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**Consultancy Services for**
**Building Information Modelling (BIM)**
**Standards of Statutory Plan Submission to the HKSAR Government for the Construction Industry Council (CIC)**

# The Guide in Using BIM for Statutory Plans Submission Training for Users

**27th Nov 2019**
**By Kevin Wong**

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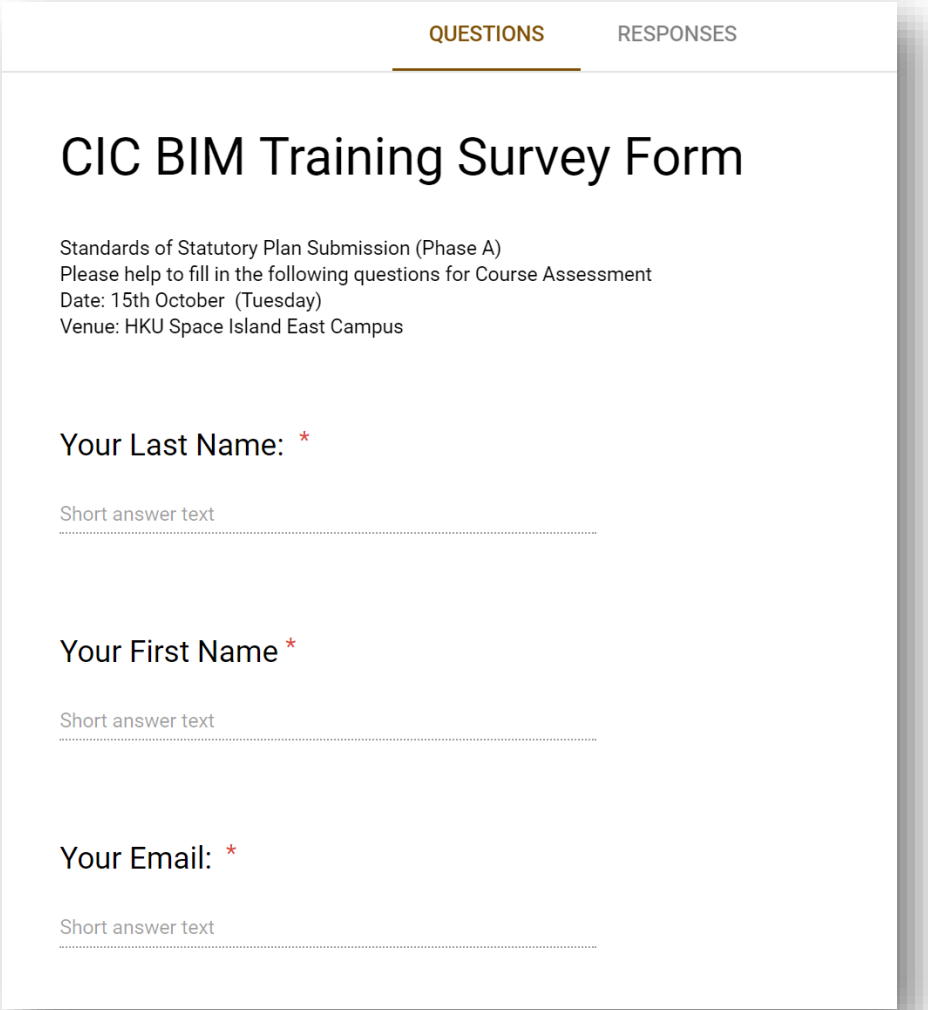


QUESTIONS RESPONSES

CIC BIM Training Survey Form

Standards of Statutory Plan Submission (Phase A)
Please help to fill in the following questions for Course Assessment
Date: 15th October (Tuesday)
Venue: HKU Space Island East Campus

Your Last Name: *

Short answer text

Your First Name *

Short answer text

Your Email: *

Short answer text

## Phase A

Superstructure

Foundation

Demolition
(incl. Hoarding)

## Phase B

ELS

Site Formation

Ground
Investigation

## Phase C

Drainage

Curtain Wall
Details *(Part of Superstructure)*

**Topics:**

AUTODESK® REVIT®

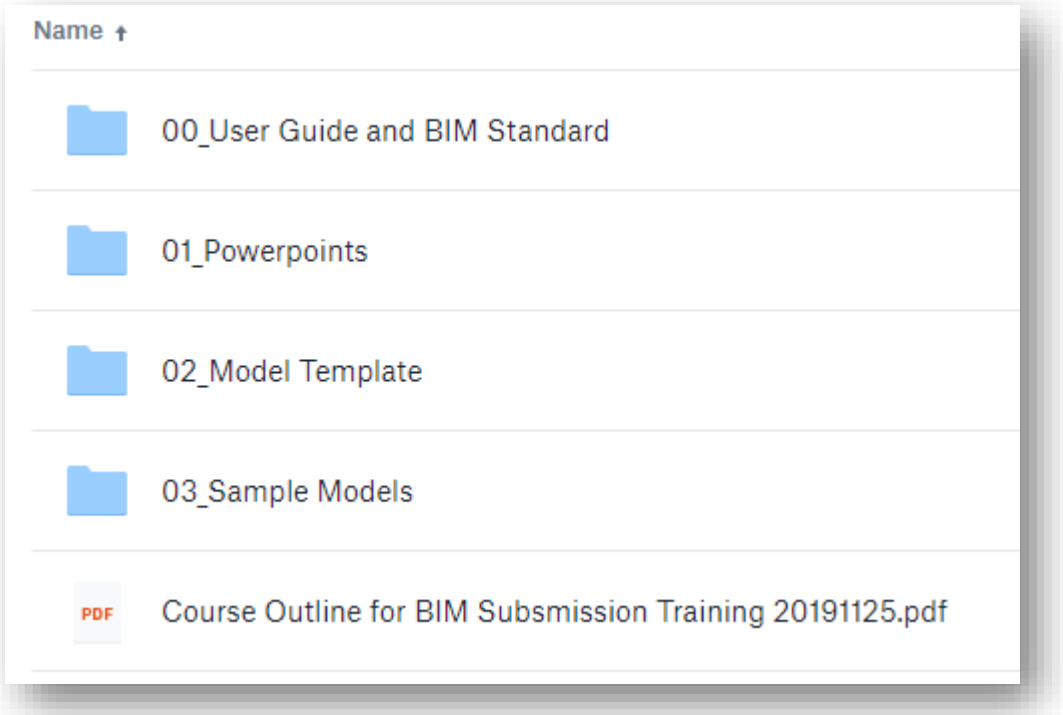
1. Introduction to Hardware / System Requirements for Revit
2. Getting Start with Revit Basics
3. Creating Revit Model Objects
    - Superstructure
    - Demolition including hoarding
    - Foundation
4. Configuring Schedules
    - Superstructure Schedules (e.g. Column and Beam Schedule)
    - Foundation and loading Schedule
5. Standardizing Model View Setting
6. Preparing Drawings Production
    - Duplicating Views
    - Creating Drafting View
    - Creating Legends
7. Creating Drawing Sheets
    - Creating Drawings Lists
    - Title Block Parameters
    - Examples of sheets

**Topics:**

1. Introduction to Hardware / System Requirements for Tekla Structures
2. Getting Start with Tekla Structures Basics
3. Creating Tekla Model Objects
    - Superstructure
    - Demolition including hoarding
    - Foundation
4. Configurating Tekla Schedules with User Defined Attributes (UDA)
    - Superstructure Schedules (e.g. Column and Beam Schedule)
    - Foundation and loading Schedule
5. Understanding Tekla View Setting
6. Creating 2D Drawing Production
    - Creating GA drawings
    - Insert Views in Drawings
    - Creating Text and 2D Typical Details to Drawings
    - Adding Dimensions and Marks in Drawings
    - Creating Title Blocks and Schedules to Drawings
7. Exporting Tekla Models as Deliverables with Reference Tekla Structures Templates

## All Shared Files (Dropbox Link):

https://qrgo.page.link/M7Ud3



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# Introduction

## BIM Standards of Statutory Plan Submission for HKSAR Government

## Phase A

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The key initiatives were to identify and align the common practices, as well as set up the standards and guidelines which are essential and beneficial to facilitate **better implementation and adoption of BIM technologies** with regards to project execution. The establishment of **BIM Standards (Phase Two)** includes the following specific BIM usages and disciplines:

- **Statutory Plans Submission**
- Underground Utilities (UU)
- Mechanical, electrical and plumbing (MEP) Level of Development (LOD)

1. The **Guidelines** for using BIM in the preparation of Statutory Plans

2. **Software Templates** with Sample projects

3. **Sample Drawings sets**

To illustrate the methodologies in BIM modelling that can produce statutory plans for submission to the approval authority, namely the Building Authority (BA).

The plans produced from BIM have two purposes:

1. **Used and reviewed** by the Buildings Department (BD) for processing under the Buildings Ordinance (BO);

2. With the benefit of having the BIM models which contain building information presented in the statutory plans, the information can also be used by BD to **assist** in the approval process.

The Guidelines, Software Templates with Sample projects and drawings are jointly developed by the Task Force and BD, and promulgated in phases with the aim to cover all major statutory plans submission including:

1. **Superstructure Plans**
2. **Foundation Plans**
3. **Demolition Plans (including Hoarding Plans)**
4. **Excavation and Lateral Support (ELS) Plans**
5. **Site Formation Plans**
6. **Ground Investigation Plans**
7. **Drainage Plans**
8. **Curtain Wall Plans.**

This edition of the Guidelines (Nov 2019 edition) covers (Phase A):

1. Superstructure Plans
2. Foundation Plans
3. Demolition Plans (including Hoarding Plans)

**Please note:**

- Sample drawings are provided to demonstrate the feasibility of drawings generation with the Guidelines

- They **do not** represent the complete set of submission drawings required for BD's approval.

## Guidelines are software independent.

**Any BIM software** meeting the requirements in the Guidelines can be used to produce prescribed plans for statutory submission.

The application of BIM and the requirements set out in these Guidelines are **NOT** intended to change the submission requirements.

It aims to illustrate the **methodologies for producing the prescribed plans in 2D format from BIM model** based on:

1. The data-driven BIM objects
2. non-graphical information
3. 2D annotations in BIM models.

Although BIM model can technically produce 2D plans, the plans for statutory submission required **manual and engineering input** to annotate for the appropriate presentation of the design on plans in 2D format.

The selection of BIM authoring software for the purpose of illustrating the practicality of the Guidelines based on the following criteria:

1. It is a BIM software classified by buildingSMART International;

2. It is a Parametric Modelling software contains data-driven 3D objects; and

3. It can produce 2D drawings using the information embedded to the data-driven 3D objects such that information presented are consistent when it is shown more than once.

# Objectives

The Guidelines aim to set out:

(a) **General guidelines** to facilitate AP/RSE/RGE in preparing statutory plans by BIM authoring software; and

(b) **Recommended good practices** for the enhancement of submission standard.

*While non-conformity with the Guidelines **will not constitute a ground for disapproval** of the plans, BA may not accept the BIM electronic files depending on the degree of non-conformity.*

# Statutory submission/approval process with BIM

According to BD PNAP **ADV-34**, in addition to the statutory requirement of plan submission in paper format, AP/RSE/RGE are **encouraged** to present their building and/or building works proposals **in digital format** compatible with BIM viewing software, or real-time simulation, to enhance illustration of the proposals and/or the construction sequence of the proposed works in a specific manner and format.

For the moment, BIM is submitted as **supplementary information** for reference, as BD will continue processing approval of plans under the BO based on the information contained in the prescribed plans.

# Administrative Requirements

1. The BIM digital files should be stored on a non-rewritable **DVD-ROM** in ISO/IEC 13346:1995 format (i.e. DVD format).

2. Each BIM file should be limited to the size of **500MB** and should contain / confine to one type of plan submission.

3. Different type of plans may be cross-linked with each other under **clear file hierarchy structure/ linkage**, as appropriate. Except otherwise agreed in writing by BA, all other electronic submission media are not acceptable.

# Administrative Requirements

4. Each BIM digital file should contain a **3D model, views, and schedules,** as well as the **preset drawing sheets**, including **plans, sections, schedules**, etc. for production of the hardcopy of prescribed plans.

5. Text file should be included in the **DVD-ROM** to describe the linked files' hierarchy structure.

BA currently accepts BIM **native digital files** created by the following BIM authoring software:

| Type of Plans | Software 1 | Software 2 |
|---|---|---|
| **Superstructure** | Revit (version 2017 or later) | Tekla (version 2019 or later) |
| **Foundation** | Revit (version 2017 or later) | Tekla (version 2019 or later) |
| **Demolition (Including Hoarding and Covered Walkway)** | Revit (version 2017 or later) | Tekla (version 2019 or later) |

# Plug-in / Script used for Program

- As BIM technology is fast developing, there may be add-ins assistant programs or in-house scripts used for enhancing automation in the BIM statutory plan submission file production.

- **Add-ins or other implanted automation** may cause the submission files not usable by BD's standard Autodesk Revit or Tekla software accepted by BD.

- It is the **responsibility of the AP/RSE/RGE** to ensure that the purposes of the BIM statutory plan submission models (as elaborated in these guidelines) are served **without relying** on add-ins or additional scripts.

- It should be clearly understood that BA **does not accept any web-based** BIM software.

**BIM Native Files for each type of BIM authoring software should be saved in their corresponding format as list below.**

| Software | File Format |
|---|---|
| Revit | '.rvt' |
| Tekla | '.db1' |

In addition to the above BIM native files, **OpenBIM format of IFC** defined by buildingSMART International directly output from BIM models is also **recommended** to be submitted.

All other lightweight, compressed or zipped file formats, such as '.dwf', 'dwfx', '.pdf(3D)' and '.u3d' **will not be accepted.**

# BIM File Formats

- The BIM statutory plan submission file(s) submitted in DVD ROM format should be **self-contained and dettached** from the originating server.

- It should be able to be opened on any standalone computer with the abovementioned software. All ‘X-Ref’ files for the BIM model such as xlsx, pdf files, etc. should be **stored in respective sub-folders** in DVD ROM and the link between all ‘X-Ref’ files and BIM main file should be **properly connected.**

# BIM Model General Requirements

All BIM models should be developed by BIM software, which fulfils the interoperability requirement of accepting data exchange through the **Industry Foundation Classes (IFC)** data format and collaboration through the **BIM Collaboration Format (BCF).**

# BIM Model Environment Requirements

All BIM models should be set up with the required environment information to define the model with common sharing information to enable a **common reference** when it is shared or linked to other models.

# Unit and measurement

All BIM elements should be modelled with linear dimensions in **millimetres (mm) and angles in degrees (°).**

# BIM origin point and orientation

The origin or base point and orientation of the BIM model should have a '**True North**' location setting taking reference to the Hong Kong 1980 Grid (HK1980 Grid) and the Hong Kong Principal Datum (HKPD).

The BIM model should also have a '**Project North**' location setting to orientate the project to project grid directions to define an orthogonal environment for ease of model authoring and presentation of plans.

# BIM Common Object Requirements

All BIM models should have the common objects built in the individual model, copied from other models or linked from other models for use. These common objects should be checked for their accuracy if they are not linked from a single source of truth.

## 5.2.1 Level

Levels should be the **floor level given in the General Building Plans (GBP).** If the Finished Floor Level (FFL) and Structural Floor Level (SFL) are provided in the GBP, levels in the **structural model** should refer to **SFL**. For the **Drainage plan submission**, levels in the MEP model should refer to **FFL.**

## 5.2.2 Grid

Grids should **be identical** to those provided in the architectural model for the **GBP**.

## 5.2.3 Site boundaries

Site boundaries should be built in accordance with **setting out coordinates** at the ends of boundary segments, with additional information for the arc in terms of length or radius given in the lease document.

# BIM Annotations Requirements

In addition to the 3D BIM objects, there are 2D annotations to present the non-graphical information, especially the parameter value embedded with the 3D objects. There are also Symbols (e.g. Symbol for the slope on plan view, level difference, etc.) that are added to enhance the description of the 2D representation only. As Symbol has no linkage to the BIM objects, the use of **Symbol shall have a lower priority than Tag**.

# BIM Annotations Requirements

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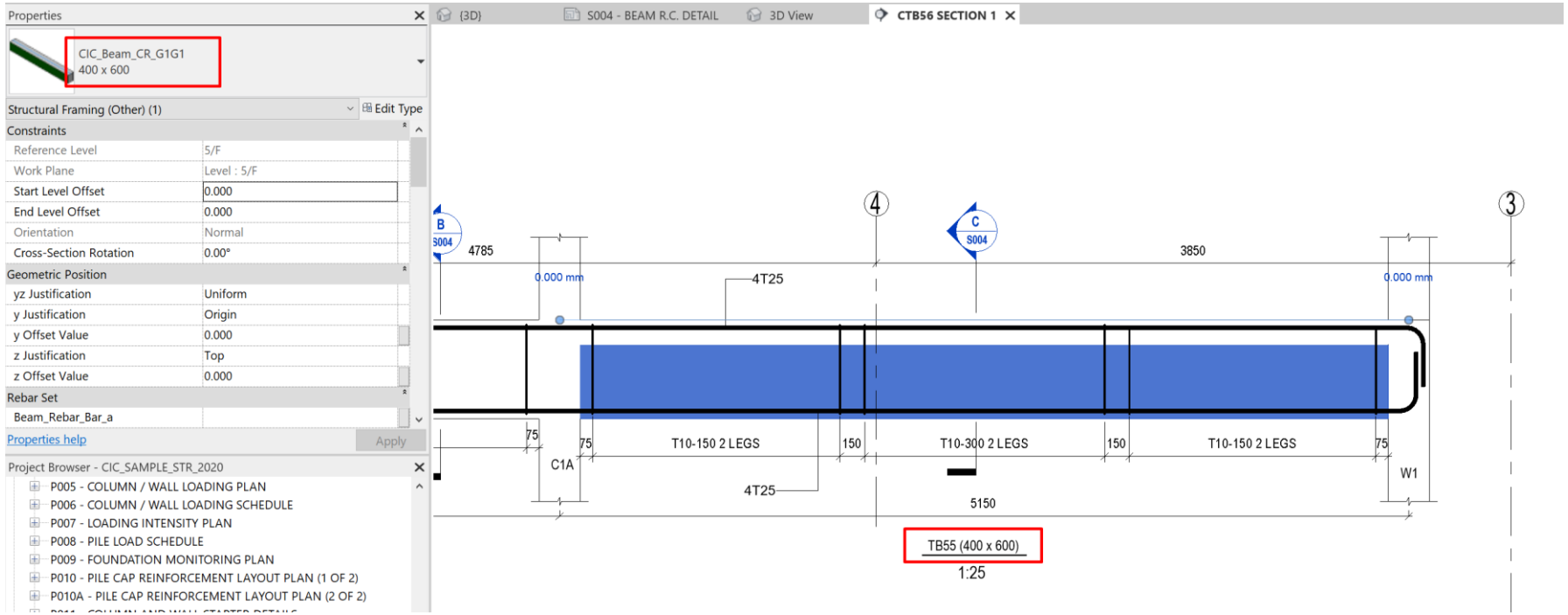
## 5.3.1 Object Tag

Object Tag is a 2D Symbol linked to BIM objects with reference to the parameter value. In the case of text showing the parameter value, the value should preferably be used more than once to cross-check its accuracy.

For example, the **beam mark** which is an Object Tag for beams showing 'Depth x Width' should use the same Depth and Width to control the size of the beam.



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# BIM Annotations Requirements

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## 5.3.2 Symbol

Symbol is a 2D annotation to enhance the description of the 2D representation. As it has no link with the BIM objects, Symbol should only be added with care.

The use of Symbol does not change the practice in using 2D CAD as it needs ‘Human Intelligence’ to **add the right symbol in the right place.**



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# BIM Annotations Requirements

### 5.3.3 Dimensions

Dimensions are intelligent 2D annotations referenced to BIM objects. The dimension value is a live update with its references and therefore should not be covered/replaced by number text to avoid any misleading presentation of the dimension value.

### 5.3.4 Notes

Notes are 2D text added to 2D views in a BIM model. These 2D views should be added to drawing sheets for the plans.

### 5.3.5 Legend

A legend should be developed to elaborate the meaning of symbols and shapes, and should be shared in drawings for consistency of reuse.

### 5.3.6 Title block

Title blocks containing a unique drawing number showing revision legends, site/project title, drawing title etc. should be inserted in every drawing for identification purposes. Information for each drawing (e.g. drawing title, drawing number, etc.) should be stored with parameters for use.

### 5.3.7 Drawing list

A drawing list should be developed from the information on the drawings. Also, the parameter values for the title block should be provided with the statutory plan submission.

## 5.3.8 2D annotation requirements

The following 2D annotations are the basic types of symbols that link with BIM objects to present the information live updated with the objects.

| Type of 2D annotation | Tag/Symbol | Remarks |
|---|---|---|
| Elevation mark | Symbol | • Symbol with reference to object faces/reference points for the live update of the displayed objects in view, view range and extent can be adjusted manually |
| Section mark | Symbol | • Symbol with reference to object faces/reference points for the live update of the displayed objects in view, view range and extent can be adjusted manually |
| Spot coordinates | Symbol | • Symbol with coordinates live updated with the location of the marker of the symbol |
| Dimensions | Symbol | • Symbol with reference to object faces/reference points for the live update of the dimension value |

# 5.4 Common Types of Plans Requirements

Among all different types of statutory plans, common items are applicable. Requirements for these common items are unique and universally applicable.

## 5.4.1 Block plan

## 5.4.2 Notes

## 5.4.3 Typical Details

## 5.4.1 Block plan

A block plan should be drawn to a scale as stipulated in PNAP ADV-33 and Building (Administration) Regulations (B(A)R). The block plan showing the map of an area surrounding the site should use the 2D CAD drawings of the government map obtained from the Hong Kong Map Service, which is managed by Survey and Mapping Office of the Lands Department.

The map should be oriented to '**True North**' with the site boundaries shown. Spot coordinates of the site boundaries should be added to show the correct location and orientation set

## 5.4.2 Notes

Notes (including all text in labels and tags) should be written with **capital letters** added in a 2D view in the BIM model to produce plans.

The text height of notes **should not be less than 2.5 mm**.

Text font should use a simple type, preferably '**Arial Narrow**'.

## 5.4.3 Typical Details

Typical details should consist of 2D drafting in the BIM model, as well as a 2D view included in sheets for the plans.

There are no specific requirements for the setting of the 2D drafting providing the details are shown as neatly and tidily as in 2D CAD.

# 6.0 Statutory Plan Specific Requirements

**Graphical Information** is the information or parameter values that define the **shape and size** of the geometry.

For example, the size of a column section is defined by the width and depth. The ‘Width’ and ‘Depth’ are graphical information in relation to the geometry

# 6.0 Statutory Plan Specific Requirements

**Non-graphical Information** are the information or parameter values with **no link/control** to the shape and size of the geometry.

Non-graphical Information covers many types of information from material specifications to physical properties, or simply the label of an object.

If the detailed shape of an object is not needed in the early stages of a project, or only at a low Level of Development (LOD) requirements, objects that are not modelled with the geometry can be described by Non-graphical Information.

