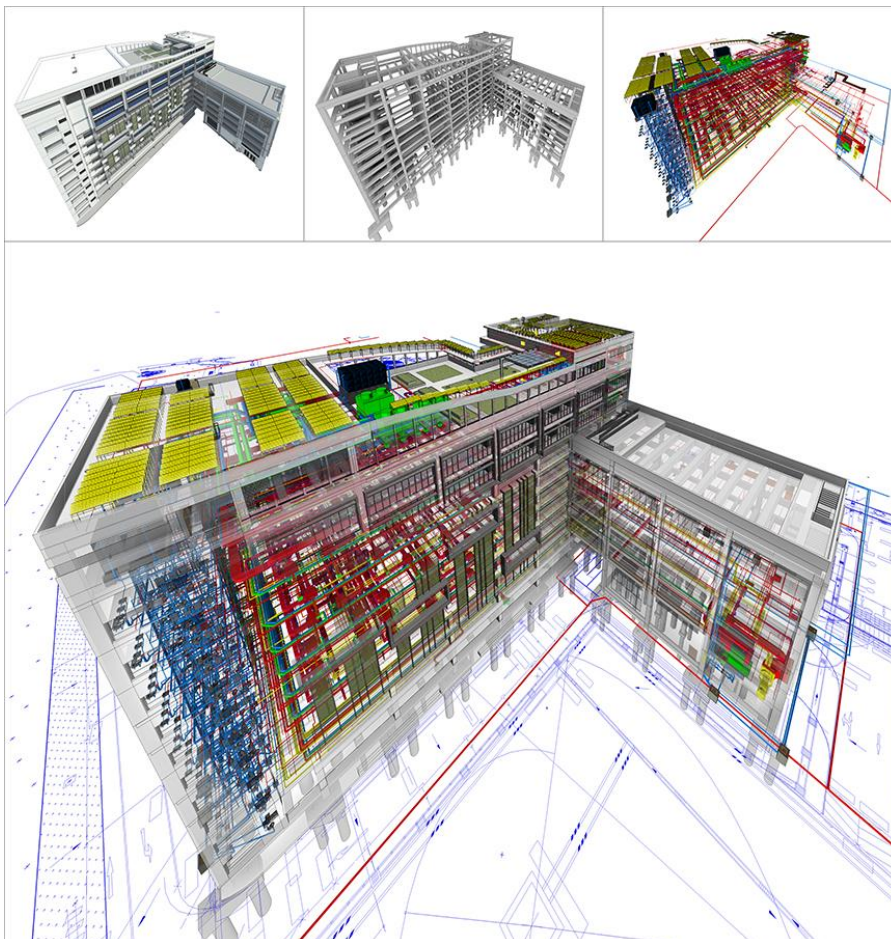


Code of Practice for Building Information Modelling (BIM) e-Submission

GENERAL REQUIREMENTS



BCA acknowledges the leadership provided by the BIM Steering Committee in support of the production of the Code of Practice for Building Information Modelling (BIM) e-Submission.

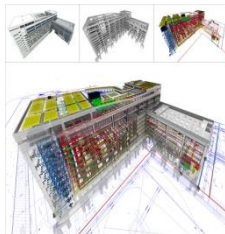
This Code of Practice (CP) has been prepared by the Centre for Construction IT on behalf of BCA and the BIM Steering Committee.

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1 OBJECTIVES

The objective of this Code of Practice is to assist Qualified Persons (QPs) to develop BIM models to meet the new requirements of Building Information Model (BIM) submission. It describes the requirements and guidelines on the creation of models with specific object types, associated properties and presentation format for regulatory BIM e-Submissions:

Table 1 - CORENET's Participating Agencies

Submission	Regulatory Agencies
Architectural	<ul style="list-style-type: none"> i. Building and Construction Authority (BCA) ii. Urban Redevelopment Authority (URA) iii. Singapore Civil Defence Force (SCDF) iv. National Environment Agency (NEA) v. Public Utilities Board (PUB) vi. National Parks Board (NParks) vii. Land Transport Authority (LTA) viii. Housing and Development Board (HDB) ix. JTC Corporation (JTC)
Civil & Structural (C&S)	<ul style="list-style-type: none"> i. Building and Construction Authority (BCA)
MEP	<ul style="list-style-type: none"> i. Building and Construction Authority (BCA) ii. National Environment Agency (NEA) iii. City Gas Pte Ltd iv. Info-communications Media Development Authority (IMDA) v. Public Utilities Board (PUB) vi. Singapore Civil Defence Force (SCDF)

Note:

The respective regulatory agency reserves the right to reject and request the resubmission of the required deliverables or formats that do not meet the requirements.

