

Guidelines for using Building Information Modelling in Statutory Plan Submissions (other than General Building Plan) 2023



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Abbreviations

Abbreviation	Full Name
AP	Authorized Persons
B(A)R	Building (Administration) Regulations
BA	Building Authority
BD	Buildings Department
BO	Buildings Ordinance
CIC	Construction Industry Council
Com-BIM	Committee on BIM
D.T.I.L.	Disconnecting trap invert level
DEVB	Development Bureau
FFL	Finished floor level
G.W.T.	Ground water table
GBP	General Building Plans
HKPD	Hong Kong Principal Datum
IFC	Industry Foundation Classes
LL	Live Load
LOD	Level of Development
MEP	Mechanical, Electrical and Plumbing
PDF	Portable Document Format
PNAP	Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers
RGE	Registered Geotechnical Engineers
RSE	Registered Structural Engineers
SDL	Superimposed Dead Load
SFL	Structural Floor Level

1 Background

To promote wider and fuller adoption of Building Information Modelling (BIM) for preparing different types of statutory plan submissions, the Buildings Department (BD), after the promulgation of the Guidelines for using Building Information Modelling in General Building Plans Submission in 2019, has collaborated with the Construction Industry Council (CIC) who has commissioned a consultancy study to prepare a set of Building Information Modelling Standards (BIM Standards) together with software templates to facilitate the preparation of statutory plan submissions (other than General Building Plans (GBP)) under the Buildings Ordinance (BO). After consulting building stakeholders, the CIC BIM Standards for Preparation of Statutory Plan Submissions¹ was published in the CIC website in December 2020. BD, after consulting the Building Sub-Committee of Land and Development Advisory Committee and the Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers Committee, has further enhanced the CIC BIM Standards and the associated software templates and published them as the Guidelines for using Building Information Modelling in Statutory Plan Submissions (other than General Building Plan) (Guidelines) in BD website.

The Guidelines set out the requirements in using BIM in particular with information that can facilitate the production of statutory plans. They illustrate the methodologies in BIM modelling that can produce statutory plans for submission to the Building Authority (BA). The plans produced from BIM can then be submitted to BD for processing under the BO. At the same time, with the benefit of having the BIM models which contain rich building information presented on the statutory plans, the information can facilitate BD in the plan approval process.

The Guidelines which have been developed to cover eight types of the prescribed plans, i.e. Superstructure Plans, Foundation Plans, Demolition Plans (including hoarding, covered walkway and gantry plans), Excavation and Lateral Support (ELS) Plans, Site Formation Plans, Ground Investigation Plans, Drainage Plans and Curtain Wall Plans, include the following:

1

https://www.bim.cic.hk/en/resources/publications_detail/82?keyword=&sorting=seq&back=%2fen%2fresources%2fpublications%3fsorting%3dseq%26keyword%3d

1. Sample Drawings in Appendix A

Sample drawings are provided to demonstrate the feasibility of drawings generated with the Guidelines and to illustrate the presentation format sample for statutory submission only. They do not represent a complete set of submission drawings required for approval by BA. Details shown in the sample drawings do not imply compliance with the BO and its subsidiary legislation, relevant Codes of Practice, Practice Notes for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAPs), Circular Letters, Guidelines, or approval will be given by BA.

2. BIM Objects Presentation Summary in Appendix B

Due to the limitation to include all different types of design in a set of sample drawings, BIM Objects Presentation Summary is aimed to provide commonly used BIM Objects which may not be shown on the sample drawings. Additional 2-dimensional (2D) details may be required for a complete set of submission.

3. Sample BIM models with 2D drawings of two BIM authoring software²

The standardised representation of each BIM object is provided with plan view, isometric 3-dimensional (3D) view, and elevation/section views where applicable. When there is a schedule provided on submission drawings (e.g. piling schedule) with information extracted from BIM Objects, the schedule is also provided in the BIM Objects Presentation Summary with identification of parameters that are linked with geometrical information or non-geometrical information captured in the BIM object. 2D details and 3D objects are identified in the BIM Objects Presentation Summary to illustrate the delineation between 2D and 3D objects when statutory plans are produced from BIM models.

4. Software Templates of two BIM authoring software²

For more detailed step by step procedures of modelling, BIM users may make reference to the software-specific user guides published by the CIC, available at <https://www.bim.cic.hk/en/resources/publications>.

² Available in BD website.

2 Preface

The Guidelines have been developed to facilitate the preparation of eight types of the prescribed plans for submission to BA. The Guidelines are software independent. Any BIM software meeting the requirements in the Guidelines can be used to produce prescribed plans for statutory submission. For preparing digital GBP generated from BIM, the Guidelines for using Building Information Modelling in General Building Plans Submission 2019 should be referred to.

The prescribed plans for approval, no matter how they are produced, **must fulfil** the statutory requirements as stipulated under the BO and its subsidiary legislation, relevant Codes of Practice, PNAPs and Circular Letters issued by BA. The application of BIM and the requirements set out in the Guidelines are **NOT** intended to change the submission requirements. The Guidelines aim to illustrate the methodologies for producing the prescribed plans in 2D format from BIM model based on the data-driven BIM Objects, non-geometrical information and 2D annotations in BIM models. Although BIM model can technically generate plans, the content and presentation of plans for statutory submission may require manual and engineering input by Authorized Persons (AP)/Registered Structural Engineers (RSE)/Registered Geotechnical Engineers (RGE) to annotate the appropriate presentation of the design on plans.

Following the Guidelines, sample BIM project models with 2D drawings and software templates are developed for two BIM authoring software commonly used in Hong Kong for each type of plans. All these deliverables are free for preparing statutory plan submissions for building development projects. The BIM authoring software for the purpose of illustrating the practicality of the Guidelines is selected based on the following criteria:

1. It is a BIM software certified by buildingSMART International;
2. It is a parametric modelling software that contains data-driven 3D objects; and
3. It can produce 2D drawings using the information embedded in the data-driven 3D objects such that information presented is consistent when it is shown more than once, i.e. single source of truth.

To avoid confusion that all construction items are built with BIM Objects or drawn in 3D, the Guidelines are so structured to explain what data-driven BIM Objects will be included, what non-geometrical information will be sufficient, what 2D annotations (e.g. Tags, Lines or Symbols) and which types of BIM Objects are needed for the preparation of statutory plans. Each type of plans is presented to show the presentation style with the use of the templates.

3 Objectives

The Guidelines aim to set out:

- (a) the requirements in BIM in preparing statutory plans by BIM authoring software; and
- (b) recommended good practices for the enhancement of submission standards.

3.1 Statutory Submission/Approval Process with BIM

According to PNAP ADV-34, in addition to the statutory requirements of plan submission in paper format or 2D PDF, AP/RSE/RGE are encouraged to present their proposals in digital format compatible with BIM viewing software, or real-time simulation, to enhance illustration of the proposals and/or the construction sequence of the proposed works in a specific manner and format.

While BD will process the approval of plans under the BO based on the information presented on the prescribed plans in paper format or 2D PDF, the information contained in the BIM file will be used for checking against the contents of the plans to facilitate scrutiny of the plans in accordance with the requirements of the BO. In case of any discrepancy between the plans and BIM files, the plans shall prevail.

4 BIM File Submission Requirements

Performance and administrative requirements are itemised below for reference.

4.1 Performance Requirements

All BIM statutory plan submission files should meet the following requirements:

- The BO and its subsidiary legislation
- Relevant Codes of Practice, PNAPs and Circular Letters issued by BA
- Relevant BIM sample templates associated with the Guidelines

Information contained in BIM statutory plan submission files should be identical to the information shown on the prescribed plans. Prescribed plans submitted to BA should be directly generated from the BIM model. Post-manual editing to the drawings generated from the BIM model should be minimised as far as possible.

4.2 Administrative Requirements

BIM files should be submitted by electronic means. For plan submission made in electronic format, the BIM files should be submitted together with the electronic plans via the Electronic Submission Hub (ESH)³. For plan submission made in paper format, the BIM files should be stored in a non-rewritable DVD-ROM in ISO/IEC 13346:1995 format (i.e. DVD format) and submitted together with the plans. Each BIM file should be limited to the size of 500MB and should contain/confine to one type of plan submission. Different type of plans may be cross-linked with each other under a clear file hierarchy structure/linkage, as appropriate. Except otherwise agreed in writing by BA, all other electronic submission media are not acceptable.

Each BIM file should contain a 3D model, views, and schedules, as well as the drawing sheets, including plans, sections, area diagrams, calculations, etc. for the printout to hardcopy of prescribed plans. A text file should be included in the submission via ESH or in the DVD-ROM to describe the hierarchy structure of linked files.

