BIM
eSubmission Guideline
Structural

Annex 2b

Template Guide – Bentley AECOsim Building Designer v8i

Building and Construction Authority

We shape a safe, high quality, sustainable and friendly built environment.

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Template Training Guide – Bentley AECOsim V8i

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Contents

1 Introduction

The objective of this document is to assist qualified persons (QPs) in developing Building Information Model (BIM) for Structural regulatory submission in Singapore. The BIM e-Submission template creates a basic structure to further assist the QPs in preparing the model. QPs are also advised to make reference to the training materials distributed or to consult Bentley for any enquiries on the application.

This training material is meant for Bentley Structural Users reference only.

1.1. Range of Requirements for BIM e-Submission

The Prescribed format covers a range of requirements based on a BIM e-Submission template that is downloadable from the regulatory authority covering:

1. Project Standards
2. Standardized File Naming
3. Project Basic Composition

2 Bentley Goal

The goal of Bentley Systems Pte Ltd Singapore is provide user with the necessary template and guidance to make BIM e-submission in Singapore.

This document is not to be used as a substitute for Bentley's regular training courses, available through Bentley's LEARN Server or On-site Training, for AECOsim Building Designer, Bentley Building Products or MicroStation.

This document is Bentley's BIM e-Submission Template Guide for BIM e-submission to BCA.

3 Deliverable Format

For deliverable format, please refer to the Structural BIM e-submission guideline by BCA. Below is a summary of requirements.

For BIM e - Submission, Qualified Person (QP) is required to compile all drawing views/sheets of a project into two (2) separate DWF/PDF files for submission:

a) FileName1.pdf/.dwf. This file includes general notes, floor plans, elevations, sections, schedules, and details compiled in sheets with title block. This file is for approval.
b) FileName2_REF.pdf/dwf. This file includes architectural drawings (floor plans, elevations, sections, etc.), structural 3D model, structural site plan and supplementary views. This file is for reference only.

The diagram below illustrates conceptually, the differences between current e - Submission with 2D documents against BIM e - Submission.

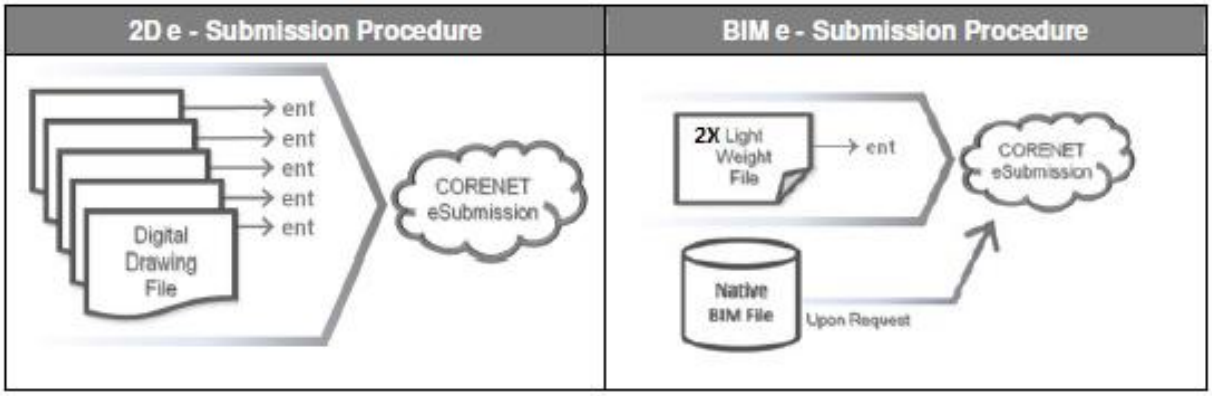


Figure: 1.1.1

Source: Building Construction Authority: BIM e-Submission Guideline Structural

3.1 Light Weight File – PDF

Light-Weight PDF files can be generated with the Bentley application by publishing the project model, Floor Plans, Elevation and Sections into single PDF file. **PDF plotter configuration** (PDF.PLTCFG) for printing these documents is available by default in Bentley applications.

4 Installation: Applications

4.1 Software Installation

Install AECOsim Building Designer prior to installing the Bentley Templates:

AECOsim Building Designer is a single, interdisciplinary Building Information Modelling application that combines architectural, structural, mechanical, and electrical design and construction documentation into a single application. Supporting the design of large, complex, and distributed models, AECOsim Building Designer V8i includes Bentley's industry leading Clash Detection capabilities for design review and constructability and provides integrated Visualization with the Luxology rendering engine.

Key features and enhancements in AECOsim Building Designer V8i include:

- Single unified interface for Architectural, Structural, Mechanism and Electrical building design
- Customizable Interactive Task Interface Shared Building Elements, Shared Placement Tools, Universal Modify Tool
- Built-in Clash Detection
- Integrated Point Clouds tools
- Unified Dataset provides for reduce administration
- Dynamic Views

There are no prerequisites required for installation of this software. The installer contains all the necessary integrated modules.

AECOsim Building Designer V8i	08.11.09.225	3/26/2012	1396.97 MB	Windows XP, Windows Vista x64, Windows XP x64, Windows 7, Windows 7 x64

Figure: 4.1.1

4.2 Project Installation

4.2.1 Installation of Workspace/BCA File Naming Utility:

Once the software has been installed, install the **Singapore Dataset** (Workspace) available from **SELECTservices: Downloads/MySELECT CD,** download category: **Enhancements & Updates**.

Figure: 4.2.1.1

The **BCAFileNaming** utility is automatically available to Structural Engineers via the use of a customised project: **BIMe-Submission_SG** that provides all the necessary files to run a project based on **Singapore Standard CP83, Part 3:2001**, Code of Practice for Construction computer-aided design (CAD), Organising and naming of CAD files.

The required files are installed in a sub directory titled '**BCAFileNaming**' under the default path selected. A customised **Project Configuration File: BIMe-Submission_SG.PCF** delivered with the Singapore dataset points to this directory to ensure that the BCA File Naming MDL application is loaded each time a Bentley application is started.

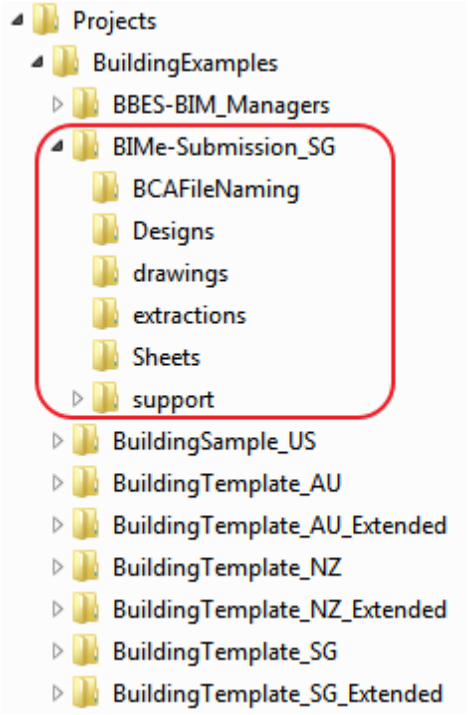


Figure: 4.2.1.2

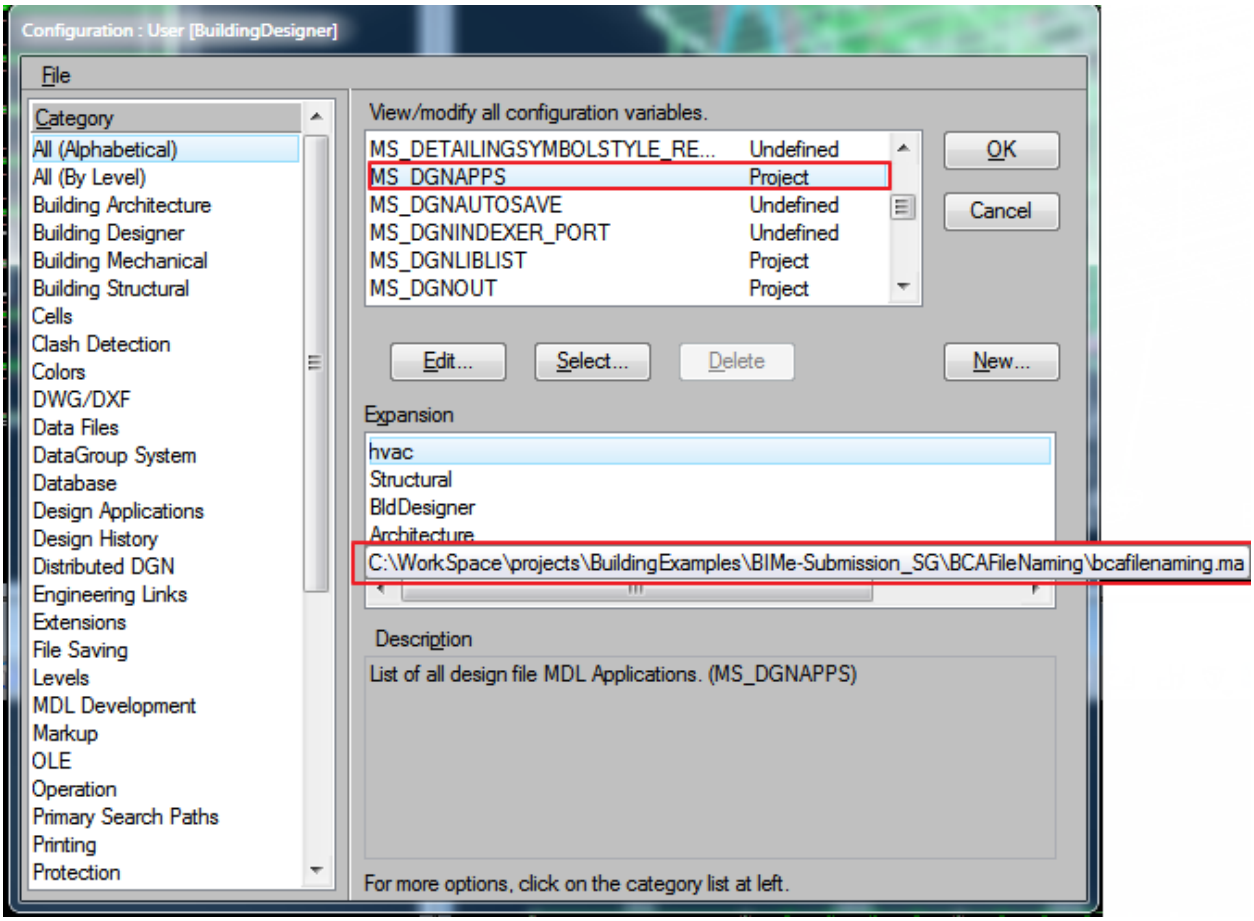


Figure: 4.2.1.3

5 Bentley Templates

Bentley delivers a **BIM e-Submission.dgn** template document which incorporates the BIM e-Submission range of requirements:

1. Project model scale
2. Site Configuration / Layout
3. Project model orientation
4. Project model Datum

The template file **BIMe-Submission.dgn** must be selected as a **SEED FILE (Template)** during the creation of a new project design file.

Refer **Figure:** 5.0.1 below.

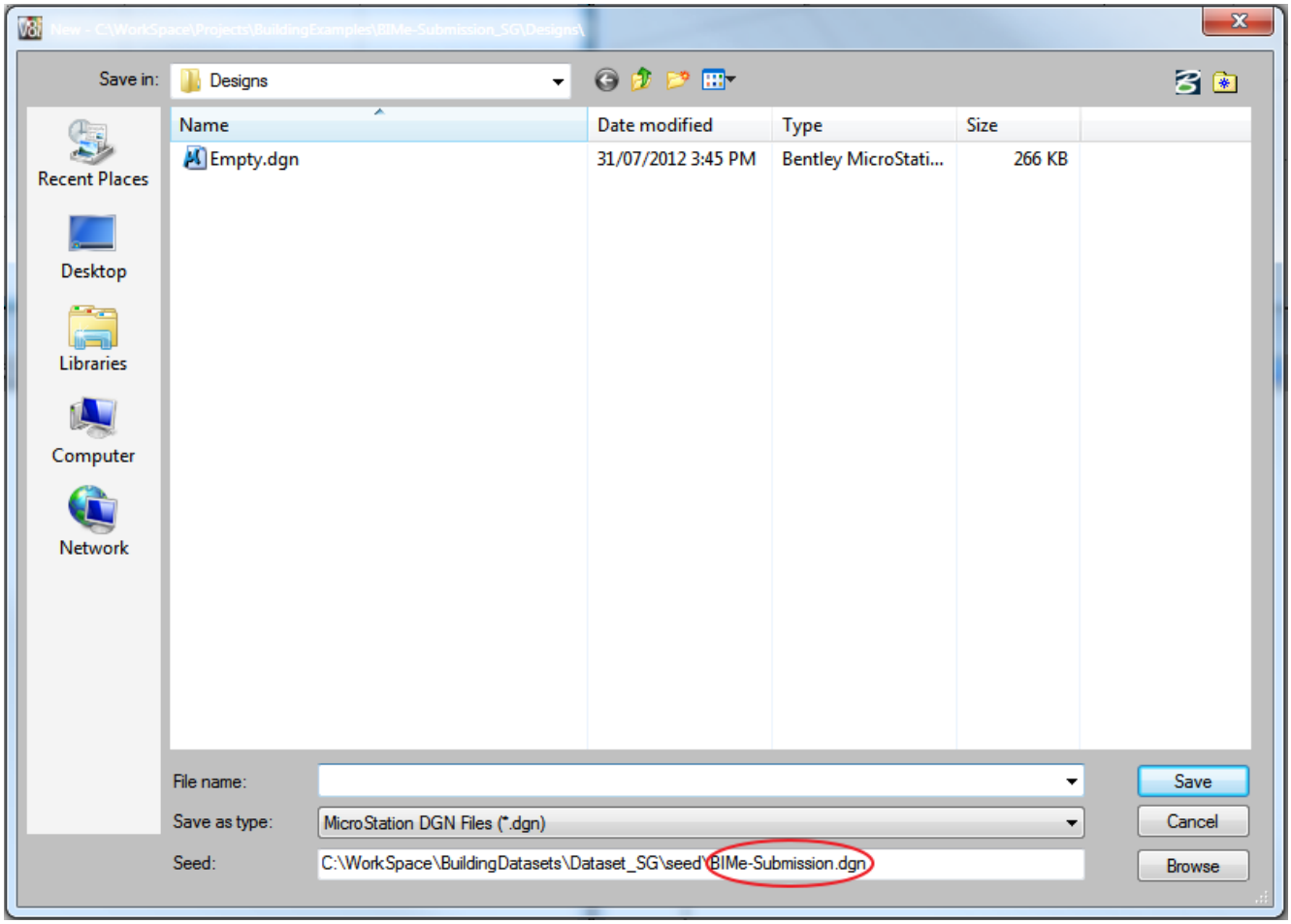


Figure: 5.0.1

5.1 Project Model Scale

It is recommended to use "**Real-World**" measurement for the project model scale for BIM e-Submission. In Bentley applications, Project model scale is presented in "Real-World" measurements via **SETTINGS MENU>DESIGN FILE** under the category **WORKING UNITS.** Metric units are configured by default in the BIM e-Submision.dgn template file.