2 SCOPE

The part of the Code of Practice for BIM e-Submission contains the General Requirements for submission to CORENET's Participating Agencies as listed in Table 1.

The scope includes:

- Deliverables
- Site Model Setup
- Scale
- File Naming
- View Naming
- Annotations and Dimensions
- Colour Standards
- Last Saved Views
- Cover Page & Sheets
- Core Information (CI)

Note:

For more information or enquiries on the specific submission requirements, please refer to the 'Code of Practice for BIM e-Submission' discipline-specific requirements, or consult the appropriate regulatory agency, if necessary.

3 DEFINITIONS

For the purpose of this Code, the following definitions shall apply:

Table 2 - Definition of Terms

Building Information Model (BIM)	<p>Referred to as 'model' in this Code.</p> <p>Digital representation of physical and functional characteristics of an asset made of objects or elements.</p>
View	Generated rendition of the graphical and non-graphical information from the model (e.g. plan, section, elevation, schedule etc.).
BIM Object/Element	Refers to a digital representation of the physical and functional characteristics of an actual building component to be used in the project.
Core Information	Properties, attributes or parameters embedded in an object/element that shall be provided for use by the different project members for different purposes at different project stages.
BIM e-Submission Template	<p>Refers to the BIM Template file to use for BIM Regulatory Submission, which has customised Properties, Settings, Views, Objects and Schedule.</p> <p>BIM e-Submission Templates can be downloaded from CORENET website: (https://www.corenet.gov.sg/general/building-information-modeling-(bim)-e-submission.aspx)</p>
BIM e-Submission Template Guide	<p>Document explains how the BIM e-Submission Template shall be used.</p> <p>BIM e-Submission Template Guides can be downloaded from CORENET Website: (https://www.corenet.gov.sg/general/building-information-modeling-(bim)-e-submission.aspx)</p>

4 DELIVERABLES

This chapter describes the required deliverables to be submitted to the respective agencies. Files that are still in collaboration mode (e.g. worksharing, teamwork, etc) should be retrieved from the server and saved locally, so that they can be read by a non- server machine.

For more information, refer to **BIM e-Submission Template Guides**.

4.1 File Formats

Table 3 - File formats for Architectural Submissions

Regulatory Agencies	Acceptable File Formats	Remarks
i. Urban Redevelopment Authority (URA)	a. Native File Format (.rvt, .pla, .dgn); and b. Lightweight File Format (.dwf, .pdf, .bimx)	<i>Maximum file size of 1GB each.</i>
ii. Building and Construction Authority (BCA)	a. *Native File Format (.rvt, .pla, .dgn); or b. Lightweight File Format (.dwf, .pdf, .bimx)	
Other Agencies: iii. Singapore Civil Defence Force (SCDF) iv. National Environment Agency (NEA) v. Public Utilities Board (PUB) vi. National Parks Board (NParks) vii. Land Transport Authority (LTA) viii. Housing and Development Board (HDB) ix. JTC Corporation (JTC)	a. Lightweight File Format (.dwf, .pdf, .bimx)	

Table 4 - File formats for Civil & Structural Submissions

Regulatory Agencies	Acceptable File Formats	Remarks
i. Building and Construction Authority (BCA)	a. *Native File Format (.rvt, .db1, .dmp, .dgn, .pla); or b. Lightweight File Format (.dwf, .pdf, .bimx)	<i>Architectural reference file can be submitted in PDF or DWF format.</i> <i>BIM native file size total of 1 GB (including Architectural reference files) per ST.</i>

Table 5 - File formats for MEP Submissions

Regulatory Agencies	Acceptable File Formats	Remarks
i. Building and Construction Authority (BCA) ii. Info-communications Media Development Authority (IDA)- TFCC	a. *Native File Format (.rvt, .pla, .dgn); or b. Lightweight File Format (.dwf, .pdf, .bimx)	
i. City Gas ii. National Environment Agency (NEA)-CBPD iii. Public Utilities Board (PUB) iv. Singapore Civil Defence Force (SCDF) - FSSD	a. Lightweight File Format (.dwf, .pdf, .bimx)	

* For native file submissions to BCA, please refer to the [CORENET website](#) (as shown below) for the latest circular on the implementation dates for voluntary and mandatory submissions.