Examples of BIM authoring software for the development of BIM native digital file currently accepted by BA include, but not limited to, the following:

³ Please refer to ESH website at <https://esh.bd.gov.hk> for details.

Type of Plans	Software 1	Software 2
Superstructure *	Revit (version 2020 or later)	Tekla (version 2020 or later)
Foundation	Revit (version 2020 or later)	Tekla (version 2020 or later)
Demolition (Including hoarding, covered walkway and gantry plan)	Revit (version 2020 or later)	Tekla (version 2020 or later)
Excavation and Lateral Support	Revit (version 2020 or later)	Tekla (version 2020 or later)
Site formation	Revit (version 2020 or later)	Civil 3D (version 2019 or later)
Ground Investigation	Revit (version 2020 or later)	Civil 3D (version 2019 or later)
Drainage	Revit (version 2020 or later)	ArchiCAD (version 26 or later)
Curtain Wall	Revit (version 2020 or later)	Tekla (version 2020 or later)

Table 1

* The other structural plans e.g. cladding, window, window wall, protective barrier, noise barrier, temporary steel platform are not included.

As BIM technology is growing rapidly, there may be add-ins programs or in-house scripts used for enhancing automation in the production of BIM statutory plan submission files. Add-ins or other embedded automation may cause the submission files not to be usable by the standard BIM authoring software accepted by BD. It is the responsibility of AP/RSE/RGE to ensure that the purposes of the BIM statutory plan submission models are served without relying on add-ins or additional scripts.

Pre-acceptance from BA should be sought for software that is not listed in Table 1. As a general rule for such acceptance, AP/RSE/RGE should submit at least one sample project file together with the enabling software for installation and testing. Web based BIM software will not be accepted.

BIM native files for each type of BIM authoring software should be saved in their corresponding format as listed below.

Software	File Format
Revit	‘.rvt’
Tekla	Tekla project name folder
Civil 3D	‘.dwg’
ArchiCAD	‘.pla’

Table 2

In addition to the above BIM native files, file format defined by buildingSMART International directly output from BIM models is also recommended to be submitted. All other lightweight, compressed or zipped file formats, such as '.dwf', '.dwfx', '.pdf(3D)' and '.u3d' will not be accepted.

The BIM files submitted via ESH or in DVD format should be self-contained and detached from the originating server. It should be able to be opened on any standalone computer with the above-mentioned software. All External Reference (X-Ref) files for the BIM model such as .xls, .xlsx, .pdf files, etc. should be compressed into a file with file folder structure properly maintained and the links between all X-Ref files and BIM main file should be properly connected for plan submission via ESH. For BIM files with X-Ref to be submitted in DVD format, they should be stored in respective sub-folders in DVD-ROM without compression.

5 BIM Model General Requirements

All BIM models should be developed by BIM software, which fulfils the interoperability requirement of accepting data exchange through the IFC data format defined by buildingSMART International.

5.1 BIM Model Environment Requirements

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

5.1.1 Unit and measurement

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

5.1.2 BIM origin point and orientation

BIM models should be set up with geo-reference to the Hong Kong 1980 Grid System (HK1980 Grid) and the Hong Kong Principal Datum. The origin or base point and orientation of the BIM model should have a 'True North' location taking reference to this geo-reference. The BIM model should also have a 'Project North' location setting to orientate the project to project grid directions to define an orthogonal environment for the ease of model authoring and presentation of plans.

5.2 BIM Common Object Requirements

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

5.2.1 Level

Levels should be the floor level given in the general building plans (GBP). If the finished floor level (FFL) and structural floor level (SFL) are provided in the GBP, levels in the structural model should refer to SFL. For the drainage plan submission, levels in the drainage model should refer to FFL.

5.2.2 Grid

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

5.2.3 Site boundaries

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

5.3 BIM Annotations Requirements

In addition to the 3D BIM Objects, there are 2D annotations to present the non-geometrical information, especially the parameter value embedded with the 3D objects. There are also symbols (e.g. symbol for the slope on the plan view, level difference, etc.) that are added to enhance the description of a 2D representation only. As symbol has no linkage to the BIM Objects, the use of symbol should have a lower priority than Object Tag. Symbol should be used with special care to ensure its accuracy and correctness.

5.3.1 Object Tag

Object Tag is a 2D Symbol linked to BIM Objects with reference to the parameter value. In the case of text showing the parameter value, the value should preferably be used more than once to cross-check its accuracy. For example, the beam mark which is an Object Tag for beams showing 'Depth x Width' should use the same depth and width to control the size of the beam.

5.3.2 Symbol

Symbol is a 2D annotation to enhance the description of a 2D representation. As it has no linkage with the BIM Objects, symbols should be added with care. The use of symbol does not change the practice in using 2D CAD as it needs human intelligence and professional knowledge to add the right symbol at the right place.

5.3.3 Dimensions

Dimensions are intelligent 2D annotations referenced to BIM Objects. The dimension value is driven by data in BIM model and therefore should not be covered or replaced by numerical text to avoid any misleading presentation of the dimension value.

5.3.4 Notes

Notes are 2D text added to Views in the BIM model. These Views should be added to drawing sheets for the plan representation.

5.3.5 Legend

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

5.3.6 Title block

Title block containing a unique drawing number showing revision legends, site/project title, drawing title, etc. should be inserted in every drawing for identification purpose. Information for each drawing (e.g. drawing title, drawing number, etc.) should be stored with parameters for use. Also, the parameter values for the title block should be provided with the statutory plan submissions.

5.3.7 Drawing list

A drawing list should be developed from the information on drawings and selected those meaningful attributes from the title block to present on the drawing list.

5.3.8 2D Annotation requirements

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

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

Table 3

5.4 Common Types of Plans Requirements

Among all different types of statutory plans, requirements for these common items are unique and universally applicable as elaborated below.

5.4.1 Block plan

A block plan should be drawn to a scale as stipulated in PNAP ADV-33 and the Building (Administration) Regulations (B(A)R). The block plan showing the map of an area surrounding the site should use the 2D CAD drawings of the government map obtained from the Hong Kong Map Service, which is managed by the Survey and Mapping Office of the Lands Department. The map should be oriented to 'True North' with the site boundaries shown. Spot coordinates of the site boundaries should be added to show the correct location and orientation set.

5.4.2 Notes

Notes (including all texts in labels and tags) should be written with capital letters added in a 2D view in the BIM model to produce plans. The text height of notes should not be less than 2.5 mm. Text font should use a simple type, preferably 'Arial Narrow'.

5.4.3 Typical details

Typical details should consist of 2D drafting in the BIM model, as well as a view included in sheets for the plans. There are no specific requirements for the setting of 2D drafting provided the details are shown as neatly and tidily as in 2D CAD.

6 Statutory Plan Specific Requirements

The BIM model for generating drawings for statutory submission consists of 'data-driven BIM Objects' (basically 3D) and '2D Annotations'. Although it might be expected that all building items should be modelled as BIM Object or in 3D, the types of items modelled in 3D are defined to avoid excessive effort to produce unnecessary or inaccurate information. A data-driven BIM Object contains BIM Object with graphical presentation of the geometry; geometrical information is related to the colour, shape and size of geometry; and non-geometrical information is not related to the geometry.

BIM Object is a 3D object with the colour, shape and size of the geometry defined by the geometrical information. BIM Object enables the geometry to be shown in both 2D and 3D views.

Geometrical information is the information or parameter values that define the colour, shape and size of the geometry. For example, the size of a rectangular column section is defined by its width and depth. The 'Width' and 'Depth' are geometrical information in relation to the geometry.

Non-geometrical information is the information or parameter values with no link or control to the colour, shape and size of the geometry. Non-geometrical information covers many types of information from material specifications to physical properties, or is simply the label of an object and hyperlink. If the detailed shape of an object is not needed in the early stages of a project, or only at a low Level of Development requirements, objects that are not modelled with the geometry can be described by non-geometrical information. For example, reinforcing bars (rebars) content can be described by 'Rebar Content' as numerical information with the unit in kg/m³. It can also be described in terms of the 'Number' and 'Diameter' of rebars, or 'Diameter' with 'Spacing'.

Requirements for each type of statutory plan are developed from 'BIM Object with graphical presentation of the geometry'. 'Geometrical information in relation to the geometry' and 'non-geometrical information' are explained in detail. Detailed presentation requirements for each type of statutory plan are also illustrated in detail.

It should be noted that the Guidelines do not cover all objects but only those commonly used.