Refer **Figure:** 5.1.1 below

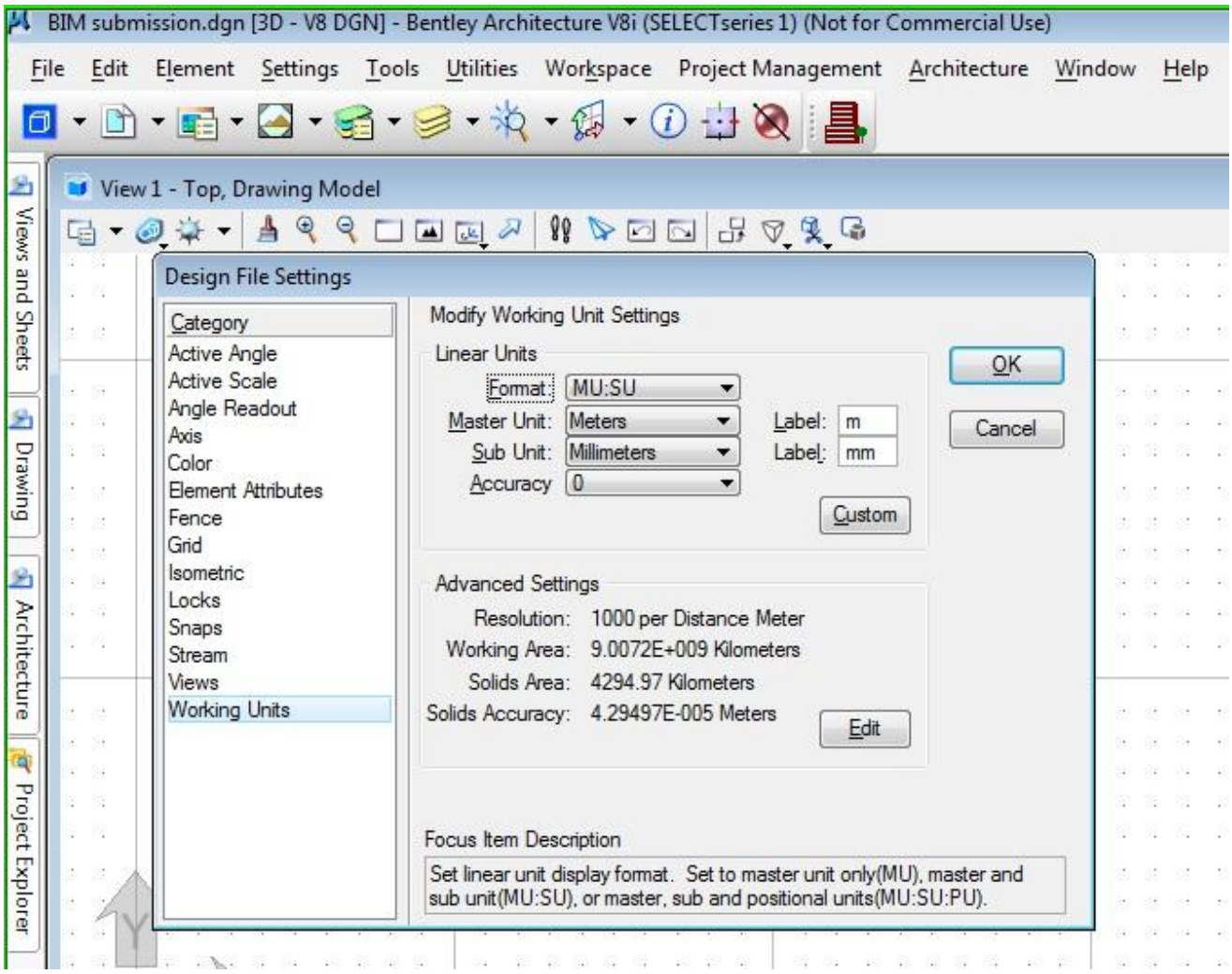


Figure: 5.1.1

5.2 Site Configuration / Layout

Real World coordinates for Singapore Zone **UTM84-48N** is configured in the template file. In Bentley applications, go to **TOOLS MENU> GEOGRAPHIC SELECT GEOGRAPHIC COORDINATE SYSTEM**.

Refer **Figure:** 5.2.1 below

The Coordinate system in the design is accessed via **UTILITIES MENU>AUXILIARY COORDINATES**.

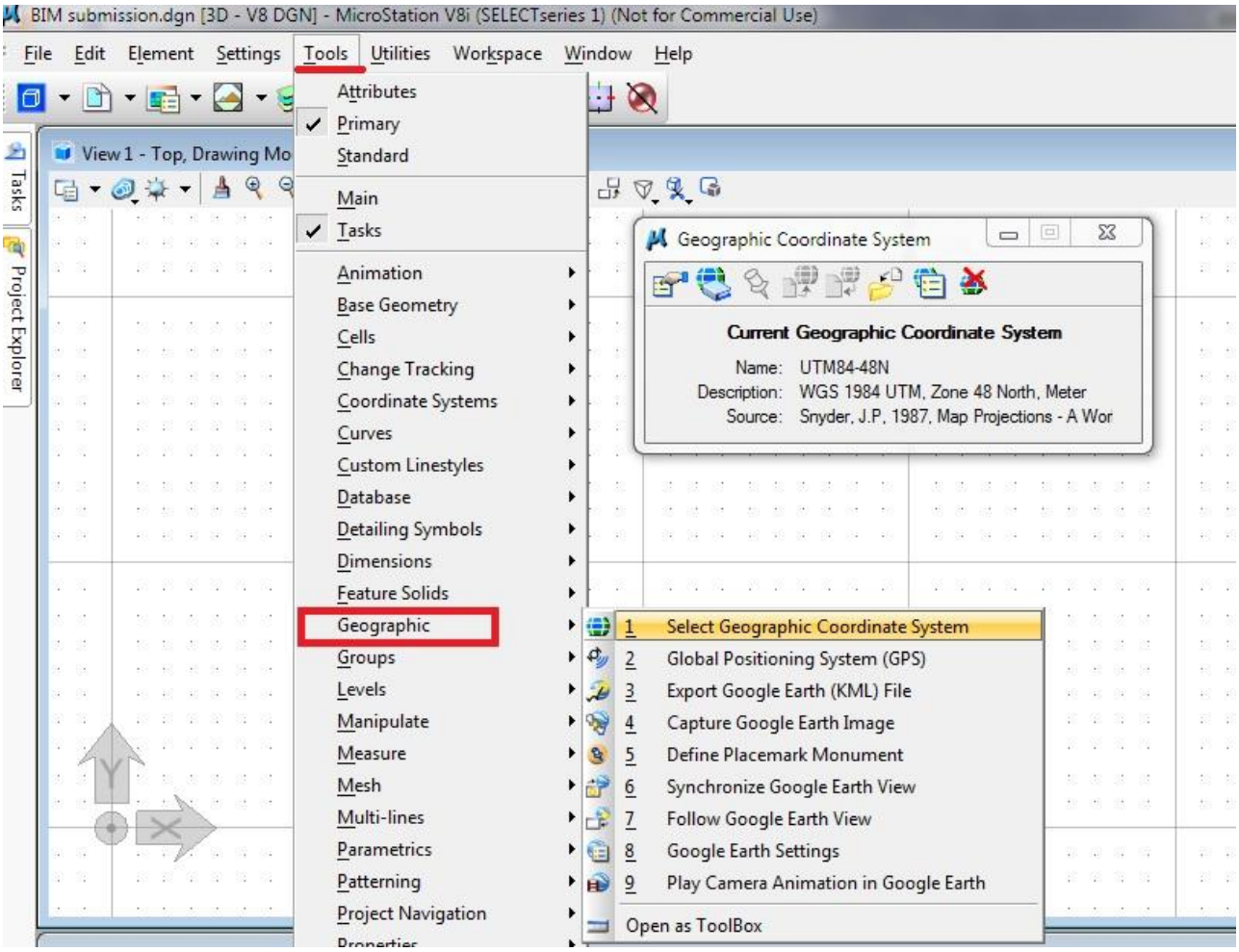


Figure: 5.2.1

5.3 Project Model Orientation

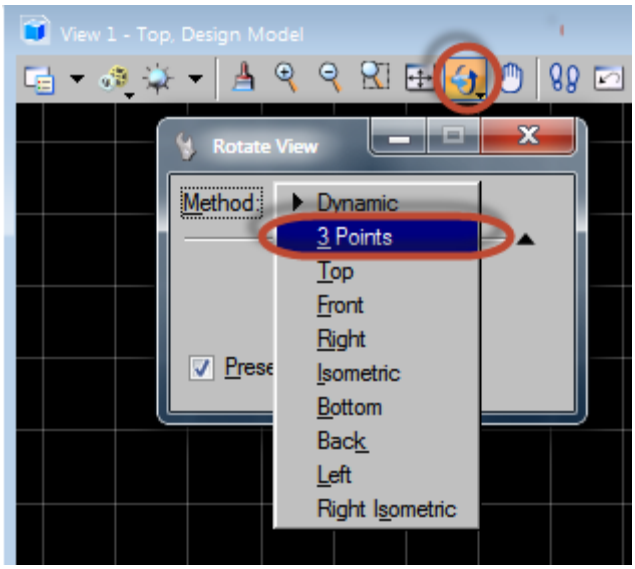
5.3.1 Project North versus True North

AECOsim Building Designer provides the ability to switch between "Project North" and "True North" allowing the user to create a model and detail a building orthogonally and yet display a site layout correctly i.e. with North pointing vertically upwards on the page.

Figure **5.3.1** below shows two diagrams:

1. Drawing according to **True** North – Model is based on True North (North Arrow shown in this case as being vertical up/down page). Note that the Model is rotated, so also the elevations if viewed without 'View' rotation.

2. Drawing according to **Project** North – 'View' has been rotated (not Model/graphics or North Arrow), so as to present the model as being orthogonal to the computer screen. This rotated view is used for creation of Plans, Sections and Elevations.

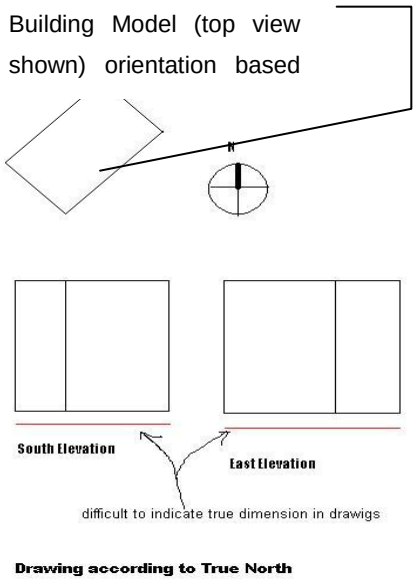


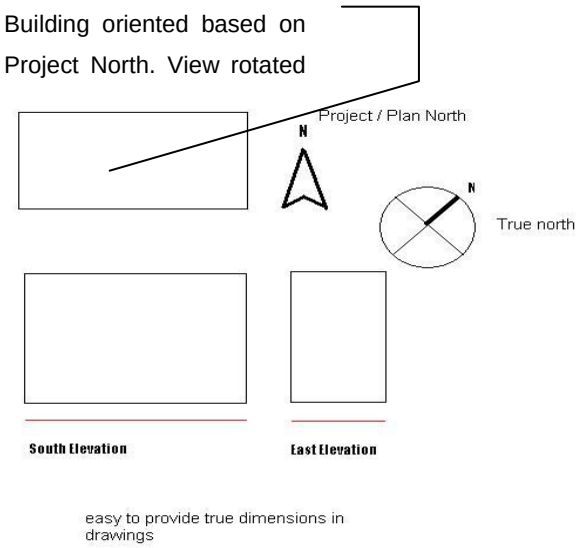
Rotate view functionality in AECOsim Building Designer

Figure: 5.3.1.1

Both methods may easily be recalled at any time via the Saved View functionality within the software.

Project orientation is **aligned orthogonal to the computer screen** (North – South), as the building industry in Singapore has adopted "Project-North" as a default for delivery of all drawing documents. The setting between Project-North and True-North (refer **Figure:** 5.3.1.2) can be configured within project setup. This setup can be configured in Bentley Building applications using the tool **ROTATE VIEW>3 POINTS** (as shown in the **Figure:** 5.3.1.3)





1. Drawing according to **True** North

2. Drawing according to **Project** North

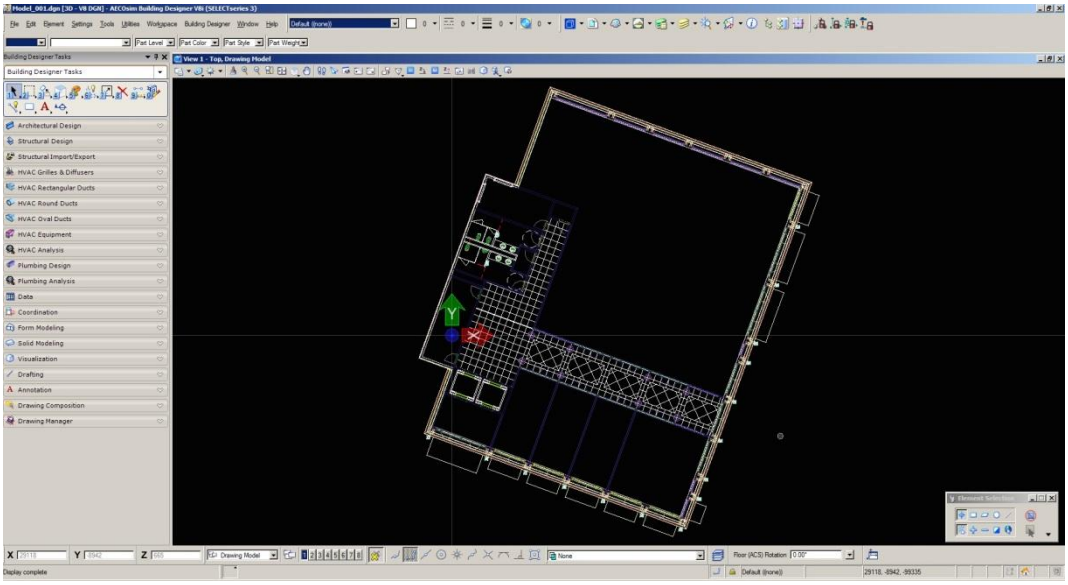


Figure: 5.3.1.2

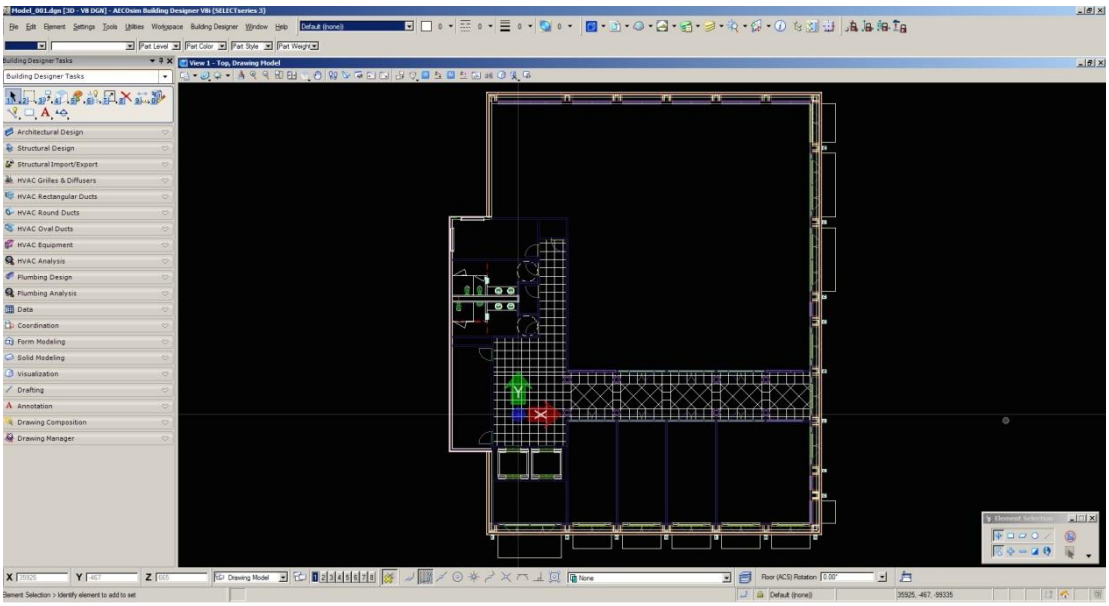


Figure: 5.3.1.3

5.4 Project Model Datum

Project Datum must be aligned to **Above Mean Sea Level or AMSL** (>100meters) and is configured in BIM e-Submission.dgn template file whereby the settings move the project to actual datum. This can be done in Bentley Building applications using **UTILITIES MENU>AUXILIARY COORDINATES**. Refer **Figure:** 5.4.1 below.

