Building Information Modelling (BIM) Guide for Architectural Design
(Version 4.0)

Architectural Branch
Architectural Services Department

Objective

The primary purpose of this Guide is to gather and present factual materials in such a manner that project officers, both professional and technical, could obtain a common reference of the various practices on the adoption of BIM in architectural design and construction for building projects undertaken by the Architectural Branch of the Architectural Services Department.

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4	15, 20,22,24	- General update of Clause 4.1 - Clause 4.4 added Project Units format table - Clause 4.8 added on Sheet/Layout/Drawing Management - Clause 4.9.3 deleted - Revision of Clause 4.10 on BIM Object Files
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4	17, 23, 24	- General update of Clause 4.7, 4.10.1 and 4.10.2 - Clause 4.10.3 and 4.10.4 added			
5	27	- "Project" deleted in Clause 5.2			
Annex C	32,33	- Annex C added			

1 Introduction

1.1 Overview

This Building Information Modelling (BIM) Guide for Architectural Design documents the general requirements of the management and production of BIM models for building projects managed by Architectural Services Department (ArchSD). It aims at providing the general requirements and practices for the processing of BIM model and related deliverables at design, construction and handover stages in order to achieve the following objectives:

- To facilitate the building up of unified data management structure
- To standardise the settings and configurations of BIM model
- To facilitate the production of common set of BIM objects

This BIM Guide for Architectural Design (hereinafter called "The Guide") is formulated base on internationally and locally recognized BIM standards, guidelines and industry practices. While BIM is under rapid development, this Guide shall be subject to regular review and update to suit the latest development of BIM.

1.2 Reference BIM Standards and Guidelines

This Guide has made referenced to the following international and local standards and guidelines:

(a) Development Bureau Technical Circular (Works) No. 02/2021 - Adoption of Building Information Modelling for Capital Works Projects in Hong Kong;
(b) Development Bureau Technical Circular (Works) No. 08/2021 – Building Information Modelling Harmonisation Guidelines for Capital Works Projects in Hong Kong;
(c) BIM Harmonisation Guidelines for Works Departments (Version 2.0 – May 2023) by the Development Bureau;
(d) CIC BIM Standards - General (Version 2.1 - December 2021) issued by Hong Kong Construction Industry Council;
(e) CIC BIM Standards for Architecture and Structural Engineering (Version 2.1 – 2021) issued by Hong Kong Construction Industry Council;
(f) CIC BIM Standards for Mechanical, Electrical and Plumbing (Version 2 -2021) issued by Hong Kong Construction Industry Council;
(g) CIC Production of BIM Object Guide - General Requirements (Version 2 – 2021) issued by Hong Kong Construction Industry Council;
(h) CIC BIM Dictionary (2021) issued by Hong Kong Construction Industry Council;
(i) CIC Beginner's Guide on Construction Digitalisation – Adoption of Common Data Environment (CDE) (November 2022) issued by Hong Kong Construction Industry Council;
(j) Building Information Modelling (BIM) Guide for SCCU Submissions (Version 1.1 – December 2023)
(k) CIC BIM Standards for Preparation of Statutory Plan Submissions (December 2020) issued by Hong Kong Construction Industry Council;
(l) Guidelines for using Building Information Modelling in Statutory Plan Submissions (other than General Building Plan) 2023 issued by Buildings Department and Hong Kong Construction Industry Council;

(m) Building Information Modelling – Asset Management (BIM-AM) Standards and Guidelines Version 3.0 (2022 Edition) issued by Electrical and Mechanical Services Department (EMSD) ;
(n) Computer-Aided-Drafting Standard for Works Projects (CSWP) issued by Development Bureau of the HKSAR Government;
(o) Building Information Modelling for General Building Plan Submission (Phase One) Consultancy Report, FEB 2017 by Hong Kong Construction Industry Council;
(p) American Institute of Architects (AIA)'s G202™-2013 Project Building Information Modeling Protocol Form;
(q) BS EN ISO 19650-1:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling, Part 1: Concepts and principles;
(r) BS EN ISO 19650-2:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling, Part 2: Delivery phase of the assets;
(s) BS EN ISO 19650-3:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling, Part 3: Operational phase of the assets;
(t) BS EN ISO 19650-5:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling, Part 5: Security-minded approach to information management;
(u) BIM Guide for Facilities Upkeep issued by Property Services Branch of Architectural Services Department; and
(v) BIM Guide for Cost Estimation issued by Quantity Surveying Branch of the Architectural Services Department.

1.3 Terminology

The abbreviations and terminology/glossary shall refer the CIC BIM Dictionary (2021).

2 Data Management Requirements

2.1 General

Prior to BIM model production, a unified data management structure must be established for collaboration and information exchange efficiently. The project setup framework should make reference to the BS EN ISO 19650.

A typical project setup must be applied for individual project according to the framework described in Item 2.2 Project Folder Structure of this Guide and documented in the BIM Execution Plan (BEP).

For consistency, it is recommended to have the same project setup both in the Common Data Environment (CDE) and the individual computer workstation.

2.2 Project Folder Structure

The project folder structures for BIM adopted projects are recommended as:

(a) Main Folder Structure

All project data shall be stored under corresponding Workstage folder. “06 As-built” folder shall refer to the latest version of Building Information Modelling (BIM) Guide for Facilities Upkeep by Property Services Branch.

Folder Structure	Description
[InForM No./Project Code]	
01 General	Folder to share general information such as contact list, project information, templates, title block, reference materials, etc.
02 WIP	
10_Architectutral	Folders to store work in progress (WIP) models/information being developed by individual discipline teams for internal collaboration. Usually the access is restricted to the individual discipline teams.
20_Building Services	
30_Structural	
40_Landscape Architecture	
50_Quantity Surveying	
60_Project Management	
03 Shared	
10_Architectutral	Folders to share approved models/information by individual discipline team for collaboration. Only current models/information should be
20_Building Services	

- 30_Structural
- 40_Landscape Architecture
- 50_Quantity Surveying
- 60_Project Management

stored and outdated/obsolete files should be moved to the "05 Archive" folder.

- 04 Published
  - 10_Architectutral
  - 20_Building Services
  - 30_Structural
  - 40_Landscape Architecture
  - 50_Quantity Surveying
  - 60_Project Management

Folders to share authorized models/information for publishing at milestones (usually in non-editable format) where they are ready for submission, procurement and construction (e.g. GBP, Tender DWG, etc.).

- 05 Archive
  - 10_Architectutral
  - 20_Building Services
  - 30_Structural
  - 40_Landscape Architecture
  - 50_Quantity Surveying
  - 60_Project Management

Folders to store historical records of file transaction such as previously shared/published models which were outdated.

- 06 As-built
  - 10_Admin
  - 20_BIM Library
  - 30_As-built BIM
  - 40_O&M Documentation
  - 50_Photo
  - 60_Drawing Sheet
  - 70_Inspection
  - 80_Statutory
  - 90_Others

Folders to store as-built models/information with structure referenced to BIM Guide for Facilities Upkeep.

2.3 Model Division

A project BIM model should be divided into separate categories and/or building blocks depending on the nature and complexity of the project. For projects with large site footprint where several building blocks existed, the model may be further divided into several zones for more efficient handling of models. The model could be divided by blocks, phases, floors or trades, etc. Once divided, the series of individual models are much easier to manage than one large file. For example:

For project with a single building block:

Model Name	Building	Category
8216-ADA-XX-XX-AR-M3_N-001.xxx	Government Offices	Architectural 3D Model
8216-ADA-XX-XX-AR_CL-M3_N-001.xxx	Government Offices	Ceiling
8216-ADA-XX-XX-AR_FE-M3_N-001.xxx	Government Offices	Furniture

For project with 2 separated building blocks or phases:

Model Name	Building	Category
8216-ADA-01-XX-AR-M3_N-001.xxx	Government Offices Block/Phase 1	Architectural 3D Model
8216-ADA-02-XX-AR-M3_N-001.xxx	Government Offices Block/Phase 2	Architectural 3D Model

Under special circumstances, a single BIM model may be acceptable depending on the nature and complexity of project. The BIM Execution Plan shall state the model division strategy (by categories or building blocks, etc.). File sizes of each divided BIM model shall be kept in minimum by purging of unused views, BIM objects and settings before publish or submission. In general, the maximum file size for each divided BIM model should not exceed 500Mb unless otherwise approved. The modelling practices for all divided BIM models shall be consistent so that they could be combined into federated model together with models of other disciplines in common software platform tools.

2.4 Information Exchange Formats

To enable interoperability, exchange formats such as IFC(v4) shall be adopted to facilitate geospatial and non-geospatial information exchange. The information exchanges requirement should refer to the latest version of the BIM Guide for Facilities Upkeep issued by the ArchSD and the BIM Harmonisation Guidelines for Works Departments issued by the DEVB.