For example, **rebar content** can be described by 'Rebar Content' as numerical information with the **unit in kg/m³**. It can also be described in terms of the '**Number**' and '**Diameter**' of rebars, or '**Diameter' with 'Spacing'.**

The geometry of rebar **may not be modelled.**

Requirements for each type of statutory plans are developed from '**BIM Object with graphical presentation of the geometry**'. 'Graphical Information in relation to the geometry' and 'Non-graphical Information' are explained in detail.

Detailed presentation requirements for each type of statutory plans are also illustrated in detail.

# 6.1 Superstructure Plans

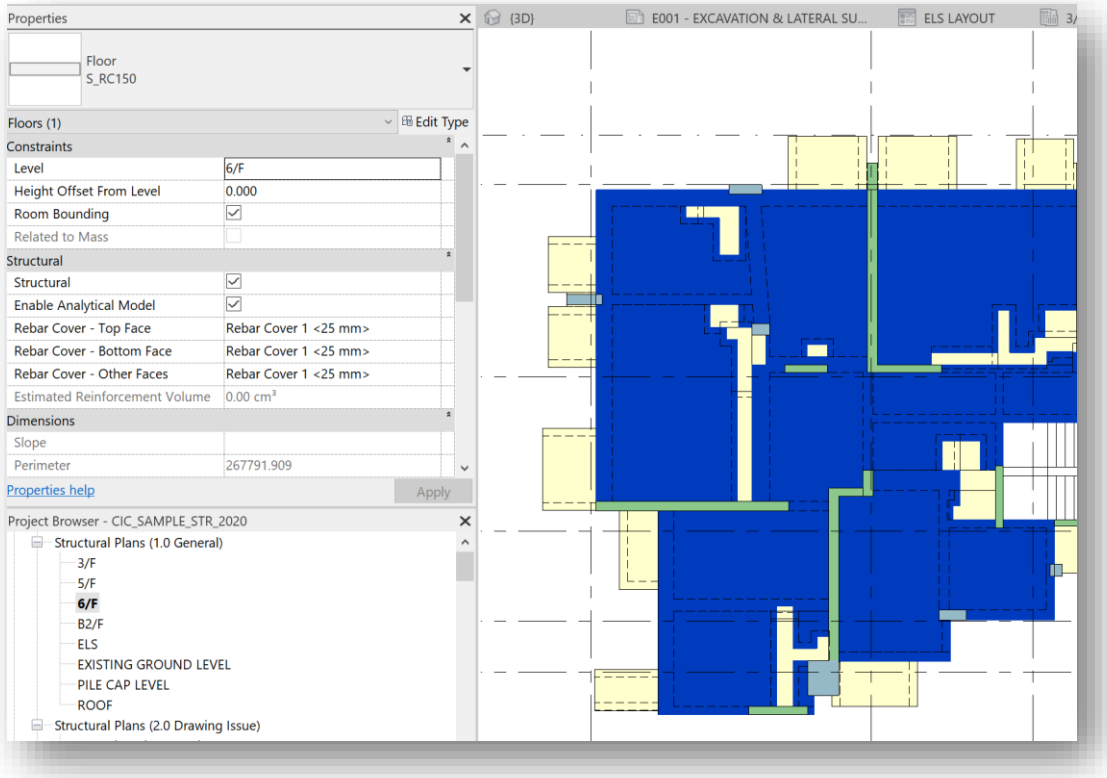
Superstructure plans present the layout arrangement and structural details of the structural system from above foundation to the roof of a building.

Essential information are also required to be added/annotated to include design codes and standards, material specifications with limiting stresses, design loads, fire resistance requirement and protection against corrosion to recognised standards, quality control standards and testing on workmanship and construction sequence of unconventional structures.

Besides, the AP/RSE/RGE should refer to other essential information to be provided/ shown on the superstructure plans as required under PNAP ADV-33.

# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Cast in situ concrete structural slab | • Intelligent Object indexed/categorised as 'Structural Floor' with a whole piece built across all spans at the same floor level (ignoring individual span)<br>• Top of slab should be modelled to Structural Floor Level<br>• Thickness of floor should only be the thickness of the cast in situ part<br>• Rebars should be modelled with sufficient details for the statutory plan submission | • Thickness<br>• Rebar size / shape / spacing / concrete cover | • Concrete grade<br>• Concrete density<br>• Rebar material grade / layer |





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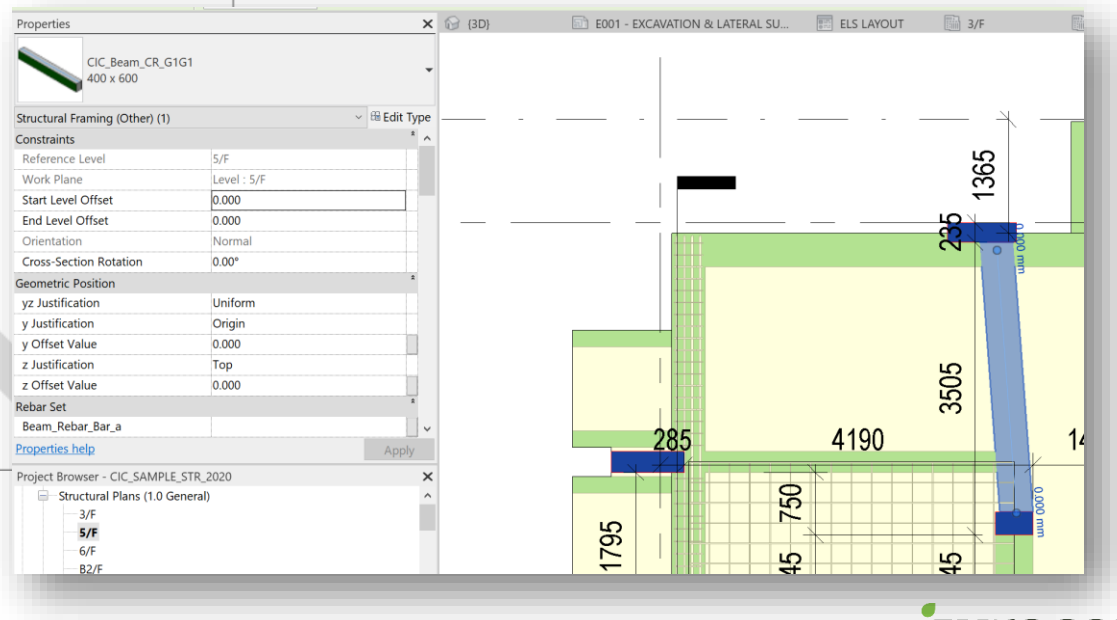
# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Precast concrete plank for structural slab | • Component Object indexed/categorised as 'Structural Floor'<br>• Top of slab shall be modelled to the top level of the precast plank<br>• Thickness of Component Object should be the thickness of the precast plank<br>• Rebars should be modelled with all required details for fabrication | • Thickness<br>• Rebar size / shape / spacing / concrete cover | • Element mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade |

# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Structural beam (concrete) | • Intelligent Object indexed/categorised as 'Structural Framing'<br>• Structural beam should be modelled to the full structural size of the width and depth<br>• Rebars should be modelled with all required details for statutory plan submission | • Width<br>• Depth<br>• Additional information should be provided to define the geometry (e.g. distance to change of depth)<br>• Rebar size / shape / spacing / concrete cover | • Element mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade |



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# 6.1.1 Data-driven BIM object requirements

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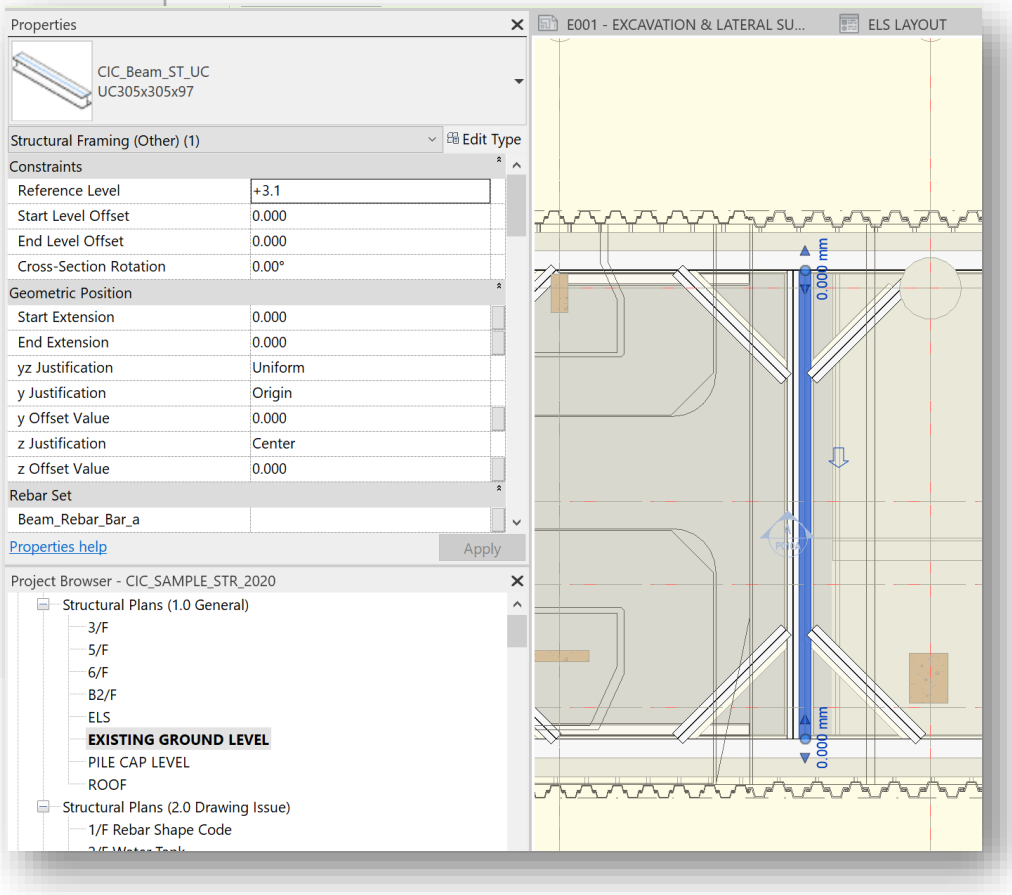
| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Structural beam (steel) | • Intelligent Object indexed/categorised as 'Structural Framing'<br>• Structural beam should be modelled to the full structural size of the width, depth and thickness of flange/web | • Width<br>• Depth<br>• Additional information should be provided to define the geometry (e.g. thickness of flange/web) | • Element mark<br>• Steel grade<br>• Steel density |



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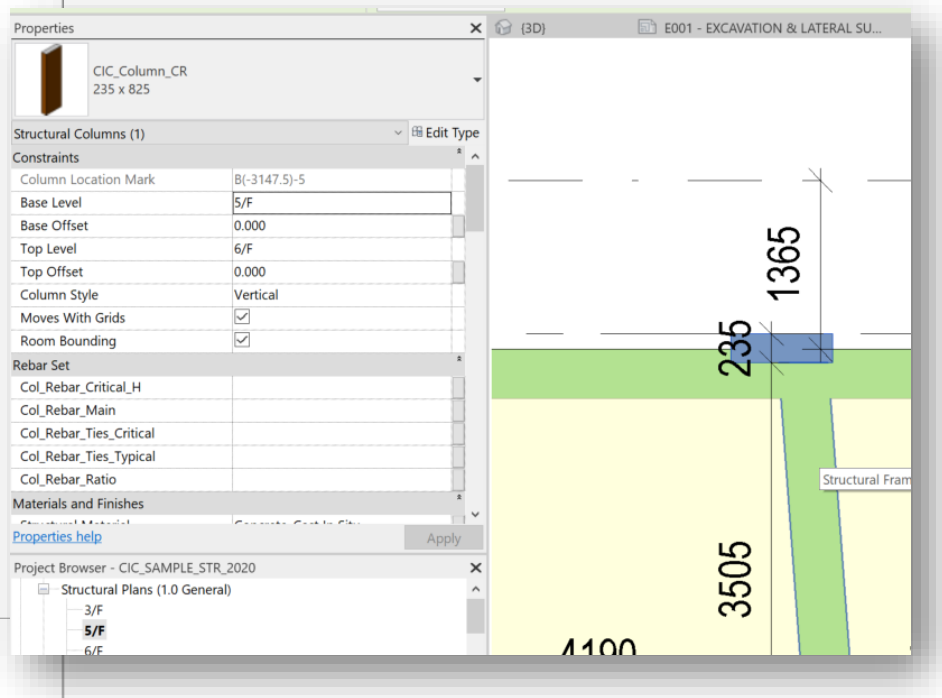
# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Structural column (concrete) | • Intelligent Object indexed/categorised as 'Structural Column'<br>• Structural column should be modelled to the full structural size of length, width and height<br>• Rebars should be modelled with all required details for statutory plan submission | • Length<br>• Width<br>• Height<br>• Rebar size / shape / spacing / concrete cover | • Element mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade / steel ratio |



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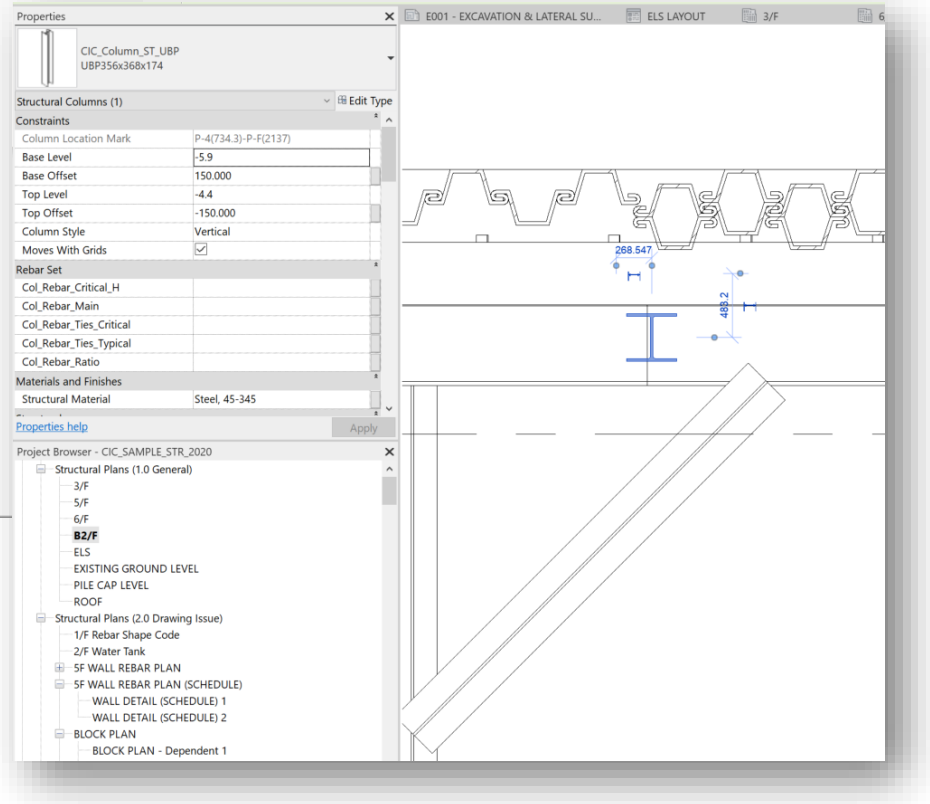
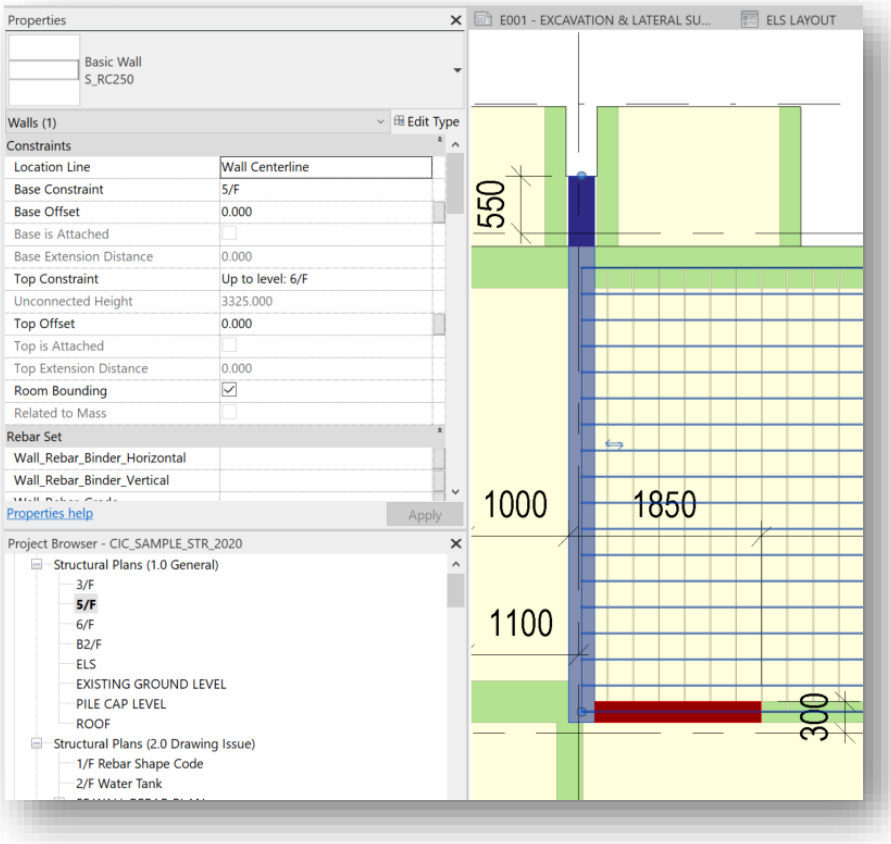
# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Structural column (steel) | • Intelligent Object indexed/categorised as 'Structural Column'<br>• Structural Column should be modelled to the full structural size of length, width, height and thickness of flange/web | • Length<br>• Width<br>• Height<br>• Thickness of flange/web | • Element mark<br>• Steel grade<br>• Steel density |



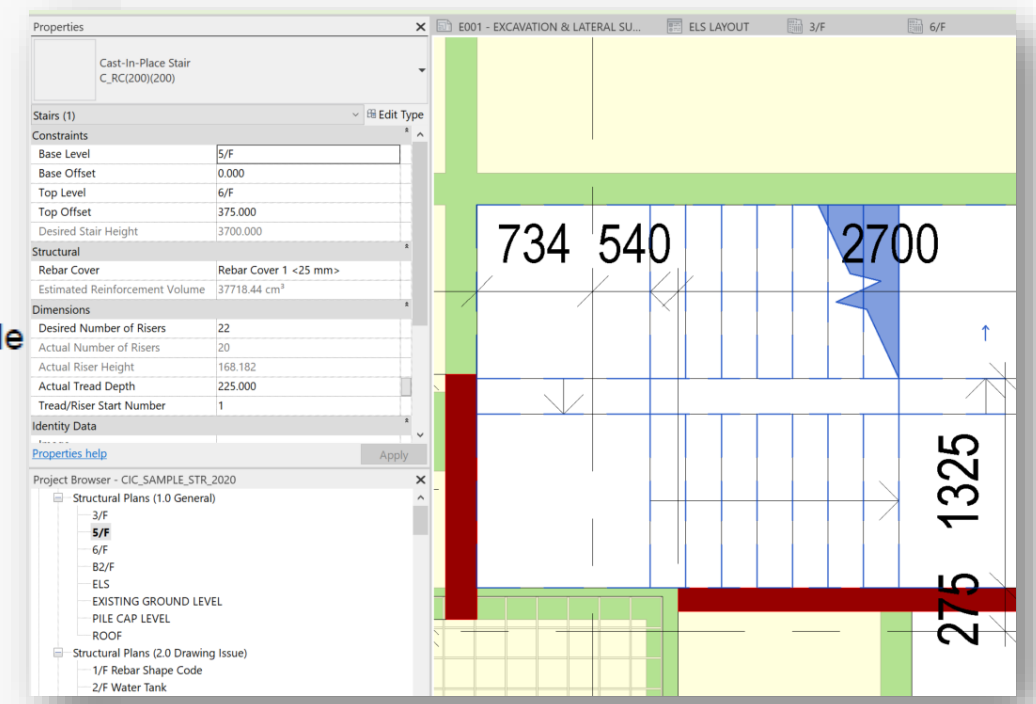
# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Structural wall (concrete) | • Intelligent Object indexed/categorised as 'Wall' with identifier for 'Structural'<br>• Structural wall should be modelled to the full structural size of length, thickness and height<br>• Rebars should be modelled with sufficient details for the statutory plan submission | • Length<br>• Thickness<br>• Height<br>• Rebar size / shape / spacing / concrete cover | • Element mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade / steel ratio |



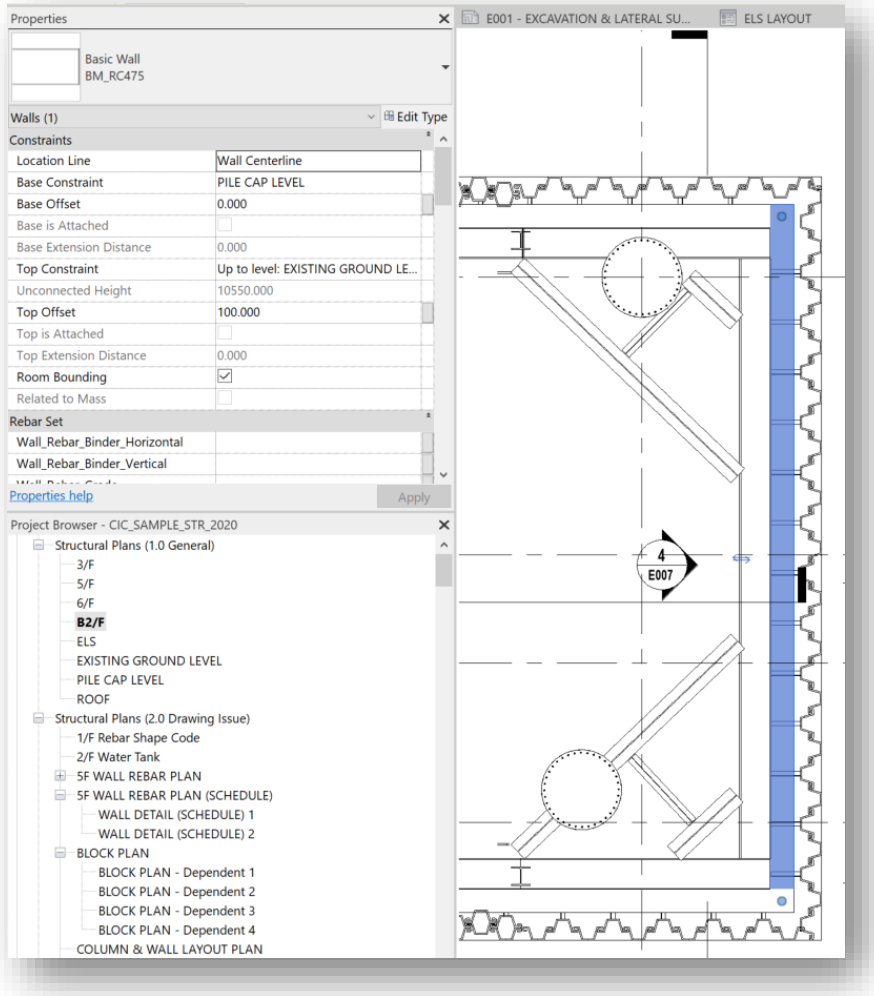
# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Stair (concrete) | • Intelligent Object indexed/categorised as 'Stair' for all landing and flight<br>• Top level of landing and flight should be modelled to the Structural Floor Level of the item<br>• Rebars should be modelled with enough details for statutory plan submission | • Thickness (landing and flight)<br>• Rebar size / shape / spacing / concrete cover | • Element mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade |



# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Basement wall | • Intelligent Object indexed/categorised as 'Wall' with identifier for 'Structural'<br>• Structural Wall should be modelled to the full structural size of length, thickness and height<br>• Rebars should be modelled with enough details for the statutory plan submission | • Length<br>• Thickness<br>• Height<br>• Rebar size / shape / spacing / concrete cover | • Element mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade / steel ratio |



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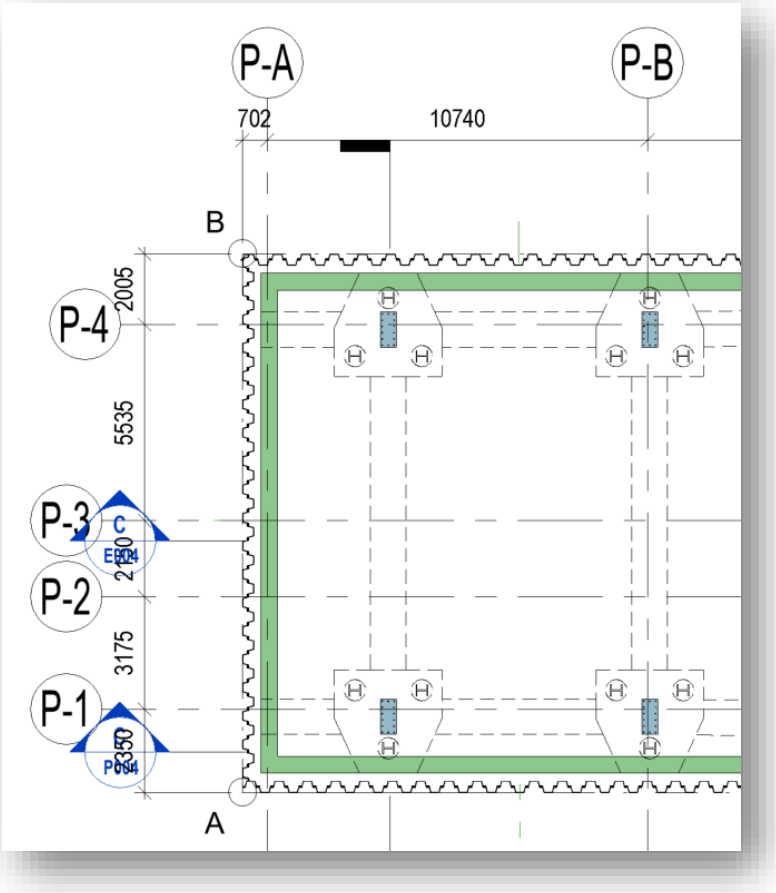
# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Pile cap* | • Intelligent Object indexed/categorised as 'Foundation'<br>• Top level of pile cap should be modelled to the top level of the pile cap<br>• Rebars should be modelled with enough details for the statutory plan submission | • Thickness<br>• Rebar size / shape / spacing / concrete cover / shear link | • Element mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade / layer |



# 6.1.1 Data-driven BIM object requirements

| | BIM Object | Graphical information | Non-graphical information |
|---|---|---|---|
| Ground profile | • Topographic surface indexed/categorised as 'Site' | • Node coordinates and elevation | • Ground material |

# 6.1.1 Data-driven BIM object requirements

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6.1.2 2D Annotation requirements

| Type of 2D Annotation | Tag/Symbol | Remarks |
|---|---|---|
| Floor (SDL & LL) Loading Layout | Hatch (Fill Region) | • 2D hatch on a view of structural plan manually define the layout and area of loading |
| Slab mark | Symbol | • Symbol with 'Mark', 'Thickness' and span direction(s) |
| Beam mark | Tag | • Tag linked with beam object using the beam 'Mark', 'Width' and 'Depth' to show BEAM MARK (WIDTH X DEPTH) |
| Column mark | Tag | • Tag linked with column object using the 'Mark' to show the 'COLUMN MARK' |
| Column schedule | Tag | • Tag linked with column rebar objects and/or non-graphical information |
| Wall mark | Tag | • Tag linked with wall object using the 'Mark' to show the 'WALL MARK' |
| Level difference | Symbol | • Symbol with manual adjustment to the direction and which side to drop |
| Coupler mark | Symbol | • Symbol to add in column schedule |





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# 6.1.3 Types of plans to be produced from BIM

Based on the above requirements, sample drawings to illustrate the preparation of for Superstructure Plans including framing plan, beam and slab reinforcement details, column and wall schedule generated by BIM software are provided in **Appendix A** for reference.

# 6.1.4 BIM Object presentation style

The presentation style defined in table below is for reference only instead of BD's requirements to follow.

| | | Projection | | Cut | |
|---|---|---|---|---|---|
| | | Line | Pattern | Line | Pattern |
| | | Style, Colour, Thickness | Style, Colour | Style, Colour Thickness | Style, Colour |
| Framing plans (1:100) | Slab | Solid, black 0.22 mm | Solid fill, RGB 255-255-206 | Solid, black 0.22 mm | None |
| | Beam | Solid black 0.15 mm | None | Solid black 0.35 mm | None |
| | Column | Solid, black 0.15 mm | None | Solid, black 0.35 mm | Solid fill, RGB 150-185-200 |
| | Wall | Solid, black 0.15 mm | None | Solid, black 0.35 mm | Solid fill, RGB 140-200-140 |
| Slab R.C. details (1:100) | Slab (half tone) | Solid, black 0.22 mm | None | Solid black 0.22 mm | None |
| | Beam (half tone) | Solid black 0.15 mm | None | Solid, black 0.35 mm | None |
| | Column (half tone) | Solid black 0.15 mm | None | Solid, black 0.35 mm | Solid fill, RGB 150-185-200 |

# 6.1.4 BIM Object presentation style

| | | Projection | | Cut | |
|---|---|---|---|---|---|
| | | Line | Pattern | Line | Pattern |
| | | Style, Colour, Thickness | Style, Colour | Style, Colour Thickness | Style, Colour |
| | Wall (half tone) | Solid, black 0.15 mm | None | Solid black 0.35 mm | Solid fill, RGB 140-200-140 |
| | Rebar | Solid black 0.35 mm | None | Solid black 0.35 mm | None |
| Beam R.C. details | Beam / Column / Slab | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Rebar | Solid black | None | Solid black | None |
| Column R.C. schedule (1:25) | Column | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Vertical rebar / Stirrup | Solid black | None | Solid black | None |
| Wall R.C. schedule (1:50) | Wall | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Vertical rebar / Stirrup | Solid black | None | Solid black | None |
| Staircase R.C. details (1:25) | Beam / Column / Slab | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Stairs | Hidden black 0.18 mm | None | Solid black 0.18 mm | None |
| | Rebar | Solid black | None | Solid black | None |

# 6.2 Foundation Plans

Foundation plans contain **layout, sections/elevations, structural details, geological condition** (including Ground Investigation Records), details showing the characteristic features of the site and environments, **column/wall loading tables**, **piling/footing schedules** and **locations** and **details of instrumentation** and **monitoring requirements.**

The AP/RSE/RGE should refer to other essential information to be provided/ shown on the foundation plans. as required under PNAP ADV-33.

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Driven steel H-pile (including raking pile) | • Intelligent Object indexed/categorised as 'Structural Foundation' with full geometry of pile section and capping plate<br>• Top of pile should be modelled to 'Cut-off Level'<br>• Bottom of pile should be modelled to 'Tentative bottom level' | • Pile section with detailed size and thickness of flange and web<br>• Cut-off level<br>• Tentative founding level<br>• Capping plate size (length/ width/depth)<br>• Raking pile inclination angle or gradient (if applicable) | • Pile mark<br>• Grade of steel |

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Socketed steel H-pile | • Intelligent Object indexed/categorised as 'Structural Foundation' with full geometry of pile section, shaft diameter of grout in soil, shaft diameter of grout in rock<br>• Top of pile should be modelled to 'Cut-off Level' | • Pile section with detailed size and thickness of flange and web<br>• Shaft diameters of grout in soil and rock<br>• Cut-off level | • Pile mark<br>• Grade of steel<br>• Material specification of grouting |
| | • Bottom of pile should be modelled to 'Tentative Bottom Level' | • Tentative founding level | |

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Large diameter bored pile | • Intelligent Object indexed/categorised as 'Structural Foundation' with full geometry of pile shaft, bellout and sleeve (if any)<br>• Top of pile should be modelled to 'Cut-off Level'<br>• Bottom of pile should be modelled to 'Tentative Bottom Level'<br>• Geometry of bellout should be generic with the bellout diameter, inclination angle and flat base<br>• Rebars should be modelled with enough details for the statutory plan submission | • Shaft diameter<br>• Bellout diameter<br>• Cut-off level<br>• Tentative founding level<br>• Bottom level of sleeve<br>• Thickness of sleeve | • Pile mark<br>• Concrete grade<br>• Concrete density<br>• Rebar material grade |

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Mini-pile | • Intelligent Object indexed/categorised as 'Structural Foundation' with full geometry of rebars and the permanent casing<br>• Spacers between rebars should be shown with details in 2D | • Number and diameter of rebar<br>• Diameter and thickness of permanent casing<br>• Cut-off level and toe level<br>• Tentative founding level | • Pile mark<br>• Grade of steel rebar and casing<br>• Material specification of grouting |

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Footing | • Intelligent Object indexed/categorised as 'Structural Foundation' with full geometry of footing and rebar details | • Dimension (including thickness)<br>• Top level<br>• Founding level | • Concrete grade<br>• Rebar material grade |
| Monitoring Instrument | • Generic Object with a symbolic shape and size should be modelled and added to location at ground or where it is intended to install it on structure | • none | • Marker mark<br>• Type |

# 6.2.2 2D Annotation requirements

| Type of 2D Annotation | Tag/Symbol | Remarks |
|---|---|---|
| Floor (SDL & LL) loading layout | Hatch (fill region) | • 2D hatch on a view of structural plan to manually define the layout and area of loading |
| Pile mark | Tag | • Tag linked with the 'Mark' of pile object |
| Borehole mark | Tag | • Tag linked with the 'Mark' of site object |
| Design Ground Water Table | Tag | • Tag linked with the 'line' according to the designated level of G.W.T. |
| (Section) Offset value of Borehole from the section cut location | Symbol | • Symbol preset with text 'OFFSET' and the value of offset dimension to be input manually. |
| (Section) Site Boundary | 2D Line | • 2D drafting |
| (Section) SPT N Value of Borehole | Tag | • Tag linked with the 'N Value' of site object |

# 6.2.2 2D Annotation requirements

| Type of 2D Annotation | Tag/Symbol | Remarks |
|---|---|---|
| (Section) Layer of Borehole | Tag | • Tag linked with the 'Layer' of site object |

# 6.2.3 Types of plans to be produced from BIM

Based on the above requirements, sample drawings to illustrate the preparation of foundation plans including piling layout plans and sections, reinforcement details, piling schedule and monitoring plans generated by BIM software are provided in Appendix A for reference.

# 6.2.4 BIM Object presentation style

The presentation style defined in table below is for reference only instead of BD's requirements to follow.

| | | Projection | | Cut | |
|---|---|---|---|---|---|
| | | Line | Pattern | Line | Pattern |
| | | Style, Colour, Thickness | Style, Colour | Style, Colour Thickness | Style, Colour |
| Piling Layout plans (1:200) | Piling | Solid, black 0.4 mm | None | Solid, black 0.4 mm | None |
| | Tie Beam / Footing / Pile Cap | Solid black 0.2 mm | None | Solid black 0.2 mm | None |
| | Column | Solid, black 0.2 mm | None | Solid, black 0.2 mm | Solid fill, RGB 150-185-200 |
| | Wall | Solid, black 0.2 mm | None | Solid, black 0.2 mm | Solid fill, RGB 140-200-140 |
| | Contours Lines | None | None | Solid, black 0.13 mm | None |
| Piling sections (1:150) | Piling | Solid black 0.4 mm | None | Solid black 0.4 mm | None |
| | Tie Beam / Footing / Pile Cap | Solid black 0.2 mm | None | Solid black 0.2 mm | None |
| | Screen Wall (half tone) | Solid, black 0.13 mm | None | Solid, black 0.2 mm | Hatch |
| | Others structural elements (half tone) | Solid, black 0.13 mm | None | Solid, black 0.2 mm | None |

# 6.2.4 BIM Object presentation style

The presentation style defined in table below is for reference only instead of BD's requirements to follow.

| | | Projection | | Cut | |
|---|---|---|---|---|---|
| | | Line | Pattern | Line | Pattern |
| | | Style, Colour, Thickness | Style, Colour | Style, Colour Thickness | Style, Colour |
| | Contours Lines | None | None | Solid, black 0.2 mm | None |
| Pile Cap Layout plans (1:200) | Tie Beam / Footing / Pile Cap | Solid black 0.6 mm | None | Solid black 0.6 mm | None |
| | Piling | Solid, black 0.06 mm | None | Solid, black 0.06 mm | None |
| | Wall | Solid, black 0.2 mm | None | Solid, black 0.2 mm | Solid fill, RGB 140-200-140 |
| | Column | Solid, black 0.2 mm | None | Solid, black 0.2 mm | Solid fill, RGB 150-185-200 |
| | Contours Lines | None | None | Solid, black 0.13 mm | None |
| Column / Wall Layout plans (1:200) | Column | Solid, black 0.2 mm | None | Solid, black 0.2 mm | Solid fill, RGB 150-185-200 |
| | Wall | Solid, black 0.2 mm | None | Solid, black 0.2 mm | Solid fill, RGB 140-200-140 |
| | Screen Wall | Solid, black 0.2 mm | None | Solid, black 0.2 mm | Hatch |
| Pile Cap R.C. Layout plans (1:100) | Pile Cap | Solid black 0.22 mm | None | Solid black 0.22 mm | None |
| | Rebar | Solid black 0.5 mm | None | Solid black 0.5 mm | None |

# 6.2.4 BIM Object presentation style

The presentation style defined in table below is for reference only instead of BD's requirements to follow.

| | | Projection | | Cut | |
|---|---|---|---|---|---|
| | | Line | Pattern | Line | Pattern |
| | | Style, Colour, Thickness | Style, Colour | Style, Colour Thickness | Style, Colour |
| | Others structural elements (half tone) | Solid black 0.22 mm | None | Solid black 0.22 mm | None |
| Column / Wall Starter Bar details (1:25) | Wall / Column | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Rebar | Solid black | None | Solid black | None |

# 6.3 Demolition Plans

**Demolition plans contain:**

1. Structural framing plans of the existing structure,
2. Method of demolition
3. Detailed demolition sequence for special structure.

**Hoarding and covered walkway plans** are not the prescribed plans. Separate submission may be required for BA's acceptance.

## 6.2.1 Data-driven BIM object requirements

The existing building to be demolished should be modelled for the structural system, demolition methodology, sequence, details about the use of mechanical plants, and precautionary works and safety measures for the public.

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Concrete structural slab | • Intelligent Object indexed/categorised as 'Structural Floor' with a whole piece of Intelligent Object for all spans at the same floor level (ignoring individual span)<br>• Top of slab should be modelled to structural floor level<br>• Thickness of floor should only be the thickness of the cast in situ part | • Thickness<br>• Rebar size / shape / spacing / concrete cover | • Cantilever structure #<br>• Rebar material grade / layer |
| Structural beam (concrete) | • Intelligent Object indexed/categorised as 'Structural Framing'<br>• Structural beam should be modelled to the full structural size of the width and depth | • Width<br>• Depth<br>• Rebar size / shape / spacing / concrete cover | • Rebar material grade |
| Structural column (concrete) | • Intelligent Object indexed/categorised as 'Structural Column' | • Length<br>• Width<br>• Height | • Rebar material grade / steel ratio |

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| | • Structural column should be modelled to the full structural size of length, width and height | • Rebar size / shape / spacing / concrete cover | |
| Structural wall (concrete) | • Intelligent Object indexed/categorised as 'Wall' with identifier for 'Structural'<br>• Structural wall should be modelled to the full structural size of length, thickness and height | • Length<br>• Thickness<br>• Rebar size / shape / spacing / concrete cover | • Rebar material grade / steel ratio |
| Stair (concrete) | • Intelligent Object indexed/categorised as 'Stair' for all landings and flights<br>• Top level of landing and flight should be modelled to the structural floor level of the item | • Thickness (landing and flight)<br>• Rebar size / shape / spacing / concrete cover | • Rebar material grade |

# 6.2.1 Data-driven BIM object requirements

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Hangers (or hanging structures) | • Intelligent Objects indexed/categorised as 'Wall' with identifier for 'Hanger'<br>• Hangers should be modelled to the full structural size of length, thickness and height | • Length<br>• Thickness<br>• Rebar size / shape / spacing / concrete cover | • Rebar material grade / steel ratio |
| Temporary supports | • Intelligent Objects indexed/categorised as 'Temporary Works' modelled in full size and configuration with the major elements (e.g. vertical members and bracings) included | • NONE | • NONE |

# 6.2.1 Data-driven BIM object requirements

Bringing ideas to life

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Scaffolding, Screen covers and Catchfan | • Intelligent Objects indexed/categorised as 'Temporary Works'<br>• Bamboo scaffolding should be modelled to the overall profile showing the location and space to be occupied. (Details of bamboo and its fixing are not necessary.) | • Width | • NONE |
| Debris chute | • Intelligent Objects indexed/categorised as 'Temporary Works'<br>• Debris chute should be modelled to the overall profile showing the location and space to be occupied. (Details of debris chute and its fixing are not necessary.) | • NONE | • NONE |



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# 6.2.1 Data-driven BIM object requirements

Bringing ideas to life

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| Hoarding, covered walkway and catchfan | • Intelligent Objects indexed/categorised as 'Site'<br>• Hoardings should be modelled to the full geometry of the footing base and the geometry of the overall profile of the hoarding structure above the footing | • Footing length<br>• Footing width<br>• Footing height | • NONE |
| Street furniture | • Intelligent Objects indexed/categorised as 'Street Furniture'<br>• The following items within the pavement area should be modelled with Intelligent Objects:<br>o Railing<br>o Traffic light<br>o Fire hydrant<br>o Lamp post/lighting mast<br>o Pillar box<br>o Tram cable mast/support<br>• Trees along the hoarding alignment should be represented by a point cloud produced by laser scanning | • NONE | • NONE |



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# 6.2.1 Data-driven BIM object requirements

Bringing ideas to life

| | BIM Object | Graphical Information | Non-graphical Information |
|---|---|---|---|
| CCTV | • Intelligent Objects indexed/categorised as "Site"<br>• The intended location, elevation and viewing direction shall be specified | • Location<br>• Elevation<br>• Viewing Direction | • NONE |



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# 6.3.2 2D Annotation requirements

Typical method of demolishing structural elements should be shown in **2D drafting only.**

| Type of 2D Annotation | Tag/Symbol | Remarks |
|---|---|---|
| Hatch above the area of a cantilever structure | Hatch | • Hatch linked with the parameter value of 'Cantilever Structure' in Slab objects |

## 6.3.3 Types of plans to be produced from BIM

- Based on the above requirements, sample drawings to illustrate the preparation of for demolition plans including **general notes, layout plans and sections, details** generated by BIM software are provided in **Appendix A** for reference.

- **Hoarding, covered walkway and catch-fan layout** and details may be under separate submission.

