CONSTRUCTION INDUSTRY COUNCIL
建造業議會

BUILDING INFORMATION MODELLING

for General Building Plan Submission (Phase One) Consultancy Report

FEB-2017

CIC Preparation of BIM Standards for General Building Plan Submission (Phase One)
FEB 2017

Developed By
Advanced Construction Information Development Ltd.

Disclaimer

Whilst reasonable efforts have been made to ensure the accuracy of the information contained in this publication, the CIC nevertheless would encourage readers to seek appropriate independent advice from their professional advisers where possible and readers should not treat or rely on this publication as a substitute for such professional advice for taking any relevant actions.

Enquiries

Enquiries on this Reference Material may be made to the CIC Secretariat at:

15/F, Allied Kajima Building
138 Gloucester Road, Wanchai
Hong Kong

Tel: (852) 2100 9000
Fax: (852) 2100 9090
Email: enquiry@hkcic.org
Website: www.hkcic.org

Document revisions

Revision	Issue Date	Comments
A	28 October, 2016	1st Issue
B	13 February, 2017	CIC's comments dated January, 2017

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Definition of abbreviation

Definition of Abbreviation

Abbreviations	Definition
CIC	Construction Industry Council, Hong Kong
BD	Buildings Department
LandsD	Lands Department
AP	Authorized Persons
RSE	Registered Structural Engineers
RGE	Registered Geotechnical Engineers
BCA	Building & Construction Authority
BIM	Building Information Modelling
CAD	Computer Aided Drafting
CSWP	CAD Standard for Works Projects
IFC	Industry Foundation Classes
GBP	General Building Plan
PNAP	Practice Notes for Authorized Persons
G.F.A.	Gross Floor Area
U.F.A.	Usable Floor Area
S.C.	Site Coverage
O.S.	Open Space
P.R.	Plot Ratio
FS Code 2011	Code of Practice for Fire Safety in Buildings 2011

The requirements in this document is expressed in sentences in which the principal auxiliary verb is "shall". Recommendations are expressed in sentences in which the principal auxiliary verb is "should". The use of the auxiliary verb "can" indicates that something is technically possible and the auxiliary verb "may" indicates permission.

Bold & Italic refers to specific Autodesk Revit terminology.

Other BIM platforms may use different terminology.

1 Introduction

The benefits of using Building Information Modelling (BIM)

BIM technology can produce a three dimensional model that can be utilized for code compliance checking (or may be for approval). The current Hong Kong practice focuses on paper based format for statutory and legal reasons. This study concentrates on using BIM technology to produce paper drawings and calculations for statutory submission purpose.

Promotion of the BIM technology

To promote the BIM technology in construction works projects, the committee on environment, innovation and technology of Construction Industry Council (CIC) set up a working group to define the roadmap for BIM Implementation in the construction industry of Hong Kong.

After a series of meetings and discussions among the working group members, two key tasks were identified:

a) To devise a set of standards or specifications for the use of BIM in construction projects to facilitate those users who wish to widen the usage of BIM.

b) To carry out more promotional activities targeting those industry stakeholders who either are not familiar with the usage and benefits of BIM or are observers or beginners for the adoption of BIM.

The CIC has decided to commission a consultancy study for the Preparation of BIM Standards for General Building Plans (GBP) Submission to Buildings Department, setting principles and methodology for other statutory authorities and concerned departments to follow in future. The techniques of using BIM for GBP Submission can also be applied to submissions for other concerned departments.

The role of A.C.I.D.

A.C.I.D. has been awarded the tasks of a consultant to prepare the BIM Standard, to organize forum among statutory authorities, institutes or other major private corporations, and to ensure the whole process will be fully understood and adopted by the industry.

Software Platform

This report does not mandate any specific BIM platform. Generic or open source IFC terminology is used throughout, except at where illustrations, diagrams and workflow demonstration are needed, Autodesk's Revit is used. To achieve the same outcome using other BIM platforms, readers should request their particular software vendor for assistance.

2 Background

Objective

It is understood that BIM technology can produce a three-dimensional model that can be utilized for code compliance checking (or may be approval), the current Hong Kong practice for the time being focuses on paper based format for statutory and legal reasons; however, this study concentrates on using BIM technology to produce paper drawings and calculations for statutory submission purpose.

The objective of this consultancy (Phase One) is to prepare a standard to utilize the advantage of Building Information Modelling (BIM) to streamline the process of submission of General Building Plans (GBP) for the new development instead of the submission of alteration and additional works to relevant statutory authorities and concerned departments.

The purpose of this phase one standards aims not to propose for a replacement or substitution of the existing practice from the statutory authorities' and the concerned departments, but to provide an alternative method to help the industry to have a quick method to quality check their submission via BIM technology before making a formal submission. It aims to reduce time needed in quality check by manual and to avoid disapproval due to computational error (if any).

The information provided in this report is for general reference only. A report user who wishes to develop computation solutions to comply with the relevant statutory requirements should consult Authorized Person or relevant professional.

It is IMPORTANT to note that this report does not aim to and must not be deemed to exhaustively list out, redefine, interpret or replace any ordinances or regulations. This report aims to specify standard BIM tools and format to be used for presenting a certain set of required information for electronic submission to relevant departments. Any attempts to list out ordinance requirements found in this report are either directly extracted or summarised from commonly referred relevant requirements under the BO and subsidiary regulations, Code of Practice, PNAP etc. and should be deemed non-comprehensive.

2.1 Deliverables

The time frame and deliverables are outlined below:

CIC Preparation of BIM Standards for GBP Submission			
Task	**Project Deliverables**	**Month After the Contract Commencement**	**Percentage of Task to Overall Project**
(I) **Consultancy Status and Study Report**	Inception Report Progress Report Final Report	2 Weeks Monthly 8th Month	40%
(II) **Conduct Stakeholders' Engagement Forums**	Stakeholders Engagement Forums	1st Month	20%
(III) **Provision of Updated Standards**	Draft Standards Final Standards Update to Standards	4th Month 6th Month < 6 months after acceptance of Final Standards	30%
(IV) **Provision of Train-the-Trainer Trainings and Technical Briefing**	Technical Trainings	7th Month	10%
Total			100%

2.2 Scope of Consultancy Services

ACID are required to review the requirements under the Buildings Ordinance and its subsidiary regulations, relevant Codes of Practice and Practice Notes issued by Buildings Department, Planning Department, and Lands Department to prepare the standards aiming to develop a computational solution which facilitates semi-automatic or automatic (preferably) checking of the following items:

a. Fundamental Checking Equivalent to the Standards as per Current Practice Notes

- Checking of file drawn in true size
- Checking of all dimensions and areas in true figures;
- Checking of area type in valid name, e.g. ARC08240 – non-domestic area.

b. Checking of Gross Floor Area (i.e. Site Coverage and Plot Ratio)

- Checking of Gross Floor Area, non-Gross Floor Area, site coverage and plot ratio;
- Checking of Gross Floor Area, non-Gross Floor Area, site coverage and plot ratio, with consideration of bonus Gross Floor Area and site coverage;
- Separate checking to be provided according to requirements from Buildings Department, Planning Department, and Lands Department.

c. Checking of Means of Escape

- Checking of Usable Floor Area;
- Checking of number and width of exit routes and doors provided;
- Checking of number of people, required number and width of exit routes and doors.

d. Checking of Sanitary Fitment Provision

- Checking of Usable Floor Space;
- Checking of sanitary fitment provision provided;
- Checking of number of male and female persons, and required number of sanitary fitments.

e. Checking of Fire Compartment and Fire Resisting Construction

- Checking of actual fire compartment area and volume;
- Checking of requirements on fire resisting rating and elements of construction.

3 Statutory Submission Drawings

BIM is a Purpose-Driven tool while every element was based on a purpose. The following section will explain the workflow and logic on how each item for General Building Plan Submission on the list below shall be created in a flow of BIM Technology.

3.1 BIM Workflow

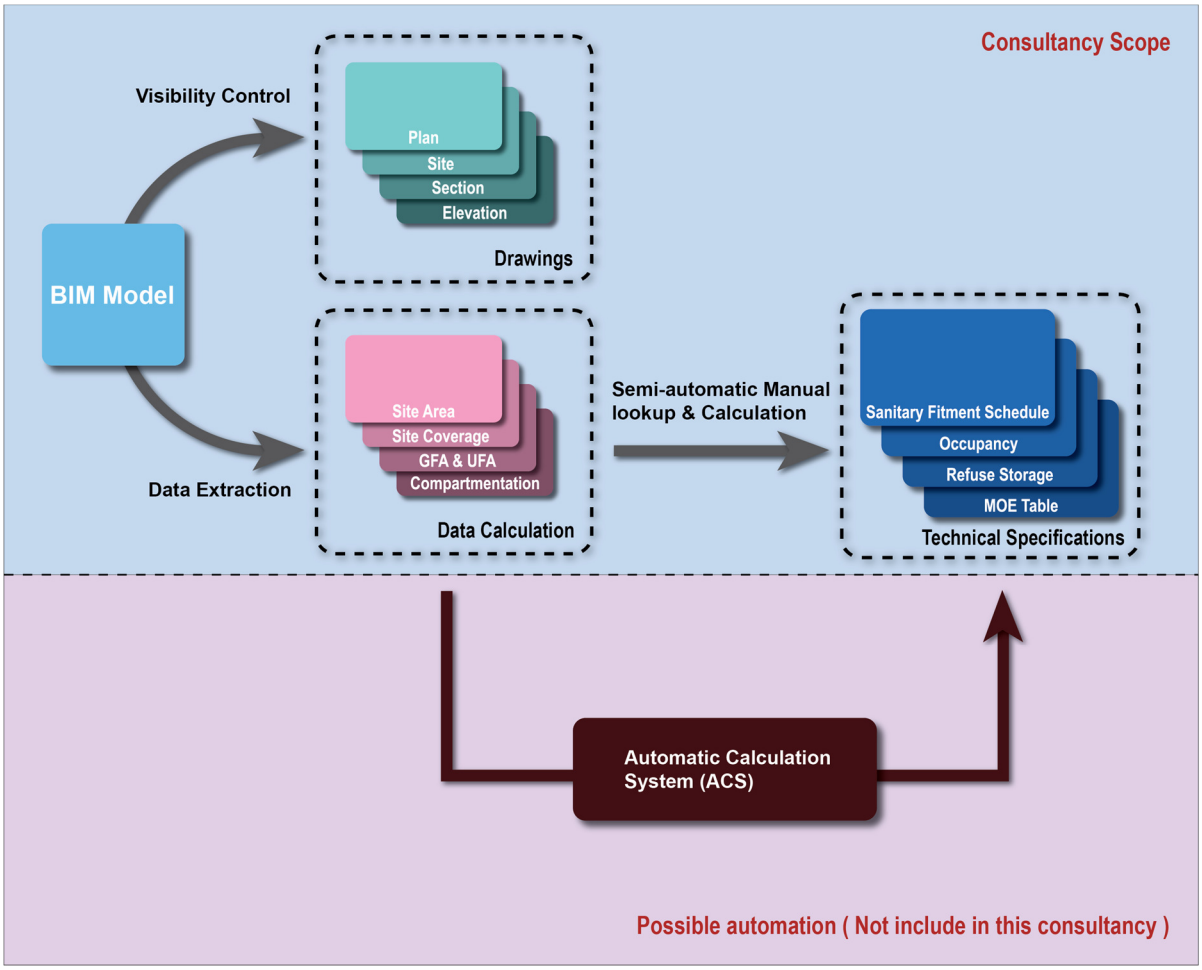


Figure 3-1. GBP workflow and components

The BIM Wokflow basically separate into 3 parts:

1. Drawings - Set up specific views on sheet such as plan, section, elevation etc.
2. Data extraction - Create ***area plans*** and ***rooms*** for calculation purposes.
3. Calculation - Use schedules to calculate the technical specifications suach as Sanitary Fitment Provision, Occupancy, Means of escape requirements etc.

3.2 Drawing Graphics

A federated BIM model had to be collaborated by different parties, such as Architectural, Structural, Mechanical etc. They have to communicate and collaborate through meetings and adjust their own respective BIM model.

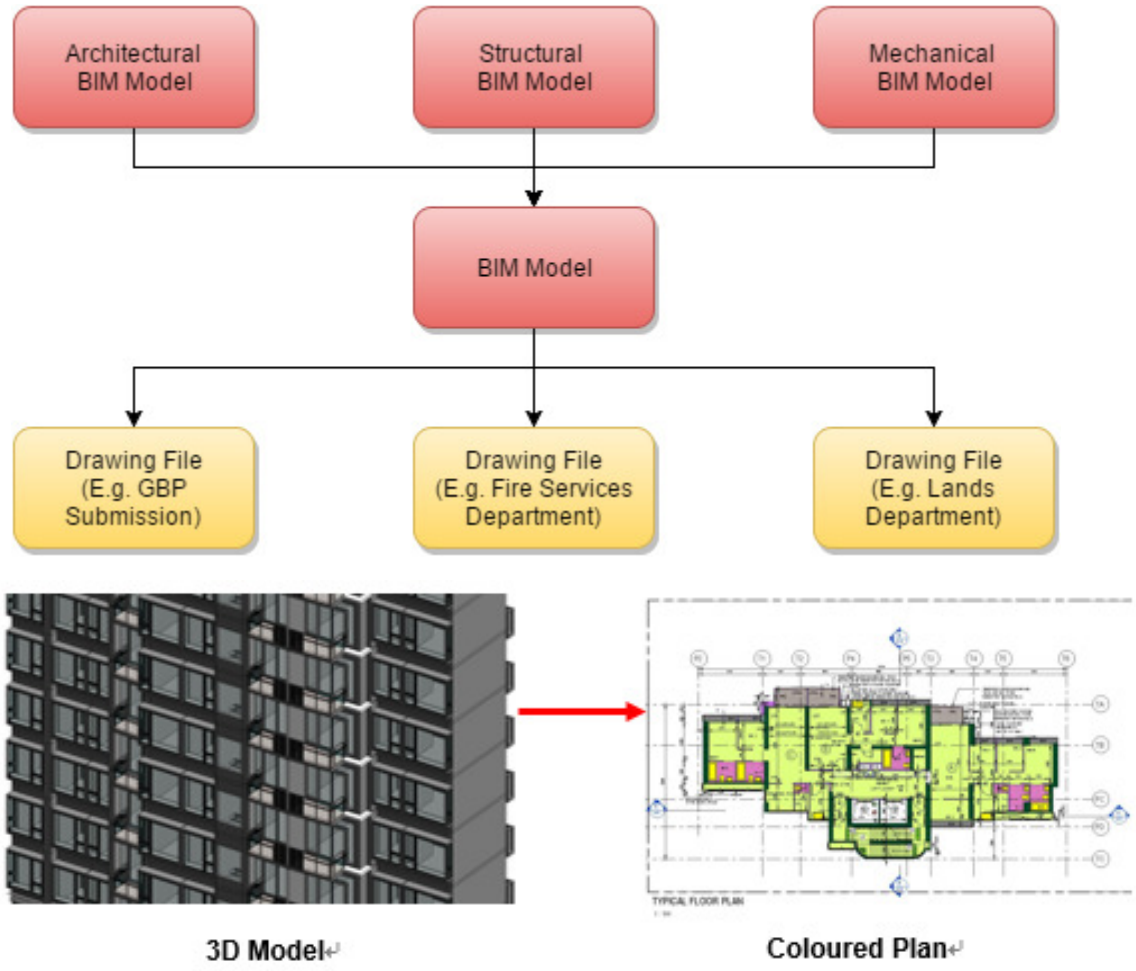


Figure 3-2. Multiple presentations for single federated BIM model

A federated BIM model can produce various deliverable such as Government Submission, Sunlight Analysis, Geotechnical Analysis, Geographic Analysis & Energy Analysis etc., . . A good practice in BIM industry is to produce submission by separating into model file and drawing file due to most of the BIM software have their limitation on file size, and it should refer to the software official recommendation. For example Revit is limited to 200Mb. Each submission should create a stand-alone drawing file. Also, it should be noted that BIM implementation is a process rather than a final product. It is a misconception that a 100% completed BIM model is required before producing any deliverable. ,

In the GBP Submission process, there is a certain requirement about the colour indication. In the Practice Notes for Authorized Persons (PNAP) ADM-9, it is mentioned that every plan submitted for approval should be coloured in order to clearly differentiate existing works from proposed new works and one part of any proposed new works from

other parts. For consistency in the use of colour, the preferred colours as shown in Appendix A should be adopted. For amendments to the approved works, the proposed amendments should be coloured so that they can be identified from the approved works.

Thus, the BIM model will be linked into the related Submission Drawing file. The materials can be shown in every view and plan. The RGB System in Appendix A is to provide a table of required colour on plan.

3.2.1 View Settings

By creating the ***View Templates*** in the BIM model, it would allow us to set different colour, line weight, view range, specific content to be shown or hidden on sheet, etc. to serve different drawing purposes such as Plan, Section, Elevation, EVA, GFA, UFA Diagram.

A systematic naming approach for View Templates will provide us an easy access to different views efficiently.

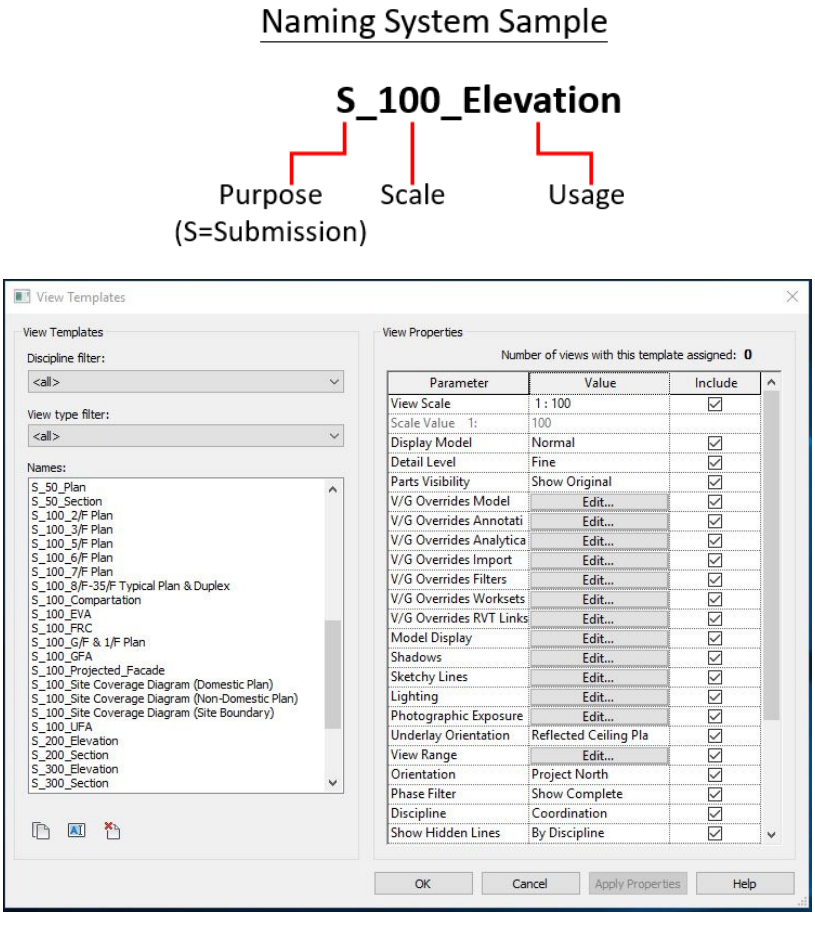


Figure 3-3. View setting and dialogue box

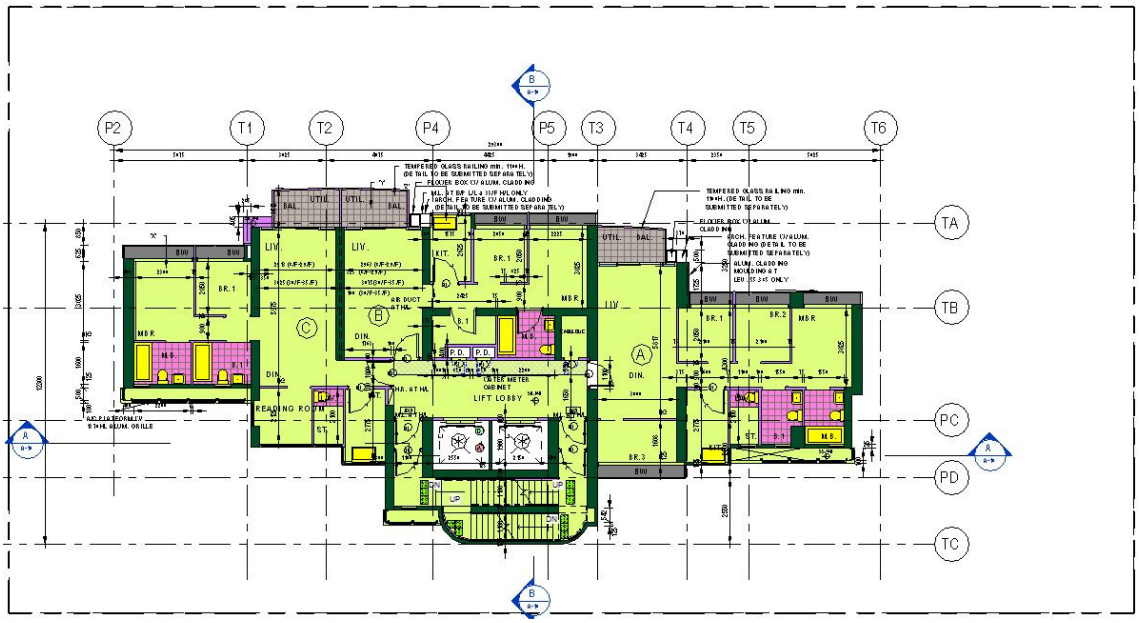


Figure 3-4. Typical plan view

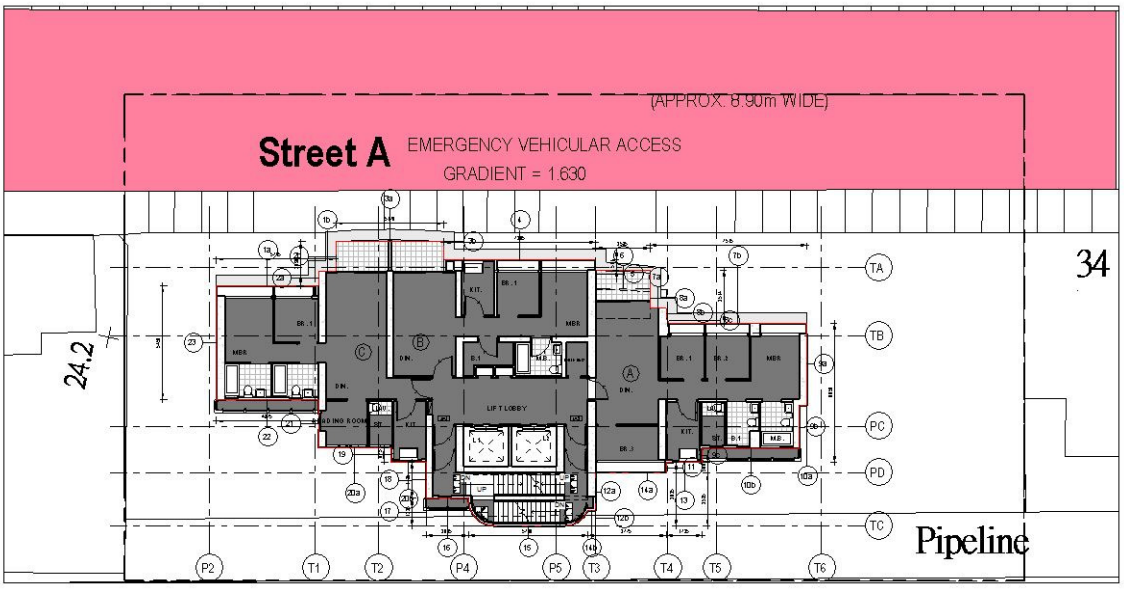


DIAGRAM FOR OF BUILDING FACADE SERVED BY EVA

1 : 100

Figure 3-5. EVA plan view

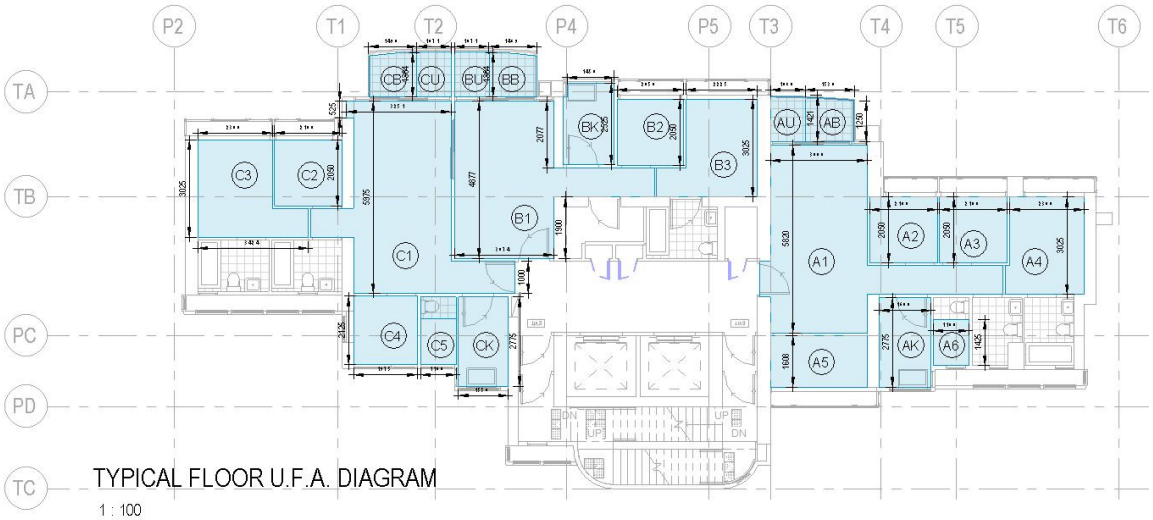


Figure 3-6. UFA Diagram view

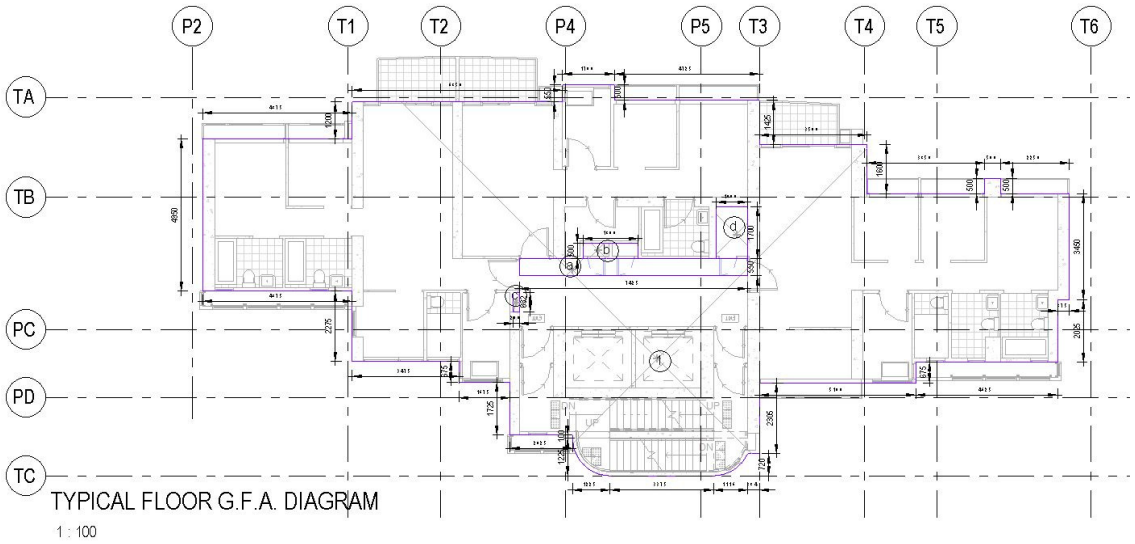


Figure 3-7. GFA Diagram view

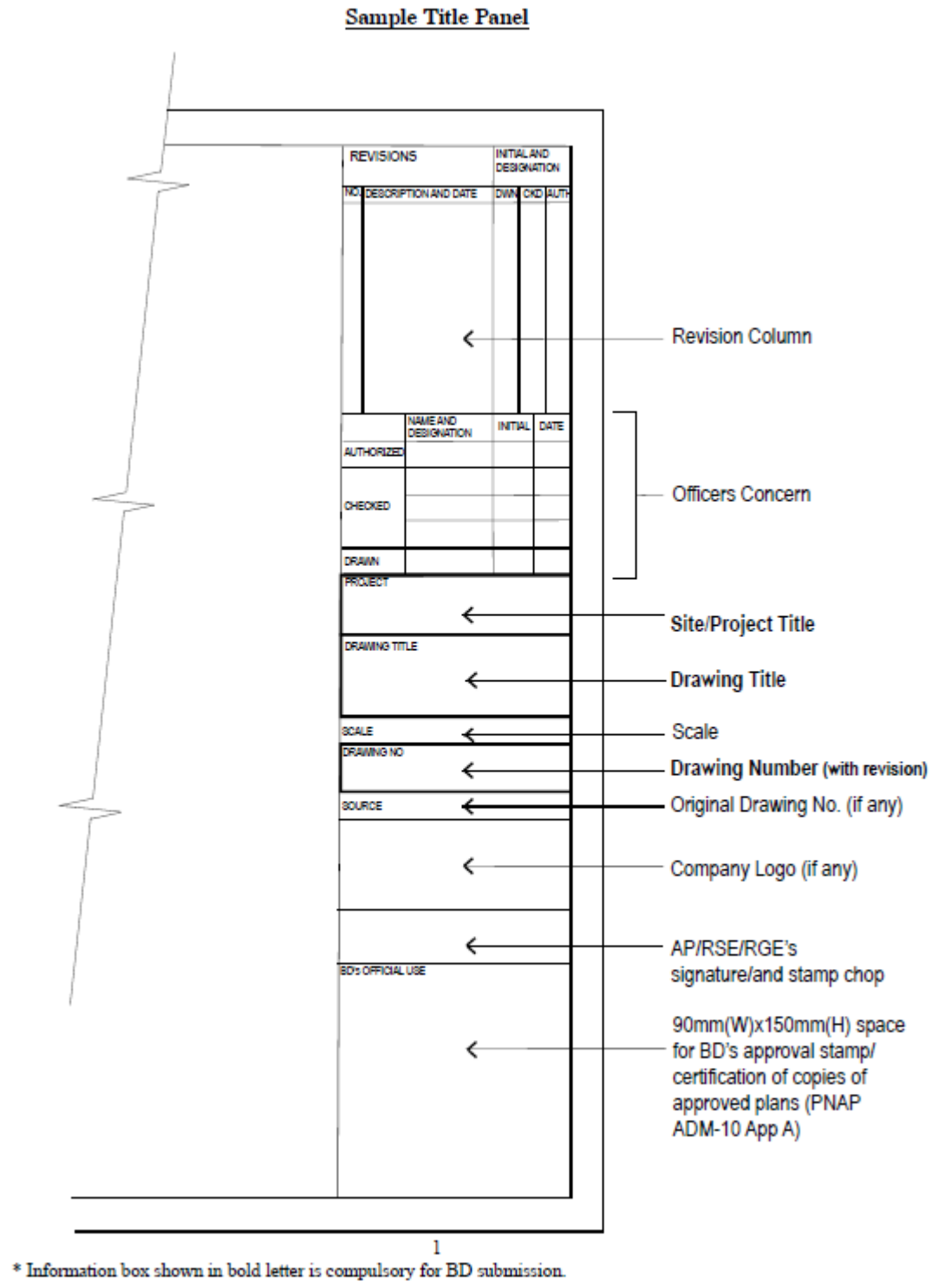


Figure 3-8. Sample Title Block from PNAP ADM-19. Information can also be extracted from model and presented as title block format

Appendix A
(PNAP ADM-9)

Preferred Colours

Material / Description	Preferred Colour	RGB Colour System[1]	Equivalent AutoCAD Colour Index[2]
Hardcore or Dry Fill	Putty	204, 178, 102	43
Brick	Orange Red	255, 63, 0	20
Concrete Slab (Lighter Wash)	Witch Haze	223, 255, 127	61
Concrete (Plain or Reinforced)	British Racing Green	0, 76, 38	118
Solid Concrete Blocks	Electric Blue	127, 223, 255	141
Hollow Concrete Blocks	Purple	191, 127, 255	191
Lightweight Partition (e.g. Plasterboard)	Macaroni and Cheese	255, 191, 127	31
Plaster or Cement Rendering	Wild Willow	204, 204, 102	53
Impermeable / Non-absorbent Floor or Wall	Neon Pink	255, 127, 223	221
Glass	Electric Blue	127, 255, 255	131
Timber	Muesli	153, 133, 76	45
Metal Work or Steel	Heliotrope	223, 127, 255	201
Stone Finish	Dark Grey	173, 173, 173	253
Sanitary Fittings	Yellow	255, 255, 0	50

[1] Colours are constructed from the combination of the red, green and blue colours.
[2] Plot screening setting should be 100 (i.e. full colour intensity).

1

Figure 3-9. PNAP ADM-9 requires preferred colouring for GBP which can be pre-set in View Setting

3.3 Data Extraction

3.3.1 Creation of Area Diagrams in Drawing Sheet

Once area diagrams are ready, there will be one more step to further produce a proper submission drawing. The area diagrams should be gathered and drag into a drawing sheet accompanied with the results in ***schedule*** to indicate the room areas. A set of drawing can be named and reviewed according to the drawing numbers.