2.5 General Naming Conventions

(a) Use only letters A-Z, hyphen, underscore and numbers 0-9 for all fields;
(b) All fields shall be separated by a hyphen character "-". DO NOT use spaces;
(c) Within a field, either Camel Case or an underscore "_" shall be used instead of a space to separate words;
(d) A single period character "." shall be used to separate the file name from the extension. This character should not be used anywhere else in the file name;
(e) The file extension shall not be amended or deleted;

(f) The scheme for zone and level sub-division shall be agreed with the other project professionals at the outset and defined in the **BIM Execution Plan (BEP)**;

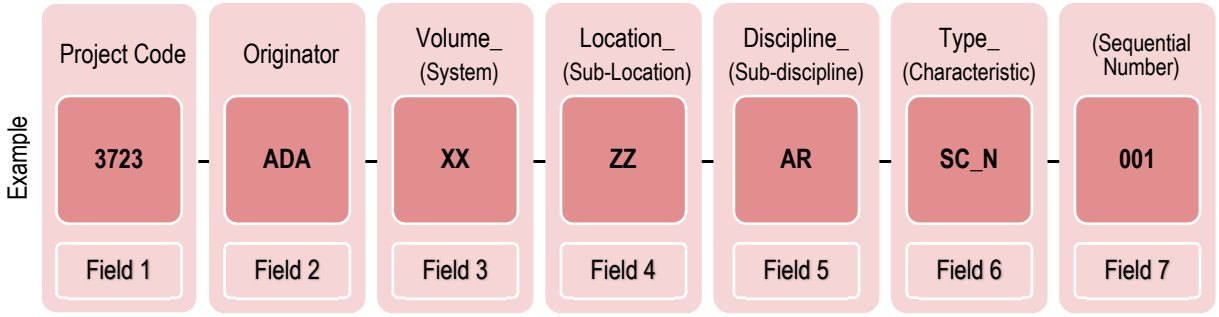
(g) To facilitate smart checking, the naming of Room/Zone shall refer to Table 3 in Annex C; and

(h) Elements where a naming convention is not explicitly defined by this Standard shall adopt the naming convention of existing elements and prefix with a 3-character abbreviation to identify corporate author. Examples:

Line Pattern Name	Line Style Name	
ADA_Dash-1.5mm	ADA_1-Solid	} Existing elements
ADS_Dash-3mm	ADS_3-Solid	
ADB_Dash-9mm	ADB_5-Solid	
ADA_Dash-12mm	ADA_3-Hidden	--- New element

2.5.1 Model File Naming

For model file naming, the following format shall be adopted which aligned with the Hong Kong 'Local Annex' of ISO 19650-2:2018 in Annex 1 of the CIC BIM Standards General:



(Optional Sub-Field): Supplement or adopt according to Project setting.

Field	Description and Format	
Field 1 4-8 characters	**Project Code** A unique identifier for identification of the project: InForM (e.g. 7781)	
Field 2 3 characters	**Originator** A unique identifier based on Agent Responsible Code (ARC) of the CAD Standard for Works Projects to indicate the model's responsible authoring party: (e.g. "ADA" for architectural discipline of ArchSD)	
Field 3 2-6 characters excluding underscore "_"	**Volume (2-3 characters)** A unique identifier to indicate specific geospatial zone or volume of the project (if required). The following generic codes should apply: **"ZZ"** – All volumes/systems; and	**(System) (2-3 characters)** An optional identifier to indicate a collection of interconnected model elements across main disciplines under a system (if required).

Field	Description and Format	
	"XX" – No volume/system applicable.	
Field 4 2-6 characters excluding underscore "_"	**Location (2-4 characters)** A unique identifier to indicate specific location for geospatial coordination. The following generic codes should apply: **"ZZ"** – Multiple levels/locations; and **"XX"** – No level/location applicable.	**(Sub-location) (2 characters)** An optional identifier to indicate a sub-location (e.g. level) within the same location.
Field 5 2-4 characters excluding underscore "_"	**Discipline (2 characters)** An identifier for each primary discipline to facilitate appearance settings and information filtering for interdepartmental coordination. The standard code **"AR"** should be applied for Architectural discipline. "**ZZ**" should be applied for multiple disciplines for combined models.	**(Sub-discipline) (2 characters)** An optional identifier to indicate the sub-discipline (trade). Commonly used codes as follows: **"CW"** – Curtain Wall; "**MW**" – Metal Works; and **"FL"** – Flooring.
Field 6 2-3 characters excluding underscore "_"	**Type (2 characters)** An identifier to indicate the information held within the container. Commonly used type identifier as follows: **CM** – Combined model **DR** – 2D drawing **M3** – 3D model **SC** – SCCU submission **SD** – Dangerous goods submission **SF** – FSD submission **SI** – Site instruction drawing **SO** – Design options **ST** – Tender drawing	**(Characteristic) (1 character)** An optional identifier to indicate the model's characteristic. Commonly used codes as follows: **E** – Existing **T** – Temporary works **N** – New works **A** – As-built **M** – Maintenance **D** – Demolition **W** – All works (combination of above works)
Field 7 3 characters	**(Sequential Number) (3 characters)** A sequential number should be assigned when necessary. Leading zeros should be used.	

The maximum total length of model names is 43 characters, including delimiters and information dividers but excluding file extension.

For a delimiter between Main Fields the Hyphen (-) or Minus character using Unicode Reference U+002D shall be used. Where a delimiter is required between Main Fields and Sub-Fields (if Sub-Field is required), then the Underscore (_) character using Unicode reference U+0332 shall be used.

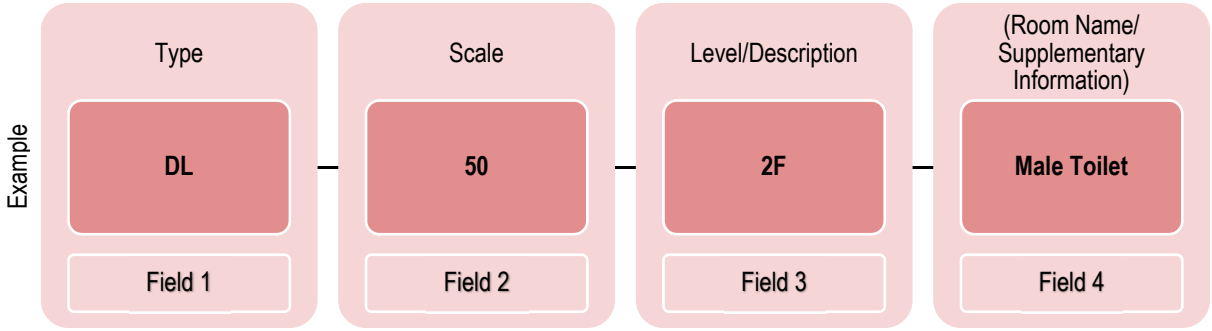
The following table provides some examples of BIM model file naming:

Description	Model File Name
Project InForM number: *3723*; Originator: *ArchSD-Architectural*; Volume: *Zone 1*; Location: *All Levels*; Discipline: *Architectural discipline*; Type/Characteristic: *SCCU submission for new works;*	3723-ADA-Z01-ZZ-AR-SC_N.xxx
Project InForM number: *7977*; Originator: *ArchSD-Architectural*; Volume: *Zone 2*; Location: *All levels*; Discipline: *Architectural discipline*; Type/Characteristic: *Tender drawing for maintenance works;* Sequential Number: *001*	7977-ADA-Z02-ZZ-AR-ST_M-001.xxx
Project InForM number: *7977*; Originator: *QQQ company (ARC: QQQ)*; Volume: *Zone 3*; Location: Level 2; Discipline: *Multiple disciplines*; Type/Characteristic: *As-built 3D Model*	7977-QQQ-Z03-L2-ZZ-M3_A.xxx
Project InForM number: *8195*; Originator: *ArchSD-Architectural*; Volume: *not applicable*; Location: *No Levels*; Discipline: *Architectural discipline*; Type/Characteristic: *3D Model of all works*	8195-ADA-XX-XX-AR-M3_W.xxx

Remark: ".xxx" – file name extension

2.5.2 View Naming

Since each view can only be placed on one sheet only, creating duplicate views is required to add a particular view to multiple sheets. Implementing a view naming system can assist users in finding the appropriate view. The following format shall be adopted:



(Optional Field): Supplement or adopt according to Project setting.

Field	Description and Format
Field 1 2 characters	**Type** Commonly used type identifier as follows: **CA** – Component drawings/Assembly drawings **CF** – Suspended ceiling system/Special floor system

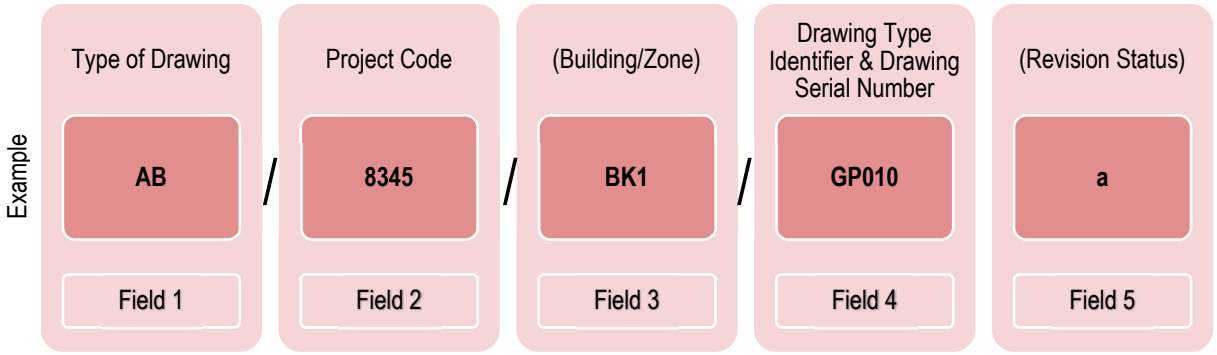
Field	Description and Format
	DL – Detailed layouts **FS** – FSD submission **GP** – Location drawings, general layout **MS** – Miscellaneous **PE** – Principal elements **PT** – Presentation **SC** – SCCU submission **SK** – Sketch drawing
Field 2	**Scale** For example 50 for 1:50; 100 for 1:100 and 2000 for 1:2000 etc.
Field 3	**Level/Description** GF, 1F, 2F, RF, Site Plan, Elevation, Section, etc.
Field 4	**(Room Name/Supplementary Information)** Toilet, Plant Room, etc.

