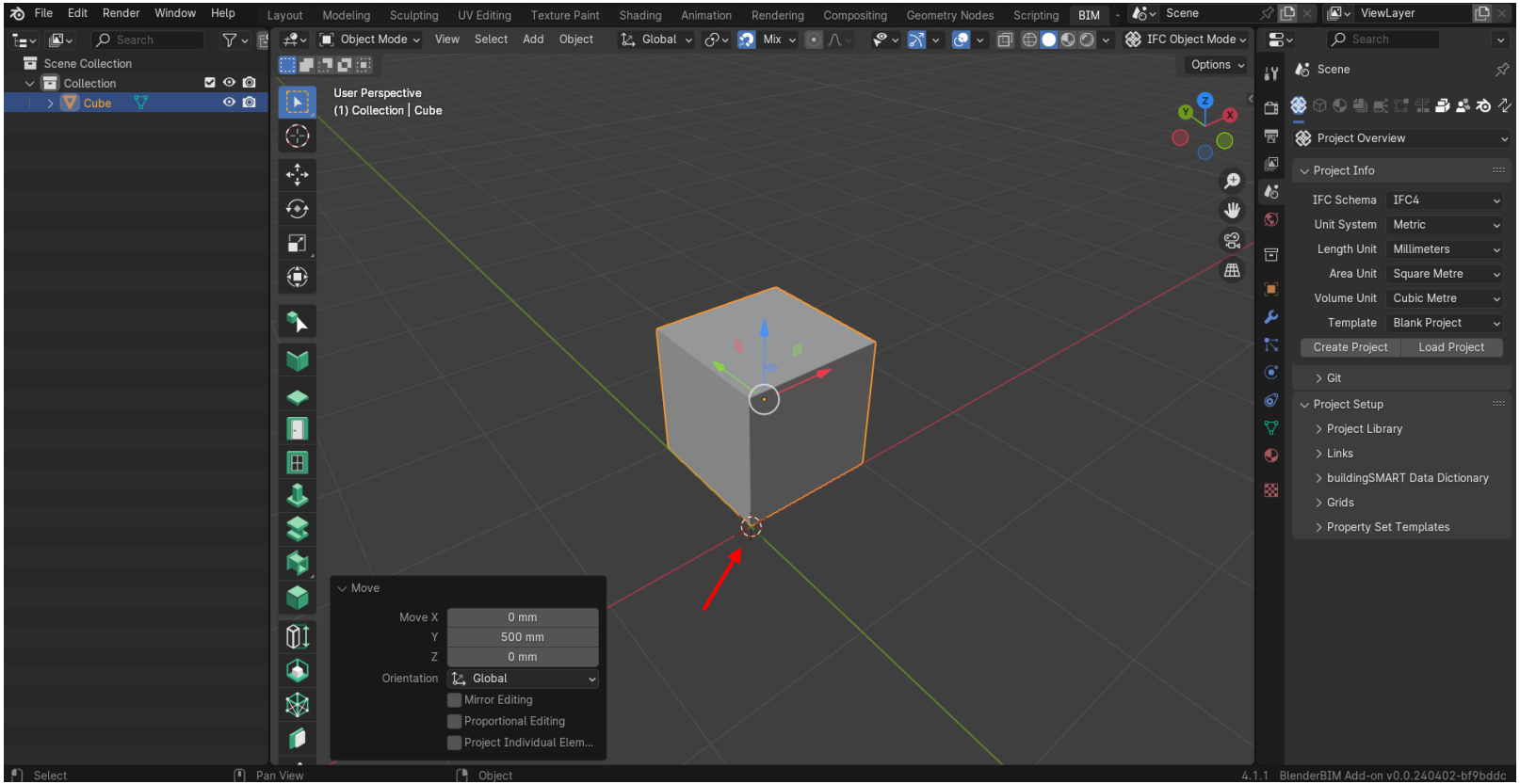
Directly after executing an action (generating cube), you can **modify** the action; e.g. change the size of the cube to 1 m(eter)



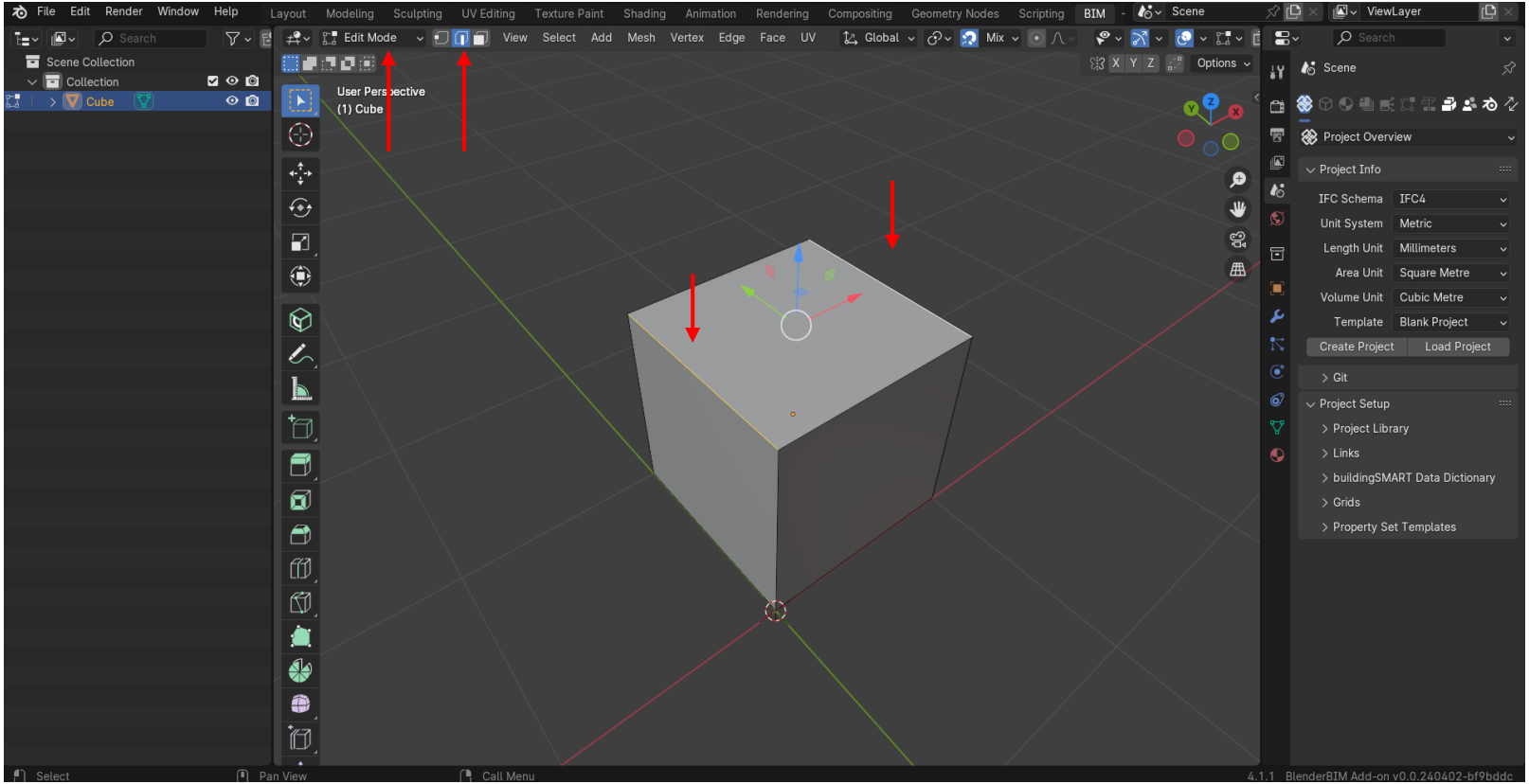
Activate snapping (‘shift+tab’) and Move gizmo if disabled. These settings reset every time you open a project. A solution later!



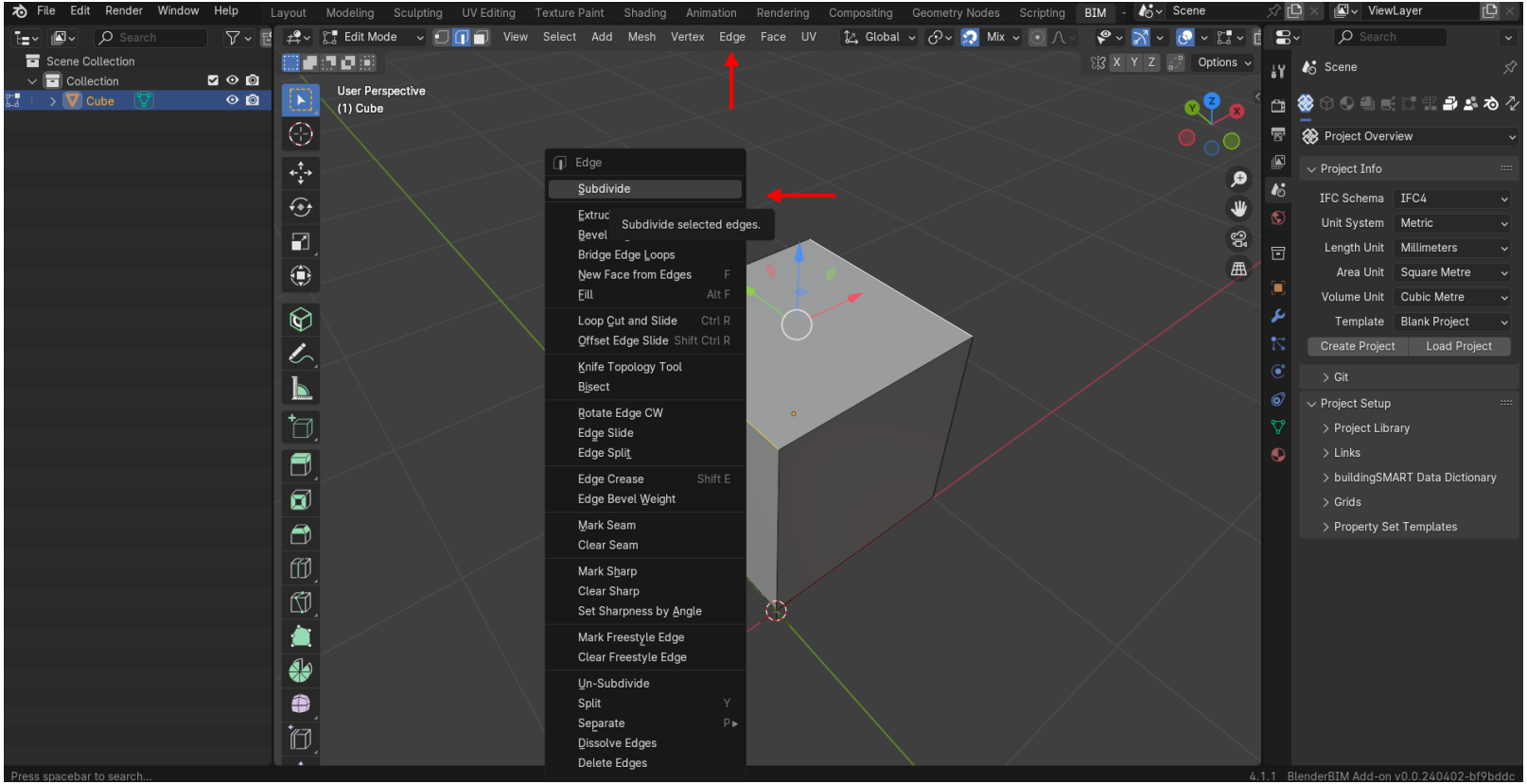
Set units to milimeters for more precise control



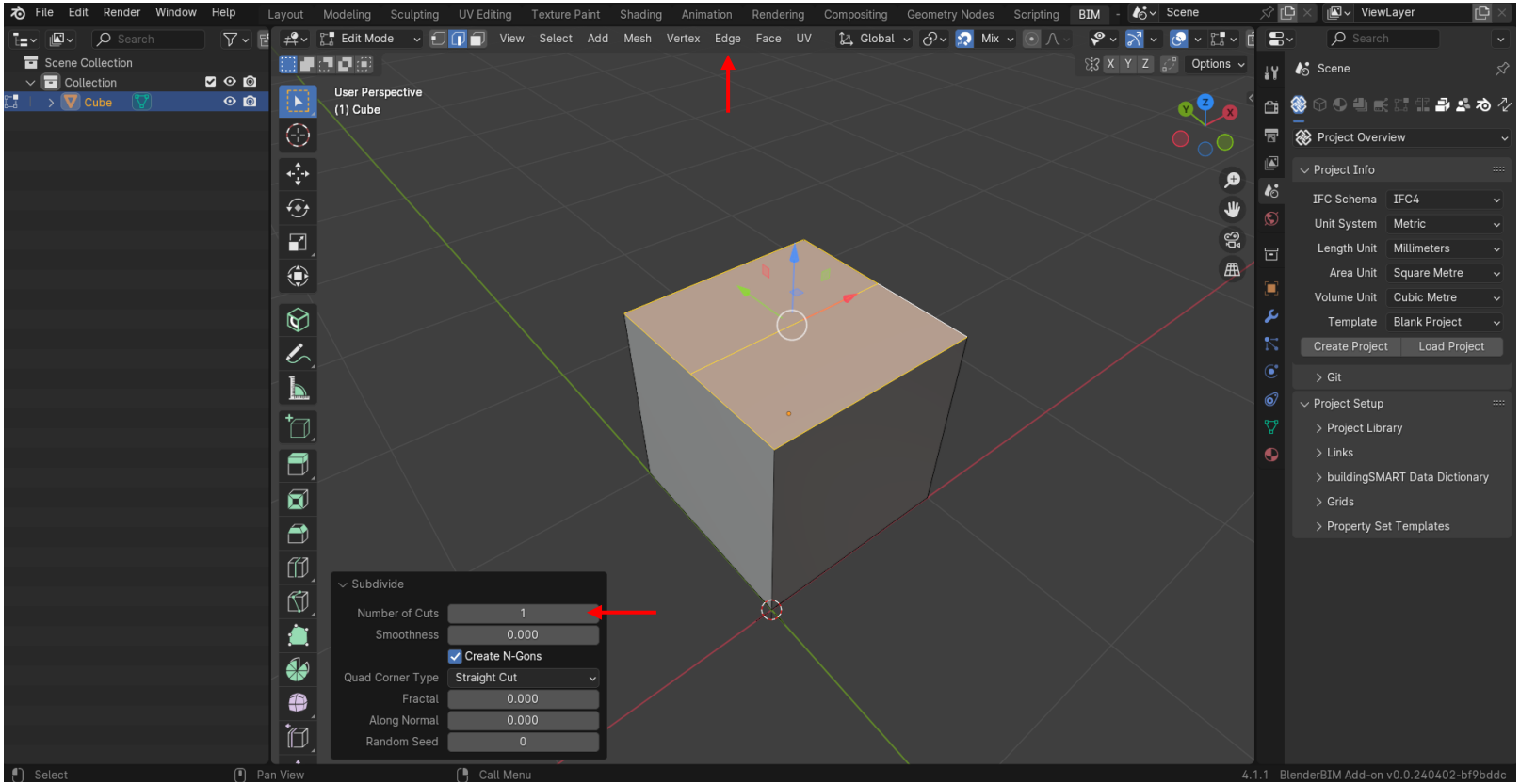
Move via ‘click+drag arrow + distance’ or using ‘G+X/Y/Z+distance’; The cube should have 1 corner at World Origin



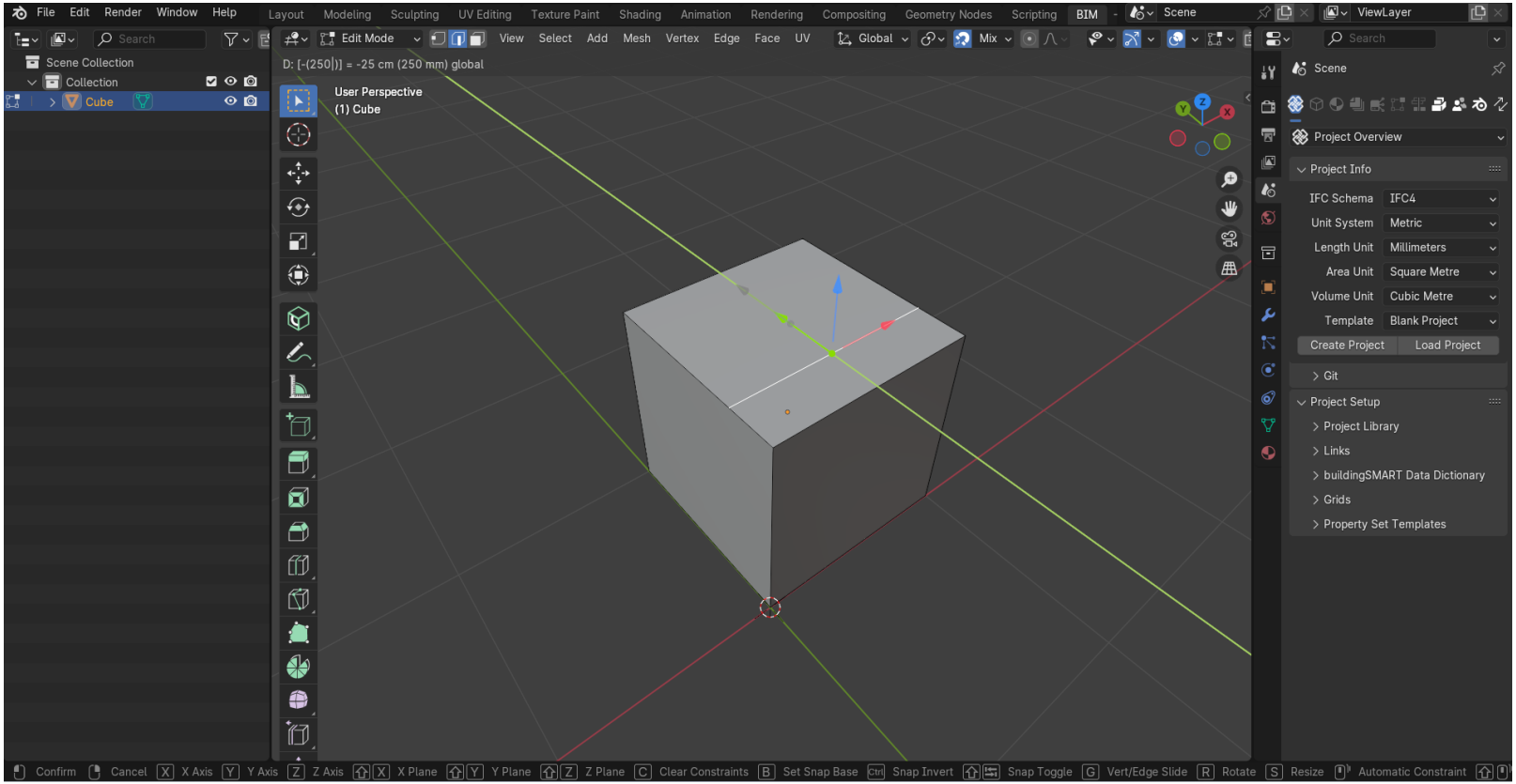
Hit ‘Tab’ to go into **Edit mode** and then ‘2’ to go into **Edge Select** mode. Select 2 parallel edges



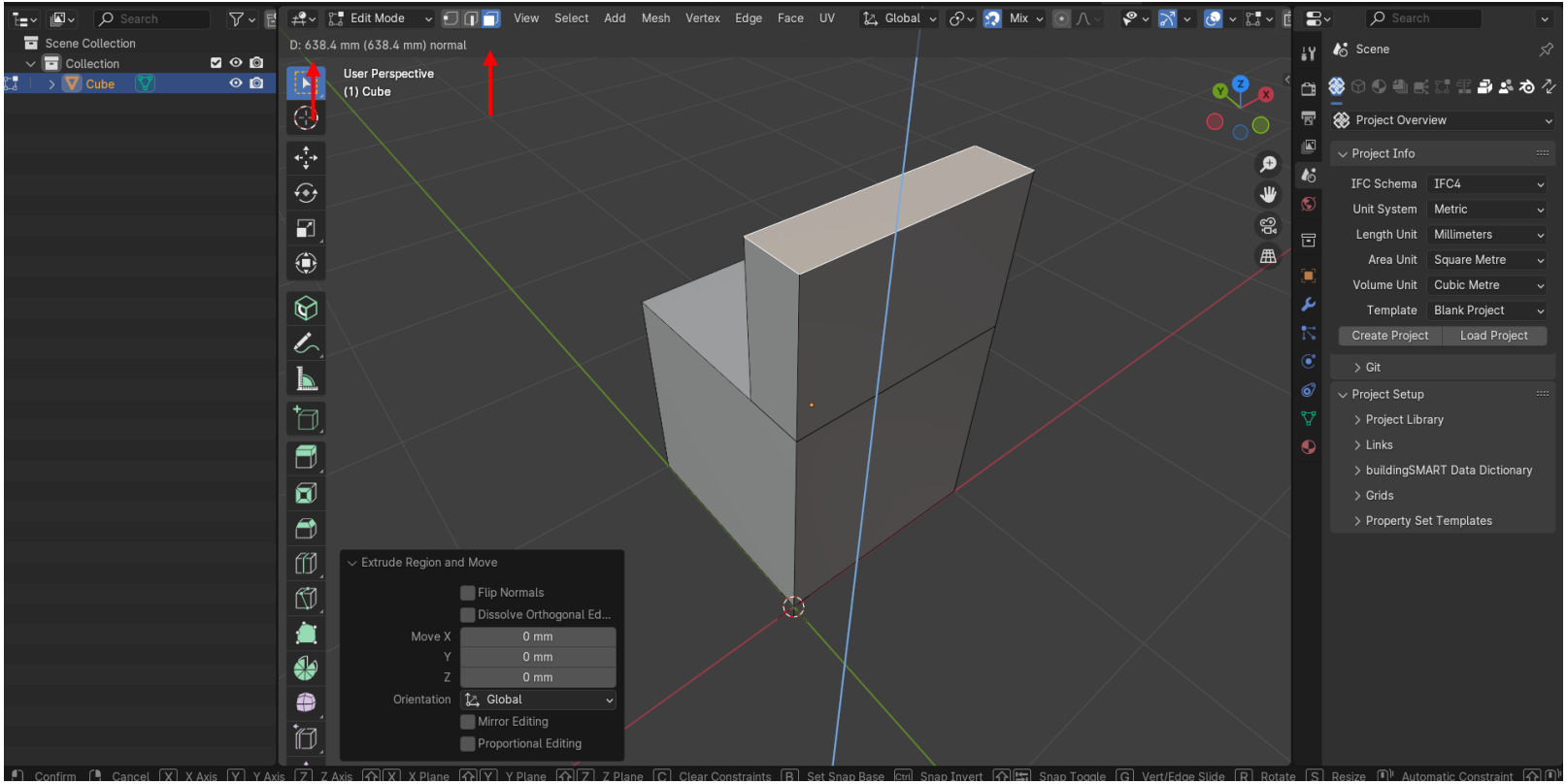
Edge menu (‘**RMB**’) and then Subdivide, to divide the edges in n equal parts



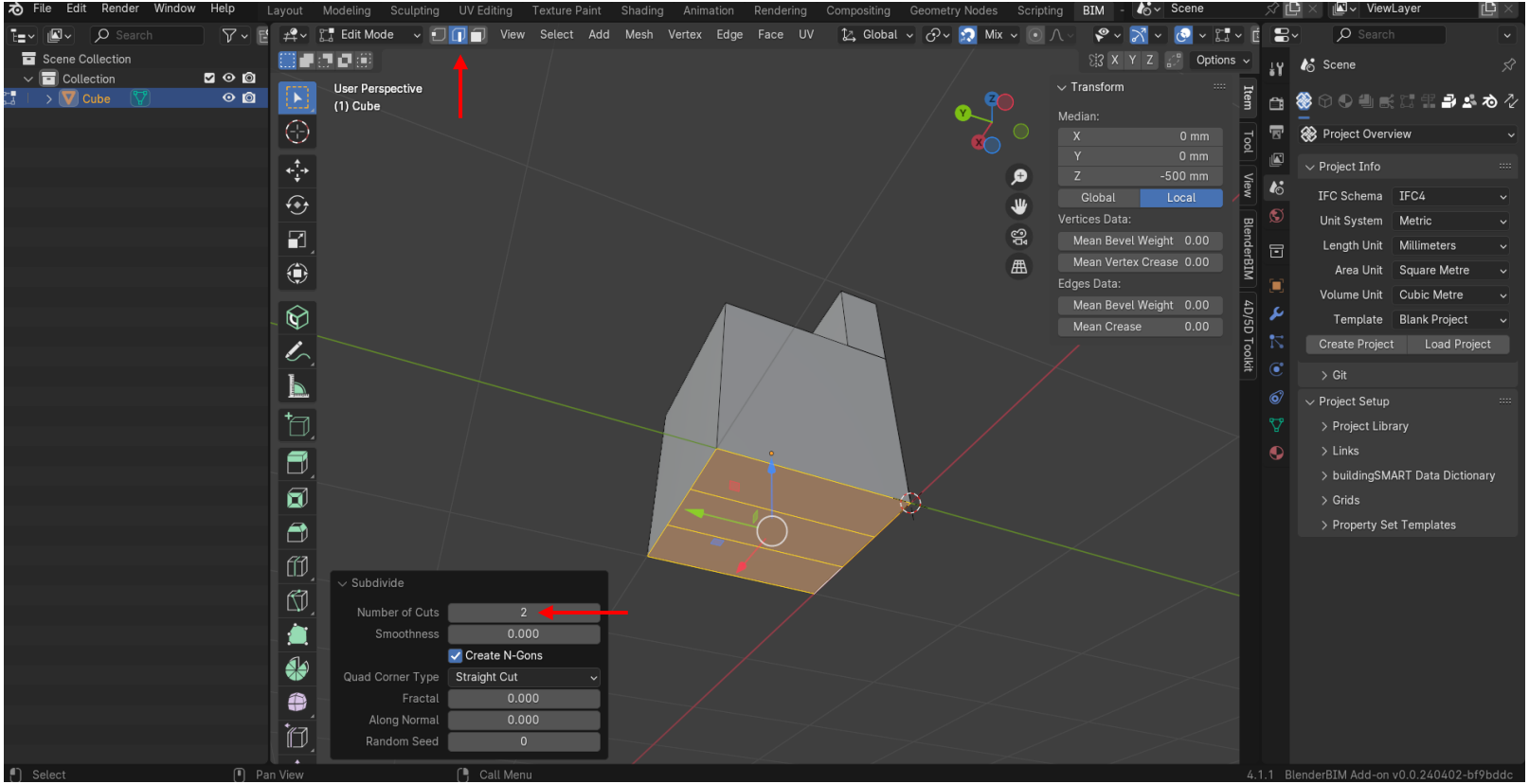
Note that **immediately** after you get this menu again, in which you can decide how many cuts/parts. In this case 1 is enough