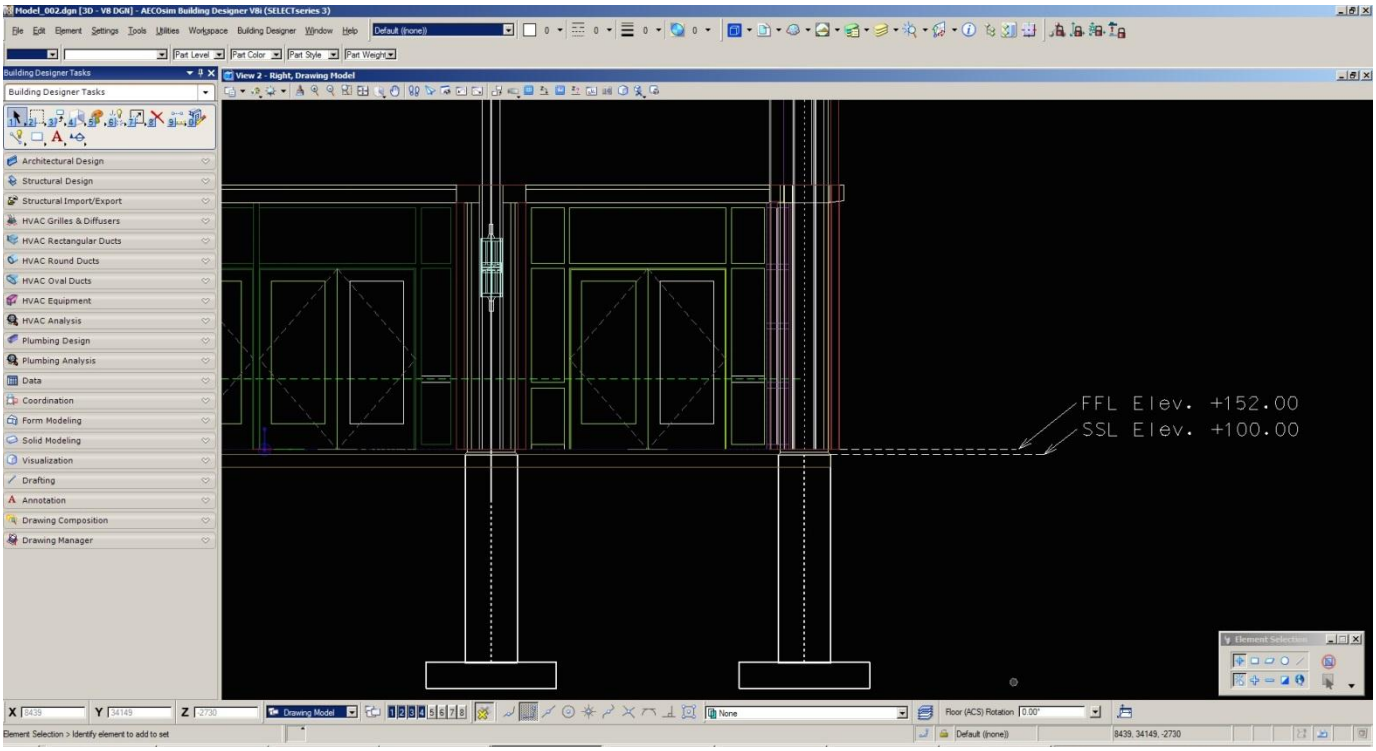


Figure: 5.4.1

6 Standard File Naming

To facilitate BIM e-Submission and to avoid ambiguity in understanding the BIM Native File, Building & Construction Authority standardized the File Naming. The convention to naming these files follows a pattern modified from **SS-CP83, Part 3**. Bentley has developed a utility which will automate the process of **Standardized File** and **View Naming**. **BIMFileNaming.mdl** requires to be loaded within Bentley Building applications via **UTILITIES MENU>MDL APPLICATION -** MDL Loaded by default when the appropriate project is selected..

Refer **Figure:** 6.0.1 below.

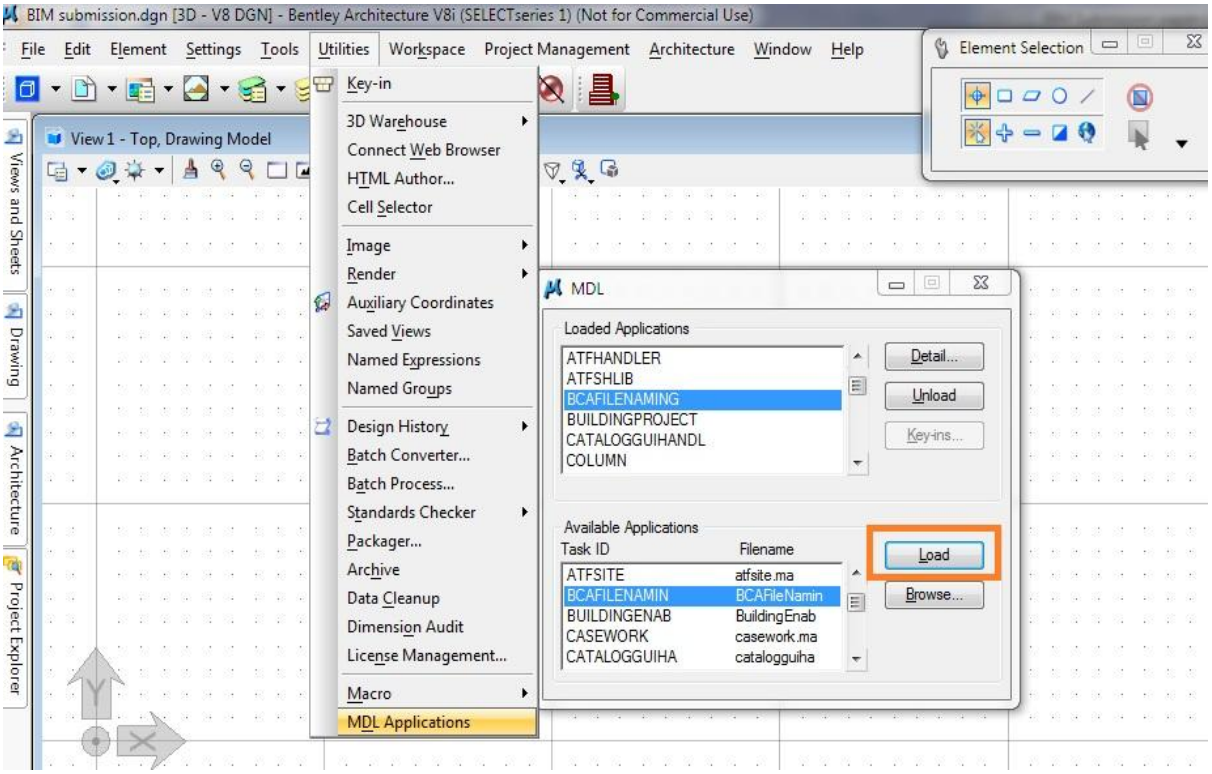
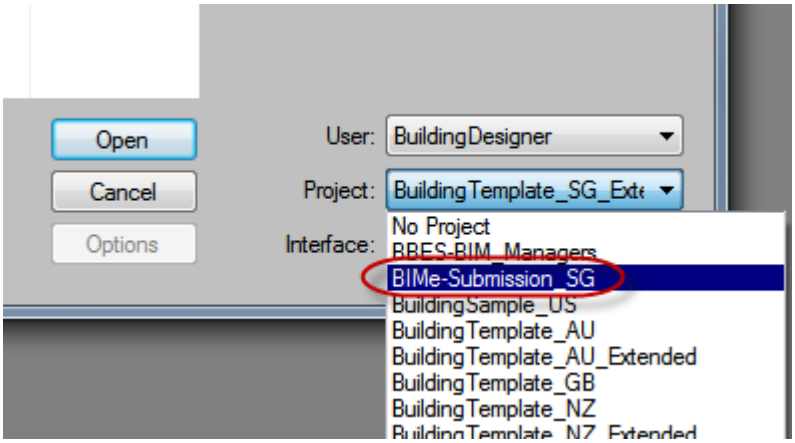


Figure: 6.0.1

7 New Structural File Creation

Start AECOsim Building Designer by selecting the appropriate project:



This ensure that all new files created within this environment will use **BIMe-Submission.dgn** as a seed file, thereby loading all the required pre requisites for BIMe-Submission.

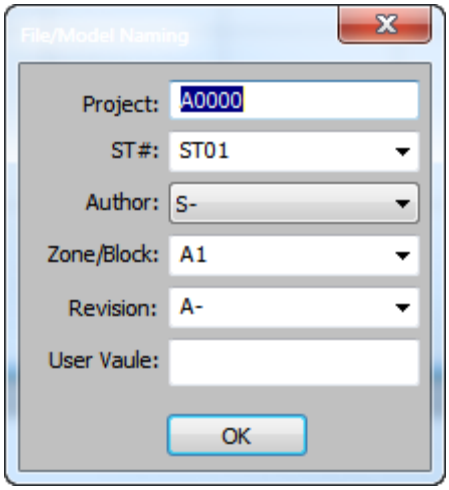
Figure: 7.0.1

By selecting **File>New** the user is presented with a dialog box requesting input to various fields. Example: Project ID, Author, Zone/Block etc.

Completion of this task opens a new dialog box with the File Name already populated based on input previously entered by the user. The correct seed file is also highlighted.

Seed file location: Drive:\WorkSpace\Projects\BuildingExamples\BIMe-Submission_SG\support\dataset\seed**BIMe-Submission.dgn**"

Figure: 7.0.2



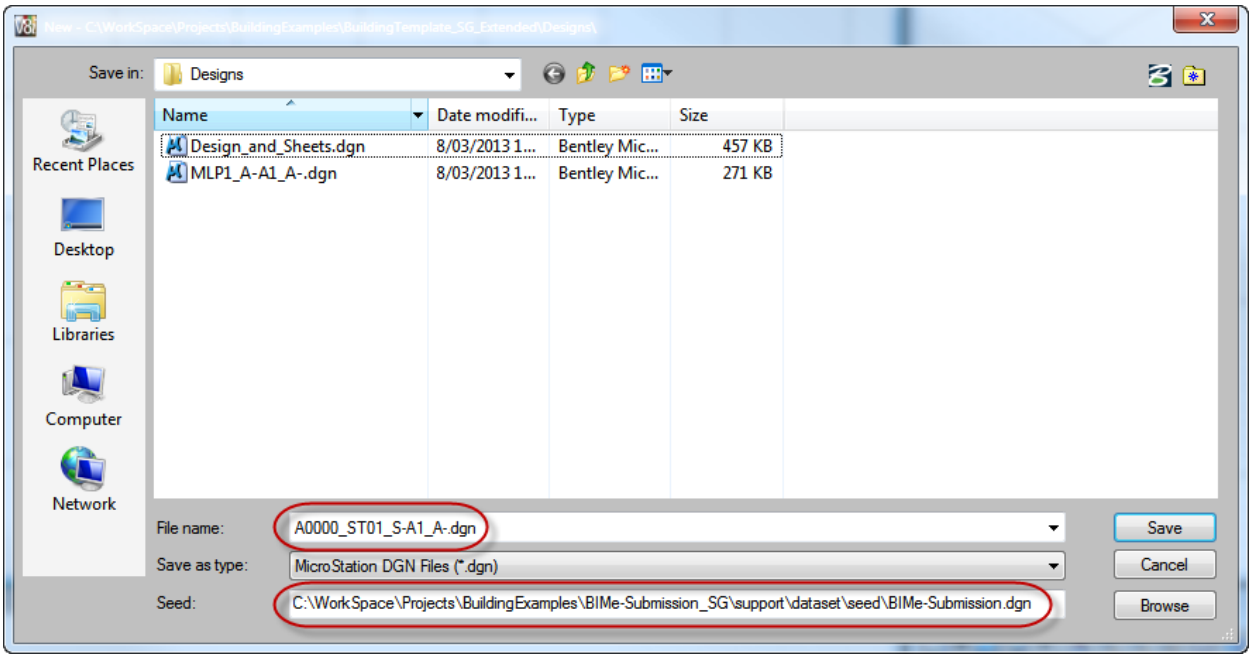


Figure: 7.0.3

7.1 Project Design MODEL / SHEET Naming

Filename Fields:

Structural File naming requires **5 mandatory** fields and an optional user-defined field. To enhance readability the project field should be separated from the remaining fields by an **underscore** "_".

Structural Engineer's Options

Table 7.1.1.1

Name of Field	Number of Characters	Indicators	Description of Field
Project ID	**6** min **14** max	**A0000-00000-2011**	Represent files of the same project
ST #		**ST01**	Represents Structural Submission packages
Author	**1**	**G**	Geotechnical Engineer
		S	Structural Engineer
		X	Contractor
		A-	Architect
		C-	Civil Engineer
		M-	Mechanical Engineer
		E-	Electrical Engineer
Zone	**2**	**NN**	Where N: zone or Block Number E.g. 01 for Block 1, A1 for Zone A1
		--	
Version	**1**	**A**	1st Submission (original)
		B	2nd Submission (revision or resubmission)
		C	3rd Submission (revision or resubmission)
User Defined	--------	**--------**	User defined code (**optional field**)

The **file naming** convention is divided into **6 parts**, where **Part 1** to **Part 5** are delineated by an underscore "_"; they are mandatory fields. Part 6 is optional but it is recommended for use to give better description to the file followed by the file extension which represents the file format.

Refer to **01BIMSubmissionTemplate_Struc-Apr11_A1.pdf** guideline by BCA for abbreviations to use in File Naming Convention.