## 6.3.4 BIM Object Presentation Style

The presentation style defined in table below is for reference only instead of BD's requirements to follow.

| | | Projection | | Cut | |
|---|---|---|---|---|---|
| | | Line | Pattern | Line | Pattern |
| | | Style, Colour, Thickness | Style, Colour | Style, Colour Thickness | Style, Colour |
| Framing plans (1:100) | Slab | Solid, black 0.22 mm | Solid fill, RGB 255-255-206 | Solid, black 0.22 mm | None |
| | Beam | Solid black 0.15 mm | None | Solid black 0.35 mm | None |
| | Column | Solid, black 0.15 mm | None | Solid, black 0.35 mm | Solid fill, RGB 150-185-200 |
| | Wall | Solid, black 0.15 mm | None | Solid, black 0.35 mm | Solid fill, RGB 140-200-140 |
| Slab R.C. details (1:100) | Slab (half tone) | Solid, black 0.22 mm | None | Solid black 0.22 mm | None |
| | Beam (half tone) | Solid black 0.15 mm | None | Solid, black 0.35 mm | None |
| | Column (half tone) | Solid black 0.15 mm | None | Solid, black 0.35 mm | Solid fill, RGB 150-185-200 |
| | Wall (half tone) | Solid, black 0.15 mm | None | Solid black 0.35 mm | Solid fill, RGB 140-200-140 |
| | Rebar | Solid black 0.35 mm | None | Solid black 0.35 mm | None |
| Beam R.C. details | Beam / Column / Slab | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Rebar | Solid black | None | Solid black | None |

## 6.3.4 BIM Object Presentation Style

The presentation style defined in table below is for reference only instead of BD's requirements to follow.

| | | Projection | | Cut | |
|---|---|---|---|---|---|
| | | Line | Pattern | Line | Pattern |
| | | Style, Colour, Thickness | Style, Colour | Style, Colour Thickness | Style, Colour |
| Column R.C. schedule (1:25) | Column | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Vertical rebar / Stirrup | Solid black | None | Solid black | None |
| Wall R.C. schedule (1:50) | Wall | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Vertical rebar / Stirrup | Solid black | None | Solid black | None |
| Staircase R.C. details (1:25) | Beam / Column / Slab | Solid black 0.18 mm | None | Solid black 0.18 mm | None |
| | Stairs | Hidden black 0.18 mm | None | Solid black 0.18 mm | None |
| | Rebar | Solid black | None | Solid black | None |

Bringing ideas to life

# Software 1 - Revit

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# 1. Introduction to Hardware / System Requirements for Revit

Minimum: Entry-Level Configuration

Value: Balanced price and performance

Performance: Large, complex models

**Official Web Link for Version 2020**
https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/sfdcarticles/sfdcarticles/System-requirements-for-Autodesk-Revit-2020-products.html

Offical Liknk for Version 2020
https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/sfdcarticles/sfdcarticles/System-requirements-for-Autodesk-Revit-2020-products.html

# Minimum: Entry-Level Configuration

| Revit 2020<br><br>Minimum: Entry-Level Configuration | |
|---|---|
| Operating System [1] | Microsoft® Windows® 10 64-bit<br>• Windows 10 Enterprise<br>• Windows 10 Pro<br><br>Note: Microsoft® Windows® 7 SP1 64-bit, Enterprise, Ultimate, and Professional are supported but not recommended. |
| CPU Type | Single- or MultiCore Intel, Xeon, or i-Series processor or AMD equivalent with SSE2 technology. Highest affordable CPU speed rating recommended.<br><br>Revit software products use multiple cores for many tasks. |
| Memory | 8 GB RAM<br>• Sufficient for a typical editing session for a single model up to approximately 100 MB on disk. This estimate is based on internal testing and customer reports. Individual models vary in their use of computer resources and performance characteristics.<br>• Models created in previous versions of Revit software products may require more available memory for the one-time upgrade process. |
| Video Display Resolutions | Minimum:<br>1280 x 1024 with true color<br><br>Maximum:<br>UltraHigh (4k) Definition Monitor |
| Video Adapter | Basic Graphics:<br>Display adapter capable of 24-bit color<br><br>Advanced Graphics:<br>DirectX® 11 capable graphics card with Shader Model 3 |
| Disk Space | 30 GB free disk space |
| Media | Download or installation from DVD9 or USB key |
| Pointing Device | MS-Mouse or 3Dconnexion® compliant device |
| Browser | Microsoft® Internet Explorer® 10 (or higher) |
| Connectivity | Internet connection for license registration and prerequisite component download |

Offical Liknk for Version 2020
https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/sfdcarticles/sfdcarticles/System-requirements-for-Autodesk-Revit-2020-products.html

# Value: Balanced price and performance

| Revit 2020<br><br>Value: Balanced price and performance | |
|---|---|
| Operating System [1] | Microsoft® Windows® 10 64-bit<br>• Windows 10 Enterprise<br>• Windows 10 Pro |
| CPU Type | Multi-Core Intel Xeon, or i-Series processor or AMD equivalent with SSE2 technology. Highest affordable CPU speed rating recommended.<br><br>Autodesk Revit® software products use multiple cores for many tasks. |
| Memory | 16 GB RAM<br><br>• Sufficient for a typical editing session for a single model up to approximately 300 MB on disk. This estimate is based on internal testing and customer reports. Individual models vary in their use of computer resources and performance characteristics.<br>• Models created in previous versions of Revit software products may require more available memory for the one-time upgrade process. |
| Video Display Resolutions | Minimum:<br>1680 x 1050 with true color<br><br>Maximum:<br>Ultra-High (4k) Definition Monitor |
| Video Adapter | DirectX 11 capable graphics card with Shader Model 5 |
| Disk Space | 30 GB free disk space |
| Media | Download or installation from DVD9 or USB key |
| Pointing Device | MS-Mouse or 3Dconnexion compliant device |
| Browser | Microsoft Internet Explorer 10 or higher |
| Connectivity | Internet connection for license registration and prerequisite component download |

Offical Liknk for Version 2020
https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/sfdcarticles/sfdcarticles/System-requirements-for-Autodesk-Revit-2020-products.html

# Performance: Large, complex models

| Revit 2020<br><br>Performance: Large, complex models | |
|---|---|
| Operating System [1] | Microsoft® Windows® 10 64-bit<br>• Windows 10 Enterprise<br>• Windows 10 Pro |
| CPU Type | Multi-Core Intel Xeon, or i-Series processor or AMD equivalent with SSE2 technology. Highest affordable CPU speed rating recommended.<br><br>Autodesk Revit software products use multiple cores for many tasks. |
| Memory | 32 GB RAM<br>• Sufficient for a typical editing session for a single model up to approximately 700 MB on disk. This estimate is based on internal testing and customer reports. Individual models vary in their use of computer resources and performance characteristics.<br>• Models created in previous versions of Revit software products may require more available memory for the one-time upgrade process. |
| Video Display Resolutions | Minimum:<br>1920 x 1200 with true color<br><br>Maximum:<br>Ultra-High (4k) Definition Monitor |
| Video Adapter | DirectX 11 capable graphics card with Shader Model 5 |
| Disk Space | • 30 GB free disk space<br>• 10,000+ RPM HardDrive (for Point Cloud interactions) or Solid State Drive |
| Media | Download or installation from DVD9 or USB key |
| Pointing Device | MS-Mouse or 3Dconnexion compliant device |
| Browser | Microsoft Internet Explorer 10 or higher |
| Connectivity | Internet connection for license registration and prerequisite component download |

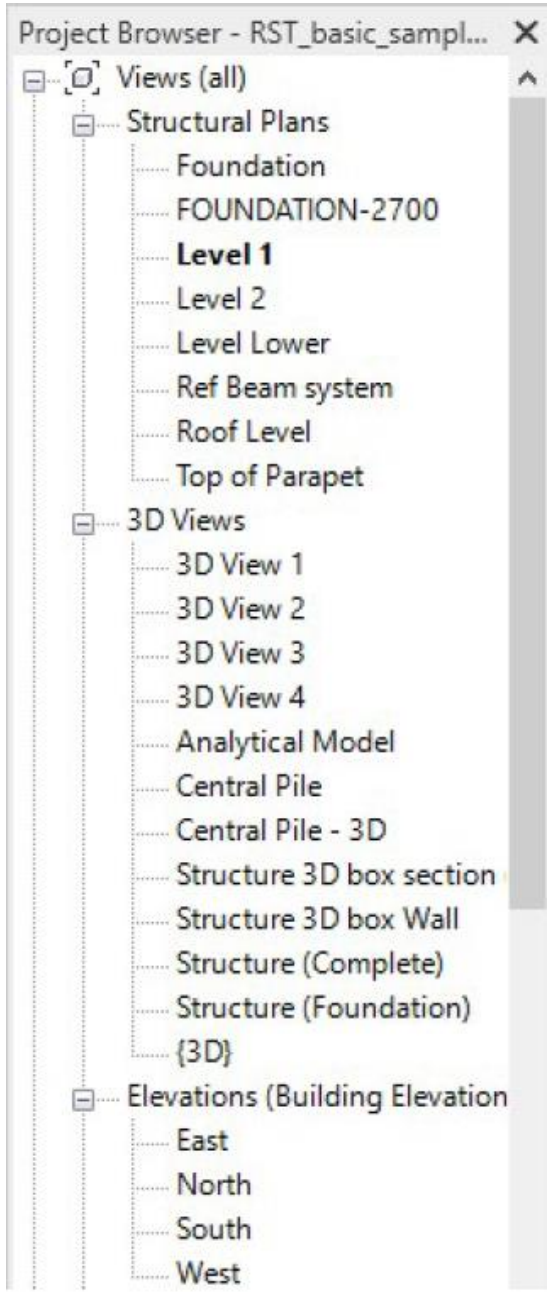
# Cloud Worksharing

| Cloud Worksharing | | | |
|---|---|---|---|
| Disk Space | Three times (3X) the total disk space consumed by equivalent RVT files for all cloud workshared projects accessed by the user. | | |
| | 4+ cores<br>2.6 GHz+ | 6+ cores<br>2.6 GHz+ | 6+ cores<br>3.0 GHz+ |
| | Minimum | Value | Performance |
| Connectivity | Internet connection able to deliver symmetrical 5 Mbps connection for each machine on burst transfers. | Internet connection able to deliver symmetrical 10 Mbps connection for each machine on burst transfers. | Internet connection able to deliver symmetrical 25 Mbps connection for each machine on burst transfers. |

# 2. Getting Start with Revit Basics

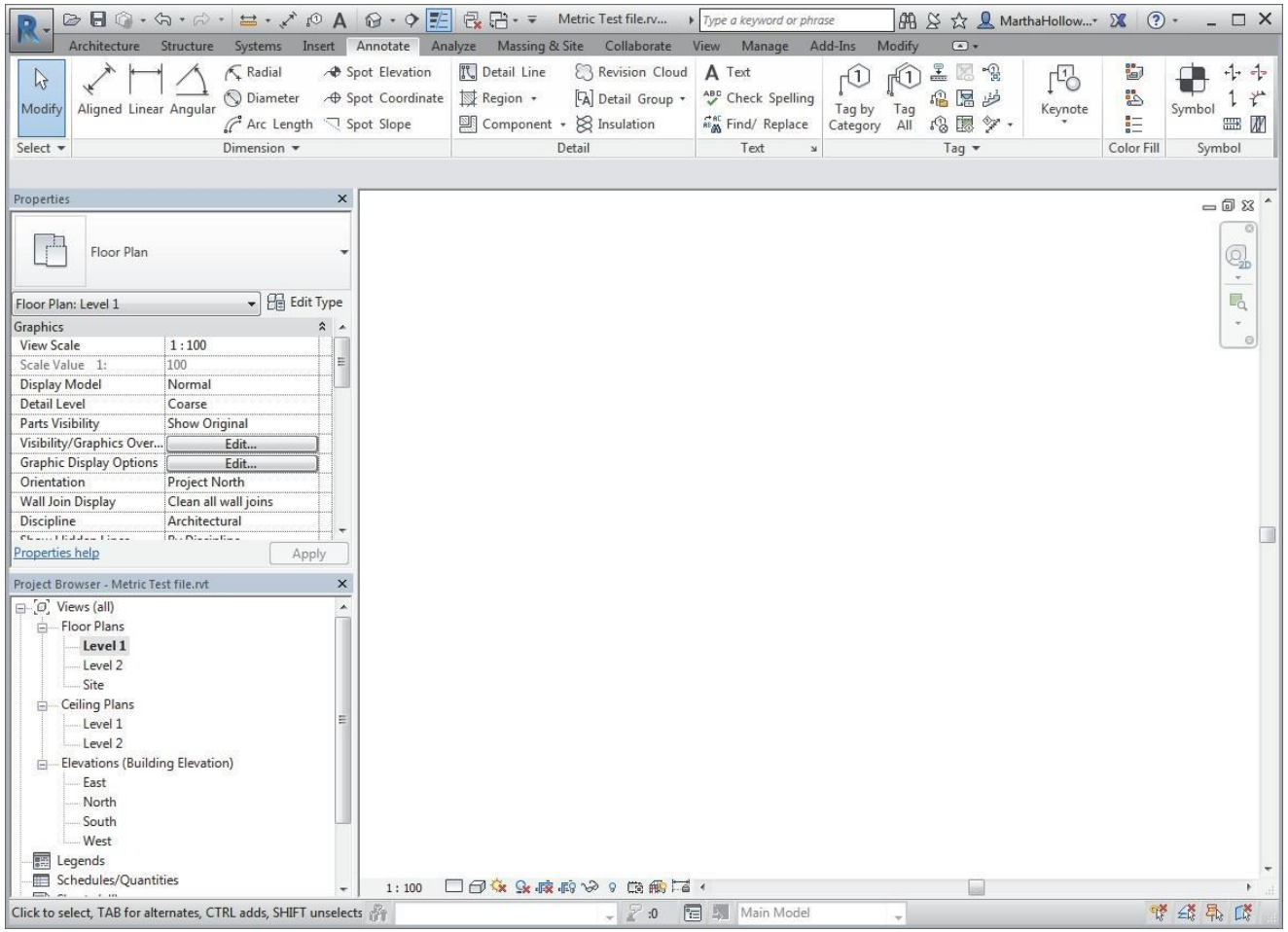
## User Interface

- Open a project or family or create either one from a template to get started. The user interface provides the tools need to work in a model. The user interface can customize the interface to support the way for different works.
- Project Browser: organize the views, schedules, and sheets of the current project.



# Overview of the Interface

The Autodesk Revit interface is designed for intuitive and efficient access to commands and views. It includes the ribbon, Quick Access Toolbar, Application Menu, Navigation Bar, and Status Bar, which are common to most of the Autodesk software. It also includes tools that are specific to the Autodesk Revit software, including the **Properties Palette, Project Browser, and View Control Bar.**

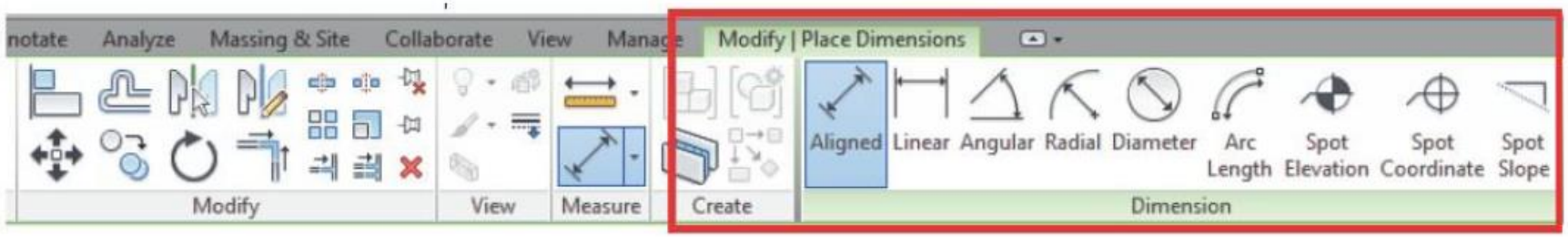


# Overview of the Interface

The Autodesk Revit interface is designed for intuitive and efficient access to commands and views. It includes the ribbon, Quick Access Toolbar, Application Menu, Navigation Bar, and Status Bar, which are common to most of the Autodesk software. It also includes tools that are specific to the Autodesk Revit software, including the **Properties Palette, Project Browser, and View Control Bar.**

Ribbon: select the tools need to design the building model.


Contextual Ribbon



# Starting a Project

Use project templates as a starting point for new projects. Use the default templates, or define custom templates to enforce office standards.

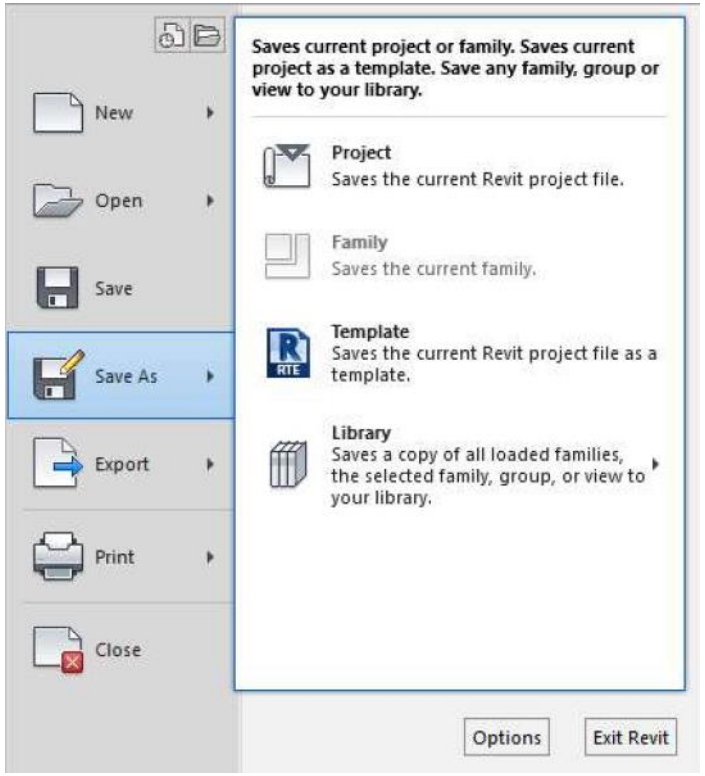
A project template provides a starting point for a new project, including view templates, loaded families, defined settings (such as units, fill patterns, line styles, line weights, view scales, and more), and geometry, if desired.

## RVT, RTE, RFA files

**.RVT** – Revit Native Format

**.RTE**- Revit Template Files

**.RFA** – Revit Family



# Types of Family (system families, loadable families, in place family)

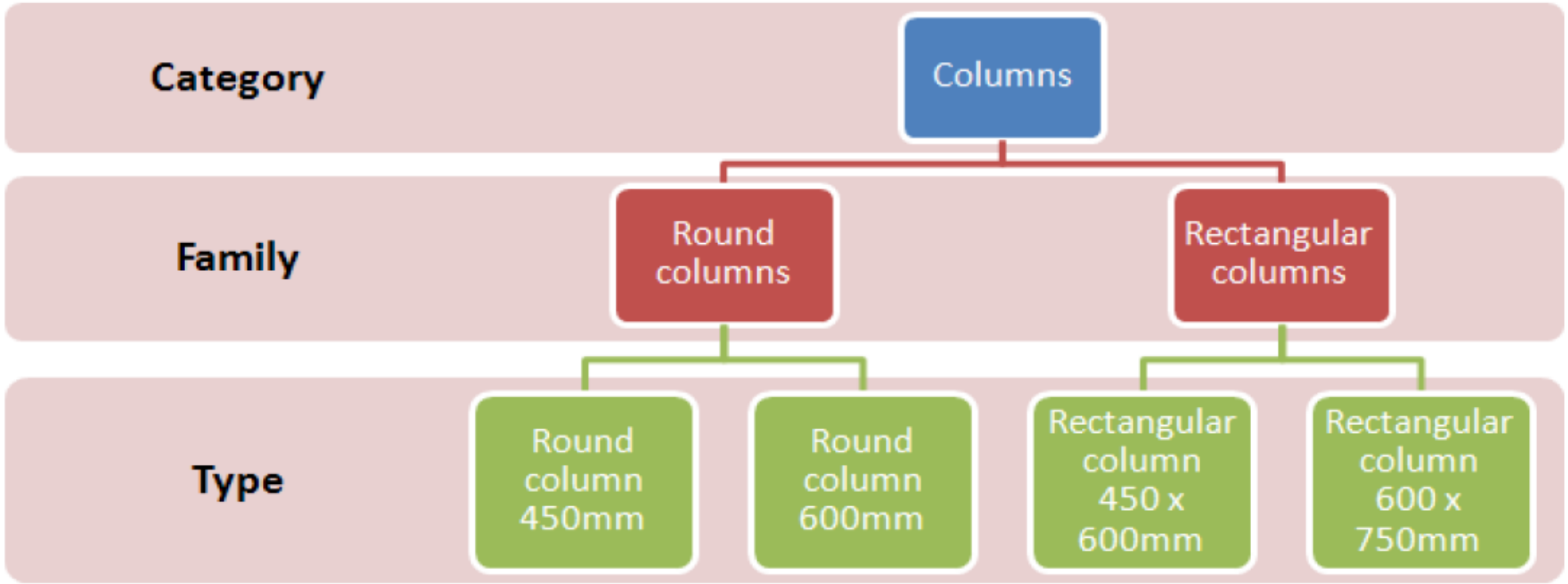
A group of elements with common parameters and graphical representation called family.
There are three types of families in model, including system families, loadable families and in place family.

**System Families**
System families are basic elements to assembly on a construction site. It can be predefined in model, for example: wall, ceiling, beam and duct.

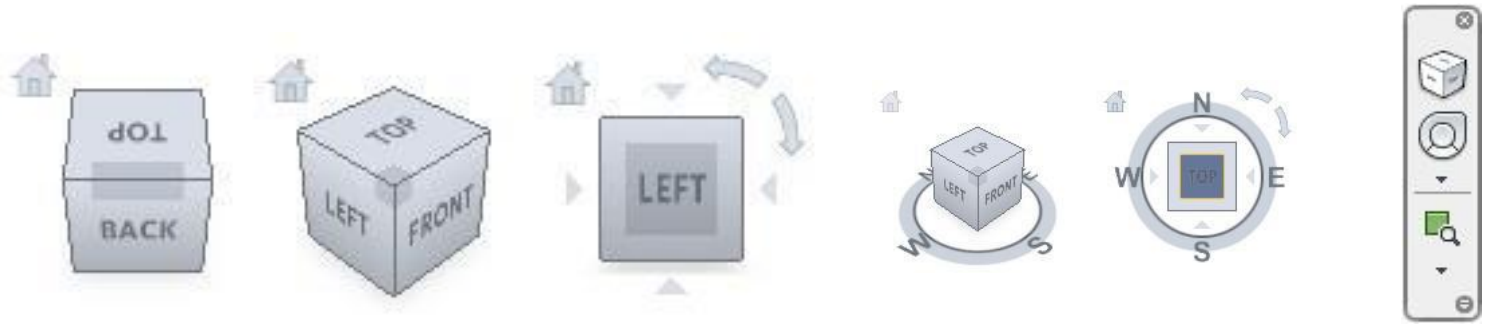
**Loadable Families**
Loadable families are families used to create non-standard or customized components which can be purchased, delivered, and installed of building, such as windows, furniture, pump and chiller. It includes customization of annotation element, such as symbols and title blocks.

**In-Place Families**
In-place elements are unique elements for specific project. It can be created in-place geometry or referred other project geometry to resize the shape

# Family Hierarchy – Category, Family, Type, Instant



# Basic Operations




• **ViewCube.** Indicates the current orientation of a model and is used to reorient the current view of a model.

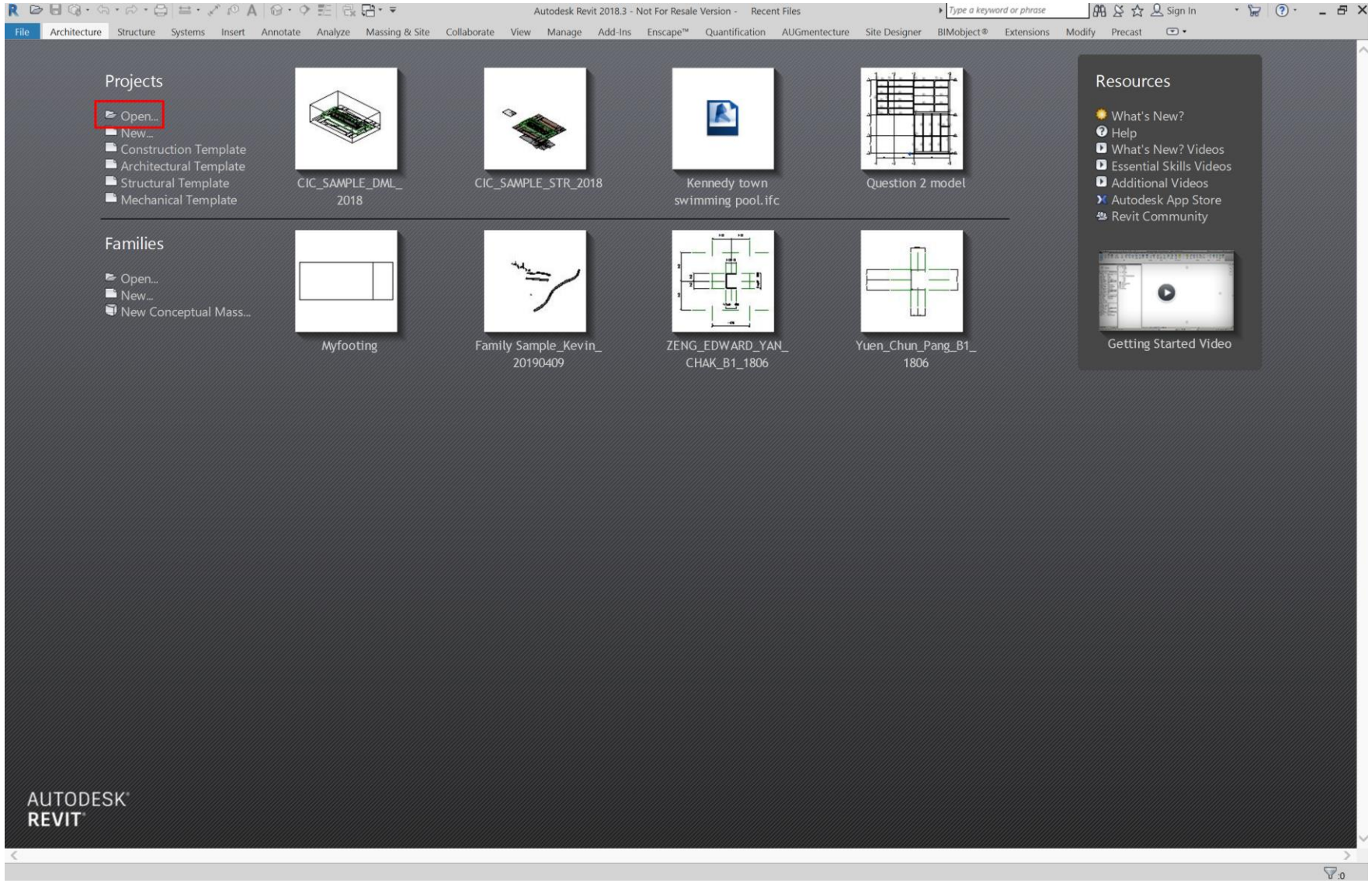
• **SteeringWheels.** Collection of wheels that offer rapid switching between specialized navigation tools.