Note:

Any updates on the acceptable file formats by the regulatory agencies will be listed in the CORENET website.

Link: ([https://www.corenet.gov.sg/general/building-information-modeling-\(bim\)-e-submission.aspx](https://www.corenet.gov.sg/general/building-information-modeling-(bim)-e-submission.aspx))

5 SITE MODEL SETUP

5.1 Model Orientation and Site Configuration

The site model shall be geo-referenced to the Singapore SVY21 coordinate system for Easting and Northing (x, y) and to the Singapore Height Datum for Height or SHD (z).

The layout of the site model shall be presented in True North or real-world orientation.

Elevation levels of the model shall be set up based on Singapore Height Datum (SHD) of 0.000m.

Note:

The Registered Surveyor shall provide the coordinates of the survey control points in SVY21 coordinate system and SHD.

Site Model Setup shall follow the **BIM e-Submission Template Guides**.

6 SCALE

Model shall be created in full size of 1:1 and shall be in metric.

2D Views generated from the model shall not be in odd drawing scales.

7 FILE NAMING

This chapter describes the standard convention for naming of building information model files.

7.1 File Naming Format

The file name shall consist of 6 fields as shown in format below.

Fig. 1 - File Naming Format

Project ID (User-defined)	Author	Model Part	Submission Version	Software Version	Additional Information (User- defined)
—	—	—	—	—	—

Table 6 - Description of fields for File Naming

Field	Description	Maximum number of characters
Project ID	User-defined project reference identification or reference number.	6
Author	Discipline responsible for creating the model. (Refer to Table 7 for the codes)	2
Model Part	Zones, Blocks, Levels or Trades	6
Submission Version	Refers to the version number submitted to each regulatory agency. (Refer to Table 8 for the codes)	1
Software Version	Refers to the software version used and submitted to each regulatory agency. The last 3 characters of the software version shall be used. (Refer to Table 9 for the codes)	3
Additional Information	When submitting federated models, this field indicates the MAIN file.	6

7.2 Code for File Naming Fields

Table 7 - Discipline Codes for the First Character of Author field

Code	Author Description
A	Architect
C	Civil Engineer
G	Geotechnical Engineer
E	Electrical Engineer
L	Land Surveyor
M	Mechanical Engineer
N	Equipment Engineer
S	Structural Engineer
T	Telecommunication/Signal Engineer
V	Other disciplines
X	Contractor
Z	Sub- contractor/ Specialist Contractor

Table 8 - Codes for Submission Version

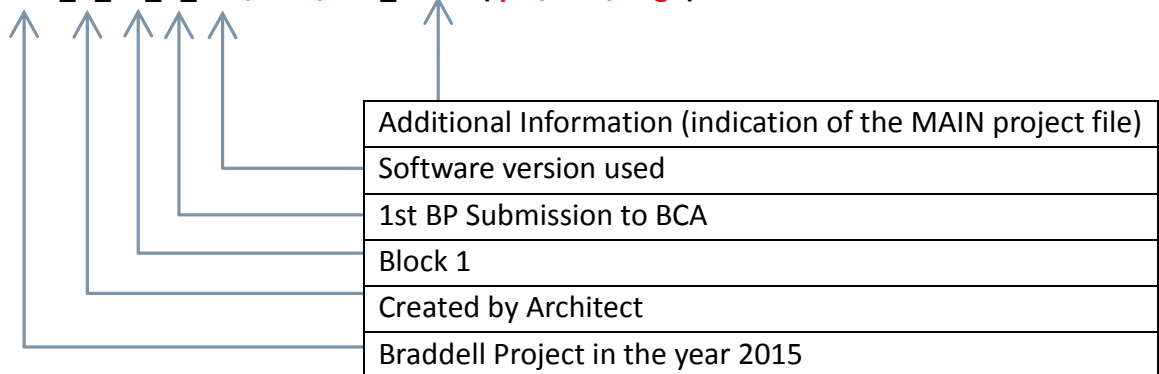
Code	Submission Version
A	1 st Submission
B	2 nd Submission
C...Z	n th Submission

Table 9 - Example Codes for Software Version

Code	Software/Version
A18	ARCHICAD 18
A19	ARCHICAD 19
A20	ARCHICAD 20
R15	Revit 2015
R16	Revit 2016
R17	Revit 2017
v8i	Aecosim Building Designer v8i
T19	Tekla 19
T20	Tekla 20
T21	Tekla 21

Note:

Versions indicated above are not comprehensive and are subject to changes.