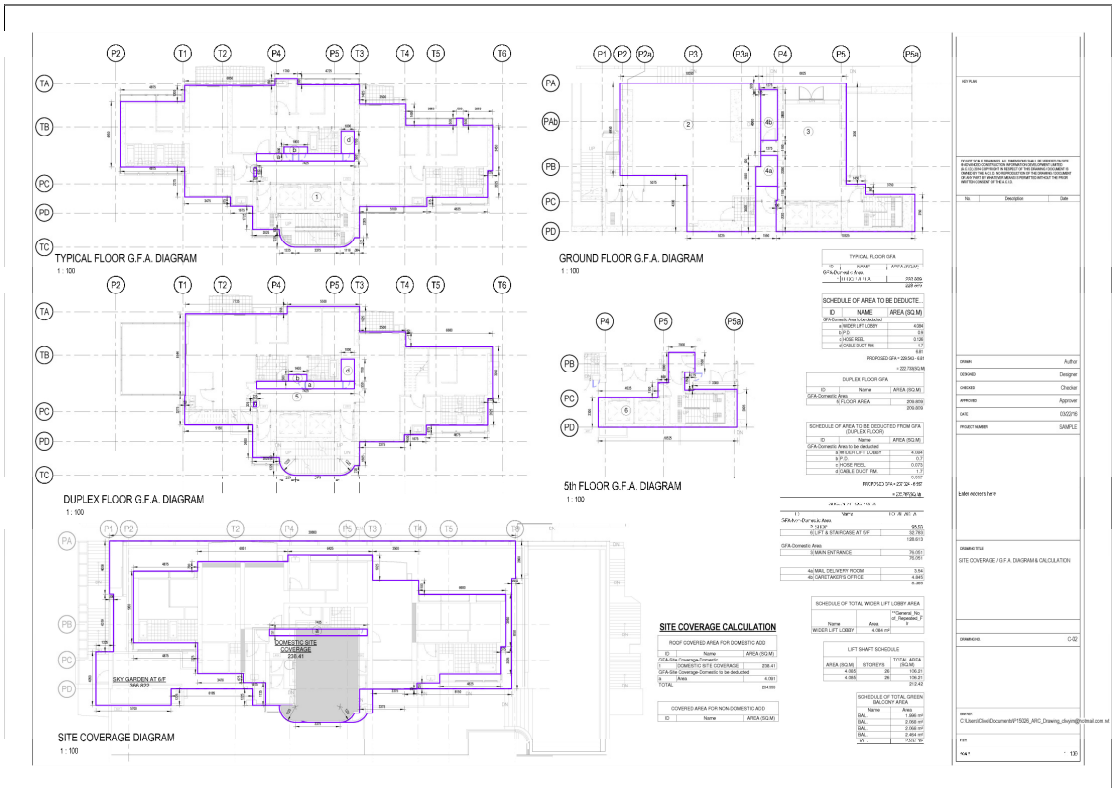


Figure 3-10. Typical area diagram drawing

3.4 Computational Logic for Calculations

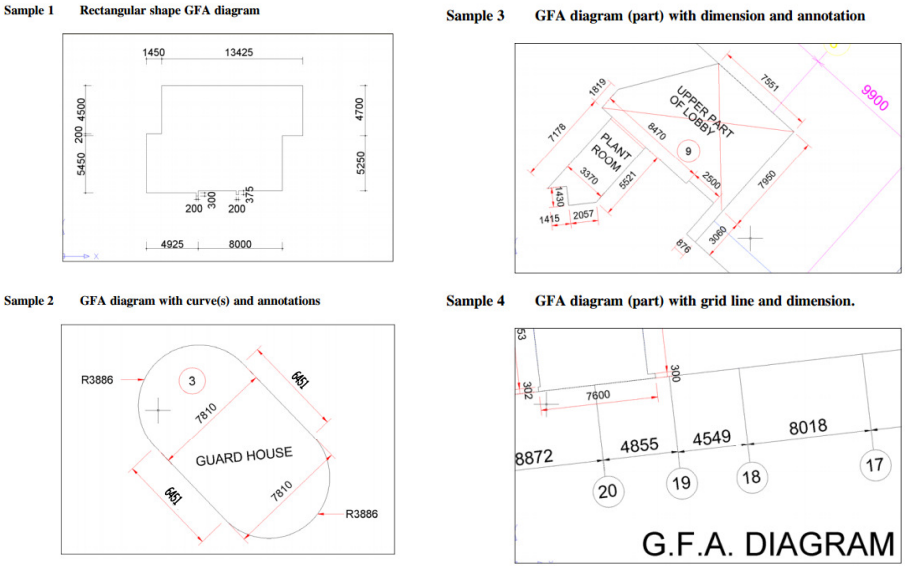
In the General Building Plan submission, all calculations are fundamentally based on 2 elements:

1. Area
2. Classification of that area

For example the concerned areas are including:

1 Site Area
2 Gross Floor Area
3 Usable Floor Area
4 Site Coverage Area

Buildings Department's PNAP ADM-19 highlights the requirements of the areas as defined for the purpose of the calculations. It requires the outline of the area concerned, classification of the area, identification code of the area and dimensions.



Sample 5 Overview of a sample GFA diagram with calculations

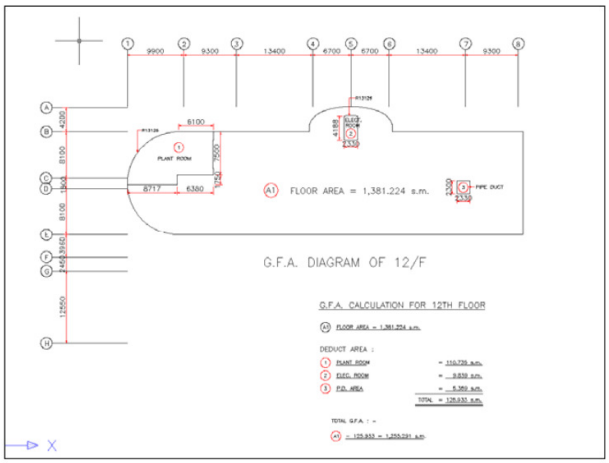


Figure 3-11. Example of Dimension Style in PNAP ADM-19 for area diagram

Code	Description	Remarks
*ARC*08240	Non-domestic area Layer	For outline of non-domestic GFA layer.
*ARC*08244	Non-domestic area to be deducted from area calculations	For non-domestic area to be deducted from the outline of non-domestic area layers under the Buildings Ordinance.
*ARC*08246	Non-domestic area to be deducted from area calculations	For non-domestic area to be deducted from the outline of non-domestic area layers under the Planning Department requirements.
*ARC*08250	Domestic area Layer	For outline of domestic GFA layer.
*ARC*08254	Domestic area to be deducted from area calculations	For domestic area to be deducted from the outline of domestic area layers under the Buildings Ordinance.

Figure 3-12. Example of Identification Code (CSWP convention) for area diagrams as required in PNAP ADM-19

3.4.1 Fundamental Checking as per Current Practice Notes

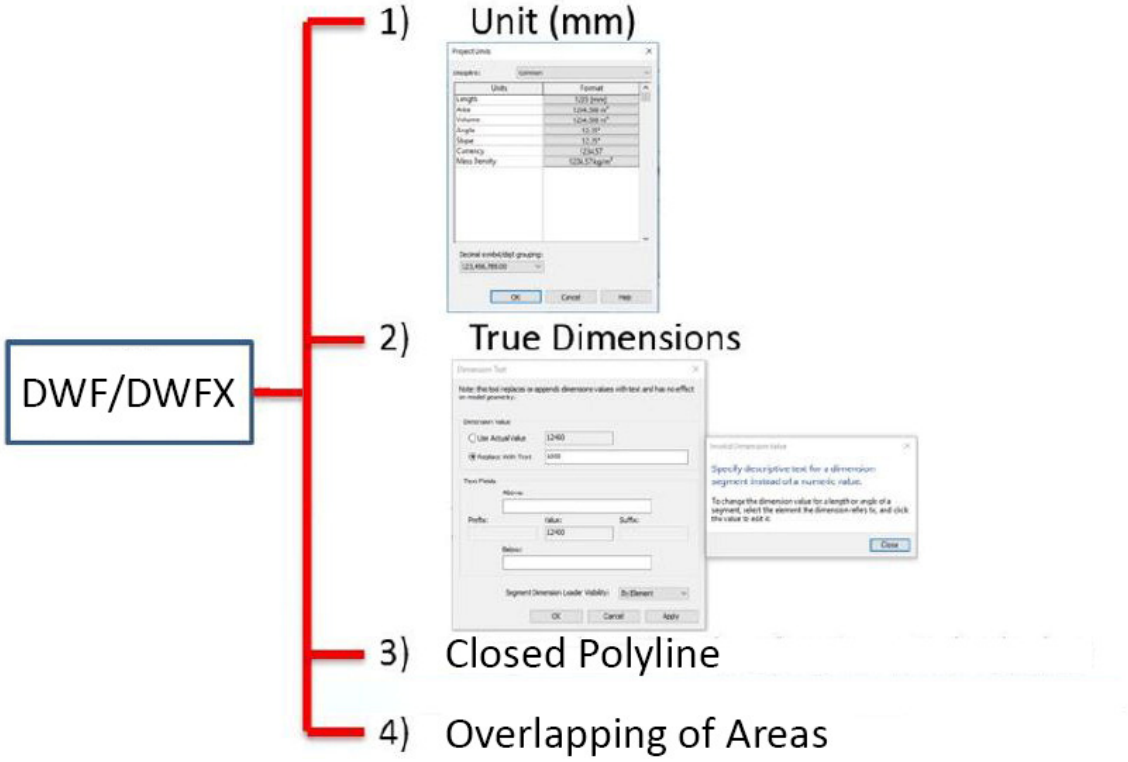


Figure 3-13. 4 fundamental checking by BD for current electronic submission

The fundamental checking system in Buildings Department for CAD drawing submission can basically separate into 4 parts:

1. Checking the unit if it is in mm.
2. Checking the dimensions if they are true or manually insert figures.
3. Checking if all area layers are closed polyline.
4. Check if there are no overlapping of areas in authoring tools and to avoid repeatedly counting one area multiple times in the drawing files.

For BIM drawing submission:

1. The software data detection already pre-set the drawing unit in mm.
2. The dimension cannot be manually altered when the software detects the input figures is numeric.
3. In order to create an ***Area Plan*** or a ***Room*** to generate area in the software, the "***Area Plan***" must be a closed area boundary and the "***Room***" is already pre-set as a closed object.
4. The software would not allow the area plan overlap with each other in single view.

Therefore, we can avoid the checking procedure for the unit, true dimension, closed polyline and overlapping of areas.

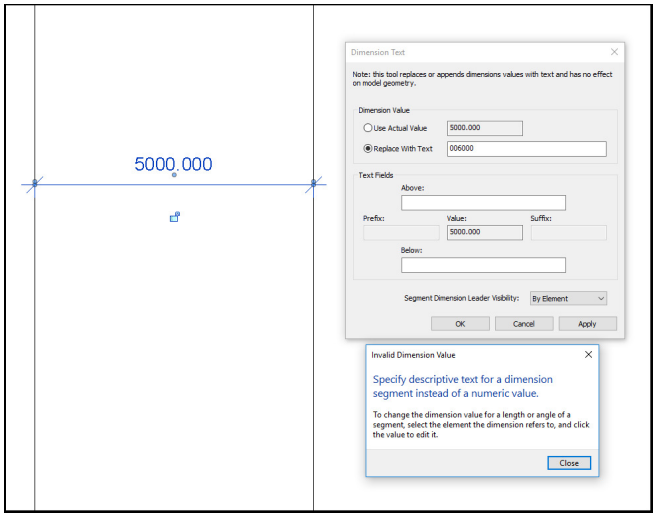


Figure 3-14. Dimension cannot be manually altered when the software detects the input figures is numeric in Autodesk Revit

3.4.2 Checking of Site Coverage and Plot Ratio

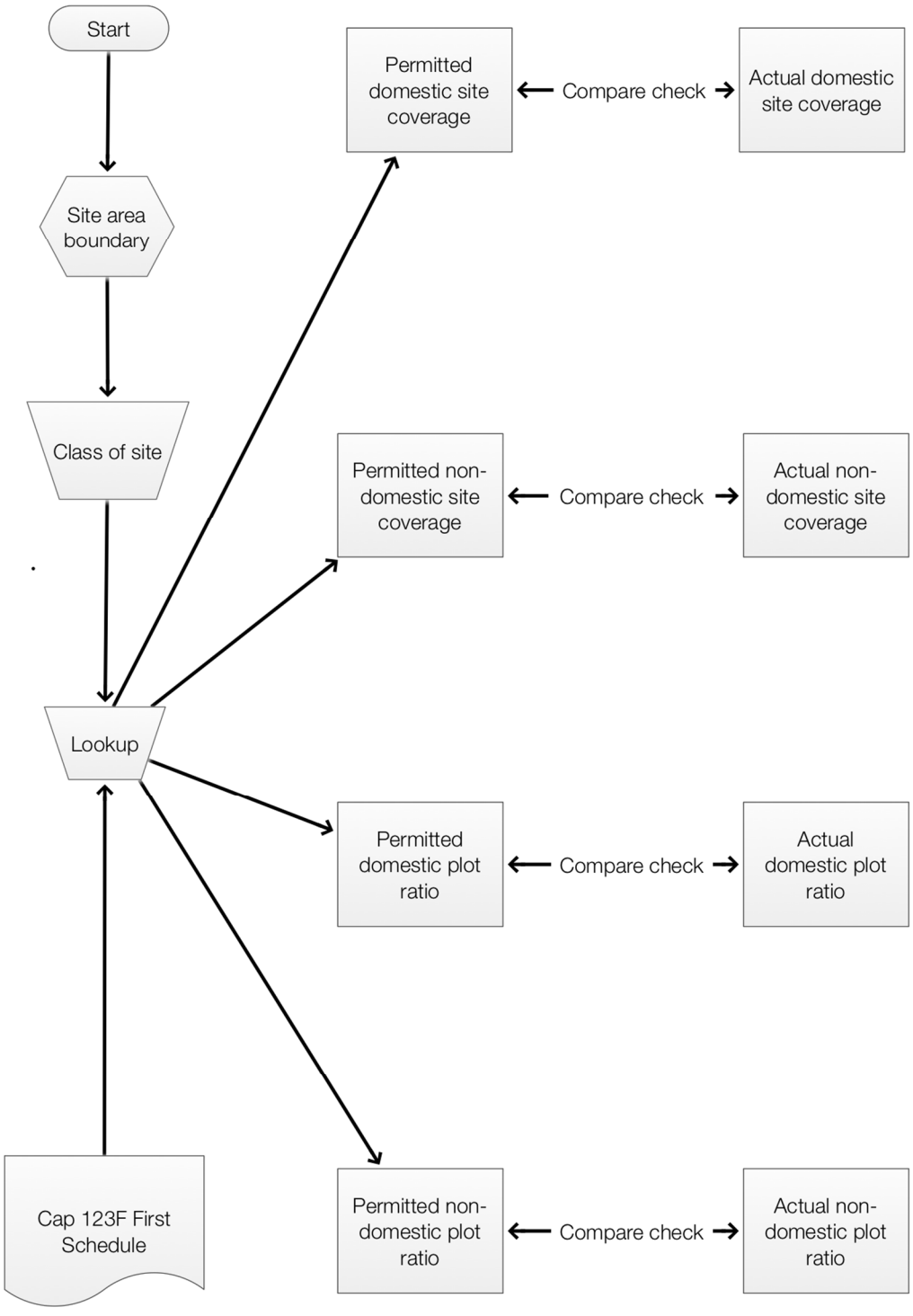


Figure 3-15. Flowchart for deriving relevant information for site coverage and plot ratio

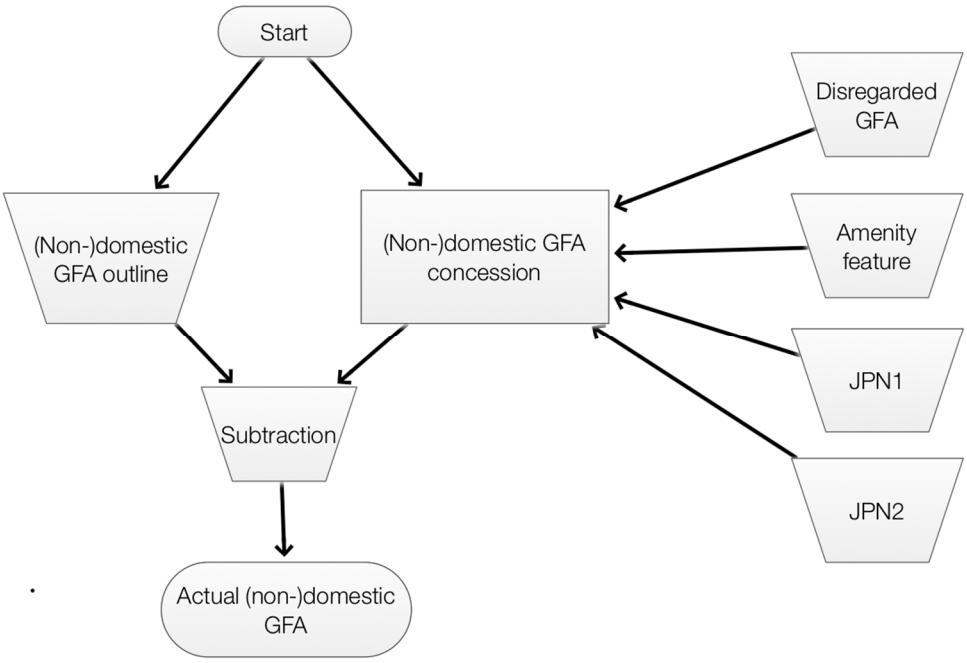


Figure 3-16. Flowchart for deriving GFA of a typical building project (GFA concession list extracted from PNAP ADM-2)

Site Coverage and Plot Ratio Calculations

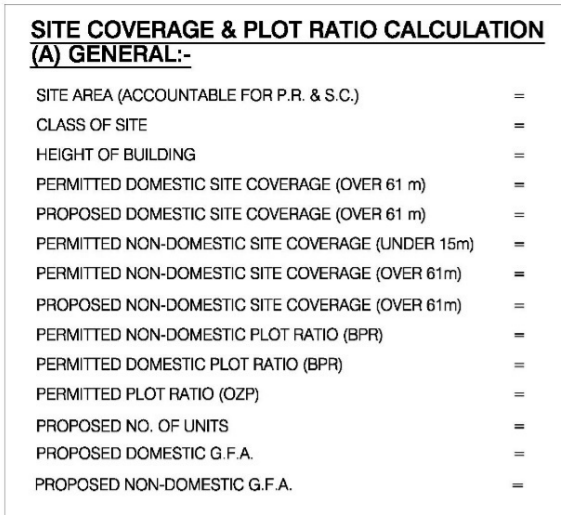
Development Intensity is generally measured by building bulk, quantified as site coverage and plot ratio.

Site coverage means the area of the site that is covered by the building that is erected thereon and, when used in relation to a part of a composite building, means the area of the site on which the building is erected that is covered by that part of the building. (see Cap123F Regulation 2)

The plot ratio of a building shall be obtained by dividing the gross floor area of the building by the area of the site on which the building is erected. (see Cap123F regulation 21)

The permitted site coverage and plot ratio for a building to be erected on a site is determined according to the class of the site, which in turn depends on the number of streets not less than 4.5m wide that the site abuts. (see PNAP APP-124)

The derived permissible and actual provision should be presented, as a general practice, in form of a set of calculations, as below as an example:



SITE COVERAGE & PLOT RATIO CALCULATION
(A) GENERAL:-

SITE AREA (ACCOUNTABLE FOR P.R. & S.C.)	=
CLASS OF SITE	=
HEIGHT OF BUILDING	=
PERMITTED DOMESTIC SITE COVERAGE (OVER 61 m)	=
PROPOSED DOMESTIC SITE COVERAGE (OVER 61 m)	=
PERMITTED NON-DOMESTIC SITE COVERAGE (UNDER 15m)	=
PERMITTED NON-DOMESTIC SITE COVERAGE (OVER 61m)	=
PROPOSED NON-DOMESTIC SITE COVERAGE (OVER 61m)	=
PERMITTED NON-DOMESTIC PLOT RATIO (BPR)	=
PERMITTED DOMESTIC PLOT RATIO (BPR)	=
PERMITTED PLOT RATIO (OZP)	=
PROPOSED NO. OF UNITS	=
PROPOSED DOMESTIC G.F.A.	=
PROPOSED NON-DOMESTIC G.F.A.	=

Figure 3-17. Example presentation format from PNAP ADV-33

The logic of deriving the information (i.e. requirement and related project information) for the following fields in the table is illustrated in the above flowchart, as described below:

Site Area (Accountable for P.R & S.C.)

- Demarcate the boundary for site area for the purpose of plot ratio and site coverage calculations.
- Extract the area from model.

Permissible Information

1. Class of Site

Insert Class “A”, “B” or “C” as determined by AP

2. Permitted domestic site coverage (over 61m)

- Use Class of Site to lookup Cap123F First Schedule

3. Permitted non-domestic site coverage (over 61m)

- Use Class of Site to lookup Cap123F First Schedule

4. Permitted non-domestic plot ratio (BPR)

- Use Class of Site to lookup Cap123F First Schedule

5. Permitted domestic lot ratio (BPR)

- Use Class of Site to lookup Cap123F First Schedule

6. Permitted plot ratio (OZP)

- Determined by AP, usually by looking up relevant statutory Outline Zoning Plan.

Actual Provision Information

1. **Actual Domestic GFA (also applicable to actual non-domestic GFA)**

- Derived from total domestic GFA outline area - total domestic GFA concession area. Each has its own subset of calculations
  - Demarcate Domestic GFA outline by as “Zone” (as defined in BS 1192-4:2014), usually by floors.
  - Demarcate GFA concession areas as “Zone” by floors. GFA concession areas comprise of 4 types of areas, namely disregarded GFA, Amenity feature, JPN1 & JPN2. (GFA concession list extracted from PNAP ADM-2)
    4 types of GFA concession areas may exist as “Space” or “Zone” or “Floor”, depending on their nature.

2. **Actual Domestic Plot Ratio (also applicable to actual non-domestic plot ratio)**
   - Derived from Actual domestic GFA divided by Site Area

3. **Checking of overall Plot ratio not exceeded**
   - If the site contains domestic and non-domestic parts, then::

Actual domestic PR <= (permitted non-domestic PR – Actual non-domestic PR) x permitted domestic PR / permitted non-domestic PR

4. **Actual Site Coverage**
   - Demarcate the boundary of site coverage outline and extract area.
   - Derived from site coverage area divided by Site Area.

3.4.2.1 Example of Autodesk Revit Operation for Checking the Area of GFA

By means of creating a proper GFA diagram for calculation, there will be a few steps to be followed. First, we have to create two sets of ***Area Plan***, one is for GFA Outline and the other is GFA Concession. Afterwards, underlay a half-toned floor plan to indicate the location of area to be created later to enhance the accuracy of area. The AP has to determine which part is the GFA Outline., which part of the floor is the GFA concession.

In each set of ***Area Plan***, create outline of the area. Overlapping both accountable GFA. outline and GFA. concession area plan can indicate both areas on the same view.

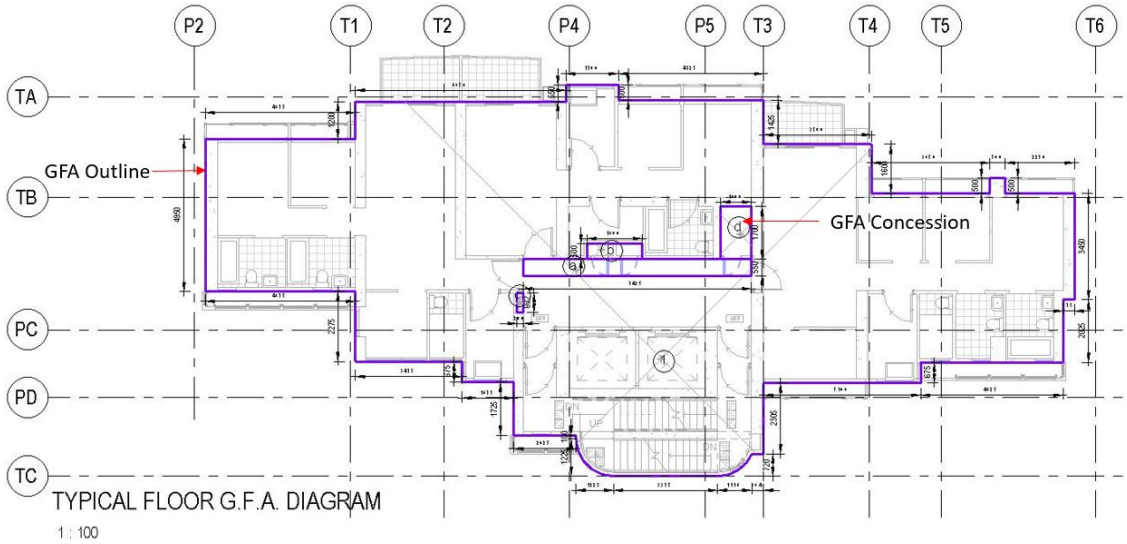


Figure 3-18. Area Plan – Overlap 2 Area Plans on same view

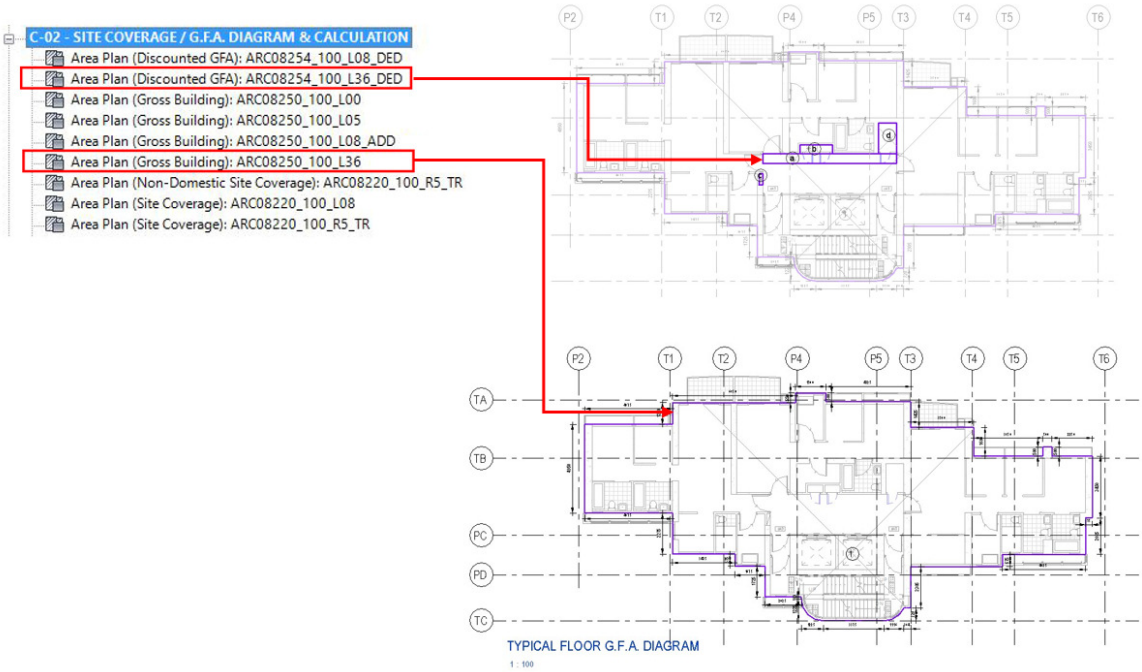


Figure 3-19. Area Outline with different CSWP convention identification code

3.4.3 Checking of Means of Escape

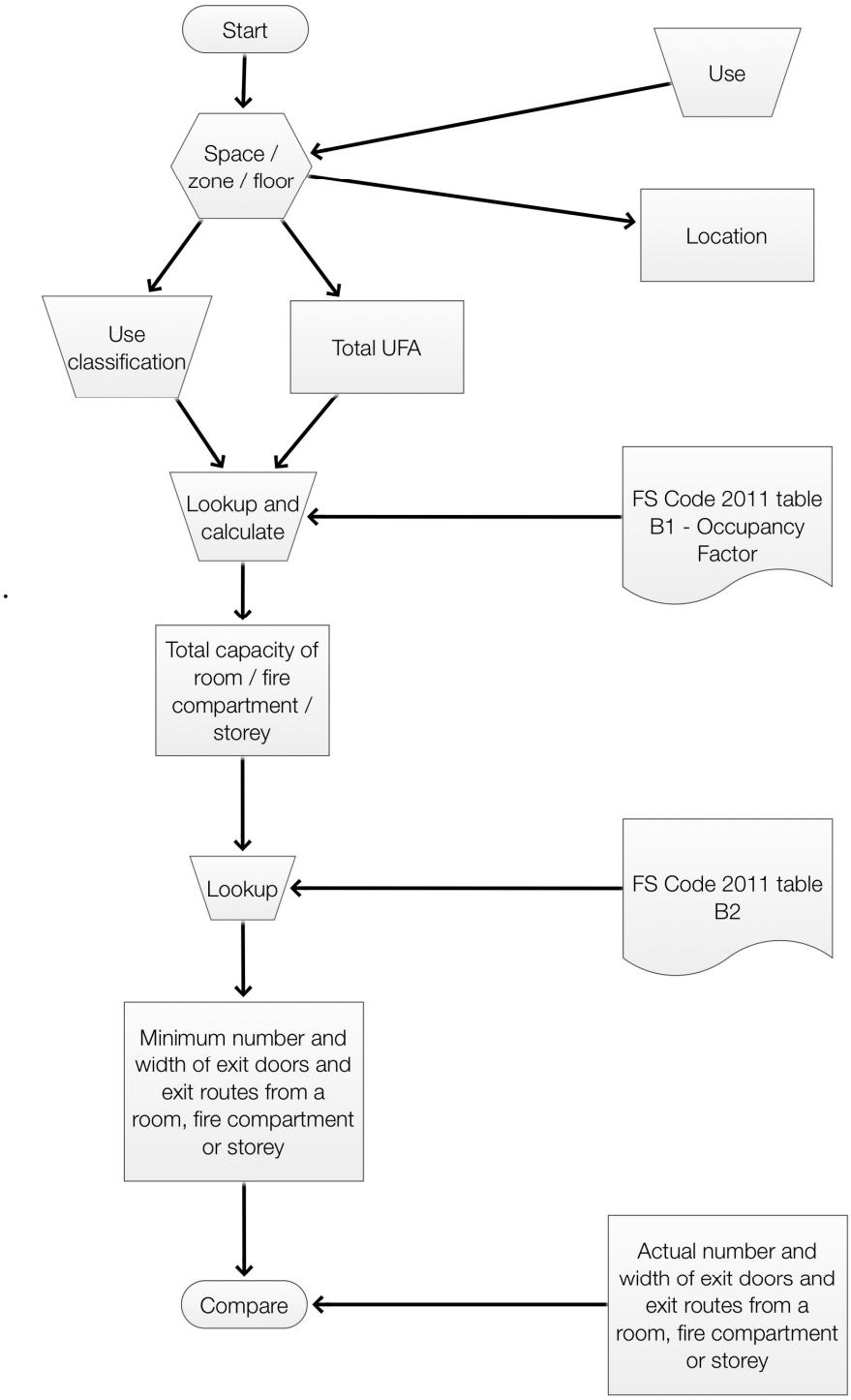


Figure 3-20. Flowchart for deriving relevant information for means of escape

Provisions of Exit Doors & Exit Routes from Room, Fire Compartment or Storey

Every building, except those buildings permitted under Clause B6.1 to have only one required staircase, should be so constructed that there are available from each storey not less than 2 exit routes or such greater number as may be required by Table B2. The width of each exit route and the total width of all the exit routes should be not less than the width shown in Table B2 according to the occupant capacity and the number of exit routes provided. Provided that:

(a) This requirement should apply to only one of the storeys of a maisonette; and
(b) Where two or more exit routes (required by Table B2 to serve a storey) vary in width, any width of an exit route in such group in excess of 50% above the width of the narrowest exit route in such group should not be included in the calculation for the minimum total width of exit routes as required by column 4 of Table B2.
(refer Code of Practice for Fire Safety in Buildings 2011, "FS Code 2011" in this section, Clause B8.1)

Table B2

Table B2: Minimum number and width of exit doors and exit routes from a room, fire compartment or storey

Occupant Capacity of room, fire compartment or storey (No. of persons)	Minimum No. of exit doors or exit routes	Minimum total width (in mm)		Minimum Width (in mm) of each	
		Exit doors	Exit routes	Exit door	Exit route
4- 30	1			750	1050
31-200	2	1750	2100	850	1050
201-300	2	2500	2500	1050	1050
301-500	2	3000	3000	1050	1050
501-750	3	4500	4500	1200	1200
751-1000	4	6000	6000	1200	1200
1001-1250	5	7500	7500	1350	1350
1251-1500	6	9000	9000	1350	1350
1501-1750	7	10500	10500	1500	1500
1751-2000	8	12000	12000	1500	1500
2001-2500	10	15000	15000	1500	1500
2501-3000	12	18000	18000	1500	1500
>3000 persons - the number of exit doors, exit routes and their width to be determined by the Building Authority					

Figure 3-21. FS Code 2011 Table B2

As a guide to assessing the requirements on means of escape, the following Table B1 should be used as the basis for calculating the occupant capacity of a building or part of a building.