Table 7.1.1.2

Part 1		Part 2		Part 3		Part 4		Part 5	Part 6
Project ID		**ST #**		**Author**		**Zone**		**Version**	**User**
A1100-00001-2011	_	ST01	_	G	_	01	_	A	Foundation
A1100-00001-2011	_	ST02	_	S	_	01	_	A	Superstructure

Part 2 is meant to distinguish between different **Structural Submissions** i.e. **ST01, ST02**, and so on. Qualified Persons or Professional Engineers in Singapore submit structural submission packages called **ST.** For example: ST01 might be a foundation design followed by ST02 for superstructure and ST03 for roof design.

Naming conventions for Part 1, Part 3, Part 4, and Part 5 follow SS CP83 Standards.

In Bentley applications, the loaded (BIMFileNaming.ma) utility will automate the process of File Naming for Models. This can be achieved by activating the Building Designer Task **Create a New Design Model Container** from the **Drawing Composition** TAB.

The **File/Model Naming** dialog box will popup the utility dialog box to select/enter standard file naming as defined by Building and Construction Authority.

Create New Design Model tools will popup the utility dialog box to select/enter standard file naming as defined by Building and construction authority. Refer **Figure:** 7.1.1.1.

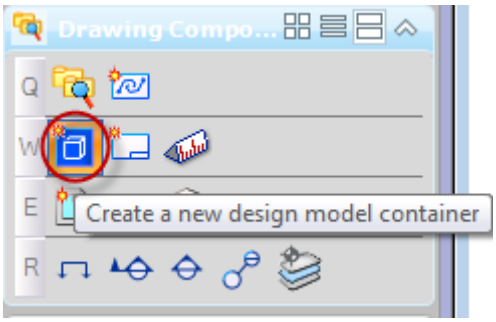


Figure: 7.1.1.1

Drawing Sheet Model dialog box will popup the utility dialog box to select/enter standard file naming as defined by Building and Construction Authority.

Refer **Figure:** 7.1.1.2 below.

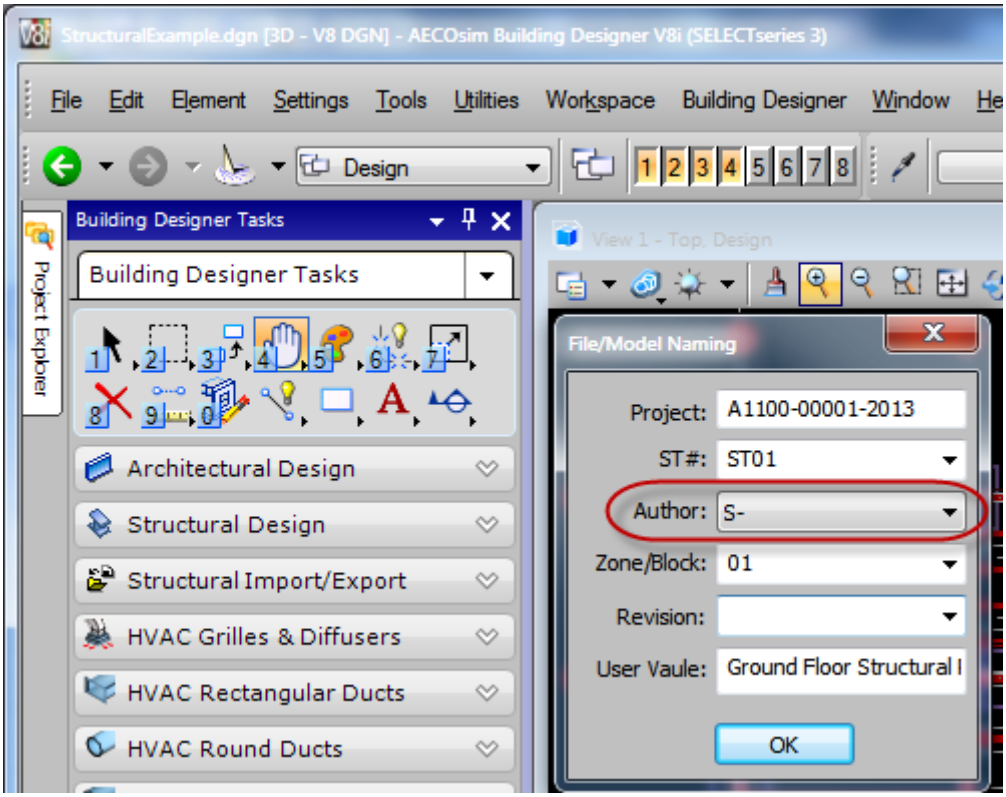


Figure: 7.1.1.2

Once entered the information, **Create Model** dialog box appears with Model name as (specified in the Structural BIM e-Submission Guideline, by BCA).

Refer Figure: 7.1.1.3 below for details.

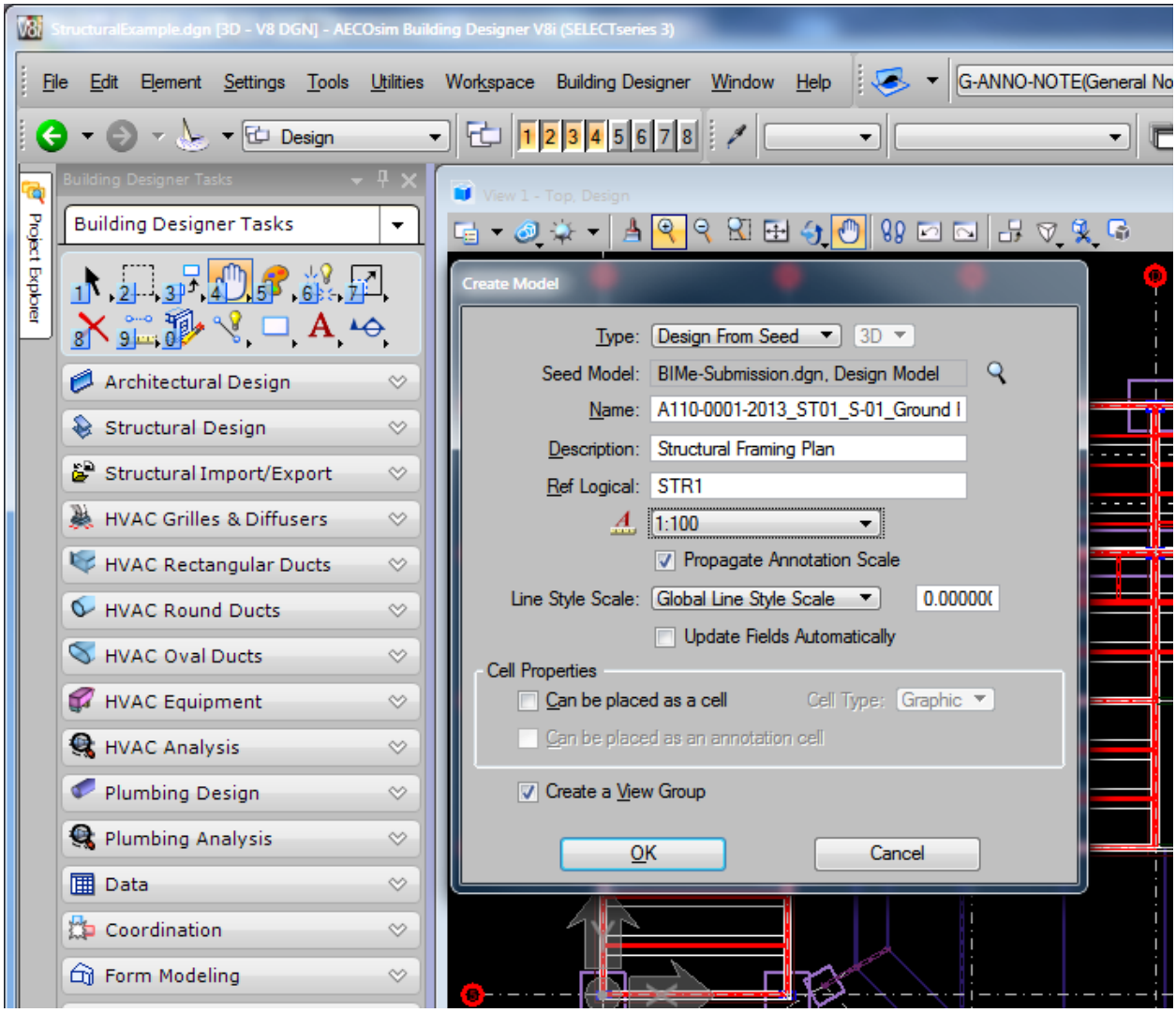


Figure: 7.1.1.3

7.1.2 Sheet Naming

Sheet naming is divided into **2 parts**, each part is delimited by an underscore "**-**". All parts to this naming convention **are mandatory** and require to be strictly adhered to. For more detail refer Table 3 - Naming Convention for individual Sheets in the **01BIMSubmissionTemplate_Struc-Apr11_A1.pdf** guideline by BCA.

The illustration shown in **Table 7.2.1** is a sample to naming a view.

Table 7.2.3.1

Part 1				Part 2
Sheet Number				User Defined
0	0	1	_	BCA/ST/001/GENERAL NOTES
0	0	3	_	BCA/ST/005/TYPICAL DETAILS
0	1	0	_	BCA/ST/010/LAYOUT OF PILES AND PILECAPS
0	5	0	_	BCA/ST/020/1st STOREY BEAM SCHEDULE

Table 7.2.3.2

Naming Convention for individual Sheets

Name of Field	Number of Characters	Indicators	Description of Field
Sheet Number	**2 (min.)**	**10**	Sheet # 10. This must tally with the sheet reference on the Title Block
User Defined	**4 (min.)**	This part use to describe the sheet. Some organization associates this part with the "Drawing Number / Reference" in the title block followed by a descriptive text to explain the purpose of the sheet.	

Create New Sheet Model Container tool will popup the utility dialog box similar to Figure: 7.1.1.2 in preceding pages.

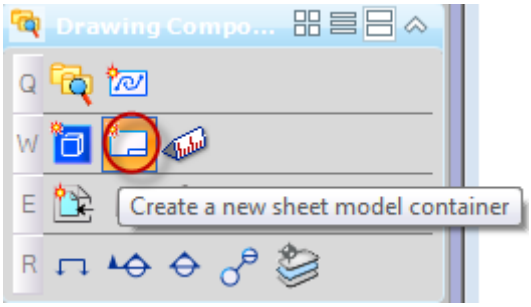


Figure: 7.1.2.1

Clicking on '**Create New Sheet Model Container**' tool will popup the File/Model Naming dialog box. When a user selects '**S-**' as the **Author**, this triggers the BCAFileNaming utility to initiate a new workflow and dialog box.

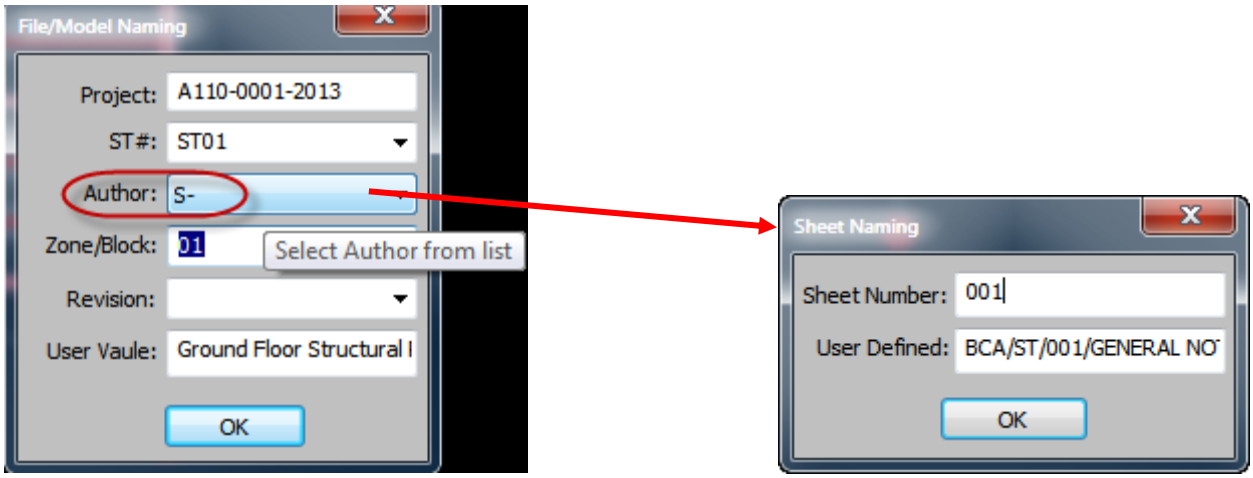


Figure: 7.1.2.2

Figure: 7.1.2.3 below shows that user input at the previous stage pre-populates the '**Create Model**' for Sheet files dialog box.

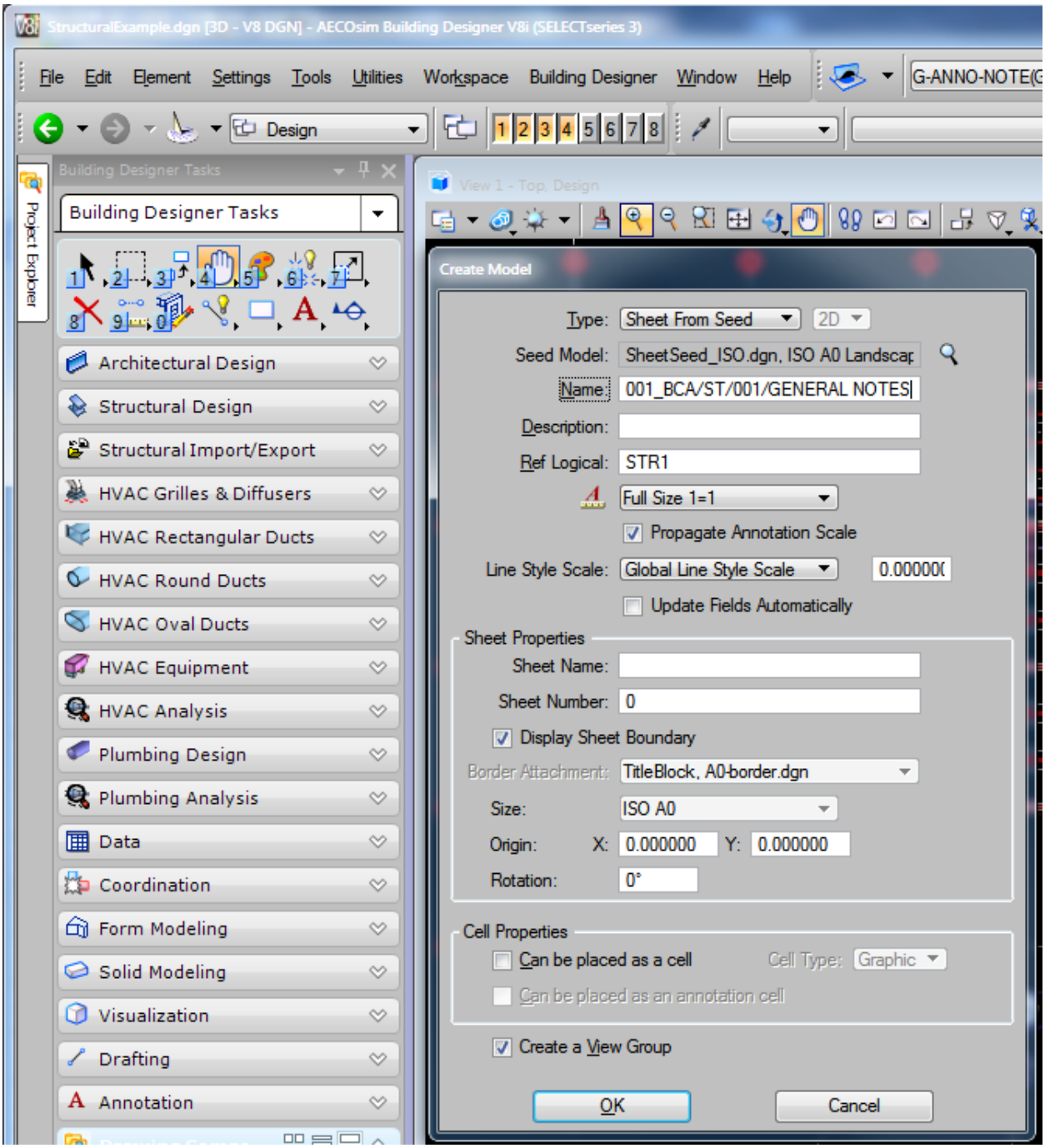


Figure: 7.1.2.3

7.2 Standardized Naming of Views

For every BIM Native file and Light-weight file submitted to regulatory agencies, there will be "**Views**" and "**Sheets**" within these files:

- "**Views**" are a representation of the project model presented in several viewing angles and horizontal / vertical planes, such as Plans and Elevations
- "**Sheets**" are generally supplementary information represented in textual form.