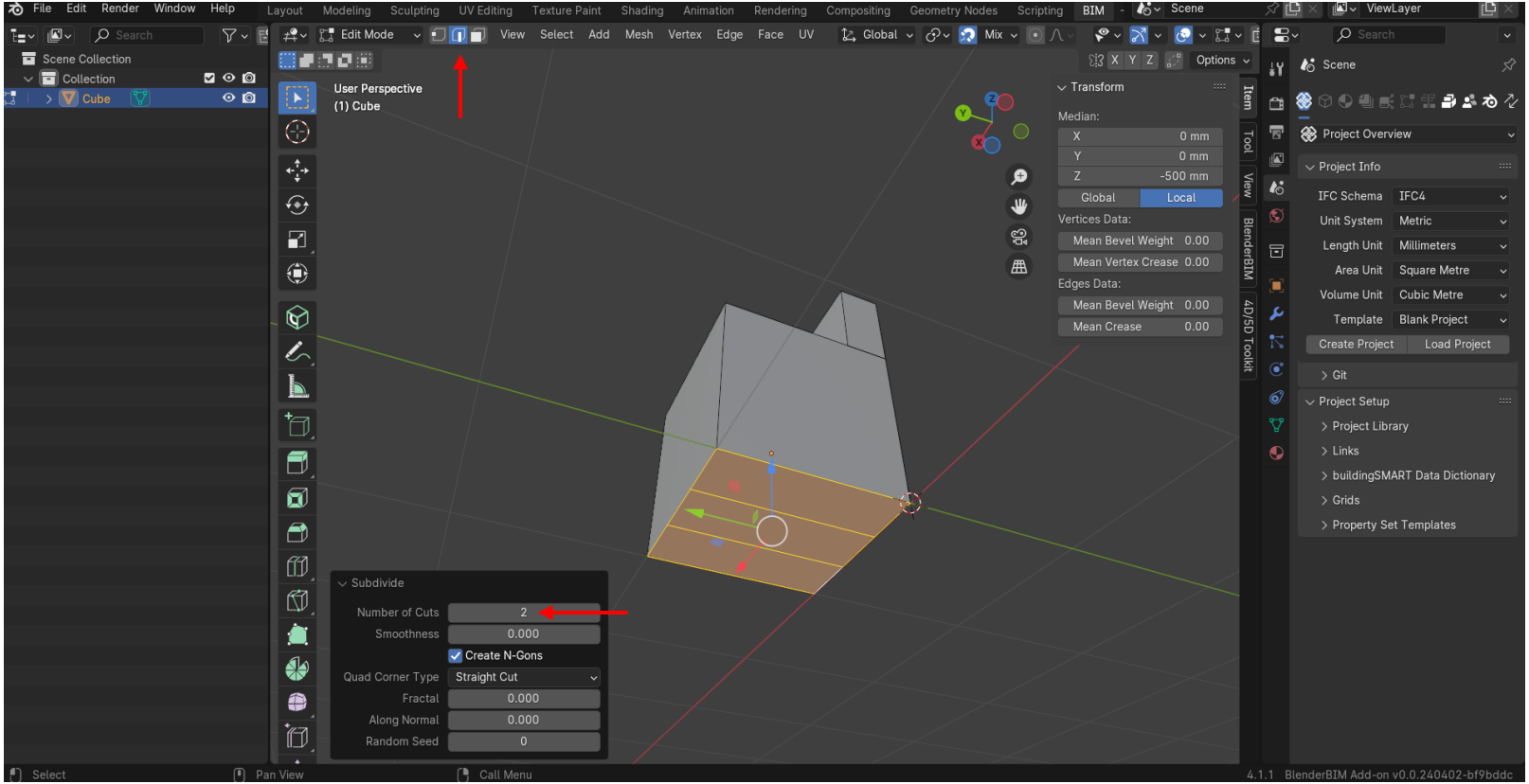
Select the new edge and move it by dragging the arrow and typing in -250 (‘G+Y+250-’) and pressing ‘Enter’



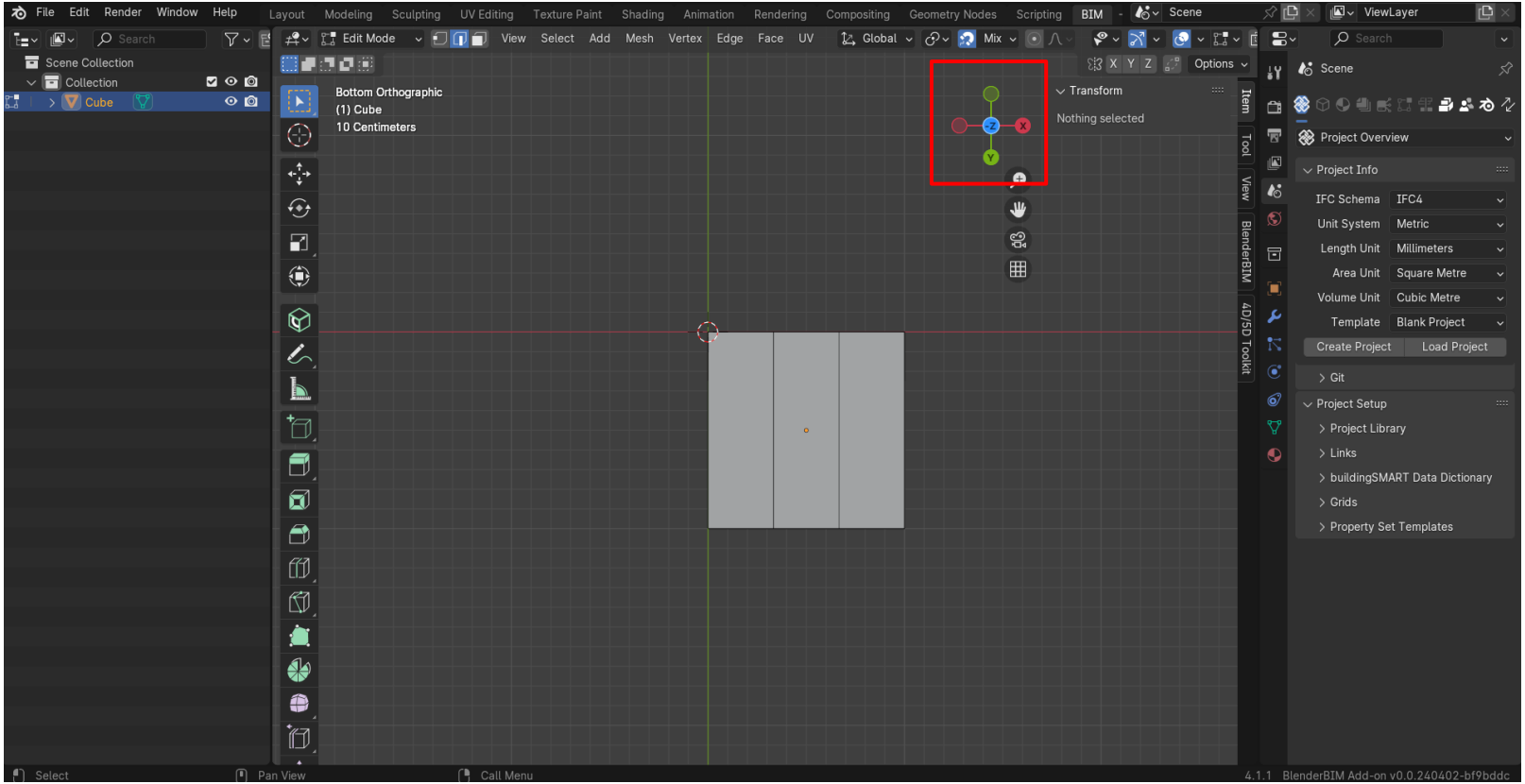
Go into **Face Select** mode (‘3’) and press ‘E’ to Extrude. Drag mouse and click or type in exact value. If needed select axis with X/Y/Z



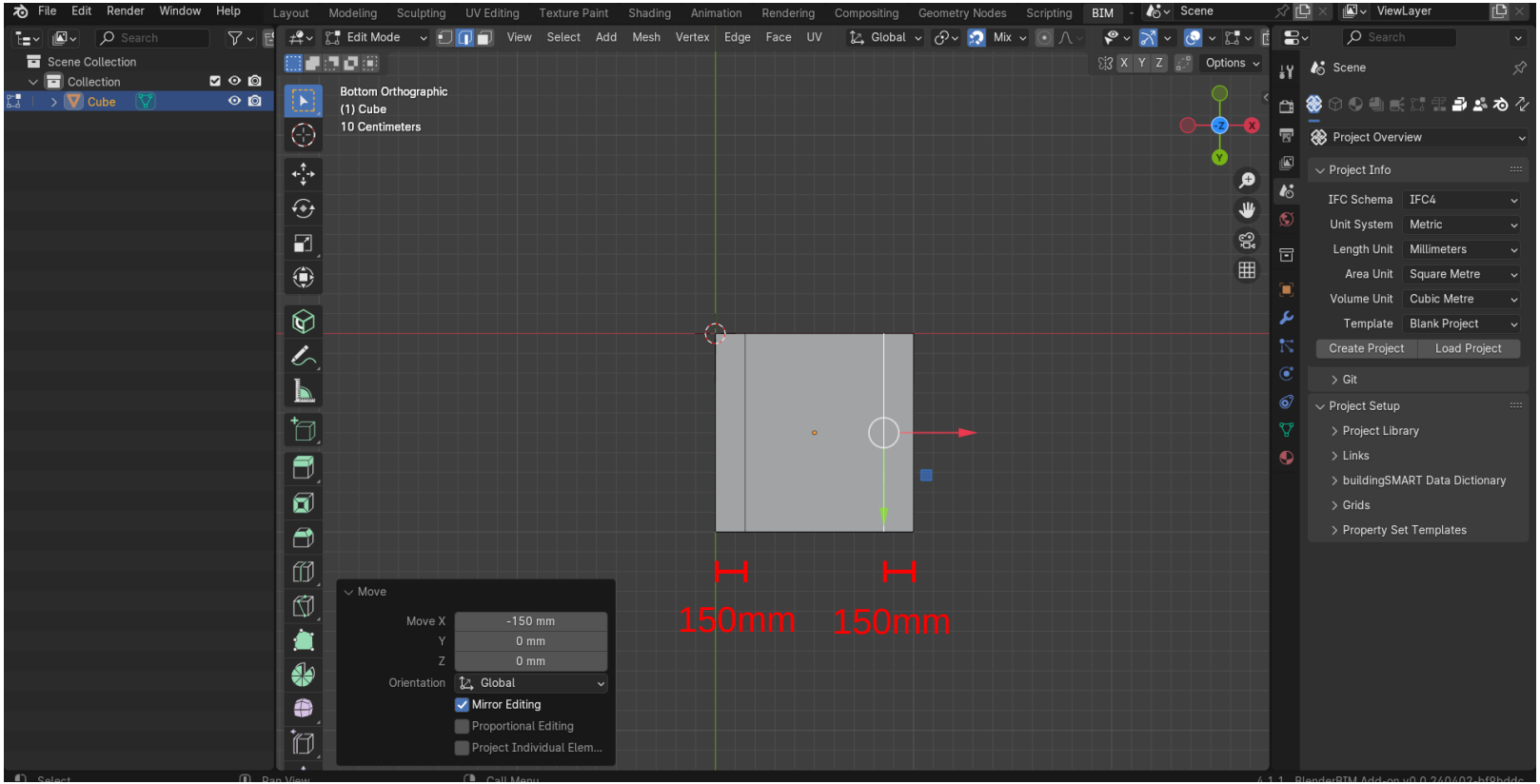
Subdivide ('RMB') the bottom face along the other axis by selecting the other edges ('2'). Make 2 cuts this time.



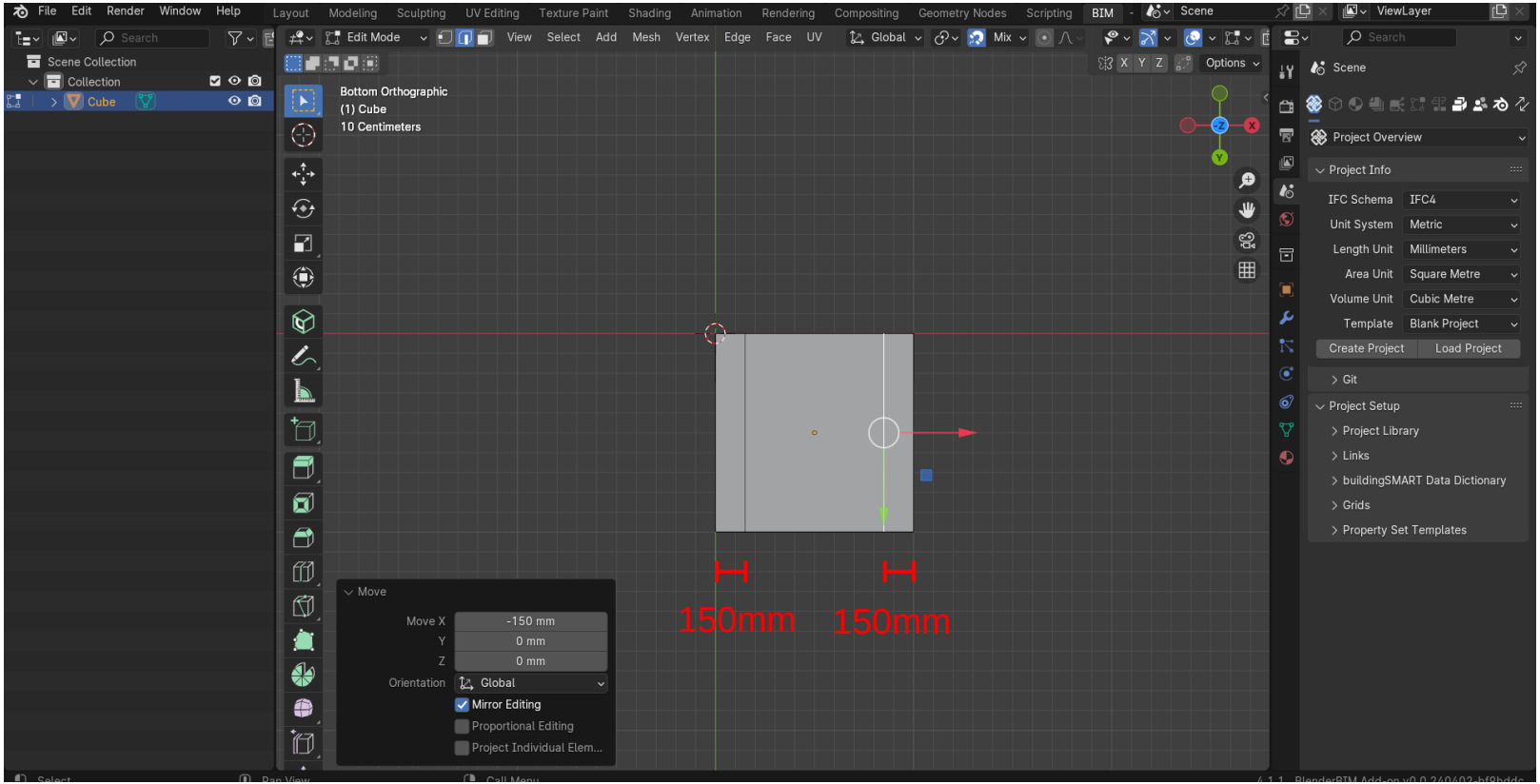
Subdivide ('RMB') the bottom face along the other axis by selecting the other edges ('2'). Make 2 cuts this time.



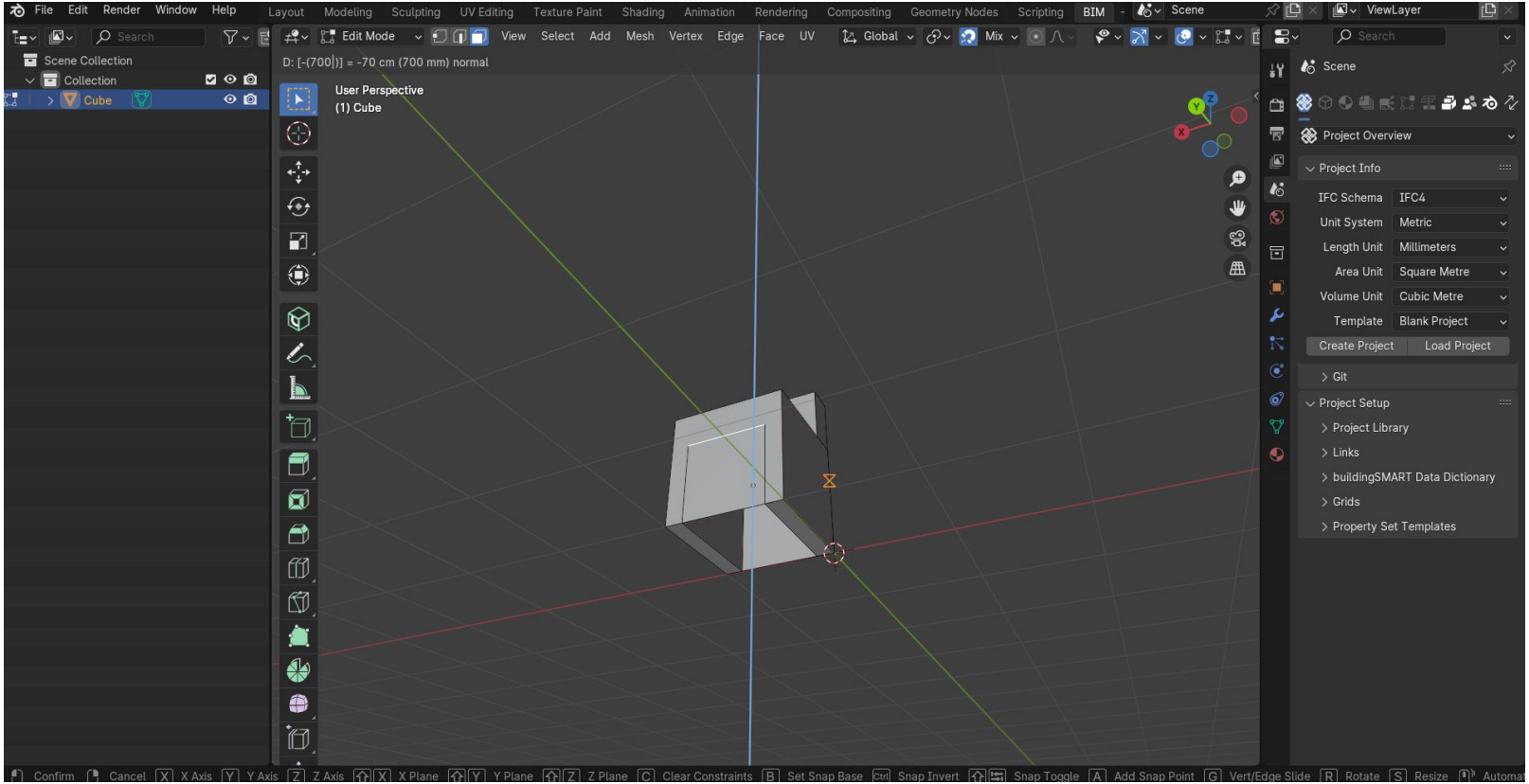
Get a better view by going to top-down view (‘NUMP 7’) and then flipping it (‘NUMP 9’) or by using this gizmo



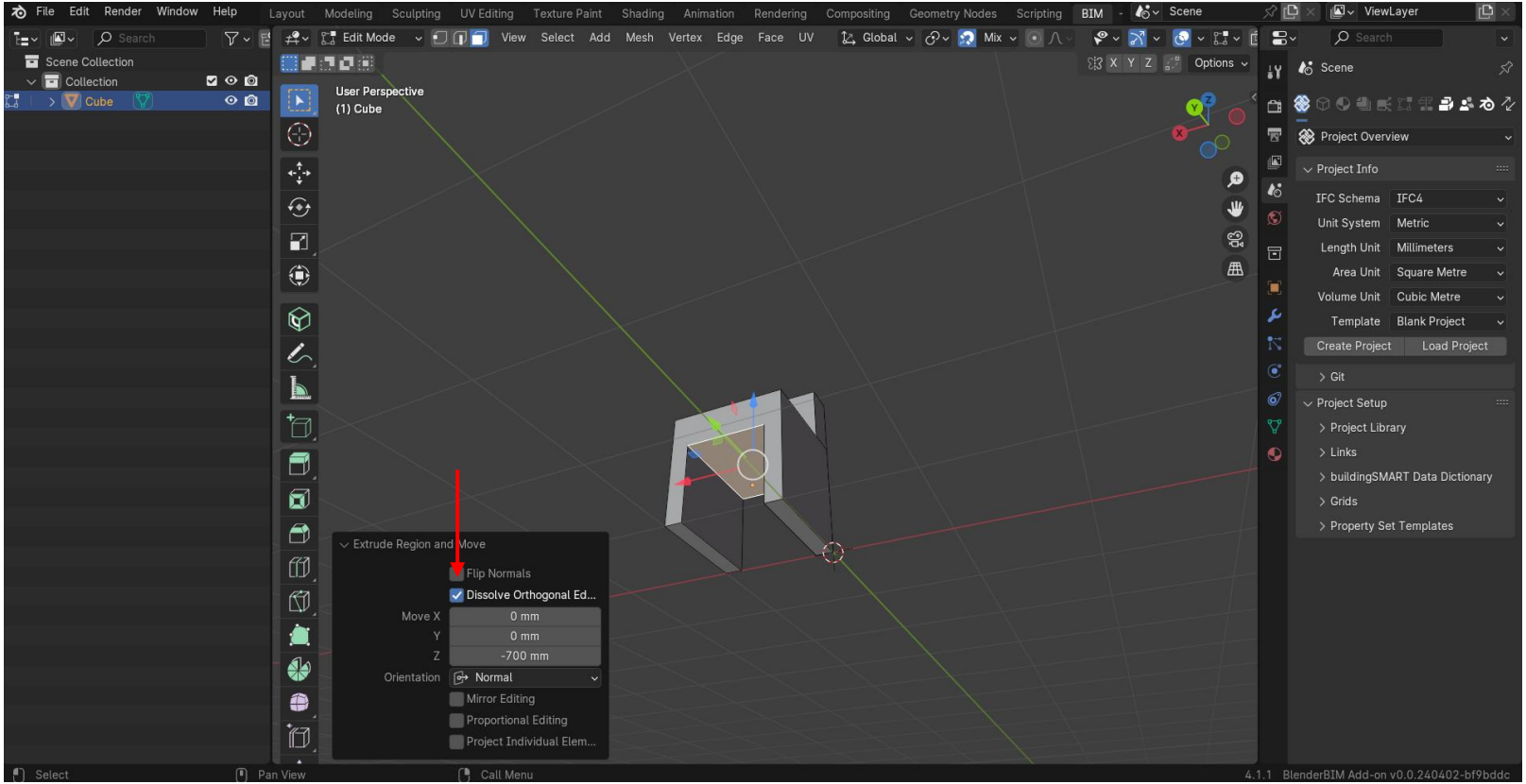
Move the edges by dragging them to 1 side and then 150 mm positive or negative ('G+X+150/150-')



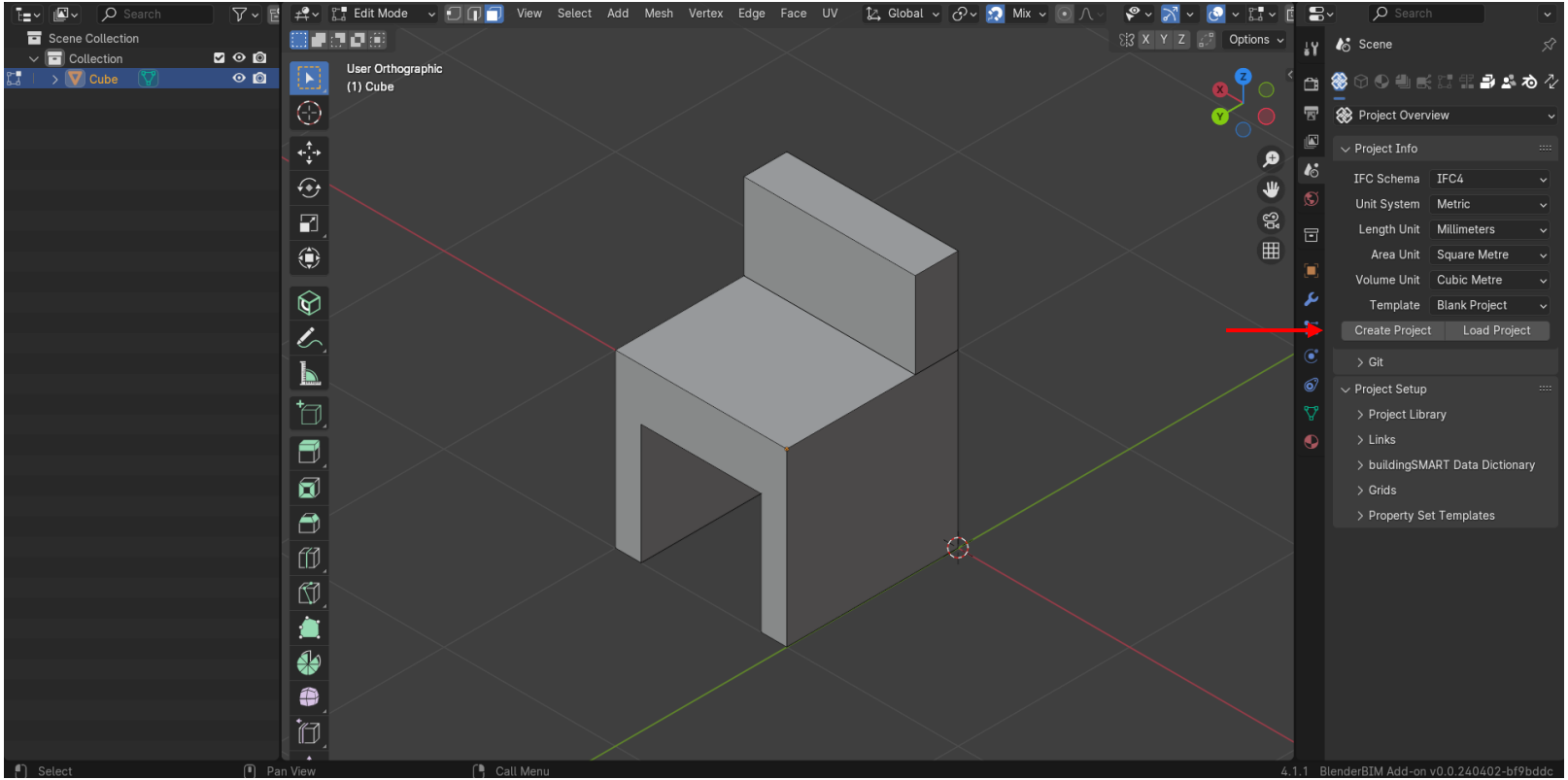
Move the edges by dragging them to 1 side and then 150 mm positive or negative ('G+X+150/150-')