*Examples of File Naming (Architectural)***BR15_A_B1_A_A20/R15/v8i_MAIN (.pla/ .rvt/ .dgn)****BR15_A_B1_B_A20.pla**

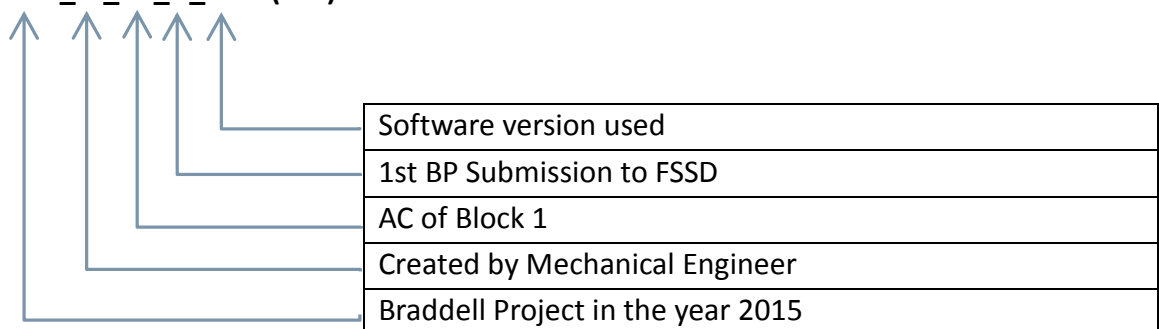
Model created by Architect (**A**) for Block 1 (**B1**), 2nd submission to BP (**B**), created in ARCHICAD 20 (**A20**).

BR15_A_B1_B_R15.rvt

Model created by Architect (**A**) for Block 1 (**B1**), 2nd submission to BP (**B**), created in Revit 2015 (**R15**).

BR15_A_B1_B_v8i.dgn

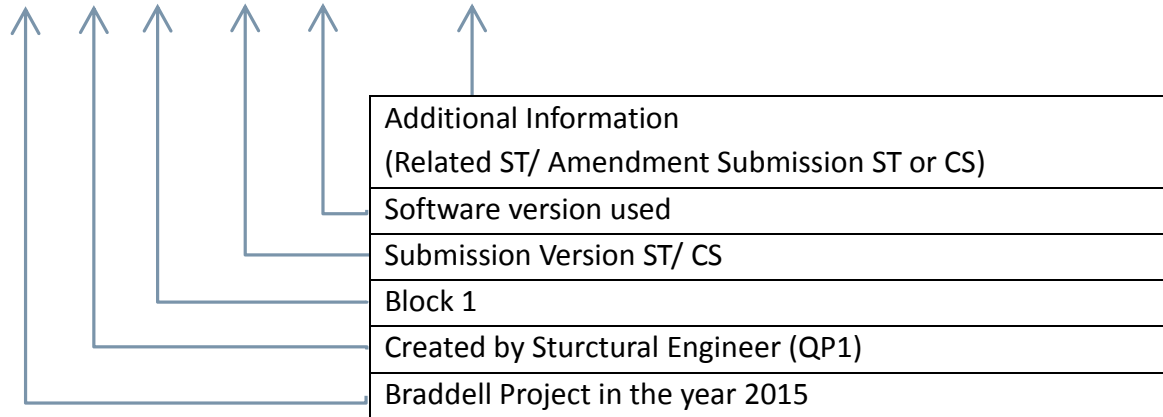
Model created by Architect (**A**) for Block 1 (**B1**), 2nd submission to BP (**B**), created in Aecosim v8i (**v8i**).

*Examples of File Naming (MEP)***BR15_M_B1AC_A_R15 (.rvt)****BR15_M_B1AC_A_R15.rvt**

Model created by Mechanical Engineer (**M**) for the air-conditioning and ventilation services of Block 1 (**B1AC**), 1st submission to FSSD (**A**), created in Revit 2015 (**R15**).