6.1 Superstructure Plans

Superstructure plans present the layout arrangement and structural details of the structural system from above the foundation to the roof of a building. Essential information is also required to be added/annotated to include but not limited to design codes and standards, material specifications with the limit of material strength, design loads, fire resistance requirements and protection against corrosion to recognised standards, quality control standards and testing on workmanship and construction sequence of unconventional structures. Besides, the RSE should refer to other essential information to be provided and shown on the superstructure plans as required under the relevant PNAPs including but not limited to PNAPs ADM-8, ADM-9, ADM-19 and ADV-33.

6.1.1 Data-driven BIM Object requirements

The following items with geometry settings, geometrical and non-geometrical information should be provided and included in BIM models.

Item	Geometry Settings	Geometrical information	Non-geometrical information
Cast in situ concrete structural slab/transfer plate	• Parametric object indexed/categorised as 'Structural Slab' with a whole piece built across all spans at the same floor level (ignoring individual span) • Top of slab should be modelled to Structural Floor Level • Thickness of slab should only be the thickness of the cast in situ part • Rebar should be modelled with sufficient details for the statutory plan submission⁴	• Thickness • Rebar size/ shape/spacing/ concrete cover/ shear link • Tendon number/ profile/type, if applicable	• Concrete grade • Concrete density • Rebar material grade/layer • Material specification • Tendon number/ profile/type, specification, prestress force if applicable

⁴ Some practitioners may not be ready to build BIM Objects on rebar, therefore 2D representation of rebar is also acceptable.

Item	Geometry Settings	Geometrical information	Non-geometrical information
Precast concrete plank for structural slab	• Parametric object indexed/categorised as 'Structural Slab' • Top of slab should be modelled to the top level of the precast plank • Thickness of parametric object should be the thickness of the precast plank • Rebar should be modelled with all required details for fabrication⁴	• Thickness • Rebar size/ shape/spacing/ concrete cover	• Object mark • Concrete grade • Concrete density • Rebar material grade • Material specification
Structural beam (concrete)	• Parametric object indexed/categorised as 'Structural Framing' • Structural beam should be modelled to the full structural size of its width and depth • Rebar should be modelled with all required details for statutory plan submission⁴	• Width • Depth • Additional information should be provided to define the geometry (e.g. distance to change of depth) • Rebar size/ shape/spacing/ concrete cover/ shear link • Tendon number/ profile/type, if applicable	• Object mark • Concrete grade • Concrete density • Rebar material grade • Material specification • Tendon number/ profile/type, specification, prestress force if applicable
Structural beam (steel)	• Parametric object indexed/categorised as 'Structural Framing' • Structural beam should be modelled to the full structural size of the width, depth and thickness of flange/web	• Width • Depth • Additional information should be provided to define the geometry (e.g. thickness of flange/web and opening size on web if any)	• Object mark • Type mark • Steel grade • Steel density • Section Physical Properties (e.g. second moment of area, radius of gyration etc.) • Material specification

Item	Geometry Settings	Geometrical information	Non-geometrical information
Structural column (concrete)	- Parametric object indexed/categorised as 'Structural Column' - Structural column should be modelled to the full structural size of width, depth and height - Rebar should be modelled with all required details for statutory plan submission⁴	- Width - Depth - Height - Rebar size/ shape/spacing/ concrete cover/ binder	- Object mark - Concrete grade - Concrete density - Rebar material grade/steel ratio - Material specification
Structural column (steel)	- Parametric object indexed/categorised as 'Structural Column' - Structural Column should be modelled to the full structural size of width, depth, height and thickness of flange/web	- Length - Width - Height - Thickness of flange/web	- Object mark - Type mark - Steel grade - Steel density - Section Physical Properties (e.g. second moment of area, radius of gyration etc.) - Material specification
Structural wall (concrete)	- Parametric object indexed/categorised as 'Wall' with identifier for 'Structural' - Structural wall should be modelled to the full structural size of length, thickness and height - Rebar should be modelled with sufficient details for the statutory plan submission⁴	- Length - Thickness - Height - Rebar size/ shape/spacing/ concrete cover/ binder	- Object mark - Concrete grade - Concrete density - Rebar material grade/steel ratio - Material specification
Stair (concrete)	- Parametric object indexed/categorised as 'Stair' for all landing and flight - Top level of landing and flight should be modelled to the Structural Floor Level of the item - Rebar should be modelled with sufficient details for statutory plan submission⁴	- Thickness (landing and flight) - Rebar size/ shape/spacing/ concrete cover	- Object mark - Concrete grade - Concrete density - Rebar material grade - Material specification

Item	Geometry Settings	Geometrical information	Non-geometrical information
Basement wall (concrete)	- Parametric object indexed/categorised as 'Wall' with identifier for 'Structural' - Structural Wall should be modelled to the full structural size of length, thickness and height - Rebar should be modelled with sufficient details for the statutory plan submission⁴	- Length - Thickness - Height - Rebar size/ shape/spacing/ concrete cover/ binder	- Object mark - Concrete grade - Concrete density - Rebar material grade/steel ratio - Material specification
Pile cap	- Parametric object indexed/categorised as 'Foundation' - Top level of pile cap should be modelled to the top level of the pile cap - Rebar should be modelled with sufficient details for the statutory plan submission⁴	- Thickness - Rebar size/ shape/spacing/ concrete cover/ shear link	- Object mark - Concrete grade - Concrete density - Rebar material grade/layer - Material specification
Ground/Rock stratum profile	Topographic surface indexed/categorised as 'Site'	Node coordinates and elevation	Ground material
Coupler	Coupler should be modelled to the size of external diameter and length	- External diameter - Total length of the coupler - Type of material	- Type mark - Object mark - Steel grade - Steel density - Material specification
Profiled steel sheet	Parametric object indexed/categorised as 'Floor'	- Length - Additional information should be provided to define the geometry (e.g. thickness of flange/web) - Type of material	- Type mark - Steel grade - Steel density - Section Physical Properties (e.g. second moment of area, radius of gyration etc.) - Material specification

Item	Geometry Settings	Geometrical information	Non-geometrical information
Base plates	Parametric object indexed/categorised as 'Structural Connection'	- Width - Thickness - Additional information should be provided to define the geometry (e.g. thickness of flange/web) - Grade of material	- Type mark - Steel grade - Steel density - Section Physical Properties (e.g. second moment of area, radius of gyration etc.) - Material specification
Steel connection plates	Parametric object indexed/categorised as 'Structural Connection'	- Size - Thickness - Additional information should be provided to define the geometry (e.g. thickness of flange/web) - Grade of material	- Type mark - Steel grade - Steel density - Section Physical Properties (e.g. second moment of area, radius of gyration etc.) - Material specification

Table 4

6.1.2 2D Annotation requirements

The following 2D annotations to present BIM Objects information should be included and shown on 2D plans.

Type of 2D Annotation	Tag/Symbol/ Others	Remarks
Floor Loading [Superimposed Dead Load (SDL) & Live Load (LL)] Layout	Hatch (Fill Region)	2D hatch on a view of structural plan manually define the layout and area of loading
Slab mark	Tag	Tag with default 'Thickness' with "Slab Mark" and span direction(s)
Beam mark	Tag	Tag linked with beam object using the beam 'Mark', 'Width' and 'Depth' to show beam mark (width x depth)
Column mark	Tag	Tag linked with column object using the 'Mark' to show the column mark
Column schedule	Tag	Tag linked with column rebar objects and/or non-geometrical information

Type of 2D Annotation	Tag/Symbol/Others	Remarks
Wall mark	Tag	Tag linked with wall object using the 'Mark' to show the wall mark
Level difference	Symbol	Symbol with manual adjustment to the direction and which side to drop
Coupler mark	Tag	Tag linked with coupler using the 'Mark' to show the coupler mark
Support connection type (moment/pinned joint) (Steel)	Symbol	Symbol linked with steel structures using the 'Start/End connection' to show the support connection type

Table 5

6.1.3 Types of plans to be produced from BIM

Based on the above requirements, sample drawings to illustrate the preparation of Superstructure Plans including framing plans, beam and slab reinforcement details, column and wall schedules, steel structure layout plans and details etc. generated by BIM software are provided in Appendix A for reference.

6.1.4 BIM Object presentation style

The presentation style defined in the table below is for reference only. Practitioners may adopt other presentation styles so long as a clear BIM model is produced.

