

Guidance Notes on Use of Building Information Modelling for Mathematical Calculation of Areas

Purpose

1. This Guidance Notes is to set out the electronic format and pre-requisites for using Building Information Modelling (“BIM”) to prepare general building plans (“GBP”) submissions for the Lands Department (“LandsD”) processing. LandsD generally makes reference to the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (“PNAP”) ADM-19 on the subject “Consent to the Extraction of Information from BIM Model”, “Notes on Submission Drawing Standards in Electronic Format” of PNAP ADV-34 and “Guidelines for using Building Information Modelling in General Building Plans Submission 2019”, as available on Buildings Department (“BD”) website (<https://www.bd.gov.hk>). To facilitate checking of the area calculations under the lease¹ conditions, the Authorized Person (“AP”) shall further observe the minimum requirements stipulated in this Guidance Notes.

2. GBP submissions for approval must be either in hard copies or via the Electronic Submission Hub² (“ESH”) (in the electronic format accepted by BD). When the minimum requirements set out in paragraphs 3.1 to 3.7 below are met and clearly shown in the submitted BIM files, diagrammatic breakdowns and details of the calculation for Gross Floor Area (“GFA”), Site Coverage (“SC”) and green features area, among other things, are not required to be included in the GBP submissions. For the avoidance of doubt, annotations and dimensions of the areas concerned are required to be indicated on individual floor plans in the GBP submissions for checking purposes.

Minimum Requirements on BIM Files Submission

3. If BIM is used to prepare GBP submissions, information in the BIM files shall be identical to the information in the GBP submissions. The GBP submissions shall be directly generated from the corresponding BIM models. To facilitate checking of the area calculations under lease, AP shall ensure the minimum requirements listed out in paragraphs 3.1 to 3.6 below on BIM files are met. To ensure that, AP is strongly

¹ All references to “lease” in this PN shall include Government Lease or Conditions of Sale/Grant/Exchange, etc. (as the case may be) and “lease” shall be construed accordingly.

² ESH is a digital platform developed by BD to receive and process building plans, documents and applications submitted under the Buildings Ordinance (Cap. 123), as an alternative means to the present paper-based mode of submission. The system is being implemented in 3 stages. While Stage 1 and 2 were launched in June 2022 and March 2023 respectively, GBP submissions will be accepted to be submitted in ESH only after Stage 3 is launched. For more details about the ESH launch programme, please refer to BD’s ESH website (<https://esh.bd.gov.hk>).

recommended to adopt and verify the files using the “areas checking plug-in tool” as available on LandsD website (<https://www.landsd.gov.hk>).

3.1 Format and Software Version

- (a) BIM files should be stored in **non-rewritable DVD-ROM diskette(s) (for GBP hard copy submissions) or submitted via ESH (for GBP submissions in ESH)**. Except otherwise agreed by the Director of Lands, all other electronic submission medias are not acceptable.
- (b) Area calculations as shown in BIM files should be verifiable by either **Revit, ArchiCAD or other BIM software accepted by the Director of Lands**.
- (c) BIM files using **Revit version 2023 or later, ArchiCAD version 26 or later or other software versions announced by the Director of Lands** are acceptable.
- (d) Revit files should be saved in “.rvt” format and ArchiCAD files in “pla” format only. All other lightweight, compressed or zipped file formats such as “.dwf”, “.dwfx” and “.bimx” will not be accepted.
- (e) Each BIM file should be limited to the size of 500MB. Each BIM file should contain 3D models, views, schedules, as well as pre-set drawing sheets including plans, area diagrams, calculations and etc. used in the production of the GBP submissions. A text file should be included in the DVD-ROM or specified in the submission via ESH to describe the linked files’ hierarchy structure.
- (f) BIM files submitted should be self-contained and detached from the originating server (i.e. openable on any standalone computer with the abovementioned software). All external reference files for BIM models such as xlsx and pdf files should be stored in respective sub-folders in DVD ROM or uploaded in ESH, and the link between all external reference files and BIM main files should be appropriately connected.
- (g) AP should provide a soft copy of a drawing index listing all file names and GBP drawing numbers with brief description on location and contents of the submitted GBP drawings in DVD ROM or via ESH. GBP drawings under different versions must carry a revision letter (e.g. A to Z) for identification purpose. For large and complicated projects involving numerous drawing versions/amendments, revision legend should be provided as well.