• **Pan Active View.** Allows you to reposition the active view on a sheet by dragging the cursor to pan the view. This option is only available from an activated view on a sheet view. For more information, see Modify a View on a Sheet.

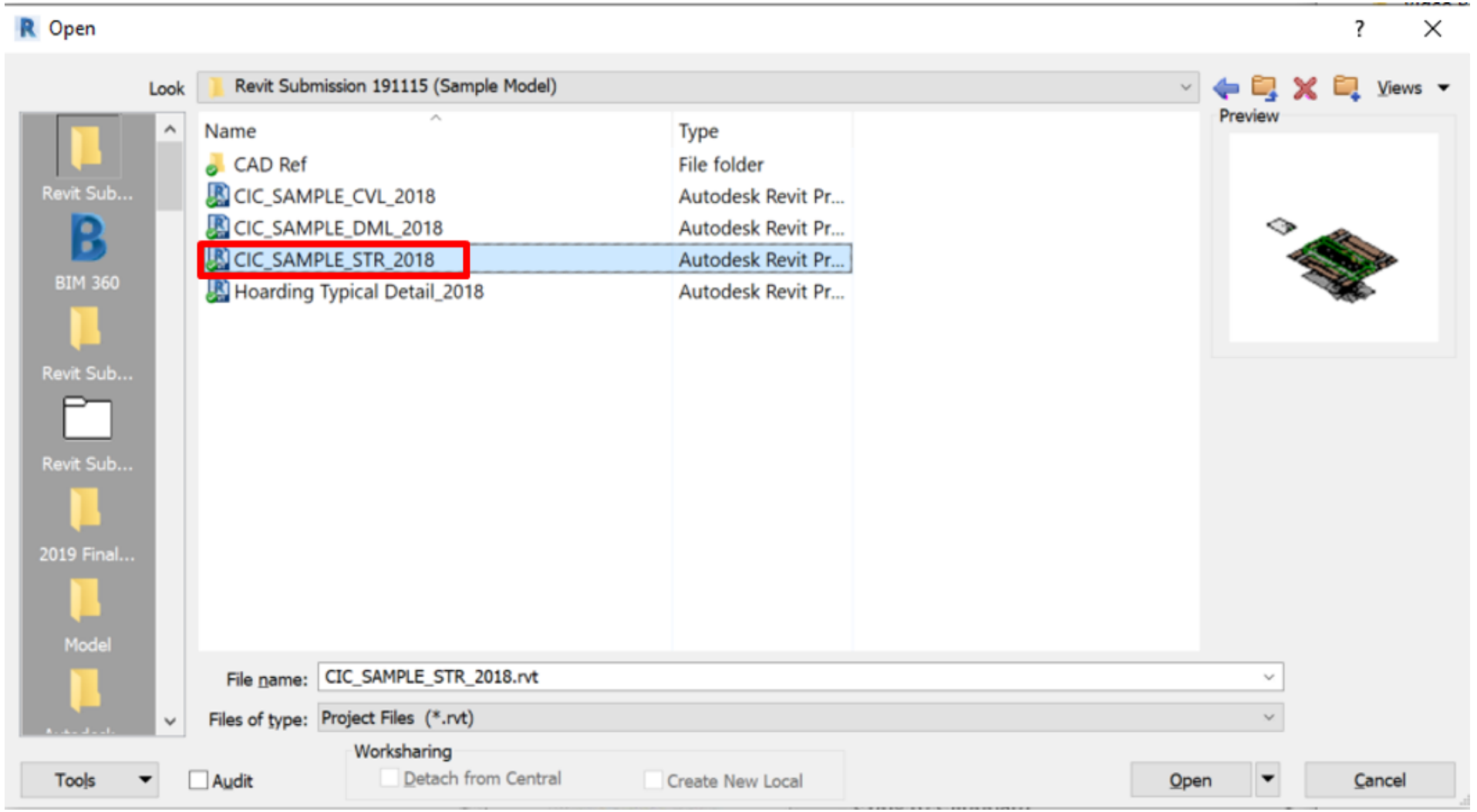
• **Zoom**. Set of navigation tools for increasing or decreasing the magnification of the current view of a model.

• **3D Mouse.** Reorient and navigate a model's view using a 3Dconnexion 3D mouse. This option is only available if a 3Dconnexion 3D mouse is installed.

# Open a Project

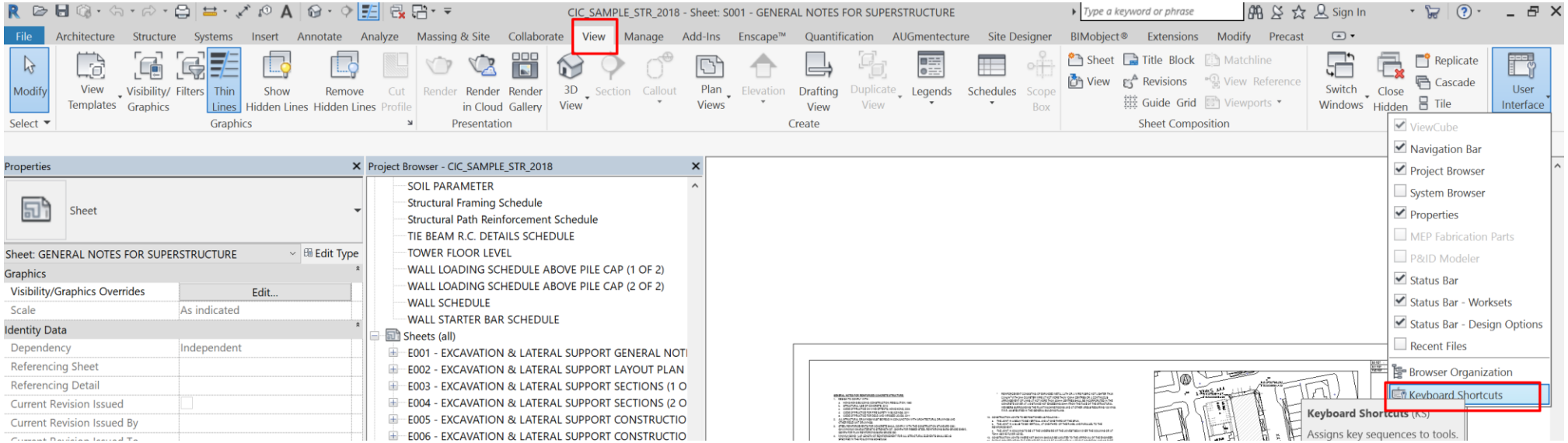


# Open a Project



# Shortcuts

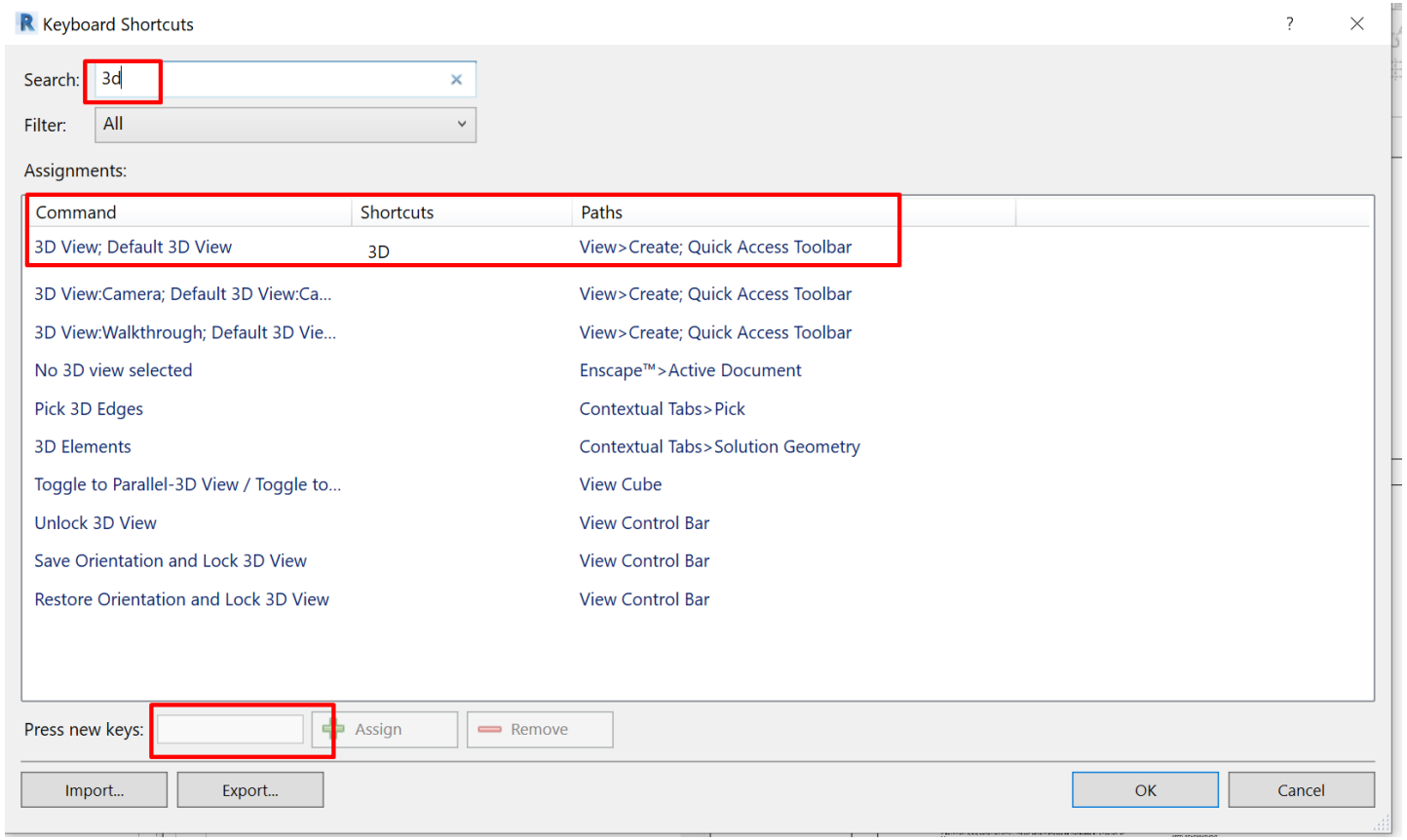
**WT = Windows Tile**
**ZA = Zoom All**
**ZZ = Zoom Area**
**Alt + Tab = Switch Windows**
**VV = View Settings**



# Shortcuts

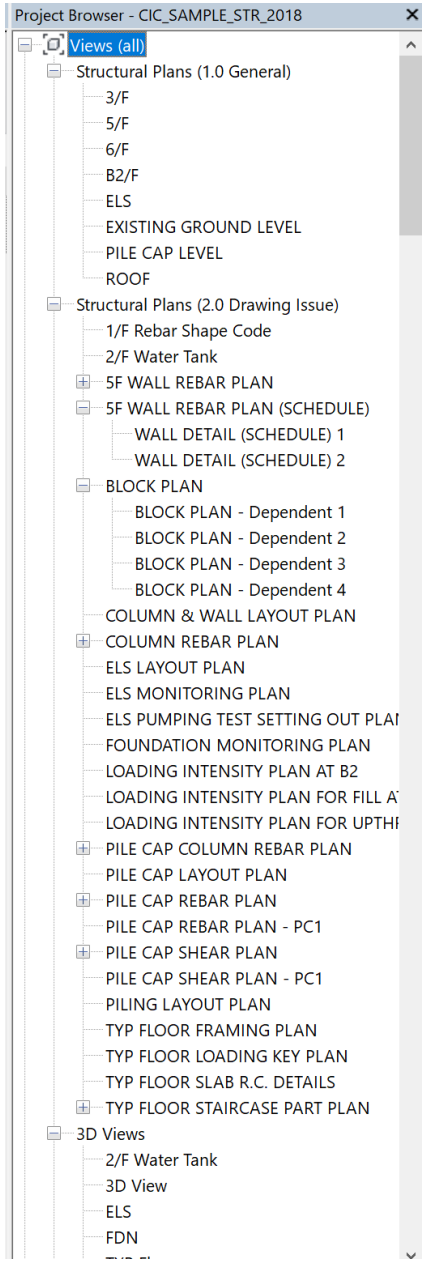
**Customize Keyboard shortcuts**
**3D = 3D Default Views**