		Projection		Cut	
		Line	Pattern	Line	Pattern
		Style, Colour, Thickness	Style, Colour	Style, Colour Thickness	Style, Colour
Framing plans (1:100)	Slab	Solid Black 0.22 mm	Solid fill, RGB 255-255-206	Solid Black 0.22 mm	None
	Beam (Concrete)	Solid Black 0.15 mm	None	Solid Black 0.35 mm	None
	Beam (Steel)	Solid Black 0.15 mm	None	Solid Black 0.15 mm	None

		Projection		Cut	
		Line	Pattern	Line	Pattern
		Style, Colour, Thickness	Style, Colour	Style, Colour Thickness	Style, Colour
	Column (Concrete)	Solid Black 0.15 mm	None	Solid Black 0.35 mm	Solid fill, RGB 150-185-200
	Column (Steel)	Solid Black 0.15 mm	None	Solid Black 0.15 mm	None
	Wall	Solid Black 0.15 mm	None	Solid Black 0.35 mm	Solid fill, RGB 140-200-140
Slab R.C. details (1:100)	Slab (half tone)	Solid Black 0.22 mm	None	Solid Black 0.22 mm	None
	Beam (half tone)	Solid Black 0.15 mm	None	Solid Black 0.35 mm	None
	Column (half tone)	Solid Black 0.15 mm	None	Solid Black 0.35 mm	Solid fill, RGB 150-185-200
	Wall (half tone)	Solid Black 0.15 mm	None	Solid Black 0.35 mm	Solid fill, RGB 140-200-140
	Rebar	Solid Black 0.35 mm	None	Solid Black 0.35 mm	None
Beam R.C. details	Beam/ Column/ Slab	Solid, Black 0.18 mm	None	Solid Black 0.18 mm	None
	Rebar	Solid black	None	Solid black	None
Column R.C. Details (1:25)	Column	Solid Black 0.18 mm	None	Solid Black 0.18 mm	None
	Vertical rebar/ Stirrup	Solid Black	None	Solid Black	None
Wall R.C. Details	Wall	Solid Black 0.18 mm	None	Solid Black 0.18 mm	None

		Projection		Cut	
		Line	Pattern	Line	Pattern
		Style, Colour, Thickness	Style, Colour	Style, Colour Thickness	Style, Colour
(1:50)	Vertical rebar/ Stirrup	Solid Black	None	Solid Black	None
Staircase R.C. details (1:25)	Beam/ Column/ Slab	Solid Black 0.18 mm	None	Solid Black 0.18 mm	None
	Stairs	Hidden Black 0.18 mm	None	Solid Black 0.18 mm	None
	Rebar	Solid Black	None	Solid Black	None
Steel Connection details (1:10)	Bolt/Plate	Solid Black	None	Solid Black	None

Table 6

6.2 Foundation Plans

Foundation plans contain layouts, sections/elevations, structural details, geological condition (including Ground Investigation Records), details showing the characteristic features of the site and environments, column/wall loading tables, piling/footing schedules, locations and details of instrumentation and monitoring requirements. The RSE/RGE should refer to other essential information to be provided/shown on the foundation plans as required under the B(A)R, Code of Practice for Foundations 2017 and the relevant PNAPs including but not limited to PNAPs ADM-8, ADM-9, ADM-19 and ADV-33.

6.2.1 Data-driven BIM Object requirements

The following items with geometry settings, geometrical and non-geometrical information should be provided and included in BIM models.

Item	Geometry Settings	Geometrical Information	Non-geometrical Information
Driven steel H-pile (including raking pile)	• Parametric object indexed/categorised as 'Structural Foundation' with full geometry of pile section and capping plate • Top of pile should be modelled to 'Cut-off Level' • Bottom of pile should be modelled to 'Tentative bottom level'	• Pile section with detailed size and thickness of flange and web • Cut-off level • Tentative founding level • Capping plate size (length/width/depth) • Raking pile inclination angle or gradient (if applicable) • Orientation • Setting out dimension or coordinates	• Pile mark • Grade of steel • Material specification • Requirement on final set • Orientation • Inclination • Coordinates
Socketed steel H-pile	• Parametric object indexed/categorised as 'Structural Foundation' with full geometry of pile section, shaft diameter of grout in soil, shaft diameter of grout in rock • Top of pile should be modelled to 'Cut-off Level' • Bottom of pile should be modelled to 'Tentative Bottom Level'	• Pile section with detailed size and thickness of flange and web • Shaft diameters of grout in soil and rock • Cut-off level • Tentative founding level • Capping plate size (length/width/depth) • Orientation • Inclination • Setting out dimension or coordinates • Shear stud size, grade and spacing	• Pile mark • Grade of steel • Material specification of grouting & steel • Minimum length and the grade of founding material for socketed steel H Pile • Orientation • Inclination • Coordinates

Item	Geometry Settings	Geometrical Information	Non-geometrical Information
Small/ Large diameter bored pile	• Parametric object indexed/categorised as 'Structural Foundation' with full geometry of pile shaft, bell-out and sleeve (if any) • Top of pile should be modelled to 'Cut-off Level' • Bottom of pile should be modelled to 'Tentative Bottom Level' • Geometry of bell-out should be generic with the bell-out diameter, inclination angle and flat base • Rebar should be modelled with sufficient details for the statutory plan submission⁴	• Shaft diameter • Bell-out diameter • Cut-off level • Tentative founding level • Top/Bottom level of sleeve • Thickness of sleeve • Setting out dimension or coordinates	• Pile mark • Concrete grade • Concrete density • Rebar material grade • Material specification • Grade of founding material and designed allowable bearing pressure • Minimum socketed length, if applicable. • Effective socket length for bond friction, if applicable • Coordinates

Item	Geometry Settings	Geometrical Information	Non-geometrical Information
Mini-pile	• Parametric object indexed/categorised as 'Structural Foundation' with full geometry of rebars and the permanent casing • Spacers between rebar should be shown with details in 2D • Connection details between mini-piles and concrete cap	• Number and diameter of rebar • Diameter and thickness of permanent casing • Cut-off level and toe level • Tentative founding level • Inclination • Setting out dimension or coordinates • Capping plate size (length/width/depth) if applicable • Pile head reinforcement arrangement details	• Pile mark • Grade of steel rebar and casing • Material specification of grouting/ reinforcement • Inclination • Coordinates • Grade of founding material
Footing	• Parametric object indexed/categorised as 'Structural Foundation' with full geometry of footing and rebar details	• Dimension (including thickness) • Top level • Founding level • Rebar size/shape/spacing/ concrete cover	• Concrete grade • Rebar material grade • Material specification • Founding material and designed allowable bearing pressure

Item	Geometry Settings	Geometrical Information	Non-geometrical Information
Monitoring Instrument	Parametric object with a symbolic shape and size should be modelled and added to location at ground or on structure where it is intended to be installed	Response zone of the instrument installed, e.g. in piezometers and standpipes, extensometers, etc., instrument details, instrument installation details/method.	- Marker mark - Type

Table 7

“Geological profile and stratum” is also a BIM Object to be shown on plan. However, it should be a linked model for showing the existing topography information on the drawings, and it is not the object requirement in foundation plans category.

6.2.2 2D Annotation requirements

The following 2D annotations to present BIM Objects information should be included and shown on 2D plans.

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

Table 8**6.2.3 Types of plans to be produced from BIM**

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

6.2.4 BIM Object presentation style

The presentation style defined in table below is for reference only. Practitioners may adopt other presentation styles so long as a clear BIM model is produced.

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

		Projection		Cut	
		Line	Pattern	Line	Pattern
		Style, Colour, Thickness	Style, Colour	Style, Colour Thickness	Style, Colour
	Others structural elements (half tone)	Solid Black 0.13 mm	None	Solid Black 0.2 mm	None
	Contours Lines	None	None	Solid Black 0.2 mm	None
Pile Cap Layout plans (1:200)	Tie Beam/ Footing/ Pile Cap	Solid Black 0.6 mm	None	Solid Black 0.6 mm	None
	Piling	Solid Black 0.06 mm	None	Solid Black 0.06 mm	None
	Wall	Solid Black 0.2 mm	None	Solid Black 0.2 mm	Solid fill, RGB 140-200-140
	Column	Solid Black 0.2 mm	None	Solid Black 0.2 mm	Solid fill, RGB 150-185-200
	Contours Lines	None	None	Solid Black 0.13 mm	None
Column/Wall Layout plans (1:200)	Column	Solid Black 0.2 mm	None	Solid Black 0.2 mm	Solid fill, RGB 150-185-200
	Wall	Solid Black 0.2 mm	None	Solid Black 0.2 mm	Solid fill, RGB 140-200-140
	Screen Wall	Solid Black 0.2 mm	None	Solid Black 0.2 mm	Hatch
Pile Cap Reinforcement Layout plans (1:100)	Pile Cap	Solid Black 0.22 mm	None	Solid Black 0.22 mm	None
	Rebar	Solid Black 0.5 mm	None	Solid Black 0.5 mm	None

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

Table 9

6.3 Demolition Plans (Including hoarding, covered walkway and gantry plans)

Demolition plans contain the structural framing plans of the existing structure, method of demolition and detailed demolition sequence for special structure. AP/RSE/RGE should refer to essential information to be provided and shown on the demolition plans as required under the B(A)R, Code of Practice for Demolition of Buildings 2004 and the relevant PNAPs including but not limited to PNAP ADM-19.