The following table provides some examples of view naming:

Description	View Name
1:500 1st floor general layout	GP-500-1F
1:50 Detailed layout for 2nd floor male toilet	DL-50-2F-Male Toilet
1:500 South elevation for SCCU submission	SC-500-South Elevation

2.5.3 Drawing Number Naming

Drawing number naming refers to the naming of the drawings. The naming system aligned with Section 4.1 of the CAD manual for ArchSD Projects.



(Optional Field): Supplement or adopt according to Project setting.

Field	Description and Format
Field 1 2 characters	**Type of Drawing** **AB** – Architectural drawing
Field 2 4-5 characters - numeric	**Project Code** A unique identifier for identification of the project: InForM (e.g. 7781)
Field 3 5 characters	**(Building/Zone)** A project may consist of more than one building or one site. To identify different buildings of the same project, an optional field for building number is devised. This will be a serial number of maximum 5 numeric, or 2 alphas + 3 numeric, or 3 numeric + 2 alphas. The alphas shall be upper case letters. The identification for the field will be controlled by the corresponding Project Team Leader.
Field 4 5 characters - 2 alphas + 3 numeric	**Drawing Type Identifier & Drawing Serial Number** This field indicates the type of drawings and the number of drawings issued. The first two alphas are used to identify the type of drawings (refer Section 3.1 of the CAD Manual for ArchSD Projects for the lists of the identifiers for architectural drawings). The remaining 3 numeric digits serve to indicate sequence of the drawing numbers.
Field 5 1-2 characters	**(Revision Status)** This field applies only when there are revisions to the drawing. Alpha (lower case letter) such as 'a', 'b', 'c', 'd', 'e', etc. is used to signify the changes/amendments as a suffix to the entire drawing number.

The following table provides some examples of drawing number naming:

Drawing Name	Drawing Number
Windows Schedule	AB/4235/CA002
Third Floor Plan	AB/8345/GP010a
Wall Section	AB/8345/PE010

3 BIM Uses

3.1 General

The scope of BIM Uses in public works projects shall be according to the latest version of the Development Bureau (DEVB) Technical Circular (Works). The following sections describe the general requirements and acceptable deliverables for various BIM Uses for architectural design.

3.2 Design Authoring

A process of using BIM software to create and develop a Building Information Model of a project which includes a database of properties, quantities, means and methods, costs and schedules. Project team shall use the authoring tools to produce plan, elevation, section, detail, fabrication and shop drawings. The tools may also be used to produce schedules (GFA, UFA, NOFA, room, door, window, finishes, etc).

3.3 Design Reviews

A process for stakeholders to view a model, images from the models or animated walk-throughs of a project, provide feedback and validate numerous design aspects such as meeting client requirements and previewing spaces and layouts in 3D. The reviewer can check layout, sightlines, lighting, security, disabled access and egress, way finding, ergonomics, acoustics, textures and colours, etc. There are numerous ways for carrying out design review process. Apart from regular workshop or meeting to review the federated BIM model by project team, some other examples are animated walk-throughs in BIM software platform, virtual mock-up by BIM software platform and virtual mock-up by using virtual reality technology, etc. where project team may consider to plan and specify if appropriate.

3.4 Existing Conditions Modelling

A process of 3D digital survey and production of BIM model for an existing site to facilitate design planning. The digital survey may be carried out by photogrammetry or laser scanning technology to generate Point Cloud model which is later transformed to an editable BIM model. The deliverables should at least include BIM model(s) indicating the existing architectural, building services and structural elements as appropriate, and character-defining elements for projects involving historic buildings. Where specified, the 3D digital survey model should meet the following requirements:

(a) Georeferenced to the absolute coordinate system;
(b) Referenced and generated from the digital Point Cloud survey result;
(c) With colour schemes applied to various architectural, building services and structural elements for differentiation; and
(d) Capable to serve as a base model for different design stage authoring use.

3.5 Site Analysis

A process in which BIM and GIS tools are used to evaluate a site to determine the most optimal location, position and orientation for a future project. The analysis may include master planning, sun and shadow studies, daylight analysis, wind flow analysis and solar envelope analysis, etc.

3.6 3D Coordination

A process of using Clash Detection software tools to identify conflicts by analysing 3D models of the different building systems. The goal of the coordination process is to eliminate clashes before construction of the project. The 3D coordination process shall include checks for headroom requirements, working spaces for building operations and maintenance activities. The following deliverables should be provided in design and construction stage as minimum:

(a) Clash analysis reports for individual zones/floors;

(b) Action plan with target completion schedule to handle and eliminate detected clashes.

3.7 Cost Estimation

Accurate quantity take-offs may be extracted from models and used by quantity surveyors to develop cost estimates for a project. The quantity surveyors shall extract the data from the models provided by the architects and engineers. Refer to the current version of BIM Guide for Cost Estimation by Quantity Surveying Branch.

3.8 Engineering Analysis

A process which uses the BIM model to analysis and assess design options to facilitate the provision of effective engineering solution. Engineering analysis may be related to structural, lighting, solar and shading, airflow, energy, acoustic, thermal, mechanical, people movement, hydraulic, etc. The details of engineering analysis should be agreed by the project team.

3.9 Facility Energy Analysis

A process of using a building energy simulation programme with a model to conduct energy assessments of a project design.

3.10 Sustainability Evaluation

A process in which a project model is evaluated based on BEAM Plus, LEED or other sustainable criteria.

3.11 Space Programming

A process in which the design layout model is used to efficiently and accurately assess the compliance of client's spatial requirements, such as approved schedule of accommodation, reference plot ratio, site coverage of greenery and other spatial requirements as considered appropriate.

3.12 Phase Planning (4D Modelling)

A process of linking a programme to the model which is used to plan the phased occupancy in a renovation or to show the construction sequence and space requirements on a construction site. The following deliverables should be provided in construction stage as minimum:

(a) Overall building construction 4D work sequence model;

(b) The 4D work sequence model shall link up the construction master programme to demonstrate the compatibility of the installation works sequences of the major building components; and

(c) The model shall be assigned with the delivery path of major building components to demonstrate the feasibility and effectiveness of the installation method statements of the works. All temporary works and site logistic arrangements shall be modelled to demonstrate the feasibility and prove the constructability and buildability of the proposed method statement.

3.13 Digital Fabrication

The use of models to facilitate the fabrication of modular construction units including those for MiC, DfMA, prefabrication of BS/MEP installations; and other construction materials or assemblies such as sheet metal fabrication, structural steel fabrication and pipe cutting. The models can also be used for prototyping with 3D printers as part of a design intent review process.

3.14 Site Utilization Planning

A process to use BIM models to perform site space planning, site logistics, sequencing requirements, temporary works and safety. If specified, the construction phase BIM model should be linked to the construction schedule (4D) include permanent and temporary facilities on site for all of the phases of the construction process. This is normally performed by the contractor if specified in project.

3.15 3D Control and Planning

It is applicable for project requiring the adoption of Digital Works Supervision System in according to DEVB Technical Circular (Works) No.2/2023 that digital setting-out, construction checking, etc. as appropriate by means of 3D laser scanners, robotic total stations, etc. shall be adopted as far as practicable.

3.16 As-built Modelling

The process of preparing an accurate record of the physical conditions and assets of a project. The As-Built model should contain information relating to the architectural elements with links to operation, maintenance, and asset data. Additional information and data for equipment and space planning may be included. For the deliverables to be provided for As-built Model, refer to the current version of BIM Guide for Facilities Upkeep by Property Services Branch.

3.17 Drawing Generation (Drawing Production)

A process of producing drawing sheets from the BIM model source. By setting various drawing views (layout or section) in the BIM software tools, drawing sheets could be automatically generated base on the BIM model information.

As far as it is practicable to generate 2D drawings from the BIM authoring software, non-BIM authoring software should not be used to generate drawings. The 2D drawings generated from BIM model does not need to follow the CAD Standard for Works Projects (CSWP). On the other hand, it is acceptable that certain architectural components, the building services schematic/control logic diagrams/drawings, reinforcement details are not generated directly from the BIM model.

4 Modelling Requirements

4.1 Coordinate System

The orientation of a BIM model shall be defined and coordinated with all disciplines as follows when the project is located in Hong Kong:

(a) Easting and Northing shall refer to Hong Kong 1980 Grid System (HK1980 Grid); and
(b) Elevation shall refer to the Hong Kong Principal Datum (HKPD).

If a model is produced in a local coordinate system due to software functionality or limitations, the BIM coordinator or modeller shall be responsible for providing clear instruction and documentation as to the origin x, y, z and bearing translations accompanying their BIM submission. Software specific setting on coordinate system should be defined in BEP.

Where Project North is created, it should only be used for identified sheet view and not used for any model coordination.

4.2 Linking to Structural, Building Services and Landscape Models

The general rules for model linking are as follows:

(a) The coordinates of the structural and/or building services models should be checked before linking; Same coordinates should be adopted for models to be linked;
(b) Do not link to model under working (WIP); and
(c) The linked model should be a detached copy of the central model.

4.3 Language

Unless specifically required by the BEP, all project information and attributes should be in the English language.

4.4 Unit of Measurement

BIM model should be modelled in metric system (International System of Units). Project units should be set as below:

Measurement	Units
Length	mm
Area	m^2 in 3 decimal places
Volume	m^3 in 3 decimal places

4.5 Date Format

Date format should follow ISO 8601 Data elements and interchange formats -Information interchange - Representation of dates and times as follow:

Year				Month		Date	
Y	Y	Y	Y	M	M	D	D

4.6 Scope of Modelling

Modelling shall be carried out at each stage of the project and level of development of the elements produced at each stage will be specified in the BEP.

The building or feature elements shall be created using the appropriate software tools and components for walls, slabs, doors, windows, etc. If the features of the BIM authoring tool are not sufficient for modelling an element then it shall be created using other appropriate objects and defined with an appropriate "Type" name.