Examples of File Naming (Structural)

BR15_S1_B1ST_ST02_ R15/ v8i/ A20 _ST01 (.rvt/ .db1/ .dmp/ .dgn/ .pla)

**BR15_S_B1ST_ST01_R15.rvt**

Model created by Structural Engineer (**S**) for the structural elements of Block 1 (**B1ST**), 1st submission to ST (**ST01**), created in Revit 2015 (**R15**).

BR15_S_B1ST_ST01_T19.db1/ dmp

Model created by Structural Engineer (**S**) for the structural elements of Block 1 (**B1ST**), 1st submission to ST (**ST01**), created in Tekla 19 (**T19**).

BR15_S_B1ST_ST01_v8i.dgn

Model created by Structural Engineer (**S**) for the structural elements of Block 1 (**B1ST**), 1st submission to ST (**ST01**), created in Aecosim v8i (**v8i**).

BR15_S_B1ST_ST01_A20.pla

Model created by Structural Engineer (**S**) for the structural elements of Block 1 (**B1ST**), 1st submission to ST (**ST01**), created in Archicad 20 (**A20**).

Table 10 - Codes for Related ST

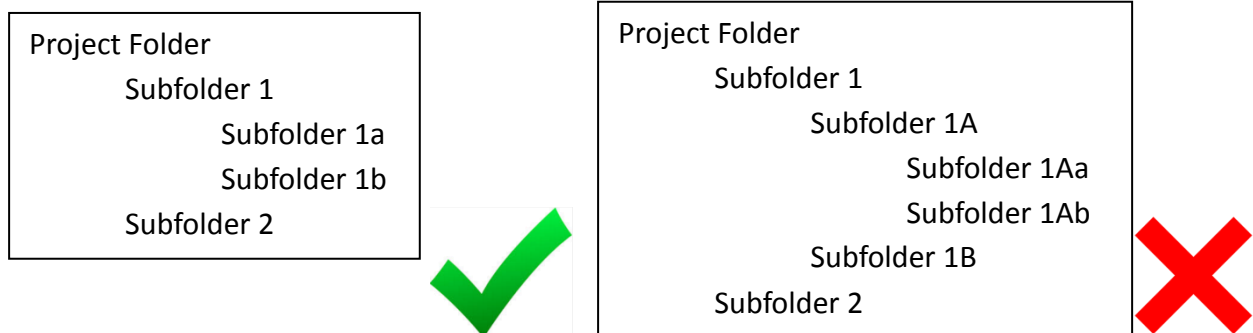
Code	Related ST
RPP	Record Plan Partial
RPF	Record Plan Full

7.3 File Structure

All submissions shall be structured in the either of the following formats:

- Single file
 - One single BIM file to contain all information. Suitable for small sized projects with only one main building.
- Federated or Linked files
 - Several BIM files linked or connected together to contain all information. Suitable for projects that comprise several buildings or that with big file size.
 - UNC (Universal Naming Convention) path or Relative path shall be used. A Relative path defines the position of a linked file in a working directory such as project folder. Its position is defined by its relative location.
 - Folder shall not have more than two (2) sub-folders.

Fig. 2 - Examples of Federated File Structure



QPs may opt to use any of the above mentioned method, whichever is appropriate for the project.

Software packaging shall follow the **BIM e-Submission Template Guides**, (if applicable).

8 VIEW NAMING

This chapter describes the standard convention for the naming of views in a model.

8.1 View Naming Format

View names shall consist of 3-4 fields as shown:

Fig. 3 - View Naming Format: (3 fields required; 1 field agency-specific)

Agency						Type of View	View Name (User-defined)	Additional Information (Agency-specific)

Table 11 - Description of fields for View Naming

Field	Description	Maximum Number of Characters
Agency	Abbreviated name of the Regulatory Agency for submission (Refer to Table 11 for the codes)	6
Type of View	Type of view (Refer to Table 12 for the codes)	2
View Name	User-defined detailed name for the particular view	-
Additional Information	Please refer to 'Code of Practice for BIM e-Submission' discipline-specific requirements. <i>Optional: If the agency does not require this additional information, the QPs shall leave it blank.</i>	-

View Naming shall follow the **BIM e-Submission Template Guides**.