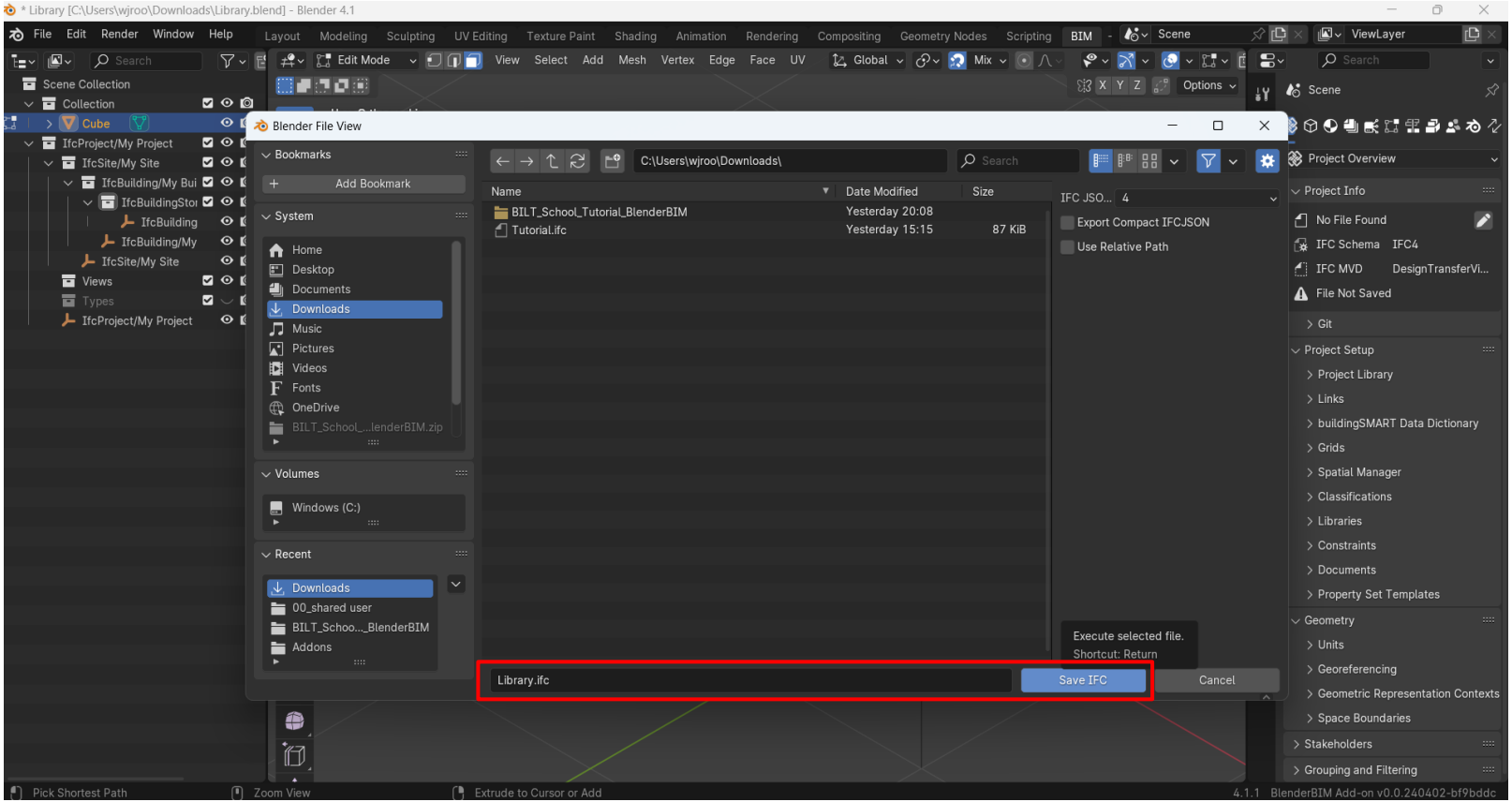
Go to **Face Select** (‘3’), select the middle face and extrude it upwards for 700 mm (‘E+Z+700-’)



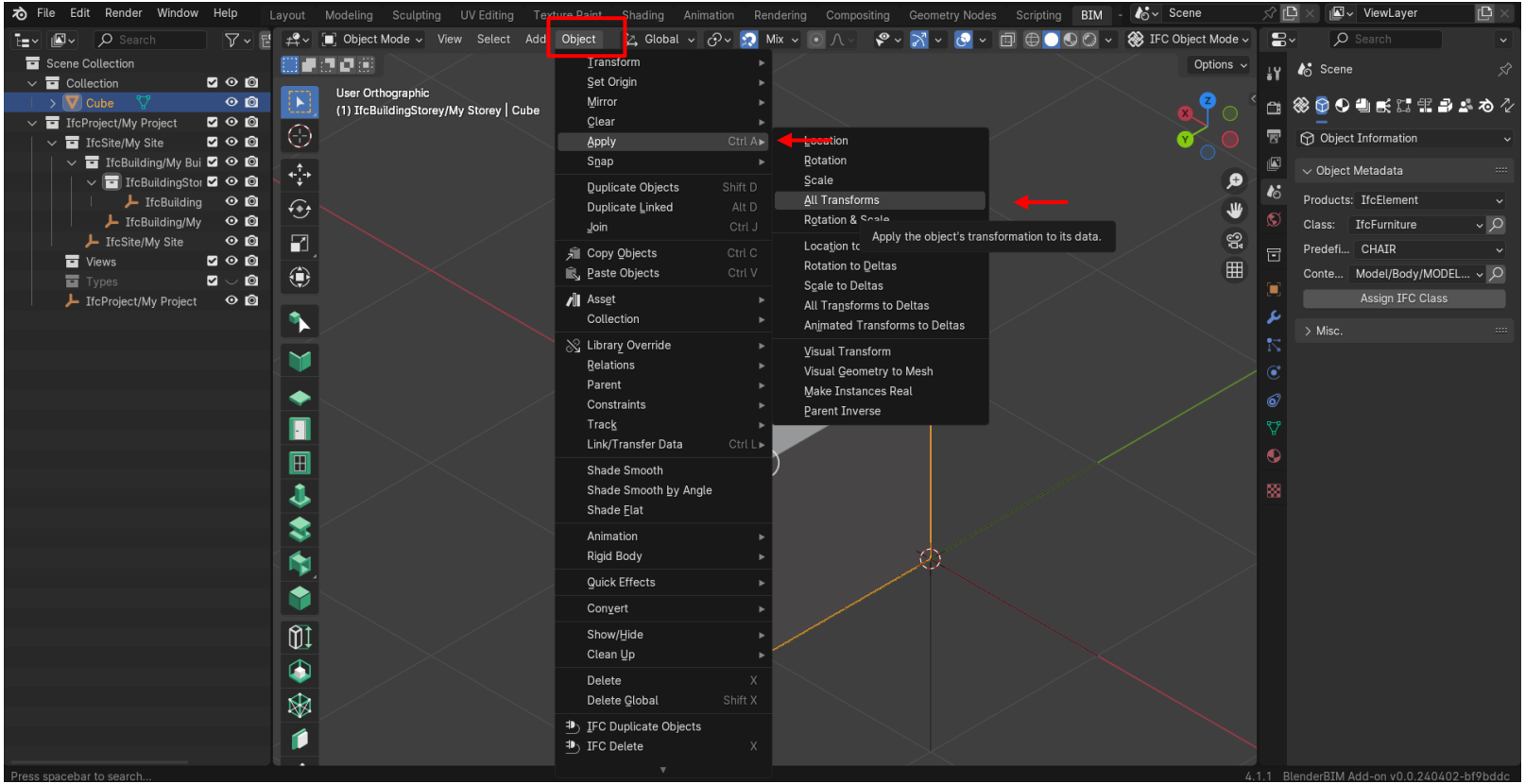
To remove the leftover faces, toggle this button. Keep in mind the next time you extrude, this option will still be **enabled**.



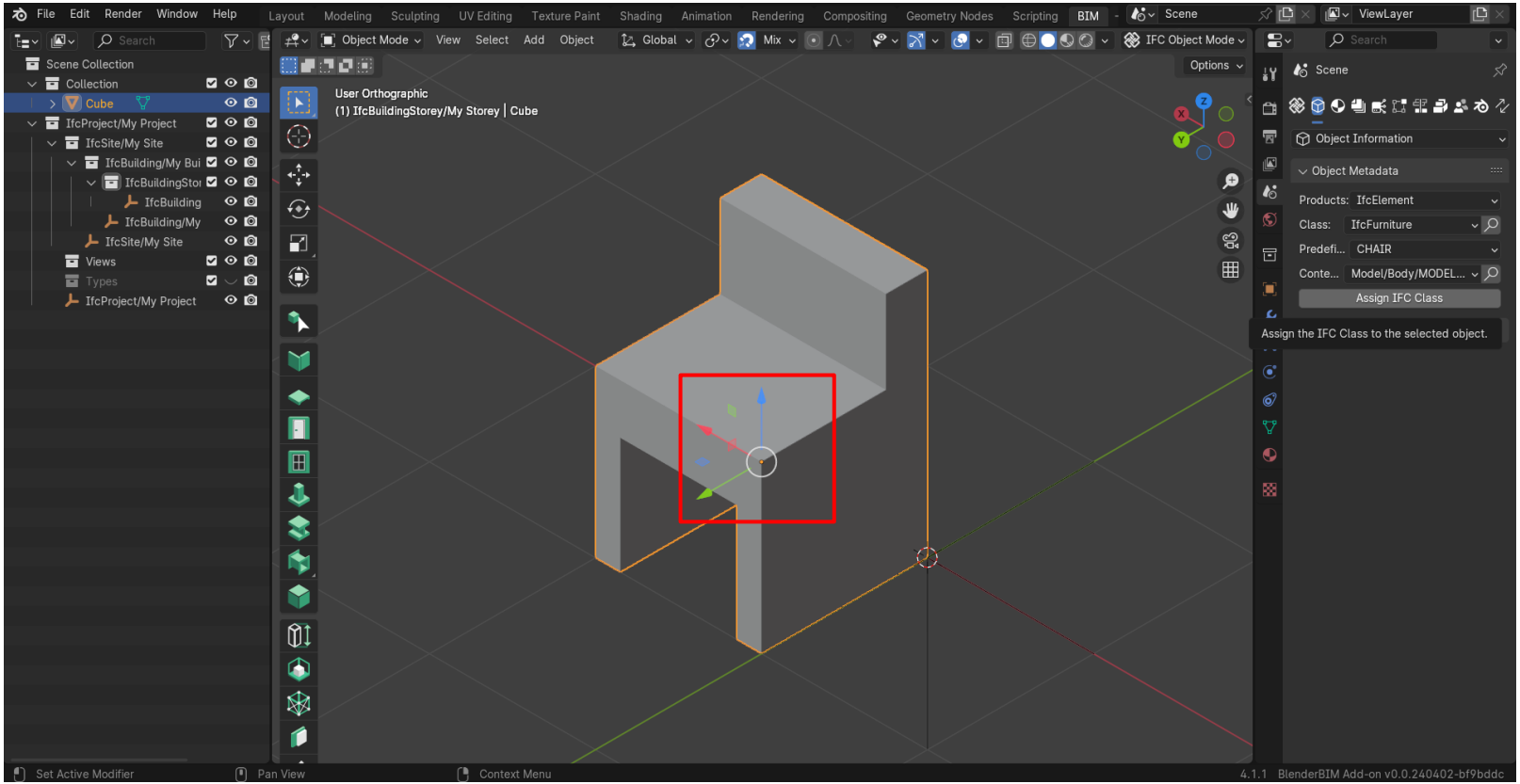
'Tab' into **Object Mode**; it's time to classify it as IFC. Press 'Create Project' with a 'Blank Project' Template



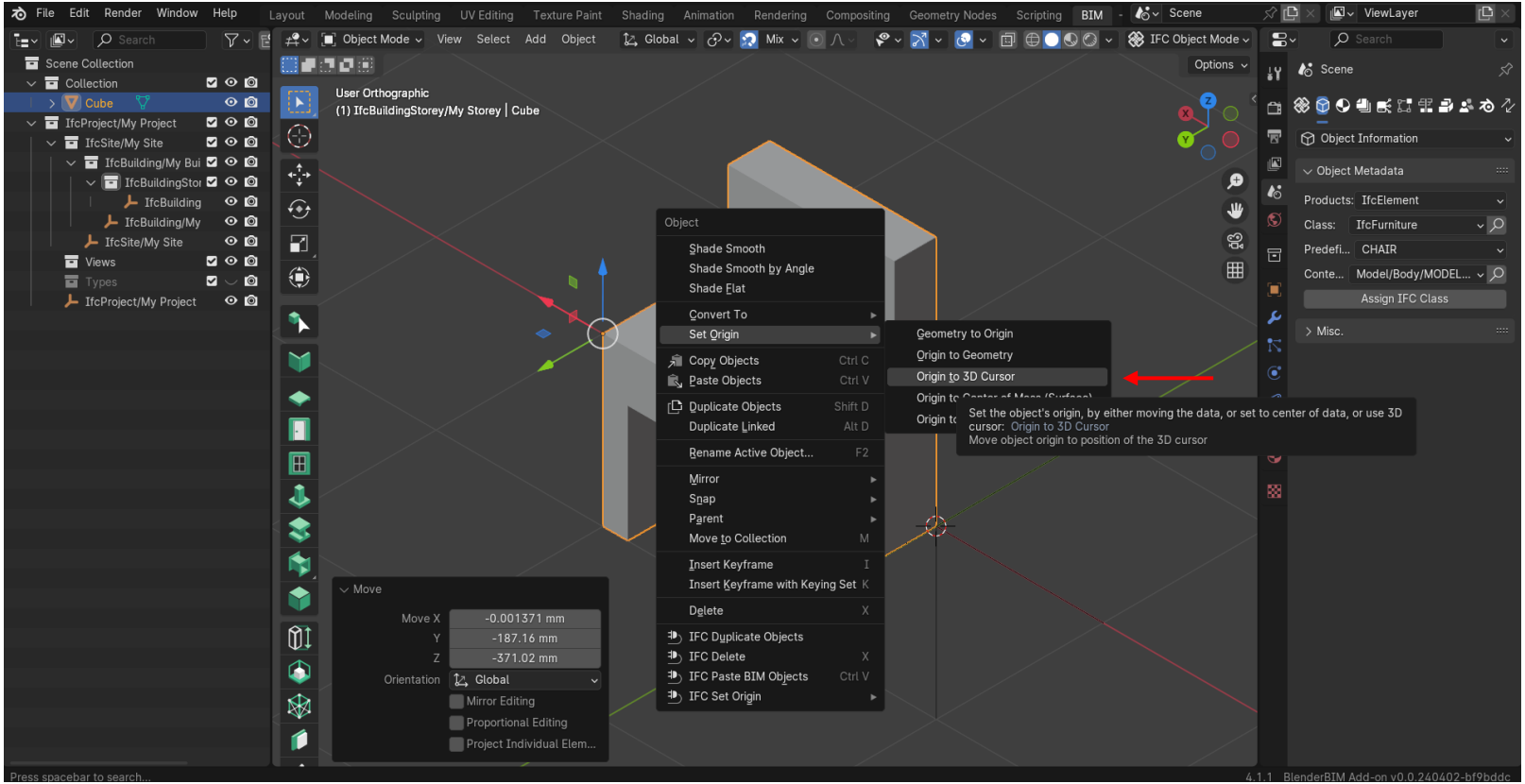
Save (‘ctrl+S’) the Ifc file to unlock all options. You can keep the name Library.ifc



Select the chair, ‘Object’ > ‘Apply’ > ‘All Transforms’; (‘ctrl+A’>’All Transforms’)

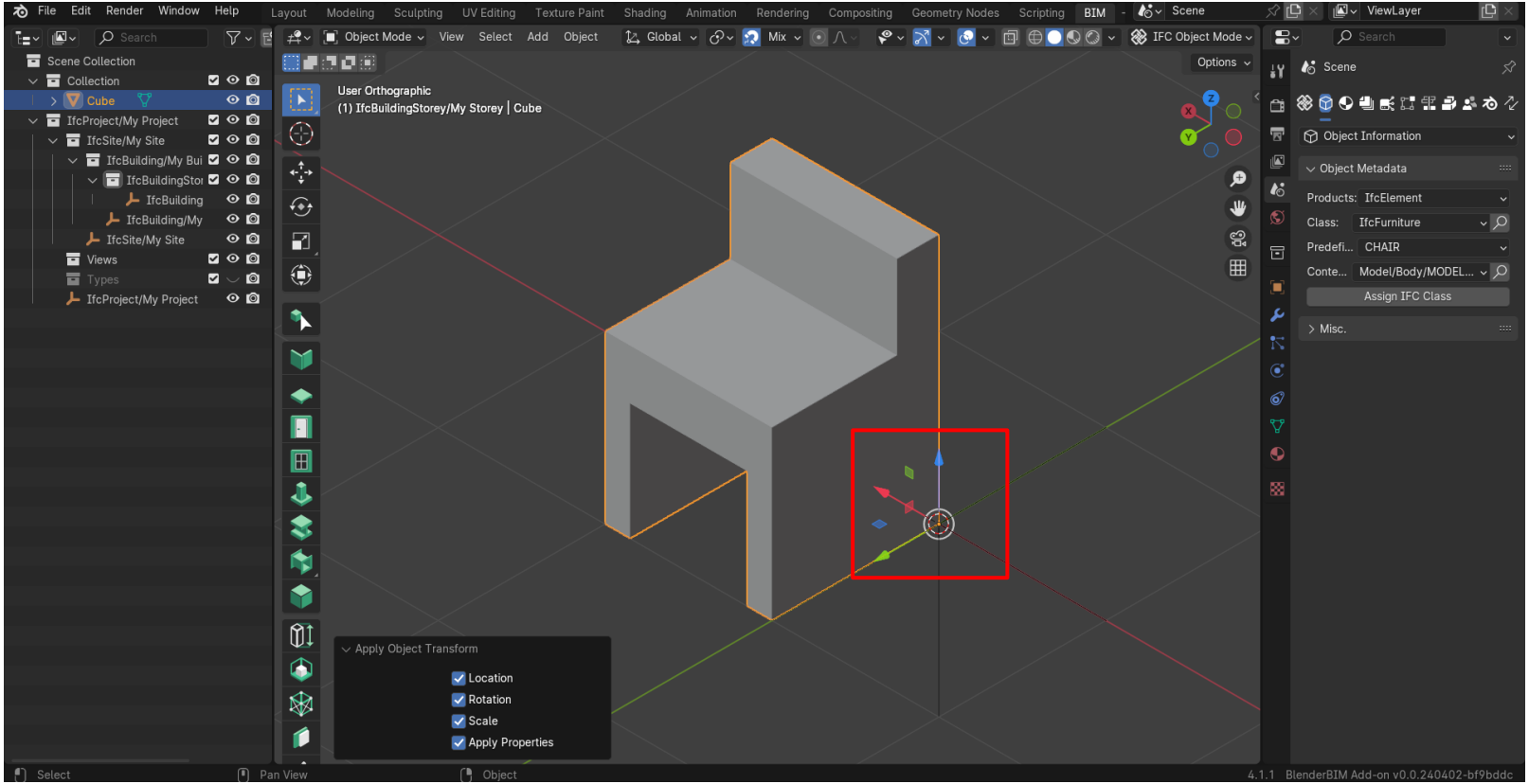


The object's origin (yellow dot with gizmo) will be set from here to the World Origin (where the red and green axis cross)

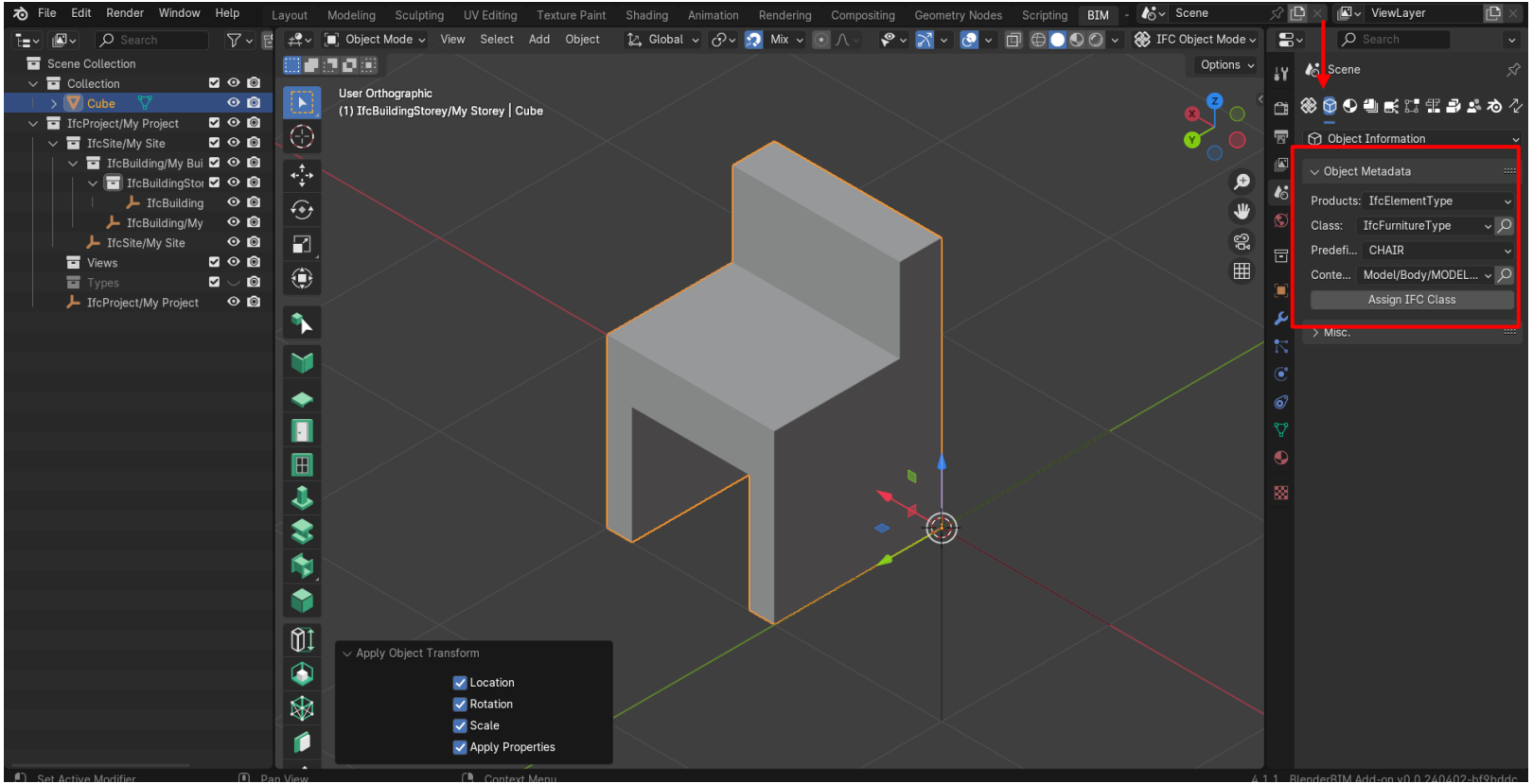


Tip: to set 3D cursor to World Origin, use ‘shift+S’ > ‘Cursor to World Origin’