- (h) In the covering letter which are submitted with GBP submissions, AP should list out the name(s) of BIM file(s) and drawing(s) in BIM files that contains information for area checking under lease conditions. Further, AP should certify in his covering letter that computations of GFA and SC under lease are derived directly from the corresponding BIM model without manual input.
- (i) Title blocks showing corresponding GBP drawing number, revision legends, site/project title, drawing title, etc. should be added to related drawing(s) in BIM files for identification purpose.
- (j) Naming and numbering of drawings in GBP submissions should be identical to those in the submitted electronic version.

3.2 Referencing System

- (a) AP should use the following file structures for linked files in the form of external reference of objects/tables/schedules in native files, as appropriate for the project.
 - (i) If several BIM files are adopted, all files should be linked or connected to each other to avoid missing information. It is applicable to projects that comprise several buildings/towers or those with large file size. (e.g. a massive scale development with thousands of apartments);
 - (ii) File transmission tool, e.g. eTransmit in Revit, should be adopted to maintain the link file dependency after transmission;
 - (iii) Relative paths should be used to link all BIM files. Relative locations should be used for defining the linking between different BIM files; and
 - (iv) If subfolder layers are used, keep the number of layers to a minimum.

3.3 Parameter Organization – Parameter Name and Value Convention

- (a) BIM files including floor plans, tables and calculations, etc. should include all of the information as their corresponding GBP submissions, either in hard copy or soft copy in ESH.
- (b) To facilitate checking of the area calculations, GBP submissions should contain GFA and other area diagrams for verification. AP should provide information to relevant parameters according to the list of required information for LandsD's area

calculation as specified in Appendix I.

- (c) Parameter organization of the file(s) should be submitted in DVD ROM or ESH. As the list in Appendix I is by no means exhaustive, if more parameters are needed in the submitted BIM, AP could expand the list of the parameter names and value conventions in Appendix I and provide a legendary description concerning the additional parameter(s).
- (d) BIM files should include all the elements and information as shown in GBP submissions to facilitate approval, including inter alias, area and dimension information. Elements such as lighting, electric appliances and the like where approval from the Director of Lands is not required under lease should not be included in the submitted BIM files.

3.4 Presentation Style – General

- (a) **Drawing Scale** – Drawing objects in BIM files for checking and area calculation including area diagrams and dimensions should be drawn in true size (i.e. 1 drawing unit = 1 mm) with precision rounded up to the nearest mm unit and in “model” space. The default scale adopted for area checking electronically in LandsD’s customized software is in milli-metre.
- (b) **Dimension** – All dimensions should be true dimensions generated automatically by the software. Text figures or figures manually inserted, amended or constructed (collectively referred as “typed-in dimension(s)”) for calculation purpose in the BIM files are not acceptable.
- (c) **Unit and Decimal Places of Areas:** All areas in BIM files should be presented in m² units and with precision rounded up to 3 decimal places.
- (d) **Maximum Distance Limit:** All elements within a BIM model should follow the “maximum distance limit” specified by software vendor.
- (e) **Area diagrams with under-laying floor plans:** Area diagrams in BIM files should be shown with the corresponding under-laying floor plans for ease of verification. The under-laying floor plans for Coloured Building Plans Diagrams (required under paragraph 6 below) should be shown in full tone.

3.5 Presentation Style – Revit

- (a) **Area Boundary** – All drawings in BIM files intended for GFA, SC, NOFA & Open Space area calculations should be defined by “area boundary” diagrams. BIM files containing any “area boundary” with gaps and hidden area boundary will be rejected and the plans will be rejected without further checking.
- (b) **Filled Region** – All drawings in BIM files intended for area calculations of vertical greening and greening on slopes/retaining structures with gradient steeper than 45° should be defined by “filled region”.
- (c) **Greening** – Greening with gradient equal or less than 45° should be defined by either “area boundary” or “room”.

3.6 Presentation Style – ArchiCAD

- (a) **Zone for GFA & SC** – All drawings in BIM files intended for GFA, SC, NOFA and open space area calculations should be defined by “Zone Polygons”. For defining the “Zone Polygons”, “Construction Method” should apply “Manual” or “Reference Line”. If “Reference Line” is used, the “Zone Polygon Display” should be set to “Gross”. “Measured Area” should be used to list out the areas defined by the “Zone Polygons”.
- (b) **Fill** – All drawings in BIM files intended for area calculations of vertical greening and greening on slopes/retaining structures with gradient steeper than 45° should be defined by “fill”. If parameter is not available for “fill”, the “fill” should be allocated to a “layer” representing vertical greening. Greening with gradient equal or less than 45° should be defined by “Zone Polygons”. For defining the “Zone Polygons”, “Construction Method” should apply “Manual”, “Reference Line” or “Inner Edge”. If “Reference Line” or “Inner Edge” is adopted, requirements as stated under paragraph 3.6(a) should be applicable for greening area measurement.