8.2 Codes for View Naming Fields

Agency

Table 12 - Codes for Agency

Code	Agency
BCA	Building and Construction Authority
URA	Urban Redevelopment Authority
NEA (CBPD)	National Environment Agency (Central Building Plan Department)
PUB	Public Utilities Board
SCDF FSSD	Singapore Civil Defence Force (Fire Safety and Shelter Department)
NParks	National Parks Board
LTA	Land Transport Authority
HDB	Housing and Development Board
TFCC	Telecommunication Facility Coordination Committee
CITY	CityGas Pte Ltd
WRN	Water Reclamation (Network)
WTR	Water Supply Network

Type of View

Table 13 - Codes for Type of View

Code	Type of View
SP	Site Plan
FP	Floor Plan
FE	Elevation
FX	Section
DT	Detail
3D	3D
LV	Layout View (Cover Page)
DG	Schematic Diagram
LG	Legend
DP	Diagrammatic Plan (for strata boundaries)
LP	Landscape Plan
AP	Area Plan
TP	Terrain/Topographic Plan
LG	Legend

View Name

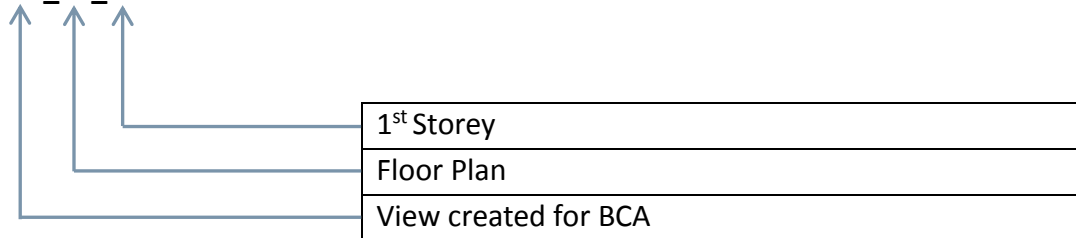
The field provides more information about the particular view of the model.

Examples:

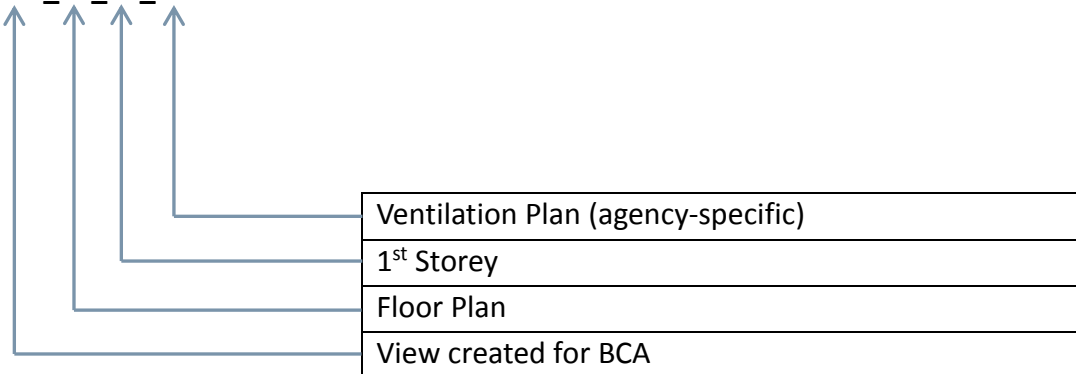
- 1st Storey
- North Elevation
- Section AA
- Fire Protection Legend
- Door Schedule

Examples:

BCA_FP_01



BCA_FP_01_VP



9 ANNOTATIONS AND DIMENSIONS

All submissions shall have minimal annotations as specified by the respective regulatory agency.

Annotations and Dimensions shall follow the **BIM e-Submission Template Guides**.





10 COLOUR STANDARDS

This chapter describes the standard colours to adopt for amendment submissions and submissions for addition and alteration works.

10.1 Colours for Amendments to Approved Plans

The colours for amendments to approved plans submissions required by the regulatory agencies are shown below.