**Import / Export to xml files.**

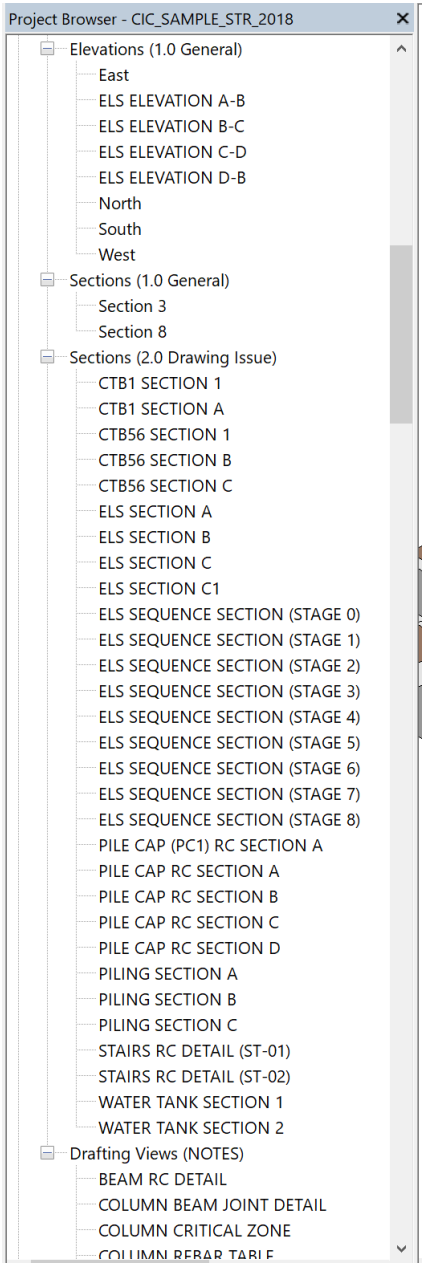


# Project Browser

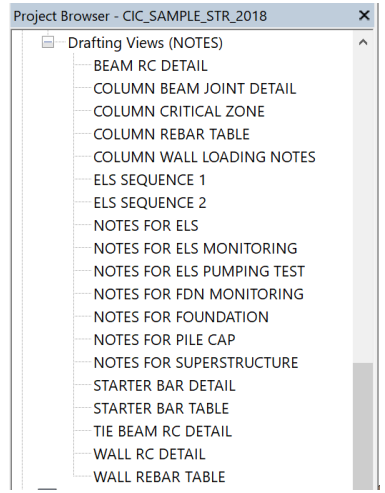
## Views




## Views

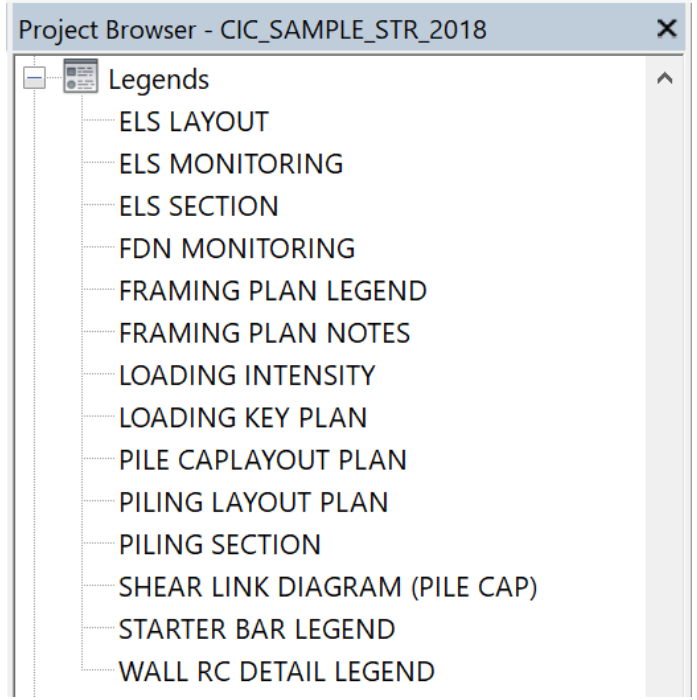



## Views

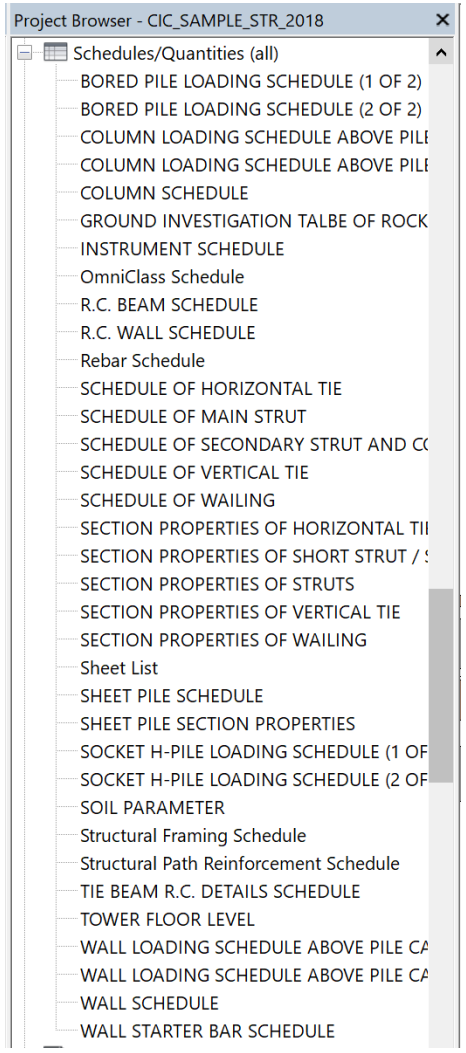


# Project Browser

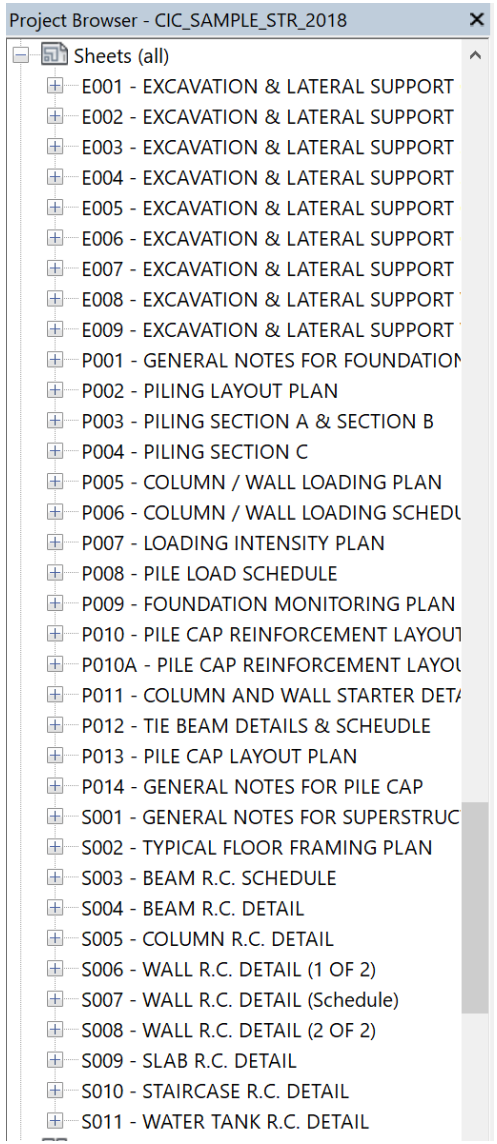
## Legend




## Schedule

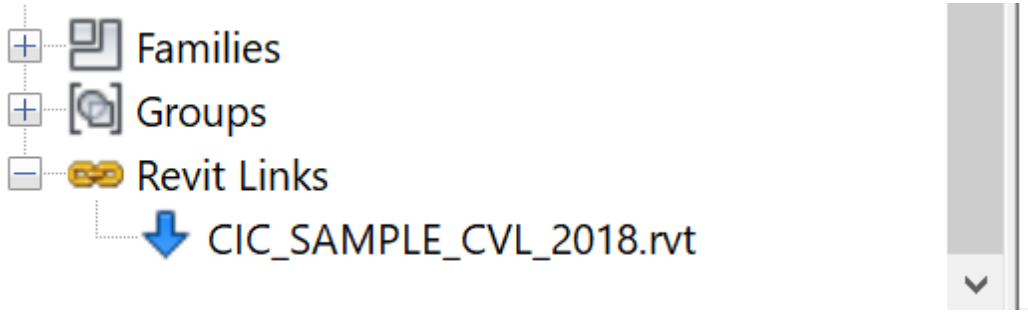



## Sheets (Drawings)

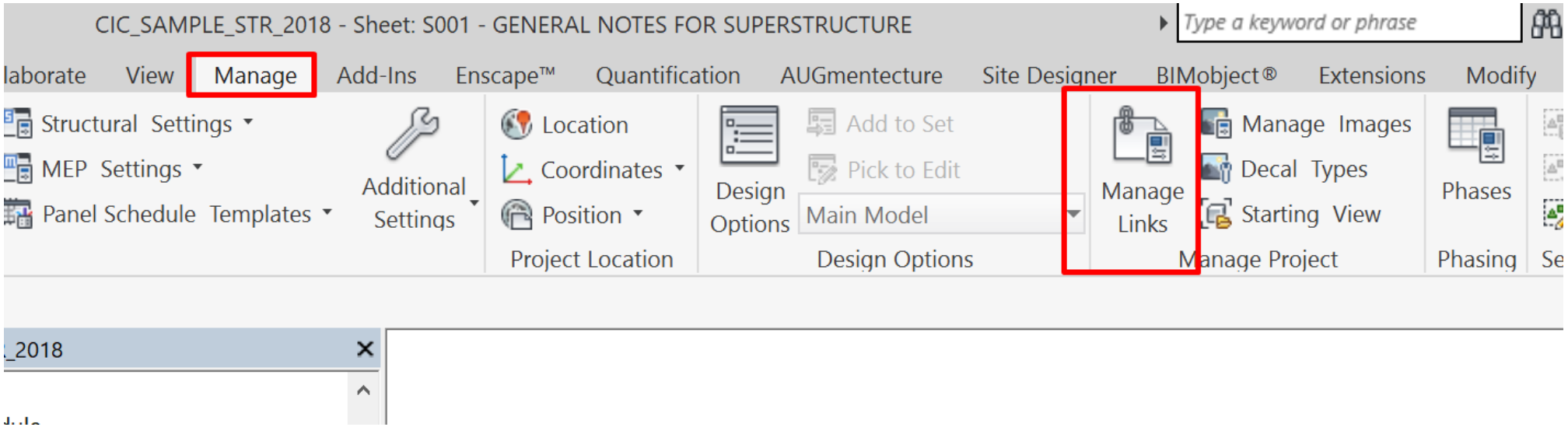


## Project Browser

## Revit Links




## Manage Links files

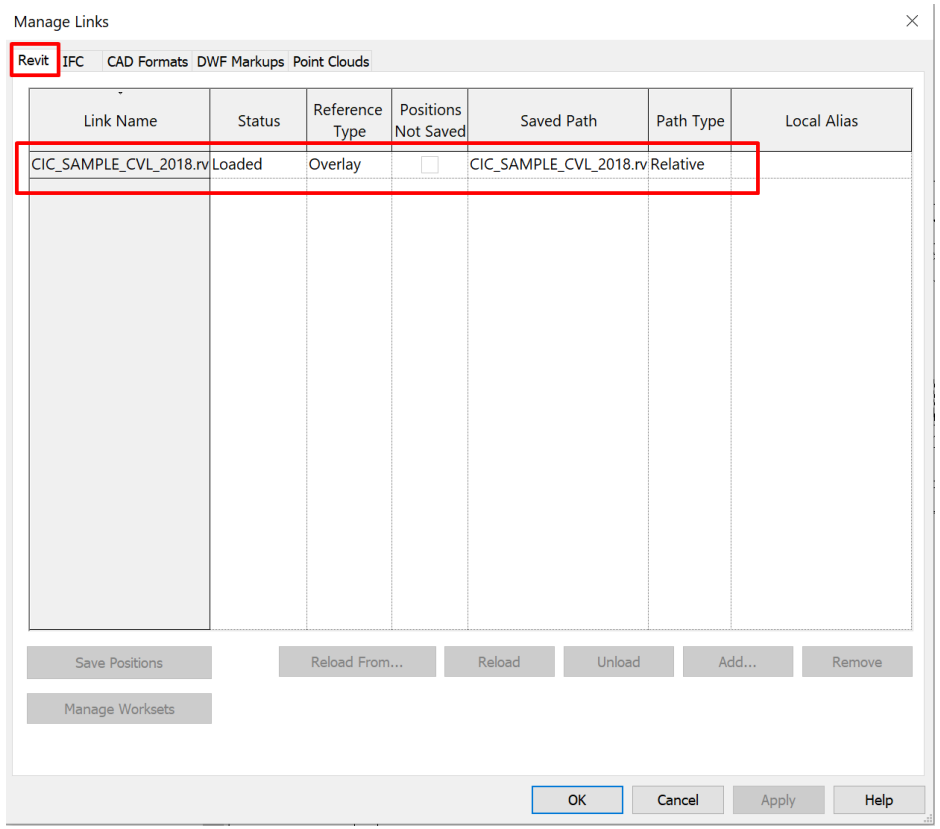


# Linked Files (3D Revit Models)

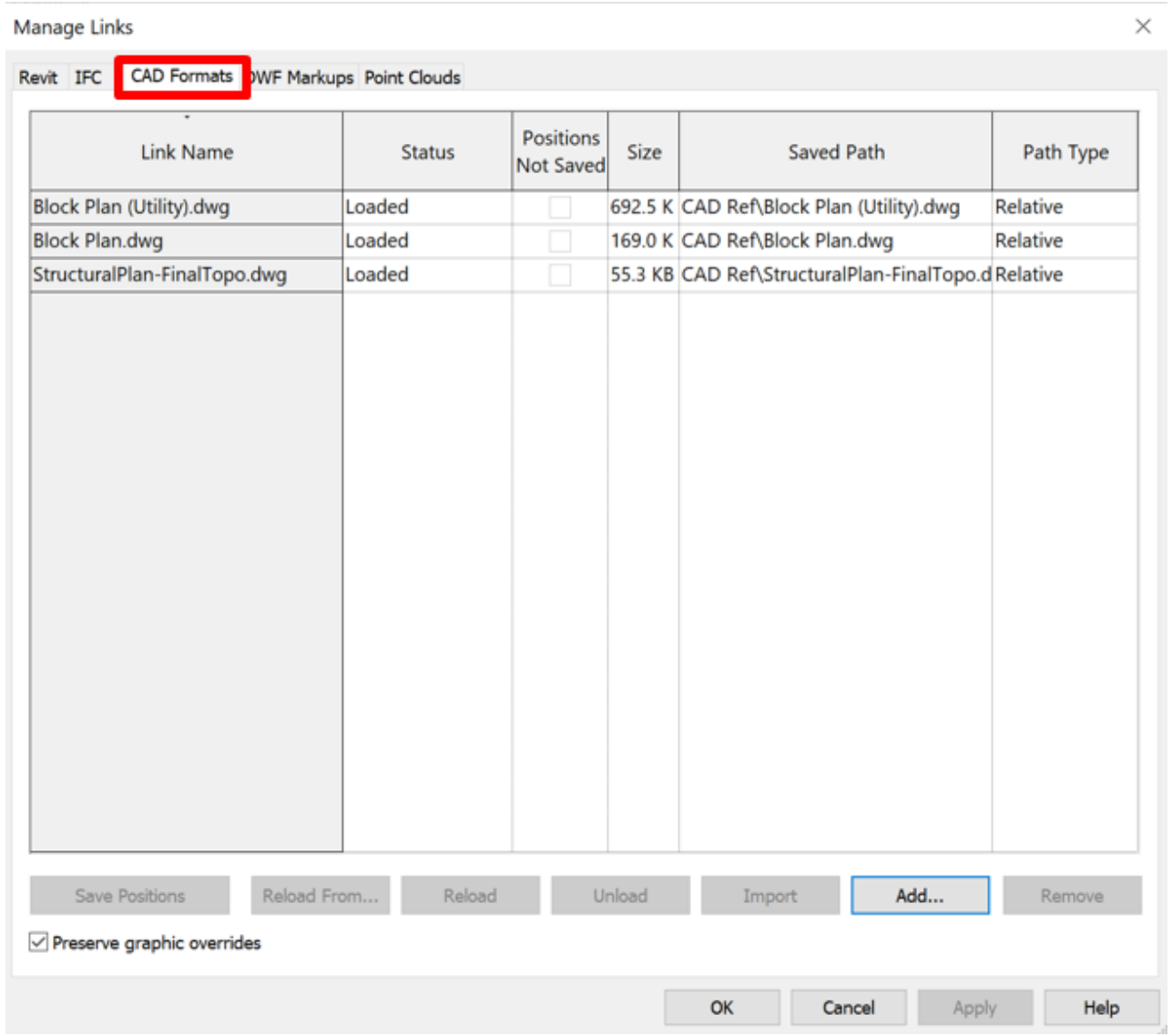
## 2.6 Suggested Model Nesting Method

When you import a model that contains a linked model, links become nested. Nested linked, models can be shown or hided in the host model. The nested links display according to Reference Type setting in the host model.

**1. Overlay - unload nested models into the host model, do not display in project**
**2. Attachment - load nested linked models in the host model, displays in project**

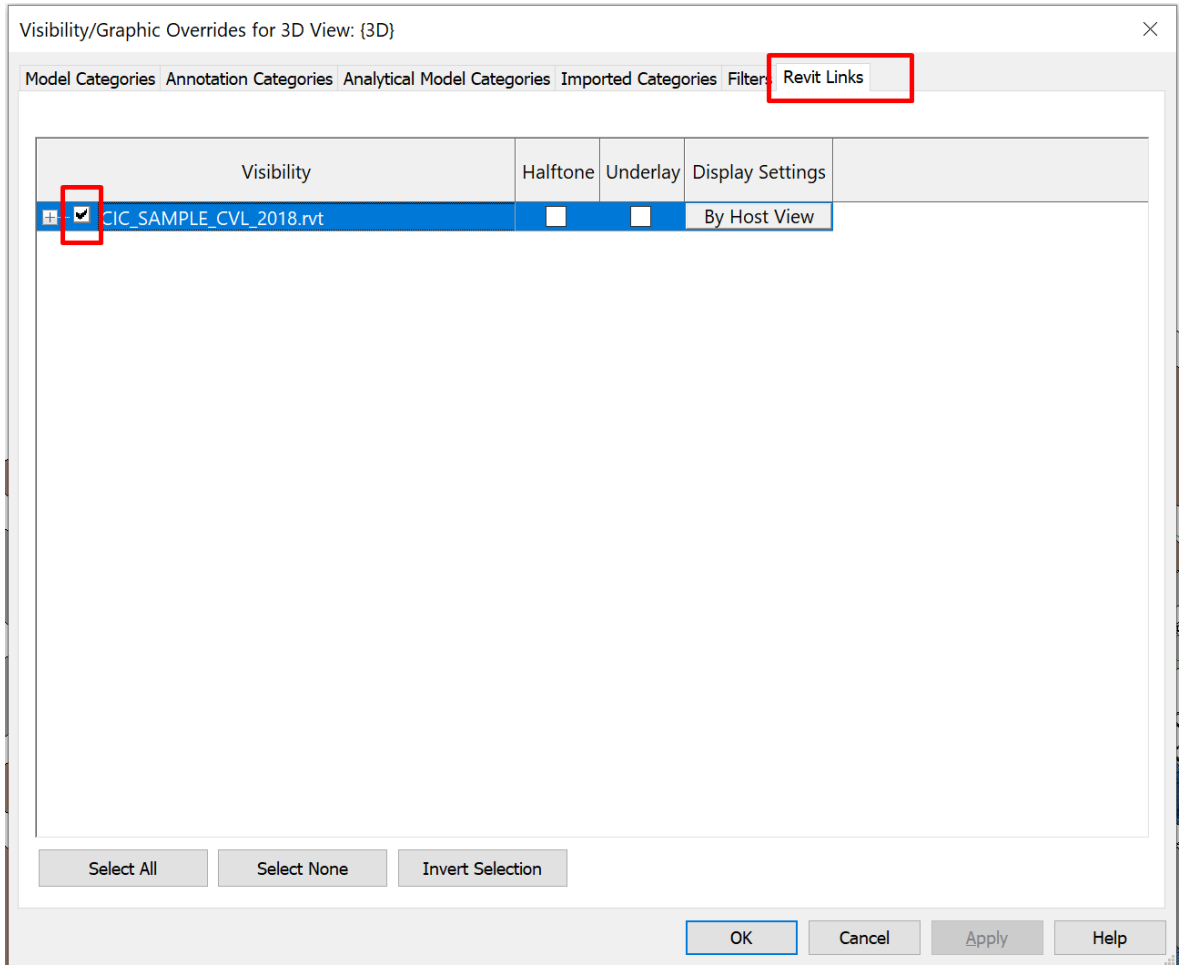


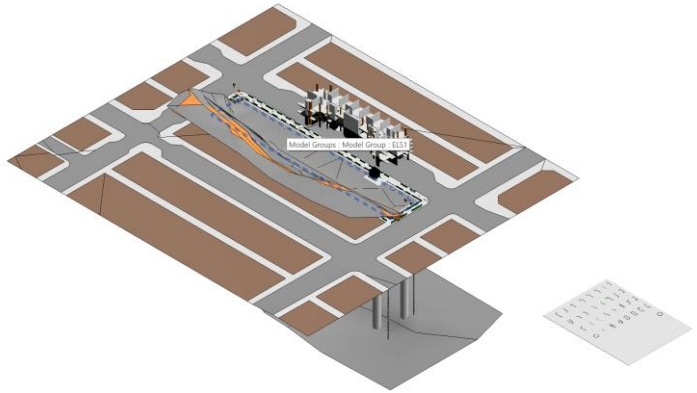
# Linked Files (2D CAD drawings)

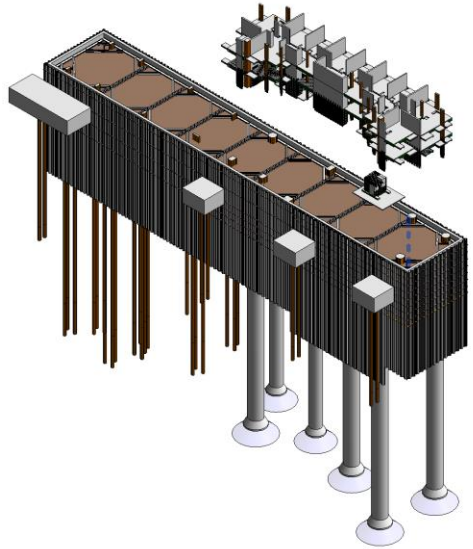


## View Settings

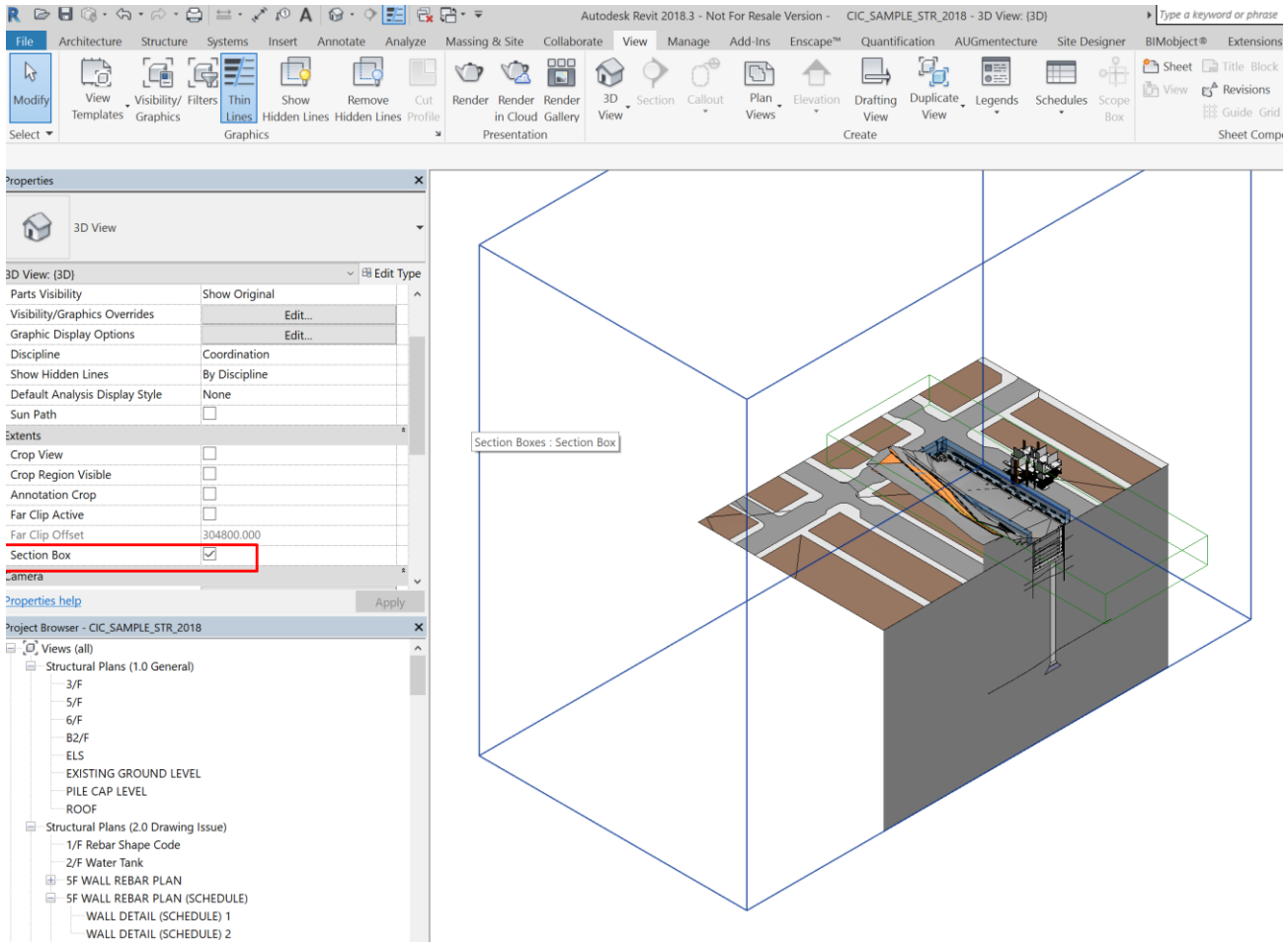
# Press VV, un-tick the Linked file

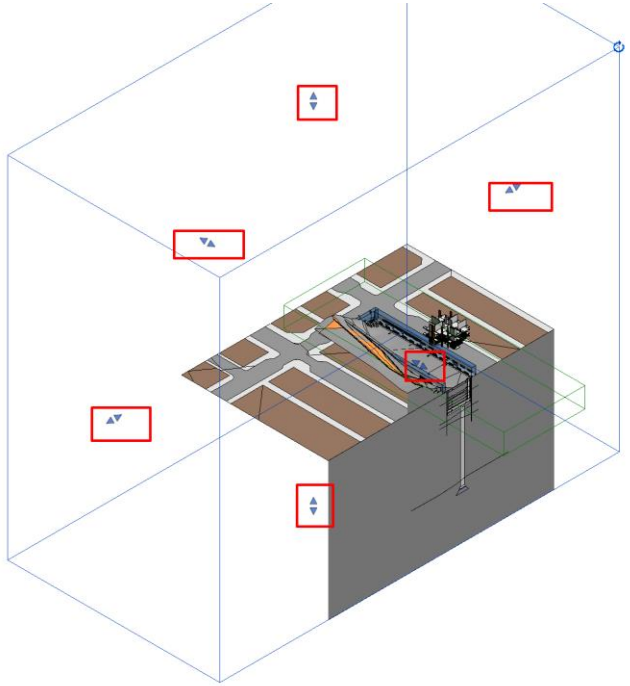


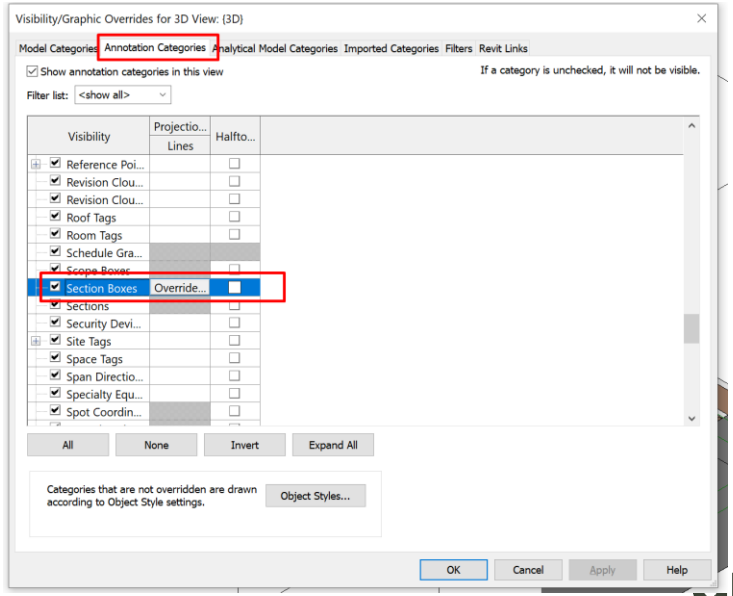





# Section Box


Autodesk Revit 2018.3 - Not For Resale Version - CIC_SAMPLE_STR_2018 - 3D View: {3D}
Properties
3D View
Parts Visibility
Show Original
Visibility/Graphics Overrides
Graphic Display Options
Discipline
Coordination
Show Hidden Lines
By Discipline
Default Analysis Display Style
None
Sun Path
Crop View
Crop Region Visible
Annotation Crop
Far Clip Active
Far Clip Offset
304800.000
Section Box
Project Browser - CIC_SAMPLE_STR_2018
Views (all)
Structural Plans (1.0 General)
3/F
5/F
6/F
B2/F
ELS
EXISTING GROUND LEVEL
PILE CAP LEVEL
ROOF
Structural Plans (2.0 Drawing Issue)
1/F Rebar Shape Code
2/F Water Tank
5F WALL REBAR PLAN
5F WALL REBAR PLAN (SCHEDULE)
WALL DETAIL (SCHEDULE) 1
WALL DETAIL (SCHEDULE) 2
Section Boxes : Section Box




Visibility/Graphic Overrides for 3D View: {3D}
Model Categories
Annotation Categories
Analytical Model Categories
Imported Categories
Filters
Revit Links
Show annotation categories in this view
If a category is unchecked, it will not be visible.
Filter list: <show all>
Visibility
Projection Lines
Halftone
Reference Poi...
Revision Clou...
Revision Clou...
Roof Tags
Room Tags
Schedule Gra...
Section Boxes
Override...
Sections
Security Devi...
Site Tags
Space Tags
Span Directio...
Specialty Equ...
Spot Coordin...
All
None
Invert
Expand All
Categories that are not overridden are drawn according to Object Style settings.
Object Styles...
OK
Cancel
Apply
Help

Bringing ideas to life

# Software 2 - Tekla

aurecon

# 1. Introduction to Hardware / System Requirements for Tekla Structures

# Recommended hardware

The following table presents two different hardware configurations. The recommendation is mainly for desktop computers, but the same guidelines can also be applied when purchasing laptops.

| | Recommendation | Best performance |
|---|---|---|
| **Operating system** | Windows 10 (64-bit) | Windows 10 (64 bit) |
| **Memory** | 16+ GB | 32+ GB |
| **Hard disk** | 240-480 GB, SSD | 1 TB, SSD |
| **Processor** | Intel® Core™ i5 CPU 2+ GHz | Intel® Core™ i7 CPU 3+ GHz |
| **Graphics card** | Two monitor support<br>e.g. NVIDIA GeForce RTX 2060/2070 | Two monitor support<br>e.g. NVIDIA GeForce RTX 2080/2080 Ti or newer |
| **Monitor(s)** | Two 24”/27” 1920x1200 each | 30” 2560x1600 or two 27” 2560x1440 |
| **Mouse** | 3-button wheel mouse, optical | 3-button wheel mouse, cordless &<br>optical + 3Dconnexion SpacePilot |
| **Backup equipment** | External hard drive | External hard drive with scheduled<br>backups |
| **Network adapter (multi-user funct.)** | 100 Mbit/s | 1 Gbit/s full-duplex |

**Memory**

Memory requirements depend on the size of the model. Large models require more memory.