7.2.1 View Naming

Similar in purpose to file naming conventions, views must also adopt standardized naming conventions to convey a meaningful definition of the project.

View naming is divided into **3 parts**, each part is delineated by an underscore "_". All parts of this naming convention **are mandatory** and require to be strictly adhered to. The figure shown below is a sample in naming a view.

Table 7.2.1

Part 1		Part 2		Part 3
Discipline		**View**		**User Defined**
STRU		FP		1st Storey Plan View
STRU		FP		1st Storey Plan View

For more detail refer Table 2 - Naming Convention for each Drawing View in the **01BIMSubmissionTemplate_Struc-Apr11_A1.pdf** guideline by BCA

7.2.2 Naming convention for each drawing view

Table 6.2.2.1 below is broadly based on SS CP83 Standards for CAD File Naming. It will be noted that similarities in naming of files, views and sheets exist between all disciplines.

Table 7.2.2.1

Name of Field	Number of Characters	Indicators	Description of Field
Discipline	**4**	**ARCH**	Architectural Drawings
		STRU	Structural Drawings
		MEPS	Building Services Drawings
		Others	Additional disciplines not included but required
View	**2**	**SP**	Site Plans
		FR	Roof Plans
		FP	Floor Plans
		FE	Elevations
		FX	Cross Section Views
		3D	3D Views
		DT	Detail Views (rebar details, steel connections etc…)
		LV	Layout View (text only-ex. AC, QP & PE declarations)
User-defined	**4** min	This part describes the view. Some suggestions are listed below	
		1st STOREY	where **N**: Storey's number
		2nd STOREY	
		3rd STOREY	
		Nth STOREY	
		ROOF	Roof Level
		MEZZANINE N	where **N**: Mezzanine's number
		BASEMENT 1	where **N**: Basement's number
		ELEVATION N	where **N**: Directions (e.g.: East, West, North, South; or 1, 2, 3, 4)
		SECTION N	Where **N**: Section's Number

7.2.3 OPTION 1: Saved Views

A '**Saved View**' is a view definition, which includes the level display for both the active model and references, the clip volume, and other view attributes. A saved view can be applied to a destination view window.

BIMFileNaming.ma loaded in Bentley Building applications are configured with standardized naming for (saved) views. Access **SAVED VIEWS** task from the **PRIMARY TASKS MENU**. Refer **Figure:** 7.2.3.1 below.

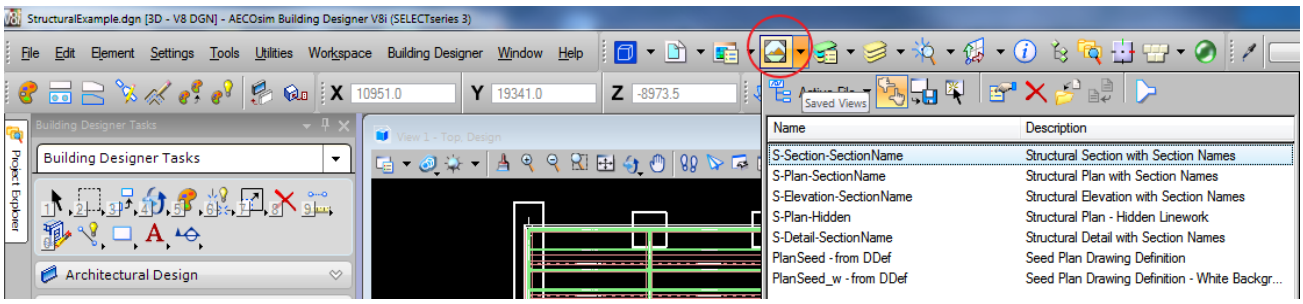


Figure: 7.2.3.1

Clicking on **CREATE SAVED VIEW** will pop up a utility **DRAWING VIEW FILE NAMING** to select / enter view name as per **BCA** standard.

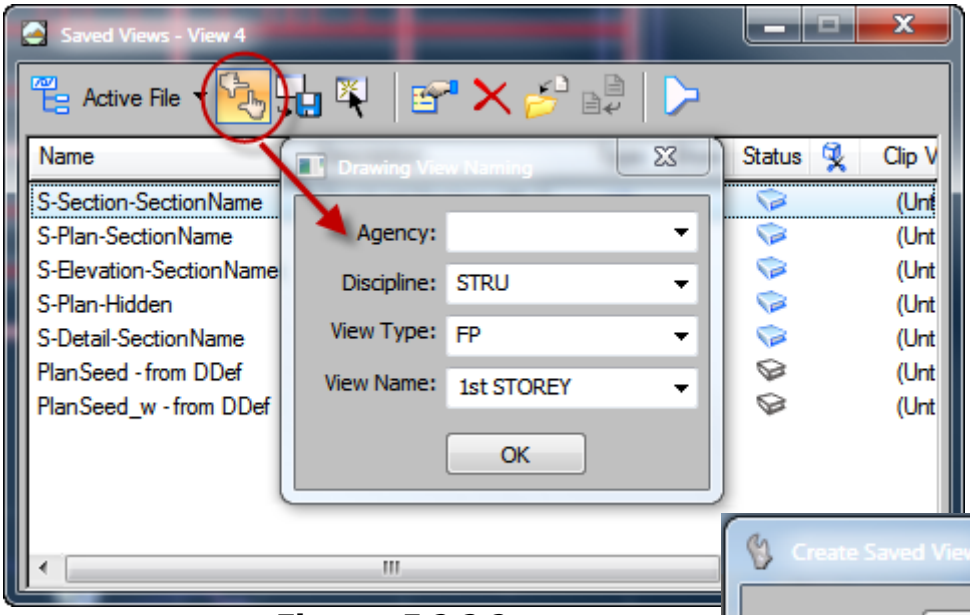


Figure: 7.2.3.2

Select the appropriate field from the drop down list for each of the above options relating to Agency, View Type and View Name and click **OK** to open the **CREATE SAVED VIEW** dialog box below which is automatically populated with data keyed-in from the previous step.

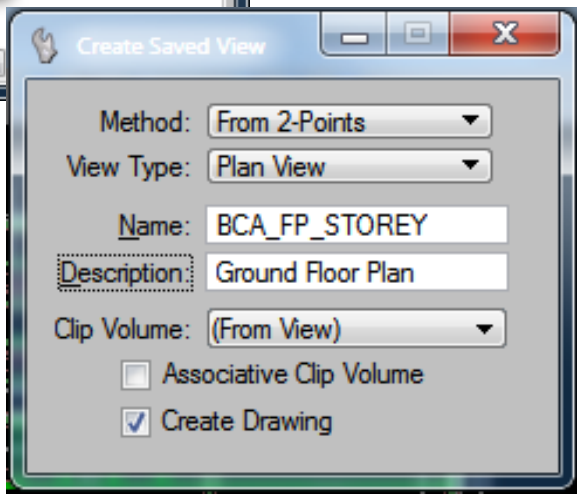


Figure: 7.2.3.3

Two data points that define the extent of the plan are required as input to define extents of plan as **From 2-Points** was selected as method of input (From View is the other option available for selection).

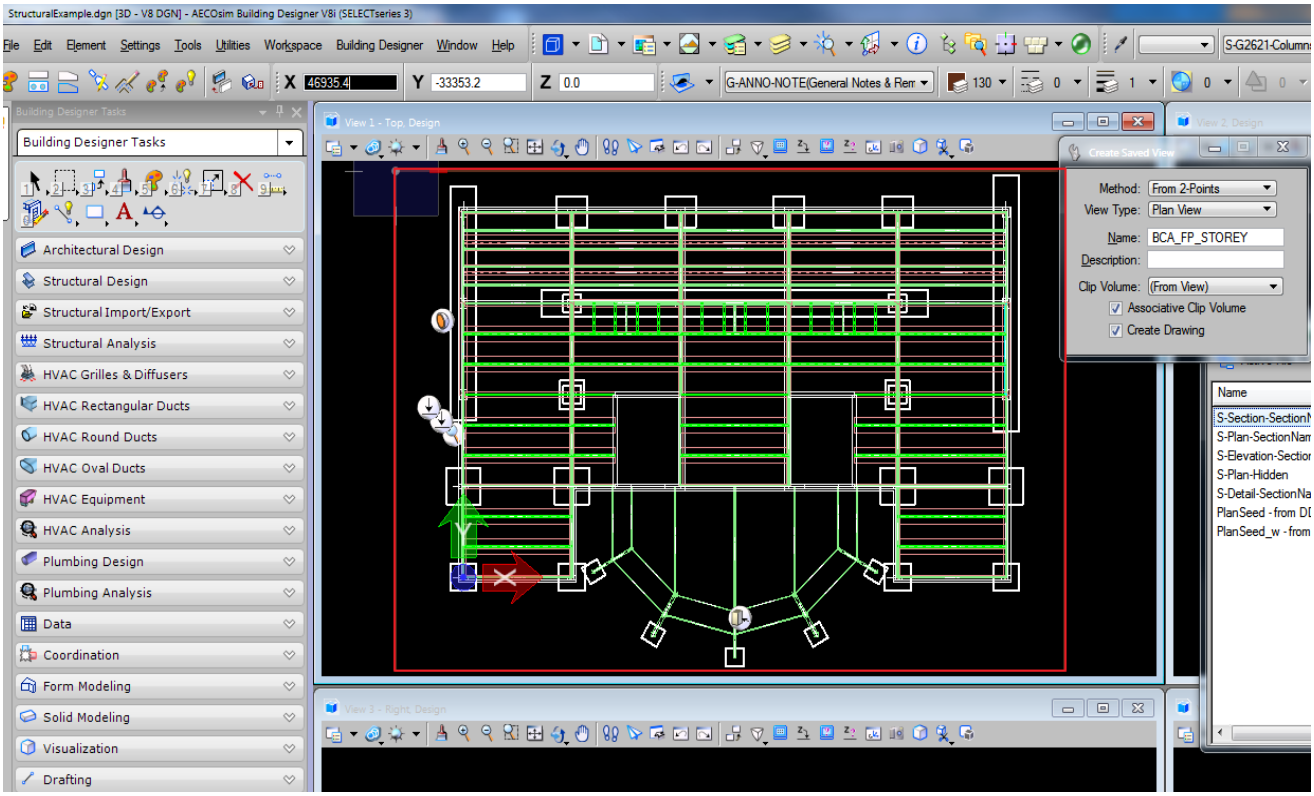


Figure: 7.2.3.4

Create Drawing dialog box opens with Name '**grayed**' out as this is derived from the previous step.

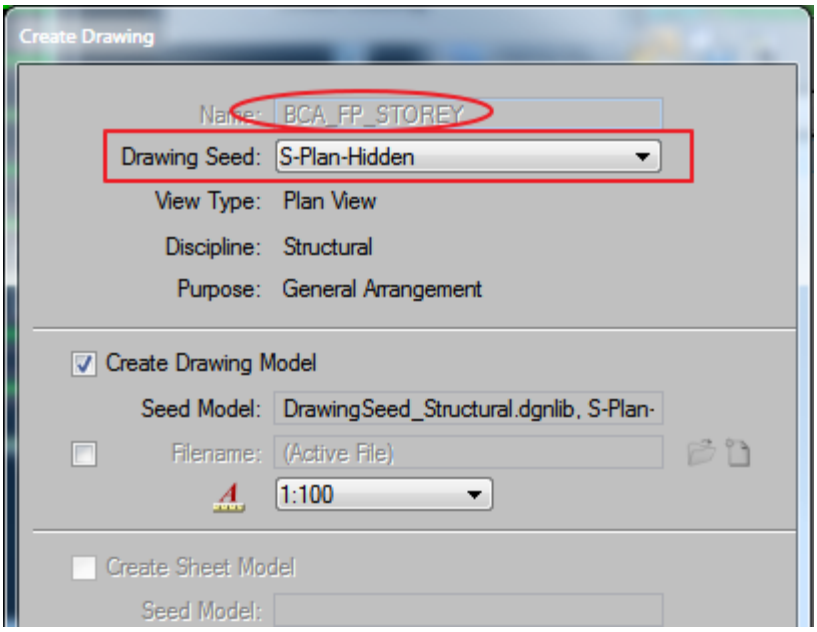


Figure: 7.2.3.5

The **Saved View** as well as the **Model** files is created with name based on BCA Standards.