Separate submission for hoarding, covered walkway and gantry may be required for acceptance by BA. AP/RSE/RGE should refer to essential information to be provided and shown on the hoarding, covered walkway and gantry plans as required under the Code of Practice for Demolition of Buildings 2004 and the relevant PNAPs including but not limited to PNAPs APP-21 and APP-23.

6.3.1 Data-driven BIM Object requirements

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

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Concrete structural slab	- Parametric object indexed/categorised as 'Structural Floor' with a whole piece of parametric object for all spans at the same floor level (ignoring individual span) - Top of slab should be modelled to structural floor level - Thickness of floor should only be the thickness of the cast in situ part	- Thickness - Rebar size/shape/spacing/concrete cover - Cantilevered balconies or Cantilevered structures	Rebar material grade/layer
Structural beam (concrete)	- Parametric object indexed/categorised as 'Structural Framing' - Structural beam should be modelled to the full structural size of the width and depth	- Width - Depth - Rebar size/shape/spacing/concrete cover	Rebar material grade
Structural beam (steel)	- Parametric object indexed/categorised as 'Structural Framing' - Structural beam should be modelled to the full structural size of the width, depth and thickness of flange/web	- Width - Depth - Additional information should be provided to define the geometry (e.g. thickness of flange/web)	- Object mark - Type mark - Steel grade - Steel density - Section Physical Properties (e.g. second moment of area, radius of gyration etc.)
Structural column (concrete)	- Parametric object indexed/categorised as 'Structural Column' - Structural column should be modelled to the full structural size of length, width and height	- Length - Width - Height - Rebar size/shape/spacing/concrete cover	Rebar material grade/steel ratio
Structural column (steel)	- Parametric object indexed/categorised as 'Structural Column' - Structural Column should be modelled to the full structural size of	- Length - Width - Height - Thickness of flange/web	- Object mark - Type mark - Steel grade - Steel density - Section Physical Properties (e.g.

Item	Geometry Settings	Geometrical information	Non-geometrical Information
	width, depth, height and thickness of flange/web		second moment of area, radius of gyration etc.)
Structural wall (concrete)	- Parametric object indexed/categorised as 'Wall' with identifier for 'Structural' - Structural wall should be modelled to the full structural size of length, thickness and height	- Length - Thickness - Rebar size/shape/spacing/concrete cover	Rebar material grade/steel ratio
Stair (concrete)	- Parametric object indexed/categorised as 'Stair' for all landing and flight - Top level of landing and flight should be modelled to the Structural Floor Level of the item - Rebar should be modelled with sufficient details for statutory plan submission⁴	- Thickness (landing and flight) - Rebar size/shape/spacing/concrete cover	- Object mark - Concrete grade - Concrete density - Rebar material grade
Hangers (or hanging structures)	- Parametric objects indexed/categorised as 'Wall' with identifier for 'Hanger' - Hangers should be modelled to the full structural size of length, thickness and height	- Length - Thickness - Rebar size/shape/spacing/concrete cover	Rebar material grade/steel ratio
Temporary supports	Parametric objects indexed/categorised as 'Temporary Works' modelled in full size and configuration with the major elements (e.g. vertical members and bracings) included	- Temporary support spacing - Type and load capacity of the temporary support	Type and load capacity of the temporary support
Scaffolding, Screen covers and catchfan	- Parametric objects indexed/categorised as 'Temporary Works' - Bamboo scaffolding should be modelled to the overall profile	- Width - Size, material, grade (if steel catchfan)	Type and load capacity of the temporary support

Item	Geometry Settings	Geometrical information	Non-geometrical Information
	showing the location and space to be occupied. (Details of bamboo and its fixing are not necessary.)		
Debris chute	• Parametric objects indexed/categorised as 'Temporary Works' • Debris chute should be modelled to the overall profile showing the location and space to be occupied. (Details of debris chute and its fixing are not necessary.)	• None	• None
Hoarding, covered walkway and catchfan	• Parametric objects indexed/categorised as 'Site' • Hoardings and covered walkway should be modelled to the full geometry of the footing base and the geometry of the overall profile of the hoarding and covered walkway structure above the footing	• Footing length • Footing width • Footing height • Type and load capacity of the temporary support • Size, material and grade of steel hoarding and covered walkway	• Type and load capacity of the temporary support • Size, material and grade of steel hoarding and covered walkway
Street furniture	• Parametric objects indexed/categorised as 'Street Furniture' • The following items within the pavement area should be modelled with Parametric objects: • Railing • Traffic light • Fire hydrant • Lamp post/lighting mast • Pillar box • Tram cable mast/support • Trees along the hoarding alignment should be represented by a point	• None	• None

Item	Geometry Settings	Geometrical information	Non-geometrical Information
	cloud produced by laser scanning • Bus Stop • Road Sign (including Street Name Plate) • Post Box • Parking meters		
CCTV	• Parametric objects indexed/categorised as "Site" • The intended location, elevation and viewing direction should be specified	• Location • Height from reference level • Viewing Direction	• None
Adjacent Building	• Massing blocks	• Building Height • Building Extent	• None
Monitoring Instrument	• Parametric object with a symbolic shape and size should be modelled and added to location at ground or on structure where it is intended to be installed	• Response zone of the instrument installed, e.g. in piezometers and standpipes, extensometers, etc., instrument details, instrument installation details/method.	• Marker mark • Type

Table 10

6.3.2 2D Annotation requirements

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

Type of 2D Annotation	Tag/Symbol/ Others	Remarks
Prestressed Concrete structure	Hatch	• Hatch linked with the parameter value of 'Prestressed Concrete Structure' in Slab objects
Cantilever structure	Hatch	• Hatch linked with the parameter value of 'Cantilever Structure' in Slab objects
Exit Route	Symbol	• Symbol to be placed on drawing view to show the exit route

Table 11

6.3.3 Types of plans to be produced from BIM

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

Hoarding, covered walkway and catchfan layout and details should be under separate submission.

6.3.4 BIM Object Presentation Style

The presentation style defined in table below is for reference only. Practitioners may adopt other presentation styles so long as a clear BIM model is produced.

		Projection		Cut	
		Line	Pattern	Line	Pattern
		Style, Colour, Thickness	Style, Colour	Style, Colour Thickness	Style, Colour
Framing plans (1:100)	Slab	Solid Black 0.22 mm	Solid fill, RGB 255-255-206	Solid Black 0.22 mm	None
	Beam	Solid Black 0.15 mm	None	Solid Black 0.35 mm	None
	Column	Solid Black 0.15 mm	None	Solid Black 0.35 mm	Solid fill, RGB 150-185-200
	Wall	Solid Black 0.15 mm	None	Solid Black 0.35 mm	Solid fill, RGB 140-200-140

Table 12

6.4 Excavation and Lateral Support Plans

ELS plans generated from the BIM model present the layout arrangement and details of the lateral support system, including the temporary pile walls and multi-layers of strutting system. Essential information is also required to be added or annotated to include construction method and sequence, details showing the characteristic features of the site, the proposed precautionary measures, details of the proposed instrumentation and monitoring, the corresponding structural details, etc. RSE/RGE should refer to other essential

information to be provided/shown on the ELS plans as required under the B(A)R and the relevant PNAPs including but not limited to PNAPs ADM-8, ADM-9, ADM-19 and ADV-33.

6.4.1 Data-driven BIM Object requirements

The following items with geometry settings, geometrical and non-geometrical information should be provided and included in BIM models.