2D lines and symbols may be used to complement the model when smaller elements are not modelled in 3D. For example, some elements smaller than 50mm may not need to be modelled. 2D standard details may be used on drawings produced using BIM authoring tools to complement overall drawing packages.

If an architect models structural elements, the size and location shall be as per the information from the structural engineers. It is recommended that the architect uses the structural model as a reference within the architectural model to avoid duplication of building elements.

Whenever possible, the architect should use the actual dimension, thickness or detail to model an element accurately. The model elements shall contain the information and data available at each stage.

4.7 Level of Information Need (LOIN)

Building Information Models will be developed from preliminary design to final as-built models with a number of distinct phases and stages throughout the process. The level of information need (LOIN) required at each stage of the design, construction and as-built phases should be different to accurately portrait the work. The LOIN refers to components of the Level of Graphics (LOD-G), Level of Information (LOD-I) and Level of Documentation (DOC).

LOIN Specification as stipulated in CIC Building Information Modelling Standards (General) should be referred and adopted to enable clients, architects, engineers, contractors, quantity surveyors and facility managers to clearly specify the content of models at each stage of a project, and incorporated into the Design Stage and Construction Stage BEPs so as to define what Levels of Development are to be achieved at each stage of a project and what will be delivered by the project teams.

The specification of LOIN allows BIM coordinators and modellers to define what their models can be relied on for and allows other stakeholders to understand the usability and the limitations of models they are receiving. LOIN defines the extent to which a model element has been developed from design to construction to operation.

LOIN should only be used to describe model elements and not models as a whole. An element has only progressed to a given LOIN when all the stated requirements have been met. There is no direct link between LOINs and design phases. Building systems are developed at different progress through the design process. For example, the design of the structural system proceeds ahead of the design of interior layouts. At the end of scheme design, the model may include many elements at LOIN 200, but will also include many at LOIN 100, as well as some at LOIN 300.

The client and/or BIM Manager shall specify in the design stage BEP, what the LOIN for each model element shall be when models will be handed over from the design team to the contractor. The definitions and requirements of graphical representation (LOD-G), non-graphical information (LOD-I) and the documentation (DOC) of Architectural elements shall reference to the CIC Building Information Modelling Standards (General) and CIC Building Information Modelling Standards (Architecture and Structural Engineering). The recommended LOIN for Architectural Model is listed as follows:

LOIN at various stages	LOIN Definition Recommendation
Workstage 1 – Inception / Feasibility	LOD-G 100 + LOD-I 100
Workstage 2 – Outline Proposals / Sketch Design	LOD-G 200 + LOD-I 200
Workstage 3 – Detail Design	LOD-G 200-300 + LOD-I 200-300
Workstage 4 – Documentation / Tendering	LOD-G 300 + LOD-I 300
Workstage 5 – Construction Supervision	LOD-G 400 + LOD-I 400

4.7.1 Level of Graphics (LOD-G)

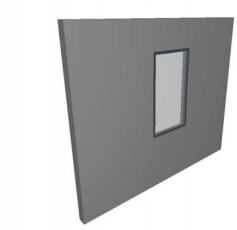
LOD-G is the description of graphical information in a model element. The recommended LOD-G for Architectural Model is listed as follows:

LOD-G	Minimum Acceptable Criteria
100	The Model Element is graphically represented within the Model by a symbol or other generic representation or rough 3D shape. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.
200	The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, assumed size, shape, location, and orientation. The assumed required spaces for access and maintenance shall be indicated. Model element is graphically represented as assumed sized/shape of equipment.
300	The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. The model shall include details of the required spaces for handling installation, operation and maintenance needs and the interface details for checking and coordination with other models/objects. The model element should easily be recognized without further clarification.
400	The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing for fabrication, assembly, and installation.

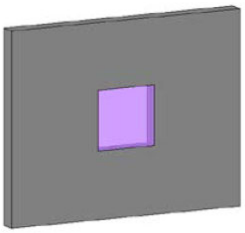
For LOD-G 100 to 400, non-graphic information and data may also be attached to the Model Elements.

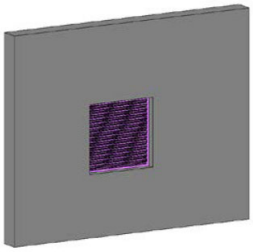
An example of the minimum object geometry shapes (images) and the corresponding object information for architectural elements at different LOD-Gs are illustrated as follows:

Example of Object Geometry Image for an Exterior Window

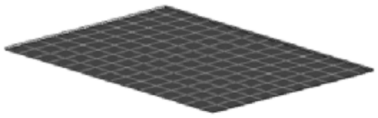
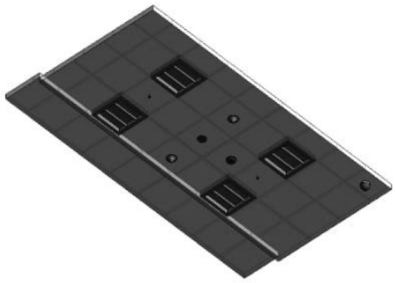
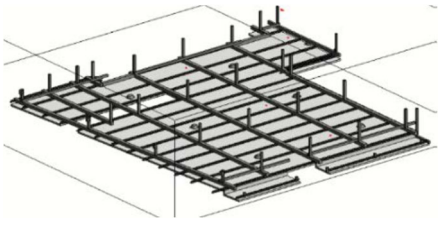
LOD-G	Description	Example Image
100	**Pre Design** N/A	N/A
200	**Schematic Design** Generic wall objects representing major types of proposed window wall assemblies. Overall window wall assembly depth represented by a single model object. Layouts and locations still flexible.	
300	**Design Development** Specified location and orientation of face of glass. Nominal face dimensions and thickness of glazing. Spacing, location, size and orientation of mullions. Operable components defined (windows, louvres and doors) and included in model.	
400	**Construction Stage** Complete mullion extrusion profiles. Interface details between wall systems (within) and wall and support systems including sealants, end dams, flashings and membranes.	

Example of Object Geometry Image for a Louvre

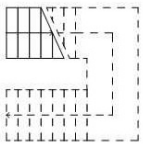
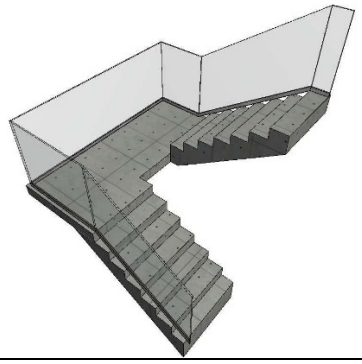
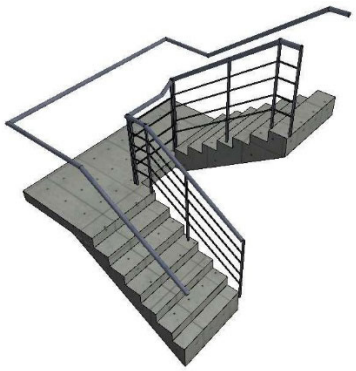
LOD-G	Description	Example Image
100	**Pre Design** N/A	N/A
200	**Schematic Design** Generic model element that is indicative of approximate area and location of intended louvre or vent.	

LOD-G	Description	Example Image
300	**Design Development** Louvre assembly modelled by type, indicative of area and location of intended louvre/vent and includes accurate frame (boundary dimensions) and blades. Opening for louvre is cut from host wall. Performance level defined in non-graphic information associated with model elements (e.g. storm proof or not, free air).	
400	**Construction Stage** Update with specific manufacturers information including frame profiles, blade profiles and sub-components.	Same as LOD-G 300

Example of Object Geometry Image for a Suspended Ceiling System

LOD-G	Description	Example Image
100	**Pre Design** N/A	N/A
200	**Schematic Design** Model ceiling approximately to show overall scope and thickness or system depth of suspended ceiling.	
300	**Design Development** Overall assembly modelled to specific system thickness including framing. Major penetrations are modelled. Location of expansion or control joints may be indicated, but not modelled.	
400	**Construction Stage** All assembly components are modelled including tees, hangers, support structure and ceiling tiles.	

Example of Object Geometry Image for Railing and Balustrade

LOD-G	Description	Example Image
100	**Pre Design** Approximate alignment and location of the element using standard symbol	
200	**Schematic Design** Generic model elements without articulation of materials of structures	
300	**Design Development** Model assemblies by type to include railings, posts and supports. Element modelling to include: - Accurate horizontal alignment - Accurate length and height of railings Required non-graphic information associated with model elements includes: - Railing Type - Material Type - Spacing and clearance requirements	
400	**Construction Stage** All elements are modelled to support fabrication and installation.	Same as LOD-G 300

4.7.2 Level of Information (LOD-I)

LOD-I is the description of non-graphical information in a model element. The recommended LOD-I for Architectural Model is listed as follows:

BIM Object Properties	Object Data Requirements	LOD-I				
		100	200	300	400	500
Project Information	Project information including organisation name, project issue date, address, name and project number.	R	R	R	R	R
General Properties	General information of the object including identification, designation, type, name, location and materials, etc.	R	R	R	R	R
Design Properties	Design information and parameters of the BIM objects.		R	R	R	R
Classification Properties (Optional)	The classification title and code of the model elements reference to the OmniClass table 23 or other coding system as agreed.			R	R	R
Manufacturer's Equipment Properties	Manufacturer's equipment information and parameters of the objects, including equipment manufacturer's name, supplier's name, brand name, model number and country of origin.				R	R
Condition Properties	Installation information including installation month/year, latest testing/commissioning month/year and equipment life expectancy.				R	R
Verification Properties	Field verification method used for verifying the as-built element.					R

R: Required

4.7.3 Level of Documentation (DOC)

DOC is the description of documentation to be associated with the uses to meet the identified requirements. The recommended DOC l is listed as follows:

BIM Object Properties	Object Documentation Requirements	LOD-I				
		100	200	300	400	500
Specification/ Properties	Product Technical Documents (e.g. product technical sheet, catalogue, type test certificate, etc.), and other external document in the form of a hyperlink.				R	R
	Operation and Maintenance Manual, Warranties, etc., and other external document in the form of a hyperlink.				R	R

R: Required

4.8 Sheet/Layout/Drawing Management

For consistent drawing sheet management and searching convenience in the BIM authoring software, Sheet Number/Layout ID/Drawing Name and Sheet Name should be inputted as follows:

Information in BIM authoring software	Input
Sheet Number/Layout ID/Drawing Name	Field 4 of the drawing number, please refer to Clause 2.5.3 on drawing number naming convention.
Sheet Name/Layout Name/Drawing Title	Drawing Title

Information on drawings title block should be extracted from property/parameter/attribute of the BIM model. Manual input is not recommended.