(refer FS Code 2011 Clause B4.1)

Table B1: Assessment of Occupant Capacity

Use Classification	Type of Accommodation	Occupancy Factor (usable floor area in m^2 per person) or otherwise as specified
1b	Flats: - with corridor or balcony access having five or more flats on each floor served by each staircase - flats not covered by the above	4.5 9
1c	Tenement houses	3
2	Boarding houses, hostels, hotels, motels, guesthouses	Number of bedspaces
	Dormitories	3
3a	Day care centres, nurseries, child care centres	4
	Hospitals (areas other than the patient care areas)	9
	Patient care areas	Number of bedspaces
3b	Detention and Correctional Centres	Number of bedspaces
4a	Offices - Board rooms, conference rooms, function rooms - Staff rooms	9 10 9
4b	Retail shops / Department Stores (including arcade and common areas) Basement, G/F, 1/F & 2/F 3rd floor & above	 3 4.5
	Markets, supermarkets, showrooms, jewellery and goldsmith shops, pawn shops and money changers	2
	Café, restaurants, dining areas, lounges, bars and pubs	1
	Banking halls (areas accessible to the public)	0.5
	Betting halls (areas accessible to the public)	0.5
	Places where public information or service counters are provided (areas accessible to the public)	0.5
5a	Art galleries, exhibition areas, museums	2
	Cinemas: Seating areas Foyer areas	 Number of seats 0.5
	Dance floors	0.75
	Sports Stadia standing removable seating fixed seating bench seating	 0.5 0.5 Number of seats 450mm/person
	Indoor sports facilities: Sports / activity areas standing removable seating fixed seating bench seating	 10 0.5 0.5 Number of seats 450mm/person
	Theatres: Seating areas Foyer areas	 Number of seats 0.5
5b	Libraries	2
	Reading rooms, study rooms	1
	Classrooms of school not covered by the Education Ordinance, lecture rooms	2 or number of seats
5c	Transport facilities like passenger terminals, railway stations, etc.	Based on actual design and layout
5d	Public halls, assembly halls, conference halls removable seating fixed seating	 0.5 Number of seats
	Gymnasia	3
	Swimming Pool	3
	Columbaria	2
	Viewing galleries	0.5
6a	Commercial Laundries	10
	Commercial Laboratories	10
	Factories / Workshops	4.5
	Commercial Kitchens	4.5
6b	Warehouses	30
6c	Storage, manufacturing of hazardous/ dangerous goods premises	30
7	Carparks	30
8	Plant rooms, switch rooms, transformer rooms, etc.	30

Figure 3-22. FS Code 2011 Table B1

The derived required provision should be presented, as a general practice, in form of the table, as below as an example:

PROVISIONS OF EXIT DOORS & EXIT ROUTES FROM ROOM,FIRE COMPARTMENT OR STOREY

LOCATION	USE	CAPACITY OF ROOM OR STOREY (PERSON)	MIN. NO. OF EXIT DOORS (FROM ROOM) OR EXIT ROUTE (FROM STOREY)		MIN. TOTAL WIDTH OF (mm)				MIN. WIDTH OF EACH (mm)			
					EXIT DOORS		EXIT ROUTES		EXIT DOOR		EXIT ROUTE	
			REQUIRED	PROVIDED	REQUIRED	PROVIDED	REQUIRED	PROVIDED	REQUIRED	PROVIDED	REQUIRED	PROVIDED

The logic of deriving the information (i.e. requirement and related project information) for the fields in the table is illustrated in the above flowchart, as described below:

1. Location:

- Demarcate the relevant proposed rooms, fire compartment or storeys as “Space”, “Zone” or “Floor” respectively (as defined in BS 1192-4:2014) and use common names as identification names for easy identification.
- Insert “Space” / “Floor” location into the field.

2. Use:

- Insert “Space” / “Zone” / “Floor” identification name.

3. Use Classification:

- Classify each “Space” / “Zone” / “Floor” according to FS Code 2011 Table B1.

4. Total Usable Floor Area (m2)

- Extract floor area of concerned “Space” / “Zone” / “Floor”.

5. Occupancy Factor (usable floor area in m2 per person)

- Derive by looking up FS code 2011 Table B1 for respective use classifications.

6. Total Capacity of Room, fire compartment or Storey

- Total Usable Floor Area x Occupancy Factor.

7. Minimum number and width of exit doors and exit routes from a room, fire compartment or storey

- Derive using Total capacity of Room or storey by looking up FS Code 2011 Table B2.

3.4.3.1 Example of Autodesk Revit Operation for Checking the Area of UFA

An example will be illustrated the workflow of UFA calculation process. By using the ***Room*** tool to find out the room area. Then classify the use of the area and check the relevant Code of Practice.

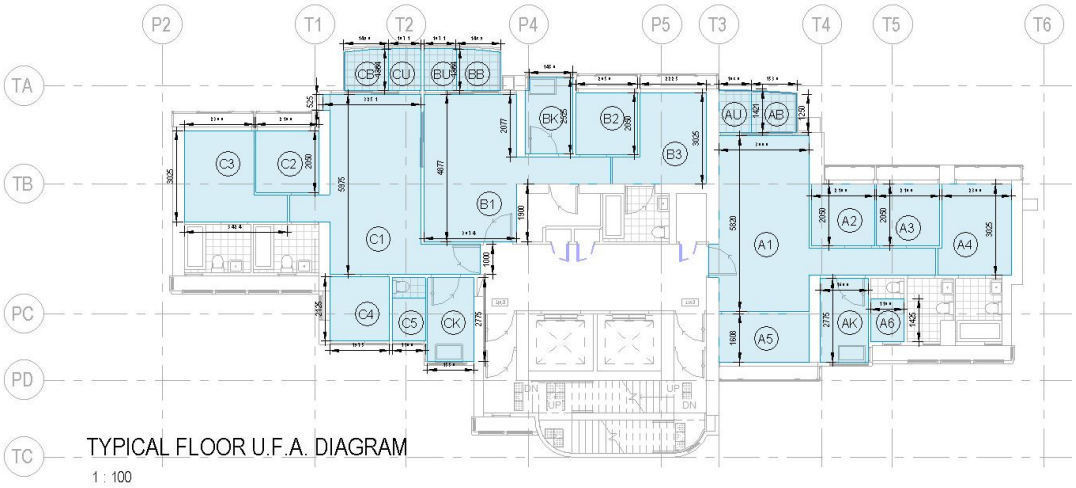


Figure 3-23. Automatic demarcation of room area by using Room tool

3.4.4 Checking of Sanitary Fitment Provision

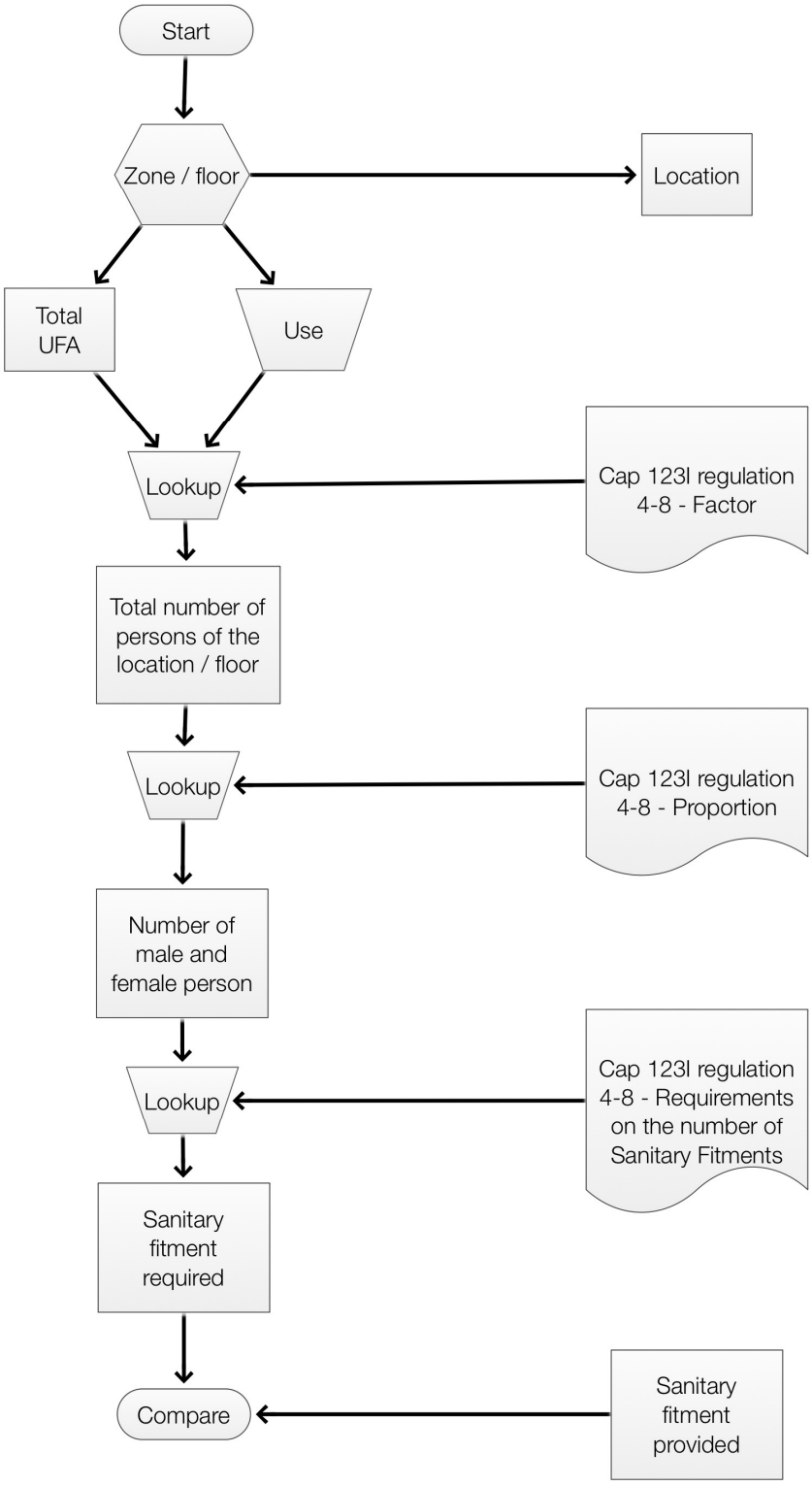


Figure 3-24. Flowchart for deriving relevant information for provision of sanitary fitment

The Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations ("the Regulations" in this section) stipulate the drainage requirements for private buildings in Hong Kong. Such requirements, inter alia, include the provisions of sanitary fitments for various types of premises.

The derived required provision should be presented, as a general practice, in form of the table, as below as an example:

SCHEDULE OF SANITARY FITMENTS

LOCATION OF FLOOR	USE	TOTAL USABLE FL. AREA (m^2)	FACTOR REPRESENTING m^2 OF USABLE FL. AREA PER PERSON	TOTAL CAPACITY PER FLOOR (PROPORTION)	NO. OF MALE PERSON AND FEMALE PERSON (PROPORTION)			SANITARY FITMENT REQUIRED				SANITARY FITMENT PROVIDED (*INCLUDE DISABLED LAV.)			
								W.C.	BATH/SHOWER BIDET	URINAL	BASIN OR WATER POINT	W.C.	BATH/SHOWER BIDET	URINAL	BASIN OR WATER POINT

The logic of deriving the information (i.e. requirement and related project information) for the following fields in the table is illustrated in the above flowchart, as described below:

1. Location or Floor:

- Identify and demarcate the location or floor as "zone" or "floor" (as defined in BS 1192-4:2014) respectively for the purpose of this calculation.
- Insert the location into the field.

2. Use:

- To classify the location or floor ("zone" or "floor") into different uses for that part of building, according to Regulations 4-8, which are:
  - Residential Buildings
  - Workplaces
  - Places of public entertainment
  - Sports stadia
  - Cinemas
  - Shopping arcade and department stores
  - Religious institutions
  - Funeral parlours
  - Restaurants

3. Total Usable Floor Area:

- Extract and insert floor area of concerned "Zone" or "Floor".

4. Factor representing m2 of usable floor area per person

- Obtain the factor by looking up respective Regulations 4-8.

5. Total number or person of the location or floor

- Equals total usable floor area divided by factor.

6. Number of male person and female person

- To determine the number of male persons and female persons for that part of building according to the “proportion” as stated in the respective Regulations 4-8.

7. Sanitary fitment required

- To calculate the required number of provisions for sanitary fitments according the rate stated in the respective Regulations 4-8 for male and female. These sanitary fitments include:
    - Watercloset fitments
    - Urinals
    - Lavatory basins
    - Baths or showers

8. Sanitary Fitment provided

- Obtain the total number of sanitary fitments of the concerned “zone” or “floor”.

3.4.5 Checking of Fire Compartment and Fire Resisting Construction

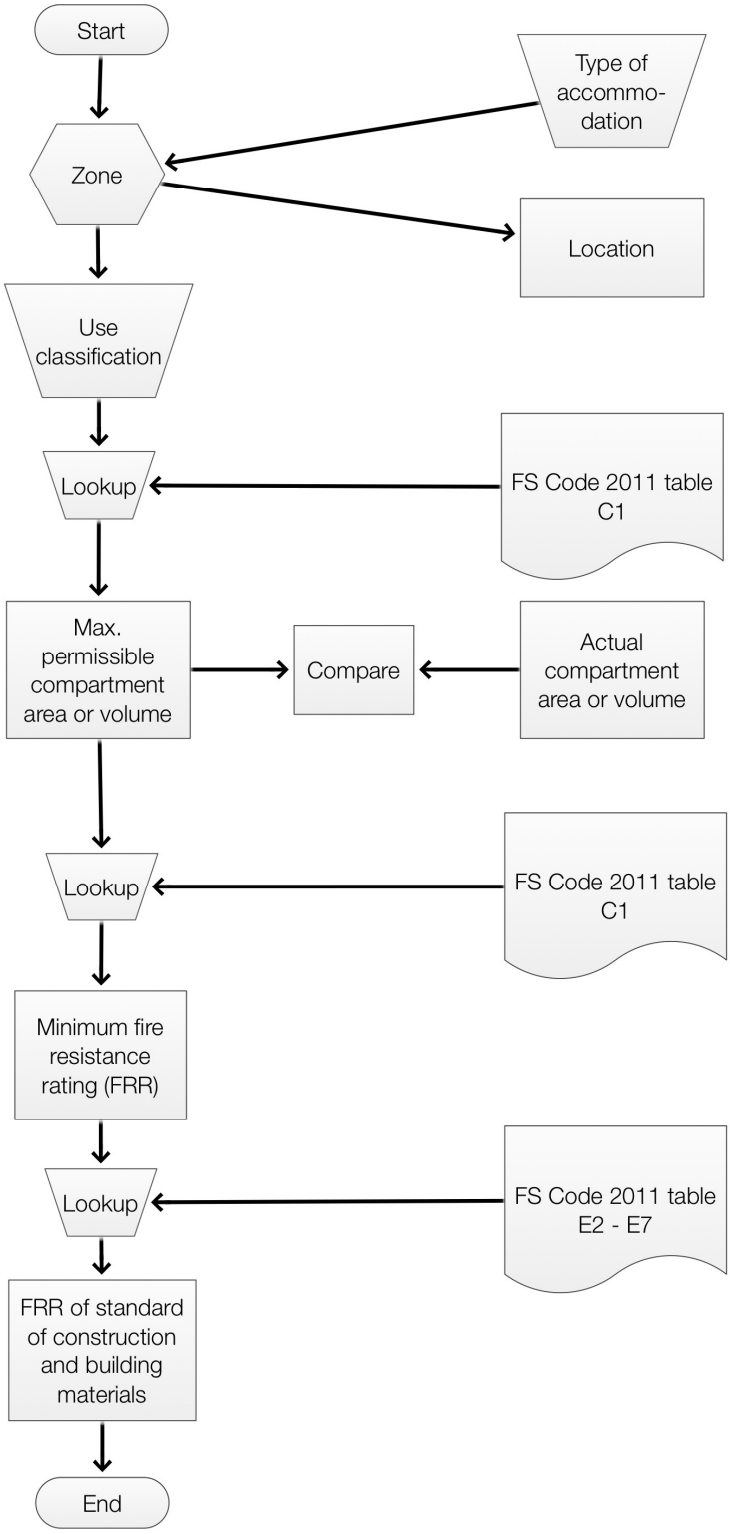


Figure 3-25. Flowchart for deriving relevant information for fire compartmentation and fire resisting construction

Fire compartmentation and Fire Resistance requirement for Elements of Construction

Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 (Code of Practice for Fire Safety in Buildings 2011, “FS Code 2011” in this section) in order to inhibit the spread of fire. (FS Code 2011 Clause C3.1)

Every element of construction within each fire compartment and every fire barrier of each fire compartment should have an FRR of not less than that as specified in Table C1. (FS Code 2011 Clause C4.1)

FS Code 2011 Table C1 is extracted here for easy reference:

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m^2	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m^2	60
4b. Mercantile Facilities	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120
5. Assembly:		
5a & 5d. PPE & Other assembly premises	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120
5b.Educational establishments	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120
5c. Transport facilities	Not exceeding 10,500m^2	120
6. Industrial:		
6a. Industrial workplaces	Not exceeding 10,500m^2	120
6b. Bulk storage, Warehouses	Not exceeding 28,000m^3 and 10,500m^2	120
6c. Storage, manufacturing of hazardous/dangerous goods premises	Not exceeding 7,000m^3	120
7. Carparks	Not exceeding 10,500m^2	60

Figure 3-26. FS Code 2011 Table C1

The derived required provision should be presented, as a general practice, in form of the table, as below as an example:

FIRE RESISTANCE REQUIREMENT FOR ELEMENTS OF CONSTRUCTION												
LOCATION	TYPE OF ACCOMMODATION	USE CLASSIFICATION	COMPARTMENT OF BUILDING		FIRE RESISTANCE RATING(minutes) FOR ELEMENTS OF CONSTRUCTION		MINIMUM DIMENSION OF ELEMENT OF CONSTRUCTION					
							R.C. FLOORS & LANDING		R.C. BEAMS		R.C. COLUMN & CORE WALL	
			FLOOR AREA (m^2)	VOLUME (m^3)	R.C. SLAB/ CORE WALL	R.C. BEAM/ COLUMN	THICKNESS OF CONCRETE	CONCRETE COVER TO REINFORCEMENT	WIDTH OF BEAM	CONCRETE COVER TO MAIN REINFORCEMENT	MINIMUM OVERALL SIZE	CONCRETE COVER TO MAIN REINFORCEMENT

The logic of deriving the information (i.e. requirement and related project information) for the following fields in the table is illustrated in the above flowchart, as described below:

1. Location:

- Demarcate the proposed fire compartmentation into “Zones” (as defined in BS 1192-4:2014) and use common names as identification names for easy identification.
- Insert “Zone” location into the field.

2. Type of Accommodation:

- Insert “Zone” identification name.

3. Use Classification:

- Classify each “Zone” according to FS Code 2011 Table C1.

4. Maximum permissible Compartment of (part of) building by floor area or volume

- Derive by looking up FS code 2011 Table C1 for respective use classifications.

5. Actual compartment of (part of) building by floor area or volume

- Extract floor area or volume of each “zone” and compare against the maximum permissible compartment of (part of) building by floor area or volume.

6. Minimum Fire Resistance Rating (FRR)

- Derive by looking up FS code 2011 Table C1 for respective use classifications.

7. The FRR of the standard of construction and building materials

- derive by looking up the following tables of FS code 2011:

a. Table E2 on Walls Constructed Wholly of Non-combustible Materials.
b. Table E3 on Walls not Constructed Wholly of Non-combustible Materials Table E4 on Floors and Landings.
c. Table E5 on Steel Columns and Beams.
d. Table E6 on Reinforced Concrete Columns and Beams.
e. Table E7 on Stairs.

3.5 Semi-Automatic vs. Automatic Calculations

Whereas the semi-automatic process involves the summation of concerned ***area plan***, due to limited data manipulation functionality in the most commonly used BIM authoring tools, the look up tables process is still commonly done outside the authoring tools, usually manually

Automatic calculations refer to a script or plug-in which will automatically refer to the statutory tables and perform the calculation, returns with a result and fill in the requirement schedule. This is, however, belongs to another phase of the Consultancy Study which will not be covered here.

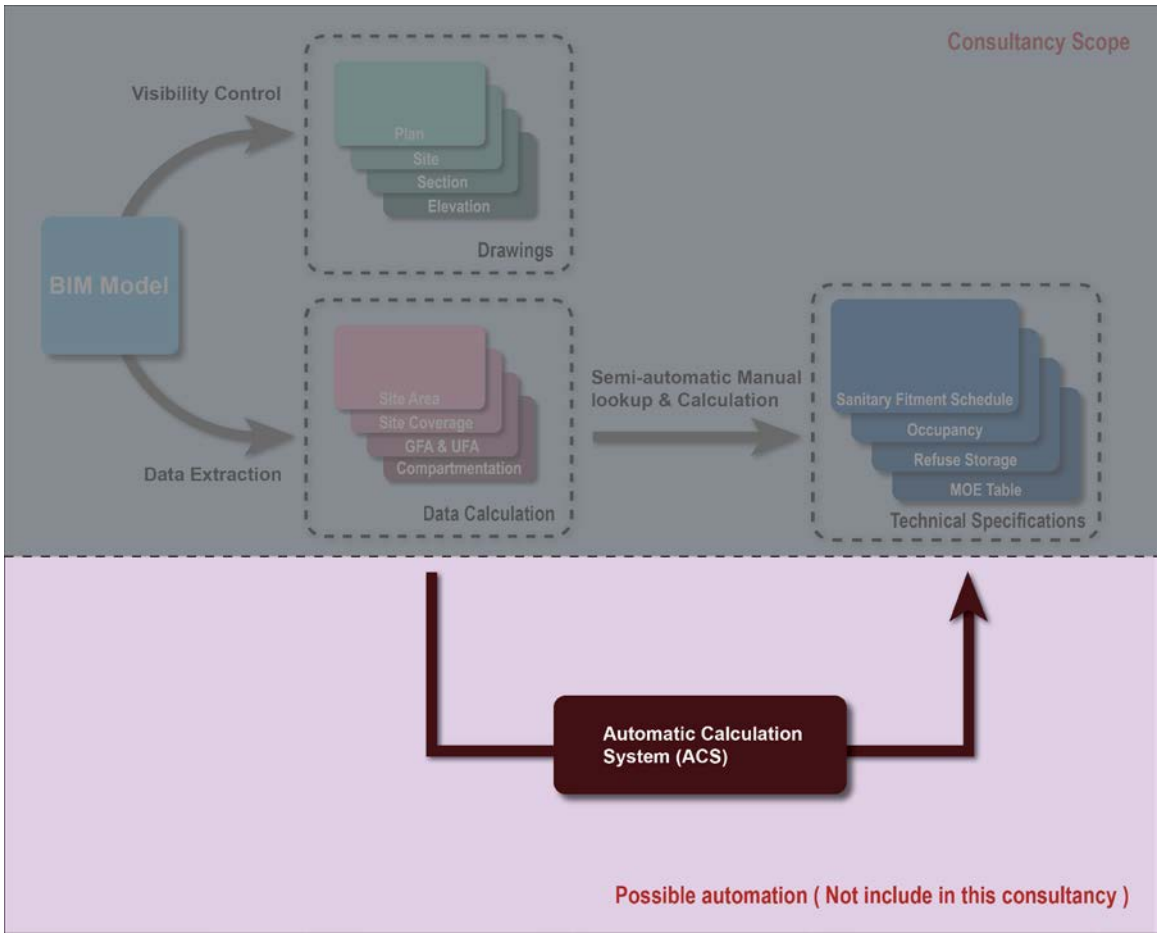


Figure 3-27. Possible automation for GBP workflow and components

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4 Proposed additional Requirements for Electronic Submission for Mathematical Calculation of Areas by BIM Platforms (based on PNAP ADM-19 Appendix F)

It is realised that BIM authoring software is much more sophisticated than CAD software. BIM authoring software generally require higher hardware and software costs, much more upfront training of staff on the BIM concept and actual operation knowledge. The process could take consideration time and effort, which would delay and hinder the adoption schedule. Therefore, we propose a two stage adoption of BIM submission on the approver side.

4.1 Stage 1: Model viewing only

For model and drawing viewing purpose, such as identifying areas alignments and 3D geometry viewing, approver may accept BIM model to be exported to their native viewer format. For example, BIM model drawn using

Autodesk Revit may be exported to .DWFx format, which can be viewed on free Autodesk Design Review;

Graphisoft ArchiCAD can be exported to .BIMx format, which can be viewed on free BIMx App on Android's or iOS devices.

BIM viewers are usually light weight, user friendly and have much shallower learning curve. The training time and effort should be much smaller and approvers can pick up and adopt within a short period of time.

This stage is about passive application of BIM models. This stage should act as a grace period for approvers and industry to cultivate BIM submission workflow.

4.2 Stage 2: Model information extraction

In this stage, native BIM format should be accepted.

There are two targets to be achieved:

1. Reduce the industry efforts needed for BIM submissions.
According to Singapore BCA's experience as stated in their latest circular letter ref. APPBCA-2016-10 dated 19 October 2016, their local industry feedback "about the extra efforts required to reinstate annotations that are lost during the compression of the Native BIM file to lightweight file format." BCA addressed this feedback by "accept voluntary BIM e- submissions in Native BIM format."

(refer: https://www.corenet.gov.sg/media/2032998/circular-on-bim-e-submission-for-plan-submission-to-bca.pdf)

2. This stage is about active application of BIM models.

It is known that an adequately prepared BIM models contain tons of information about the concerned building developments. Some of this information are public infrastructure related. Such information should be systematically incorporated into government's current system such as Lands Department mapping system and made easily accessible to government departments and public.

Buildings department or Lands Department, being the frontline departments in handling private developments, could be a window to accept BIM native model, request specific set of information organised in a specific data structure, for further incorporating into government's system.

4.3 Proposed Appendix

The following is a proposed additional appendix to current PNAP ADM-19 for stage 1 BIM adoption for accepting electronic submission of area calculations prepared by BIM software. The entire proposal is based on current appendix F of same PNAP with proposed modification underlined and marked in red.

Proposal:

The purpose of this supplementary note is to advise on the electronic format and the pre-requisites for checking of area calculations in BIM drawing files electronically.

2. When the requirements set out in the following paragraphs are complied with and clearly shown in the submitted BIM drawing files, diagrammatic breakdowns and details on calculation of the gross floor area, usable floor area, site coverage, plot ratio, refuge floor area and green feature area etc. would not be required to be included in plan submission. For avoidance of doubt, annotation and dimension of the areas concerned are required to be indicated on plans for checking purpose. Samples of the dimensioned plans are in Annex 1 for reference.

3. For area calculations computed electronically, soft copies of the building floor plans containing the area diagram layer(s) / ***"CSWP Convention" parameter*** are required to facilitate verification of the calculations. For approval purpose, hard copies of the general building plans showing floor area layouts, area diagrams and calculations without breakdowns are required. Information shown in both the soft and hard copies of the plans submitted for approval must be identical to each other. Plans may be rejected if discrepancy between the two is found. The AP should certify on each of the DVD-ROM discs with a permanent marker signifying that information in the electronic drawing files are identical to the submitted hard copies and that all files are prepared under his supervision. The disc should be finalised before submission, i.e. the contents of the disc cannot be further changed. His signature shall be deemed to be his assumption of responsibility for the electronic plans and the calculations.

4. The following minimum requirements in BIM drawing format should be observed and provided for in the area calculations computed electronically. Plans may be rejected on grounds of insufficient information if these requirements are not complied with.

4.1 Format and Software Version

(a) The submitted BIM drawing files should be stored in non-rewritable DVD-ROM discs. Except otherwise agreed by the Building Authority all other electronic submission formats are not acceptable.

(b) BIM files should be exported to lightweight ".dwf" or ".dwfx" viewer format All other compressed or zipped file formats are not acceptable.

(c) Title blocks completed with drawing number showing revision legends, site/project title, drawing title etc. should be inserted in every drawing for identification

purpose. Each BIM lightweight file shall contain all hard copy drawing. Typical title block sample is attached in Annex 2 for reference.

4.2 Referencing System

File Name/Drawing Number Convention

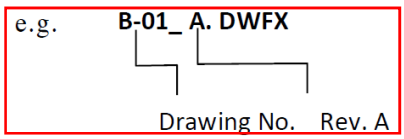
(a) Each file shall either contain full set of drawings or one drawing only, default zoomed to full drawing extent.

(b) All information for approval shall be contained in the same drawing file. The need to cross-reference or hyper-link with another BIM file to enable verification of the area calculations in the DVD-ROM is not acceptable except in situation covered in (c) below.

(c) In situation where the layering number, ***"CSWP Convention" parameter*** number and the system are limited due to software constraint, limited referencing system might be used provided that all information and BIM model files which compose the final drawings are clearly visible and intact when files are open in the computer. A clear and systematic path trial in hard copy format highlighting the list of file(s) for area checking purpose should be provided to facilitate the verification exercise. All drawing files and model files are to put into the same folder to ensure coherent path recognition. Cross-referencing and hyper-linking within folder should be kept to the minimum.

(d) Naming and numbering of drawing files in the hard copy should be identical to those in the submitted soft copy.

(e) A completed hard and soft copy of the drawing index listing all file names, drawing numbers with brief description on location and contents of the submitted drawings shall be provided. Drawings under different revision must carry a revision letter (e.g. A to Z) for identification purpose. For large and complicated project involving numerous drawing versions/amendments, a revision legend should also be provided as well.



Layering / *Area Plan* Organization

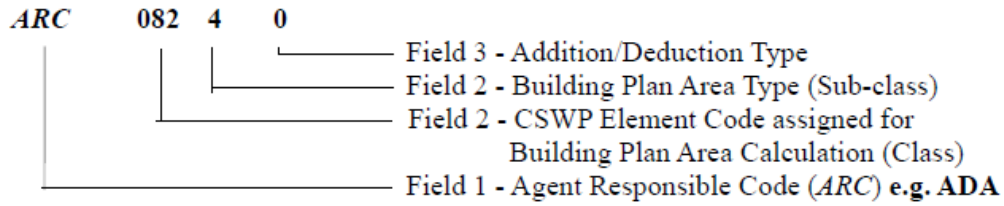
(a) BIM drawings files including floor plans, tables and calculations etc. shall contain all information identical to the hard copy. Each file shall accommodate different elements such as floor layout plans, usable floor area, gross floor area and dimension etc. into the relevant layers. The "layering" drafting technique isolates elements of a drawing and places them into separate layers for easy reference and manipulation. In BIM software without layer function, (e.g. Revit), "***area plan / room***" tools should be used for further ***"visibility control"*** for isolation and easy reference and manipulation.

(b) To facilitate checking of the area calculations, general building plans shall contain GFA and other areas diagram layers or area boundary diagram for verification and calculations. To reconcile the requirements of other government departs and to adopt the rules under BIM Standards for Works Projects (CSWP) of Environment, Transport and Works Bureau, AP shall name the relevant layers or custom created

"CSWP Convention" parameter for each area boundary for BIM software without layer function, (e.g. Revit) in a format specified below:

Layer / ***"CSWP Convention" parameter*** **Name Convention**

Diagram A: Rules of Layer / "*CSWP Convention*" Parameter Name Convention of CSWP (abstracted)



Field	Description	Length/Type	Coding
1	Agent Responsible Code	3 (alphanumeric)	See www.etwb.gov.hk/cswp
2	CSWP Element Code assigned for Building Plan Area Calculation (Class)	3 (numeric)	a) 082 for BD's area calculation, b) 086 for LandsD's area calculation
	Building Plan Area Type (Sub-class)	1 (numeric)	See Diagram B
3	Addition/Deduction Type	1 (alphanumeric)	See Diagram C

Diagram B

Code	Building Plan Area Type
1	Site Coverage (SC) – Non-domestic
2	Site Coverage (SC) –Domestic
4	Gross Floor Area (GFA) – Non-domestic
5	Gross Floor Area (GFA) – Domestic
9	Usable Floor Area (UFA)
0	Open Space (OS)
_	Elements common to all area type

Diagram C

Code	Addition/Deduction Type	Remarks
0	Base Area	
4	Deduction Area	For area to be deducted from the outline of area layers /"*CSWP Convention*" Parameter under the Buildings Ordinance.
5	Deduction Area	For area to be deducted from the outline of area layers */ "CSWP Convention"* Parameter under the Lands Department requirement.
6	Deduction Area	For area to be deducted from the outline of area layers */ "CSWP Convention"* Parameter under the Planning Department requirement.
8	Dimension	

Diagram D: Layer / "*CSWP Convention*" Parameter Names generated from the above rules for this PNAP

-

Code	Description	Remarks
*ARC*08240	Non-domestic *area*	For outline of non-domestic GFA layer / *"CSWP Convention" Parameter*.
*ARC*08244	Non-domestic area to be deducted from area calculations	For non-domestic area to be deducted from the outline of non-domestic area layers / *"CSWP Convention"* Parameter under the Buildings Ordinance.
*ARC*08246	Non-domestic area to be deducted from area calculations	For non-domestic area to be deducted from the outline of non-domestic area layers / *"CSWP Convention"* Parameter under the Planning Department requirements.
*ARC*08250	Domestic *area*	For outline of domestic GFA layer / *"CSWP Convention" Parameter.*
*ARC*08254	Domestic area to be deducted from area calculations	For domestic area to be deducted from the outline of domestic area layer / *"CSWP Convention"* Paramater under the Buildings Ordinance.