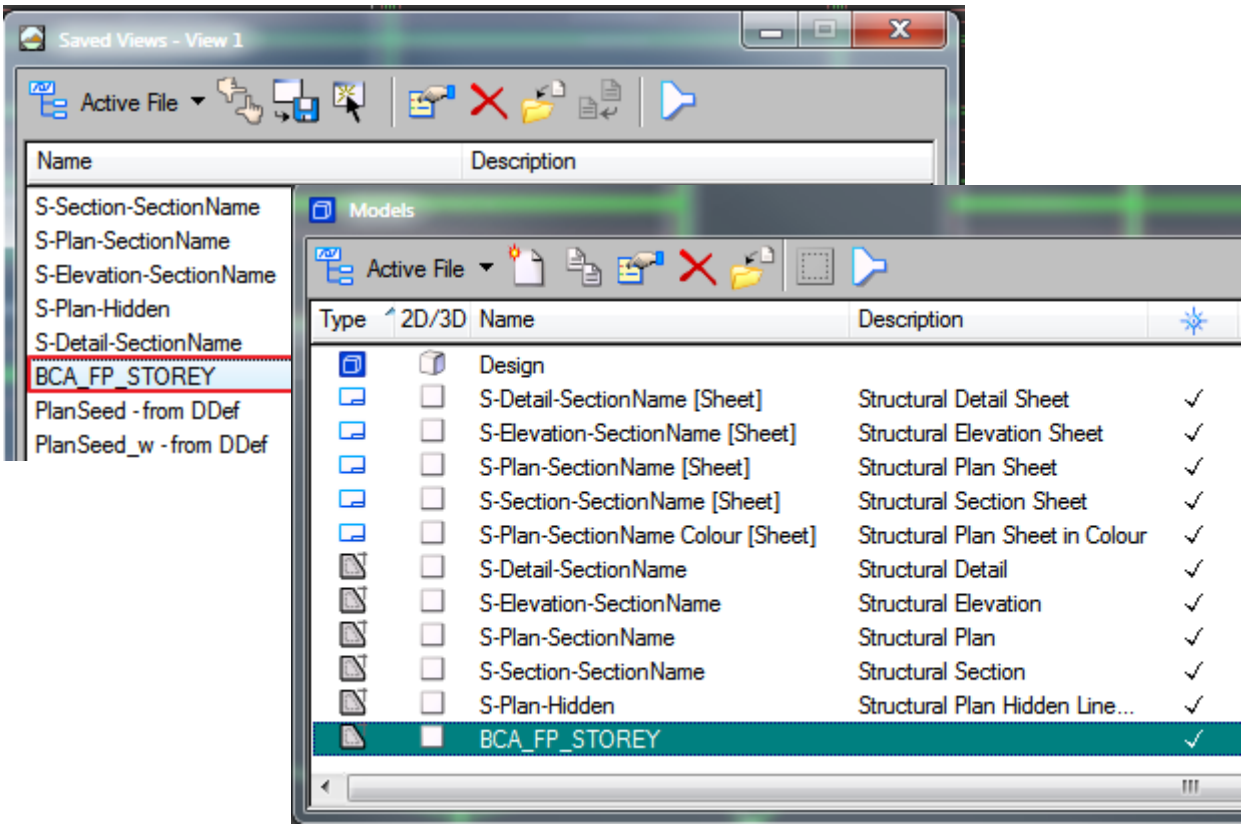


Figure: 7.2.3.6

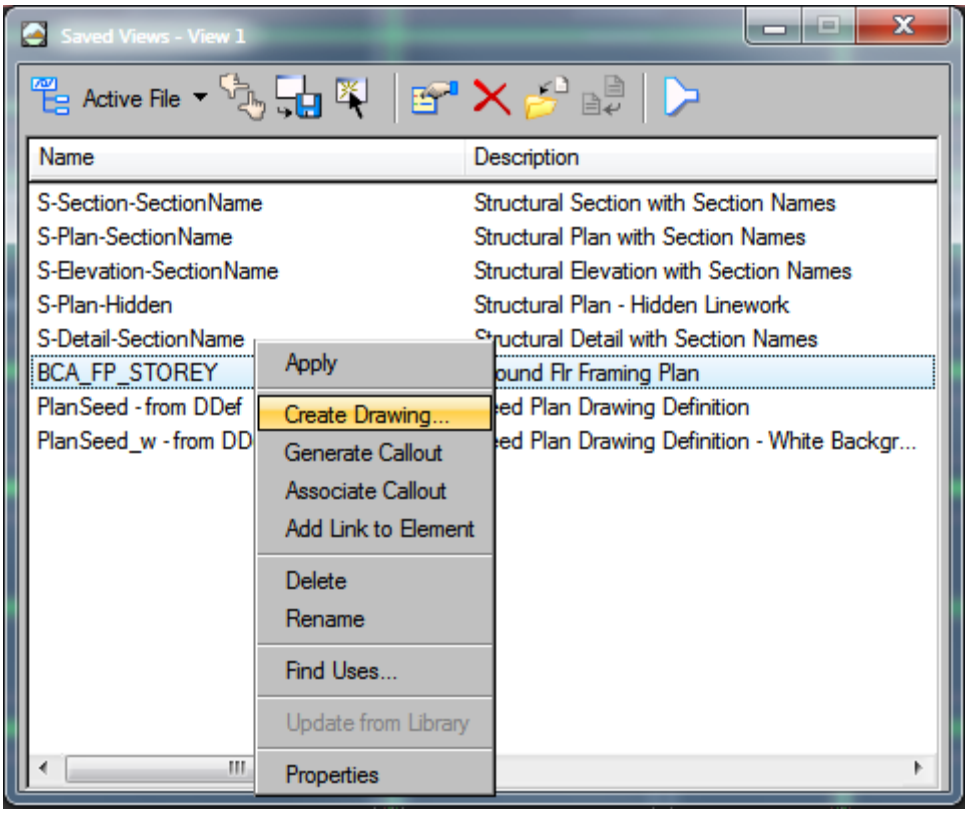


Figure: 7.2.3.7

Right click on the Saved View **BCA_FP_STOREY** opens the **CREATE DRAWING** dialog box. See Figure 7.2.3.8 below

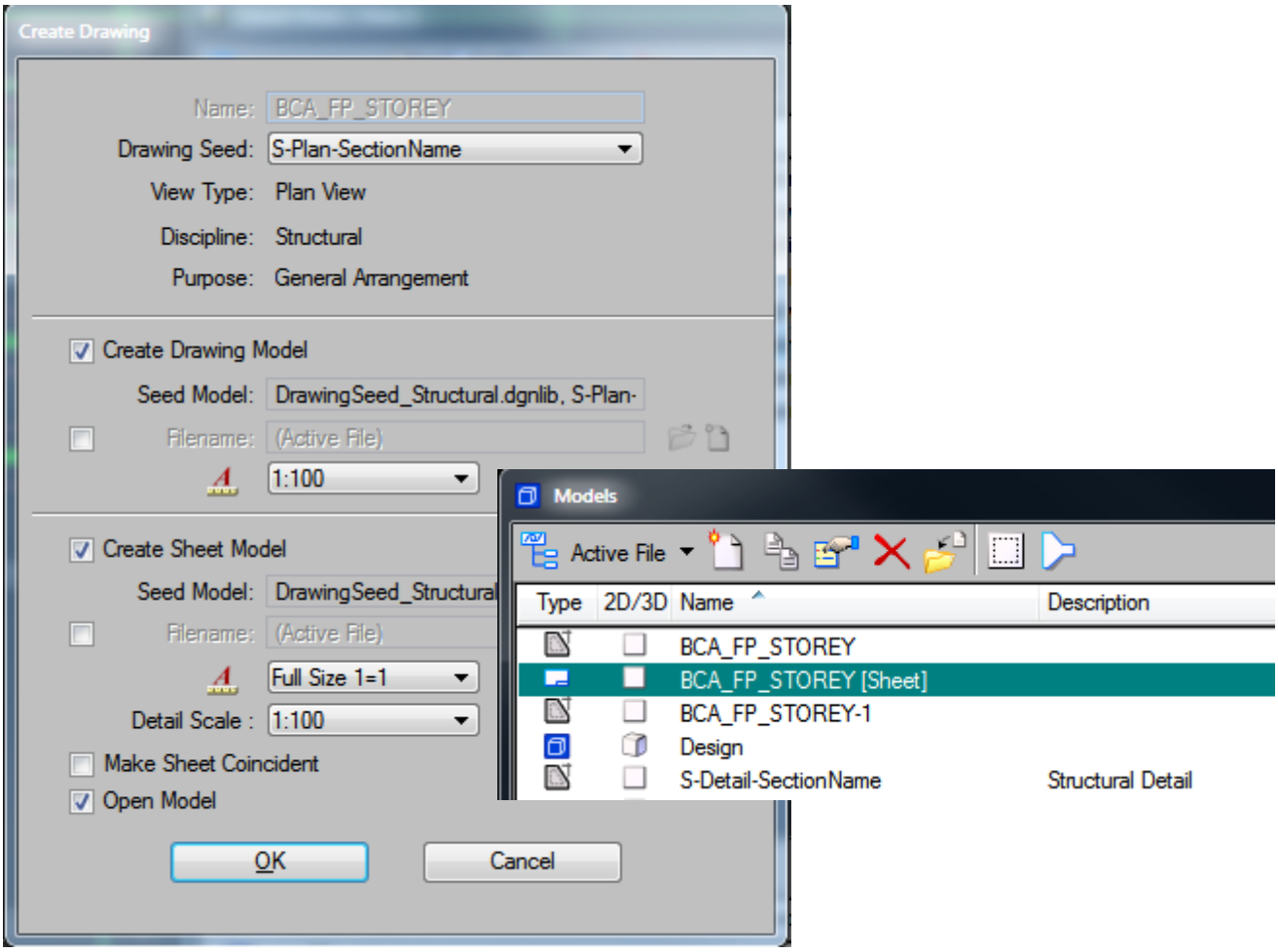


Figure: 7.2.3.8

A new **SHEET MODEL** with the appropriate naming convention is added once the user clicks OK.

7.2.4 OPTION 2: Dynamic Views

'**Dynamic Views**' is a general name that encompasses several related technologies which share a common goal of making model analysis and documentation more interactive and intuitive. One of these **technologies allows clipping of models and generating section graphics on the fly**. Section views, detail views, and elevation views are types of dynamic views. Gone are the days when designs are just static views, replaced by the ability to create live, intelligent sections of a design composition that update automatically (through the use of detailing symbols with fields and links) as the design evolves.

'**Building Dynamic Views**' are created using a host of Drawing Composition tools and Annotation tools, and they are managed using the Project Explorer. Building Dynamic Views are used to create dynamic view floor plans and drawings. The Create Floor Plan tool reads floor definitions from the Building Designer Floor Manager, the IFC i-model, and from named ACS definitions and shapes. Floor plans are created based on user defined settings and Floor Manager floor definitions. Designers can use single floor definitions or floor definition sets to create floor

plans. Shapes, defining an area within the model, can also be used to create floor plans. Floor plan properties include Building and floor definitions, story and level data, floor elevations, and distances between floors.

Creation of 'Views' may also be performed by creation of **DYNAMC** Views. Dynamic Views allows clipping of models and generating section graphics on the fly. Section views, detail views, and elevation views are types of dynamic views. A **BUILDING DYNAMIC VIEW** is a Saved View that incorporates the parameters of both the Active View and the Dynamic View. The Building Dynamic View applies additional information such as Forward, Cut, and Back view drawing symbols, sensitive distances, and patterning. Structural drawing rules are applied in this view using tabs in the Building panel. Building Dynamic Views are also used to create drawings for construction documents.

Selecting **CLIP VOLUME: APPLY or MODIFY CLIP VOLUME** from the 'View' tool bar across the top (or bottom) of the view (or via Tools>View>View Control>Clip Volume>Apply or Modify Clip Volume)

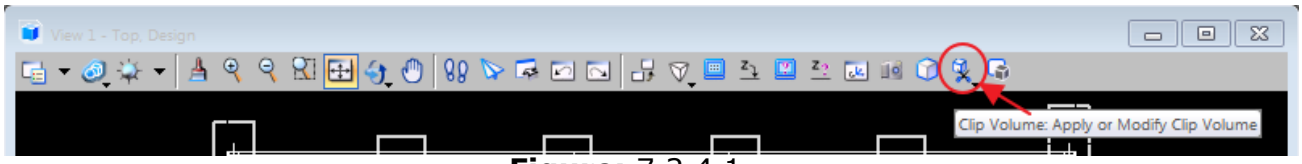


Figure: 7.2.4.1

.....opens a dialog box **PLACE FITTED SECTION** prompting the user to select a view from which a Dynamic View is created.

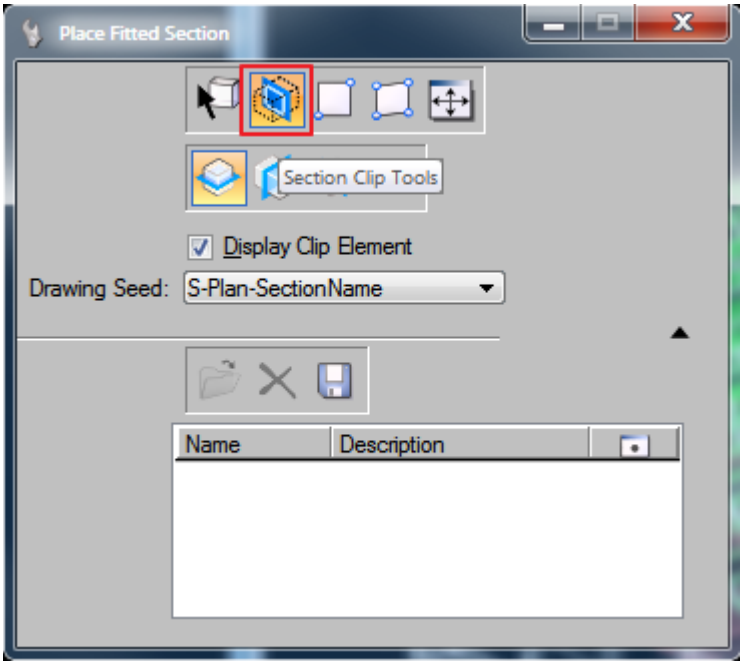


Figure: 7.2.4.2

Upon selecting an appropriate view the graphics are immediately clipped at the centre of the model. The clip boundary displays 'grips' that help define the **cut plane - Forward** and **Reflected** plane location. Once the plane is defined, **right clicking** on the **CLIP BOUNDARY** and selecting **CREATE DYNAMIC VIEW** will create a Floor plan. Refer **Figure:** 7.2.4.3 below

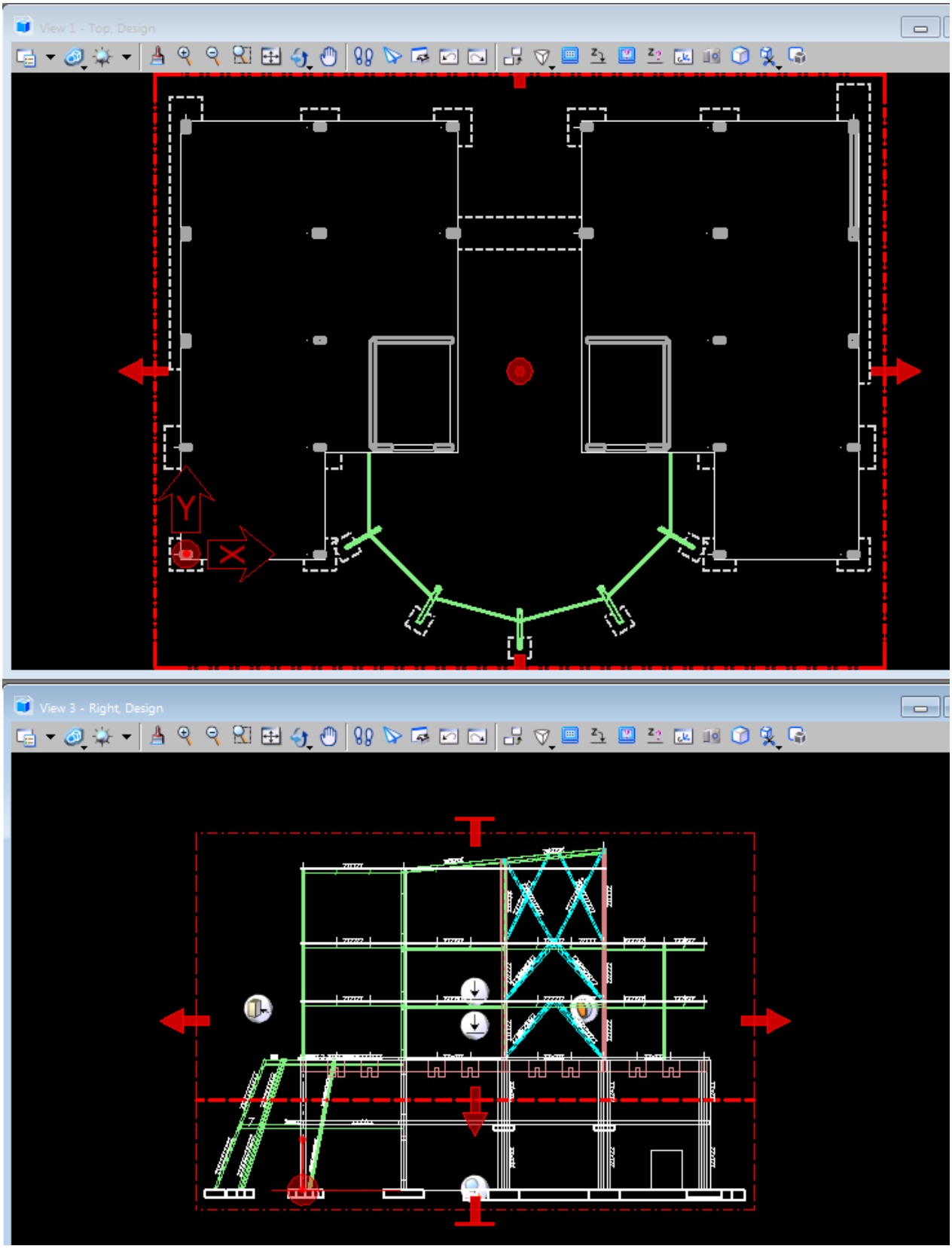


Figure: 7.2.4.3

From this point on the process and creation of Saved Views is similar to those that have already been outlined on Pages 24 through to 27.