4.9 Presentation Style

The line weight and line pattern in 2D drawing presentation should be standardised and follow the recommendations in Annex A. Samples of drawings and drawing sheets are included in Annex B for reference. The recommended line style should be applied for design, construction and as-built models.

4.10 BIM Object Files

Object file is a data file containing architectural, structural or building services element and should include geometry and parameters to represent the element's characteristics.

4.10.1 General Requirement for Object Creation

The following general requirements should be followed in creation of object:

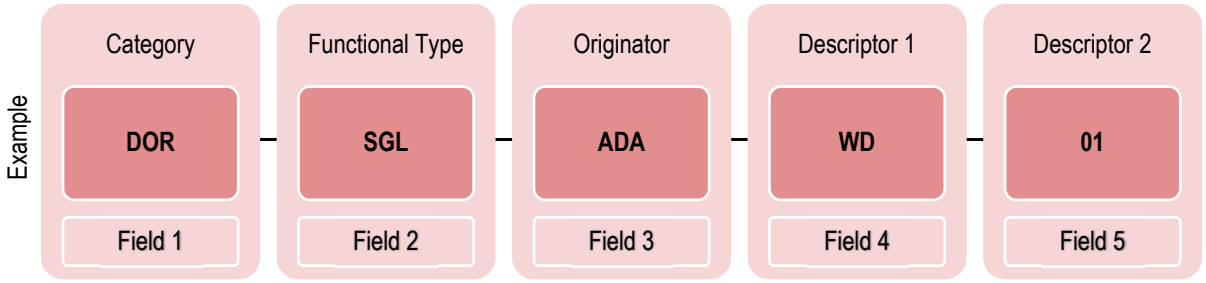
(a) The object file should include information of physical dimension for coordination of BIM model;
(b) Drawing symbol should be included in an object file for 2D drawing output and complied with the latest version of Drawing Practice Manual of ArchSD. The shape and size of symbol should be coordinated for easy reading in the drawing output;
(c) Symbolic 2D annotation (drawing symbol) should be visible while the 3D geometry should be invisible in drawing output of plan view;
(d) 3D geometry shall be visible for rendering in 3D view;
(e) Object file should include the material/equipment information;
(f) Nesting object file should be limited to 2 levels except for drawing symbol. It is important to understand that nesting object file increases the file size and affects performance, specifically the regeneration process of the object file views;
(g) Host object file should be allowed;
(h) The LOD, line styles, line weight, line pattern, text style and unit of measurement for modelling of object shall refer to relevant sections of this Guide;
(i) To minimise the object file size, only essential connectors should be used and the object file should be created directly from an object file template to reduce extra information in an object file;
(j) Level of the insertion/origin point of the object file is recommended at the centre point at the bottom level of the object; and
(k) The maximum size of each BIM object file used should be kept at the minimum, preferably under 5MB.

Architectural Services Department provides BIM object files to the Construction Industry Council (CIC) for the industry's reference and use. These files can be accessed in the BIM Objects Library on the CIC BIM portal: https://www.bim.cic.hk/en/resources/bim_objects.

4.10.2 Object File Naming Convention

Object File naming conventions ensure that objects created can be easily identified. The naming conventions include short forms of the object category and description that allow the user to search for the objects more systematically. The proposed naming convention for customised object file is as follow:

Format and Field Length



Requirements of each Field

Field	Requirements
Field 1 and Field 2 3 characters	**Category/Functional Type** - These two fields shall follow **CIC Master Type List** (https://www.bim.cic.hk/en/resources/master_list). - Field 1 shall be kept unique in value and meaning. - When Field 2 is not necessary to describe at the second level, three underscores (__) should be used. - To facilitate smart checking, identifiers shall refer to Table 2 in Annex C.
Field 3 3 characters	**Originator** - Agent Responsible Code (ARC) should be used as originator. - If a BIM object is fully adopted without change, its name should be maintained. However, if the BIM object is modified, its originator code should be updated and saved as another BIM object.
Field 4 1-15 characters	**Descriptor 1** - Descriptor 1 contains information about primary use and material when applicable. - Duplicate information with the Category and Functional Type should be avoided. - Capital letters should be used for first letter of each word (e.g. WallMounted, GlobalValve). - All-capital short forms should be used to indicate materials when applicable (e.g. CONC for concrete, WD for Wood). - If Descriptor 1 starts with all-capital short form, an underscore (_) should be used to separate the short form and the following word (e.g. CONC_Kerb, WD_Slash). - If Descriptor 1 is blank, three nos. of underscores (___) should be used in place of Descriptor 1 (e.g. SFM-RCB-ACM-___-01.rfa). - Descriptor 1 should be kept as concise as practicable with the maximum length of 15 characters in order to reserve space for 2 digit sequential number in Descriptor 2 for potential future expansion.
Field 5 2 characters	**Descriptor 2** - Descriptor 2 is a 2-digit sequential number (e.g. 01 to 99) to distinguish different types that cannot be sufficiently identified by preceding fields (e.g. STE-STA-ACM-NB_Pier-01.rfa).

	- If Descriptor 2 is blank, two underscores (__) should be used in place of Descriptor 2 (e.g. PPF-UPV-ACM-BendSocket-__.rfa).

The following table provides some examples of object file naming:

Descriptions	Object File Name
Category: *Door*; Functional Type: *Single*; Originator: *ArchSD-Architectural*; Descriptor 1: *Wood*; Descriptor 2: *Type 01*; File Format Extension: *.xxx*	DOR-SGL-ADA-WD-01.xxx
Category: *Plumbing Fixtures*; Functional Type: *Drain*; Originator: *ArchSD-Architectural*; Descriptor 1: *Channel*; Descriptor 2: *Blank*; File Format Extension: *.xxx*	PLM-DRN-ADA-Channel-__.xxx
Category: *Special Equipment*; Functional Type: *Shutter*; Originator: *ArchSD-Architectural*; Descriptor 1: *Wall Base Vertical Shutter*; Descriptor 2: *Blank*; File Format Extension: *.xxx*	SPQ-SHU-ADA- VER_ Shutter -__.xxx

Other Requirements

(a) The BIM object file shall be named systematically and logically for the understanding of the users and for easy BIM objects management;
(b) The methodology of naming conventions shall be applied to the BIM object libraries of all projects;
(c) The file name length of the BIM object file should be 30 characters maximum, including delimiters but excluding the file extension. The name should be as short as possible;
(d) Only alphanumeric characters, hyphen (-) and underscore (_) are allowed. Hyphens should be used as the delimiter between each naming field;
(e) Space, special symbols and invalid characters (including ~ " # % & * : < > ? / \ { | }.) shall not be used within BIM object file names.

4.10.3 Object Properties

To facilitate smart checking, BIM objects shall contain the information listed in Table 1 of Annex C.

4.10.4 BIM Object Sheet

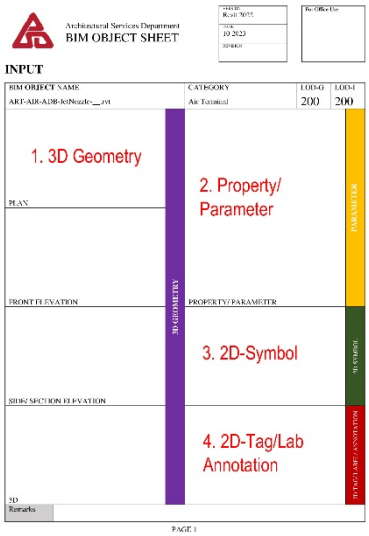
The BIM object shall contain 3D component of geometry, 2D component of symbol and **tag/label/annotation**. All of these contents are intended for drawing production of presentation drawing, statutory submission drawing and tender/construction drawing. In addition, the BIM object shall be able to schedule in project environment with proper information. The drawing production and schedule production shall follow industry practice and the requirement of project.

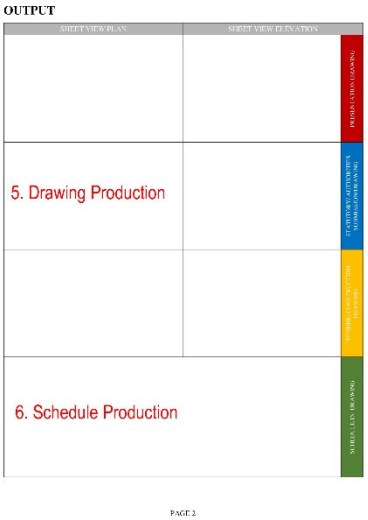
Comprehensive BIM object sheet shall be provided after completion of object creation. It enables clients, administrators and users of the BIM object to easily identify the properties, functions and outputs of the BIM object in drawing production.