ARC08256	Domestic area to be deducted from area calculations	For domestic area to be deducted from the outline of domestic area layers / ***"CSWP Convention"*** Parameter under the Planning Department requirements.
ARC082_8	Dimension layers / ***Categories***	All dimensions for the floor layout plans are automatically generated from the computer software (*not to be manually inserted by text input construction*)
ARC08210	Area for non-domestic site coverage calculations	For outline of non-domestic site coverage layer / "***CSWP Convention***" Parameter.
ARC08214	Non-domestic site coverage deducted from calculations	Deduction complying with requirements of the Buildings Department.
ARC08216	Non-domestic site coverage deducted from calculations	Deduction complying with requirements of the Planning Department.
ARC08220	Area for domestic site coverage calculations	For outline of domestic site coverage layer / "***CSWP Convention***" Parameter.
ARC08224	Domestic site coverage deducted from calculations	Deduction complying with requirements of the Buildings Department.
ARC08226	Domestic site coverage deducted from calculations	Deduction complying with requirements of the Planning Department.
ARC08200	Area for open space calculations	For outline of open space layer / ***"CSWP Convention"*** Parameter.
ARC08204	Area to be deducted from open space calculations	For area to be deducted from outline of the open space under the Buildings Ordinance.
ARC08290	Area for usable floor area calculations	For outline of usable floor area by ***Room Tool***.
ARC08294	Area to be deducted from the usable floor area calculations	For area to be deducted from outline of the usable floor area under the Buildings Ordinance.

(c) The Layer / ***"CSWP Convention" Parameter*** names required by LandsD are not listed in this PNAP and AP should make reference to the Practice Note issued by LandsD. AP should also refer to CSWP of Environment, Transport and Works Bureau (atwww.etwb.gov.hk/cswp) for other layer name convention.

(d) Layer / ***"CSWP Convention" Parameter*** file organization of the file(s) in hard copy format shall be submitted. If more layer / ***"CSWP Convention" Parameter*** description is required in the submitted general building plans, AP could lengthen the above list with additional input along similarly constructed methodology. All layering / ***"CSWP Convention" Parameter*** organizations must be clearly shown.

(e) BIM file for the floor plan shall contain all elements and information that have to be shown on the drawings to facilitate approval, including, inter alia, the area and the dimension ~~layers~~. Elements such as lighting, electric appliances and the like where approval from the Building Authority is not required should not be shown in the submitted drawings.

4.4 Presentation Style

Drawing Scale

(a) BIM drawings should be drawn in true size with precision rounded up to the nearest mm unit.

Drawing Object within area diagram

(b) The position of the drawing shall be close to ***project base point, survey point 0,0*** and drawing objects in area diagram shall not be grouped or blocked.

Area boundary (Area Boundaries in ***"Area Plans / Room"*** for Revit, ***"Zone" for Archicad"***

(c) All area boundaries for BIM drawings intended for area calculation shall be closed

Dimension

(d) All dimensions should be true dimensions generated automatically by the software and laid in the specified layers / "***category"*** (in Revit). Text figures or figures manually inserted, amended or constructed for calculation purpose in the BIM file is not acceptable.

Decimal places of areas and volumes

(e) All areas and volumes should be presented in m^2 and m^3 units respectively and rounded up to 3 decimal places.

Suggested Text Font

(f) Text style is not compulsory. Conventional text fonts are suggested. Common type such as "Arial Narrow" font in 2.5mm size is recommended for use in the text.

Review

5. These guidelines will be refined taking into the experience gained. Suggestions to facilitate and/or to improve the electronic vetting procedures are always welcomed.

Common BIM Platform and Viewer

There are many viewers to view the dwf / dwfx file provided by Autodesk:

	dwf	dwfx
Autodesk Design Review	✓	✓
Autodesk DWF Viewer	✓	✕
Autodesk Navisworks Freedom	✓	✓

Sample of CSWP Naming Convention in BIM model (Screen capture from Autodesk Design Review)

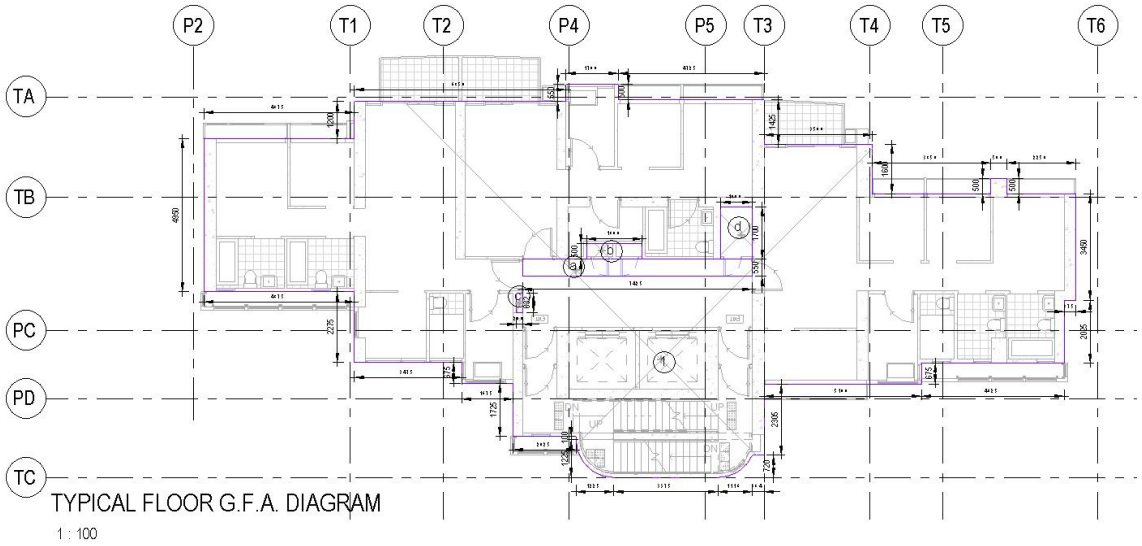
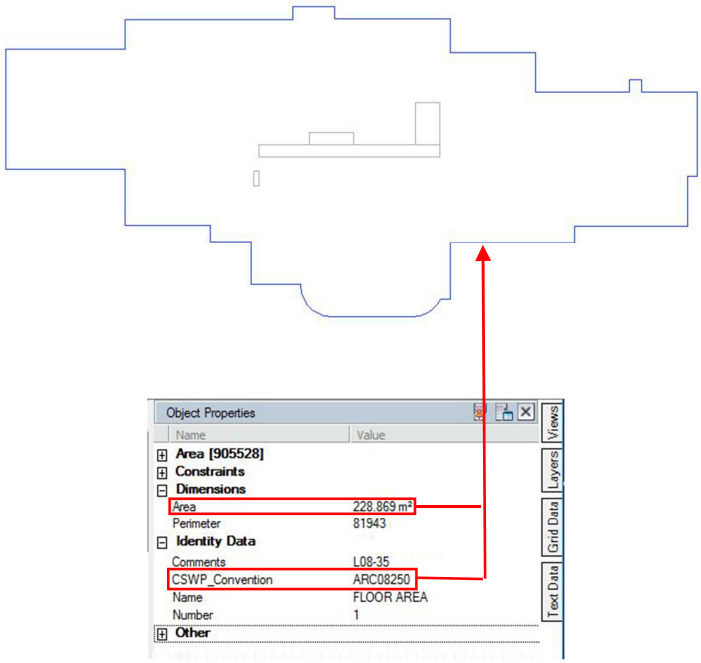


Figure 4-1. Typical Floor G.F.A. Diagram



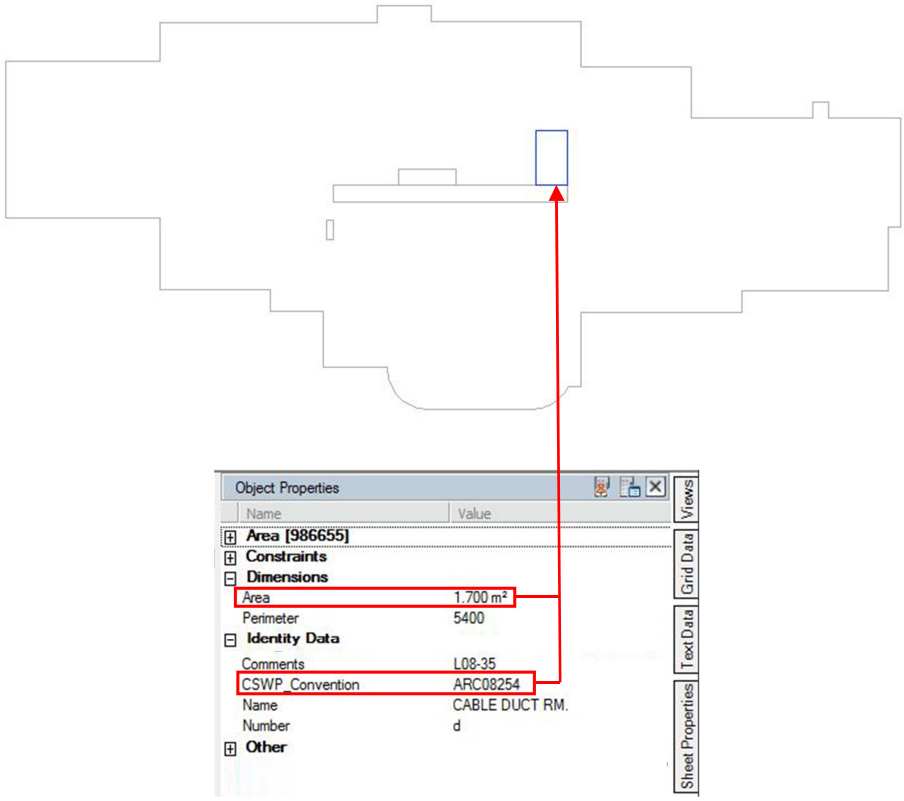


Figure 4-2. Sample of CSWP Naming Convention in DWFX File

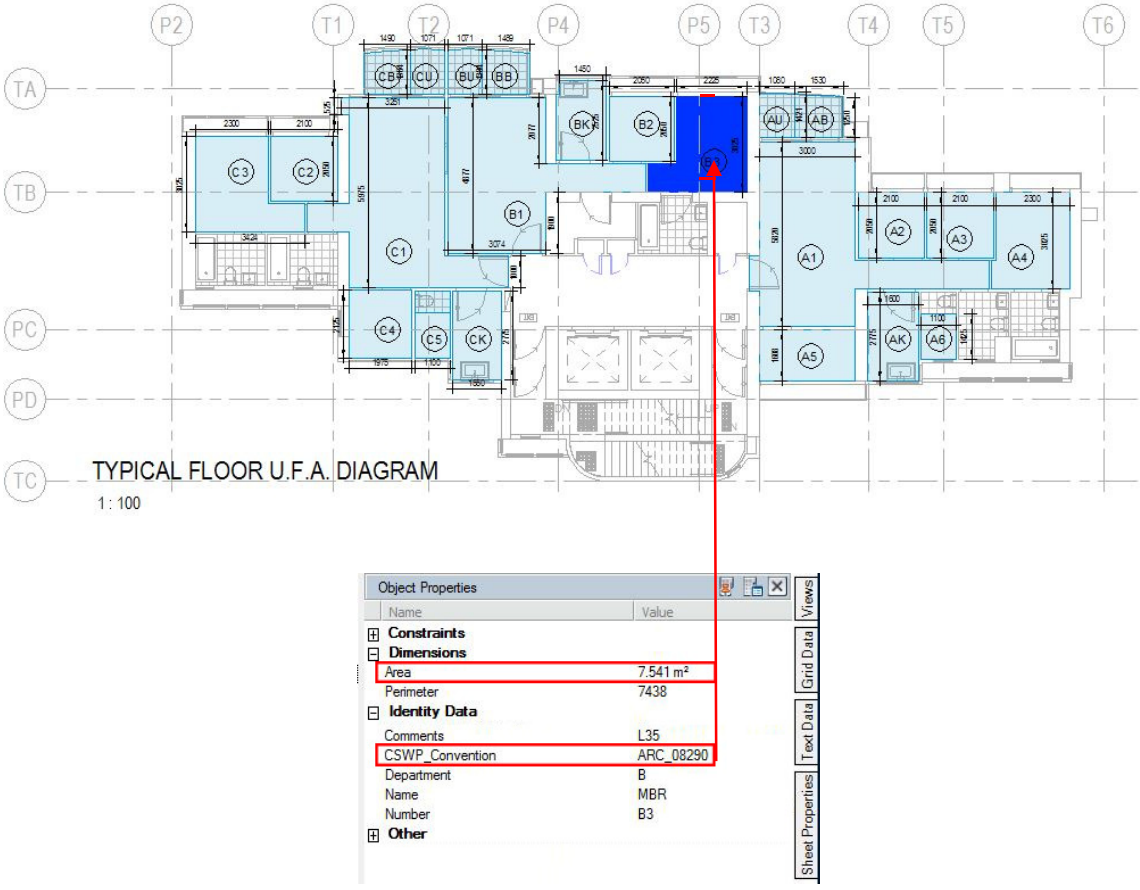
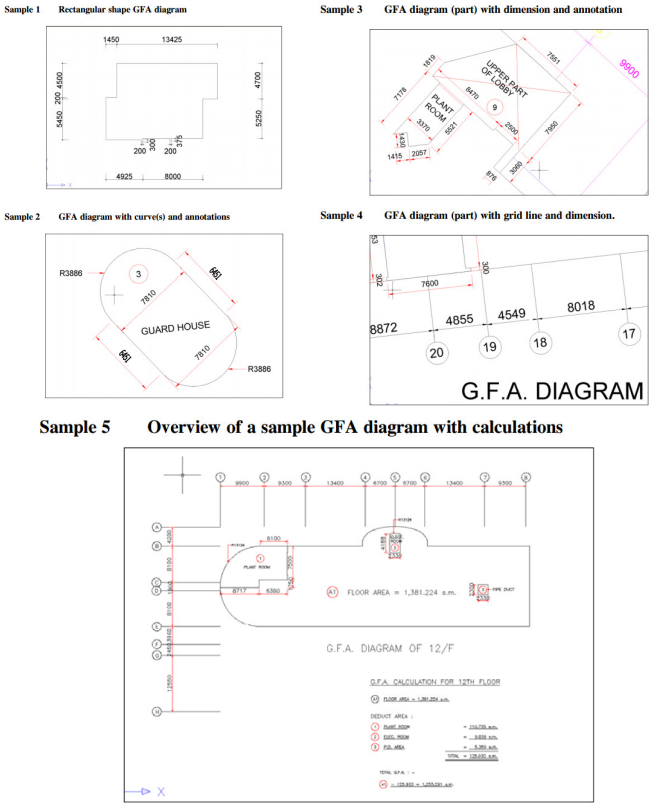
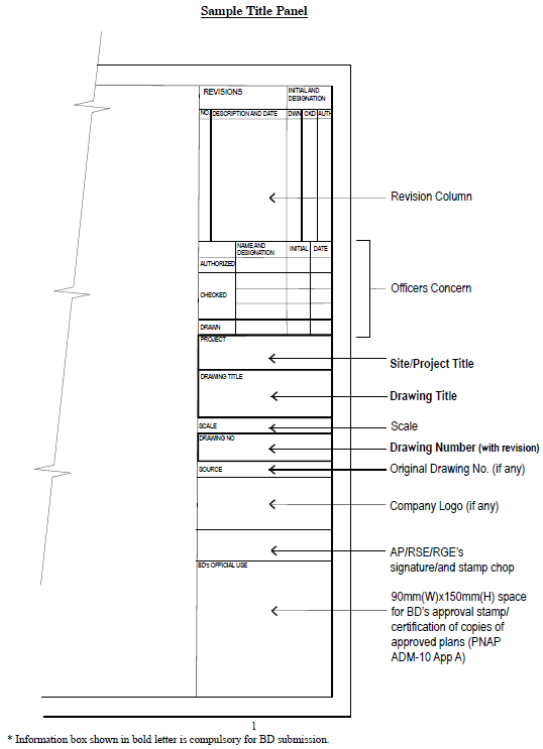


Figure 4-3. Sample of CSWP Naming Convention in DWFX



Annex 1. Example of Dimension Style in PNAP ADM-19 for area diagram



Annex 2. Sample Title Block from PNAP ADM-19. Information can also be extracted from model and presented as title block format

5 Stakeholders Engagement Forum

Meetings with concerned parties were held in the following meetings

1 Stakeholder meeting No.1 (7/12/2016 at Housing Authority conference room)
2 Building Department Workshop No.1 (16/8/2016 at A.C.I.D. office)
3 HKIBIM Board Meeting (6/9/2016 at VTC office)
4 Housing Department ICU Meeting (12/9/2016 at HKHA ICU conference room)
5 Building Department Workshop No.2 (19/9/2016 at B.D. conference room)
6 Stakeholder meeting No.2 (3/10/2016 at Housing Authority conference room)
7 HKIA BIM & IT Committee Meeting (4/10/2016 at HKIA Premises)
8 Lands Department meeting (20/10/2016 at Lands Department conference room)

5.1 Opinions and Feedbacks from stakeholders

The following items have been discussed among different stakeholders:

1 Stakeholders suggested that templates based on the standard proposed in the report should be created and distributed for benefit of local building industry.
2 The contents of this report could not replace professional judgement.
3 Stakeholders were concerned on the software platforms and versions.
4 The formats of GBP presentation are flexible and vary among practices. The report should only describe the logic of deriving relevant information using BIM softwares. For example: BIM is using schedule format to show the calculation other than in formula format.
5 Increase of efficiency of plan preparation by APs and plan checking efficiency by government departments could be important incentive for adopting BIM for submission purpose.
6 The report should be further extended to include other information, such as car park calculations, to be submitted to other relevant departments.
7 BIM models contain a lot more data other than GBP related information, and it was suggested that more studies should be conducted for incorporating them into other government databases.

6 Statutory Submission Drawings

To improve the efficiency of plan processing and enhance the quality of plan submission, the Buildings Department (BD) reviews the plan approval process regularly and has implemented various measures, such as curtailed check system, pre-submission enquiry and conference services, streamlined procedures, fast track processing, etc. The general principles and details of such measures are given in the PNAP ADM-19. The PNAP ADV-33 sets out general guidance to facilitate the Authorized Persons (AP), Registered Structural Engineers (RSE) and Registered Geotechnical Engineers (RGE) in the preparation of plan submissions for various types of building works.

In this section, we are going to demonstrate the comparisons of the graphics and formats between PNAP ADV-33 and BIM drawings.

6.1 Comparisons of B.D. PNAP ADV-33 versus BIM Drawings

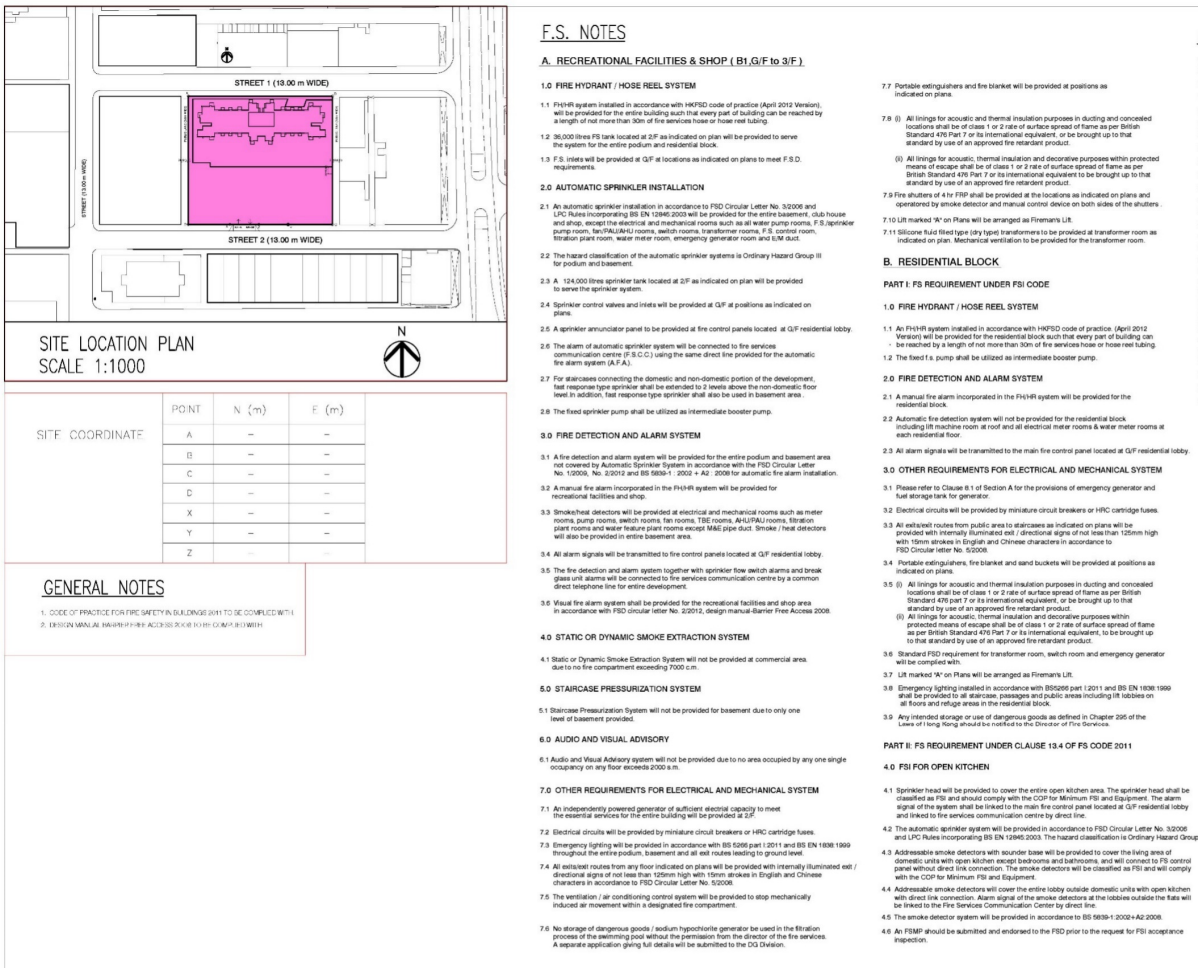
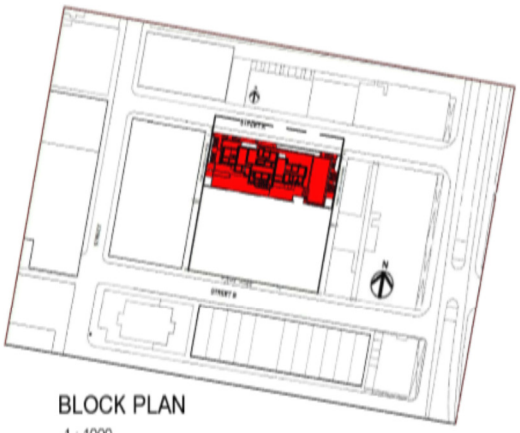


Figure 6-1. Site Location Plan and Notes extracted from PNAP ADV-33



BLOCK PLAN

1 : 1000

SITE AREA CALCULATIONS:

SITE AREA (FROM LEASE)

I.L. 897 S.B ss.1 S.A	=1081.67 s.ft.
I.L. 897 S.B ss.5 S.A	=270.43 s.ft.
I.L. 897 S.B ss.5 R.P	=1353.98 s.ft.
I.L. 897 S.B ss.8	=3291.37 s.ft.
I.L. 897 S.B ss.9	=1636.89 s.ft.
TOTAL	=7604.34 s.ft. (706.460 s.m.)

GENERAL NOTES:

1. ALL DIMENSIONS SHOWN ON DRAWINGS ARE STRUCTURAL MEASUREMENT IN MILLIMETRES AND ALL LEVELS SHOWN IN METERS ABOVE PRINCIPAL DATUM UNLESS OTHERWISE STATED.

2. EVERY REQUIRED STAIRCASE SHALL:
(a) HAVE A CLEAR HEIGHT OF NOT LESS THAN 2000mm,
(b) BE CONSTRUCTED WITH TREADS NOT LESS THAN 280mm IN WIDTH AND RISERS NOT EXCEEDING 150mm IN HEIGHT FOR THE RESTAURANT
(c) BE PROVIDED WITH HANDRAILS ON BOTH SIDES AT A HEIGHT NOT LESS THAN 850mm NOR MORE THAN 950mm AND EXTENDED 300mm TO LANDING IN ACCORDANCE WITH CODE OF
PRACTICE FOR FIRE SAFETY IN BUILDINGS 2011 (FSB 2011) CLAUSE B14.6 & (BFA 2008) CLAUSE 28-30.

3. ALL DOORS REQUIRED TO HAVE AN FRR SHALL COMPLY WITH B(C)R 90 & (FSB 2011) CLAUSE C16.

4. THE LOCKING DEVICE PROVIDED FOR EXIT DOORS, IF NECESSARY, SHALL BE OF THE TYPE, WHICH IS CAPABLE OF BEING OPENED FROM THE INSIDE WITHOUT USING A KEY.

5. PROTECTIVE BARRIERS (SUCH AS PARAPET WALL AND RAILING) SHOULD BE PROVIDED IN ACCORDANCE WITH B(P)R 3A & B(C)R 8.

6. A VERTICAL BARRIER PROVIDED TO SURROUND THE INTERNAL UNPROTECTED OPENING IN FLOORS WITHIN A COMPARTMENT FOR AGAINST SPREAD OF FIRE, SUCH AS THOSE FOR
ESCALATORS, CIRCULATION STAIRCASES OR WALKWAYS IN AN ATRIUM, SHALL HAVE AN FRR OF NOT LESS THAN 60 MIN. AND EXTEND NOT LESS THAN 450mm FROM THE UNDERSIDE OF
THE FLOOR OR BELOW THE FALSE CEILING IF THE FALSE CEILINGS ARE HUNG IN THE VICINITY OF THE OPENING (FSB 2011) CLAUSE C10.1

7. THE GLAZING MATERIALS IN SKYLIGHT SHALL MEET THE FOLLOWING CRITERIA :-
(a) IT SHOULD NOT BE OF THE TYPE WHICH WILL MELT AND FORM BURNING DROPLETS UNDER FIRE SITUATIONS; AND
(b) WHEN IT IS SHATTERED, IT DOES NOT FORM SHARPENING AND HARMFUL PIECES.

8. EVERY PART OF AN EXIT ROUTE SHOULD BE PROVIDED WITH ARTIFICIAL LIGHTING PROVIDING A HORIZONTAL ILLUMINANCE AT FLOOR LEVEL OF NOT LESS THAN 30 LUX
(AND COMPLY WITH CoP FOR MIN. F.S. INSTALLATION AND EQUIPMENT.)

9. EVERY OPENING FORMED FOR DUCTS OR PIPES PASSING THROUGH FIRE BARRIERS WOULD COMPLY WITH (FSB 2011) CLAUSE C8.

10. ELEMENTS OF CONSTRUCTION OTHER THAN REINFORCED CONCRETE FOR SEPARATING COMPARTMENTS TO BE PROVIDED WITH STABILITY, INTEGRITY AND INSULATION AS STATED
IN (FSB 2011) TABLE C2.

11. ONE LEAF OF A PAIR OF DOUBLE DOORS SHALL HAVE A CLEAR WIDTH OF NOT LESS THAN 800mm BETWEEN THE OPEN DOOR AND THE OTHER LEAF.

12. CAT LADDER AT PUBLIC ACCESSIBLE AREA WOULD BE PROVIDED WITH LOCKABLE PLATE.

13. DOORS OF ALL PROTECTED LOBBY SHOULD BE PROVIDED WITH SMOKE SEALS (FSB 2011) CLAUSE C16.5.

14. ALL LIFT WELLS & DUMB WAITER SHAFT SHOULD BE SEPARATED FROM THE REST OF THE BUILDING BY FIRE BARRIERS HAVING AN FRR OF NOT LESS THAN 120/120/120, AND ALL DOORS
PROVIDED AT A LIFT LANDING SHOULD HAVE AN FRR OF NOT LESS THAN -/120/- IN ACCORDANCE WITH (FSB 2011) CLAUSE C9.1.

15. WHERE THE HEADROOM IS 2000mm OR LESS FROM THE FINISHED FLOOR LEVEL, A WARNING GUARDRAIL OR OTHER BARRIER SHALL BE PROVIDED FOR DETECTION. HAVING ITS
LEADING EDGE AT OR BELOW 680mm ABOVE THE FINISHED FLOOR LEVEL (BFA 2008 CLAUSE 36).

16. ALL EXISTING DISABLED RAMP SHOULD COMPLY WITH BFA 2008.

F.S. NOTES :

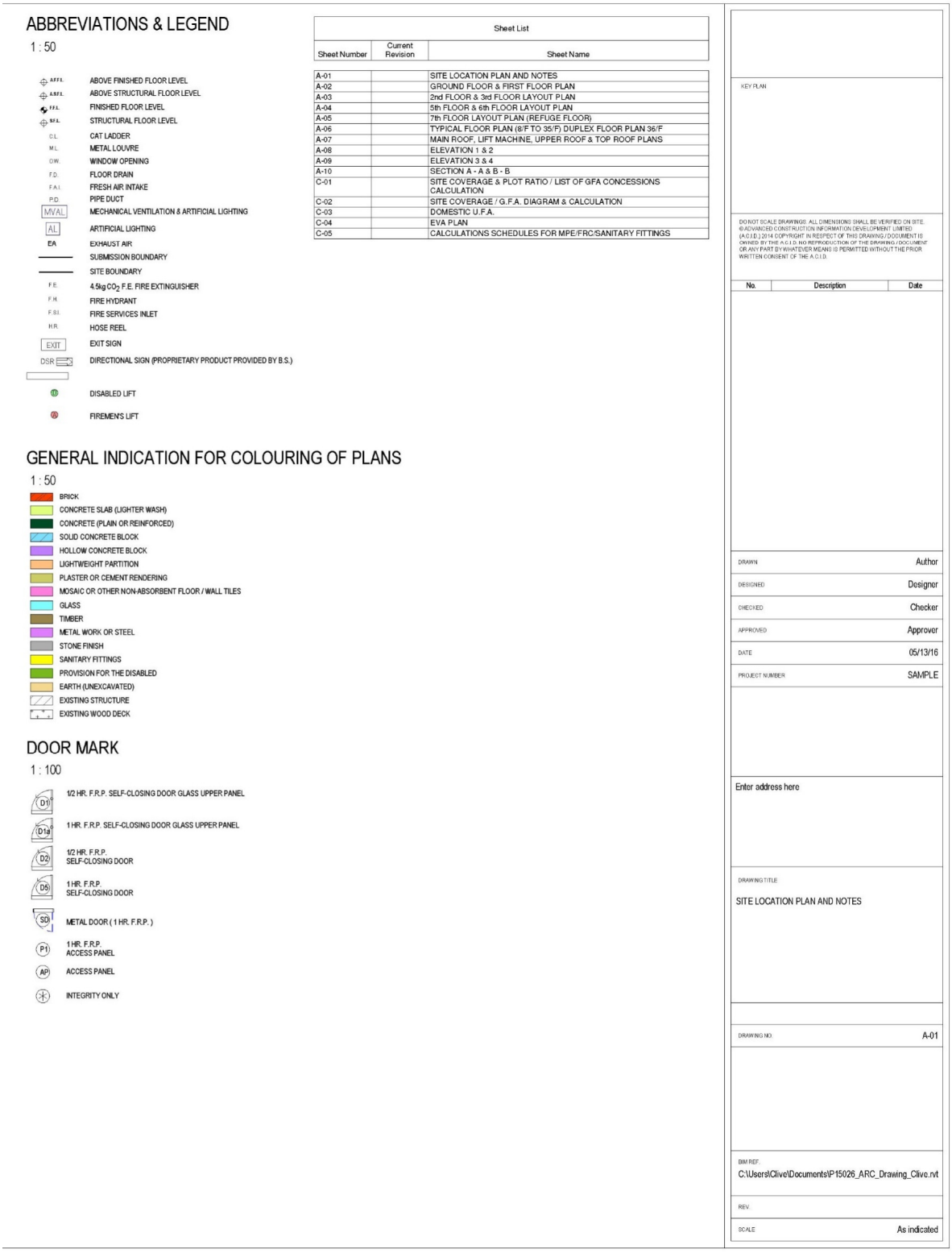
1.0 FIRE HYDRANT / HOSE REEL SYSTEM
1.1 FHHR system installed in accordance with HKFSD code of practice (April 2012 Version), will be provided for the entire building such that every part of building can be reached by a length of not more than 30m of fire services hose or hose reel tubing.
1.2 36,000 litres F.S tank located at 2/F as indicated on plan will be provided to serve
1.3 F.S. inlets will be provided at G/F at locations as indicated on plans to meet F.S.D. requirements.
2.0 AUTOMATIC SPRINKLER INSTALLATION
2.2 The hazard classification of the automatic sprinkler systems is Ordinary Hazard Group III
2.3 A 124,000 litres sprinkler tank located at 2/F as indicated on plan will be provided to serve the sprinkler system.
2.4 Sprinkler control valves and inlets will be provided at G/F at positions as indicated on plans.
2.5 A sprinkler annunciator panel to be provided at fire control panels located at G/F residential lobby.
2.6 The alarm of automatic sprinkler system will be connected to fire services communication centre (F.S.C.C.) using the same direct line provided for the automatic fire alarm system (A.F.A.).
2.7 For staircases connecting the domestic and non-domestic portion of the development, fast response type sprinkler shall be extended to 2 levels above the non-domestic floor level. In addition, fast response type sprinkler shall also be used in basement area .