An average set-up for lighter projects is a 64-bit operating system with 16 GB of RAM.

If you are working with heavier projects, you should consider having a computer with more RAM. It is not unusual to have 32 GB or even more RAM when working with large models.

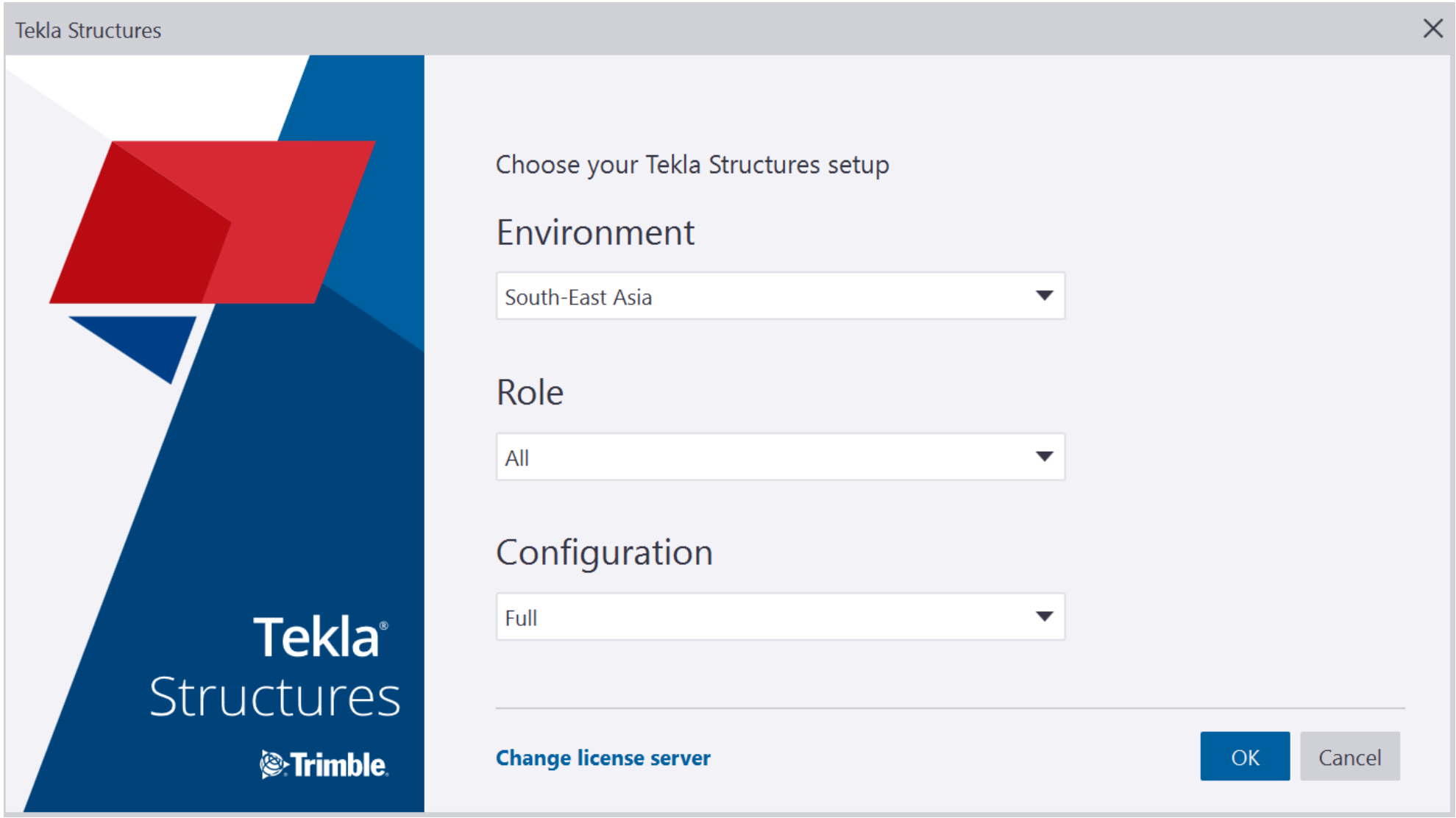
Note that the supported amount of RAM varies within different 64-bit Windows editions. Also note that especially with laptops the physical limit of supported RAM modules may be low.

Memory problems are usually difficult to trace. Do not buy the cheapest kind of memory, but consider some quality brand.

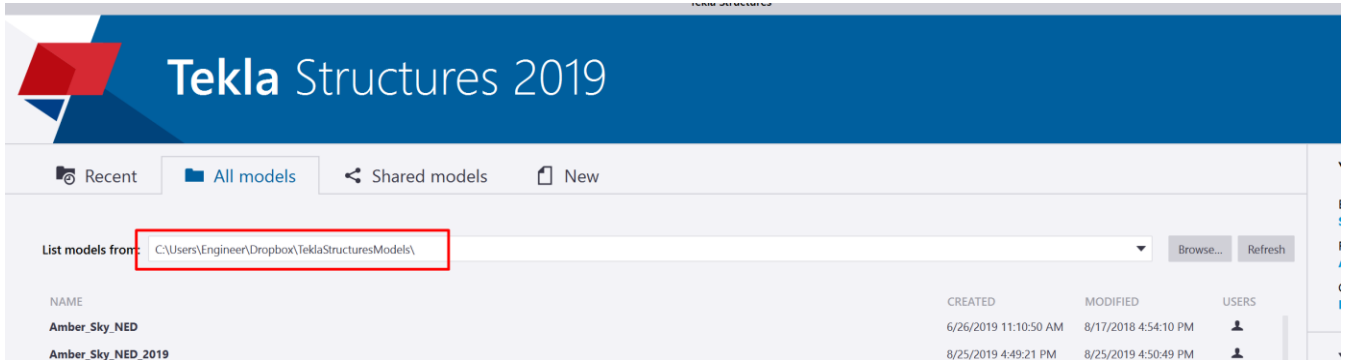
Processor "The faster, the better" is the rule that applies with processors. Note that Tekla Structures does not support Itanium processors.

# 2. Getting Start with TEKLA Basics

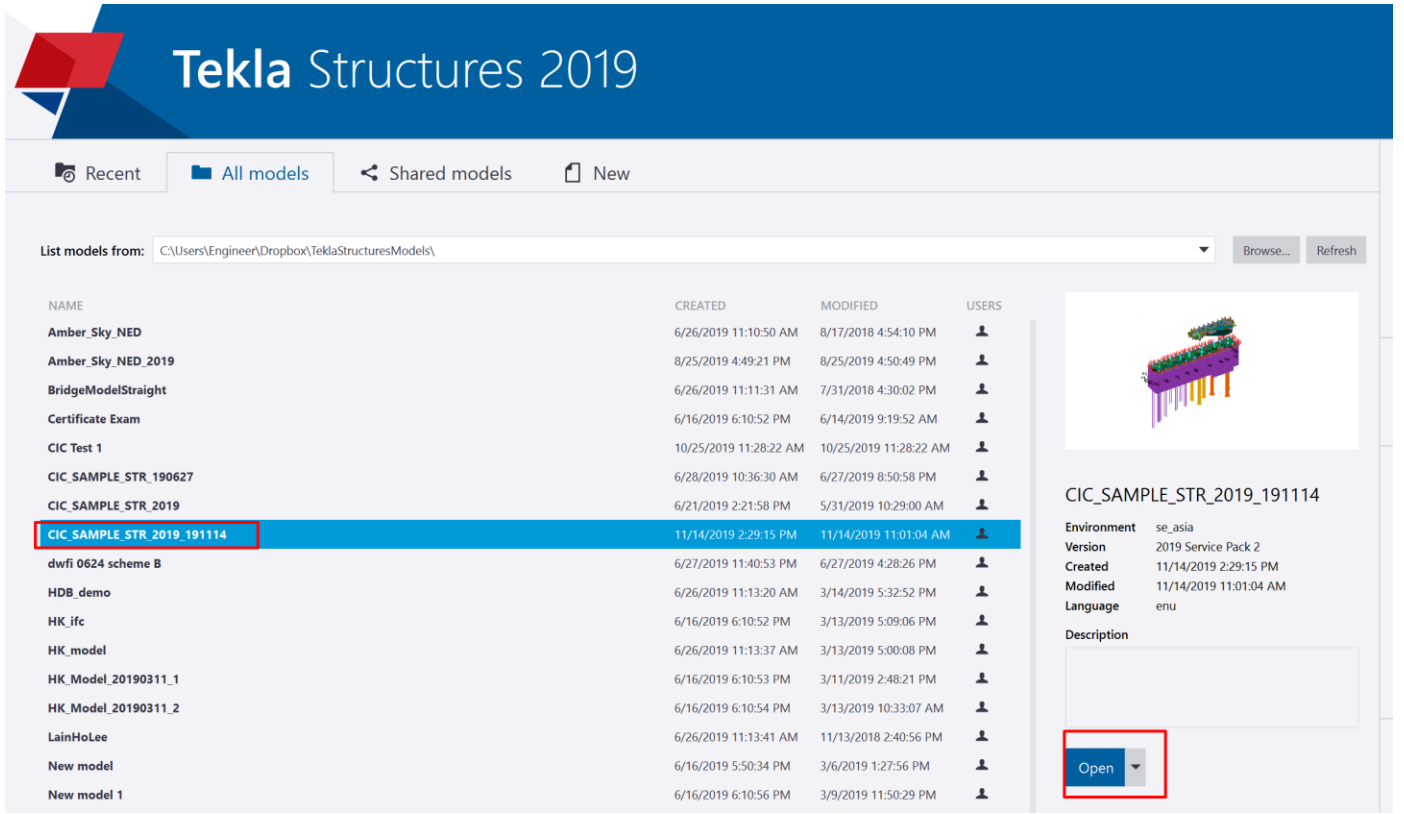
# Choose Configurations



# Open models at “All Models”, choose files, click open




**Tekla model files are stored inside a folder**



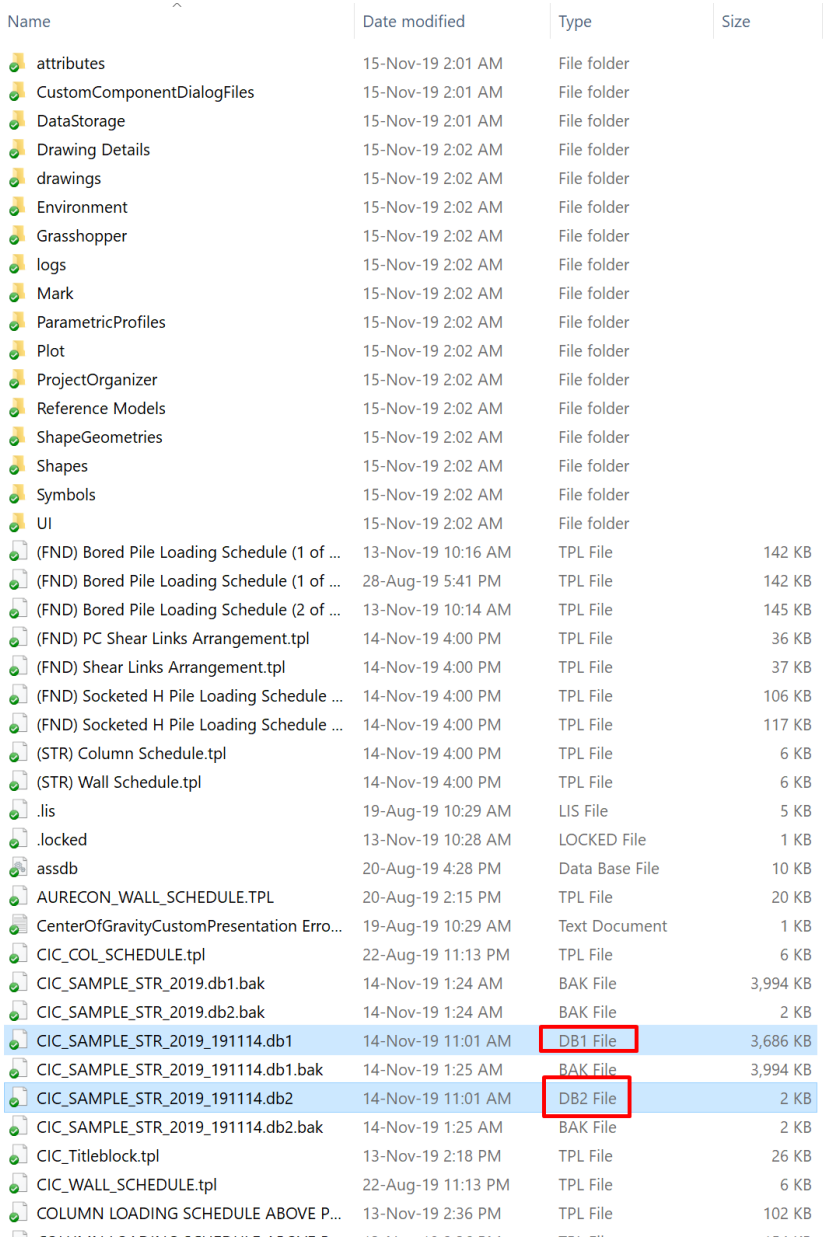
# Open models at “All Models”, choose files, click open

**Tekla model files are stored inside a folder**

**File format is**

**.db1**

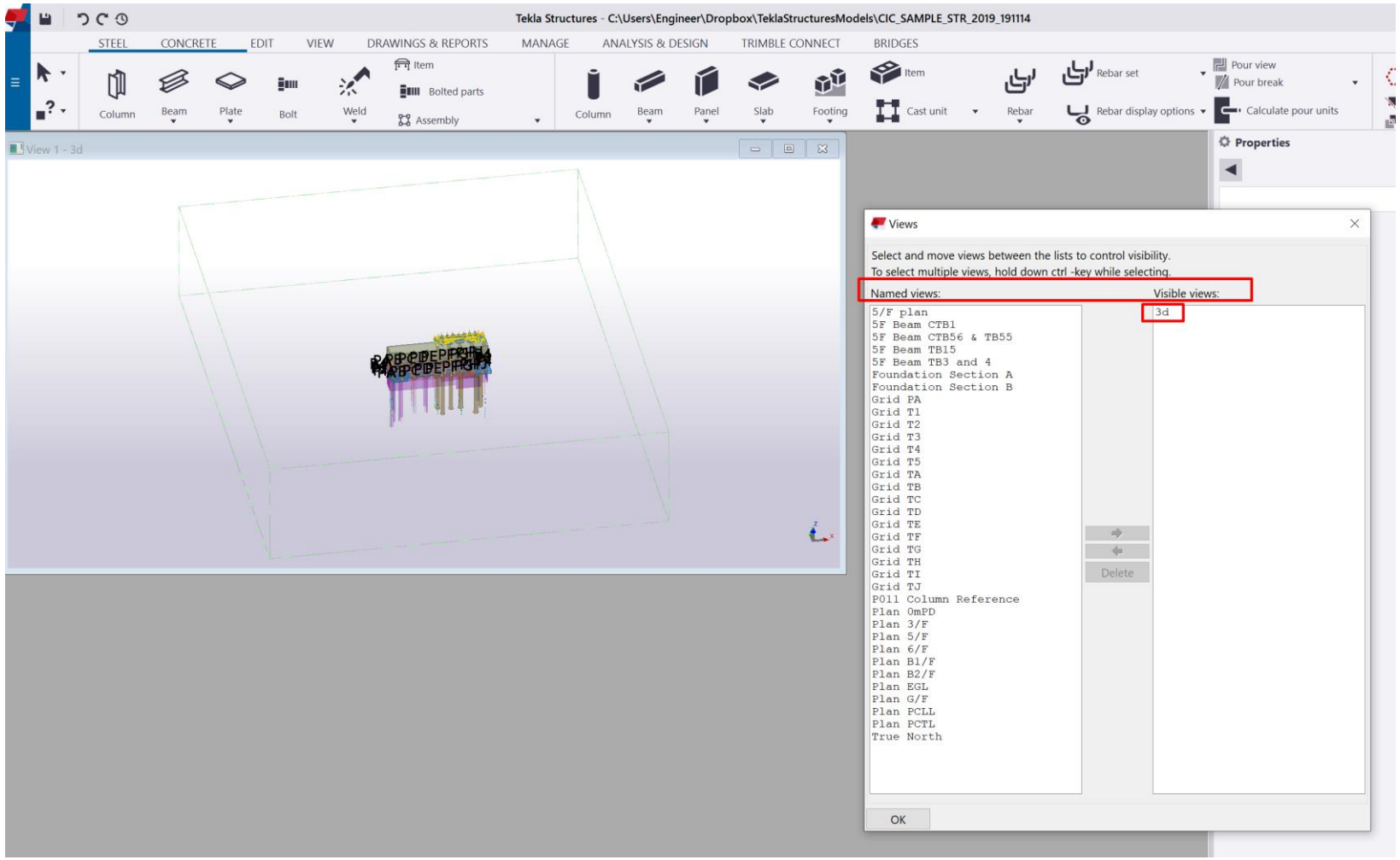
**.db2**



| Name | Date modified | Type | Size |
|---|---|---|---|
| attributes | 15-Nov-19 2:01 AM | File folder | |
| CustomComponentDialogFiles | 15-Nov-19 2:01 AM | File folder | |
| DataStorage | 15-Nov-19 2:01 AM | File folder | |
| Drawing Details | 15-Nov-19 2:02 AM | File folder | |
| drawings | 15-Nov-19 2:02 AM | File folder | |
| Environment | 15-Nov-19 2:02 AM | File folder | |
| Grasshopper | 15-Nov-19 2:02 AM | File folder | |
| logs | 15-Nov-19 2:02 AM | File folder | |
| Mark | 15-Nov-19 2:02 AM | File folder | |
| ParametricProfiles | 15-Nov-19 2:02 AM | File folder | |
| Plot | 15-Nov-19 2:02 AM | File folder | |
| ProjectOrganizer | 15-Nov-19 2:02 AM | File folder | |
| Reference Models | 15-Nov-19 2:02 AM | File folder | |
| ShapeGeometries | 15-Nov-19 2:02 AM | File folder | |
| Shapes | 15-Nov-19 2:02 AM | File folder | |
| Symbols | 15-Nov-19 2:02 AM | File folder | |
| UI | 15-Nov-19 2:02 AM | File folder | |
| (FND) Bored Pile Loading Schedule (1 of ... | 13-Nov-19 10:16 AM | TPL File | 142 KB |
| (FND) Bored Pile Loading Schedule (1 of ... | 28-Aug-19 5:41 PM | TPL File | 142 KB |
| (FND) Bored Pile Loading Schedule (2 of ... | 13-Nov-19 10:14 AM | TPL File | 145 KB |
| (FND) PC Shear Links Arrangement.tpl | 14-Nov-19 4:00 PM | TPL File | 36 KB |
| (FND) Shear Links Arrangement.tpl | 14-Nov-19 4:00 PM | TPL File | 37 KB |
| (FND) Socketed H Pile Loading Schedule ... | 14-Nov-19 4:00 PM | TPL File | 106 KB |
| (FND) Socketed H Pile Loading Schedule ... | 14-Nov-19 4:00 PM | TPL File | 117 KB |
| (STR) Column Schedule.tpl | 14-Nov-19 4:00 PM | TPL File | 6 KB |
| (STR) Wall Schedule.tpl | 14-Nov-19 4:00 PM | TPL File | 6 KB |
| .lis | 19-Aug-19 10:29 AM | LIS File | 5 KB |
| .locked | 13-Nov-19 10:28 AM | LOCKED File | 1 KB |
| assdb | 20-Aug-19 4:28 PM | Data Base File | 10 KB |
| AURECON_WALL_SCHEDULE.TPL | 20-Aug-19 2:15 PM | TPL File | 20 KB |
| CenterOfGravityCustomPresentation Erro... | 19-Aug-19 10:29 AM | Text Document | 1 KB |
| CIC_COL_SCHEDULE.tpl | 22-Aug-19 11:13 PM | TPL File | 6 KB |
| CIC_SAMPLE_STR_2019.db1.bak | 14-Nov-19 1:24 AM | BAK File | 3,994 KB |
| CIC_SAMPLE_STR_2019.db2.bak | 14-Nov-19 1:24 AM | BAK File | 2 KB |
| CIC_SAMPLE_STR_2019_191114.db1 | 14-Nov-19 11:01 AM | DB1 File | 3,686 KB |
| CIC_SAMPLE_STR_2019_191114.db1.bak | 14-Nov-19 1:25 AM | BAK File | 3,994 KB |
| CIC_SAMPLE_STR_2019_191114.db2 | 14-Nov-19 11:01 AM | DB2 File | 2 KB |
| CIC_SAMPLE_STR_2019_191114.db2.bak | 14-Nov-19 1:25 AM | BAK File | 2 KB |
| CIC_Titleblock.tpl | 13-Nov-19 2:18 PM | TPL File | 26 KB |
| CIC_WALL_SCHEDULE.tpl | 22-Aug-19 11:13 PM | TPL File | 6 KB |
| COLUMN LOADING SCHEDULE ABOVE P... | 13-Nov-19 2:36 PM | TPL File | 102 KB |