The BIM object sheet shall contain following items:

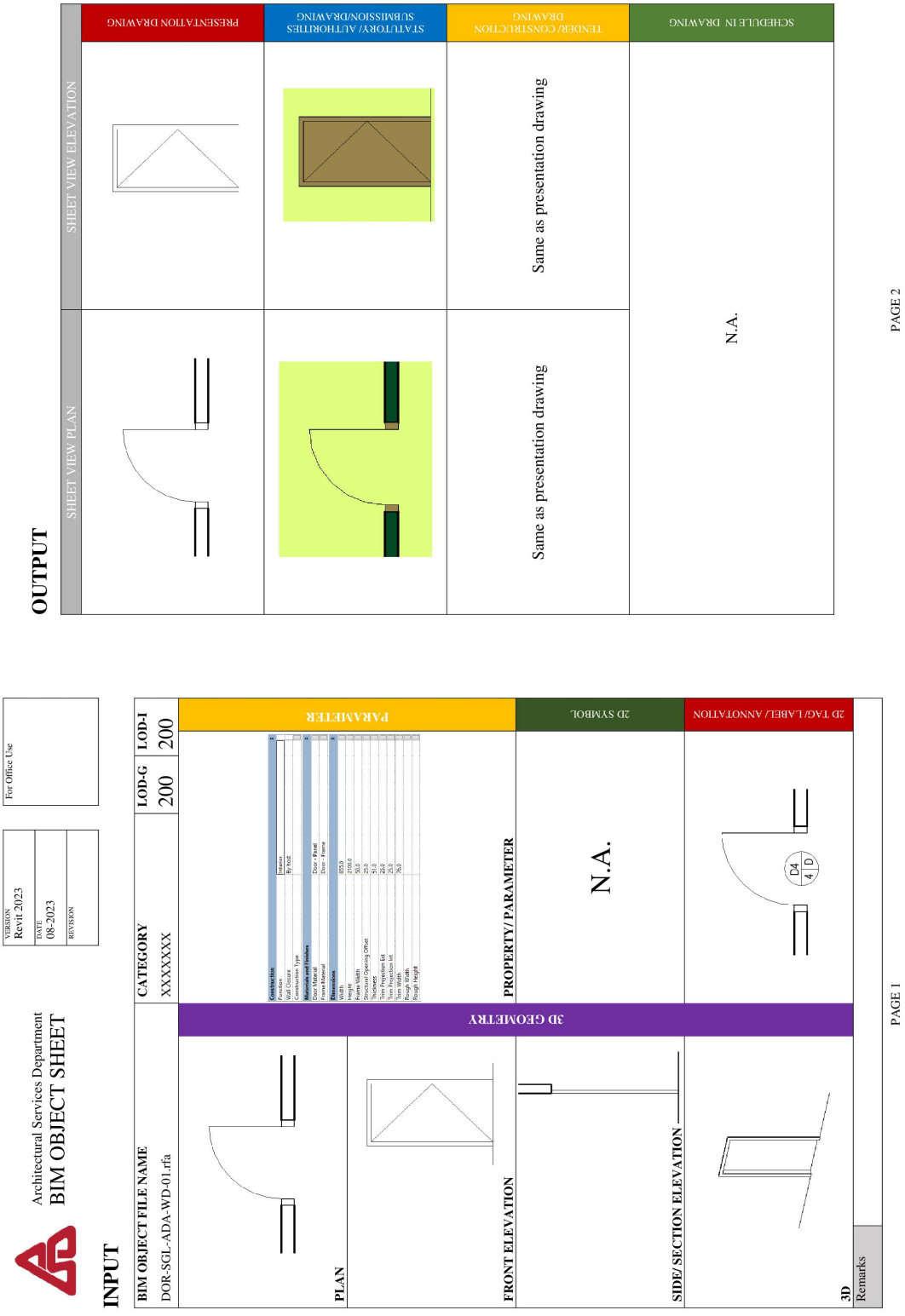
Item	Description
1. 3D Geometry	- Views to be shown in the sheet (plan view, front and side elevation view, 3D view) - (2D symbolic items do not show in this part)
2. Property/Parameter	- Property/Parameter set and value
3. 2D – Symbol	- 2D symbolic item for drawing production
4. 2D – Tag/Label/Annotation	- 2D symbolic item for drawing production
5. Drawing Production	- Plan view and elevation view for presentation purpose - Plan view and elevation view for statutory/authority submission purpose - Plan view and elevation view for tender/construction purpose
6. Schedule Production	- Schedule with appropriate property/parameter

The BIM Object Sheet shall generally follow the layout below:





Sample BIM Object Sheet:



4.11 Overlapping Elements

Overlapping elements should be avoided and minimised. When overlapping elements cannot be eliminated, the overlapping elements, reason for overlapping and associated parameter for filtering should be documented in the BEP.

4.12 Large Spanning Continuous Elements

Model elements spanning over one level (e.g. walls spanning over 1 story high) or across building (e.g. floor plates spanning between buildings through connection bridges) should be split into separate model elements. When large spanning continuous elements (e.g. curtain wall) cannot be split, the reason should be documented in the BEP.

4.13 Complex Geometry

Modelling method of complex geometries, such as two-way curves and non-uniform rational basis spline surfaces, should be documented in BEP.

5 Data Requirement for Asset management

5.1 Data Format of As-built Information

As-built information relevant to asset management should be stored in a standardised file folder structure as mentioned in Section 2.2 of this Guide.

The requirements of BIM file coding, naming convention, model presentation style (colour code, line type, line weight, etc.) and unit of measurement of the as-built BIM model should make reference to the latest version of BIM Guide for Facilities Upkeep by Property Services Branch.

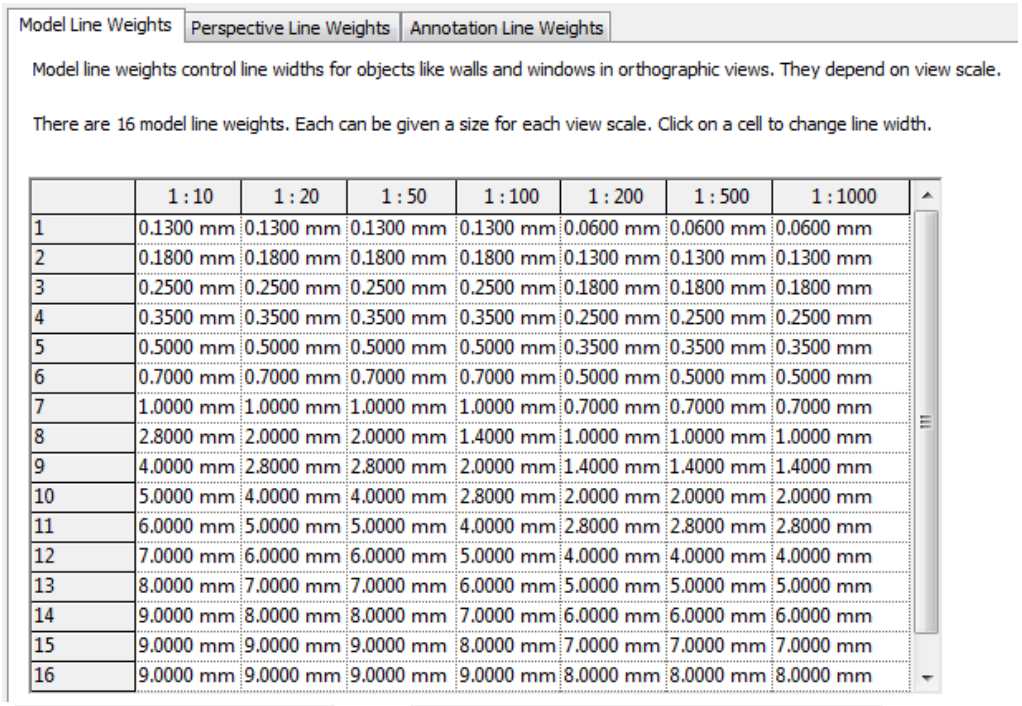
5.2 Deliverables

The As-Built information shall be contained in a prescribed folder system including but not limited to the following deliverables:

(a) BIM Execution Plan indicating the adopted modelling methodology and details;
(b) As-built BIM models for all disciplines and 2D drawing files for architectural details;
(c) Design authoring tools' templates, title block, BIM object files and other necessary resources for viewing of the as-built BIM model;
(d) Testing and Commissioning reports;
(e) Operation and Maintenance manuals;
(f) Relevant statutory certificates, approval documents and forms; and
(g) Other relevant project information as required.

- END-

Annex A – Line weight & Line pattern

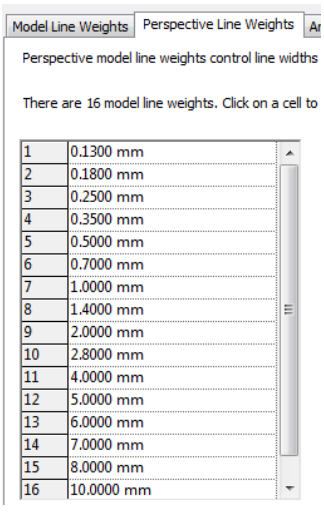


Model Line Weights | Perspective Line Weights | Annotation Line Weights

Model line weights control line widths for objects like walls and windows in orthographic views. They depend on view scale.

There are 16 model line weights. Each can be given a size for each view scale. Click on a cell to change line width.