3.0 FIRE DETECTION AND ALARM SYSTEM
3.1 A fire detection and alarm system will be provided for the entire podium and basement area not covered by Automatic Sprinkler System in accordance with the FSD Circular Letter No. 1/2009, No. 2/2012 and BS 5839-1 : 2002 + A2 : 2008 for automatic fire alarm installation.
3.2 A manual fire alarm incorporated in the FHHR system will be provided for recreational facilities and shop.
3.3 Smoke/heat detectors will be provided at electrical and mechanical rooms such as meter rooms, pump rooms, switch rooms, fan rooms, TBE rooms, AHU/FAU rooms, filtration plant rooms and water feature plant rooms except M&E pipe duct. Smoke / heat detectors
3.4 All alarm signals will be transmitted to fire control panels located at G/F residential lobby.
3.5 The fire detection and alarm system together with sprinkler flow switch alarms and break glass unit alarms will be connected to fire services communication centre by a common direct telephone line for entire development.
4.0 STATIC OR DYNAMIC SMOKE EXTRACTION SYSTEM
4.1 Static or Dynamic Smoke Extraction System will not be provided at commercial area.
5.0 STAIRCASE PRESSURIZATION SYSTEM
level of basement provided.
6.0 AUDIO AND VISUAL ADVISORY
6.1 Audio and Visual Advisory system will not be provided due to no area occupied by any one single
7.0 OTHER REQUIREMENTS FOR ELECTRICAL AND MECHANICAL SYSTEM
7.2 Electrical circuits will be provided by miniature circuit breakers or HRC cartridge fuses.
7.3 Emergency lighting will be provided in accordance with BS 5266 part 1:2011 and BS EN 1838:1999 throughout the entire podium, basement and all exit routes leading to ground level.
7.4 All exits/exit routes from any floor indicated on plans will be provided with internally illuminated exit / directional signs of not less than 125mm high with 15mm strokes in English and Chinese characters in accordance to FSD Circular Letter No. 5/2008.
7.5 The ventilation / air conditioning control system will be provided to stop mechanically induced air movement within a designated fire compartment.
7.8 (i) All linings for acoustic and thermal insulation purposes in ducting and concealed locations shall be of class 1 or 2 rate of surface spread of flame as per British Standard 476 Part 7 or its international equivalent, or be brought up to that standard by use of an approved fire retardant product.
(ii) All linings for acoustic, thermal insulation and decorative purposes within protected means of escape shall be of class 1 or 2 rate of surface spread of flame as per British Standard 476 Part 7 or its international equivalent to be brought up to that standard by use of an approved fire retardent product.
7.10 Lift marked "A" on Plans will be arranged as Fireman's Lift.
B. RESIDENTIAL BLOCK
1.0 FIRE HYDRANT / HOSE REEL SYSTEM
1.1 An FHHR system installed in accordance with HKFSD code of practice. (April 2012 Version) will be provided for the residential block such that every part of building can be reached by a length of not more than 30m of fire services hose or hose reel tubing.
3.0 OTHER REQUIREMENTS FOR ELECTRICAL AND MECHANICAL SYSTEM
3.1 Please refer to Clause B.1 of Section A for the provisions of emergency generator and fuel storage tank for generator.
3.2 Electrical circuits will be provided by miniature circuit breakers or HRC cartridge fuses.
3.3 All exits/exit routes from public area to staircases as indicated on plans will be with 15mm strokes in English and Chinese characters in accordance to FSD Circular letter No. 5/2008.
3.4 Portable extinguishers, fire blanket and sand buckets will be provided at positions as indicated on plans.
3.5 (i) All linings for acoustic and thermal insulation purposes in ducting and concealed locations shall be of class 1 or 2 rate of surface spread of flame as per British Standard 476 part 7 or its international equivalent, or be brought up to that standard by use of an approved fire retardant product.
(ii) All linings for acoustic, thermal insulation and decorative purposes within protected means of escape shall be of class 1 or 2 rate of surface spread of flame as per British Standard 476 Part 7 or its international equivalent, to be brought up to that standard by use of an approved fire retardant product.
3.6 Standard FSD requirement for transformer room, switch room and emergency generator will be complied with.
3.7 Lift marked "A" on Plans will be arranged as Fireman's Lift.
3.8 Emergency lighting installed in accordance with BS5266 part 1:2011 and BS EN 1838:1999 shall be provided to all staircase, passages and public areas including lift lobbies on all floors and refuge areas in the residential block.
the system for the entire podium and residential block.
7.1 Silicone fluid filled type (dry type) transformers to be provided at transformer room as indicated on plan. Mechanical ventilation to be provided for the transformer room.
7.6 No storage of dangerous goods / sodium hypochlorite generator be used in the filtration process of the swimming pool without the permission from the director of the fire services. A separate application giving full details will be submitted to the DG Division.
2.0 FIRE DETECTION AND ALARM SYSTEM
2.1 A manual fire alarm incorporated in the FHHR system will be provided for the residential block.
2.2 Automatic fire detection system will not be provided for the residential block including lift machine room at roof and all electrical meter rooms & water meter rooms at each residential floor.
2.3 All alarm signals will be transmitted to the main fire control panel located at G/F residential lobby.
7.7 Portable extinguishers and fire blanket will be provided at positions as indicated on plans.
2.1 An automatic sprinkler installation in accordance to FSD Circular Letter No. 3/2006 and LPC Rules incorporating BS EN 12845:2003 will be provided for the entire basement, club house and shop, except the electrical and mechanical rooms such as all water pump rooms, F.S./sprinkler pump room, fan/PAU/AHU rooms, switch rooms, transformer rooms, F.S. control room, filtration plant room, water meter room, emergency generator room and E/M duct.
3.6 Visual fire alarm system shall be provided for the recreational facilities and shop area in accordance with FSD circular letter No. 2/2012, design manual-Barrier Free Access 2008.
7.1 An independently powered generator of sufficient electrical capacity to meet the essential services for the entire building will be provided at 2/F.
3.9 Any intended storage or use of dangerous goods as defined in Chapter 295 of the Laws of Hong Kong should be notified to the Director of Fire Services.
will also be provided in entire basement area.
due to no fire compartment exceeding 7000 c.m.
5.1 Staircase Pressurization System will not be provided for basement due to only one occupancy on any floor exceeds 2000 s.m.
provided with internally illuminated exit / directional signs of not less than 125mm high for podium and basement.
7.9 Fire shutters of 4 hr FRP shall be provided at the locations as indicated on plans and operatored by smoke detector and manual control device on both sides of the shutters .
PART I: FS REQUIREMENT UNDER FSI CODE
PART II: FS REQUIREMENT UNDER CLAUSE 13.4 OF FS CODE 2011
4.0 FSI FOR OPEN KITCHEN
4.1 Sprinkler head will be provided to cover the entire open kitchen area. The sprinkler head shall be classified as FSI and should comply with the COP for Minimum FSI and Equipment. The alarm signal of the system shall be linked to the main fire control panel located at G/F residential lobby and linked to fire services communication centre by direct line.
4.2 The automatic sprinkler system will be provided in accordance to FSD Circular Letter No. 3/2006 and LPC Rules incorporating BS EN 12845:2003. The hazard classification is Ordinary Hazard Group I.
4.3 Addressable smoke detectors with sounder base will be provided to cover the living area of domestic units with open kitchen except bedrooms and bathrooms, and will connect to FS control panel without direct link connection. The smoke detectors will be classified as FSI and will comply with the COP for Minimum FSI and Equipment.
4.5 The smoke detector system will be provided in accordance to BS 5839-1:2002+A2:2008.
4.4 Addressable smoke detectors will cover the entire lobby outside domestic units with open kitchen with direct link connection. Alarm signal of the smoke detectors at the lobbies outside the flats will be linked to the Fire Services Communication Center by direct line.
2.8 The fixed sprinkler pump shall be utilized as intermediate booster pump.
1.2 The fixed f.s. pump shall be utilized as intermediate booster pump.
4.6 An FSMP should be submitted and endorsed to the FSD prior to the request for FSI acceptance inspection

Figure 6-2. Site Location Plan and Notes produced by BIM approach

Appendix A4 (PNAP ADV-33)

Figure 6-3. Legends, Drawing List and Notes extracted from PNAP ADV-33



ABBREVIATIONS & LEGEND

1 : 50

A.F.F.L. ABOVE FINISHED FLOOR LEVEL
A.S.F.L. ABOVE STRUCTURAL FLOOR LEVEL
F.F.L. FINISHED FLOOR LEVEL
S.F.L. STRUCTURAL FLOOR LEVEL
C.L. CAT LADDER
M.L. METAL LOUVRE
O.W. WINDOW OPENING
F.D. FLOOR DRAIN
F.A.I. FRESH AIR INTAKE
P.D. PIPE DUCT
MVAL MECHANICAL VENTILATION & ARTIFICIAL LIGHTING
AL ARTIFICIAL LIGHTING
EA EXHAUST AIR
SUBMISSION BOUNDARY
SITE BOUNDARY
F.E. 4.5kg CO_2 F.E. FIRE EXTINGUISHER
F.H. FIRE HYDRANT
F.S.I. FIRE SERVICES INLET
H.R. HOSE REEL
EXIT EXIT SIGN
DSR DIRECTIONAL SIGN (PROPRIETARY PRODUCT PROVIDED BY B.S.)
DISABLED LIFT
FIREMEN'S LIFT

Sheet List

Sheet Number	Current Revision	Sheet Name
A-01		SITE LOCATION PLAN AND NOTES
A-02		GROUND FLOOR & FIRST FLOOR PLAN
A-03		2nd FLOOR & 3rd FLOOR LAYOUT PLAN
A-04		5th FLOOR & 6th FLOOR LAYOUT PLAN
A-05		7th FLOOR LAYOUT PLAN (REFUGE FLOOR)
A-06		TYPICAL FLOOR PLAN (6/F TO 35/F) DUPLEX FLOOR PLAN 36/F
A-07		MAIN ROOF, LIFT MACHINE, UPPER ROOF & TOP ROOF PLANS
A-08		ELEVATION 1 & 2
A-09		ELEVATION 3 & 4
A-10		SECTION A - A & B - B
C-01		SITE COVERAGE & PLOT RATIO / LIST OF GFA CONCESSIONS CALCULATION
C-02		SITE COVERAGE / G.F.A. DIAGRAM & CALCULATION
C-03		DOMESTIC U.F.A.
C-04		EVA PLAN
C-05		CALCULATIONS SCHEDULES FOR MPE/FRC/SANITARY FITTINGS

GENERAL INDICATION FOR COLOURING OF PLANS

1 : 50

BRICK
CONCRETE SLAB (LIGHTER WASH)
CONCRETE (PLAIN OR REINFORCED)
SOLID CONCRETE BLOCK
HOLLOW CONCRETE BLOCK
LIGHTWEIGHT PARTITION
PLASTER OR CEMENT RENDERING
MOSAIC OR OTHER NON-ABSORBENT FLOOR / WALL TILES
GLASS
TIMBER
METAL WORK OR STEEL
STONE FINISH
SANITARY FITTINGS
PROVISION FOR THE DISABLED
EARTH (UNEXCAVATED)
EXISTING STRUCTURE
EXISTING WOOD DECK

DOOR MARK

1 : 100

D1 1/2 HR. F.R.P. SELF-CLOSING DOOR GLASS UPPER PANEL
D1a 1 HR. F.R.P. SELF-CLOSING DOOR GLASS UPPER PANEL
D2 1/2 HR. F.R.P. SELF-CLOSING DOOR
D5 1 HR. F.R.P. SELF-CLOSING DOOR
SD METAL DOOR (1 HR. F.R.P.)
P1 1 HR. F.R.P. ACCESS PANEL
AP ACCESS PANEL
INTEGRITY ONLY

KEY PLAN

DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.
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No.	Description	Date

DRAWN	Author
DESIGNED	Designer
CHECKED	Checker
APPROVED	Approver
DATE	05/13/16
PROJECT NUMBER	SAMPLE

Enter address here

DRAWING TITLE
SITE LOCATION PLAN AND NOTES

DRAWING NO. A-01

BIM REF.
C:\Users\Clive\Documents\P15026_ARC_Drawing_Clive.rvt

REV.

SCALE As indicated

Figure 6-4. Legends, Drawing List and Notes produced by BIM approach

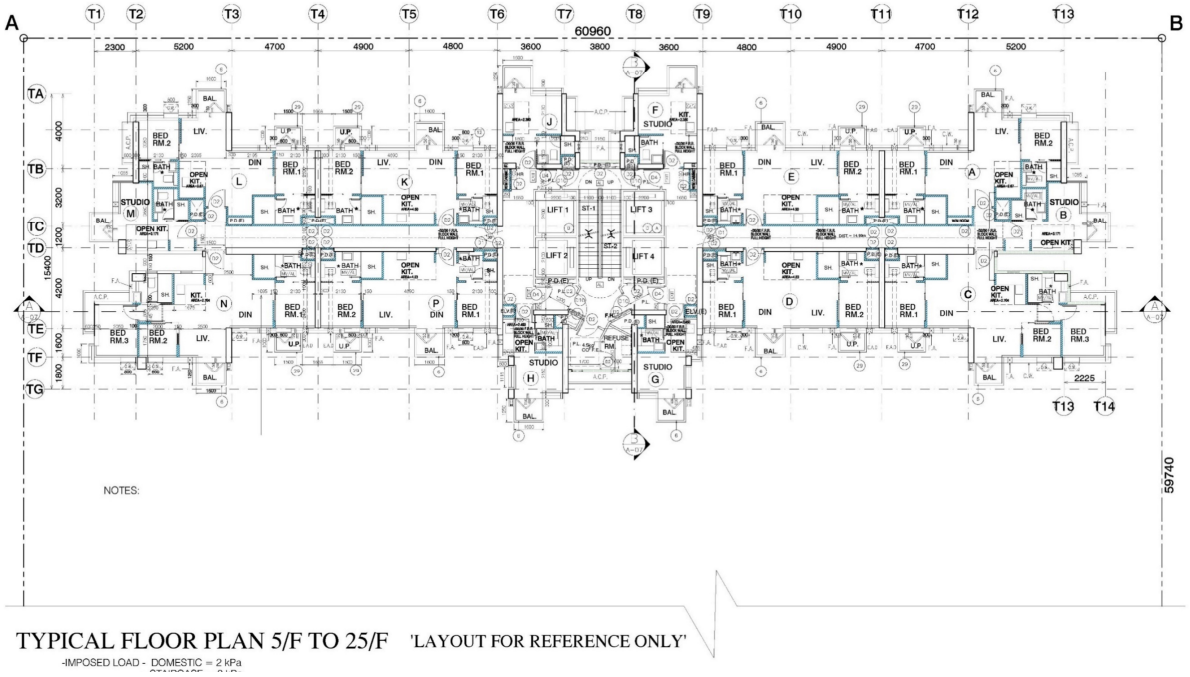


Figure 6-5. Typical Plan extracted from PNAP ADV-33

Figure 6-6. Typical Plan produced by BIM approach

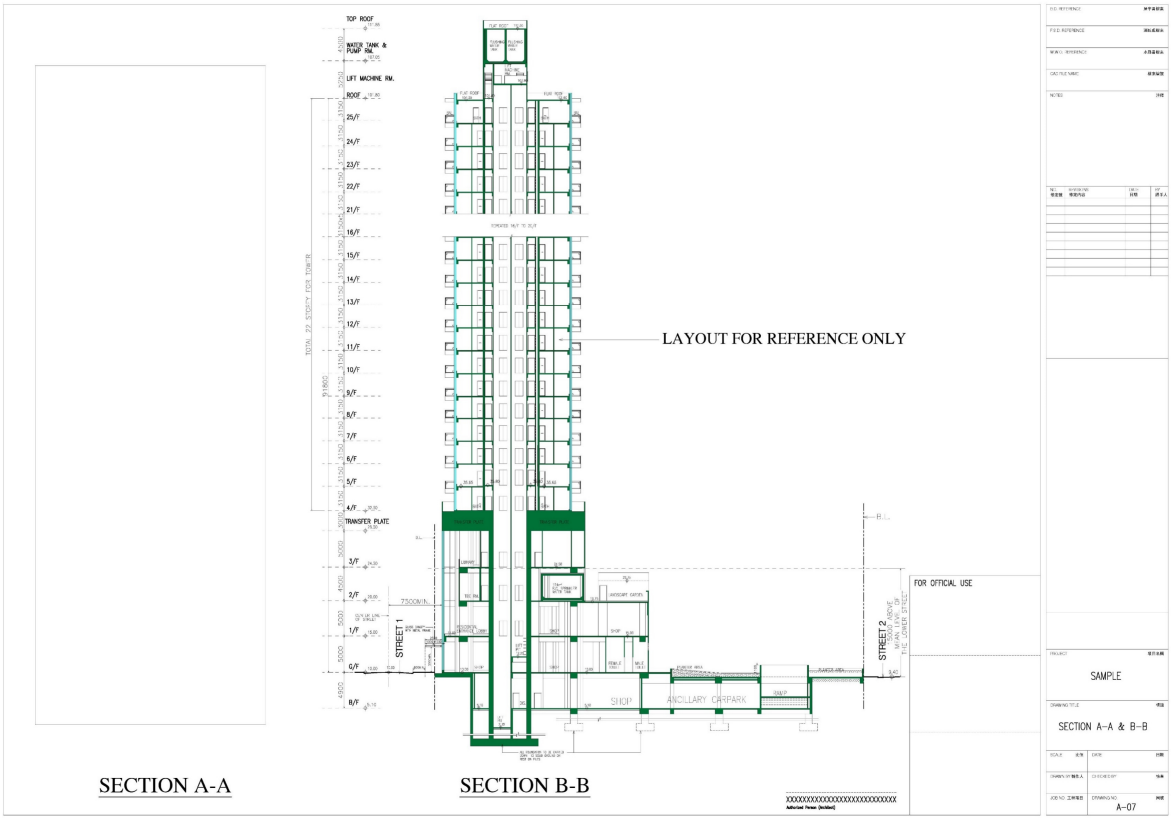


Figure 6-7. Section extracted from PNAP ADV-33

Figure 6-8. Sections produced by BIM approach

Figure 6-9. Elevation extracted from PNAP ADV-33

Figure 6-10. Elevations produced by BIM approach

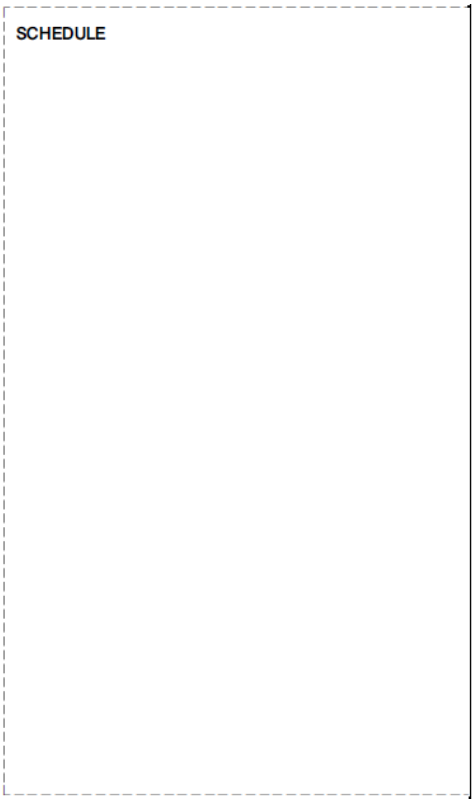
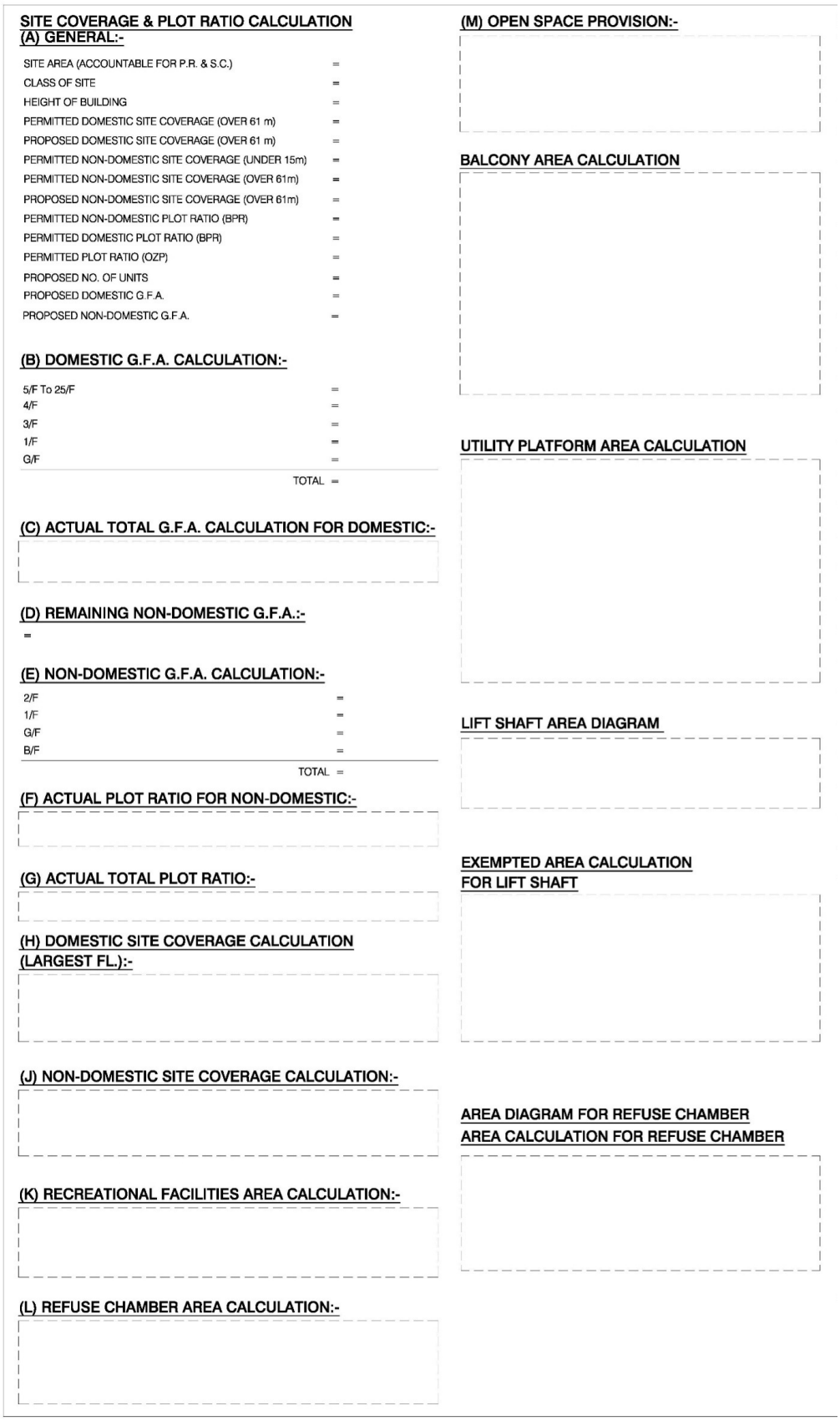


Figure 6-11. List of GFA Concession extracted from PNAP ADV-33

AREA OF GFA CONCESSIONS	
Name	AREA (SQ.M)
TBE ROOM	23.455 m²
POTABLE & FLUSHING WATER TANK TRANSFER PUMP ROOM	37.307 m²
ELECTRICAL ROOM	9.720 m²
MAIN SWITCH ROOM	20.494 m²
TRANSFORMER ROOM	25.753 m²
TRANSFORMER ROOM	22.446 m²
SPRINKLER PUMP RM.	27.943 m²
ELECTRICAL ROOM	3.950 m²
FILTRATION PLANT ROOM	49.183 m²
CLEANSING WATER PUMP RM	19.653 m²
WATER METER RM.	3.500 m²
ELECT. RM.	2.849 m²
ELEC. RM.	1.457 m²
EMERGENCY GENERATOR ROOM	25.980 m²
NON-ESSENTIAL GENEARATOR RM.	16.745 m²
LOADING/ UNLOADING	24.500 m²
METER ROOM	2.821 m²
REFUSE STORAGE MATERIAL RECOVERY CHAMBER	13.517 m²
METER ROOM	2.010 m²
TOTAL	333.284 m²

Figure 6-12. List of GFA Concession produced by BIM approach



SITE COVERAGE & PLOT RATIO CALCULATION

(A) GENERAL:-

SITE AREA (ACCOUNTABLE FOR P.R. & S.C.)	=
CLASS OF SITE	=
HEIGHT OF BUILDING	=
PERMITTED DOMESTIC SITE COVERAGE (OVER 61 m)	=
PROPOSED DOMESTIC SITE COVERAGE (OVER 61 m)	=
PERMITTED NON-DOMESTIC SITE COVERAGE (UNDER 15m)	=
PERMITTED NON-DOMESTIC SITE COVERAGE (OVER 61m)	=
PROPOSED NON-DOMESTIC SITE COVERAGE (OVER 61m)	=
PERMITTED NON-DOMESTIC PLOT RATIO (BPR)	=
PERMITTED DOMESTIC PLOT RATIO (BPR)	=
PERMITTED PLOT RATIO (OZP)	=
PROPOSED NO. OF UNITS	=
PROPOSED DOMESTIC G.F.A.	=
PROPOSED NON-DOMESTIC G.F.A.	=

(B) DOMESTIC G.F.A. CALCULATION:-

5/F To 25/F	=
4/F	=
3/F	=
1/F	=
G/F	=
TOTAL	=

(C) ACTUAL TOTAL G.F.A. CALCULATION FOR DOMESTIC:-

(D) REMAINING NON-DOMESTIC G.F.A.:-

=

(E) NON-DOMESTIC G.F.A. CALCULATION:-

2/F	=
1/F	=
G/F	=
B/F	=
TOTAL	=

(F) ACTUAL PLOT RATIO FOR NON-DOMESTIC:-

(G) ACTUAL TOTAL PLOT RATIO:-

(H) DOMESTIC SITE COVERAGE CALCULATION (LARGEST FL.):-

(J) NON-DOMESTIC SITE COVERAGE CALCULATION:-

(K) RECREATIONAL FACILITIES AREA CALCULATION:-

(L) REFUSE CHAMBER AREA CALCULATION:-

(M) OPEN SPACE PROVISION:-

BALCONY AREA CALCULATION

UTILITY PLATFORM AREA CALCULATION

LIFT SHAFT AREA DIAGRAM

EXEMPTED AREA CALCULATION FOR LIFT SHAFT

AREA DIAGRAM FOR REFUSE CHAMBER

AREA CALCULATION FOR REFUSE CHAMBER

Figure 6-13. Calculations extracted from PNAP ADV-33

SITE COVERAGE & PLOT RATIO CALCULATION

(A) GENERAL:

CLASS OF SITE:	A
SITE AREA (SQ.M):	706.46
BUILDING HEIGHT (M):	114.5 >61m
PERMITTED NON-DOMESTIC SC (%):	60
PERMITTED DOMESTIC SC (%):	33.33
PERMITTED NON-DOMESTIC PR:	15
PERMITTED DOMESTIC PR:	8

(D) REMAINING NON-DOMESTIC G.F.A.:
(E) NON-DOMESTIC G.F.A. CALCULATION:
(F) ACTUAL PLOT RATIO FOR NON-DOMESTIC::

ACTUAL NON-DOMESTIC GFA (SQ.M):	128.613
ACTUAL NON-DOMESTIC PR:	128.613/706.46
	0.182

(G) ACTUAL TOTAL PLOT RATIO::

REMAINING DOMESTIC PR:	(15-0.182)x8/15
	7.903
ACTUAL DOMESTIC GFA (SQ.M):	5378.653
ACTUAL DOMESTIC PR:	5378.653/706.46
	7.614<7.903

(H) DOMESTIC SITE COVERAGE CALUILATION:

ACTUAL DOMESTIC	234.319
SITE COVERAGE OVER 15M (SQ.M):	
ACTUAL DOMESTIC	234.319/706.46x100
SITE COVERAGE IN %	33.168<33.33

(J) NON-DOMESTIC SITE COVERAGE CALCULATION:

ACTUAL NON-DOMESTIC	366.822
SITE COVERAGE OVER 15M (SQ.M):	
ACTUAL NON-DOMESTIC	366.822/706.46x100
SITE COVERAGE IN %	51.924<60

(C) ACTUAL TOTAL G.F.A. CALCULATION FOR DOMESTIC:

DOMESTIC ACCOMMODATION	
OVERALL DOMESTIC GFA (SQ.M):	5451.568
OVERALL NON-DOMESTIC GFA (SQ.M):	128.613
OVERALL TOTAL GFA (SQ.M):	5451.568+128.613
	5580.181
DOMESTIC LIFT SHAFT AREA (SQ.M):	212.420
MAXIMUM EXEMPTED GFA (SQ.M):	5580.181x3.5%
	195.306
ACTUAL EXEMPTED GFA (SQ.M):	212.420-5580.181x2.5%
	72.915 (MAX.195.306)
ACTUAL DOMESTIC GFA (SQ.M):	5451.568-72.915
	5378.653

(B) DOMESTIC G.F.A. CALCULATION

TOTAL DOMESTIC GFA				
ID	NAME	AREA (SQ.M)	STOREY	TOTAL AREA (SQ.M)
1	FLOOR AREA	228.869	24	5492.856
3	MAIN ENTRANCE	76.051	1	76.051
5	FLOOR AREA	209.809	1	209.809
				5778.716

UNDER OUTLINE ZONING PLAN

ZONE	=R(A)
PROPOSED USE	=RESIDENTIAL & SHOP ON G/F (ALWAYS PERMITTED)
PERMISSIBLE BUILDING HEIGHT	=140mPD
PROPOSED BUILDING HEIGHT	=135.240mPD < 140mPD

(K) RECREATIONAL FACILITIES AREA CALCULATION

5/F RECREATIONAL FACILITIES DIAGRAM		
ID	NAME	AREA (SQ.M)
1	RECREATIONAL FACILITIES FLOOR AREA	278.88

(N) BALCONY AREA CALCULATION

48.822 x 4%=1.952 s.m. or 2.0 s.m.
WHICHEVER IS THE GREATER

GREEN BALCONY AREA CALCULATION (UNIT A)			
Number	Name	Area	
AB	BAL.	1.996 m²	<2.000 s.m.

33.052 x 4%=1.322 s.m. or 2.0 s.m.
WHICHEVER IS THE GREATER

GREEN BALCONY AREA CALCULATION (UNIT B)			
Number	Name	Area	
BB	BAL.	1.997 m²	<2.000 s.m.

43.023 x 4%=1.721 s.m. or 2.0 s.m.
WHICHEVER IS THE GREATER

GREEN BALCONY AREA CALCULATION (UNIT C)			
Number	Name	Area	
CB	BAL.	1.998 m²	<2.000 s.m.

SCHEDULE OF UFA & UFS UNIT A (FOR 36F) EXEPTED AREA (BALCONY)		
Number	Name	Area
AB	BAL.	2.464 m²

SCHEDULE OF UFA & UFS UNIT B (FOR 36F) EXEPTED AREA (BALCONY)		
Number	Name	Area
BB	BAL.	2.987 m²

(O) OUTILITY PLATFORM AREA CALCULATION

TOTAL UTILITY PLATFORM & GREEN BALCONY AREA (UNIT A)		
Number	Name	Area
AB	BAL.	1.996 m²
AU	UTIL.	1.499 m²
TOTAL		3.494 m²

TOTAL UTILITY PLATFORM & GREEN BALCONY AREA (UNIT B)		
Number	Name	Area
BB	BAL.	1.997 m²
BU	UTIL.	1.500 m²
TOTAL		3.497 m²

TOTAL UTILITY PLATFORM & GREEN BALCONY AREA (UNIT C)		
Number	Name	Area
CU	UTIL.	1.500 m²
CB	BAL.	1.998 m²
TOTAL		3.498 m²

SCHEDULE OF UFA & UFS UNIT A (FOR 36F) EXEPTED AREA (UTILITY PLATFORM)		
Number	Name	Area
AU	UTIL.	1.084 m²

SCHEDULE OF UFA & UFS UNIT B (FOR 36F) EXEPTED AREA (UTILITY PLATFORM)		
Number	Name	Area
BU	UTIL.	1.500 m²

EXEMPTED U.P. AREA CALCULATION UNDER JPN2 (UNIT A)			
Number	Name	Area	
AU	UTIL.	1.499 m²	<1.500 s.m.

EXEMPTED U.P. AREA CALCULATION UNDER JPN2 (UNIT B)			
Number	Name	Area	
BU	UTIL.	1.500 m²	<1.500 s.m.

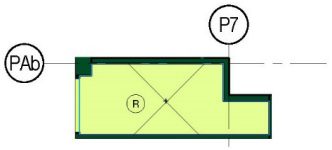
EXEMPTED U.P. AREA CALCULATION UNDER JPN2 (UNIT C)			
Number	Name	Area	
CU	UTIL.	1.500 m²	<1.500 s.m.