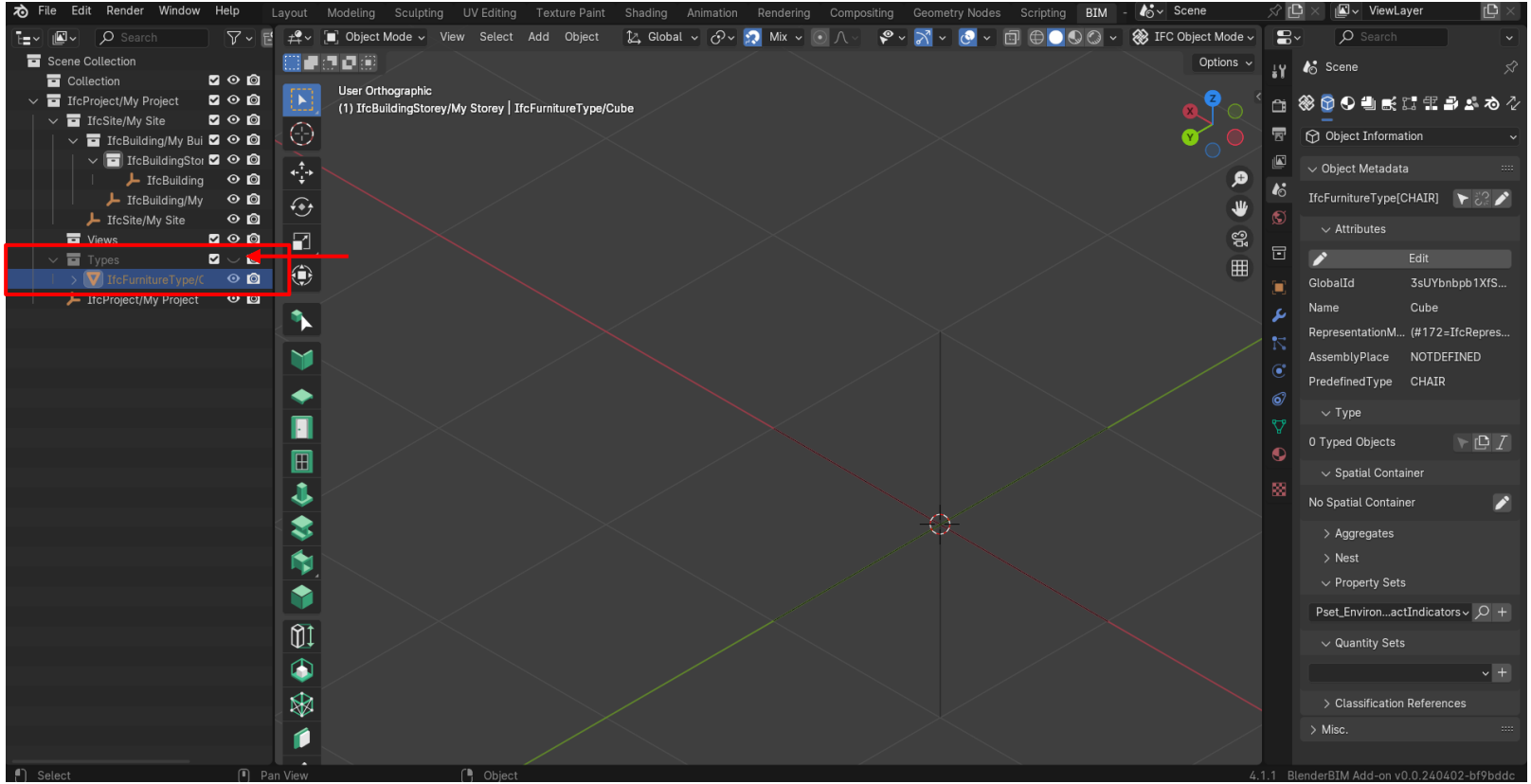
Another way is to set the **3D-cursor** to the desired position; then ‘RMB’> ‘Set Origin’ > ‘Origin to 3D Cursor’



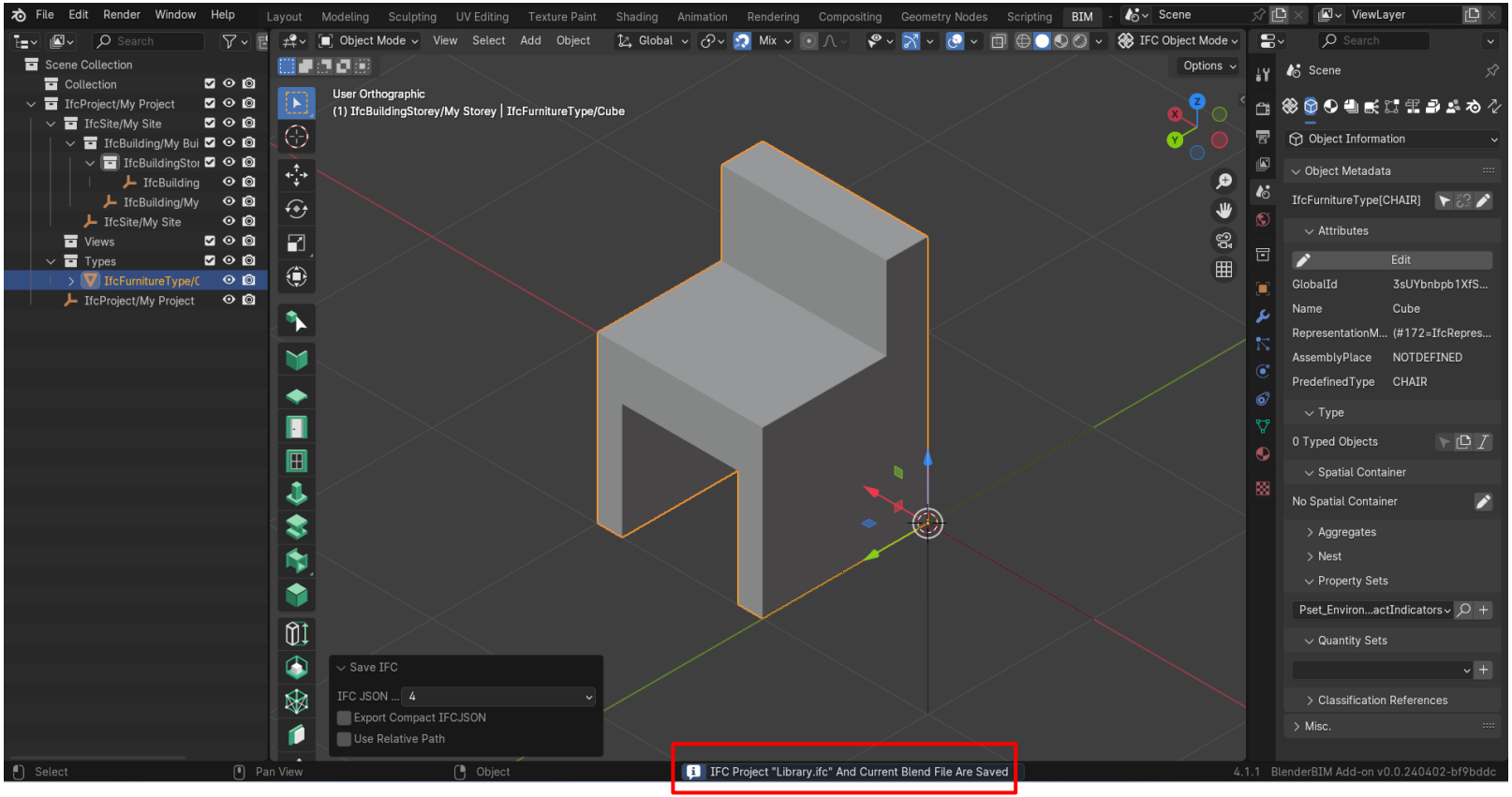
Always do this **before** assigning an IFC Class, or the placement will be weird.



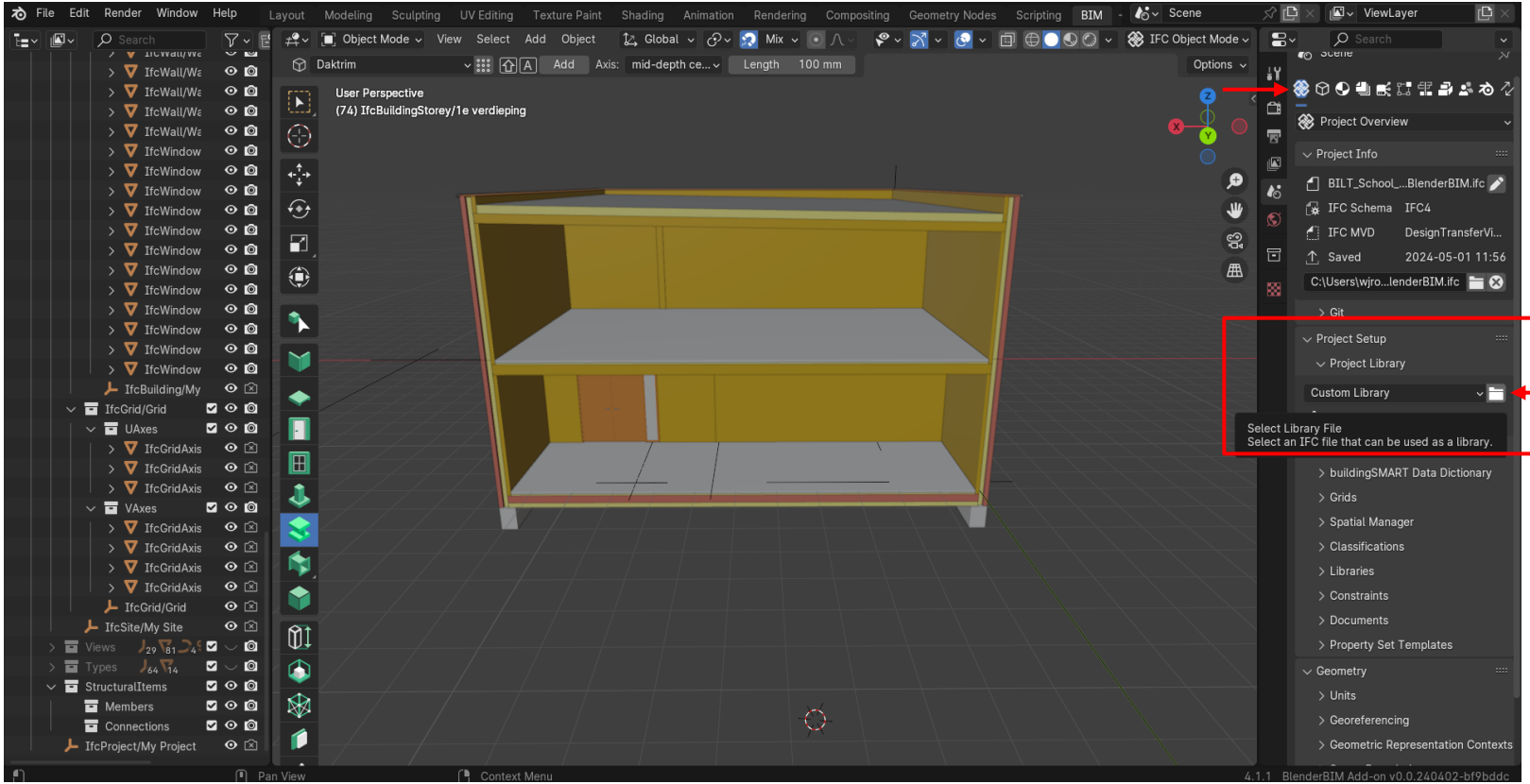
Go to the Object Information tab and fill in these properties: IfcElementType – IfcFurnitureType – CHAIR. Press ‘Assign IFC Class’



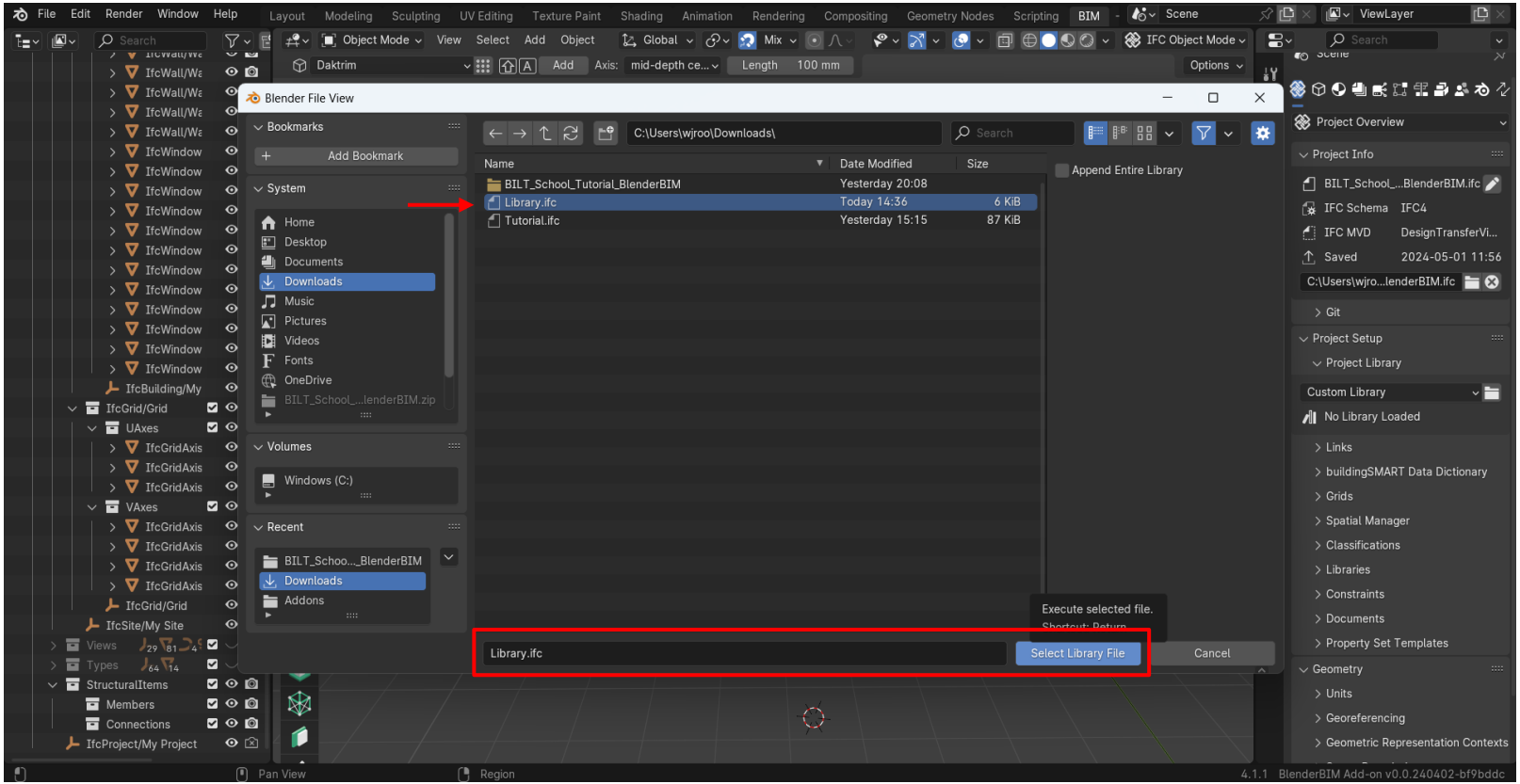
IfcElementType are automatically hidden as there are no Instances placed, but you can view it via the eye icon.



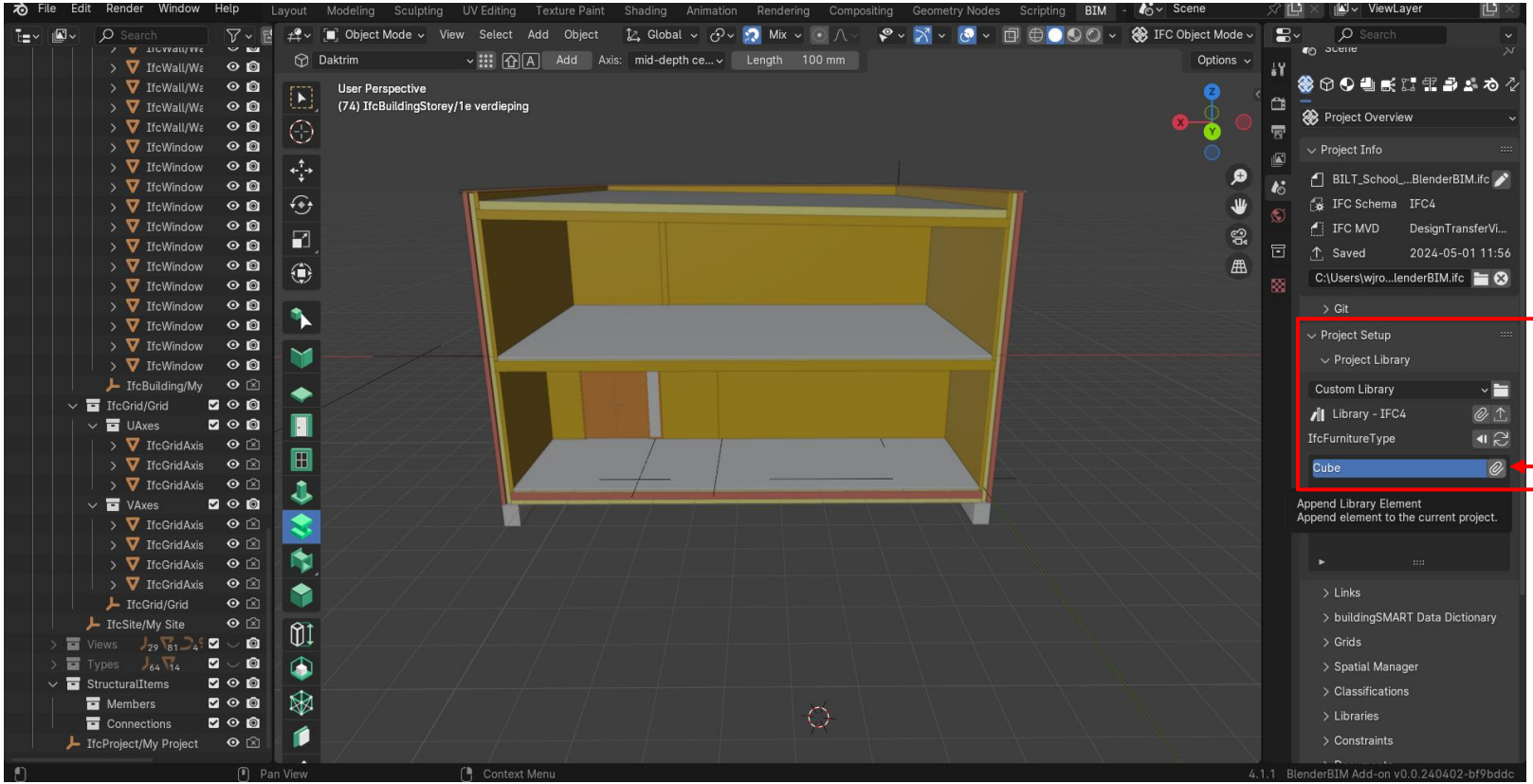
Save the project (‘ctrl+S’), note that both the .blend and the .ifc files are saved.



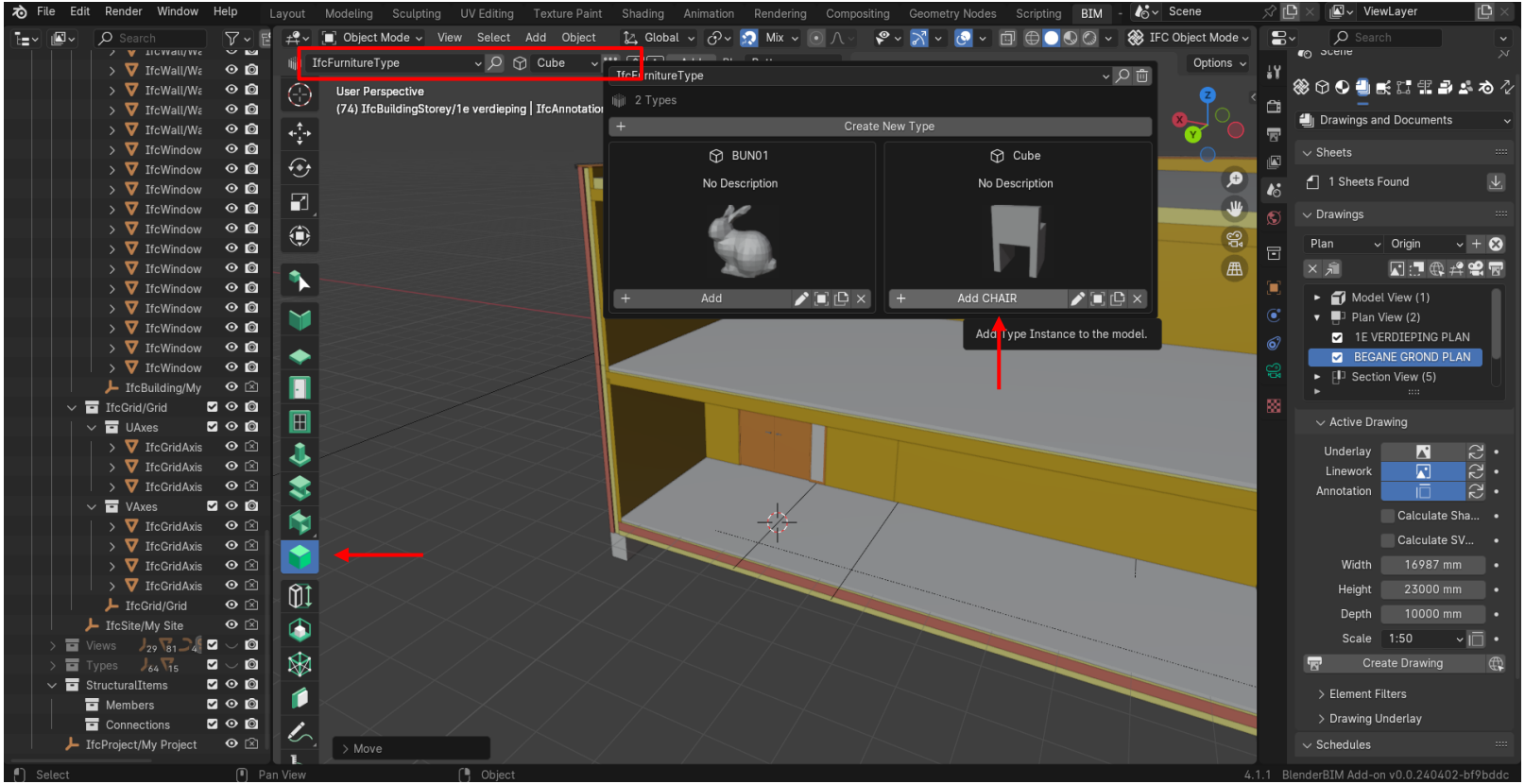
Time to load it in. Switch back to the other IFC project. In ‘Project Overview’ > ‘Project Setup’ > ‘Project Library’



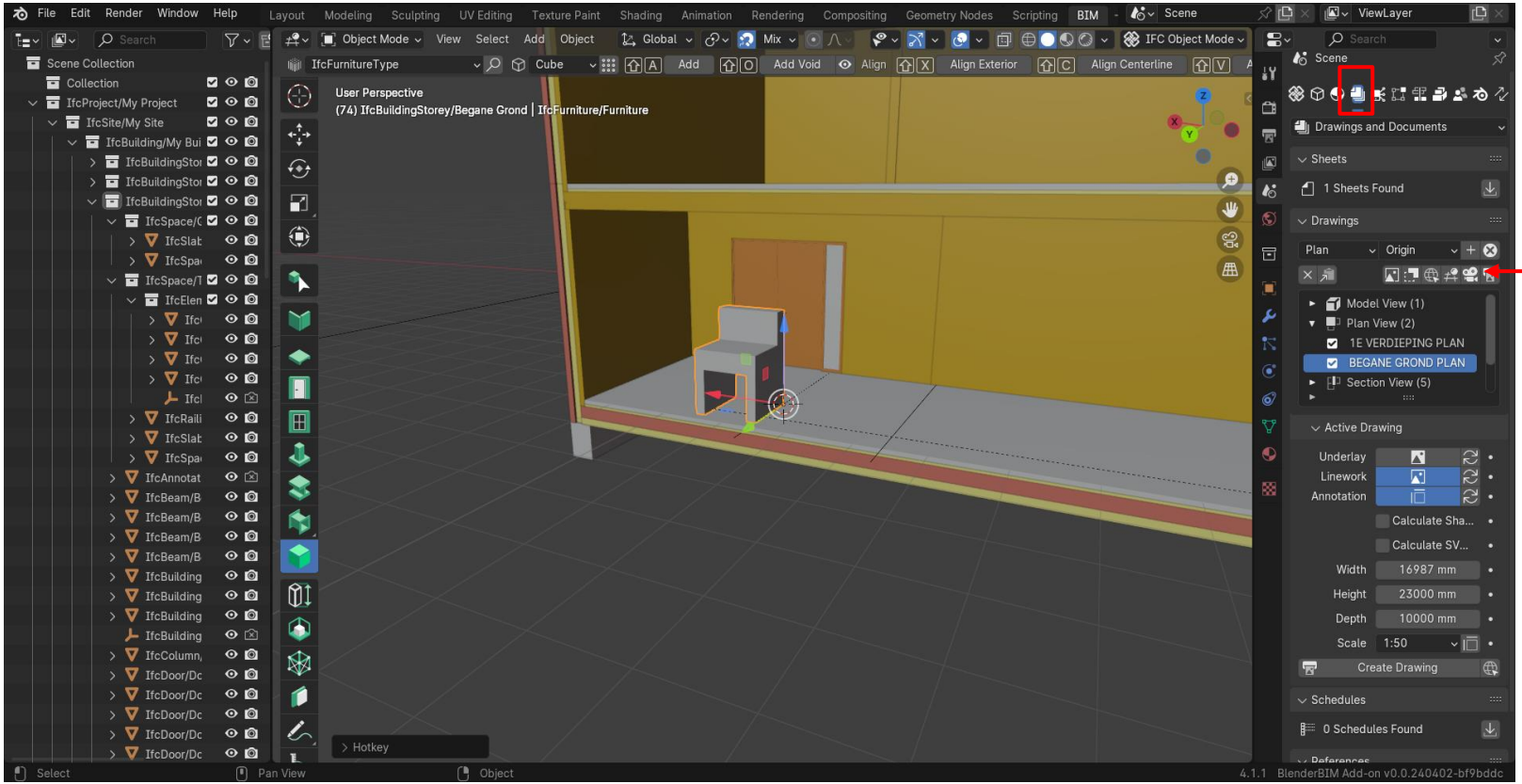
Select your Library.ifc file you just created