	1 : 10	1 : 20	1 : 50	1 : 100	1 : 200	1 : 500	1 : 1000
1	0.1300 mm	0.1300 mm	0.1300 mm	0.1300 mm	0.0600 mm	0.0600 mm	0.0600 mm
2	0.1800 mm	0.1800 mm	0.1800 mm	0.1800 mm	0.1300 mm	0.1300 mm	0.1300 mm
3	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.1800 mm	0.1800 mm	0.1800 mm
4	0.3500 mm	0.3500 mm	0.3500 mm	0.3500 mm	0.2500 mm	0.2500 mm	0.2500 mm
5	0.5000 mm	0.5000 mm	0.5000 mm	0.5000 mm	0.3500 mm	0.3500 mm	0.3500 mm
6	0.7000 mm	0.7000 mm	0.7000 mm	0.7000 mm	0.5000 mm	0.5000 mm	0.5000 mm
7	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	0.7000 mm	0.7000 mm	0.7000 mm
8	2.8000 mm	2.0000 mm	2.0000 mm	1.4000 mm	1.0000 mm	1.0000 mm	1.0000 mm
9	4.0000 mm	2.8000 mm	2.8000 mm	2.0000 mm	1.4000 mm	1.4000 mm	1.4000 mm
10	5.0000 mm	4.0000 mm	4.0000 mm	2.8000 mm	2.0000 mm	2.0000 mm	2.0000 mm
11	6.0000 mm	5.0000 mm	5.0000 mm	4.0000 mm	2.8000 mm	2.8000 mm	2.8000 mm
12	7.0000 mm	6.0000 mm	6.0000 mm	5.0000 mm	4.0000 mm	4.0000 mm	4.0000 mm
13	8.0000 mm	7.0000 mm	7.0000 mm	6.0000 mm	5.0000 mm	5.0000 mm	5.0000 mm
14	9.0000 mm	8.0000 mm	8.0000 mm	7.0000 mm	6.0000 mm	6.0000 mm	6.0000 mm
15	9.0000 mm	9.0000 mm	9.0000 mm	8.0000 mm	7.0000 mm	7.0000 mm	7.0000 mm
16	9.0000 mm	9.0000 mm	9.0000 mm	9.0000 mm	8.0000 mm	8.0000 mm	8.0000 mm

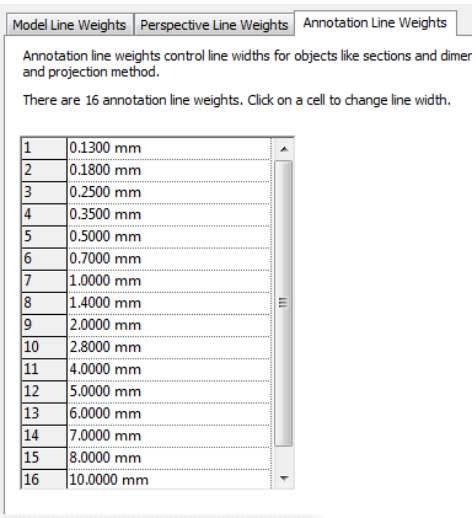


Model Line Weights | Perspective Line Weights

Perspective model line weights control line widths

There are 16 model line weights. Click on a cell to

1	0.1300 mm
2	0.1800 mm
3	0.2500 mm
4	0.3500 mm
5	0.5000 mm
6	0.7000 mm
7	1.0000 mm
8	1.4000 mm
9	2.0000 mm
10	2.8000 mm
11	4.0000 mm
12	5.0000 mm
13	6.0000 mm
14	7.0000 mm
15	8.0000 mm
16	10.0000 mm

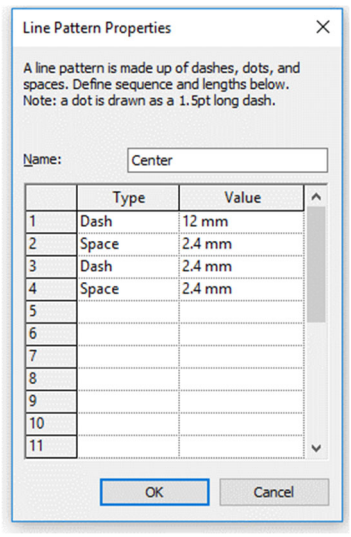


Model Line Weights | Perspective Line Weights | Annotation Line Weights

Annotation line weights control line widths for objects like sections and dimer and projection method.

There are 16 annotation line weights. Click on a cell to change line width.

1	0.1300 mm
2	0.1800 mm
3	0.2500 mm
4	0.3500 mm
5	0.5000 mm
6	0.7000 mm
7	1.0000 mm
8	1.4000 mm
9	2.0000 mm
10	2.8000 mm
11	4.0000 mm
12	5.0000 mm
13	6.0000 mm
14	7.0000 mm
15	8.0000 mm
16	10.0000 mm



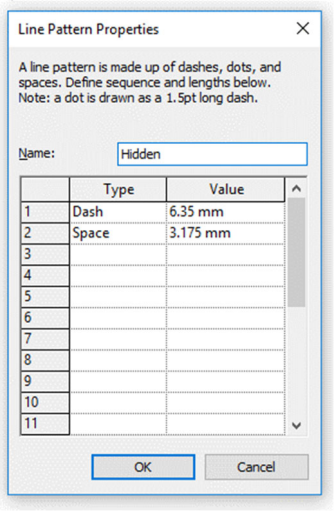
Line Pattern Properties

A line pattern is made up of dashes, dots, and spaces. Define sequence and lengths below.
Note: a dot is drawn as a 1.5pt long dash.

Name: Center

	Type	Value
1	Dash	12 mm
2	Space	2.4 mm
3	Dash	2.4 mm
4	Space	2.4 mm
5		
6		
7		
8		
9		
10		
11		

OK Cancel



Line Pattern Properties

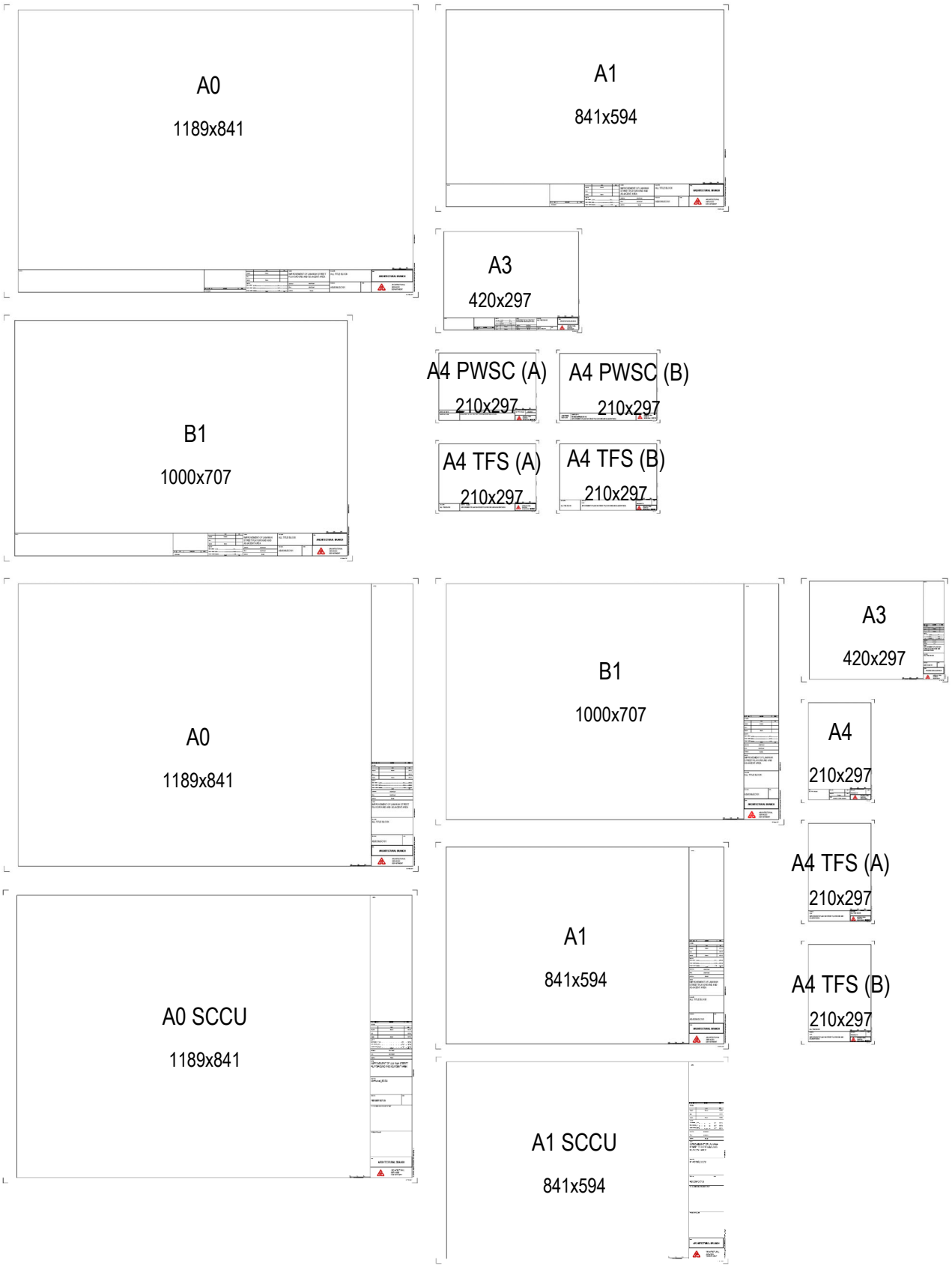
A line pattern is made up of dashes, dots, and spaces. Define sequence and lengths below.
Note: a dot is drawn as a 1.5pt long dash.