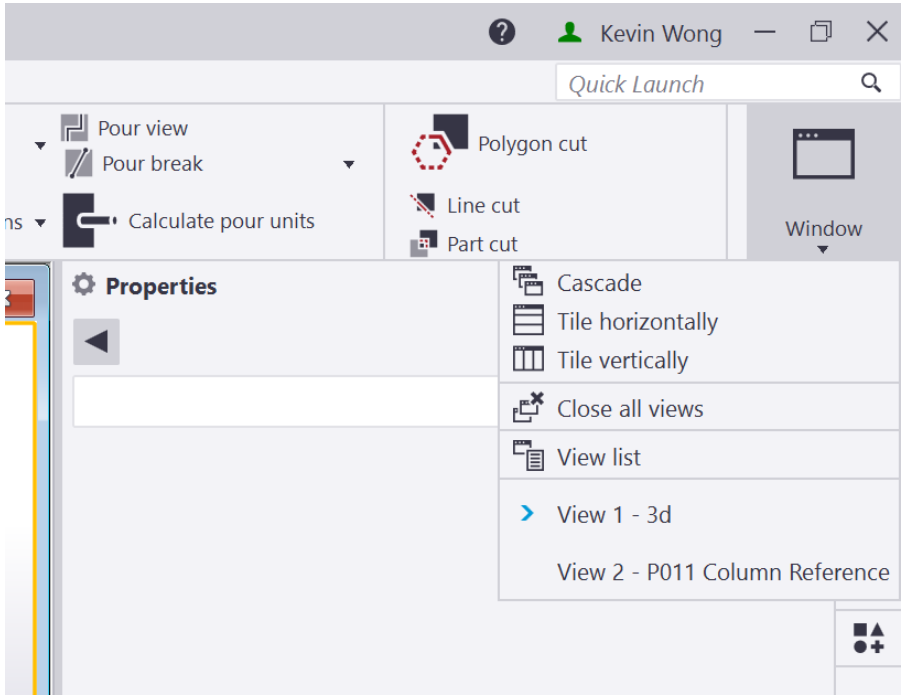
# Choose View

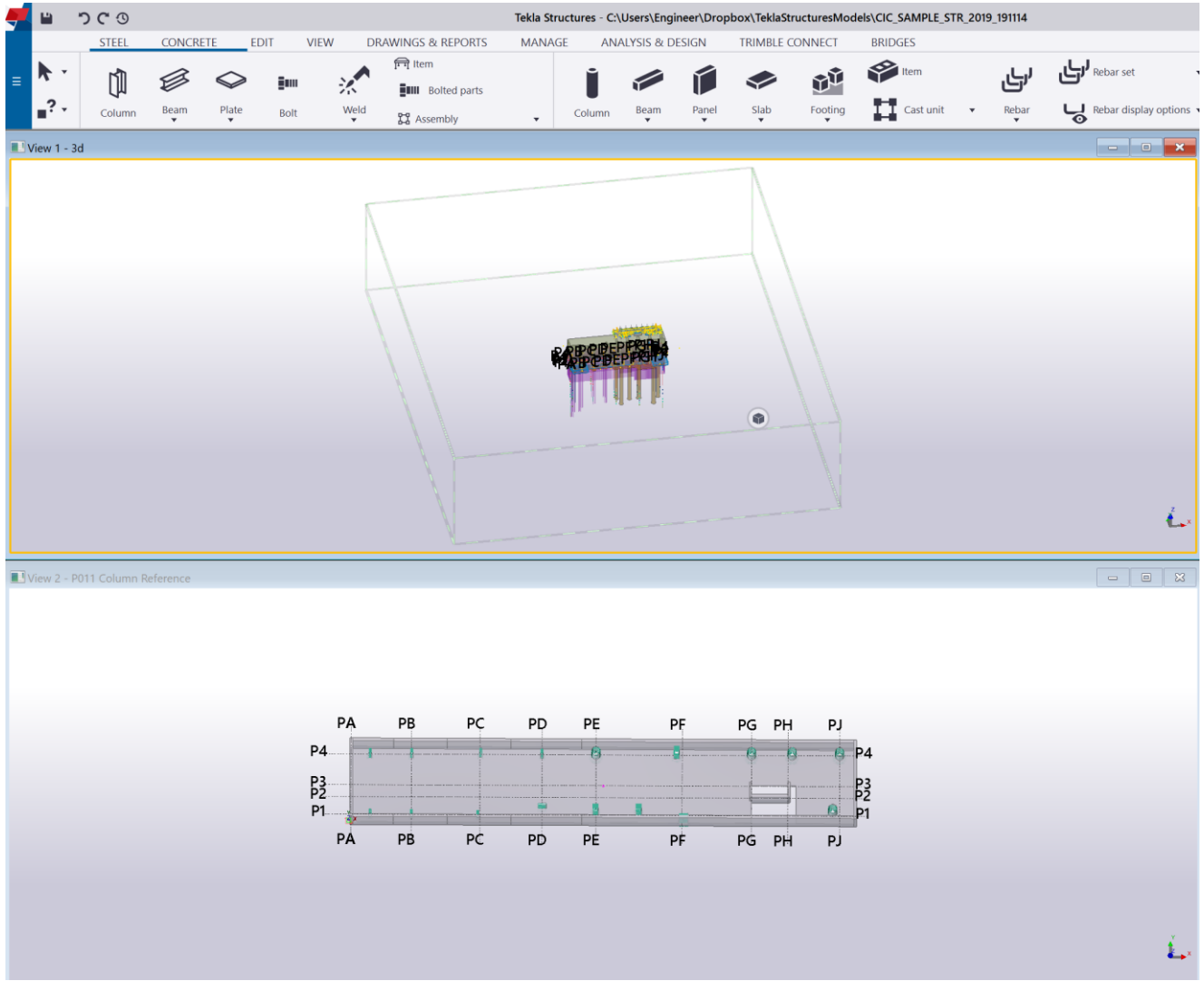
**Double click Named View and it will put into Visible View**



# Choose View

**Press “Q” for windows tiles horizontally**



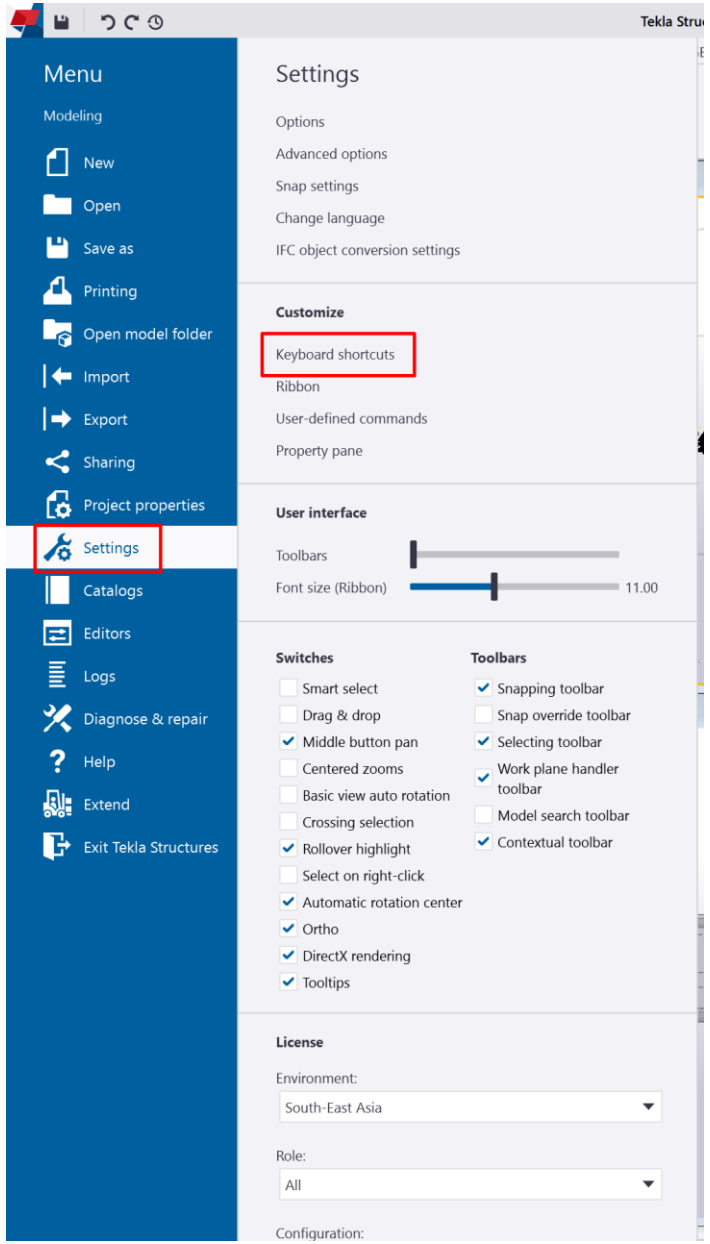
# Define Shortcut Keys

**Q = Tile Windows**

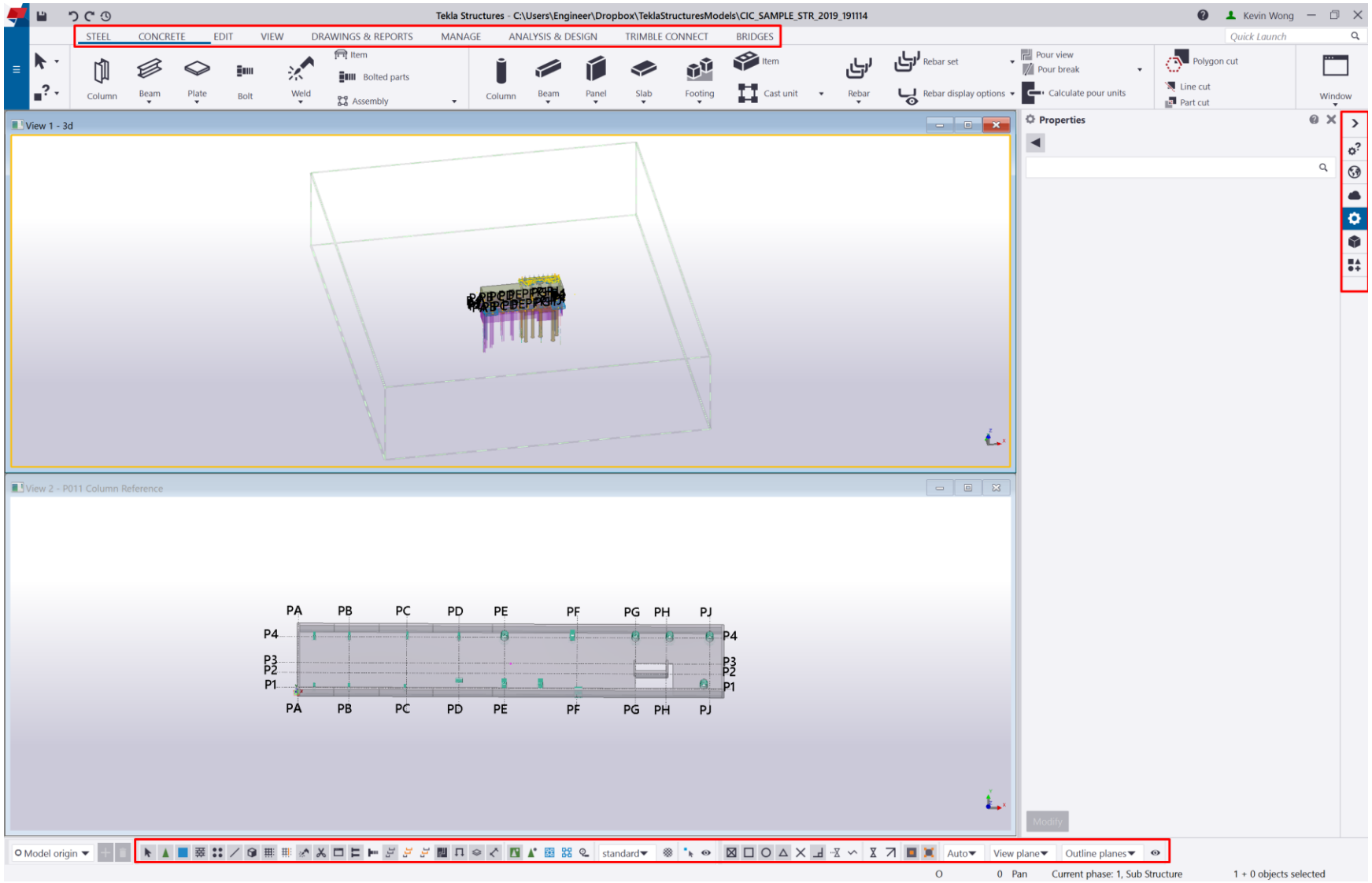
**Ctrl + P = Switch 2D / 3D views**

**Ctrl + I = Open Views**

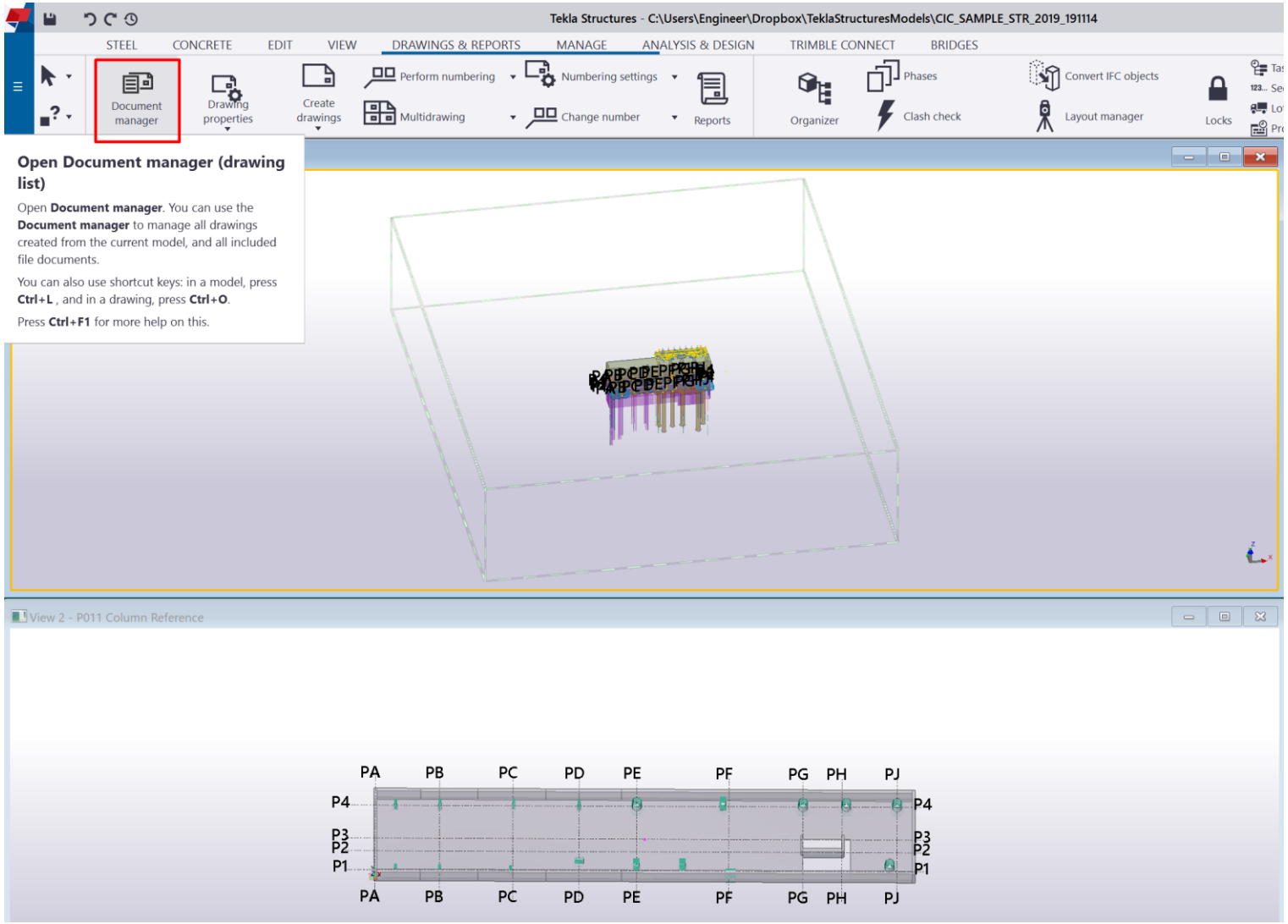
**Press “Home” to zoom all**



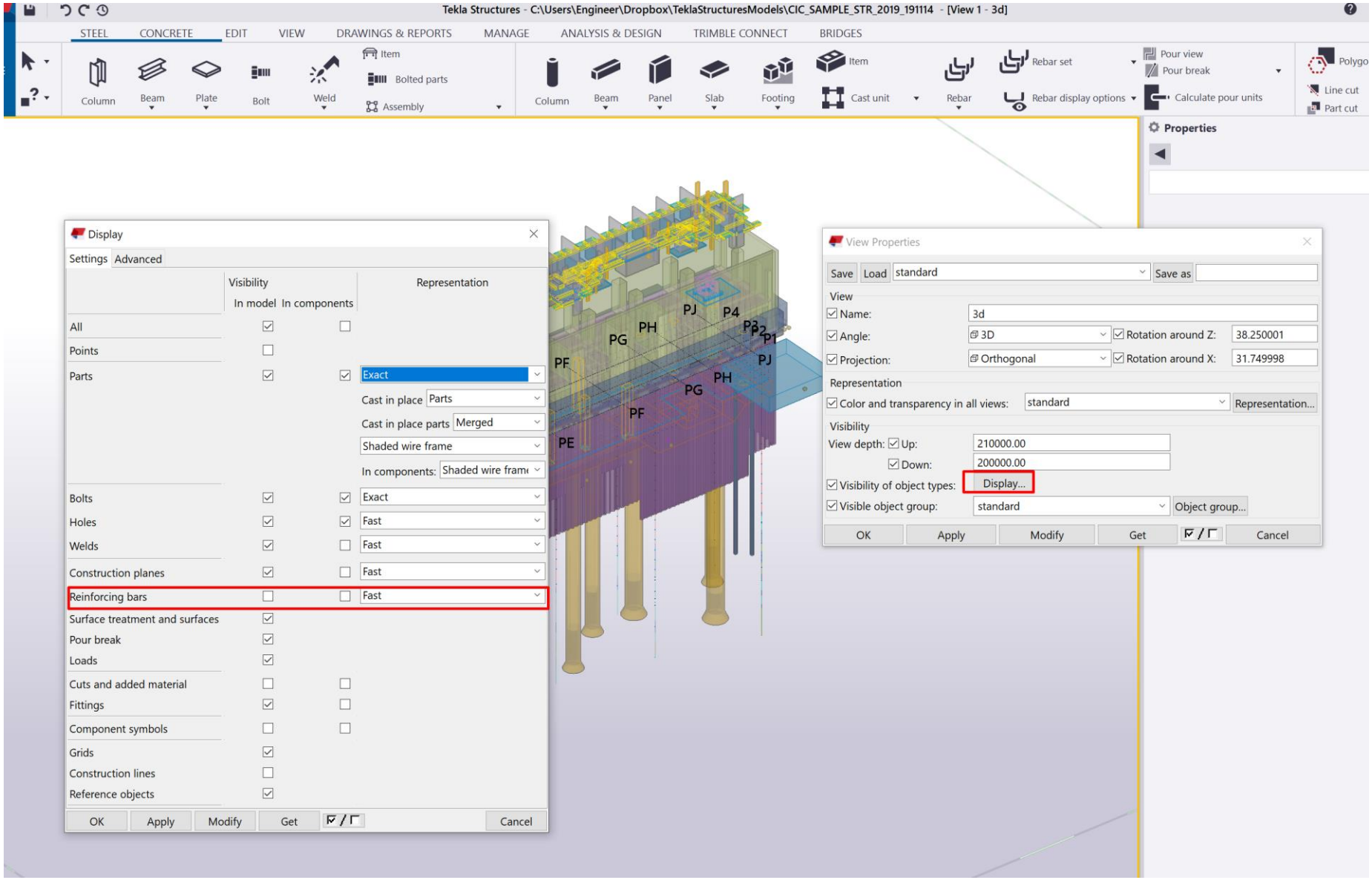
# User interface



# View Drawing

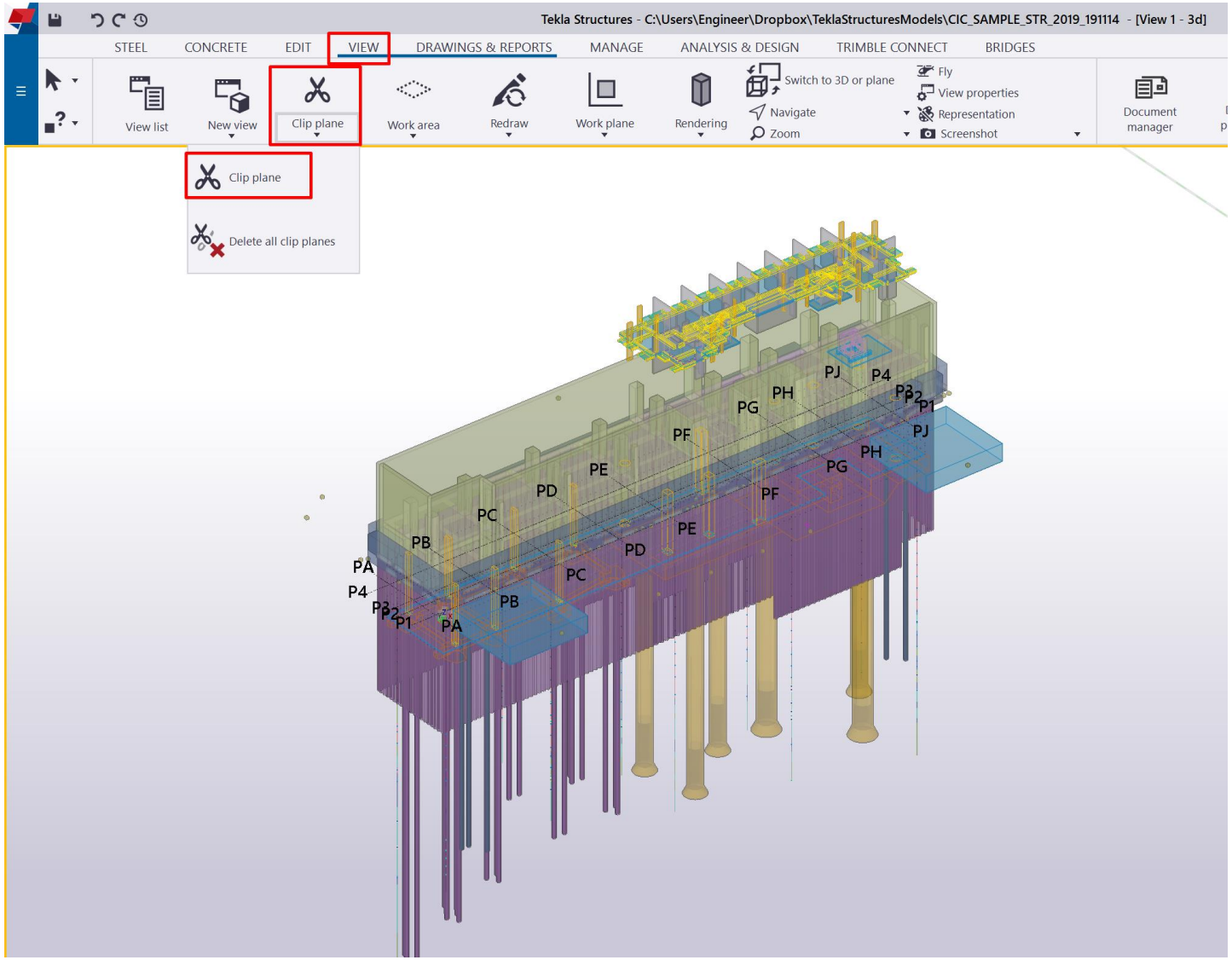


# Show Rebars – double click on background space



# Cut Sections

**View → Clip Plane**



Bringing ideas to life

# User Guide

## Basic Framework

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# Consultancy Services for Building Information Modelling (BIM) Standards of Statutory Plan Submission to the HKSAR Government for the Construction Industry Council (CIC)

# Thank you!

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