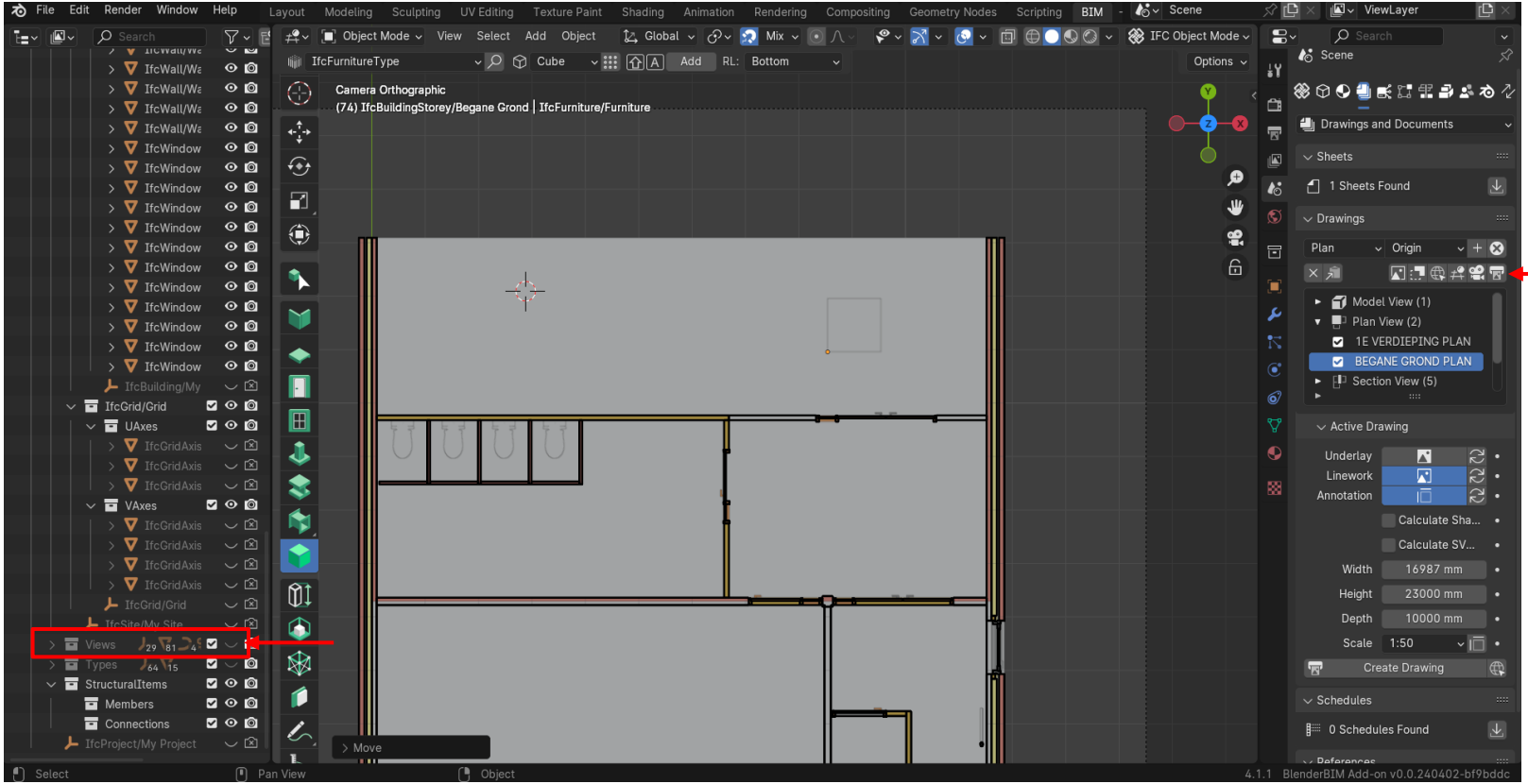
Click until you see the Cube (as we forgot to name it before classifying) and press the paperclip



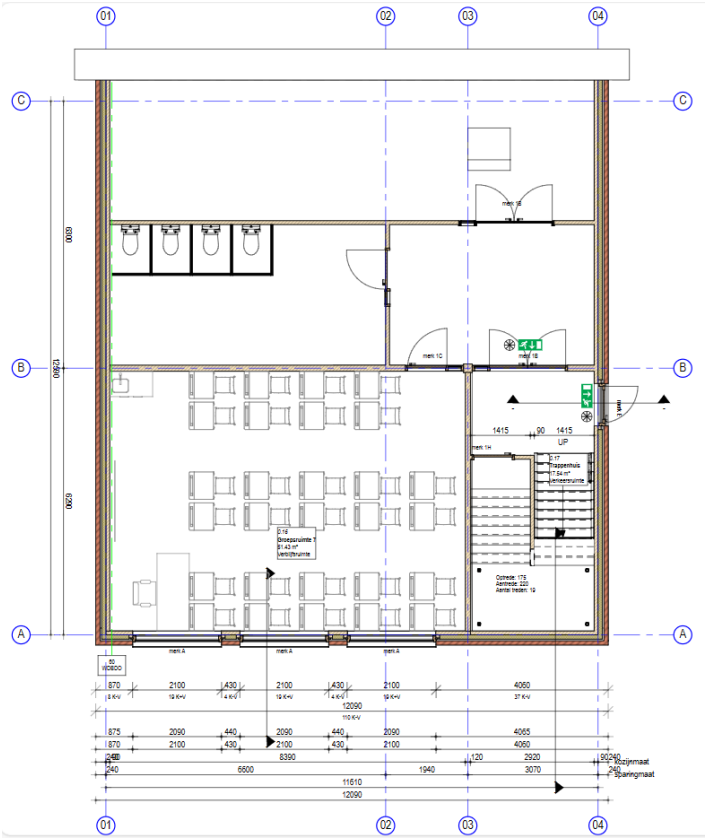
Place 3D-cursor to the floor, select the ‘Create Element’ tool and select the correct items. Select floor in project browser. Add (‘shift+A’)

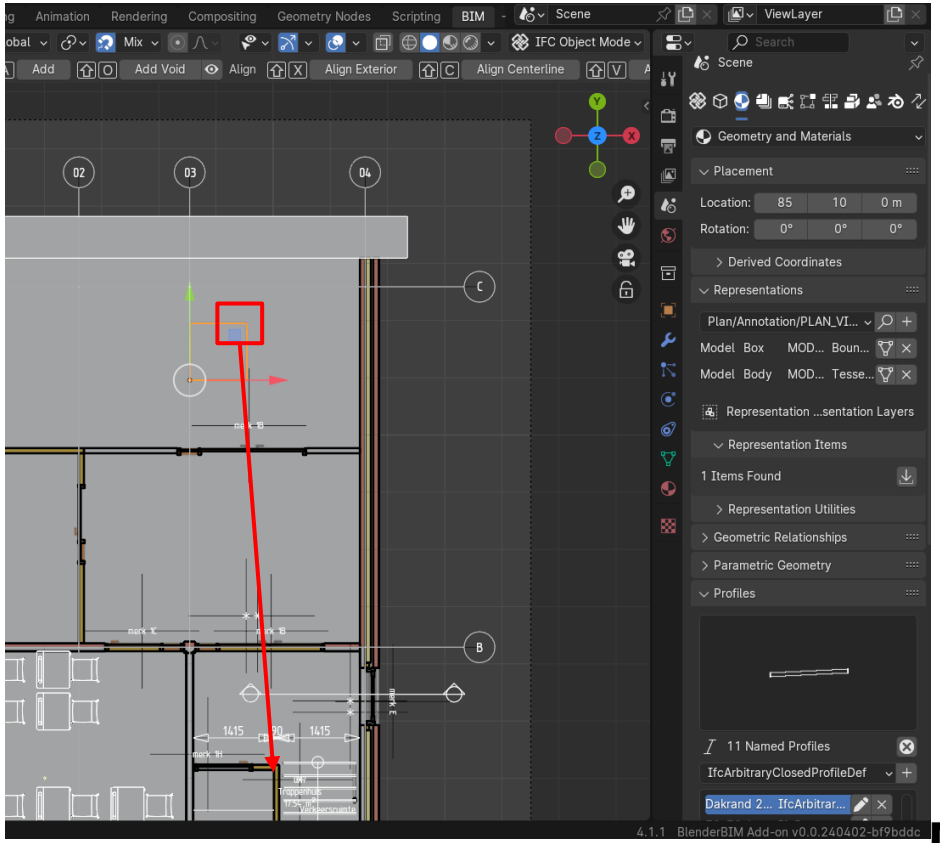


There it is, great! Let's look on the floorplan

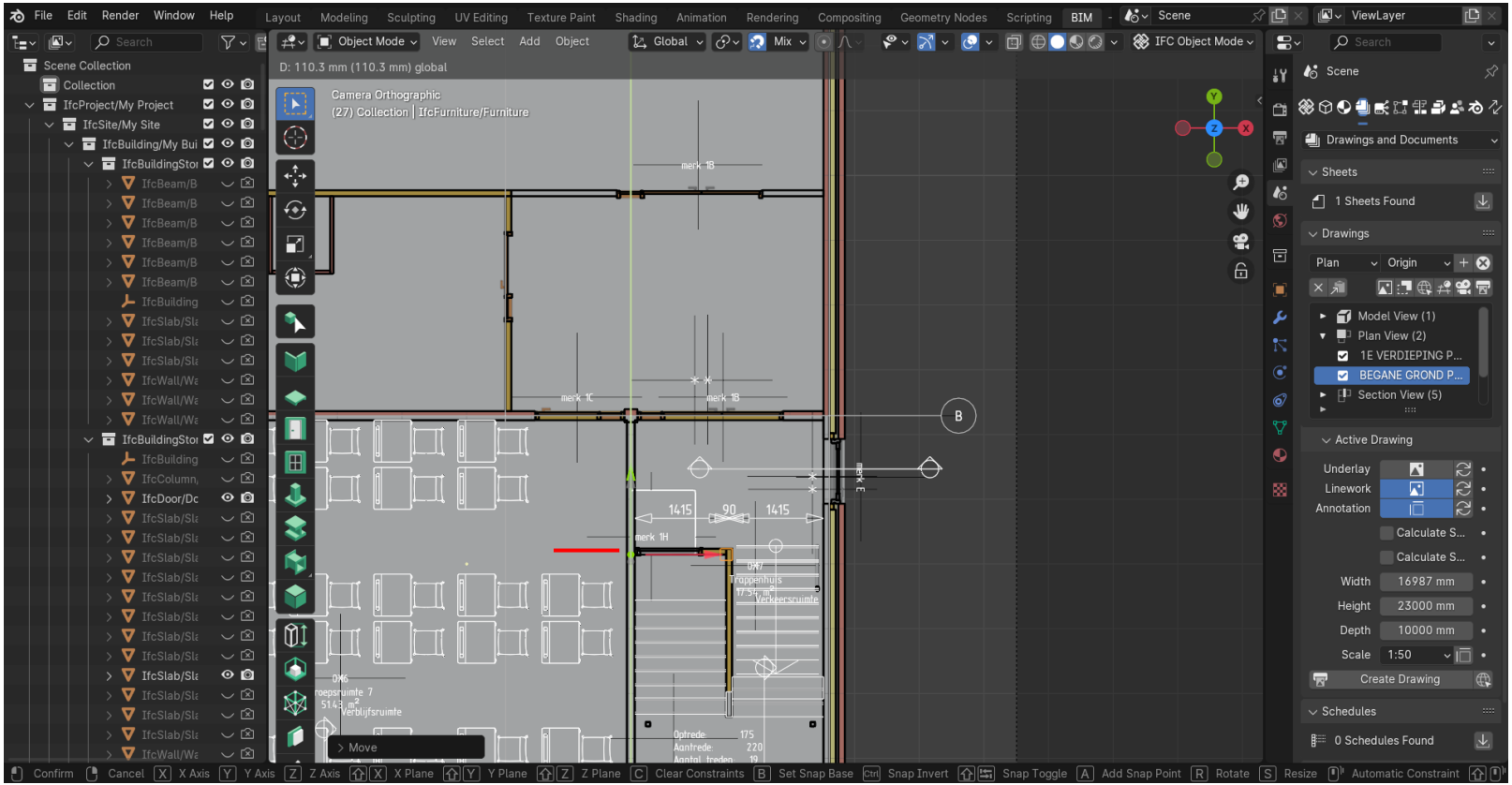


Show annotations with the eye symbol. Create a print next

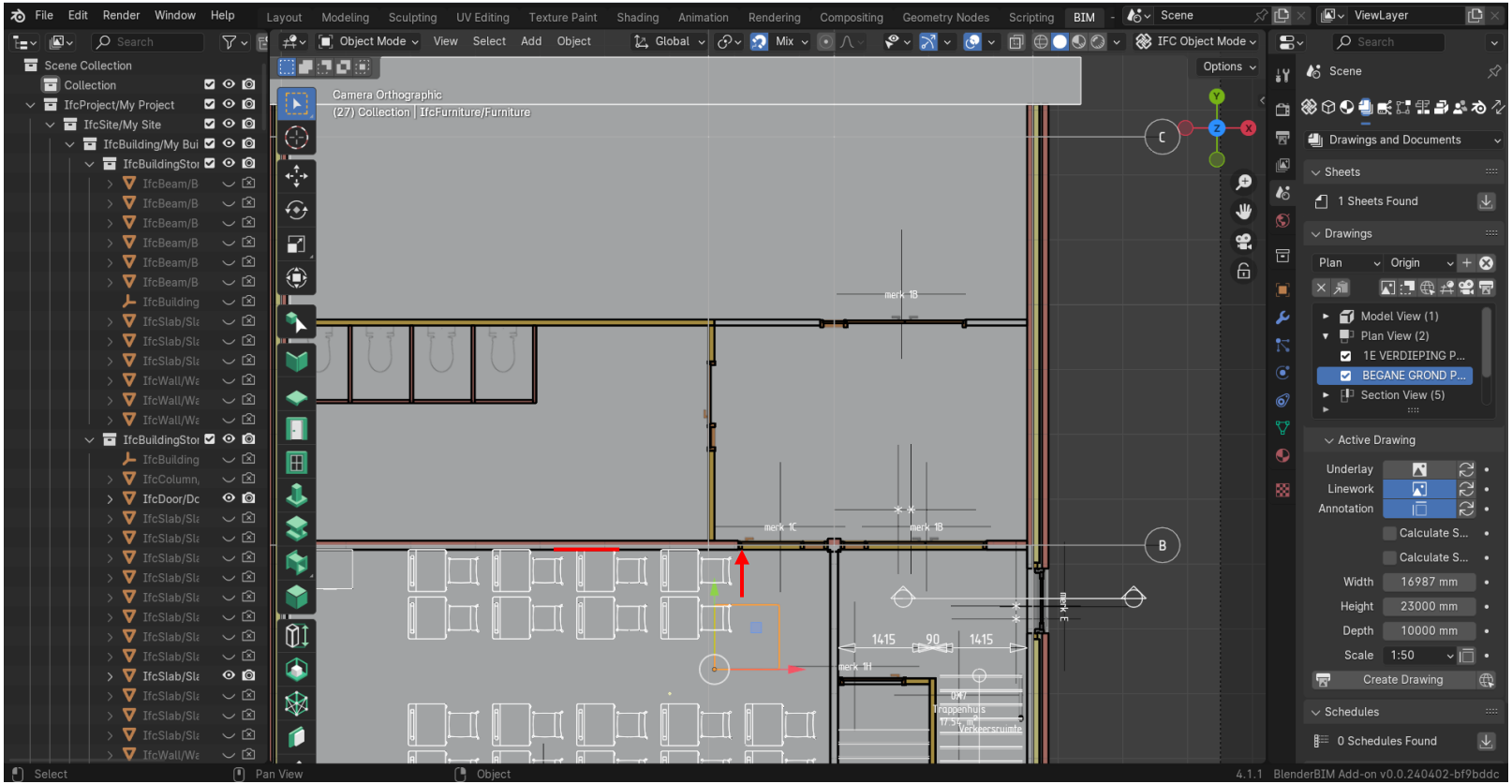




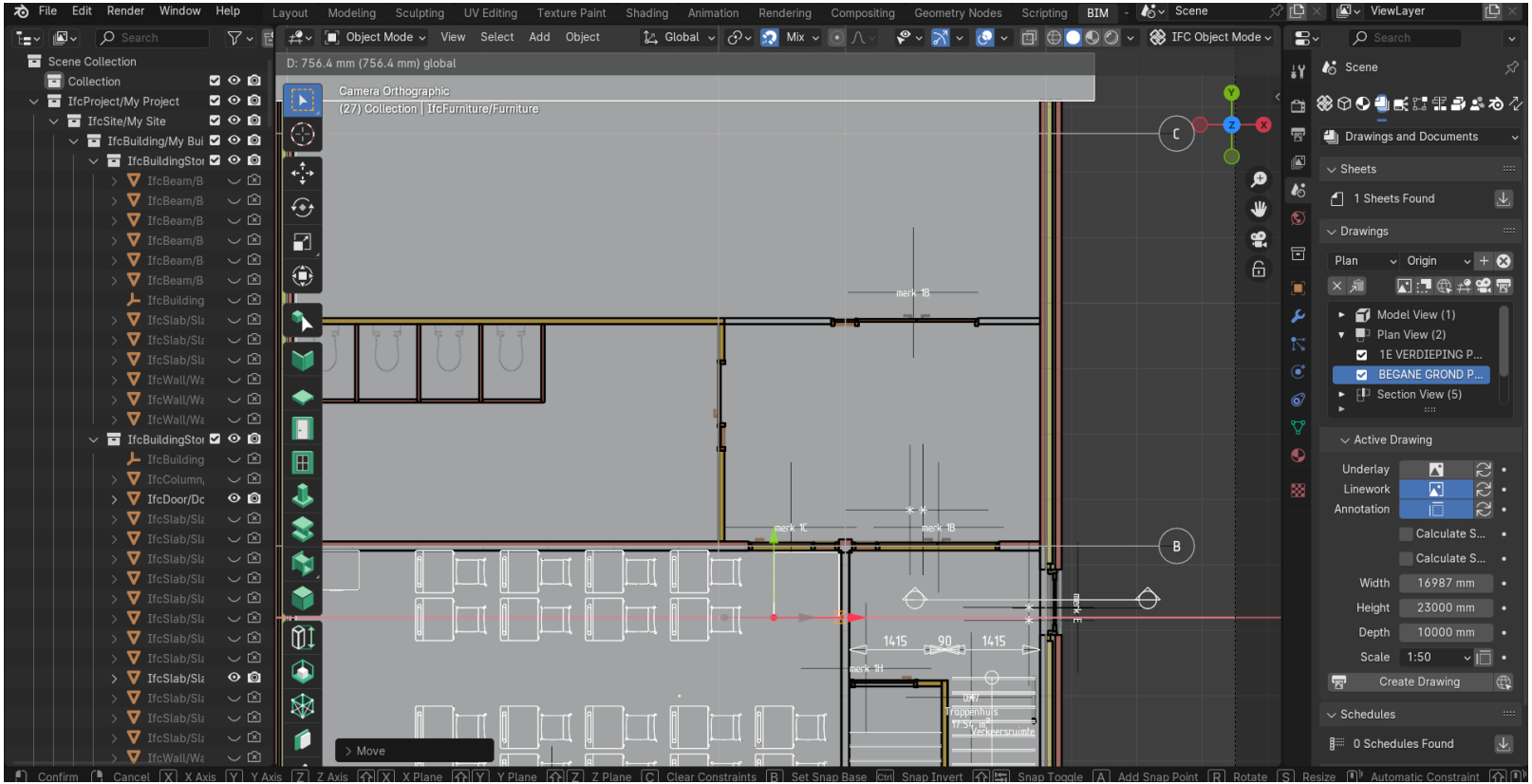
Awesome! Lets put it somewhere else. I want to move it under the stairs, with this point right in the corner. Try it yourself!



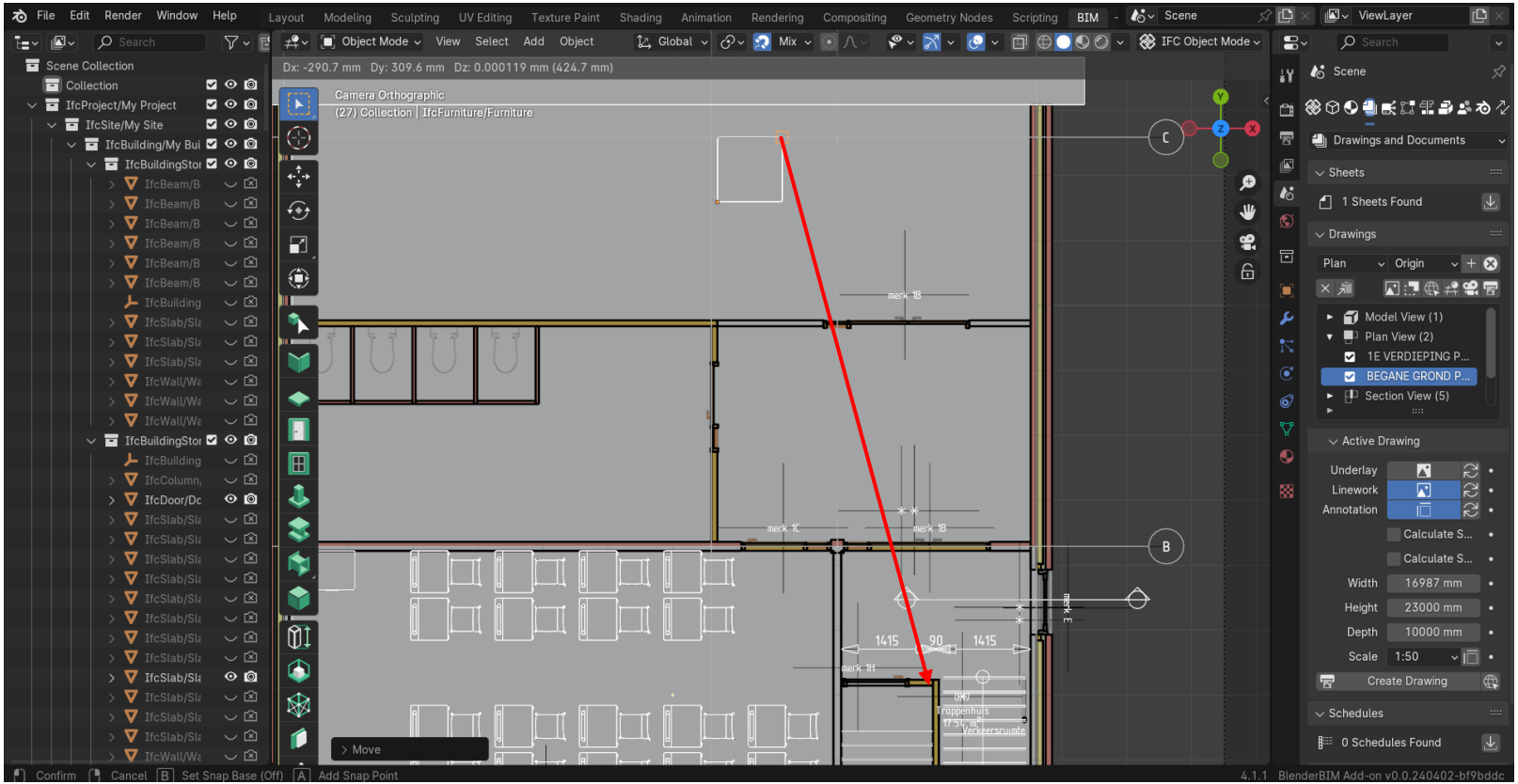
Moving via the gizmo or ‘G+Y’ doesn’t work, as the wrong side is snapped to the point you want.



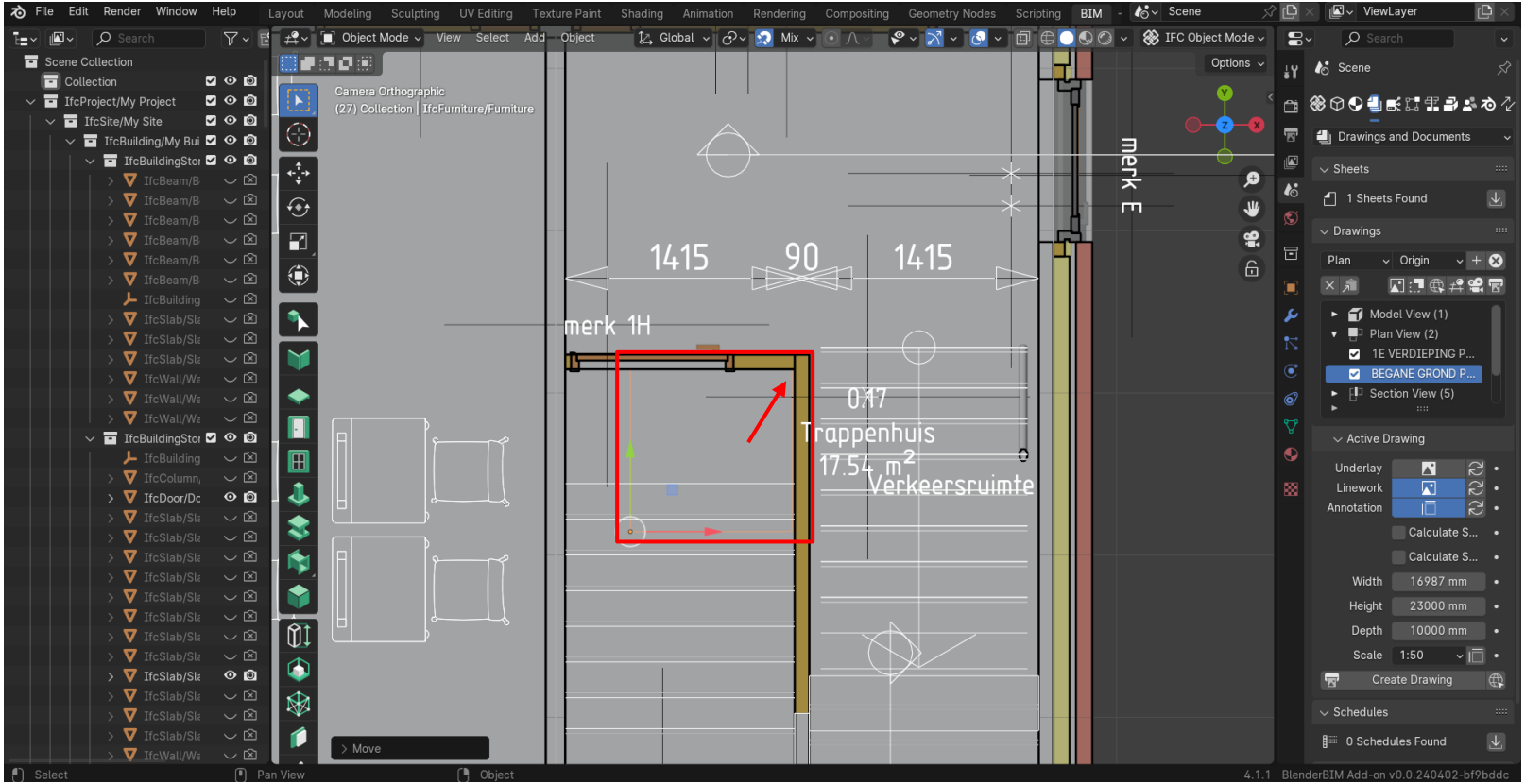
It will snap to the edge **closest** to the place you want to move it, so if you move it upwards **from** below the wall it will be as you want.



Then you can move it horizontally to the right place. Quite tedious isn't it? There is a better way since 4.1!