Table 14a - Colours for Amendment to Approved Plans

Colour & Line Type		RGB Values			Usage
		R	G	B	
Magenta (Solid)		255	0	255	Proposed elements
Yellow (Hidden) OR		255	225	0	Deleted elements
Orange (Hidden)		255	204	0	
Overlapping of: Magenta (Solid) and Yellow (Hidden) OR Magenta (Solid) and Orange (Hidden)					Approved elements

10.2 Colours for Addition and Alteration (A&A) Works

The colours for Addition and Alteration submissions required by the regulatory agencies are shown below.

Table 14b - Colours for Addition and Alteration (A&A) Works

Colour & Line Type		RGB Values			Usage
		R	G	B	
Magenta (Solid)		255	0	255	Proposed elements
Cyan (Solid)		0	255	255	Existing elements
Yellow (Hidden)		255	255	0	Deleted elements

Colour Standards shall follow the **BIM e-Submission Template Guides**.

11 LAST SAVED VIEWS

Checking and approval from the regulatory agencies are based on the “Last Saved Model”, together with the “Last Saved View” of site plans, floor plans, elevations and sections submitted. Qualified Persons (QPs) are to ensure that the following items are checked before submission:

- a. Maximum extent is saved for each view.
- b. There are no hidden objects or annotations.
- c. All external files that form part of the submission can be loaded when opened.
- d. There shall be no missing/unreadable external files.
- e. All other external references, irrelevant drawing layers, objects, annotations, drafting work and construction lines, which are not part of the proposed building elements or submission, are to be removed or purged before submission.
- f. Unnecessary federated or linked files shall be purged before submission.
- g. No proprietary fonts are used for annotations and all the fonts should be legible.
- h. All objects and annotations in each phase are displayed in the last saved view.

Last Saved Views shall follow the **BIM e-Submission Template Guides**.

12 COVER PAGE

This chapter describes the cover page that shall be used for all submissions unless otherwise specified or provided for in the BIM e-Submission templates. The Cover Page shall contain minimally the following information or as specified under the discipline-specific requirements:

- 1 Submission Authority & Endorsement(s)/QP's declaration
- 2 Project Information
- 3 List of Views, Schedules and Sheets for approval

Fig. 4 - Example of Cover Page (as provided in the BIM e-submission template)

COVER PAGE

1. Submission Authority & Endorsement(s)/QP's declaration

2. Project Information

3. List of Views, Schedules and Sheets for approval

View Name	View Number	Sheet Number
Architectural	101	101
Structural	102	102
Mechanical	103	103
Electrical	104	104
Plumbing	105	105
Fire Protection	106	106
Transportation	107	107
Other	108	108

Project Details

Field	Value
Project Name	Project Name
Project Number	Project Number
Project Date	Project Date
Project Location	Project Location

- For Views, Schedules and Sheets required by agencies, please refer to the 'Code of Practice for BIM e-Submission' discipline-specific requirements.
- Naming of views used in submission shall be the same as the View Name.

Cover Page shall follow the **BIM e-Submission Template Guides**.

13 CORE INFORMATION (CI)

13.1 List of Core Information

All submissions shall have the minimal Core Information (CI) as specified by the respective regulatory agency.

Table 15 - Terms used in Core Information (CI)

Building Element	Refers to the actual physical element constructed on site by the contractors.	
BIM Object	Refers to the BIM object to be used to create the building element in the model.	
Parameters	Refer to the attributes/ parameters required by individual regulatory agencies.	
	Name:	Name of the parameter
	Sample Value:	Sample value for each parameter
	Remarks:	Any other specific remark in particular to the parameter.

Note:

Please refer to 'Code of Practice for BIM e-Submission' discipline-specific Requirements.

Core Information shall follow the **BIM e-Submission Template Guides**.

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CODE OF PRACTICE FOR BIM E-SUBMISSION SERIES

This section is part of the Code for Practice for BIM e-Submission series:

Code of Practice for BIM e-Submission	
	A. General Requirements
	B. Architectural Requirements
	C. Civil & Structural (C&S) Requirements
	D. Mechanical, Electrical & Plumbing (MEP) Requirements

All documents related to BIM e-Submission can be downloaded from the CORENET website:

- **Code of Practice for BIM e-Submission**
- **BIM e-Submission Templates**
- **BIM e-Submission Template Guides**

[https://www.corenet.gov.sg/general/building-information-modeling-\(bim\)-e-submission.aspx](https://www.corenet.gov.sg/general/building-information-modeling-(bim)-e-submission.aspx)



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