3.7 Text Style

- (a) Text style in BIM files is not compulsory. Conventional text fonts are suggested. Common type such as “Romans” font is recommended for use in the text.

Administrative Arrangement

4. If the submitted BIM files are found not conforming to the minimum requirements as set out in above paragraphs 3.1 to 3.6, AP will be informed by LandsD to replace the DVD-ROM or re-submit in ESH. AP should take note that the time specified in our performance pledge is deemed to have been “frozen” at this point. If a replacement DVD-ROM or, for submissions in the ESH, a replacement BIM file is received within 7 calendar days from the date of notification, the time of our pledge period will restart immediately upon receipt of the replacement DVD-ROM/BIM files. If the replacement DVD-ROM/BIM files are received after 7 calendar days, the pledge time will be reset to begin from the date of receipt of the replacement DVD-ROM/BIM files. If no replacement DVD-ROM/BIM files are received by the end of the pledge time, the general building plans submission will be rejected without further scrutiny on the ground of insufficient information.

5. If the following scenarios are still observed in the replacement DVD-ROM/BIM files, **the GBP may be rejected without further checking on grounds of incorrect or missing information.**
 - (a) Information shown in the BIM files and plans submitted for approval do not tally with each other;

 - (b) The required information in paragraphs 3.1(h) have not been clearly provided in or along with the covering letter;

 - (c) BIM files are not created following the format and software version requirements in paragraphs 3.1(b), (c), (d) and (e);

 - (d) BIM files do not follow the parameter name and value convention in paragraph 3.3(b);

 - (e) The general presentation style do not follow the requirement laid down in paragraphs 3.4(a) to 3.4(d); and

 - (f) The following prohibited actions are noted in BIM files:
 - (i) There are hidden room bounding elements and/or rooms in Revit BIM files defined by discontinue room bounding elements as prohibited in paragraph 3.5(b) in Revit BIM files; and

- (ii) There are hidden room bounding elements and/or rooms in BIM files defined by discontinuous room bounding elements as prohibited in paragraph 3.6(b) in ArchiCAD BIM files.

Guidelines on Preparation and Submission of Coloured Building Plans

6. To facilitate compliance checking of area calculations under lease, AP should submit a full set of floor plans duly coloured to show the extent of SC, transfer plate, GFA accountable and non-accountable areas under lease (“Coloured Building Plans”). Sample Coloured Building Plans are attached at Appendix II for illustration purpose. One set of Coloured Building Plans in hard copy or, for submissions in ESH, in pdf format should be submitted to LandsD through BD under the Centralised Processing System, along with the GBP submission. The requirements as set out in the following paragraphs should be observed. Plans may be rejected on grounds of insufficient information if these requirements are not complied with.

Colour Code

7. All categories of GFA such as office, retail/commercial, hotel and residential GFA under lease should be coloured in accordance with the standard colour code at Appendix III. In other circumstances, such as sites restricted for industrial purposes or sites with provision of government accommodations as required under the lease, AP may propose additional colours to indicate the GFA categories other than those listed in the standard colour code, and AP should clearly mark the use of additional colours and the corresponding GFA categories in his correspondence with LandsD. AP may suitably adjust the level of colour transparency to ensure that the colouring on the plans does not visually obscure details of the floor plans.

Format of Coloured Building Plans

8. If submitting hard copies of the Coloured Building Plans, ensure the Coloured Building Plans are printed at the same scale and size as the corresponding floor plans in the GBP submissions. For ESH submissions, the Coloured Buildings Plans shall fulfil the requirements laid down in PNAP ADM-17. Coloured Buildings Plans should include all of the same information, including dimensions and annotations, as their corresponding floor plans.
9. The extent of the SC, transfer plate, GFA accountable and non-accountable areas as shown on the Coloured Building Plans shall align with the GFA/SC calculations and

diagrams in the GBP submissions. Otherwise, the GBP submission may be rejected without further checking due to the incorrect information.

Building Plan Unit

Development Control Section

Lands Department

30 September 2024

Appendices

- I List of Area Information and Parameter Naming
- II Sample Drawings of Coloured Building Plan (BIM)
- III Standard Colour Code for Coloured Building Plans (BIM)