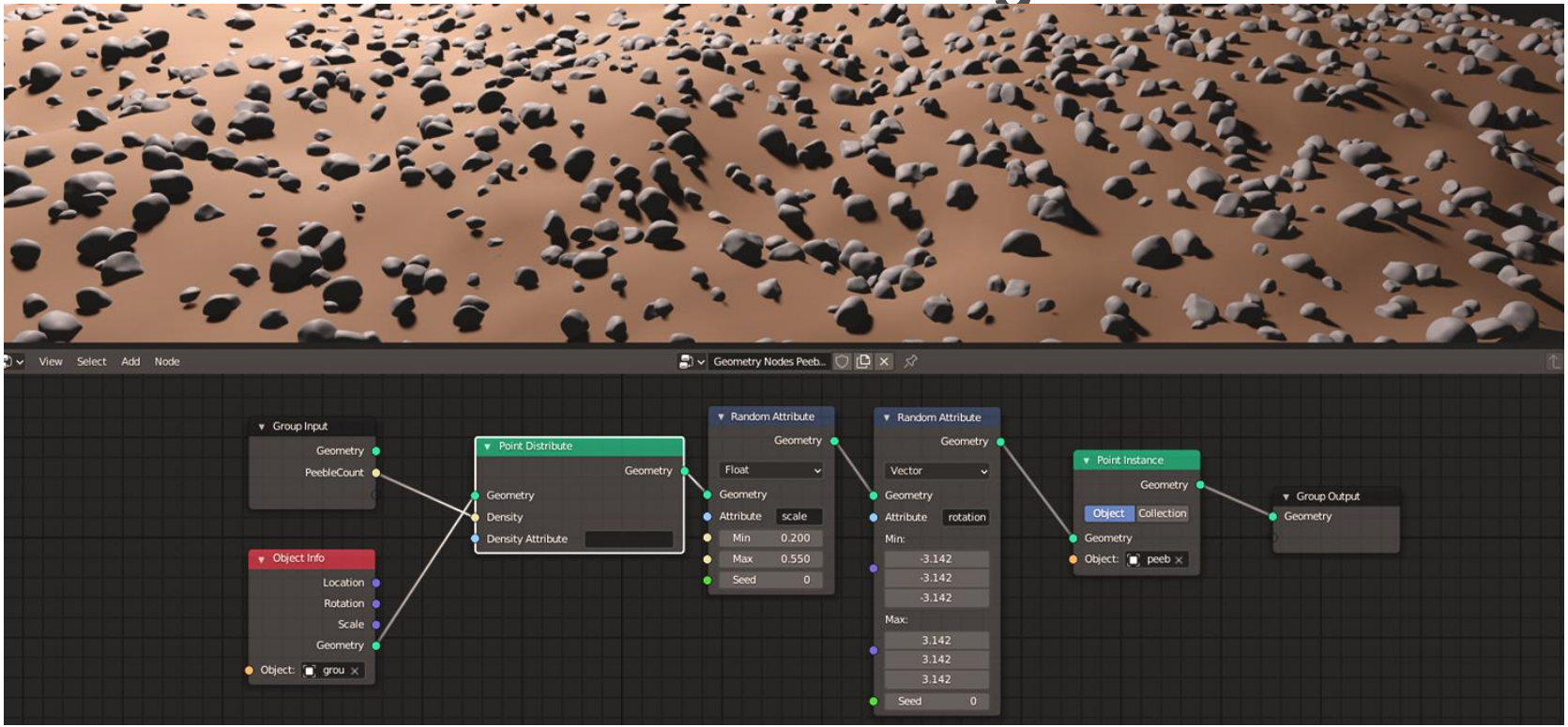


Initiate the move action by dragging an arrow or with ‘G’, then press **‘B’** and click on the point you want to snap.

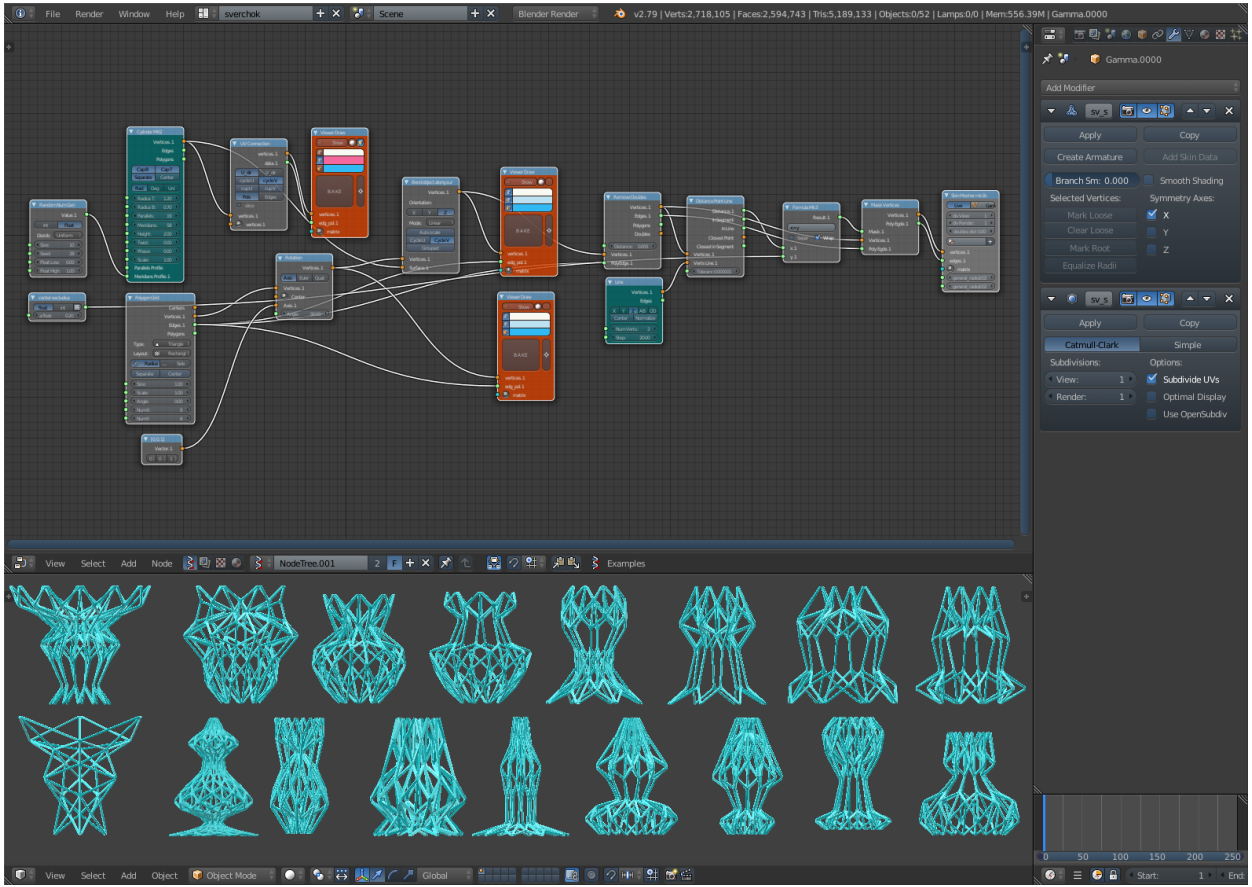


Then click the point you want it to go to, and voilà!

Parametric design



Parametric design Geometry Nodes

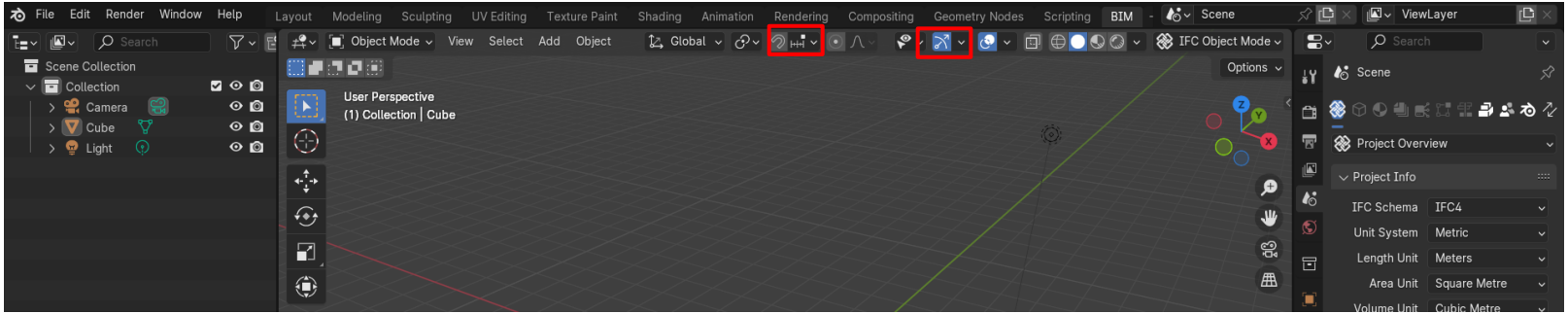


Sverchok doesn't work completely in Blender 4.1, but together with IfcSverchok it's a possible and most likely the easiest way to make parametric IFC elements

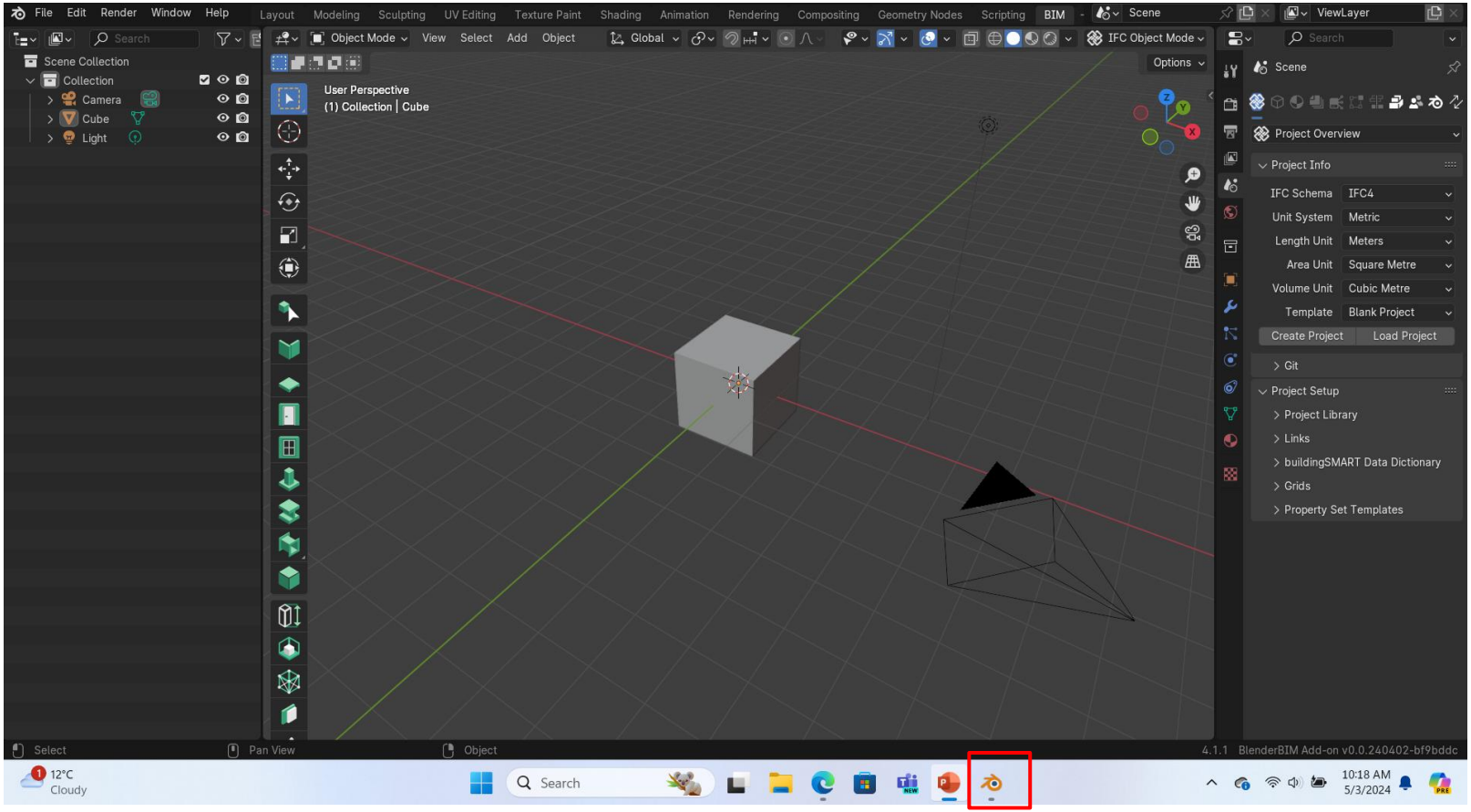
Parametric design Sverchok

Default snapping & gizmo

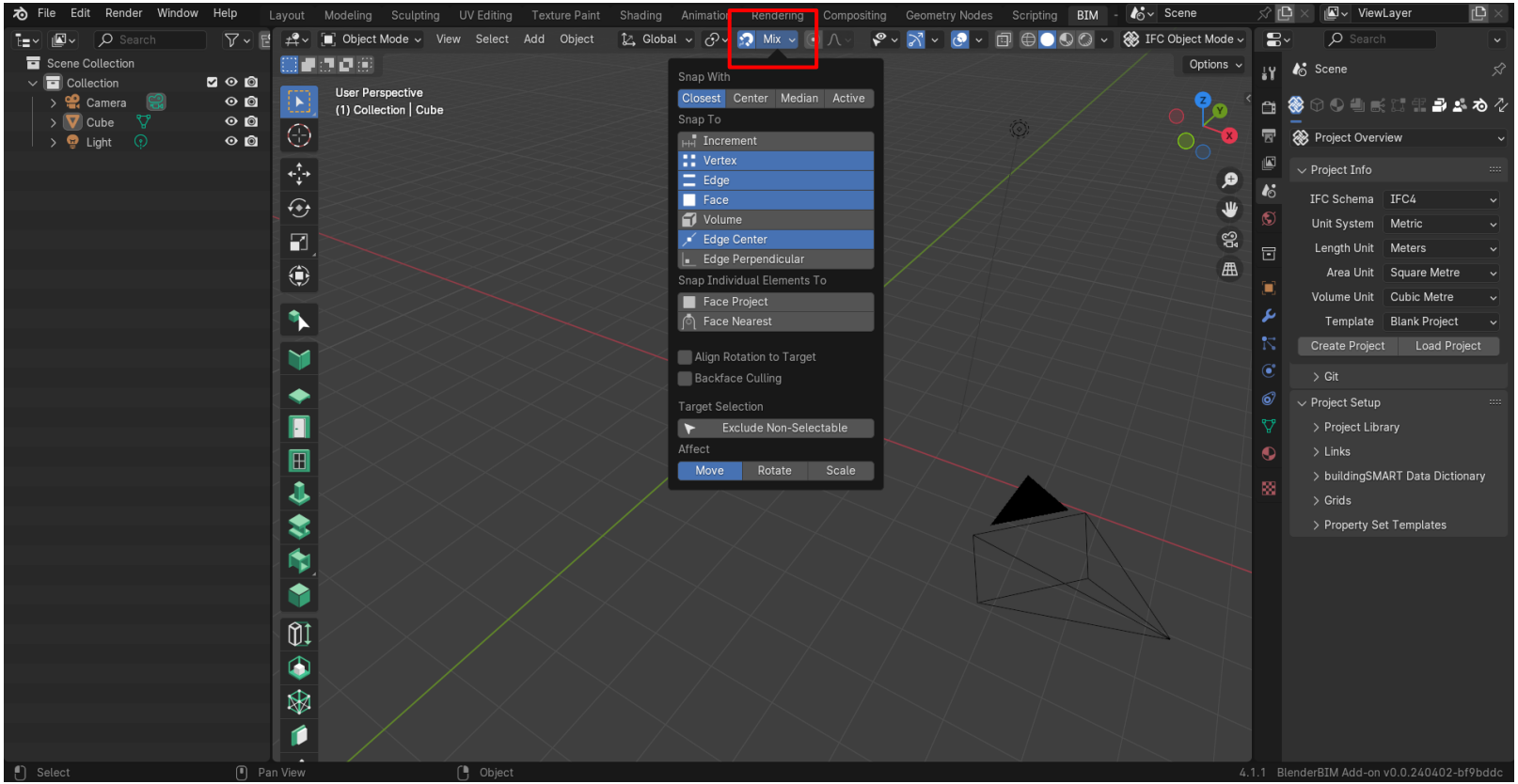
- You've noticed snapping and gizmo aren't turned on by default
- Need to turn on every time you open a project
- Let's change this!



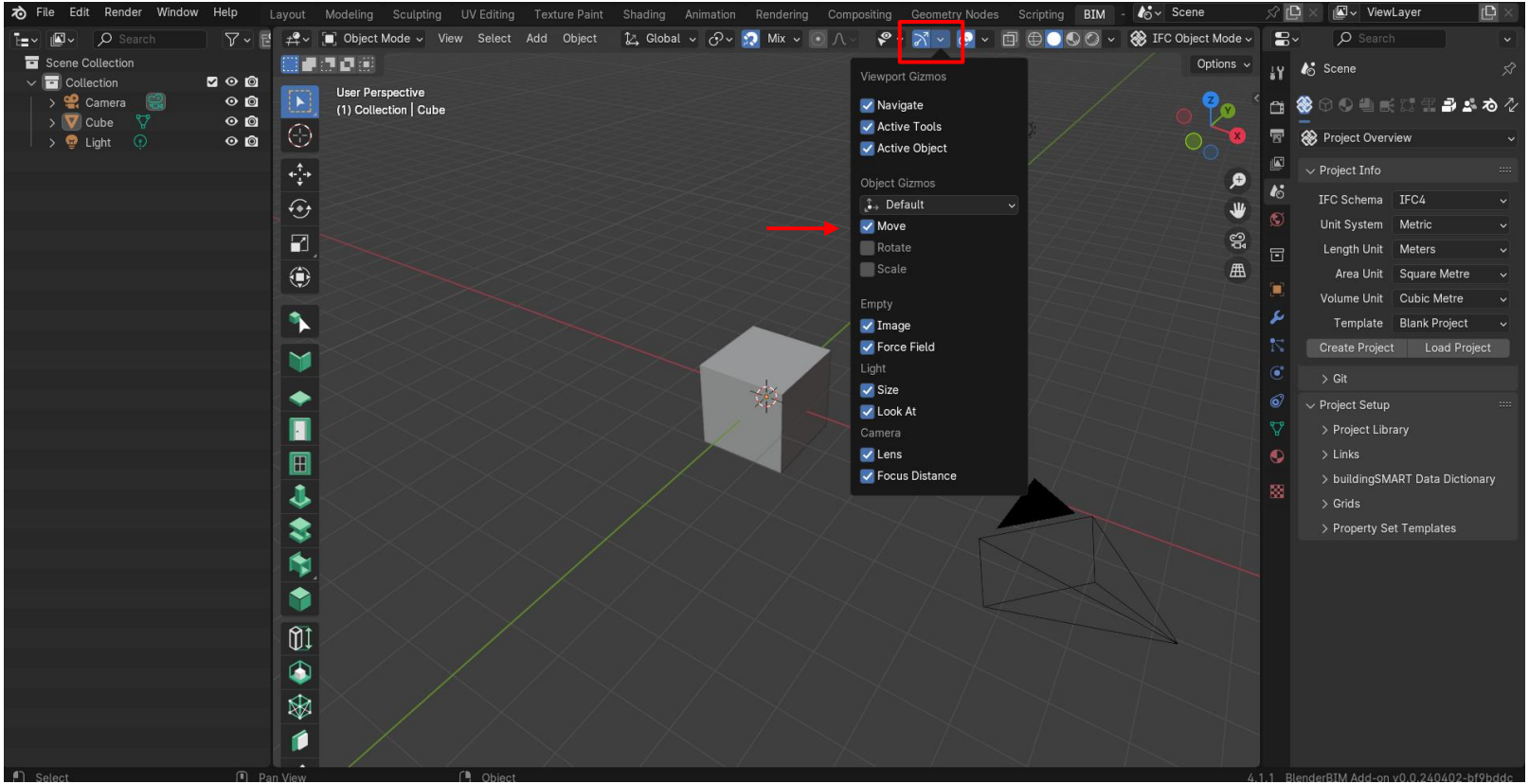
Snapping and gizmo settings are **not** saved in .ifc



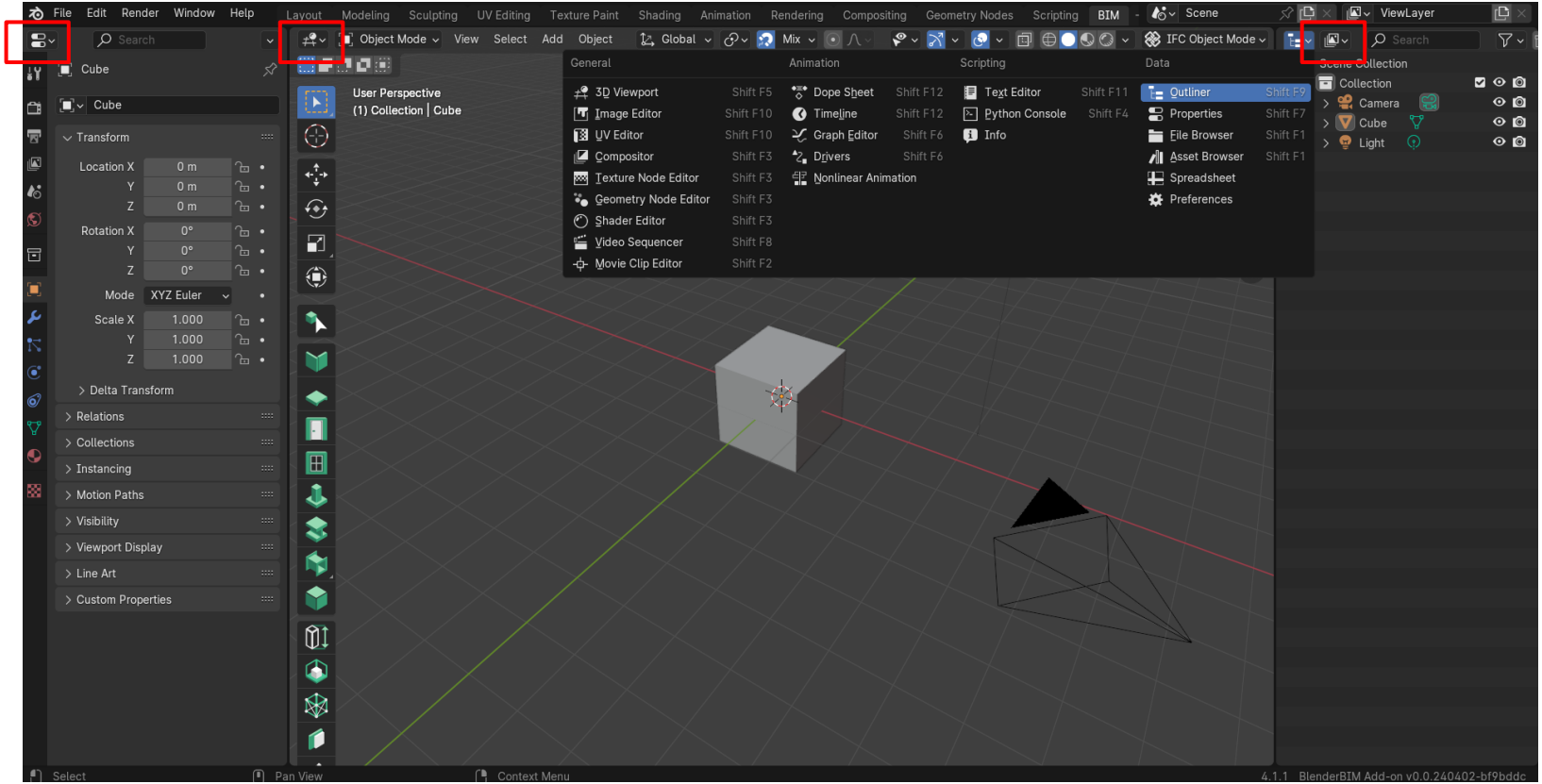
Close **all** Blender/BlenderBIM instances, open a new Blender instance, but **don't** create an IFC project



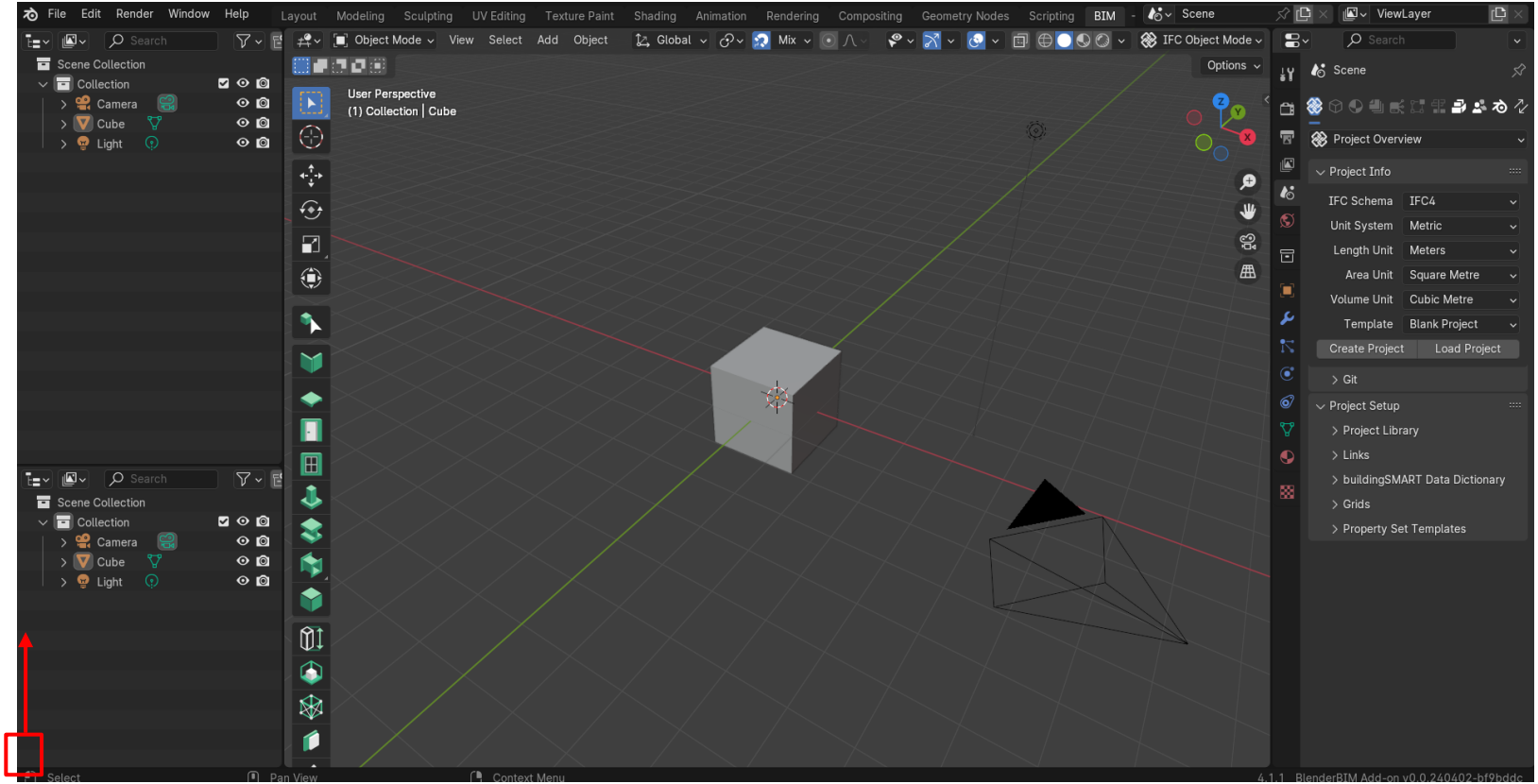
These are the best settings to begin with (snapping can be toggled on/off with ‘shift+tab’)