7.2.5 OPTION 3: Hypermodels

Dynamic views features may be used to create sheet compositions. Previously in a 3D design, a model could be viewed in all its planes. However, dimensions, annotations and other details that were placed on the sheet models could not be seen. To view these details, the sheet models had to be navigated manually. Callouts could not be placed in a 3D design model. AECOsim Building Designer now provides the ability to not only place callouts in a 3D design model but also view these callouts in the sheet graphics in a 3D design model, in place, automatically. This capability of AECOsim Building Designer is called **'hypermodels'**

'Hypermodels' are therefore a combination of:

- dynamic views
- markers and
- mini toolbar features

.....that automatically contextulise in 3D all project documentation, so that both the drawings in sheets or drawing models as well as the 3D design model are easily understood, interpreted and updated.

Hypermodels:

- Link documents within the spatial context of 3D models
- Automatically coordinate models and drawings
- Slice and filter models interactively
- Update drawings automatically
- Update annotation dynamically

Some of the benefits of using callouts in 3D are:

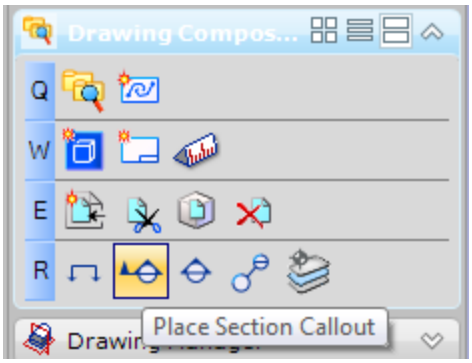
- Callouts make drawings easier to understand and interpret.
- The effectiveness of project communication is increased, leading to better informed decisions.
- Project quality is improved by the increase in speed to insight. This is beneficial through all phases of project: design, review, construction, operation.
- Callouts make 3D design models more reliable, effective and easy to use for construction, operation and so on.

Following is a generic workflow for using the callouts in a project.

7.2.5.1 General Procedure — Using Callouts in a Project

1. Place a Callout in a 3D design model or in a drawing or sheet model.

   The callout is automatically detected in the target design composition model.



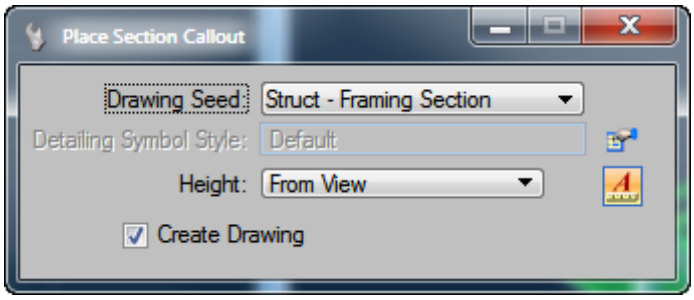


Figure: 7.2.5.1.1

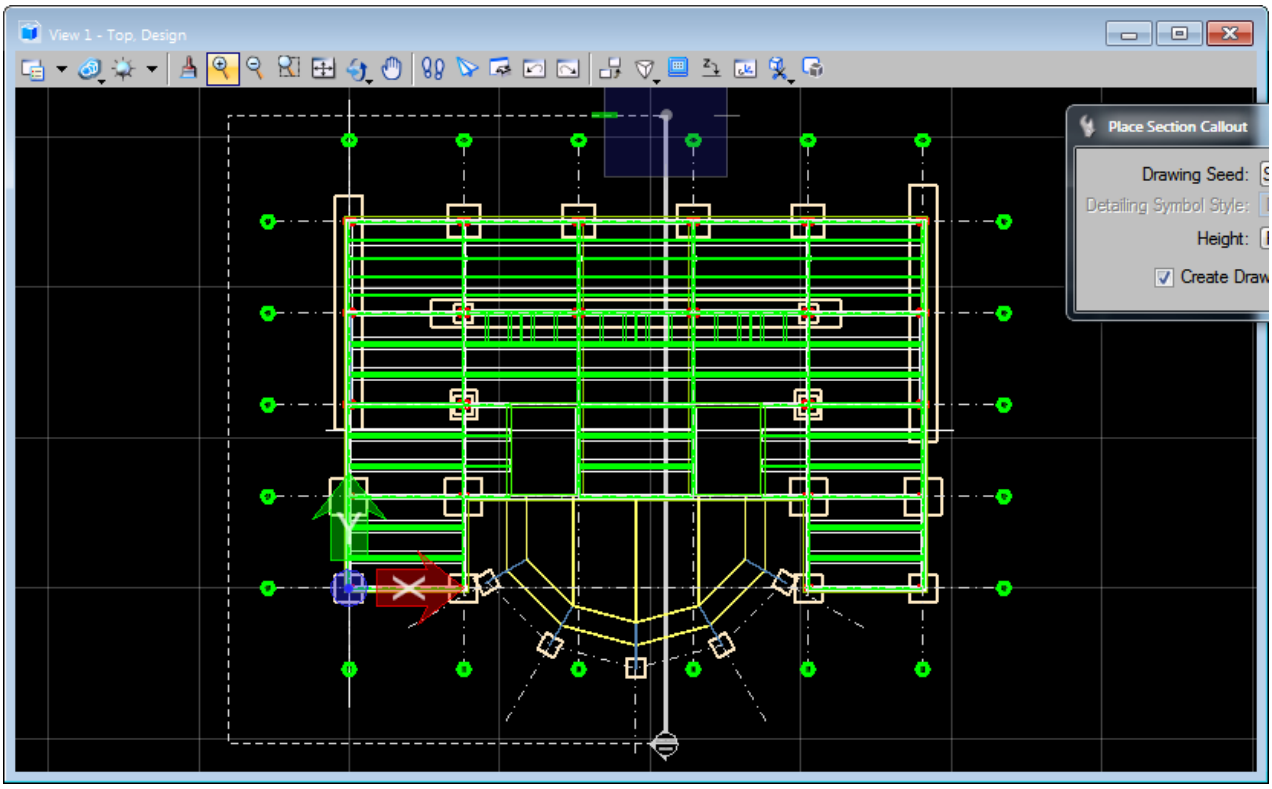


Figure: 7.2.5.1.2

2. From the Links tab of the Project Explorer dialog, drag the callout´s saved view onto another sheet.

3. Add annotations, dimensions and other embellishments on the sheet.

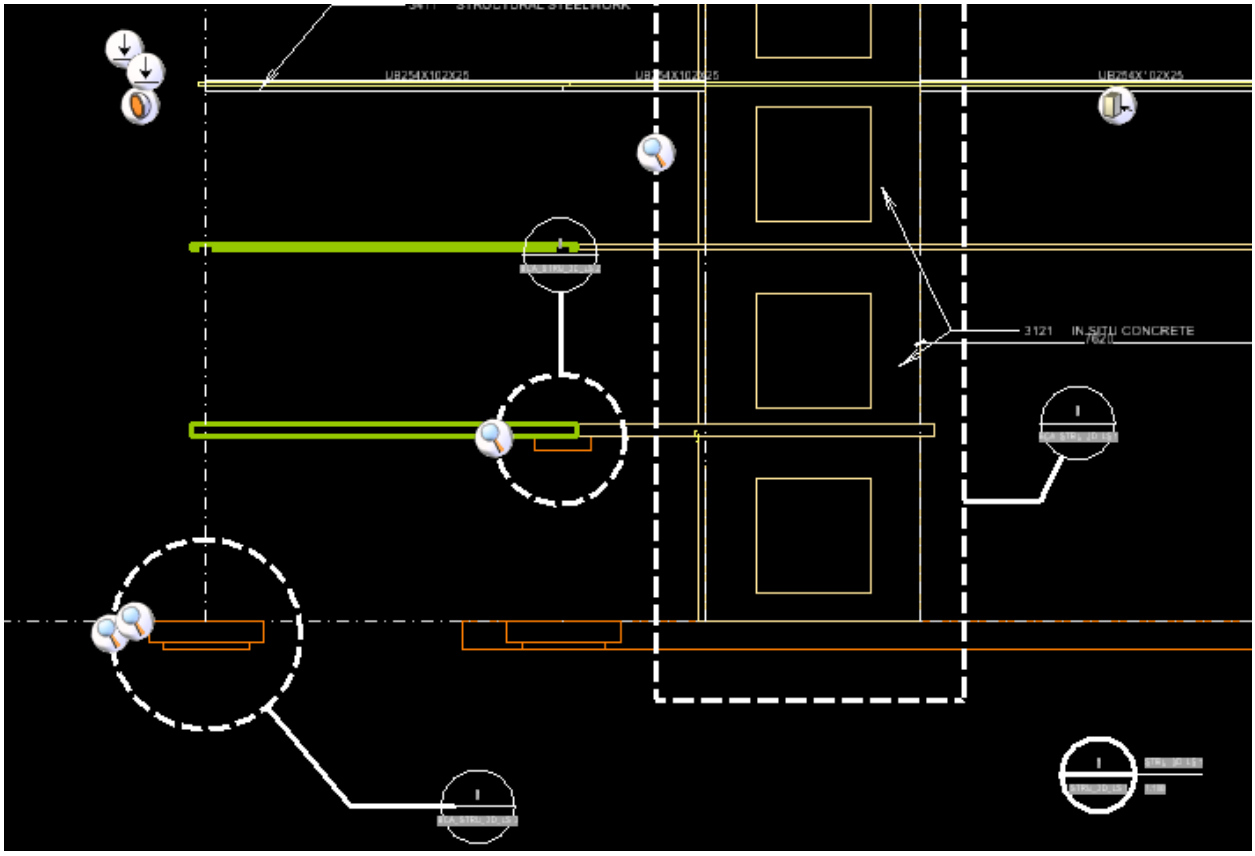


Figure: 7.2.5.1.3

4. In the 3D design model, turn on the Markers icon from the View Attributes dialog to view the markers of the saved views in the project.

5. Hold the pointer on a marker and select the Apply View tool. The saved view linked to the callout is applied in the 3D model.

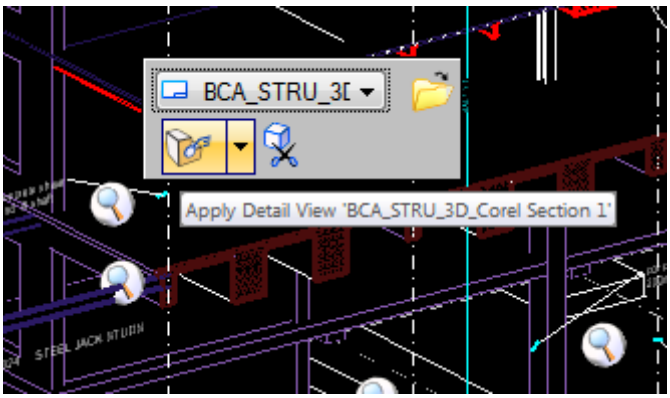


Figure: 7.2.5.1.4

The model is automatically clipped at the location of the callout with the given Apply View settings. It also displays the sheet annotations, dimensions and other embellishments, in the 3D model, in place.

6. To make changes in the annotations, select the Open Sheet Model tool on the Mini toolbar to open the sheet model.

7. Make the desired changes in the sheet model and select the Open Design Model tool in the Mini toolbar of the callout in sheet model to switch back to the 3D design model.

8. Select the next marker to view the next callout location.

The result is that all of your project documentation is contextualized in 3D, at your control, automatically so that both the drawings in the sheet or drawing models and the 3D design model are easy to understand, interpret and update.

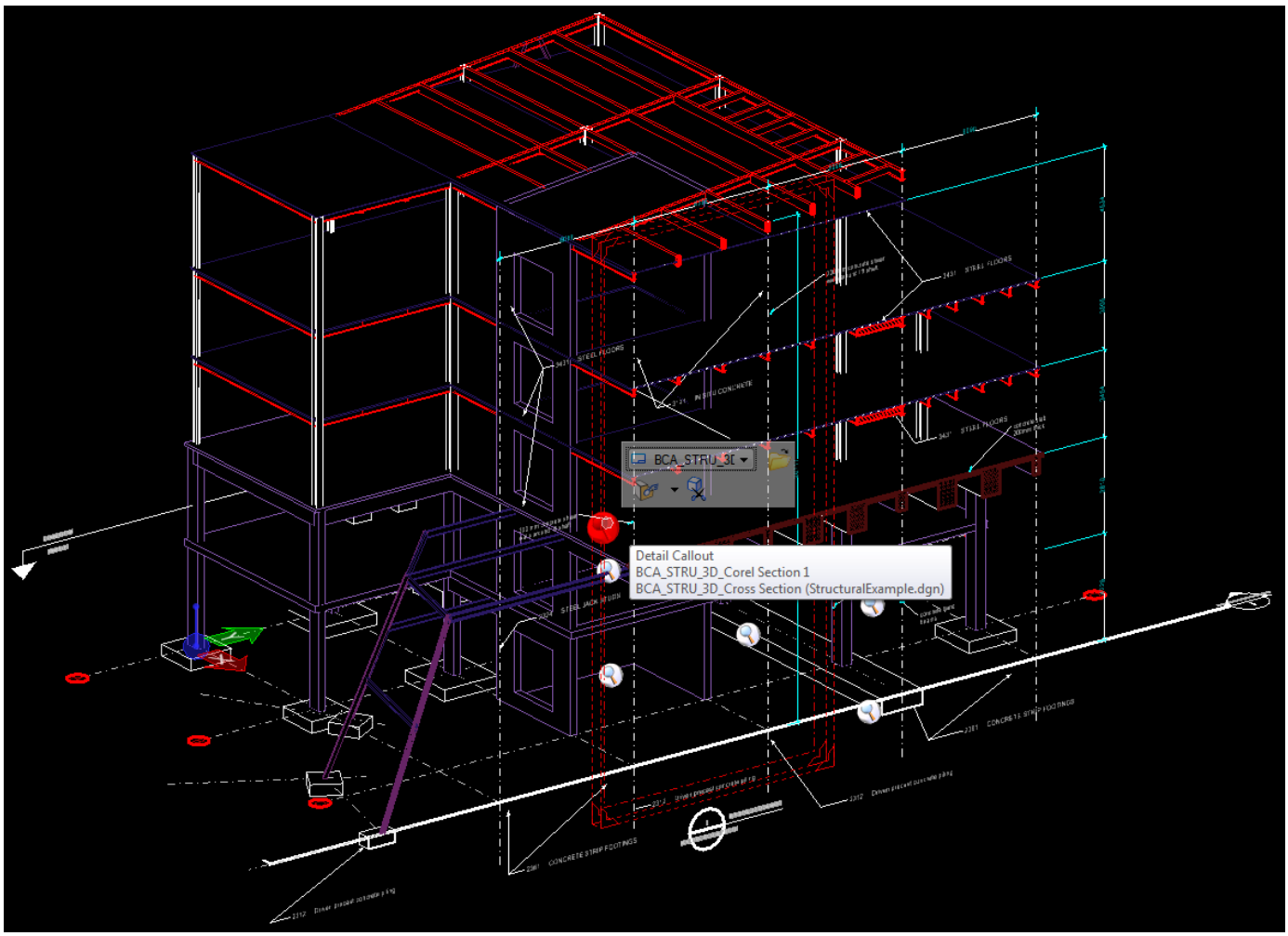


Figure: 7.2.5.1.5

NOTE: The workflow for the creation of new models and Sheets is exactly the same as those described under Option 1 : Saver Views.