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Sheet piling	- Parametric object indexed/categorised as 'Pile Wall' for the sheet pile with the correct shape (including the customised shape for corner pile), size should be modelled - Grouting (with grout pipes and required zone)	- Top level - Required toe level - Sheet piling profile - Thickness - Material & Type of sheet pile	- Type mark - Weight per unit length (kg/m) - Material & Type of sheet pile - Section properties (Elasticity (EI) , Area, etc) - Grout mix
Pipe pile wall (with Lagging Plate)	- Parametric object indexed/categorised as 'Pile Wall' for the pipe pile with the correct size should be modelled - Grouting (with grout pipes and required zone)	- Diameter - Top level - Required toe level - Top and bottom level of grouting zone - Thickness of Pipe Pile Wall - Thickness of Lagging Plate - Material of pipe pile - Material of lagging plate - Weld size - Weld material - Material of infill (if any)	- Type mark - Weight per unit length (kg/m) - Section properties (EI, Area, etc) - Grout mix - Maximum Spacing - Material of pipe pile - Material of lagging plate - Weld size - Weld material - Material of infill (if any)
Steel waling	Parametric object indexed/categorised as 'Structural Framing' for the steel waling with the correct size and length should be modelled	- Width - Depth - Length - Flange thickness - Web thickness - Level - Material - Grade of material	- Type mark - Weight per unit length (kg/m) - Section properties (EI, Area, etc) - Material - Grade of material

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Diaphragm Wall	Parametric object indexed/categorised as 'Structural Wall' for the diaphragm wall with the correct size should be modelled	- Thickness - Length - Height - Level (top and toe) - Material - Grade of material	- Concrete and Reinforcement Grade - Concrete and reinforcement specification - Wall mark - Section properties (EI, Area, etc)
Steel strut/ Bracing	Parametric object indexed/categorised as 'Structural Framing' for the steel strutting with the correct size and length should be modelled	- Width - Depth - Flange thickness - Web thickness - Length - Level - Material - Grade of material	- Type mark - Weight per unit length (kg/m) - Section properties (EI, Area, etc) - Material - Grade of material - Steel strut/bracing preload force (if any)
King post	Parametric object indexed/categorised as "Structural Column" for the King post with the correct size, length and depth should be modelled	- Width - Depth - Flange thickness - Web thickness - Top Level - Required toe Level - Material - Grade of material	- Type mark - Weight per unit length (kg/m) - Section properties (EI, Area, etc) - Material - Grade of material
Excavation levels in stages	Parametric object of the surface indexed/categorised as 'Topography' built up by spot locations with elevations should be modelled	- Node coordinates and elevation - Section	None
Monitoring Instrument	Parametric object with a symbolic shape and size should be modelled and added to location at ground or on structure where it is intended to be installed	Response zone of the instrument installed, e.g. in piezometers and standpipes, extensometers, etc., instrument details, instrument installation details/method.	- Marker mark - Type

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Soil nail	Parametric object indexed/categorised as 'Site' with the correct size, length or fall should be modelled	- Bar Length - Bar Diameter - Inclination - Bearing - Level - Spacing	- Rebar material grade - Cement grout and anchor plate/block material grade - Maximum Spacing - Soil nail prestress force (if any)

Table 13

"Geological profile and stratum" is also a BIM Object to be shown on plan. However, it should be a linked model for showing the existing topography information on the drawings, and it is not the object requirement in ELS plans category.

6.4.2 2D Annotation requirements

The following 2D annotations to present BIM Objects information should be included and shown on 2D plans.

Type of 2D Annotation	Tag/Symbol/Others	Remarks
Waling/Strutting mark	Tag	Tag linked with beam object using the waling/strutting 'Mark'
Pile mark	Tag	Tag linked with the 'Mark' of pile object
Pile wall mark	Dimensions	Edit text for the dimension in order to show the types of pile wall.
Borehole mark	Tag	Tag linked with the 'Mark' of site object
Cut Slope mark	Symbol	Symbol with manual adjustment to the direction and which side to fall
Layer of excavation level	Tag	Tag linked with the 'line' according to each topographic layer.
Design Ground Water Table (G.W.T.)	Tag	Tag linked with the 'line' according to the designated level of G.W.T.
(Section) Offset value of Borehole from the section cut location	Symbol	Symbol present with text 'OFFSET' and the value of offset dimension to be input manually.
(Section) Site Boundary	2D Line	2D drafting
(Section) SPT N Value of Borehole	Tag	Tag linked with the 'N Value' of site object
(Section) Layer of Borehole	Tag	Tag linked with the 'Layer' of site object

Type of 2D Annotation	Tag/Symbol/ Others	Remarks
Monitoring Instrument points	Tag	Tag linked with the type of monitoring instrument model

Table 14

6.4.3 Types of plans to be produced from BIM

Based on the above requirements, sample drawings to illustrate the preparation of ELS plans including general notes, layout plans, elevations and sections, construction sequence, monitoring plan and pumping test setting out plan generated by BIM software are provided in Appendix A for reference.

6.4.4 BIM Object Presentation Style

The presentation style defined in table below is for reference only. Practitioners may adopt other presentation styles so long as a clear BIM model is produced.

		Projection		Cut	
		Line	Pattern	Line	Pattern
		Style, Colour, Thickness	Style, Colour	Style, Colour Thickness	Style, Colour
ELS plans (1:200)	Steel Waling	Solid Black 0.06 mm	None	Solid Black 0.13 mm	None
	Diaphragm Wall	Solid Black 0.13 mm	None	Solid Black 0.20 mm	None
	Steel Strut	Solid Black 0.06 mm	None	Solid Black 0.13 mm	None
	King Post	Solid Black 0.06 mm	None	Solid Black 0.13 mm	None
	Pile Wall (Sheet Pile)	Solid Black 0.06 mm	None	Solid Black 0.06 mm	None
	Pile Wall (Pipe Pile)	Solid Black 0.06 mm	None	Solid Black 0.06 mm	None

Table 15

6.5 Site Formation Plans

Site formation plans generated from BIM model present the layout and details of site formation, e.g. slope gradients, soil nails and U-Channel layouts. Cutting slopes, retaining structures/walls, catch pits, sand traps and U-Channel layout. AP/RSE/RGE should refer to other essential information to be provided/shown on the site formation plans as required under the B(A)R and the relevant PNAPs including but not limited to PNAPs ADM-8, ADM-9, ADM-19 and ADV-33.

6.5.1 Data-driven BIM Object requirements

The following items with geometry settings, geometrical and non-geometrical information should be provided and included in BIM models.

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Existing ground profile <i>Note: Details and information of the existing ground profile should contain all ground features as if it is given in topographic survey.</i>	• Parametric object of the surface indexed/categorised as 'Topography' built up by spot locations with elevations should be modelled • Existing ground features, e.g. retaining wall, drains, existing slopes with suitable symbols indicating soil/rock slopes • Existing trees	• Node coordinates and elevation • Section	• Material

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Site formation profile (slope/ berm/platform/ design ground water level/subsoil profile)	- Parametric object of the surface indexed/categorised as 'Topography' built up by spot locations with elevations should be modelled - The surface should be able to 'Soil Cut Slope', 'Rock Cut Slope' and 'Fill Slope' when compared with the previous stage of site formation works - Type of surface protection should be modelled in 'Material' in geometrical information with representative colour - Gradient for slope	- Formation level - Node coordinates and elevation - Section - Material	- None - Material
Site drainage (channels/catchpit/ Manhole/raking drain etc.)	Parametric object indexed/categorised as 'Site' with the correct size, depth or fall should be modelled	- Width - Depth - Gradient - Fall direction	None
Retaining wall	- Parametric object with the correct size, depth, inclination and position should be modelled - Any mass concrete filling beneath the base of retaining wall	- Width - Depth - Thickness - Founding level	- Grade of founding material and designed allowable bearing pressure - Material properties including concrete grade and density
Soil nail	Parametric object indexed/categorised as 'Site' with the correct size, length or fall should be modelled	- Bar Length - Bar Diameter - Inclination - Bearing - Level - Spacing	- Rebar material grade - Cement grout and anchor plate/block material grade - Maximum Spacing - Soil nail prestress force (if any)
Rock Slope Stabilisation Measures (e.g. Buttress and Rock dowels)	Parametric object indexed/categorised as 'Site'	Size (objects dependent)	Mark

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Monitoring Instrument	Parametric object with a symbolic shape and size should be modelled and added to location at ground or on structure where it is intended to be installed	Response zone of the instrument installed, e.g. in piezometers and standpipes, extensometers, etc., instrument details, instrument installation details/method.	- Marker mark - Type
Geological profile and stratum	Parametric object of the surface indexed/ categorised as 'Topography' built up by spot locations with elevations for the top level of stratum should be modelled	- Node coordinates and elevation - Section	- Grade or short description - Stratum description

Table 16

"Geological profile and stratum" is also a BIM Object to be shown on plan. However, it should be a linked model for showing the existing topography information on the drawings, and it is not the object requirement in Site Formation plans category.

6.5.2 2D Annotation requirements

The following 2D annotations to present BIM Objects information should be included and shown on 2D plans.