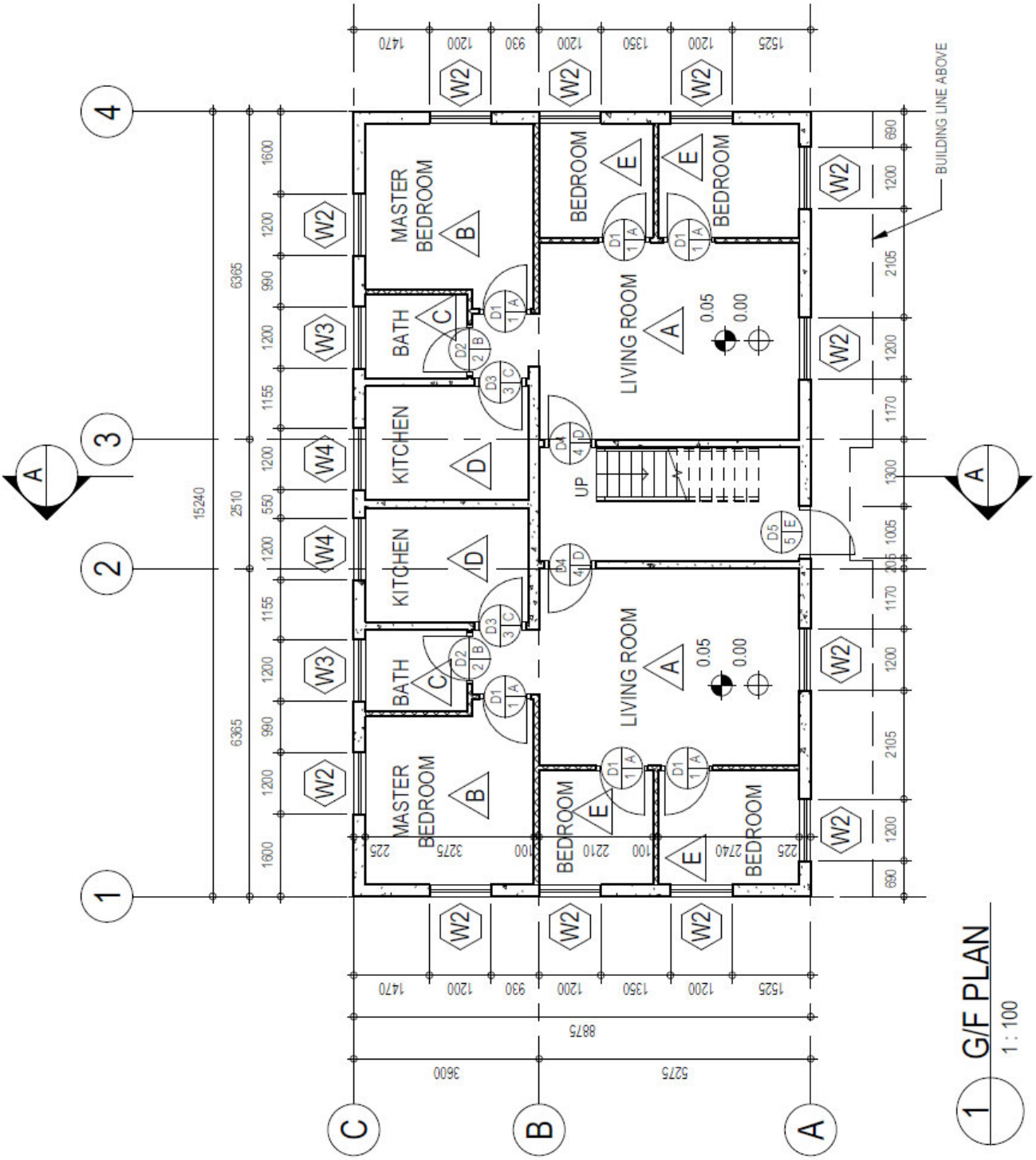
Name: Hidden

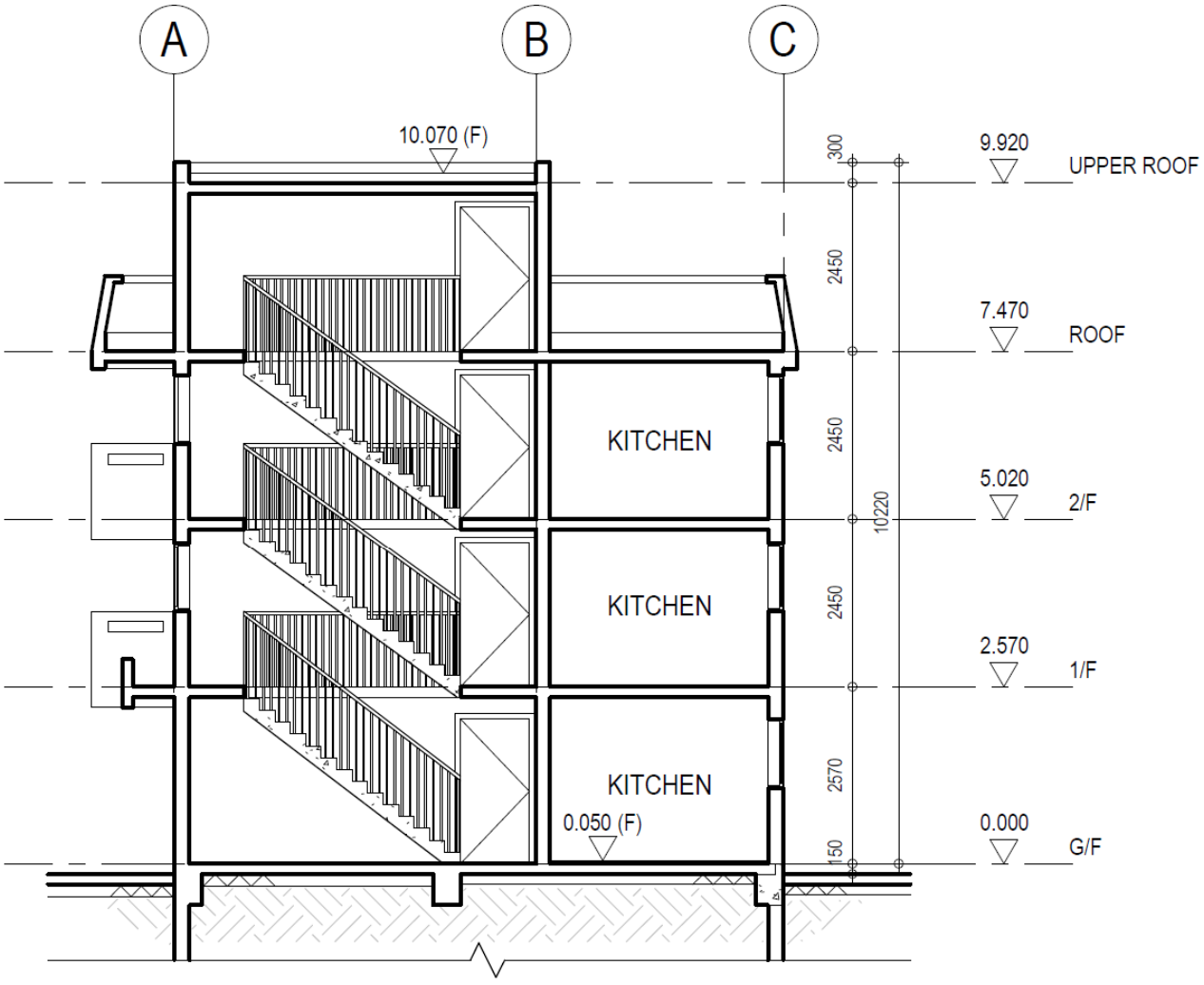
	Type	Value
1	Dash	6.35 mm
2	Space	3.175 mm
3		
4		
5		
6		
7		
8		
9		
10		
11		

OK Cancel

Annex B - Samples drawings and drawing sheets




MASTER BEDROOM
BEDROOM
BEDROOM
LIVING ROOM
BATH
KITCHEN
UP
BUILDING LINE ABOVE
1 G/F PLAN
1 : 100



A SECTION A
1 : 100

Annex C – Requirements for Smart Checking

Table 1 – BIM Objects Properties

Object		Information	Property Name	Data Type (Type/Instance)	Sample Value
1	Wall	Fire Resistance Rating-Integrity	FRR-Integrity	Integer (Type/Instance) *or* Integer	60
		Fire Resistance Rating-Insulation	FRR-Insulation		60
2	Door	Door Clear Width (reference value)	Clear Width	Length (Type) *or* Integer	835
		Exit Door	Exit Door	Yes/No (Instance) *or* True/False	☑ *or* True
		Exit Door of Flat/Guestroom	Exit Door of Flat/Guestroom		
		Fire Resistance Rating-Integrity	FRR-Integrity	Integer (Type) *or* Integer	60
		Fire Resistance Rating-Insulation	FRR-Insulation		60
3	Lift Door	Fireman's Lift Door	Fireman's Lift Door	Yes/No *or* True/False	☑ *or* True
4	Room / Zone	Accessible Toilet	Accessible Toilet	Yes/No (Instance) *or* True/False	☑ *or* True
		Female Toilet	Female		
		Fireman's Lift Lobby	Fireman's Lift Lobby		
		FRS Lobby	FRS Lobby		
		FSAP Passage	FSAP Passage		
		Inner Room	Inner Room		
		Male Toilet	Male		
		Override Capacity	Override Capacity	Integer (Instance) *or* Integer	40
		Room Capacity	Room Capacity (Calculated value except manual override value)		40
		Special Hazard	Special Hazard	Yes/No (Instance) *or* True/False	☑ *or* True
		Staff Toilet	Staff		
		Unisex Toilet	Unisex		
5	Sanitary Fitments	Facilities for Accessible Toilet	Accessible	Yes/No (Instance) *or* True/False	☑ *or* True

Table 2 – Object File Naming Convention

Element	Identifier	Location
Folding Grab Rail	FGR	Field 2
Tactile	FWS	Field 1
Urinal	URN	Field 2
Vertical Grab Rails	VGR	
Wall Finishes	FNH	
Wash Basins	SNK	
Water Closet	WCS	

Table 3 - Room/Zone Naming Convention

Element	Name
Fireman's Lift Lobby	FLL
Smoke lobby	SML