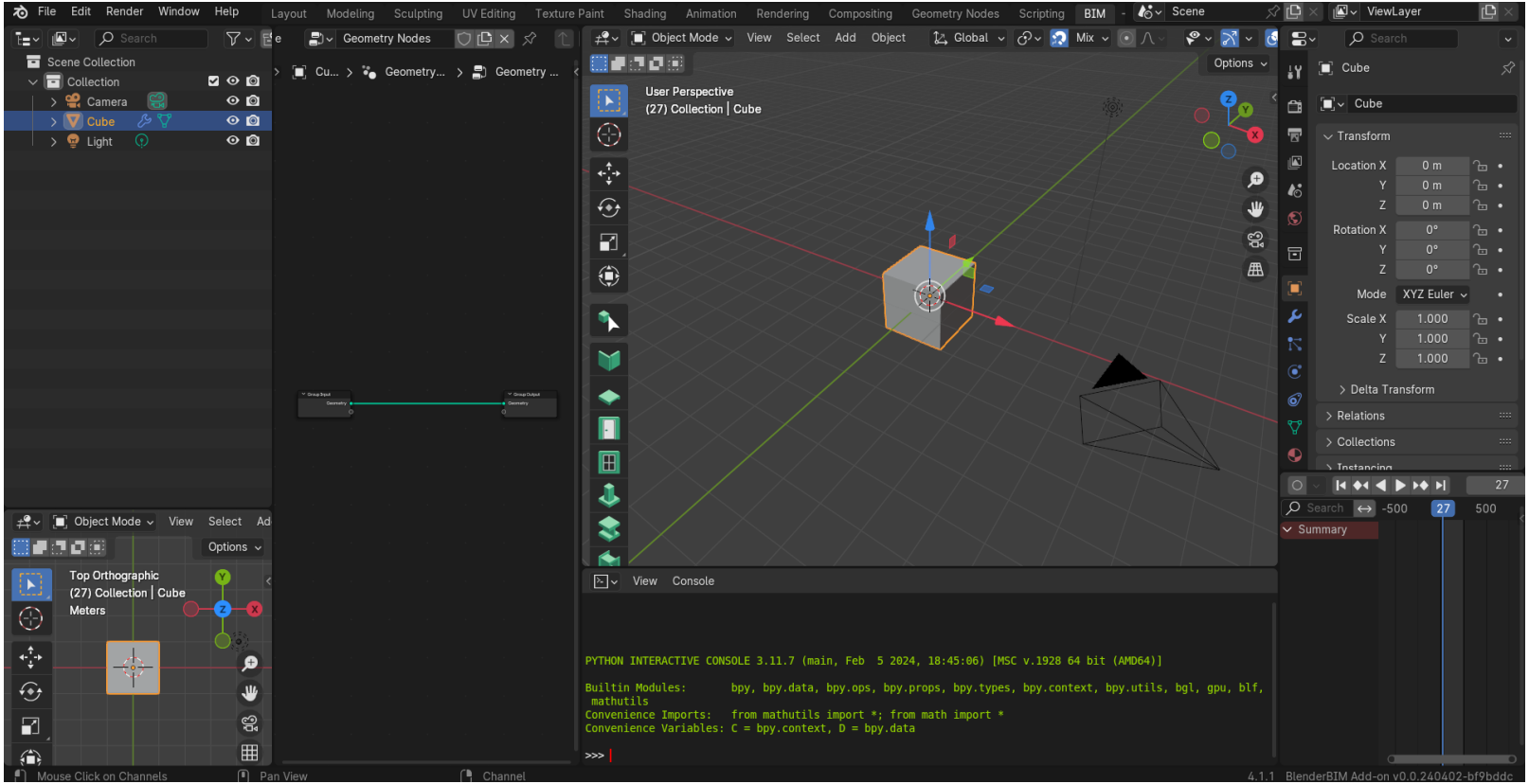
These are the best settings to begin with



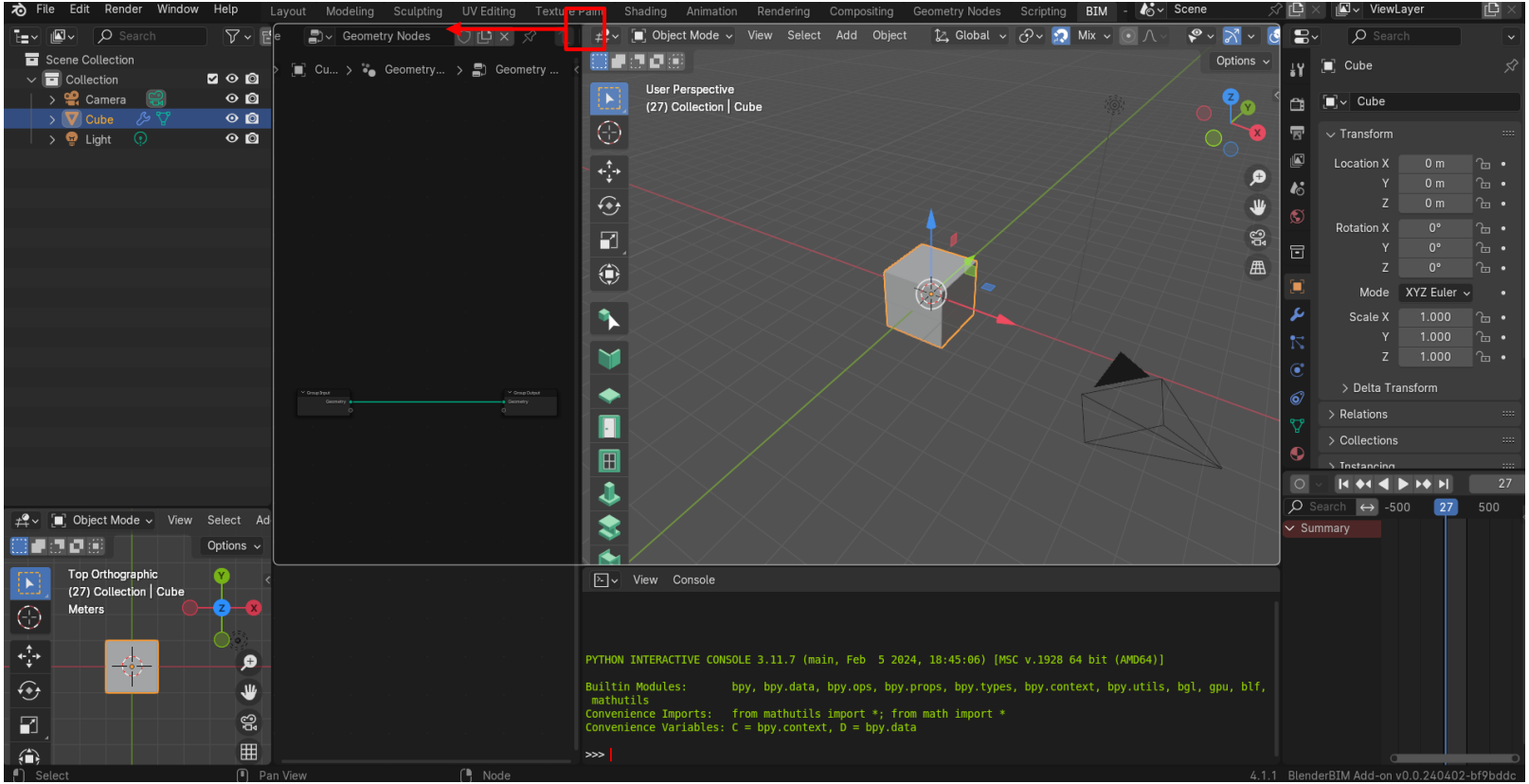
You can also customize the UI to the way you prefer to be default now. Click the icons in the corners and choose what you need



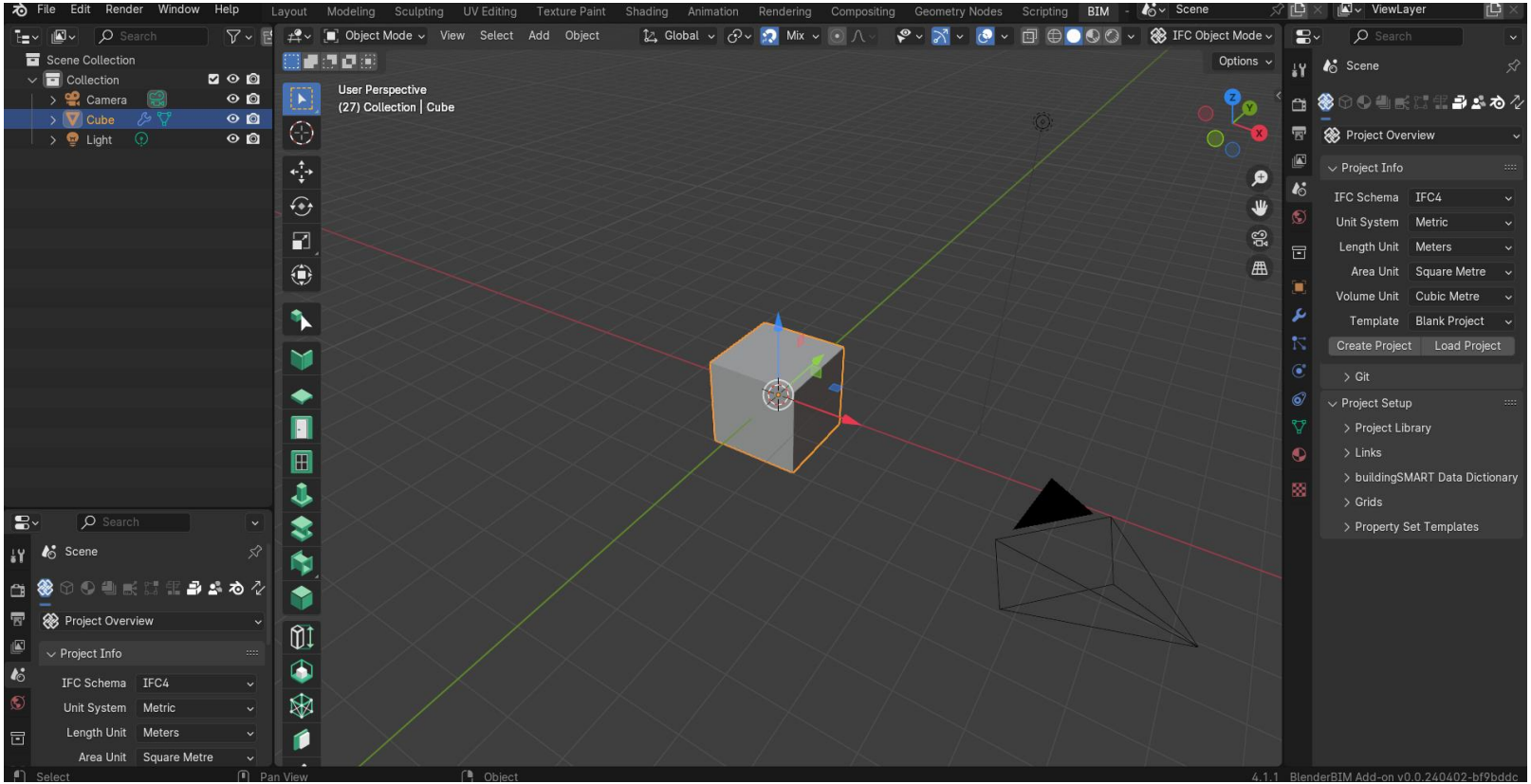
You can also add more ‘tabs’ by dragging from the corners (drag when your cursor changes to a ‘+’)



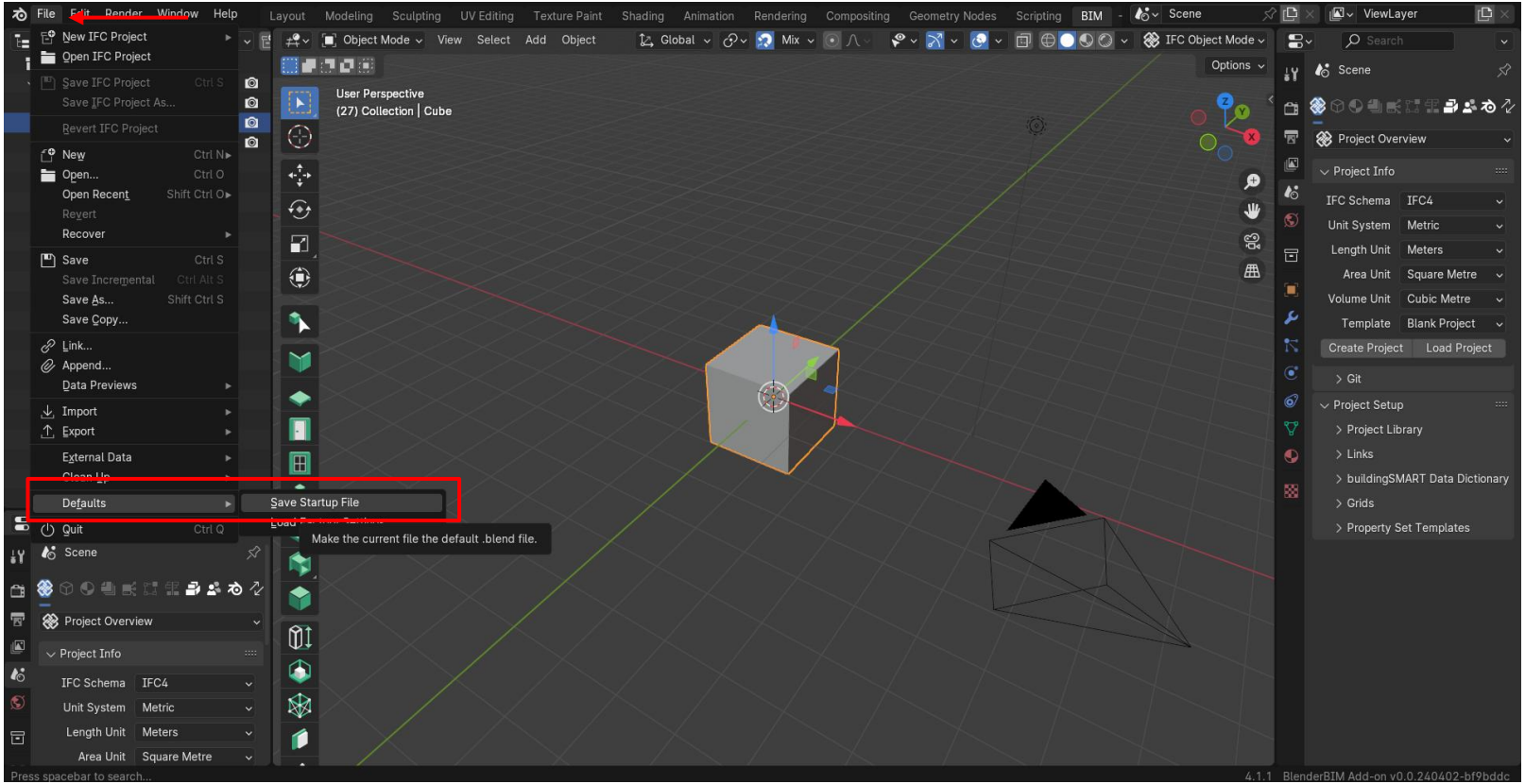
Possibilities are endless!



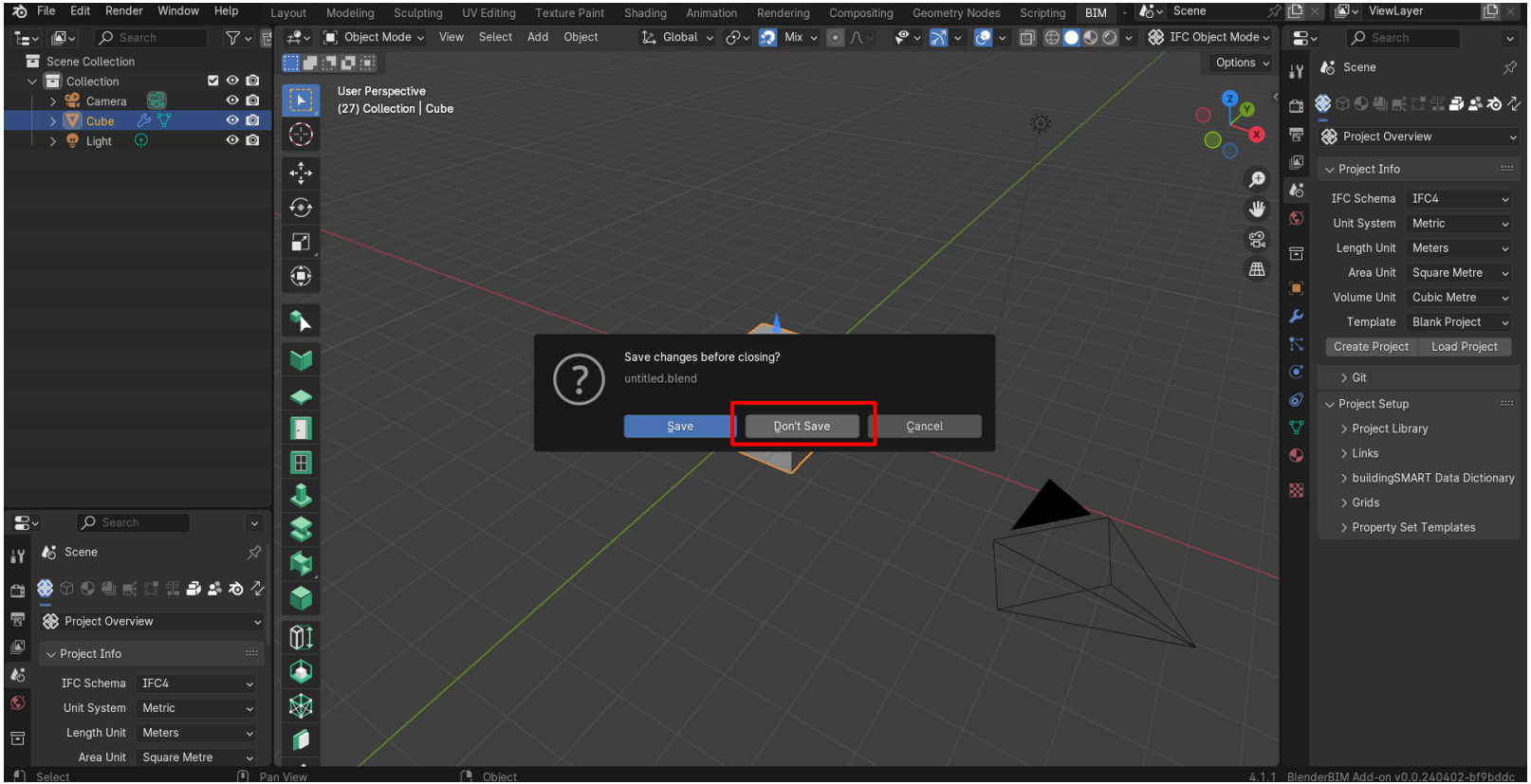
You can also remove the tabs by dragging from the corner of an existing tab to another tab, until you see the '<' or '>' icon



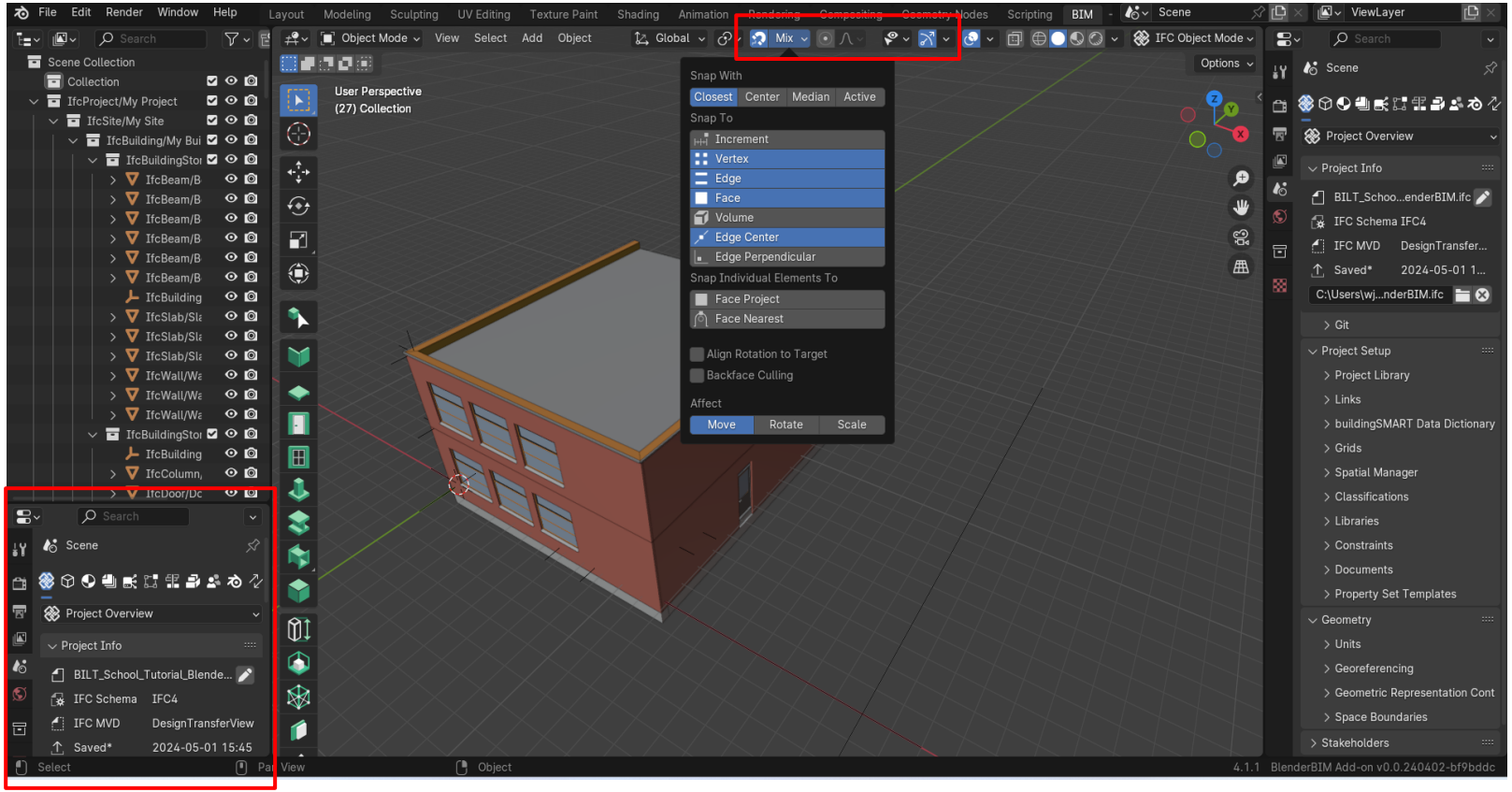
So set up your preferred UI; I like to have another property tab open to access sheets & drawings quickly



If **everything** is set, go to 'File>Defaults>Save Startup File'. This is **not undoable**, except if you turn everything back manually and repeat

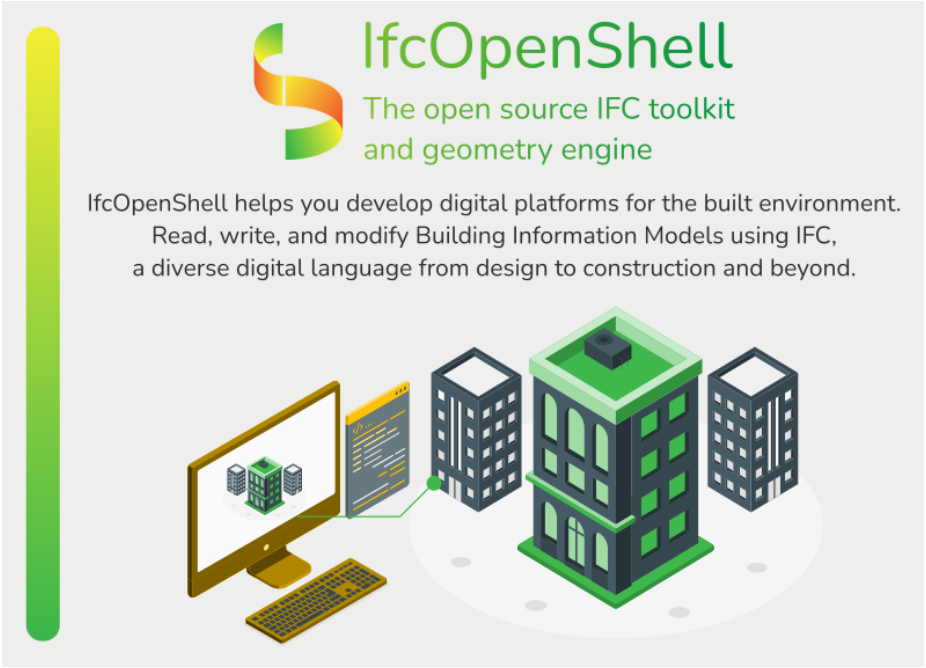


Quit Blender, you don't need to save. Then re-open Blender and the IFC of the building