Type of 2D Annotation	Tag/Symbol/ Others	Remarks
U Channel mark	Tag	Tag linked with the 'type mark' in the site object
Soil Nail mark	Tag	Tag linked with the 'mark' of Site Object
Slope Label	Symbol	Symbol with manual adjustment to the slope type, direction and which side to fall
Catch pit mark	Tag	Tag linked with the 'mark' of Site Object
Tie back/Soil Nail mark	Tag	Tag linked with the 'mark' of Site Object
Monitoring Instrument points	Tag	Tag linked with the type of monitoring instrument model
Site Boundary	Property Line	Create Property Lines as Site Boundary
Slope Gradient	Tag	Tag read the 'slope' gradient value

Table 17

6.5.3 Types of plans to be produced from BIM

Based on the above requirements, sample drawings to illustrate the preparation of Site Formation plans generated by BIM software are provided in Appendix A for reference.

6.6 Ground Investigation Plans

Ground Investigation (GI) layout and details such as borehole, trial pit and the topographic profiles to be presented in GI Plans in the Scheduled Areas, Site Formation Plans, Foundation Plans and ELS Plans. AP/RSE/RGE should refer to other essential information to be provided/shown on the GI plans as required under the B(A)R and relevant PNAPs.

6.6.1 Data-driven BIM Object requirements

The following items with geometry settings, geometrical and non-geometrical information should be provided and included in BIM models.

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Borehole	Parametric object indexed/categorised as 'Site' showing the thickness of stratum should be modelled to location	- Top level - Toe level - Inclination - Orientation - Coordinates	- Borehole mark - Schedule area number to be provided if the borehole is located in schedule area - Layer depth, stratum description & field test result if any e.g. UCS, PLI₅₀, SPT etc
Geological profile and stratum	Parametric object of the surface indexed/ categorised as 'Topography' built up by spot locations with elevations for the top level of stratum should be modelled	- Node coordinates and elevation - Section	- Grade or short description - Stratum description

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Trial pit	Parametric object indexed/categorised as 'Site Component' showing the size and depth should be modelled to location	- Plan dimension (e.g. length, width) - Elevation at top of trial pit - Elevation at bottom of trial pit	- Trial pit mark - Schedule area number to be provided if the borehole is located in schedule area - Layer depth, stratum description & field test result if any e.g. UCS, PLI₅₀, SPT etc
Monitoring Instrument	Parametric object with a symbolic shape and size should be modelled and added to location at ground or on structure where it is intended to be installed	Instrument details and installation details	- Marker mark - Type
Standpipe/ piezometer	Parametric object indexed/categorised as 'Site Component' with details should be modelled to location	- Elevation at top of standpipe - Elevation at top of light non-aqueous phase liquid (LNAP) - Elevation at bottom of LNAP - Elevation at top of dense non-aqueous phase liquid (DNAP) - Elevation at bottom of DNAP	Mark

Table 18

6.6.2 2D Annotation requirements

The following 2D annotations to present BIM Objects information should be included and shown on 2D plans.

Type of 2D Annotation	Tag/Symbol/ Others	Remarks
Borehole geological stratum tag	Tag	Tag linked with the 'Grade or short description' of borehole geological stratum
Geological profile tag	Tag	Tag linked with the 'Grade or short description' of geological Profile
Groundwater symbol	Symbol	Symbol for the groundwater level

Type of 2D Annotation	Tag/Symbol/ Others	Remarks
Bedrock symbol	Symbol	Symbol for the bedrock profile
Monitoring instrument points	Tag	Tag linked with the type of monitoring instrument model

Table 19

6.6.3 Types of plans to be produced from BIM

Based on the above requirements, GI information is gathered in the Site Formation Plans, Foundation Plans and ELS Plans. Sample drawings to illustrate the preparation of these plans generated by BIM software are provided in Appendix A for reference.

6.7 Drainage Plans

Drainage plans present the drainage layouts including plans and schematic diagrams. The AP should refer to other essential information to be provided or shown on the drainage plans as required under the B(A)R and the relevant PNAPs including but not limited to PNAPs ADM-9, ADM-19 and ADV-33.

6.7.1 Data-driven BIM Object requirements

The following items with geometry settings, geometrical and non-geometrical information should be provided and included in BIM models.

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Sanitary Item	- Parametric objects indexed/categorised as 'Drainage System Components' - The following items should be modelled with Parametric objects: - Water closet - Wash basin - Urinal - Bath/Shower tray - Sink	None	None

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Pipe (including underground drain)	Parametric objects indexed/categorised as 'Drainage System Components'	- Inside Diameter (only this can be changed)/Outer Diameter - Type of pipe - Material - Fall direction	System Type
Floor Drain	Parametric objects indexed/categorised as 'Drainage System Components'	Size	Type mark
Vertical Floor Drain	Parametric objects indexed/categorised as 'Drainage System Components'	Size	Type mark
Rain water outlet	Parametric objects indexed/categorised as 'Drainage System Components'	None	Object mark
Storm Water Manhole	Parametric objects indexed/categorised as 'Drainage System Components'	- Internal dimension - Wall thickness - Top and bottom slabs thickness	- Object mark - Pipe diameter - Invert level - Disconnecting trap invert level (D.T.I.L.) - Type of manhole - Cover level - Bottom level
Foul Water Manhole	Parametric objects indexed/categorised as 'Drainage System Components'	- Internal dimension - Wall thickness - Top and bottom slabs thickness	- Object mark - Pipe diameter - Invert level - D.T.I.L - Type of manhole - Cover level - Bottom level
Petrol Interceptor	Parametric objects indexed/categorised as 'Drainage System Components'	- Overall Size - Internal dimension - Wall thickness - Top and bottom slabs thickness	- Object mark - Invert level - Bottom level - Cover level

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Septic tank	Parametric objects indexed/categorised as 'Drainage System Components'	- Overall Size - Internal dimension - Wall thickness - Top and bottom slabs thickness	- Object mark - Invert level - Bottom level - Cover level
Sump pit	Parametric objects indexed/categorised as 'Drainage System Components'	- Overall Size - Internal dimension - Thickness	- Object mark - Invert level - Bottom level - Cover level - Pump number - Pump duty (flow, head)
Grease Trap	Parametric objects indexed/categorised as 'Drainage System Components'	- Overall Size - Internal dimension - Thickness	- Object mark - Invert level - Bottom level - Flow Rate
Seal Trap Gully	Parametric objects indexed/categorised as 'Drainage System Components'	None	Type Mark
Open Trap Gully	Parametric objects indexed/categorised as 'Drainage System Components'	None	Type Mark
Wire Balloon	Parametric objects indexed/categorised as 'Drainage System Components'	None	Type Mark
Fresh Air Inlet	Parametric objects indexed/categorised as 'Drainage System Components'	None	Type Mark
Cleaning eye	Parametric objects indexed/categorised as 'Drainage System Components'	None	Type Mark
Surface channel	Parametric objects indexed/categorised as 'Drainage System Components'	- Size - Fall direction	Type Mark

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Soak-away pit	Parametric objects indexed/categorised as 'Drainage System Components'	- Overall Size - Internal dimension - Thickness	- Object mark - Invert level - Bottom level - Cover level
Grey water manhole	Parametric objects indexed/categorised as 'Drainage System Components'	- Internal dimension - Wall thickness - Top and bottom slabs thickness	- Object mark - Pipe diameter - Invert level - D.T.I.L. - Type of manhole - Cover level - Bottom level
Sand Trap/ Silt Trap	Parametric objects indexed/categorised as 'Drainage System Components'	- Overall Size - Internal dimension - Thickness	- Object mark - Invert level - Bottom level - Cover level
Back Inlet Gully Trap	Parametric objects indexed/categorised as 'Drainage System Components'	None	Type Mark

Table 20

If structural details are to be included in drainage plan, the following information should be provided:

- Geometrical information: concrete cover, rebar size and spacing, and reinforcement details; and
- Non-geometrical Information: concrete grade, and grade of rebar and specification.

6.7.2 2D Annotation requirements

The following 2D annotations to present BIM Objects information should be included and shown on 2D plans.