Note: BIM e-Submission standard Naming Sheet / Model / View attributes can be modified or appended via SETTING.XML file which is located in the Installer path of AECOsim Building Designer.

By default the location is:
Drive:\WorkSpace\Projects\BuildingExamples\BIMe-Submission_SG\BCAFileNamingBCAFileNamingsetting.xml.

The regulatory agencies check and approve the saved views of a project model and all its peripheral information such as Site Plans, Floor Plans, Elevation and Section. Care should be taken to ensure that the following actions are exercised before exporting to the Light-Weight File for doing BIM e-Submission:

1. Maximum extent to each drawing views are set and saved
2. No hidden objects or annotation exist
3. Any external links such as attached 2D drawings, 3D model and project segment saved in other files, which are part of the submission must be bound into a single integrated model
4. All other external and internal reference object, regardless of drawing layers, annotations, draft work and construction lines, that are inside the project model having no bearing to the submission, must be removed or purged before doing BIM e-Submission
5. The use propriety fonts for annotation are unacceptable. All the fonts must be legible
6. All objects and annotation for each phases must be displayed in the last saved view
7. Ensure all "Project Basic Composition" views are available in the project. BIM native files may contain more than what is needed for the submission but the Light-Weight File must contain only the listed composition

7.3 Addition and Alteration Projects

"**Addition and Alteration**" (**A and A**) projects are required to comply with **SS-CP83, Part 5** in the project model. **Colour Identifier** (Refer Table 7.3.1) has to apply to all the objects in the model before doing BIM e-Submission.

Table 7.3.1

Colour	Usage
Magenta	**Proposed Elements**
Cyan	**Existing Elements**
Yellow	**Deleted Elements**

NOTE: All DGNlibs have now been updated to conform to **Singapore CP83: Part 5 2001 – Colour & Line Type.**

Object properties such as colour identifier, line styles can be configured in Bentley Building applications via **Families and Parts**. In **PROJECT MANAGEMENT MENU,** FAMILIES AND PARTS select single parts to open **DATAGROUP EXPLORER** which stores the CAD standard data of objects in the project model.

Refer **Figure:** 7.3.1 below.

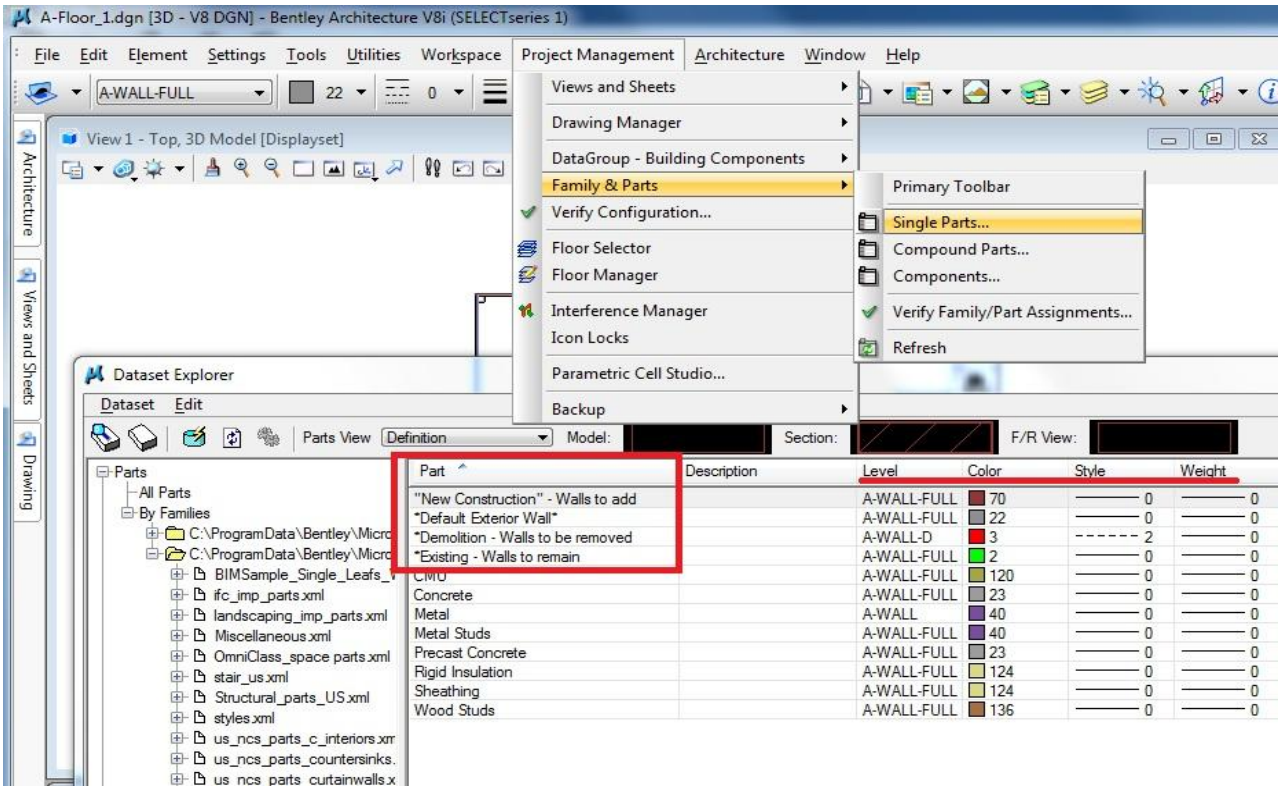


Figure: 7.3.1

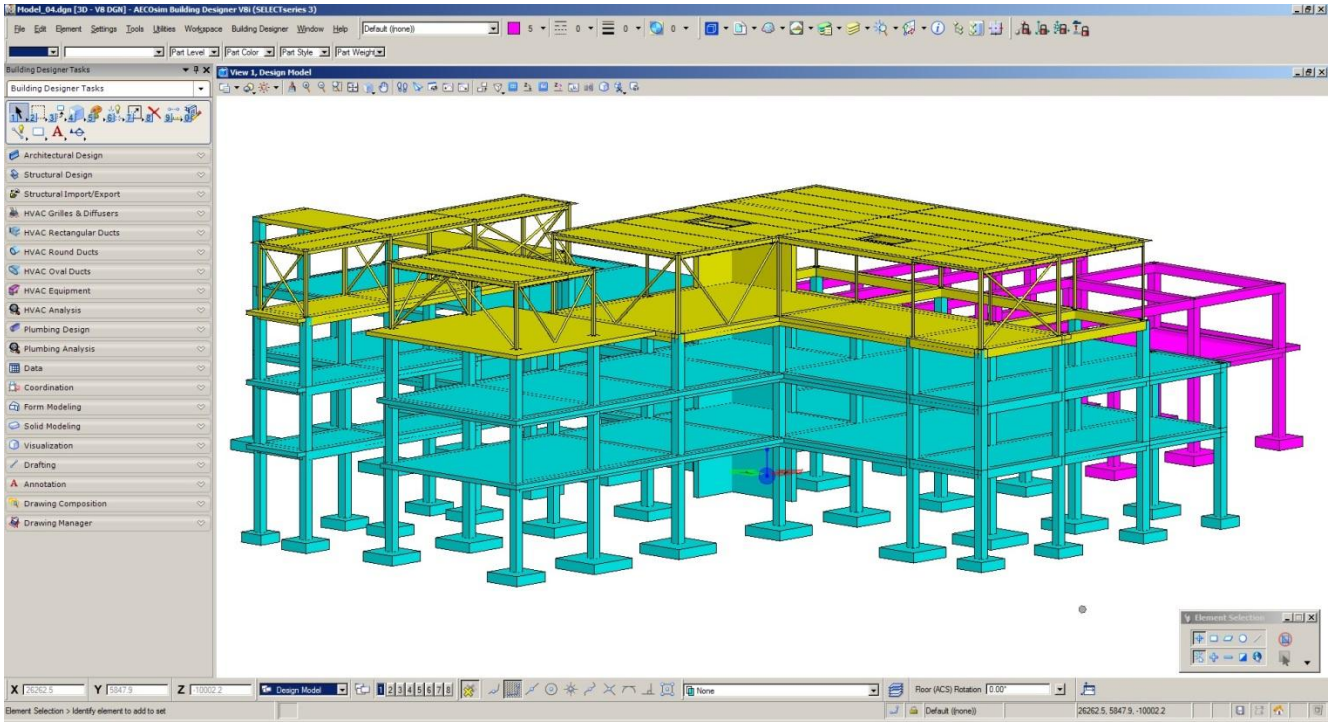

Model_04.dgn [3D - V8 DGN] - AECOsim Building Designer V8i (SELECTseries 3)
File Edit Element Settings Tools Utilities Workspace Building Designer Window Help
Building Designer Tasks
View 1, Design Model
Architectural Design
Structural Design
Structural Import/Export
HVAC Grilles & Diffusers
HVAC Rectangular Ducts
HVAC Round Ducts
HVAC Oval Ducts
HVAC Equipment
HVAC Analysis
Plumbing Design
Plumbing Analysis
Data
Coordination
Form Modeling
Solid Modeling
Visualization
Drafting
Annotation
Drawing Composition
Drawing Manager
Element Selection

Figure: 7.3.2

7.4 Project Basic Composition

For BIM e-Submission purpose, project models should have fundamental composition in explorer view which must be exported to the Light-Weight file. **Table 5** of the BIM e-Submission template document from BCA outlines the fundamental composition.

In Bentley Building applications, Project Explorer comprising the aforesaid composition can be accessed through **FILE MENU>PROJECT EXPLORER**. Refer **Figure:** 7.4.1 below.

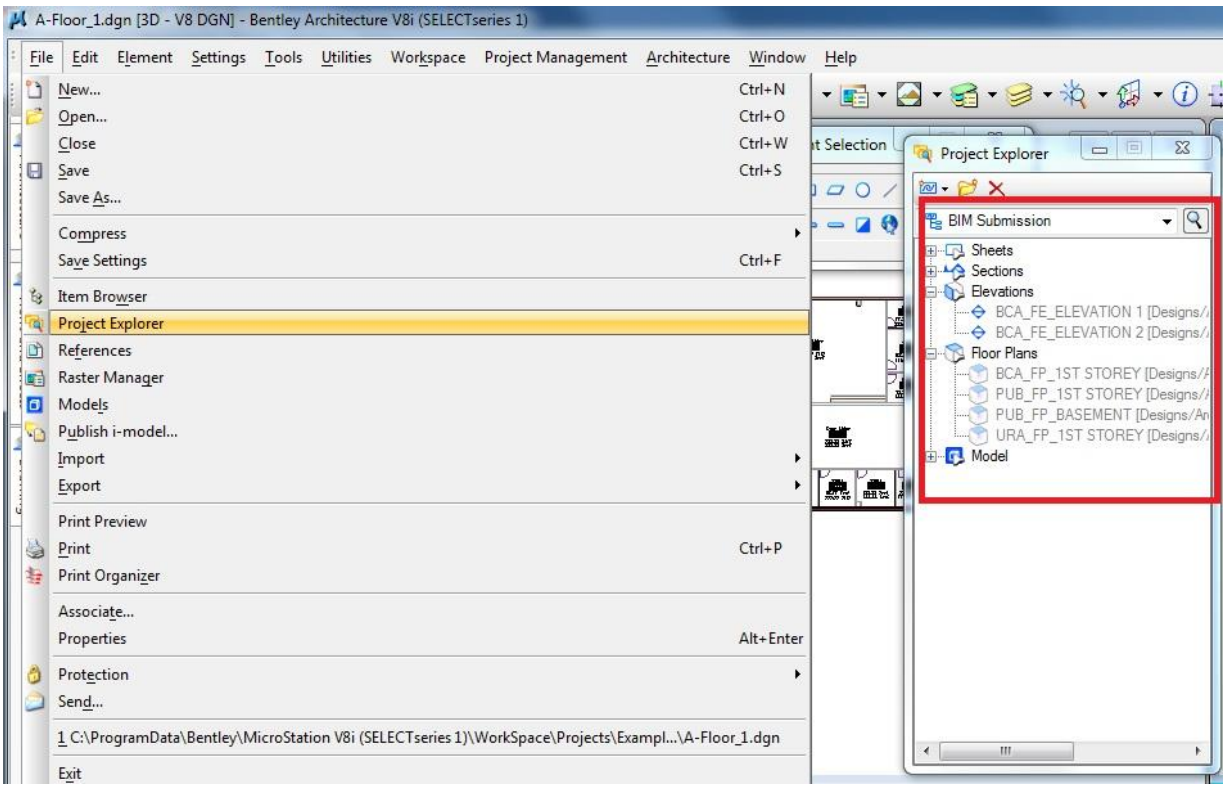


Figure: 7.4.1

By default the project explorer has configured with fundamental project composition defined by BCA.

8 BIM e-Submission Benefits

Benefits of using Bentley's templates and processes to achieve BIM enabled software approval status in Singapore include:

1. Structural BIM e-Submission is configured in Bentley Building applications via BIM e-Submission.DGN template file and BIMFileNaming.mdl
2. Users have the advantage of appending their Company CAD standards and project standards in the BIM e-Submission.dgn file. Care should be taken to ensure that the configuration does not violate the Structural BIM e-Submission requirements
3. Bentley BIM applications will strictly be in compliance and formatted to the Singapore Structural BIM e-submission standards. Users can focus on the main task of design and delivery of the Project

9 Conclusions

The Methodology described above fulfils the Singapore Structural BIM e-Submission requirements and also provides the building and construction firms registered in Singapore with BIM e-Submission.dgn template file and BIMFileNaming.mdl installer. Thus local firms could use the template for Structural BIM e-Submission for regulatory approval.