Now the snapping, move gizmo and the UI are as you wanted! You can do this for other settings, but be **sure** you want them on **by default**

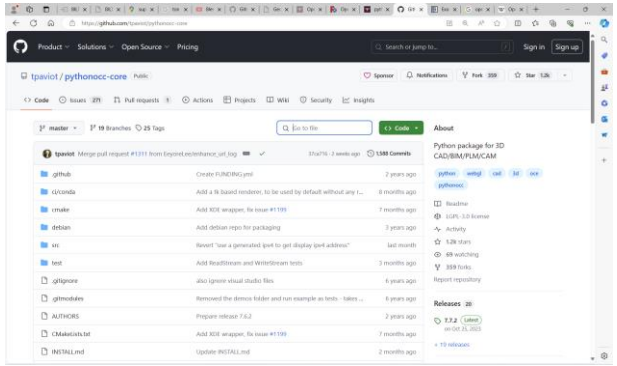
IfcOpenShell



- **Open Source** IFC toolkit and geometry engine
- **C++ / Python**
- **Viewing** models, including spaces, properties, and relationships
- **Edit** and extract attributes and properties
- **Moving** objects, and changing their geometry
- **Create** new objects using library elements
- **Manage** classification systems, document and library references
- **Generating 2D drawings**, schedules, and creating sheets
- Investigating and editing **structural analysis** models
- Connecting and managing **distribution systems** and ports
- Creating **construction schedules**, critical path analysis, and generating sequence animations
- Creating **cost** schedules, using formulas, and deriving quantities from model elements
- Clash **detection** and **managing issues** for model coordination

Open Cascade

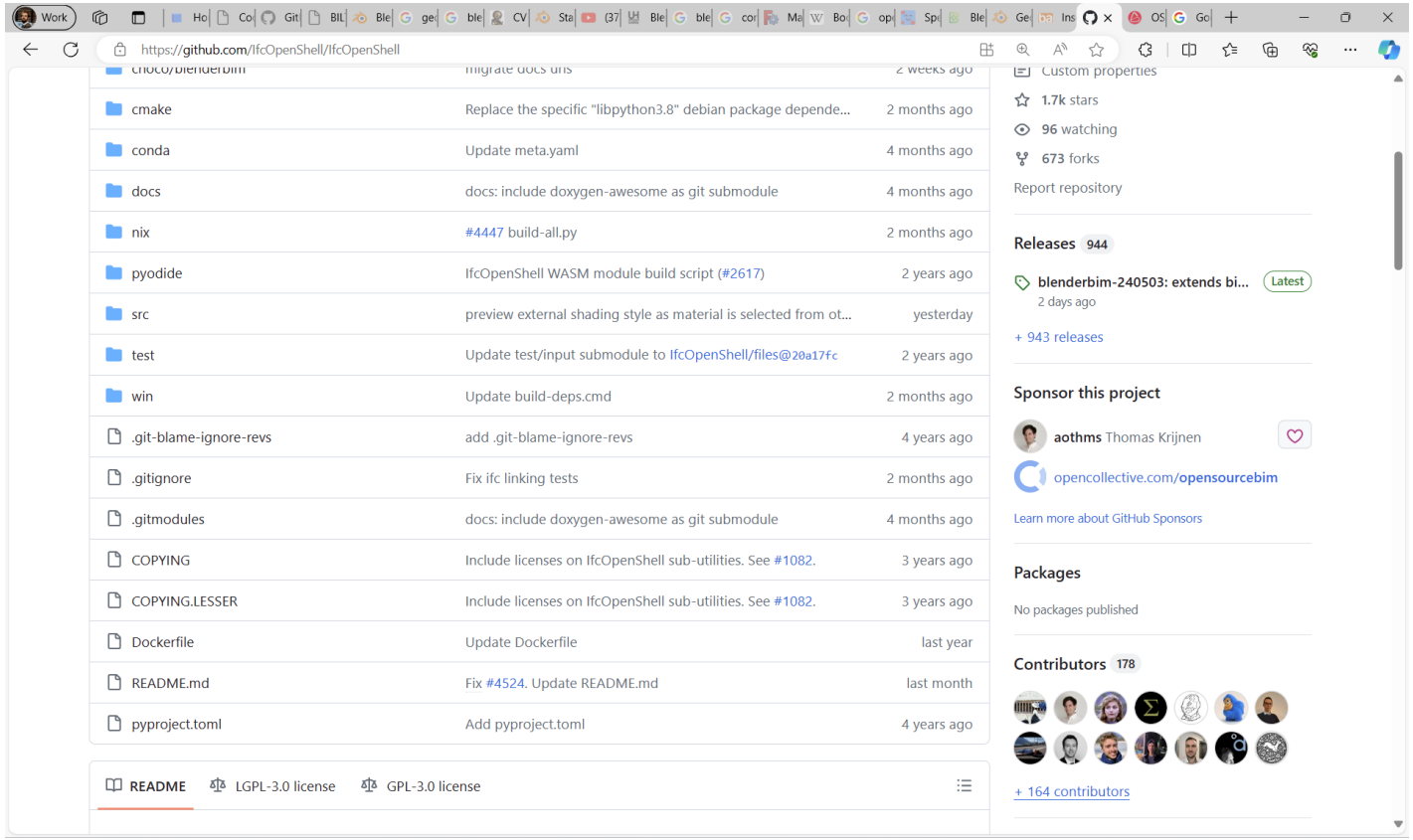
Open Cascade 3D Kernel



Python-OCC

Also used in FreeCAD, CADquery etc

IfcOpenShell



IfcOpenShell

Part	Description
cf	Library to read and write BCF-XML and query OpenCDE BCF-API modules
blenderbim	Add-on to Blender providing a graphical native IFC authoring platform
bsdd	Library to query the bSDD API
ifc2ca	Utility to convert IFC structural analysis models to Code_Aster
ifc4d	Convert to and from IFC and project management software
ifc5d	Report and optimise cost information from IFC
ifcbimtester	Wrapper for Gherkin based unit testing for IFC models
ifccityjson	Convert CityJSON to IFC
ifcclash	Clash detection library and CLI app
ifcconvert	CLI app to convert IFC to many other formats
ifccsv	Library and CLI app to export and import schedules from IFC
ifcdiff	Compare changes between IFC models
ifcfm	Extract IFC data for FM handover requirements
ifcgeom	Internal library for IfcOpenShell

Part	Description
ifcgeom_schema_agnostic	Internal library for IfcOpenShell
ifcgeomserver	Internal library for IfcOpenShell
ifcjni	Internal library for IfcOpenShell
ifcmax	Historic extension for IFC support in 3DS Max
ifcopenshell-python	Python library for IFC manipulation
ifcparse	Internal library for IfcOpenShell
ifcpatch	Utility to run pre-packaged scripts to manipulate IFCs
ifcsverchok	Blender Add-on for visual node programming with IFC
ifctester	Library, CLI and webapp for IDS model auditing
ifcwrap	Internal library for IfcOpenShell
qtviewer	Qt-framework viewer
serializers	Internal library for IfcOpenShell

IfcOpenShell Python API

```python
import ifcopenshell
from ifcopenshell.api import run

# Create a blank model
model = ifcopenshell.file()

# All projects must have one IFC Project element
project = run("root.create_entity", model, ifc_class="IfcProject", name="My Project")

# Geometry is optional in IFC, but because we want to use geometry in this example, let's define uni
# Assigning without arguments defaults to metric units
run("unit.assign_unit", model)

# Let's create a modeling geometry context, so we can store 3D geometry (note: IFC supports 2D too!)
context = run("context.add_context", model, context_type="Model")

# In particular, in this example we want to store the 3D "body" geometry of objects, i.e. the body s
body = run("context.add_context", model, context_type="Model",
    context_identifier="Body", target_view="MODEL_VIEW", parent=context)

# Create a site, building, and storey. Many hierarchies are possible.
site = run("root.create_entity", model, ifc_class="IfcSite", name="My Site")
building = run("root.create_entity", model, ifc_class="IfcBuilding", name="Building A")
storey = run("root.create_entity", model, ifc_class="IfcBuildingStorey", name="Ground Floor")

# Since the site is our top level location, assign it to the project
# Then place our building on the site, and our storey in the building
run("aggregate.assign_object", model, relating_object=project, product=site)
run("aggregate.assign_object", model, relating_object=site, product=building)
run("aggregate.assign_object", model, relating_object=building, product=storey)
```

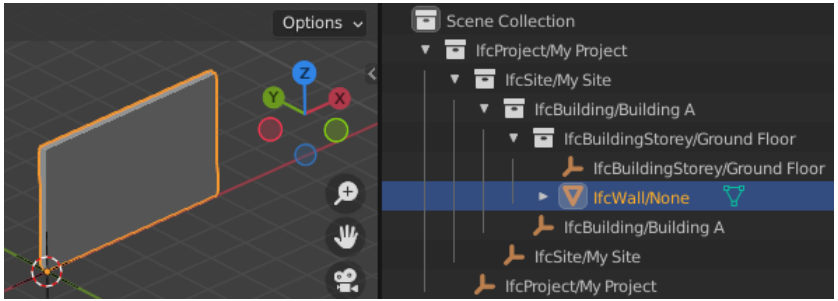
```python
# Let's create a new wall
wall = run("root.create_entity", model, ifc_class="IfcWall")

# Give our wall a local origin at (0, 0, 0)
run("geometry.edit_object_placement", model, product=wall)

# Add a new wall-like body geometry, 5 meters long, 3 meters high, and 200mm thick
representation = run("geometry.add_wall_representation", model, context=body, length=5, height=3, th
# Assign our new body geometry back to our wall
run("geometry.assign_representation", model, product=wall, representation=representation)

# Place our wall in the ground floor
run("spatial.assign_container", model, relating_structure=storey, product=wall)

# Write out to a file
model.write("/home/dion/model.ifc")
```



Examples

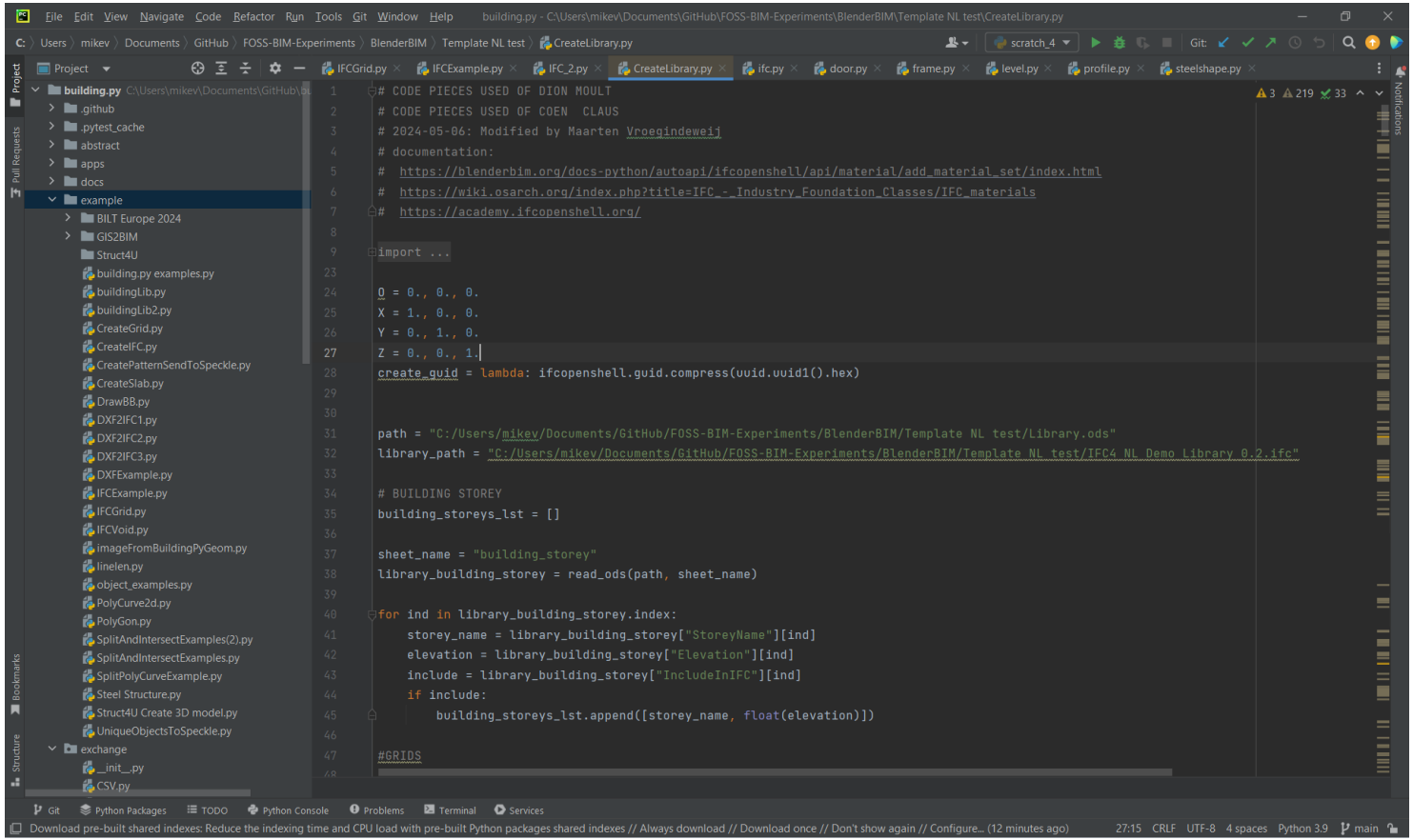
```
import ifcopenshell
import ifcopenshell.geom
from OCC.Core.gp import gp_Pnt
from OCC.Core.BRepPrimAPI import BRepPrimAPI_MakeBox
from OCC.Core.BRepAlgoAPI import BRepAlgoAPI_Cut

outer   = BRepPrimAPI_MakeBox(gp_Pnt(-5000., -180., -2000.), gp_Pnt(5000., 5180., 3000.)).Shape()
inner   = BRepPrimAPI_MakeBox(gp_Pnt(-4640.,  180.,     0.), gp_Pnt(4640., 4820., 3000.)).Shape()
window1 = BRepPrimAPI_MakeBox(gp_Pnt(-5000., -180.,   400.), gp_Pnt( 500., 1180., 2000.)).Shape()
window2 = BRepPrimAPI_MakeBox(gp_Pnt( 2070., -180.,   400.), gp_Pnt(3930.,  180., 2000.)).Shape()
building_shell = BRepAlgoAPI_Cut(
        BRepAlgoAPI_Cut(
            BRepAlgoAPI_Cut(outer, inner).Shape(),
            window1
            ).Shape(),
        window2
    ).Shape()

model = ifcopenshell.file(schema="IFC2X3")
product_definition = ifcopenshell.geom.serialise("IFC2X3", building_shell, False)
product_definition = model.add(product_definition)
```

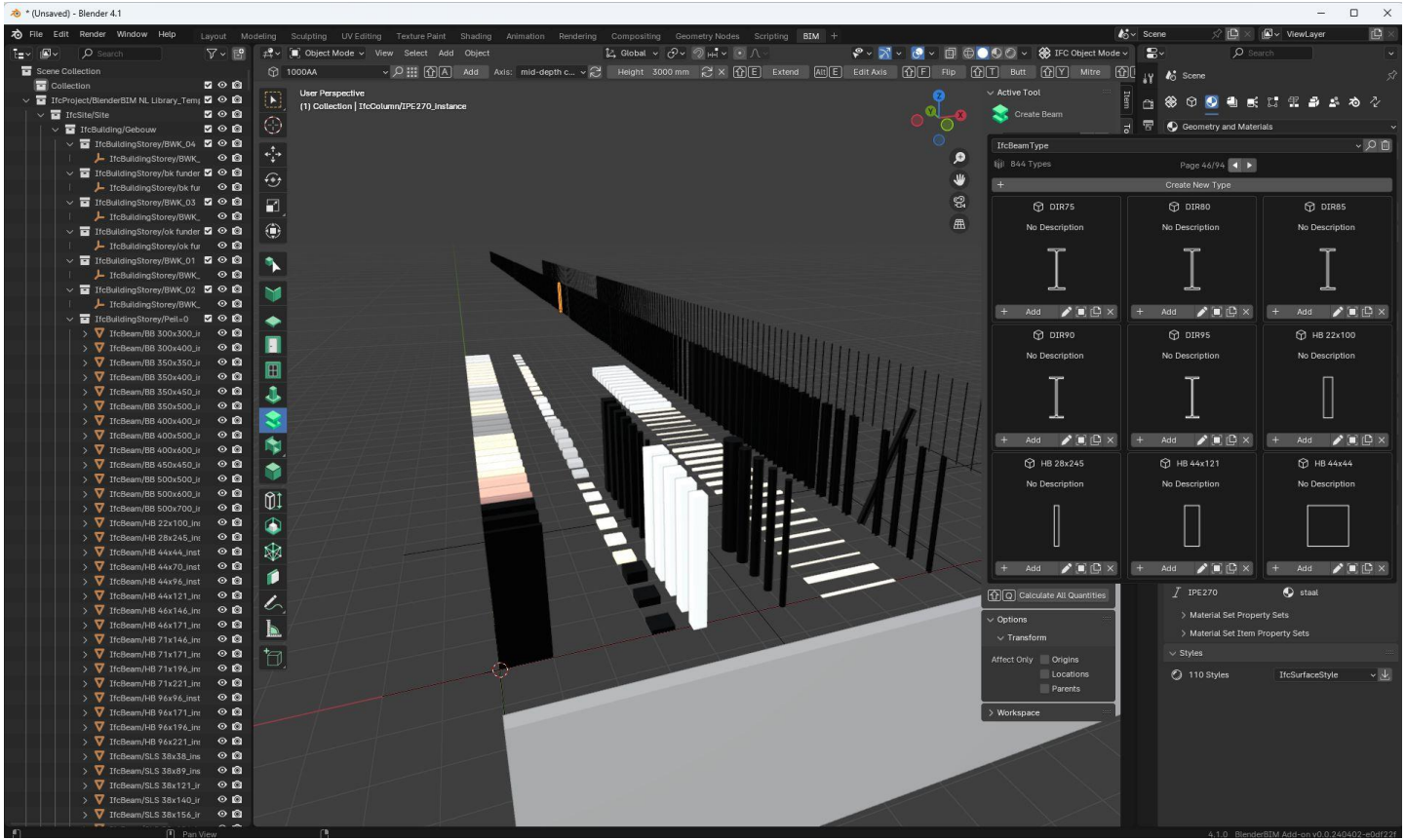
https://docs.ifcopenshell.org/ifcopenshell-python/geometry_tree.html

Examples

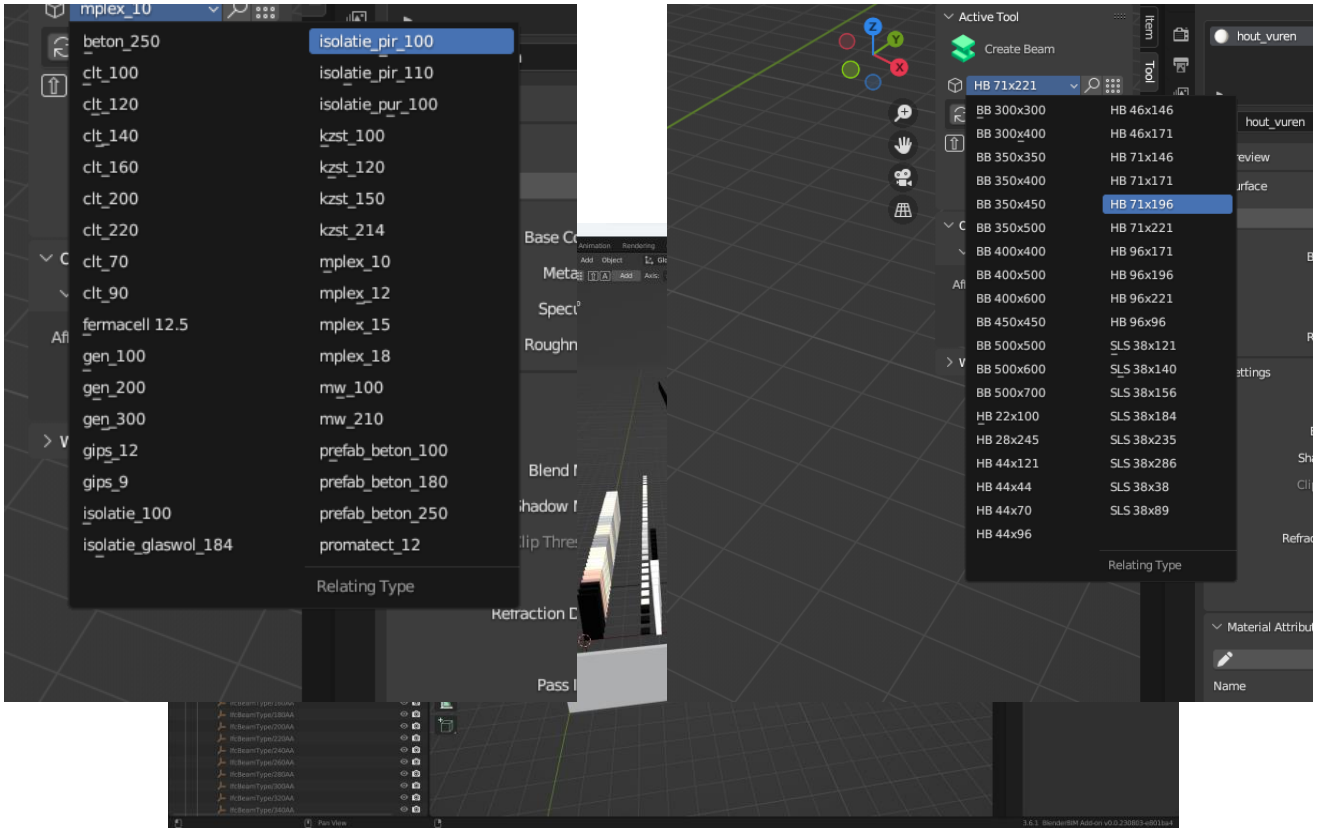


Library Creation, open in PyCharm

Result


* (Unsaved) - Blender 4.1
File Edit Render Window Help
Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Geometry Nodes Scripting BIM
Object Mode View Select Add Object
Global
IFC Object Mode
Scene Collection
Collection
IfcProject/BlenderBIM NL Library_Temp
IfcSite/Site
IfcBuilding/Gebouw
IfcBuilding/Storey/BWK_04
IfcBuilding/Storey/BWK_03
IfcBuilding/Storey/BWK_01
IfcBuilding/Storey/BWK_02
IfcBuilding/Storey/Peil=0
IfcBeam/BB 300x300_ir
IfcBeam/BB 300x400_ir
IfcBeam/BB 350x350_ir
IfcBeam/BB 350x400_ir
IfcBeam/BB 350x450_ir
IfcBeam/BB 350x500_ir
IfcBeam/BB 400x400_ir
IfcBeam/BB 400x500_ir
IfcBeam/BB 400x600_ir
IfcBeam/BB 450x450_ir
IfcBeam/BB 500x500_ir
IfcBeam/BB 500x600_ir
IfcBeam/BB 500x700_ir
IfcBeam/HB 22x100_ins
IfcBeam/HB 28x245_ins
IfcBeam/HB 44x44_inst
IfcBeam/HB 44x70_inst
IfcBeam/HB 44x96_inst
IfcBeam/HB 44x121_ins
IfcBeam/HB 46x146_ins
IfcBeam/HB 46x171_ins
IfcBeam/HB 71x146_ins
IfcBeam/HB 71x171_ins
IfcBeam/HB 71x196_ins
IfcBeam/HB 71x221_ins
IfcBeam/HB 96x96_inst
IfcBeam/HB 96x171_ins
IfcBeam/HB 96x196_ins
IfcBeam/HB 96x221_ins
IfcBeam/SLS 38x38_ins
IfcBeam/SLS 38x89_ins
IfcBeam/SLS 38x121_ir
IfcBeam/SLS 38x140_ir
IfcBeam/SLS 38x156_ir
User Perspective
(1) Collection | IfcColumn/IPE270_instance
Active Tool
Create Beam
Scene
ViewLayer
Geometry and Materials
IfcBeamType
846 Types
Page 46/94
Create New Type
DIR75
DIR80
DIR85
DIR90
DIR95
HB 22x100
HB 28x245
HB 44x121
HB 44x44
No Description
Add
Calculate All Quantities
Options
Transform
Affect Only
Origins
Locations
Parents
Workspace
IPE270
staal
Material Set Property Sets
Material Set Item Property Sets
Styles
110 Styles
IfcSurfaceStyle

Examples


beton_250
clt_100
clt_120
clt_140
clt_160
clt_200
clt_220
clt_70
clt_90
fermacell 12.5
gen_100
gen_200
gen_300
gips_12
gips_9
isolatie_100
isolatie_glaswol_184
isolatie_pir_100
isolatie_pir_110
isolatie_pur_100
kzst_100
kzst_120
kzst_150
kzst_214
mplex_10
mplex_12
mplex_15
mplex_18
mw_100
mw_210
prefab_beton_100
prefab_beton_180
prefab_beton_250
promatect_12
Relating Type
Active Tool
Create Beam
HB 71x221
BB 300x300
BB 300x400
BB 350x350
BB 350x400
BB 350x450
BB 350x500
BB 400x400
BB 400x500
BB 400x600
BB 450x450
BB 500x500
BB 500x600
BB 500x700
HB 22x100
HB 28x245
HB 44x121
HB 44x44
HB 44x70
HB 44x96
HB 46x146
HB 46x171
HB 71x146
HB 71x171
HB 71x196
HB 71x221
HB 96x171
HB 96x196
HB 96x221
HB 96x96
SLS 38x121
SLS 38x140
SLS 38x156
SLS 38x184
SLS 38x235
SLS 38x286
SLS 38x38
SLS 38x89
Relating Type
Material Attribu
Name

REMINDER:

Speaker Feedback is appreciated

Fill the Survey in the Event App

3.1 BlenderBIM

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3BM

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RADISSON BLU

LATVIJA

07 – 09 May 2024