Type of 2D Annotation	Tag/Symbol/ Others	Remarks
Pipe size and system type	Tag	Tag linked with the 'system abbreviation' and 'diameter' of pipe object
Floor Drain type and size	Tag	Tag linked with the 'type mark' of pipe object

Fall gradient	Symbol	• Symbol with manual input to the fall gradient and fall direction
Sanitary Item symbol (schematic diagram)	Tag	• Tag linked with the 'mark' of sanitary object.
Drainage system symbol (schematic diagram)	Tag	• Tag linked with the 'mark' and necessary information of drainage system object.
Sunken (schematic diagram)	Hatch	• 2D hatch to manually define the area of sunken in schematic diagram.
Schematic line diagram	2D line	• 2D drafting

Table 21

6.7.3 Types of plans to be produced from BIM

Based on the above requirements, sample drawings to illustrate the preparation of Drainage Plans including general notes, schematic diagram, layout plans, schedules and details generated by BIM software are provided in Appendix A for reference.

6.8 Curtain Wall Plans

Curtain Wall Details in the Guidelines present the structural framing and key structural details and the installation procedures excluding any unnecessary shop fabrication details, to be included in the curtain wall plans for submission to BA for approval. AP/RSE/RGE should refer to other essential information to be provided or shown on the curtain wall plans as required by the relevant PNAPs including but not limited to PNAPs ADM-9, APP-37 and ADV-33.

6.8.1 Data-driven BIM Object requirements

The following items with geometry settings, geometrical and non-geometrical information should be provided and included in BIM models.

Item	Geometry Settings	Geometrical information	Non-geometrical Information
Embed	Parametric object with full geometry of embed and member section	- Size - Material - Grade of material	- Type mark - Material - Grade of material
Mullion and Transom	Parametric object indexed/categorised as 'Mullion/Transom'	- Length - Section profile - Material - Grade of material	- Member mark - Material - Grade of material
Glass Panels	Parametric object indexed/categorised as 'Panel'	- Size - Glass thickness - Thickness of interlayer for laminated glass - Space between two panes for insulating glass unit - Sealant material - Sealant thickness	- Type Mark - Panel types - Glass types - Glass strength - Number of glass panes for laminated glass and insulating glass unit - Sealant material - Sealant strength - Sealant thickness
Louvre	Parametric object indexed/categorised as 'Panel'	- Size - Thickness - Section profile - Material - Grade of material	- Type Mark - Louvre Type - Material - Grade of material

Table 22

6.8.2 2D Annotation requirements

The following 2D annotations to present BIM Objects information should be included and shown on 2D plans.

Type of 2D Annotation	Tag/Symbol	Remarks
Embed type mark	Tag	Tag linked with the 'mark' of embed object
Mullion and Transom mark	Tag	Tag linked with the 'mark' of mullion and transom object
Glass span direction	Symbol	Symbol with and span direction(s)
Glass panel materials	Hatch	Hatch linked with the parameter value of 'Type mark' in glass panel objects

Table 23

6.8.3 Types of plans to be produced from BIM

Based on the above requirements, sample drawings to illustrate the preparation of curtain wall details including layout plans, cast-in layout plans, elevations, sections and details generated by BIM software are provided in Appendix A for reference.

Appendix A

Sample Drawings

- Software 1 Drawings
- Software 2 Drawings

(Disclaimer: The sample drawings shown on the Guidelines are for reference only. They consist of 2D representation of 3D objects and manual input of essential 2D details/annotation/information for the completion of drawings and are provided to demonstrate how the standard templates should be used to build 3D models for generation of submission plans or to illustrate the presentation format sample for statutory submission. The sample drawings do not represent the complete set of submission drawings required for BD's approval under the BO and are to illustrate the presentation format sample for statutory submission. Details shown in the sample drawings do not imply compliance with the BO and its subsidiary legislations, relevant Code of Practice, PNAPs, Circular Letters or approval will be given by BA. Essential information/details for submission of statutory plans should refer to relevant Code of Practice, PNAPs including but not limited to PNAPs ADM-8, ADM-9, ADM19 and ADV-33 and Circular Letters issued by BA.)

Drawing List of Appendix A – Sample Drawings

Drawing number	Drawing title
S001	GENERAL NOTES FOR SUPERSTRUCTURE
S002	TYPICAL FLOOR FRAMING PLAN
S003	BEAM R.C. SCHEDULE
S004	BEAM R.C. DETAIL
S005	COLUMN R.C. DETAIL
S006	WALL R.C. DETAIL (1 OF 2)
S007	WALL R.C. DETAIL (Schedule)
S008	WALL R.C. DETAIL (2 OF 2)
S009	SLAB R.C. DETAIL
S010	STAIRCASE R.C. DETAIL
S011	WATER TANK R.C. DETAIL
S012	TYPICAL DETAIL 1
S013	TYPICAL DETAIL 2
S014	TYPICAL DETAIL 3
S015	TYPICAL DETAIL 4
R001	STEEL STRUCTURE FLOOR PLAN AND GENERAL NOTES
R002	STEEL STRUCTURE FLOOR PLAN
R003	STEEL STRUCTURE DETAIL
R004	STEEL STRUCTURAL SECTIONS
C001	CURTAIN WALL GENERAL NOTES
C002	CURTAIN WALL LAYOUT PART PLAN
C003	CURTAIN WALL CAST-IN LAYOUT PART PLAN
C004	EMBED DETAIL
C005	CURTAIN WALL ELEVATIONS AND SECTIONS
P001	GENERAL NOTES FOR FOUNDATION (1 OF 2)
P001A	GENERAL NOTES FOR FOUNDATION (2 OF 2)
P002	PILING LAYOUT PLAN
P003	PILING SECTION A & B
P004	PILING SECTION C

Drawing number	Drawing title
P005	COLUMN WALL LOADING PLAN
P006	COLUMN WALL LOADING SCHEDULE
P007	LOADING INTENSITY PLAN
P008	PILE LOADING SCHEDULE
P009	FOUNDATION MONITORING PLAN
P010	PILE CAP REINFORCEMENT LAYOUT PLAN (1 OF 2)
P010A	PILE CAP REINFORCEMENT LAYOUT PLAN (2 OF 2)
P011	COLUMN AND WALL STARTER DETAILS
P012	TIE BEAM DETAILS & SCHEUDLE
P013	PILE CAP LAYOUT PLAN
P014	GENERAL NOTES FOR PILE CAP
D001	GENERAL NOTES FOR DEMOLITION
D002	DEMOLITION PLAN - EXISTING G/F, 1/F FRAMING PLAN
D003	DEMOLITION DETAILS (BY HAND HELD TOOLS)
D004	DETAIL FOR DEMOLITION WORKS (1/2)
D005	DETAIL FOR DEMOLITION WORKS (2/2)
H001	HOARDING LAYOUT PLAN
H002	HOARDING TYPICAL DETAILS
E001	EXCAVATION & LATERAL SUPPORT GENERAL NOTES
E002	EXCAVATION & LATERAL SUPPORT LAYOUT PLAN
E003	EXCAVATION & LATERAL SUPPORT SECTIONS (1 OF 2)
E004	EXCAVATION & LATERAL SUPPORT SECTIONS (2 OF 2)
E005	EXCAVATION & LATERAL SUPPORT CONSTRUCTION SEQUENCE (1 OF 2)
E006	EXCAVATION & LATERAL SUPPORT CONSTRUCTION SEQUENCE (2 OF 2)
E007	EXCAVATION & LATERAL SUPPORT ELEVATION
E008	EXCAVATION & LATERAL SUPPORT WORKS MONITORING PLAN
E009	EXCAVATION & LATERAL SUPPORT WORKS PUMPING TEST SETTING OUT PLAN
G001	PROPOSED GROUND INVESTIGATION PLAN

Drawing number	Drawing title
T001	SITE FORMATION BLOCK PLAN
T002	SITE FORMATION LAYOUT PLAN
T003	SITE FORMATION SECTIONS
M001	GENERAL NOTES FOR DRAINAGE
M001A	SITE DRAINAGE LAYOUT
M002	SCHEMATIC DIAGRAM OF DRAINAGE SYSTEM
M003	DRAINAGE LAYOUT PLAN FOR TYPICAL FLOOR (NEW APPROACH)
M003A	DRAINAGE LAYOUT PLAN FOR TYPICAL FLOOR (TRADITIONAL STYLE)
M004	DRAINAGE LAYOUT PLAN FOR ROOF FLOOR
M005	DRAINAGE LAYOUT PLAN FOR TOP ROOF FLOOR
M006	DRAINAGE INSTALLATION DETAILS
M007	DRAINAGE SCHEDULES/TABLE FOR MODIFICATIONS

Appendix B

BIM Objects Presentation Summary

(Disclaimer: The BIM Objects Presentation Summary aims to provide a more comprehensive summary to major BIM Objects for preparing the eight types of statutory plan submissions due to the limited coverage of sample drawings provided in Appendix A. All typical details are prepared by 2D drafting in BIM software.)