(Q) EXEMPTED AREA CALCULATION FOR LIFT SHAFT

LIFT SHAFT SCHEDULE		
AREA (SQ.M)	STOREYS	TOTAL AREA (SQ.M)
4.085	26	106.21
4.085	26	106.21
		212.42

(R) AREA DIAGRAM FOR REFUSE CHAMBER
AREA CALCULATION FOR REFUSE CHAMBER

REFUSE STORAGE & MATERIAL RECVERY CHAMBER AREA CALCULATION		
Number	Name	Area
R	REFUSE STORAGE MATERIAL RECOVERY CHAMBER	13.517 m²



REFUSE AREA DIAGRAM
1 : 100

Figure 6-14. Calculations produced by BIM approach

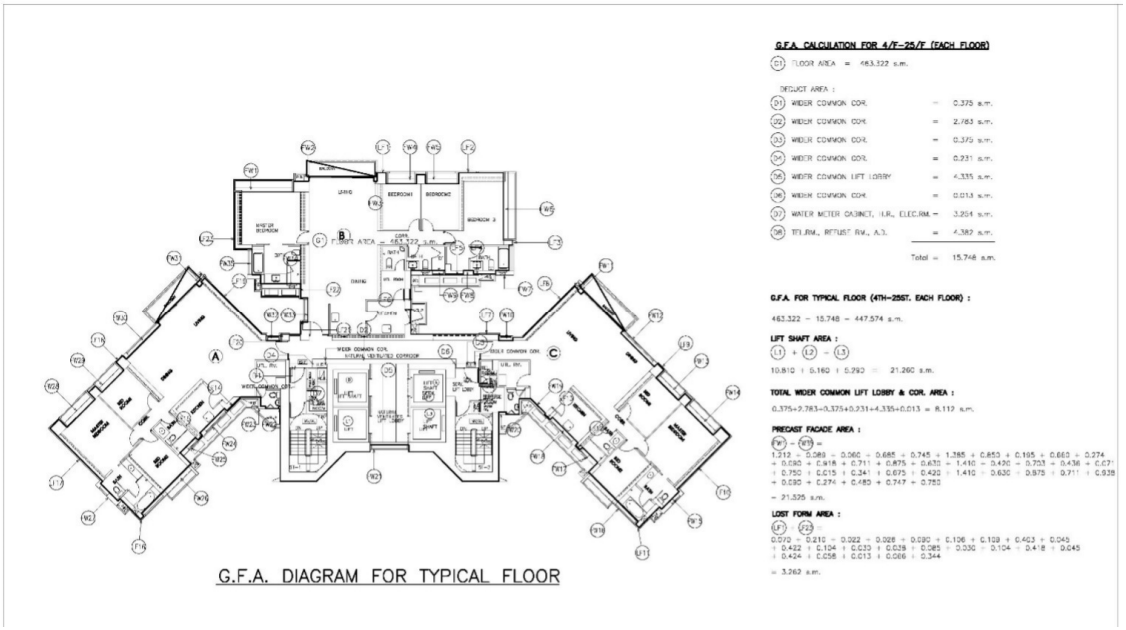


Figure 6-15. GFA Diagram & Calculation extracted from PNAP ADV-33

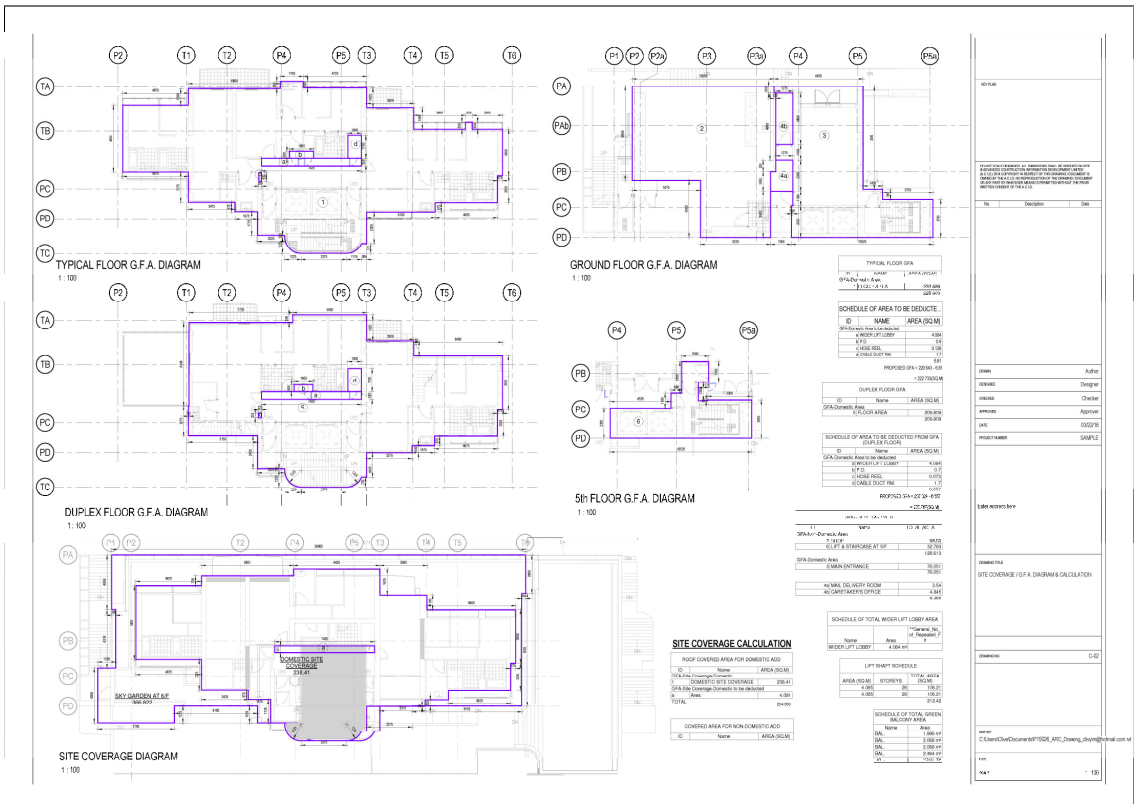
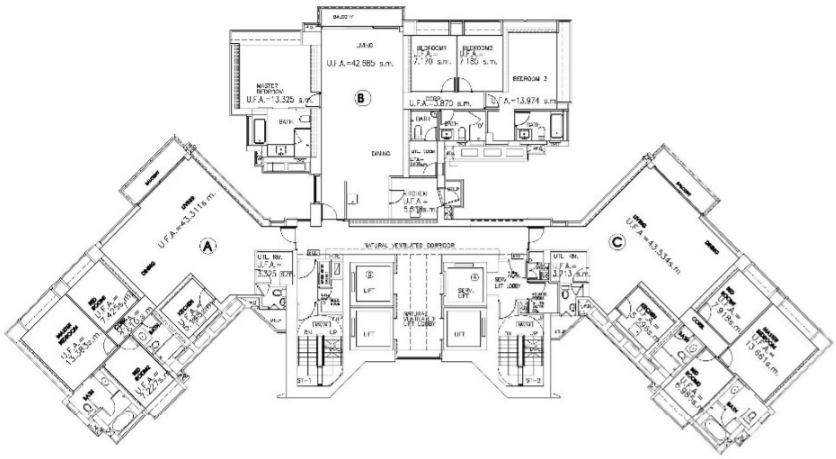


Figure 6-16. GFA Diagram & Calculation produced by BIM approach

UFA Diagram & Calculation



U.F.A. CALCULATION FOR 4/F TO 25/F

FLOOR NO.	UNIT NO.	LIVING & DINING (s.m.)	MASTER BEDROOM (s.m.)	BEDROOM 1 (s.m.)	BEDROOM 2 (s.m.)	CORRIDOR (s.m.)	U.C. RM. (s.m.)	TOTAL (s.m.)
4/F TO 25/F	A	—	—	—	—	—	—	—
	B	—	—	—	—	—	—	—
	C	—	—	—	—	—	—	—
TOTAL U.F.A. FOR TYPICAL FLOOR								
TOTAL								— x 22 STOREYS = —

NON-ESSENTIAL PLANT ROOM AREA CALCULATION SCHEDULE

Figure 6-17. UFA Diagram & Calculation extracted from PNAP ADV-33

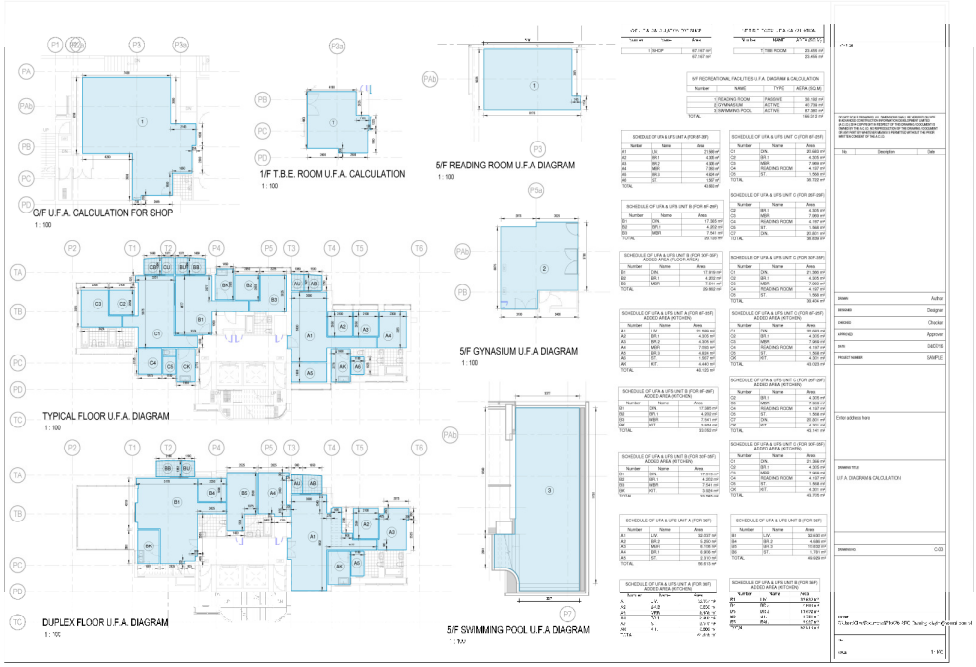


Figure 6-18. UFA Diagram & Calculation produced by BIM approach

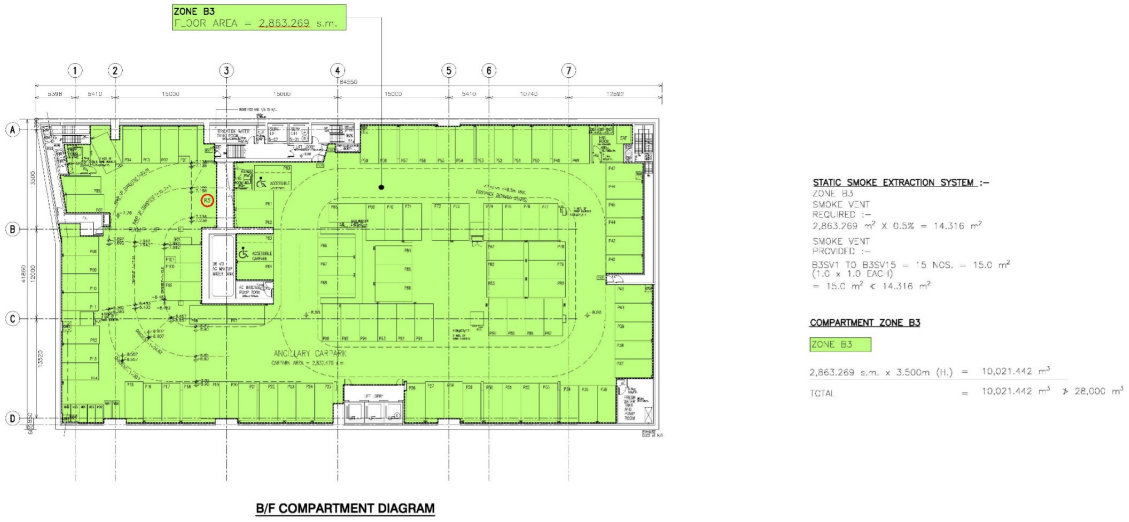


Figure 6-19. Compartmentation Diagram extracted from PNAP ADV-33

Figure 6-20. Compartmentation Diagram produced by BIM approach

EVA Diagram & Calculation

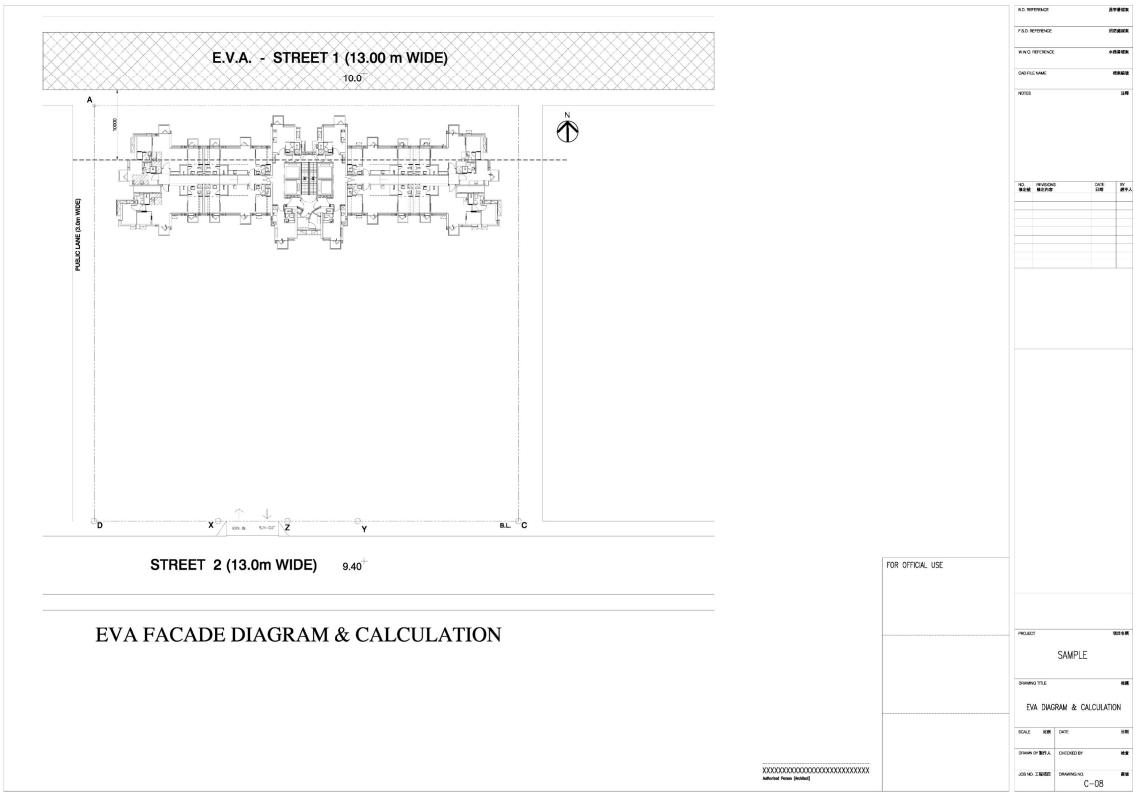


Figure 6-21. EVA Diagram and Calculations extracted from PNAP ADV-33

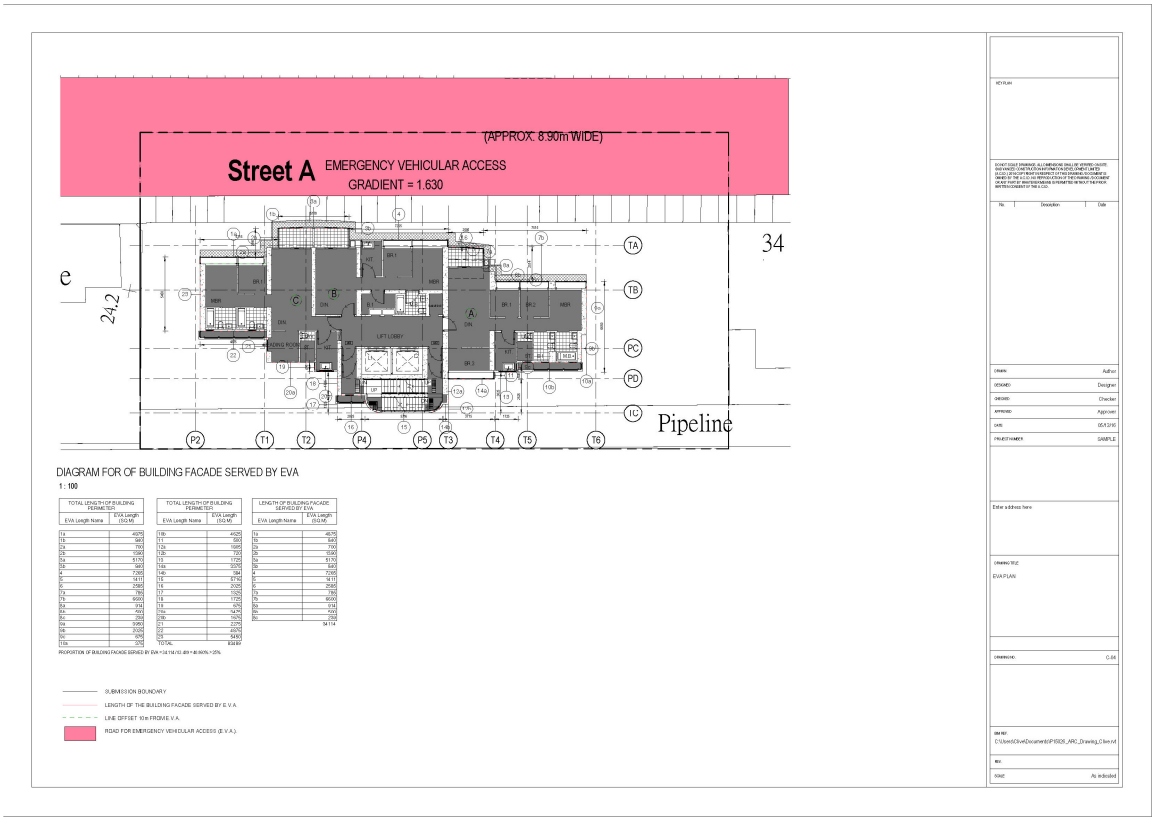


Figure 6-22. EVA Diagram and Calculations produced by BIM approach

FIRE RESISTANCE REQUIREMENT FOR ELEMENTS OF CONSTRUCTION

LOCATION	TYPE OF ACCOMMODATION	USE CLASSIFICATION	COMPARTMENT OF BUILDING		FIRE RESISTANCE RATING(minutes) FOR ELEMENTS OF CONSTRUCTION		MINIMUM DIMENSION OF ELEMENT OF CONSTRUCTION					
							R.C. FLOORS & LANDING		R.C. BEAMS		R.C. COLUMN & CORE WALL	
			FLOOR AREA (m^2)	VOLUME (m^3)	R.C. SLAB/ CORE WALL	R.C. BEAM/ COLUMN	THICKNESS OF CONCRETE	CONCRETE COVER TO REINFORCEMENT	WIDTH OF BEAM	CONCRETE COVER TO MAIN REINFORCEMENT	MINIMUM OVERALL SIZE	CONCRETE COVER TO MAIN REINFORCEMENT

Figure 6-23. FRR Schedule extracted from PNAP ADV-33

FIRE RESISTANCE REQUIREMENT FOR ELEMENTS OF CONSTRUCTION

LEVEL	NAME	CLASS	FRP REQ'D	R.C. WALL => 1% V.R.		R.C. SLAB		R.C. BEAM		R.C. COLUMN		R.C. STAIR	
				THK.	COVER TO STEEL	THK.	COVER TO STEEL	THK.	COVER TO STEEL	THK.	COVER TO STEEL	THK.	COVER TO STEEL
G/F	LOADING / UNLOADING		60	75	15	100	20	200	30	200	25	95	20
G/F	MAIN ENTRANCE	1a (Residential - House type dwellings)	60	75	15	100	20	200	30	200	25	95	20
G/F	SHOP	4a (Commercial - Business facilities)	60	75	15	100	20	200	30	200	25	95	20
1/F	TRANSFER PUMP ROOM		120	100	25	125	25	200	40	300	35	125	35
1/F	ELECTRICAL ROOM		120	100	25	125	25	200	40	300	35	125	35
1/F	TBE ROOM		120	100	25	125	25	200	40	300	35	125	35
1/F	MAIN SWITCH ROOM		120	100	25	125	25	200	40	300	35	125	35
1/F	TRANSFORMER ROOM		240	180	25	170	45*	280	60*	450	35	170	55*
2/F	SPRINKLER PUMP RM		120	100	25	125	25	200	40	300	35	125	35
2/F	MAIN SWITCH ROOM		120	100	25	125	25	200	40	300	35	125	35
2/F	TRANSFORMER ROOM		240	180	25	170	45*	280	60*	450	35	170	55*
3/F	F3 PUMP RM		120	100	25	125	25	200	40	300	35	125	35
3/F	CLEANSING WATER PUMP RM		120	100	25	125	25	200	40	300	35	125	35
5/F	E/M ROOM		120	100	25	125	25	200	40	300	35	125	35
5/F	E/M ROOM		120	100	25	125	25	200	40	300	35	125	35
5/F	E/M ROOM		120	100	25	125	25	200	40	300	35	125	35
5/F	READING ROOM	5a (Assembly - Places of Public Entertainment)	60	75	15	100	20	200	30	200	25	95	20
5/F	SWIMMING POOL	5a (Assembly - Places of Public Entertainment)	60	75	15	100	20	200	30	200	25	95	20
5/F	GYMNASIUM	5d (Assembly - Other Assembly Premises)	60	75	15	100	20	200	30	200	25	95	20
6/F	E/M ROOM		120	100	25	125	25	200	40	300	35	125	35
6/F	SKY GARDEN		60	75	15	100	20	200	30	200	25	95	20
7/F LOWER FLOOR	REFUGE FLOOR	1a (Residential - House type dwellings)	120	100	25	125	25	200	40	300	35	125	35
7/F LOWER FLOOR	REFUGE FLOOR	1a (Residential - House type dwellings)	120	100	25	125	25	200	40	300	35	125	35
8/F	DOMESTIC	1b (Residential - Flats)	60	75	15	100	20	200	30	200	25	95	20
LIFT MACHINE ROOM LEVEL	LIFT MACHINE ROOM		120	100	25	125	25	200	40	300	35	125	35
LIFT MACHINE ROOM LEVEL	METER ROOM		120	100	25	125	25	200	40	300	35	125	35
EMERGENCY GENERATOR & WATER PUMP ROOM	LIFT MACHINE ROOM		120	100	25	125	25	200	40	300	35	125	35
EMERGENCY GENERATOR & WATER PUMP ROOM	PUMP ROOM		120	100	25	125	25	200	40	300	35	125	35

Figure 6-24. FRR Schedule produced by BIM approach

PROVISIONS OF EXIT DOORS & EXIT ROUTES FROM ROOM,FIRE COMPARTMENT OR STOREY

LOCATION	USE	CAPACITY OF ROOM OR STOREY (PERSON)	MIN. NO. OF EXIT DOORS (FROM ROOM) OR EXIT ROUTE (FROM STOREY)		MIN. TOTAL WIDTH OF (mm)				MIN. WIDTH OF EACH (mm)			
					EXIT DOORS		EXIT ROUTES		EXIT DOOR		EXIT ROUTE	
			REQUIRED	PROVIDED	REQUIRED	PROVIDED	REQUIRED	PROVIDED	REQUIRED	PROVIDED	REQUIRED	PROVIDED

Figure 6-25. Provisions of Exit Doors and Routes Schedule extracted from PNAP ADV-33

SCHEDULE OF MINIMUM NUMBER & WIDTH OF EXIT DOOR & EXIT ROUTE FROM EACH FLOOR

LEVEL	FLOOR CAPACITY	MIN. NO. OF EXIT ROUTE		MIN. TOTAL WIDTH OF				MIN. WIDTH OF EACH			
				EXIT DOORS		EXIT ROUTES		EXIT DOOR		EXIT ROUTE	
		REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D
5/F		2	2	1750	1750	2100	2100	850	875	1050	1050
26/F	39	2	2	1750	1750	2100	2100	850	875	1050	1050

Figure 6-26. Provisions of Exit Doors and Routes Schedule produced by BIM approach

PROVISIONS OF MEANS OF ESCAPE IN CASE OF FIRE

LOCATION	USE	TOTAL USABLE FLOOR AREA (m^2)	FACTOR REPERSENTING s.m. OF U.F.A. PER PERSON	TOTAL CAPACITY PER FLOOR (PERSON)	TOTAL CAPACITY OF STOREYS SERVED BY STAIRS (PERSON)	NUMBER & STAIRS PROVIDED IN THE BUILDING	NUMBER OF STOREYS ABOVE GROUND	WIDTH OF STAIRS (mm)	TOTAL DISCHARGE VALUE OF THE STAIRS (PERSON) (NON-SPRINKLER BUILDING) (*SPRINKLER BUILDING)

Figure 6-27. Provision of MOE Schedule extracted from PNAP ADV-33

SCHEDULE OF DISCHARGE VALUE

STAIR NO.	DISCHARGE VALUE OF STAIRCASE IN A SPRINKLERED BUILDING	DISCHARGE VALUE OF STAIRCASE IN A SPRINKLERED BUILDING	DISCHARGE VALUE OF STAIRCASE IN A SPRINKLERED BUILDING	DISCHARGE VALUE OF STAIRCASE IN A SPRINKLERED BUILDING			DISCHARGE VALUE OF STAIRCASE IN A SPRINKLERED BUILDING	DISCHARGE VALUE OF STAIRCASE IN A SPRINKLERED BUILDING
	WIDTH OF STAIRCASE (mm)	PERMITTED	PERMITTED	CALCULATED PERMITTED	CALCULATED WIDTH OF STAIRCASE	CALCULATED PERMITTED	TOTAL NO. OF FLOOR SERVED ABOVE G/F	ACTUAL
ST-1		0					48	

Figure 6-28. Provision of MOE produced by BIM approach

SCHEDULE OF SANITARY FITMENTS

LOCATION OF FLOOR	USE	TOTAL USABLE FL. AREA (m^2)	FACTOR REPRESENTING m^2 OF USABLE FL. AREA PER PERSON	TOTAL CAPACITY PER FLOOR (PROPORTION)	NO. OF MALE PERSON AND FEMALE PERSON (PROPORTION)			SANITARY FITMENT REQUIRED				SANITARY FITMENT PROVIDED (*INCLUDE DISABLED LAV.)			
								W.C.	BATH/SHOWER BIDET	URINAL	BASIN OR WATER POINT	W.C.	BATH/SHOWER BIDET	URINAL	BASIN OR WATER POINT

Figure 6-29. Schedule of Sanitary Fitments extracted from PNAP ADV-33

SCHEDULE OF SANITARY FITMENTS PROVISIONS

LOCATION	USE	AREA (SQ.M)	CAPACITY			W.C.				BASIN				URINAL		BATH			
						M.		F.		M.		F.				M.		F.	
			TOTAL	M.	F.	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D
G/F	SHOP/DEPARMENT STORE	67.167	5	3	2	1	1	1	1	1	1	1	1	0	-	0	-	0	-
5/F RECREATIONAL FASCILITIES GYMNASIUM	DOMESTIC	40.739	14	7	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5/F RECREATIONAL FASCILITIES READING ROOM	DOMESTIC	38.192	39	20	19	2	2	2	1	2	2	2	2	2	2	2	2	2	2
5/F RECREATIONAL FASCILITIES RECEPTION LOBBY	DOMESTIC	51.516	6	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5/F RECREATIONAL FASCILITIES SWIMMING POOL	DOMESTIC	87.38	30	15	15	2	2	2	2	2	2	2	2	2	2	2	2	2	2
8/F - 35/F (DOMESTIC) (LARGEST UNIT) * UNIT A	DOMESTIC		10	-	-	2	2	0	-	2	2	0	-	0	-	2	2	0	-
8/F - 35/F (DOMESTIC) (LARGEST UNIT) * UNIT B	DOMESTIC		7	-	-	1	2	0	-	1	2	0	-	0	-	1	2	0	-
8/F - 35/F (DOMESTIC) (LARGEST UNIT) * UNIT C	DOMESTIC		9	-	-	2	2	0	-	2	2	0	-	0	-	2	2	0	-
36/F (DOMESTIC) UNIT A	DOMESTIC		8	-	-	1	1	0	-	1	1	0	-	0	-	1	1	0	-
36/F (DOMESTIC) UNIT B	DOMESTIC		9	-	-	2	2	0	-	2	2	0	-	0	-	2	2	0	-

Figure 6-30. Schedule of Sanitary Fitments produced by BIM approach

6.2 Latest Development of B.D. on BIM Use

PNAP ADV-34 was newly issued by B.D. in September 2016. The practice note provides general guidelines to AP, RSE and RGE on BIM submissions for building proposals as supplementary information to facilitate plan process by BD.

Buildings Department	Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers	ADV-34

Building Information Modelling

The use of Building Information Modelling (BIM) is a relatively new and innovative approach to building design and construction. The Buildings Department (BD) encourages authorized persons (AP), registered structural engineers (RSE) and registered geotechnical engineers (RGE) to consider adopting BIM in their building projects under the Buildings Ordinance. This practice note provides general guidelines on BIM submissions for building proposals as supplementary information to facilitate plan processing by the BD.

BIM Submissions

2. There is a wide range of applications of BIM on new building development and alteration and addition works which are considered useful to facilitate the BD in processing plan submissions. Some examples of BIM applications are given in **Appendix A** and the project AP/RSE/RGE are encouraged to provide the BD with a soft copy of the computer modelling information under the specified format for consideration.

Format and Software Version

3. In addition to the statutory requirement of plan submission in paper format, AP/RSE/RGE are encouraged to present their building and/or building works proposals by the computer aid of BIM information 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 the following manner and format:-

(a) The data files should be stored in non-rewritable CD-ROM in ISO 9660 format (i.e. CD format) or non-rewriteable DVD-ROM in ISO/IEC 13346:1995 format (i.e. DVD format);

(b) BIM viewing software (but not web based BIM viewer) shall be available for free download from the Internet for viewing the BIM submission. The link to download the viewing software should also be provided by the AP/RSE/RGE. Each individual file for viewing on BIM viewing software should also be limited to the size of 30 MB; and

(c) The real-time simulation should be in Windows Media Video (wmv) or Audio Video Interleave (avi) format and supported by Windows Media Player 11 or above.

BIM Submission as Reference Material

4. Whilst BIM is submitted as a kind of supplementary information for reference, the BD processes approval of plans under the Buildings Ordinance based on the information contained in the plans. In case of any discrepancy between the plans and BIM submitted, the plans shall prevail. To keep pace with the development of BIM in the building industry, the BD will, from time to time, review the extent of BIM application and evaluate its effectiveness in the plan submission.

(HUI Siu-wai)
Building Authority

Ref. : BD GR/1-125/11/1

First Issue : September 2016 (AD/NB2)

Appendix A
(PNAP ADV-34)

Examples of application of BIM to supplement Plan Submissions

Types of Plan Submission	Examples of Building Information to be illustrated by BIM	
	Building Information Model	**Real-time Simulation**
General Building Plans	● innovative building design, irregular/twisted building form; ● projecting features on external wall; ● relationship between site profiles/street levels and proposed building; ● arrangement of means of escape and compartmentation; ● spatial arrangement of building; ● relationship between existing building and proposed alteration and addition (A&A) works.	● sequence and phasing of various stages[Note 1] of new building development; ● sequence and phasing of A&A works.
Drainage Plans	● complex drainage systems and/or connections ● relationship between proposed underground drainage works and foundation works/site formation works etc.	● sequence and phasing of various stages[Note 1] of new building development; ● sequence and phasing of A&A works.
Superstructure Plans	● complex steel structures and/or connections; ● arrangement of transfer structures and illustration of load path; ● basement structures supporting adjoining ground and/or existing geotechnical features; ● assembly sequence, structural arrangement and/or connection of façade/glass wall/curtain wall/cladding works, etc.; ● relationship between existing structures and proposed A&A works; ● working space, temporary supports and strengthening in A&A works.	● sequence and phasing of various stages[Note 1] of new building development; ● sequence and phasing of A&A works.
Foundation Plans Excavation and Lateral Support (E&LS) Plans	● relationship between proposed foundations, sub-structures, E&LS works and geological ground profiles, adjoining existing foundations, geotechnical features, sensitive structures, etc.	● sequence and phasing of various stages[Note 1] of new building development; ● top-down construction.
Site Formation Plans	● relationship between site profiles, geological ground profiles and proposed works.	● sequence and phasing of various stages[Note 1] of new building development.
Demolition Plans	● final stage of partial demolished structures.	● sequence and phasing of works, method statements and temporary precautionary measures.

Notes : Relevant stages of new building development may include demolition, foundation, E&LS, site formation, sub-structure and superstructure construction, as the case may be.

6.3 Immediate Term Suggestion

BIM Technology can facilitate presenting conventional measurements on plan. For example, in a BIM model, the calculation of discharge value and MOE Travel Distance Measurement can easily be done.

SCHEDULE OF DISCHARGE VALUE			
	DISCHARGE VALUE OF STAIRCASE IN A SPRINKLERED BUILDING		
STAIR NO.	WIDTH OF STAIRCASE (mm)	PERMITTED	TOTAL NO. OF FLOOR SERVED ABOVE G/F
ST-1	1125	420	1
ST-4	1688	640	1

TOTAL PERMITTED DISCHARGE VALUE = 420 + 640
= 1060

TOTAL ACTUAL DISCHARGE VALUE = 425

TOTAL : 1060 > 425

Figure 6-31. Discharge Value schedule

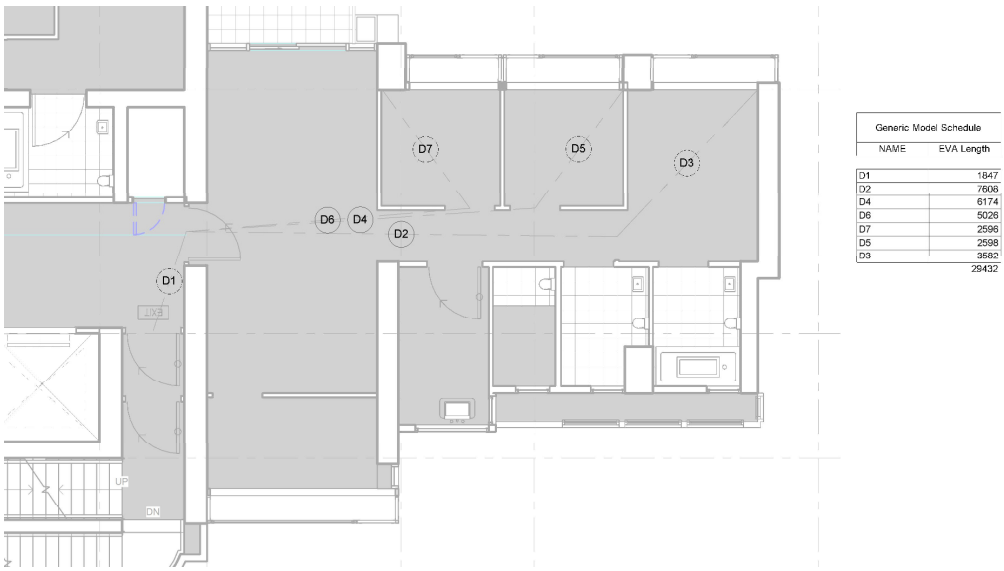


Figure 6-32. Travel Distance Diagram

6.4 Medium Term Suggestion

In the traditional presentation of drawings in 2D format, the drawing up of 3D presentation of illustration purpose is extremely time consuming.

With BIM, as the model is already in 3D, issuing 3D drawings is not of much extra work. Thus, it can be a common deliverable with 3D illustrations showing the different part of a project, from the overall building outlook to smallest component part. Besides producing 2D drawings from the BIM model, calculation will also run automatically with related information. This can facilitate the Fire Compartmentation calculation with 3D model supported to counter some problematic building forms or irregular ceilings.

3D presentation, together with latest techniques such as hiding elements, making elements transparent or temporary exploding different components to derive better clarity, revealing a new way of communication, will deliver far better information than traditional 2D representation.

Fire Computational Calculation Schedule

Level	Department	Number	Name	Area	Room Height	Volume
8/F	A	A5	BR.3	4.824 m²	3000	14.472 m³

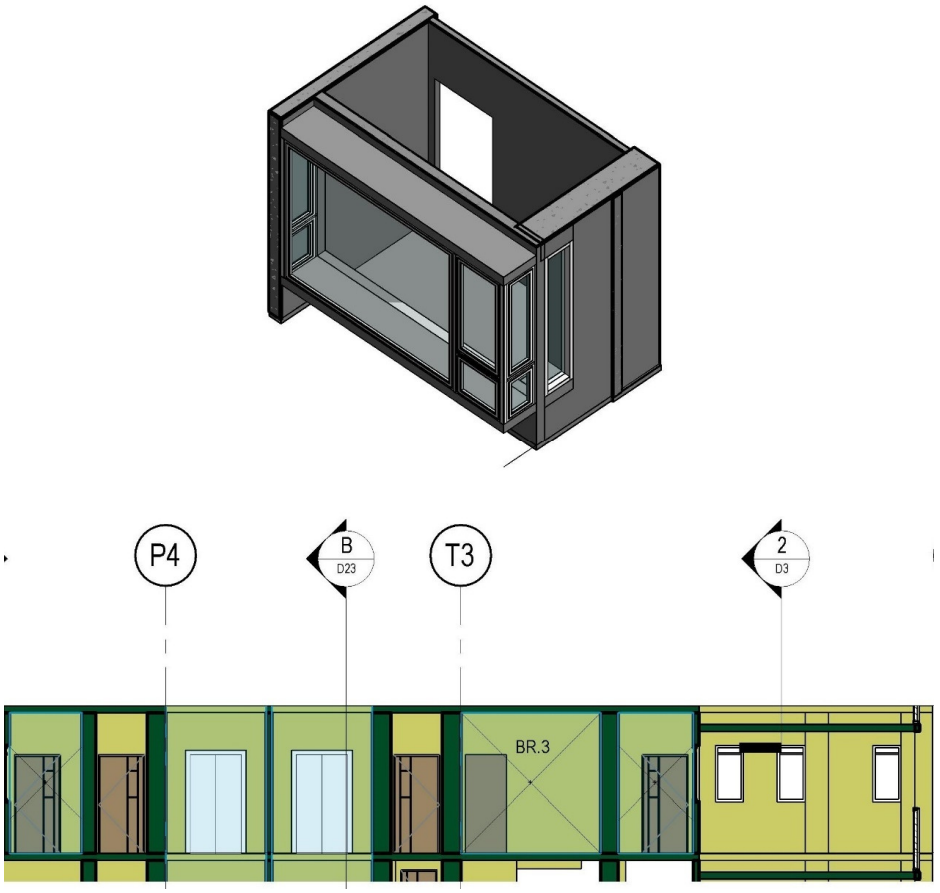


Figure 6-33. Compartmentation Diagram

6.5 Long Term Suggestion

The long term objective is the use of BIM Model Submission as GBP Submissions and Building Regulation Checking. Providing a BIM model for checking is a relatively efficient method of checking for government departments. It easily reveals the building elements hidden under plans. It reduces the tolerance of mislead drawings which costs variation orders, and minimizes the overall project sum and project duration.

With BIM models, we can produce architectural, structural and building services drawings. Traditional plans, elevations and sections can be generated with ease, showing all different aspects of the BIM model.

The 2D drawings can be created by putting views on the sheet in BIM software without layer function, (e.g. Revit). Then, these sheets can be published in DWFX or pdf format.

Moreover, Industry Foundation Classes (IFC) file can also be an alternative for BIM submission. It is cross platform BIM file format which can collaborate between programs.

One of the model checking applications is **Solibri** Model Checker, for BIM validation, compliance control, design review, analysis, extract BIM information and code checking. It has been used in the U.S. for model checking such as Egress and Occupancy and Accessibility Control, etc.

7 Appendix – Specifications

7.1 Introduction

This part explains the terminology used in GBP submission and how they can be translated into BIM terminology.

7.2 BIM Terminology (Specification Structure)

The enclosed Appendix-Specification explains the BIM approach for each statutory submission items.

Each specification contains the following:

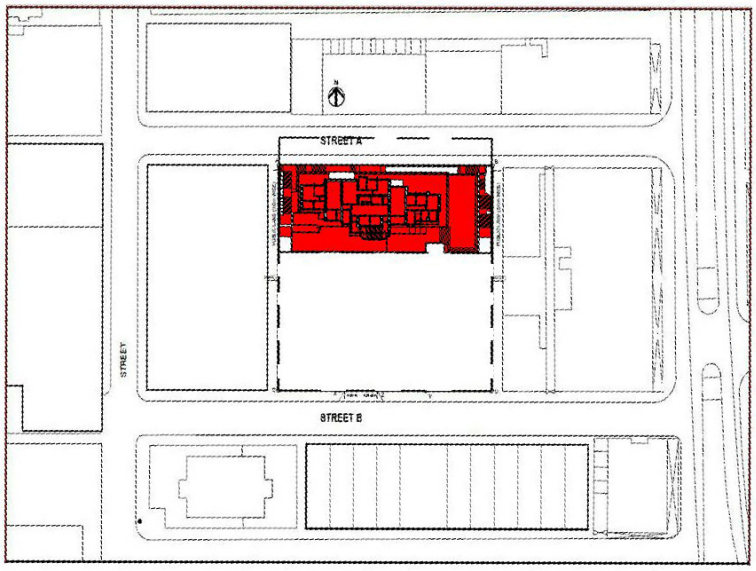
a. Area of Concern is the category of Submission as describe in sections 3.4.1-3.4.5.
b. Statutory Submittal refers to the terminology used in statutory submission.
c. The Objectives as stated in relevant regulations explains the purpose of a specific submittal.
d. Logics is the calculation method/ definition in Building Ordinance and PNAP.
e. Specifications translate the “Logics” part into common BIM terminology.
f. BIM Approach means how the statutory submittal can be done by BIM technology, and supported by an example in BIM software.

Format	Drawing	Statutory Submittal	Site Boundary	Area of Concern

PNAP	N/A	3.4.2 Checking of GFA
PNAP Link	N/A	
Building Ordinance/ Regulations/ COP	Lease Information	
Regulation Link	N/A	
Objectives	N/A	
Logics	Site boundary of the project	
Specifications	Define the site boundary according to survey data provided by Registered Land Surveyors / Government Lease Information	
BIM Approach	Use "Property Line" tool to define Site boundary.	

Relevant Table

BIM Example



Format	Calculations	Statutory Submittal	Site Area Calculations	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 23(2)			
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/5B99D12A51151F0C482579C900301807?OpenDocument			
Objectives	To define the site area for purpose of B(P)R			
Logics	The site area determined for the project			
Specifications	AP to determine area			
BIM Approach	Use "Area Plan" to define Site Area			

Relevant Table

BIM Example

SITE AREA CALCULATIONS:

SITE AREA (FROM LEASE)	
I.L. 897 S.B ss.1 S.A	=1081.67 s.ft.
I.L. 897 S.B ss.5 S.A	=270.43 s.ft.
I.L. 897 S.B ss.5 R.P	=1353.98 s.ft.
I.L. 897 S.B ss.8	=3261.37 s.ft.
I.L. 897 S.B ss.9	=1636.89 s.ft.
TOTAL	=7604.34 s.ft. (706.460 s.m.)

Format	Calculations	Statutory Submittal	Site Classification	Area of Concern
PNAP	APP-124			3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/APP/APP124.pdf			
Building Ordinance/ Regulations/ COP	Cap 123F reg 18A			
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/83E51E6E0E729859482579C900301805?OpenDocument			
Objectives	To determine site classification			
Logics	(1) In this Part and the First and Second Schedules— "class A site" (甲類地盤) means a site, not being a class B site or class C site, that abuts on one specified street not less than 4.5 m wide or on more than one such street; "class B site" (乙類地盤) means, subject to paragraph (2), a corner site that abuts on 2 specified streets neither of which is less than 4.5 m wide; "class C site" (丙類地盤) means, subject to paragraph (2), a corner site that abuts on 3 specified streets none of which is less than 4.5 m wide. (2) For the purposes of paragraph (1)— (a) a corner site shall not be regarded as abutting on 2 specified streets unless at least 40 per cent of the boundary of the site abuts on the streets; and (b) a corner site shall not be regarded as abutting on 3 specified streets			
Specifications	AP to determine Class A, B or C			
BIM Approach	Definite Site Classification Parameter for automatic search of Appropriate tables			

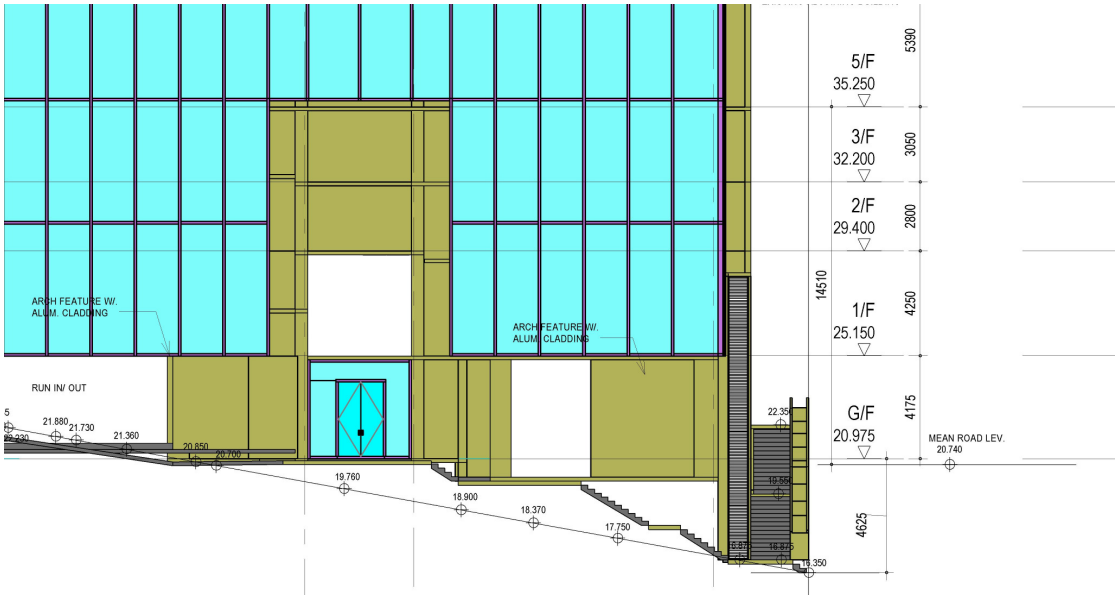
Relevant Table	
BIM Example	UNDER BUILDING (PLANNING) REGULATIONS: CLASS OF SITE: A

Format	Calculations	Statutory Submittal	Mean Street Level	Area of Concern
PNAP	N/A			Checking of Building Height
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 23 (1)			
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/5B99D12A51151F0C482579C900301807?OpenDocument			
Objectives	To calculate height of a building for purposes of B(P)R 20, 21 and 22			
Logics	(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987; L.N. 110 of 2005)			
Specifications	(S(lowest)T-S(lowest)B)/2 where S(lowest) = lowest street, T= Top Level; B = Bottom Level			
BIM Approach	Set Mean Street Level as parameter			

Relevant Table

(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987; L.N. 110 of 2005)

BIM Example

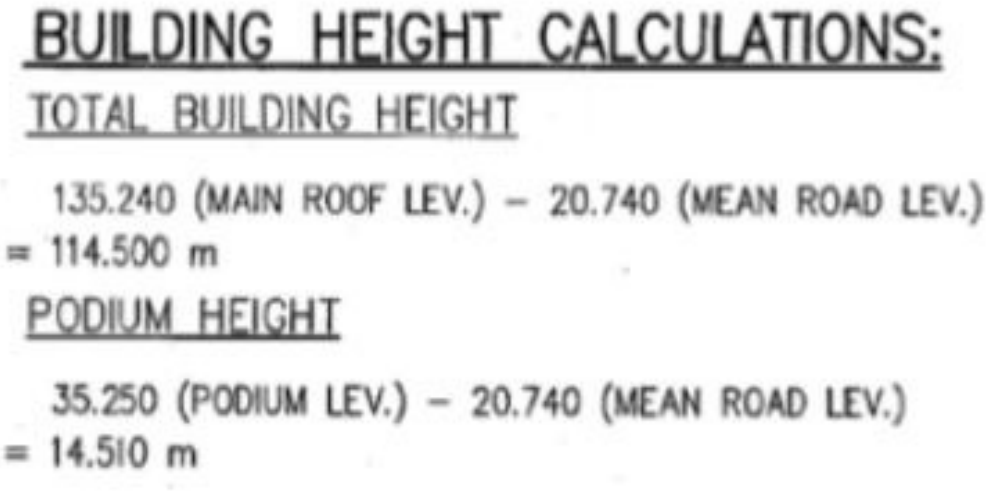


Format	Calculations	Statutory Submittal	Building Height	Area of Concern
PNAP	N/A			Checking of Building Height
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 23 (1)			
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/5B99D12A51151F0C482579C900301807?OpenDocument			
Objectives	To calculate height of a building for purposes of B(P)R 20, 21 and 22			
Logics	(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987; L.N. 110 of 2005)			
Specifications	Main Roof Level (Structural Floor Level) - Mean Street Level			
BIM Approach	Automatic calculation of Main Roof Level - Mean Street Level Parameter			

Relevant Table

(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987; L.N. 110 of 2005)

BIM Example



Format	Calculations	Statutory Submittal	Permitted Non-domestic Site Coverage	Area of Concern

PNAP	APP-19 & APP-132	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/APP/APP132.pdf	
Building Ordinance/ Regulations/ COP	Cap 123F reg 21 & First Schedule	
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/425AAFD4AFAE2256482579C90030180D?OpenDocument	
Objectives	The expression "permitted percentage site coverage" (准許上蓋面積百分率) means the maximum site coverage permitted under paragraph (2).	
Logics	(1) The maximum site coverage permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 20; Refer table in First Schedule	
Specifications	Lookup values from First Schedule	
BIM Approach	Lookup values from First Schedule	

Relevant Table

First Schedule

Height of building in metres	Domestic buildings						Non-domestic buildings					
	Percentage site coverage			Plot ratio			Percentage site coverage			Plot ratio		
	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site
Not exceeding 15 m	66.6	75	80	3.3	3.75	4.0	100	100	100	5	5	5
Over 15 m but not exceeding 18 m	60	67	72	3.6	4.0	4.3	97.5	97.5	97.5	5.8	5.8	5.8
Over 18 m but not exceeding 21 m	56	62	67	3.9	4.3	4.7	95	95	95	6.7	6.7	6.7
Over 21 m but not exceeding 24 m	52	58	63	4.2	4.6	5.0	92	92	92	7.4	7.4	7.4

BIM Example

PERMITTED NON-DOMESTIC SC (%): 60

PERMITTED DOMESTIC SC (%): 33.33

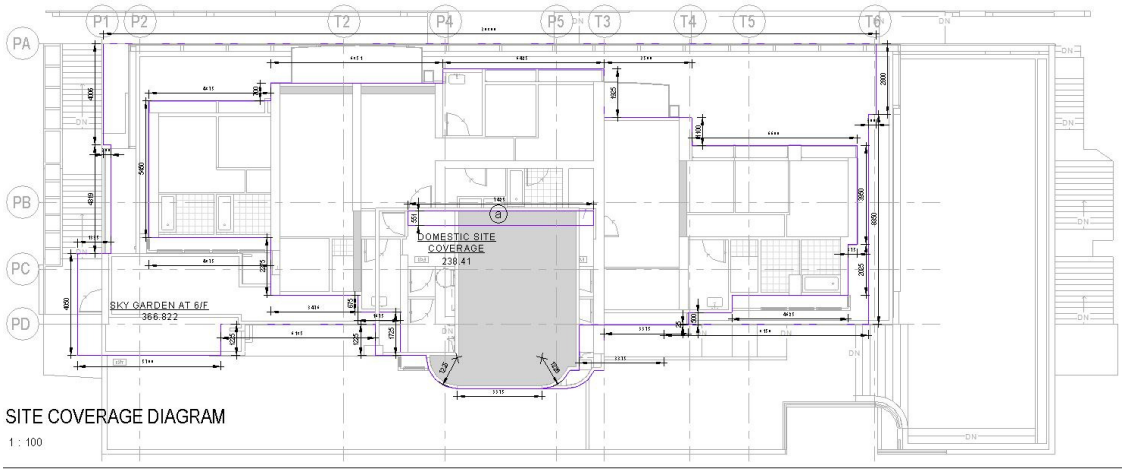
PERMITTED NON-DOMESTIC PR: 15

PERMITTED DOMESTIC PR: 8

Format	Calculations	Statutory Submittal	Non-domestic site coverage outline	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 2			
Regulation Link	N/A			
Objectives	N/A			
Logics	Site coverage (上蓋面積) means the area of the site that is covered by the building that is erected thereon and, when used in relation to a part of a composite building, means the area of the site on which the building is erected that is covered by that part of the building; (G.N.A. 97 of 1962)			
Specifications	Total area outlined from top view of non-domestic part of building including all building elements.			
BIM Approach	Set "View Depth" to the lowest floor to include all building elements then draw area boundary.			

Relevant Table

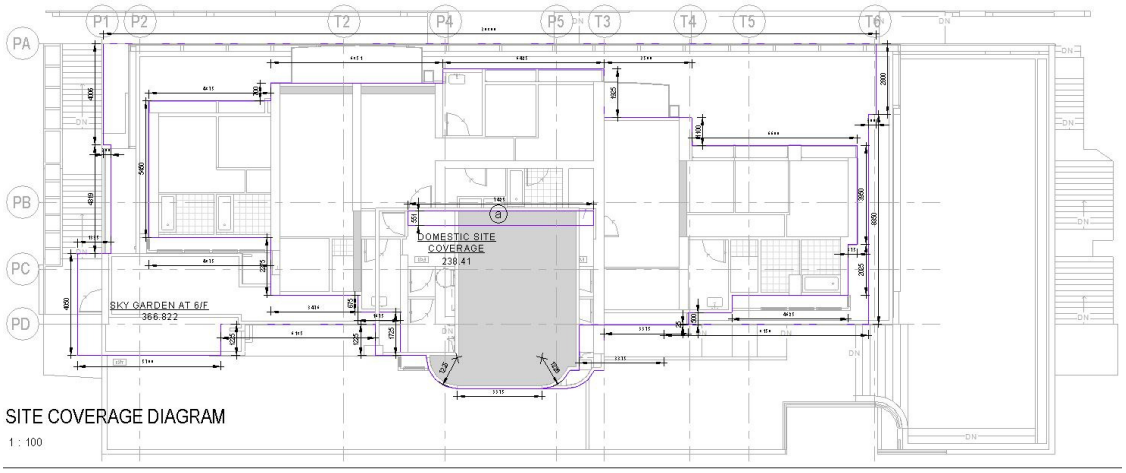
BIM Example



Format	Calculations	Statutory Submittal	Non-accountable Non-domestic site coverage (SC)	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 2			
Regulation Link	N/A			
Objectives	N/A			
Logics	AP to determine			
Specifications	Demarcate area on an area plan			
BIM Approach	Use "Area Plan" to demarcate area			

Relevant Table

BIM Example

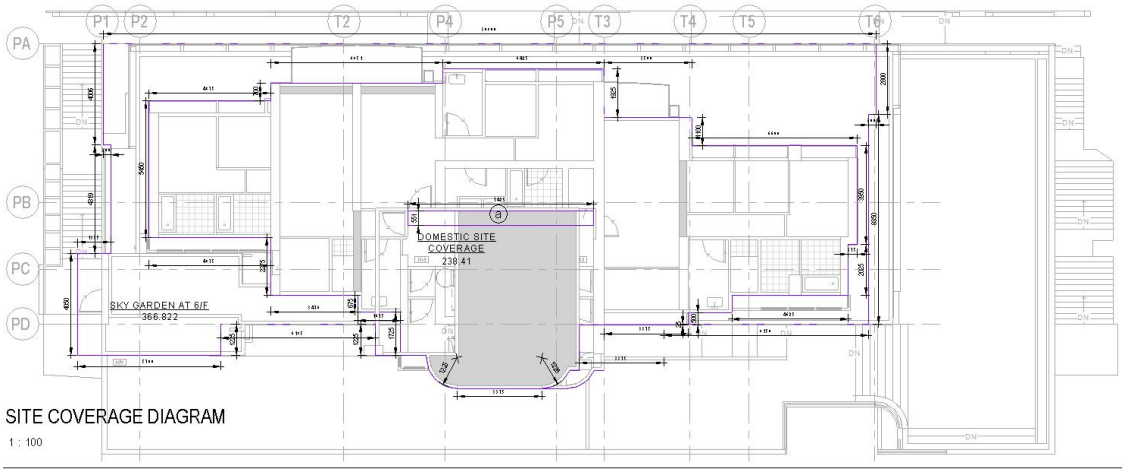


Format	Calculations	Statutory Submittal	Actual non-domstic Site Coverage	Area of Concern

PNAP	APP-19 & APP-132	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/APP/APP132.pdf	
Building Ordinance/ Regulations/ COP	N/A	
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/3EC4D082719D1C49482579C90030184C?OpenDocument	
Objectives	N/A	
Logics	Non-domestic SC outline - non-accountable non-domestic SC	
Specifications	Non-domestic SC outline - non-accountable non-domestic SC	
BIM Approach	Use "Area Plan" to demarcate non-domestic SC outline - non-accountable non-domestic SC	

Relevant Table

BIM Example



Format	Calculations	Statutory Submittal	Permitted domestic Site Coverage	Area of Concern

PNAP	APP-19 & APP-132	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/APP/APP132.pdf	
Building Ordinance/ Regulations/ COP	Cap 123F reg 20 & First Schedule	
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/425AAFD4AFAE2256482579C90030180D?OpenDocument	
Objectives	the expression "permitted percentage site coverage" (准許上蓋面積百分率) means the maximum site coverage permitted under paragraph (2).	
Logics	(1) The maximum site coverage permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 20; Refer table in First Schedule	
Specifications	Lookup values from First Schedule	
BIM Approach	Lookup values from First Schedule	

Relevant Table

First Schedule

Height of building in metres	Domestic buildings						Non-domestic buildings					
	Percentage site coverage			Plot ratio			Percentage site coverage			Plot ratio		
	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site
Not exceeding 15 m	66.6	75	80	3.3	3.75	4.0	100	100	100	5	5	5
Over 15 m but not exceeding 18 m	60	67	72	3.6	4.0	4.3	97.5	97.5	97.5	5.8	5.8	5.8
Over 18 m but not exceeding 21 m	56	62	67	3.9	4.3	4.7	95	95	95	6.7	6.7	6.7
Over 21 m but not exceeding 24 m	52	58	63	4.2	4.6	5.0	92	92	92	7.4	7.4	7.4

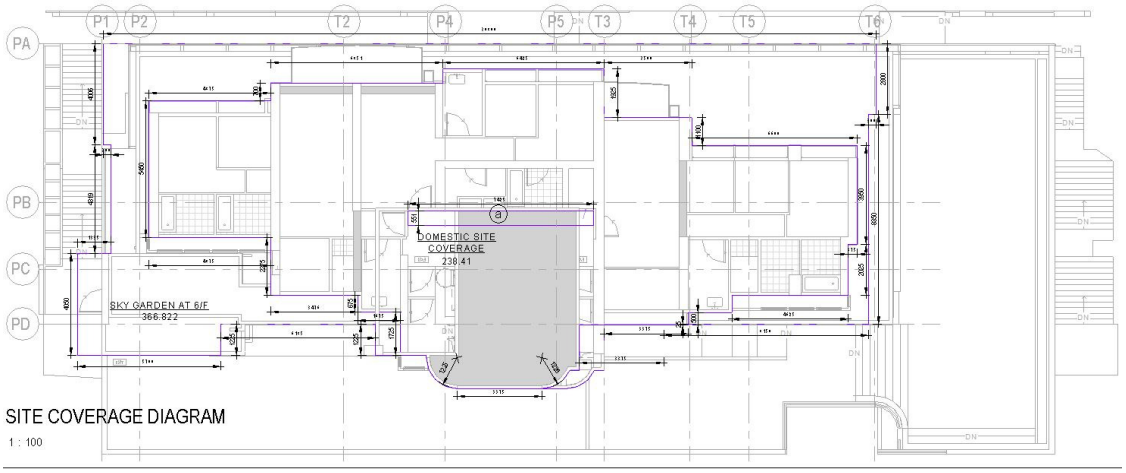
BIM Example

PERMITTED NON-DOMESTIC SC (%):	60
PERMITTED DOMESTIC SC (%):	33.33
PERMITTED NON-DOMESTIC PR:	15
PERMITTED DOMESTIC PR:	8

Format	Calculations	Statutory Submittal	Domestic Site Coverage outline	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 2			
Regulation Link	N/A			
Objectives	N/A			
Logics	site coverage (上蓋面積) means the area of the site that is covered by the building that is erected thereon and, when used in relation to a part of a composite building, means the area of the site on which the building is erected that is covered by that part of the building; (G.N.A. 97 of 1962)			
Specifications	Total area outlined from top view of non-domestic part of building including all building elements.			
BIM Approach	Set "View Depth" to the lowest floor to include all building elements then draw area boundary.			

Relevant Table

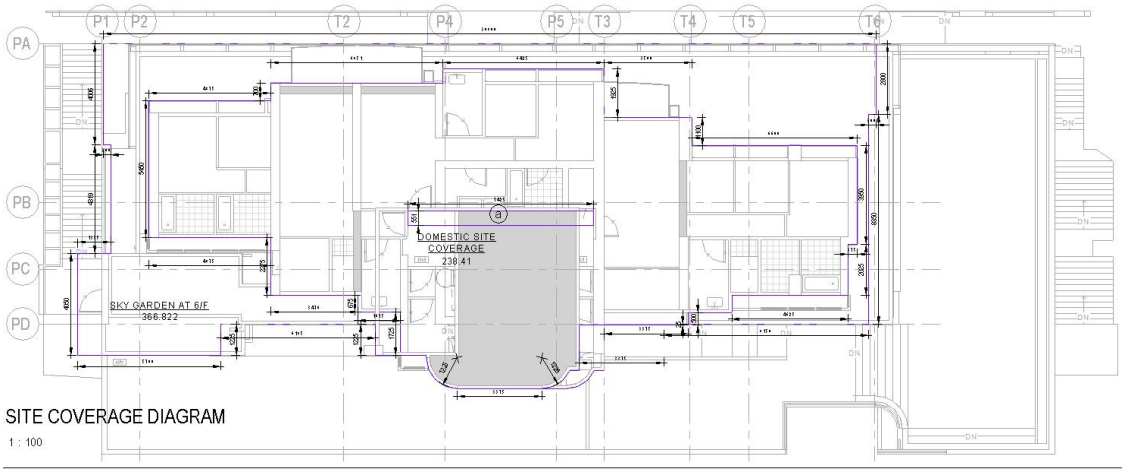
BIM Example



Format	Calculations	Statutory Submittal	Non-accountable Domestic site coverage (SC)	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	N/A			
Regulation Link	N/A			
Objectives	N/A			
Logics	AP to determine			
Specifications	Demarcate area on an area diagram view			
BIM Approach	Use "Area Plan" to demarcate area			

Relevant Table

BIM Example



Format	Calculations	Statutory Submittal	Permitted Non-domestic Plot Ratio	Area of Concern

PNAP	APP-19	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/signed/APP019se.pdf	
Building Ordinance/ Regulations/ COP	Cap 123F reg 21 & First Schedule	
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/425AAFD4AFAE2256482579C90030180D?OpenDocument	
Objectives	(2) The maximum plot ratio permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 21.	
Logics	Refer table in First Schedule	
Specifications	Lookup values from First Schedule	
BIM Approach	Lookup values from First Schedule	

Relevant Table

First Schedule

Height of building in metres	Domestic buildings						Non-domestic buildings					
	Percentage site coverage			Plot ratio			Percentage site coverage			Plot ratio		
	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site
Not exceeding 15 m	66.6	75	80	3.3	3.75	4.0	100	100	100	5	5	5
Over 15 m but not exceeding 18 m	60	67	72	3.6	4.0	4.3	97.5	97.5	97.5	5.8	5.8	5.8
Over 18 m but not exceeding 21 m	56	62	67	3.9	4.3	4.7	95	95	95	6.7	6.7	6.7
Over 21 m but not exceeding 24 m	52	58	63	4.2	4.6	5.0	92	92	92	7.4	7.4	7.4

BIM Example

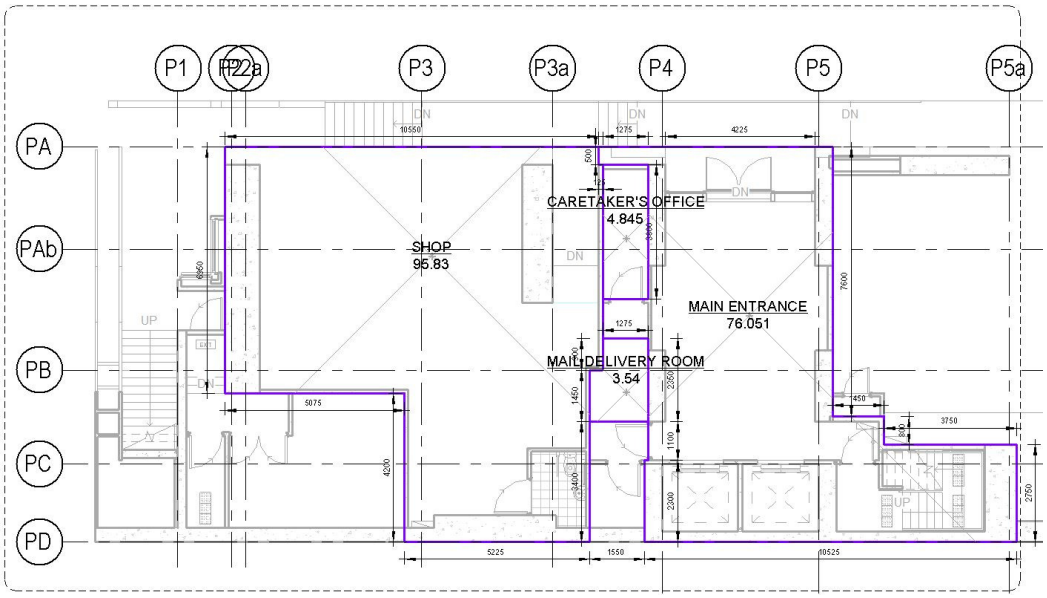
PERMITTED NON-DOMESTIC SC (%):	60
PERMITTED DOMESTIC SC (%):	33.33
PERMITTED NON-DOMESTIC PR:	15
PERMITTED DOMESTIC PR:	8

Format	Calculations	Statutory Submittal	Non-Domestic GFA outline	Area of Concern

PNAP	N/A	3.4.2 Checking of GFA
PNAP Link	N/A	
Building Ordinance/ Regulations/ COP	Cap 123F reg 23 (3)(a)	
Regulation Link	N/A	
Objectives	N/A	
Logics	(3) (a) Subject to sub-paragraph (b), for the purposes of regulations 19, 20, 21 and 22, the gross floor area of a building shall be the area contained within the external walls of the building measured at each floor level (including any floor below the level of the ground), together with the area of each balcony in the building, which shall be calculated from the overall dimensions of the balcony (including the thickness of the sides thereof), and the thickness of the external walls of the building.	
Specifications	Demarcate area on an area diagram view	
BIM Approach	Use "Area Plan" to demarcate GFA	

Relevant Table

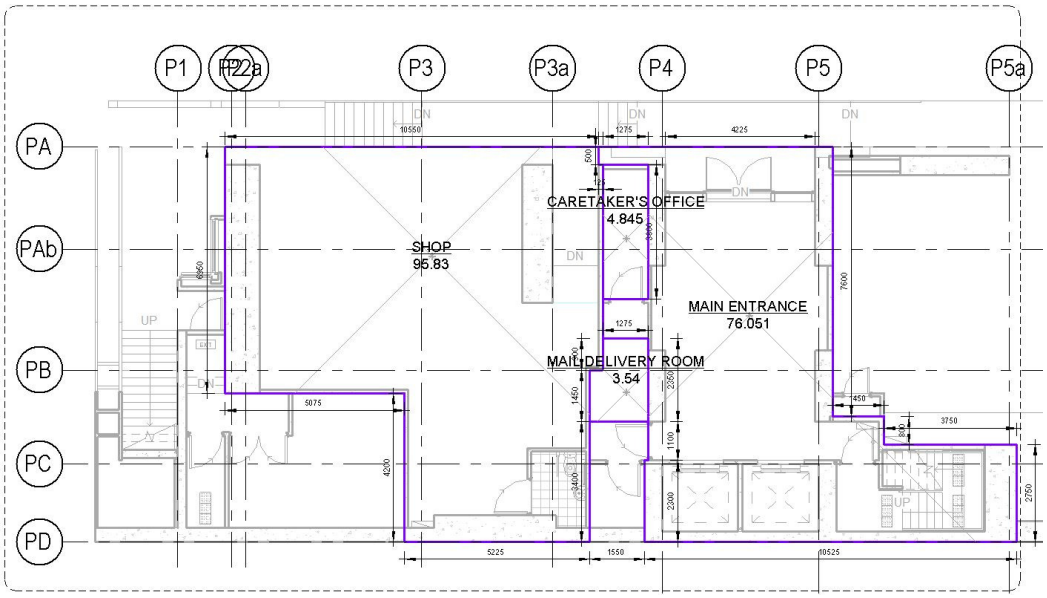
BIM Example



Format	Calculations	Statutory Submittal	Non-domestic GFA concessions per floor (non-domestic area to be deducted from area	**Area of Concern**
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	N/A			
Regulation Link	N/A			
Objectives	N/A			
Logics	...exempting or disregarding green and amenity features and non-mandatory / non- essential plant rooms and services from gross floor area and/or site coverage calculations...			
Specifications	Disregarded GFA(ND) + exempted GFA(ND)			
BIM Approach	Use "Schedule" to calculate disregarded GFA(ND) + exempted GFA(ND)			

Relevant Table

BIM Example



Format	Calculations	Statutory Submittal	Actual non-domestic GFA per floor	Area of Concern
PNAP	APP-151, ADM-2			3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/ADM/ADM002.pdf			
Building Ordinance/ Regulations/ COP	Cap 123F reg 23 (3)(a)			
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/5B99D12A51151F0C482579C900301807?OpenDocument			
Objectives	N/A			
Logics	Non-domestic GFA outline per floor - non-domestic GFA concession per floor			
Specifications	Domestic GFA outline per floor - domestic GFA concession per floor			
BIM Approach	Use "Schedule" to calculate domestic GFA outline per floor - domestic GFA concession per floor			

Relevant Table

BIM Example

GROUND FLOOR GFA		
ID	Name	TOTAL AREA
GFA-Non-Domestic Area		
2	SHOP	95.83
6	LIFT & STAIRCASE AT 5/F	32.783
		128.613

Format	Calculations	Statutory Submittal	Actual non-domestic GFA	Area of Concern

PNAP	APP-151, ADM-2	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/ADM/ADM002.pdf	
Building Ordinance/ Regulations/ COP	N/A	
Regulation Link	http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/25C2868DA2669A12482575EE003F079B/$FILE/CAP_123F_e_b5.pdf	
Objectives	To ensure the total GFA does not exceed the Maximum Floor Area calculated from Permitted Plot Ratio.	
Logics	Adding up of Actual non-domestic GFA of all floors	
Specifications	Adding up of Actual GFA of all floors	
BIM Approach	Use "Schedule" to add up of actual GFA of all floors	

Relevant Table

BIM Example

GROUND FLOOR GFA		
ID	Name	TOTAL AREA
GFA-Non-Domestic Area		
2	SHOP	95.83
6	LIFT & STAIRCASE AT 5/F	32.783
		128.613

Format	Calculations	Statutory Submittal	Actual non-domestic plot ratio	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 21 (3)			
Regulation Link	N/A			
Objectives	N/A			
Logics	the plot ratio of a building shall be obtained by dividing the gross floor area of the building by the area of the site on which the building is erected.			
Specifications	Actual non-domestic GFA / Site area			
BIM Approach	Actual non-domestic GFA / Site area			

Relevant Table

BIM Example

PERMITTED NON-DOMESTIC SC (%):	60
PERMITTED DOMESTIC SC (%):	33.33
PERMITTED NON-DOMESTIC PR:	15
PERMITTED DOMESTIC PR:	8

Format	Calculations	Statutory Submittal	Permitted domestic Plot Ratio	Area of Concern

PNAP	APP-19	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/signed/APP019se.pdf	
Building Ordinance/ Regulations/ COP	Cap 123F reg 21 & First Schedule	
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/425AAFD4AFAE2256482579C90030180D?OpenDocument	
Objectives	(2) The maximum plot ratio permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 21.	
Logics	Refer table in First Schedule	
Specifications	Lookup values from First Schedule	
BIM Approach	Lookup values from First Schedule	

Relevant Table

First Schedule

Height of building in metres	Domestic buildings						Non-domestic buildings					
	Percentage site coverage			Plot ratio			Percentage site coverage			Plot ratio		
	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site	Class A site	Class B site	Class C site
Not exceeding 15 m	66.6	75	80	3.3	3.75	4.0	100	100	100	5	5	5
Over 15 m but not exceeding 18 m	60	67	72	3.6	4.0	4.3	97.5	97.5	97.5	5.8	5.8	5.8
Over 18 m but not exceeding 21 m	56	62	67	3.9	4.3	4.7	95	95	95	6.7	6.7	6.7
Over 21 m but not exceeding 24 m	52	58	63	4.2	4.6	5.0	92	92	92	7.4	7.4	7.4

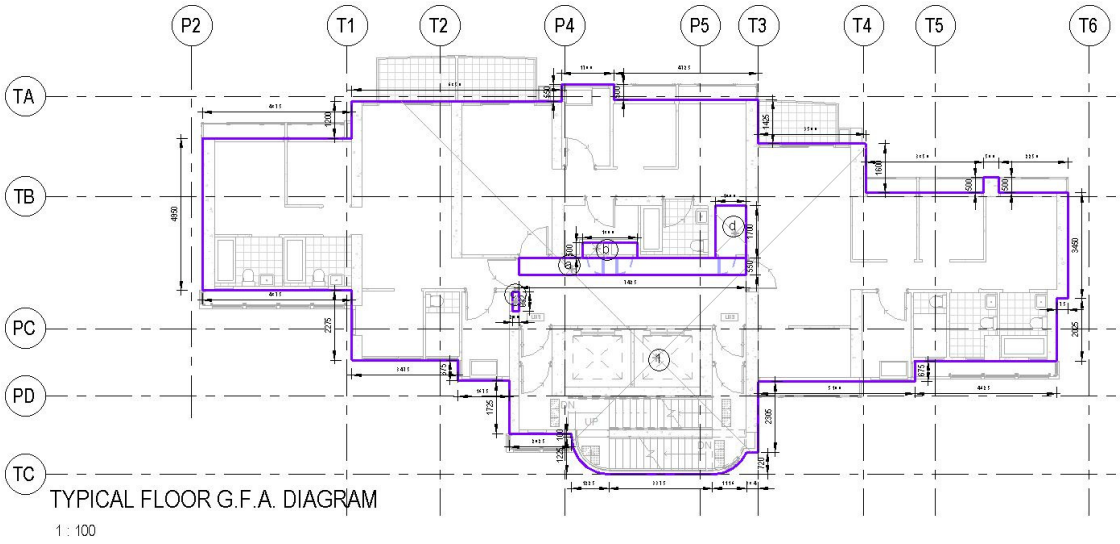
BIM Example

PERMITTED NON-DOMESTIC SC (%):	60
PERMITTED DOMESTIC SC (%):	33.33
PERMITTED NON-DOMESTIC PR:	15
PERMITTED DOMESTIC PR:	8

Format	Calculations	Statutory Submittal	Domestic GFA outline per floor	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 23 (3)(a)			
Regulation Link	N/A			
Objectives	N/A			
Logics	(3) (a) Subject to sub-paragraph (b), for the purposes of regulations 19, 20, 21 and 22, the gross floor area of a building shall be the area contained within the external walls of the building measured at each floor level (including any floor below the level of the ground), together with the area of each balcony in the building, which shall be calculated from the overall dimensions of the balcony (including the thickness of the sides thereof), and the thickness of the external walls of the building.			
Specifications	Demarcate area on an area diagram view			
BIM Approach	Use "Area Plan" to Demarcate GFA			

Relevant Table

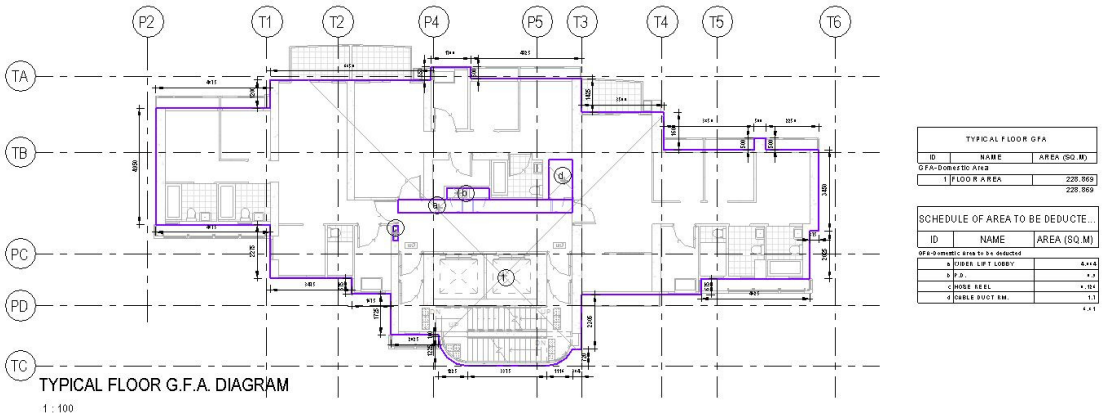
BIM Example



Format	Calculations	Statutory Submittal	Domestic GFA concessions per floor (Domestic area to be deducted from area calculations)	**Area of Concern**
PNAP	N/A			Gross Floor Area
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	N/A			
Regulation Link	N/A			
Objectives	N/A			
Logics	...exempting or disregarding green and amenity features and non-mandatory / non- essential plant rooms and services from gross floor area and/or site coverage calculations...			
Specifications	Disregarded GFA(D) + exempted GFA(D)			
BIM Approach	Use "Schedule" to add up disregarded GFA(D) and exempted GFA(D)			

Relevant Table

BIM Example



Format	Calculations	Statutory Submittal	Actual domestic GFA per floor	Area of Concern

PNAP	APP-151, ADM-2	Gross Floor Area
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/ADM/ADM002.pdf	
Building Ordinance/ Regulations/ COP	N/A	
Regulation Link	http://www.legislation.gov.hk/blis_ind.nsf/CURALLENGDOC/5B99D12A51151F0C482579C900301807?OpenDocument	
Objectives	N/A	
Logics	Domestic GFA outline per floor - domestic GFA concession per floor	
Specifications	Domestic GFA outline per floor - domestic GFA concession per floor	
BIM Approach	Use "Schedule" to calculate domestic GFA outline per floor minus domestic GFA concession per floor	

Relevant Table

BIM Example

(C) ACTUAL TOTAL G.F.A. CALCULATION FOR DOMESTIC:

DOMESTIC ACCOMMODATION	
OVERALL DOMESTIC GFA (SQ.M):	5451.568
OVERALL NON-DOMESTIC GFA (SQ.M):	128.613
OVERALL TOTAL GFA (SQ.M):	5451.568+128.613
	5580.181
DOMESTIC LIFT SHAFT AREA (SQ.M):	212.420
MAXIMUM EXEMPTED GFA (SQ.M):	5580.181x3.5%
	195.306
ACTUAL EXEMPTED GFA (SQ.M):	212.420-5580.181x2.5%
	72.915 (MAX.195.306)
ACTUAL DOMESTIC GFA (SQ.M):	5451.568-72.915
	5378.653

Format	Calculations	Statutory Submittal	Actual domestic GFA	Area of Concern

PNAP	APP-151, ADM-2	Gross Floor Area
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/ADM/ADM002.pdf	
Building Ordinance/ Regulations/ COP	Cap 123F reg 20, 21, 22, 23 & 23A	
Regulation Link	http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/25C2868DA2669A12482575EE003F079B/$FILE/CAP_123F_e_b5.pdf	
Objectives	N/A	
Logics	Adding up of Actual Domestic GFA of all floors	
Specifications	Adding up of Actual Domestic GFA of all floors	
BIM Approach	Use "Schudule" to add up of Actual Domestic GFA of all floors	

Relevant Table

BIM Example

(C) ACTUAL TOTAL G.F.A. CALCULATION FOR DOMESTIC:

DOMESTIC ACCOMMODATION	
OVERALL DOMESTIC GFA (SQ.M):	5451.568
OVERALL NON-DOMESTIC GFA (SQ.M):	128.613
OVERALL TOTAL GFA (SQ.M):	5451.568+128.613
	5580.181
DOMESTIC LIFT SHAFT AREA (SQ.M):	212.420
MAXIMUM EXEMPTED GFA (SQ.M):	5580.181x3.5%
	195.306
ACTUAL EXEMPTED GFA (SQ.M):	212.420-5580.181x2.5%
	72.915 (MAX.195.306)
ACTUAL DOMESTIC GFA (SQ.M):	5451.568-72.915
	5378.653

Format	Calculations	Statutory Submittal	Actual domestic plot ratio	Area of Concern
PNAP	N/A			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 21 (3)			
Regulation Link	N/A			
Objectives	N/A			
Logics	The plot ratio of a building shall be obtained by dividing the gross floor area of the building by the area of the site on which the building is erected.			
Specifications	Actual domestic GFA / Site area			
BIM Approach	Use "Schedule" to get the result of Actual domestic GFA / Site area			

Relevant Table

BIM Example

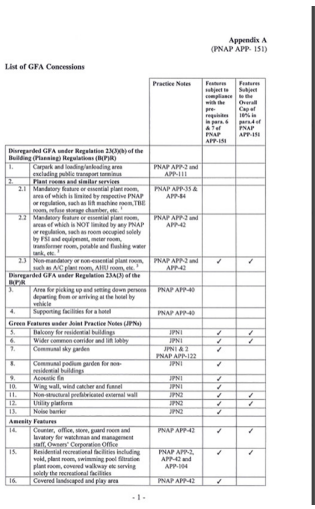
ACTUAL DOMESTIC PR: 5378.653/706.46

7.614<7.903

Format	Calculations	Statutory Submittal	Disregarded Gross Floor Area	Area of Concern

PNAP	APP-151, ADM-2	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/signed/APP151se.pdf	
Building Ordinance/ Regulations/ COP	Cap 123F reg 23(3)(b)	
Regulation Link	http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/25C2868DA2669A12482575EE003F079B/$FILE/CAP_123F_e_b5.pdf	
Objectives	N/A	
Logics	In determining the gross floor area for the purposes of regulations 20, 21 and 22, the Building Authority may disregard any floor space that he is satisfied is constructed or intended to be used solely for parking motor vehicles, loading or unloading of motor vehicles, or for refuse storage chambers, refuse storage and material recovery chambers, material recovery chambers, refuse storage and material recovery rooms, refuse chutes, refuse hopper rooms and other types of facilities provided to facilitate the separation of refuse to the satisfaction of the Building Authority, or for access facilities for telecommunications and broadcasting services, or occupied solely by machinery or equipment for any lift, air-conditioning or heating system or any similar service. (L.N. 406 of 1987; 39 of 2000 s. 7)	
Specifications	Demarcate area on an area diagram view and list out	
BIM Approach	Use "Area Plan" to demarcate area and scheule to list out	

Relevant Table

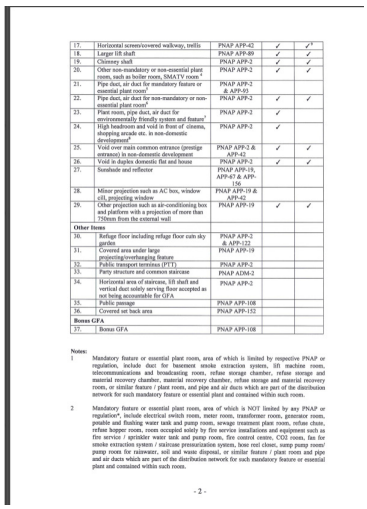


Appendix A
(PNAP APP- 151)

List of GFA Concessions

		Practice Notes	Features subject to compliance with the pre-requisites in para. 6 & 7 of PNAP APP-151	Features Subject to Overall Cap of 10% in para.4 of PNAP APP-151
Disregarded GFA under Regulation 23(3)(b) of the Building (Planning) Regulations (B(P)R)				
1.	Carpark and loading/unloading area excluding public transport terminus	PNAP APP-2 and APP-111		
2.	**Plant rooms and similar services**			
2.1	Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, such as lift machine room,TBE room, refuse storage chamber, etc. [1]	PNAP APP-35 & APP-84		
2.2	Mandatory feature or essential plant room, areas of which is NOT limited by any PNAP or regulation, such as room occupied solely by FSI and equipment, meter room, transformer room, potable and flushing water tank, etc. [2]	PNAP APP-2 and APP-42		
2.3	Non-mandatory or non-essential plant room, such as A/C plant room, AHU room, etc. [3]	PNAP APP-2 and APP-42	✓	✓
Disregarded GFA under Regulation 23A(3) of the B(P)R				
3.	Area for picking up and setting down persons departing from or arriving at the hotel by vehicle	PNAP APP-40		
4.	Supporting facilities for a hotel	PNAP APP-40		
Green Features under Joint Practice Notes (JPNs)				
5.	Balcony for residential buildings	JPN1	✓	✓
6.	Wider common corridor and lift lobby	JPN1	✓	✓
7.	Communal sky garden	JPN1 & 2 PNAP APP-122	✓	
8.	Communal podium garden for non-residential buildings	JPN1	✓	
9.	Acoustic fin	JPN1	✓	
10.	Wing wall, wind catcher and funnel	JPN1	✓	
11.	Non-structural prefabricated external wall	JPN2	✓	✓
12.	Utility platform	JPN2	✓	✓
13.	Noise barrier	JPN2	✓	
Amenity Features				
14.	Counter, office, store, guard room and lavatory for watchman and management staff, Owners' Corporation Office	PNAP APP-42	✓	✓
15.	Residential recreational facilities including void, plant room, swimming pool filtration plant room, covered walkway etc serving solely the recreational facilities	PNAP APP-2, APP-42 and APP-104	✓	✓
16.	Covered landscaped and play area	PNAP APP-42	✓	

- 1 -



17.	Horizontal screen/covered walkway, trellis	PNAP APP-42	✓	✓[3]
18.	Larger lift shaft	PNAP APP-89	✓	✓
19.	Chimney shaft	PNAP APP-2	✓	✓
20.	Other non-mandatory or non-essential plant room, such as boiler room, SMATV room [3]	PNAP APP-2	✓	✓
21.	Pipe duct, air duct for mandatory feature or essential plant room[3]	PNAP APP-2 & APP-95		
22.	Pipe duct, air duct for non-mandatory or non-essential plant room[3]	PNAP APP-2	✓	✓
23.	Plant room, pipe duct, air duct for environmentally friendly system and feature[3]	PNAP APP-2	✓	
24.	High headroom and void in front of cinema, shopping arcade etc. in non-domestic development[4]	PNAP APP-2	✓	
25.	Void over main common entrance (prestige entrance) in non-domestic development	PNAP APP-2 & APP-42	✓	✓
26.	Void in duplex domestic flat and house	PNAP APP-2	✓	✓
27.	Sunshade and reflector	PNAP APP-19, APP-67 & APP-156		
28.	Minor projection such as AC box, window sill, projecting window	PNAP APP-19 & APP-42		
29.	Other projection such as air-conditioning box and platform with a projection of more than 750mm from the external wall	PNAP APP-19	✓	✓
Other Items				
30.	Refuge floor including refuge floor cum sky garden	PNAP APP-2 & APP-122		
31.	Covered area under large projecting/overhanging feature	PNAP APP-19		
32.	Public transport terminus (PTT)	PNAP APP-2		
33.	Party structure and common staircase	PNAP ADM-2		
34.	Horizontal area of staircase, lift shaft and vertical duct solely serving floor accepted as not being accountable for GFA	PNAP APP-2		
35.	Public passage	PNAP APP-108		
36.	Covered set back area	PNAP APP-152		
Bonus GFA				
37.	Bonus GFA	PNAP APP-108		

Notes:

1 Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, include duct for basement smoke extraction system, lift machine room, telecommunications and broadcasting room, refuse storage chamber, refuse storage and material recovery chamber, material recovery chamber, refuse storage and material recovery room, or similar feature / plant room, and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

2 Mandatory feature or essential plant room, area of which is NOT limited by any PNAP or regulation*, include electrical switch room, meter room, transformer room, generator room, potable and flushing water tank and pump room, sewage treatment plant room, refuse chute, refuse hopper room, room occupied solely by fire service installations and equipment such as fire service / sprinkler water tank and pump room, fire control centre, CO2 room, fan for smoke extraction system / staircase pressurization system, hose reel closet, sump pump room/ pump room for rainwater, soil and waste disposal, or similar feature / plant room and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

- 2 -

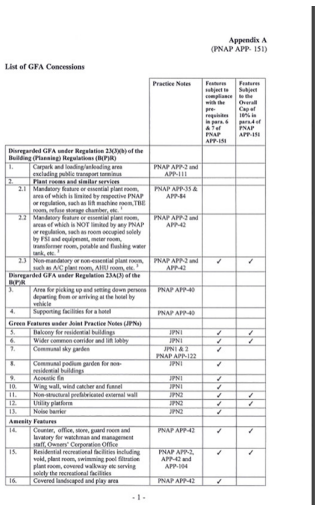
BIM Example

AREA OF GFA CONCESSIONS	
Name	AREA (SQ.M)
TBE ROOM	23.455 m²
POTABLE & FLUSHING WATER TANK TRANSFER PUMP ROOM	37.307 m²
ELECTRICAL ROOM	9.720 m²
MAIN SWITCH ROOM	20.494 m²
TRANSFORMER ROOM	25.753 m²
TRANSFORMER ROOM	22.446 m²
SPRINKLER PUMP RM.	27.943 m²
ELECTRICAL ROOM	3.950 m²
FILTRATION PLANT ROOM	49.183 m²
CLEANSING WATER PUMP RM	19.653 m²
WATER METER RM.	3.500 m²
ELECT. RM.	2.849 m²
ELEC. RM.	1.457 m²
EMERGENCY GENERATOR ROOM	25.980 m²
NON-ESSENTIAL GENEARATOR RM.	16.745 m²
LOADING/ UNLOADING	24.500 m²
METER ROOM	2.821 m²
REFUSE STORAGE MATERIAL RECOVERY CHAMBER	13.517 m²
METER ROOM	2.010 m²
TOTAL	333.284 m²

Format	Calculations	Statutory Submittal	Exempted GFA of Green Features under JPN 1	Area of Concern

PNAP	JPN 1, APP-151, ADM-2	3.4.2 Checking of GFA
PNAP Link	N/A	
Building Ordinance/ Regulations/ COP	N/A	
Regulation Link	N/A	
Objectives	...The industry is encouraged to explore ways to improve environmental performance during the construction and throughout the life cycle of new buildings by incorporating... a list of green features that may, subject to the conditions specified in subsequent paragraphs, be exempted from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations...	
Logics	The following green features may upon application and subject to conditions be excluded from GFA and/or SC calculations under the Buildings Ordinance: (a) Balconies for residential buildings; (b) Wider common corridors and lift lobbies for residential buildings; (c)Communal sky gardens for residential buildings; (d)Communal podium gardens for non-residential buildings (e) Acoustic fins; and (f) Wing walls, wind catchers and funnels.	
Specifications	Demarcate area on an area diagram view and list out	
BIM Approach	Use "Area plan" to demarcate area and scheule to list out	

Relevant Table

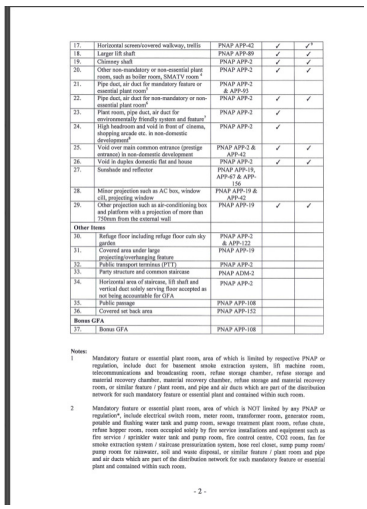


Appendix A
(PNAP APP- 151)

List of GFA Concessions

		Practice Notes	Features subject to compliance with the pre-requisites in para. 6 & 7 of PNAP APP-151	Features Subject to Overall Cap of 10% in para.4 of PNAP APP-151
Disregarded GFA under Regulation 23(3)(b) of the Building (Planning) Regulations (B(P)R)				
1.	Carpark and loading/unloading area excluding public transport terminus	PNAP APP-2 and APP-111		
2.	**Plant rooms and similar services**			
2.1	Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, such as lift machine room,TBE room, refuse storage chamber, etc. [1]	PNAP APP-35 & APP-84		
2.2	Mandatory feature or essential plant room, areas of which is NOT limited by any PNAP or regulation, such as room occupied solely by FSI and equipment, meter room, transformer room, potable and flushing water tank, etc. [2]	PNAP APP-2 and APP-42		
2.3	Non-mandatory or non-essential plant room, such as A/C plant room, AHU room, etc. [3]	PNAP APP-2 and APP-42	✓	✓
Disregarded GFA under Regulation 23A(3) of the B(P)R				
3.	Area for picking up and setting down persons departing from or arriving at the hotel by vehicle	PNAP APP-40		
4.	Supporting facilities for a hotel	PNAP APP-40		
Green Features under Joint Practice Notes (JPNs)				
5.	Balcony for residential buildings	JPN1	✓	✓
6.	Wider common corridor and lift lobby	JPN1	✓	✓
7.	Communal sky garden	JPN1 & 2 PNAP APP-122	✓	
8.	Communal podium garden for non-residential buildings	JPN1	✓	
9.	Acoustic fin	JPN1	✓	
10.	Wing wall, wind catcher and funnel	JPN1	✓	
11.	Non-structural prefabricated external wall	JPN2	✓	✓
12.	Utility platform	JPN2	✓	✓
13.	Noise barrier	JPN2	✓	
Amenity Features				
14.	Counter, office, store, guard room and lavatory for watchman and management staff, Owners' Corporation Office	PNAP APP-42	✓	✓
15.	Residential recreational facilities including void, plant room, swimming pool filtration plant room, covered walkway etc serving solely the recreational facilities	PNAP APP-2, APP-42 and APP-104	✓	✓
16.	Covered landscaped and play area	PNAP APP-42	✓	

- 1 -



17.	Horizontal screen/covered walkway, trellis	PNAP APP-42	✓	✓[3]
18.	Larger lift shaft	PNAP APP-89	✓	✓
19.	Chimney shaft	PNAP APP-2	✓	✓
20.	Other non-mandatory or non-essential plant room, such as boiler room, SMATV room [3]	PNAP APP-2	✓	✓
21.	Pipe duct, air duct for mandatory feature or essential plant room[3]	PNAP APP-2 & APP-95		
22.	Pipe duct, air duct for non-mandatory or non-essential plant room[3]	PNAP APP-2	✓	✓
23.	Plant room, pipe duct, air duct for environmentally friendly system and feature[3]	PNAP APP-2	✓	
24.	High headroom and void in front of cinema, shopping arcade etc. in non-domestic development[4]	PNAP APP-2	✓	
25.	Void over main common entrance (prestige entrance) in non-domestic development	PNAP APP-2 & APP-43	✓	✓
26.	Void in duplex domestic flat and house	PNAP APP-2	✓	✓
27.	Sunshade and reflector	PNAP APP-19, APP-67 & APP-156		
28.	Minor projection such as AC box, window sill, projecting window	PNAP APP-19 & APP-42		
29.	Other projection such as air-conditioning box and platform with a projection of more than 750mm from the external wall	PNAP APP-19	✓	✓
Other Items				
30.	Refuge floor including refuge floor cum sky garden	PNAP APP-2 & APP-122		
31.	Covered area under large projecting/overhanging feature	PNAP APP-19		
32.	Public transport terminus (PTT)	PNAP APP-2		
33.	Party structure and common staircase	PNAP ADM-2		
34.	Horizontal area of staircase, lift shaft and vertical duct solely serving floor accepted as not being accountable for GFA	PNAP APP-2		
35.	Public passage	PNAP APP-108		
36.	Covered set back area	PNAP APP-152		
Bonus GFA				
37.	Bonus GFA	PNAP APP-108		

Notes:

1 Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, include duct for basement smoke extraction system, lift machine room, telecommunications and broadcasting room, refuse storage chamber, refuse storage and material recovery chamber, material recovery chamber, refuse storage and material recovery room, or similar feature / plant room, and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

2 Mandatory feature or essential plant room, area of which is NOT limited by any PNAP or regulation*, include electrical switch room, meter room, transformer room, generator room, potable and flushing water tank and pump room, sewage treatment plant room, refuse chute, refuse hopper room, room occupied solely by fire service installations and equipment such as fire service / sprinkler water tank and pump room, fire control centre, CO2 room, fan for smoke extraction system / staircase pressurization system, hose reel closet, sump pump room/ pump room for rainwater, soil and waste disposal, or similar feature / plant room and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

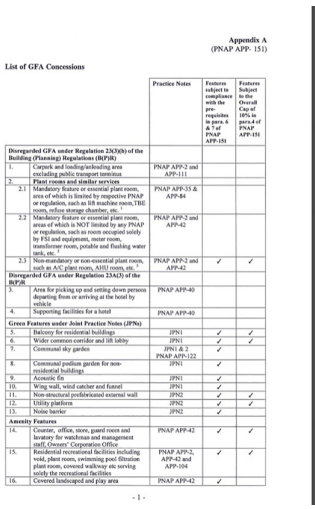
- 2 -

BIM Example

AREA OF GFA CONCESSIONS	
Name	AREA (SQ.M)
TBE ROOM	23.455 m²
POTABLE & FLUSHING WATER TANK TRANSFER PUMP ROOM	37.307 m²
ELECTRICAL ROOM	9.720 m²
MAIN SWITCH ROOM	20.494 m²
TRANSFORMER ROOM	25.753 m²
TRANSFORMER ROOM	22.446 m²
SPRINKLER PUMP RM.	27.943 m²
ELECTRICAL ROOM	3.950 m²
FILTRATION PLANT ROOM	49.183 m²
CLEANSING WATER PUMP RM	19.653 m²
WATER METER RM.	3.500 m²
ELECT. RM.	2.849 m²
ELEC. RM.	1.457 m²
EMERGENCY GENERATOR ROOM	25.980 m²
NON-ESSENTIAL GENEARATOR RM.	16.745 m²
LOADING/ UNLOADING	24.500 m²
METER ROOM	2.821 m²
REFUSE STORAGE MATERIAL RECOVERY CHAMBER	13.517 m²
METER ROOM	2.010 m²
TOTAL	333.284 m²

Format	Calculations	Statutory Submittal	Exempted GFA of Green Features under JPN 2	Area of Concern
PNAP	JPN 2, APP-151, ADM-2			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	N/A			
Regulation Link	N/A			
Objectives	...The industry is encouraged to explore ways to improve environmental performance during the construction and throughout the life cycle of new buildings by incorporating... a list of green features that may, subject to the conditions specified in subsequent paragraphs, be exempted from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations...			
Logics	2. The following green features may upon application and subject to conditions be exempted from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations under the Buildings Ordinance: (a) Non-structural prefabricated external walls; (b) Utility platforms for residential buildings; (c) Noise barriers; and (d) Communal sky gardens for non-residential buildings.			
Specifications	Demarcate area on an area diagram view and list out			
BIM Approach	Use "Area Plan" to demarcate area and Schedule to list out			

Relevant Table



Appendix A
(PNAP APP- 151)

List of GFA Concessions

		Practice Notes	Features subject to compliance with the pre-requisites in para. 6 & 7 of PNAP APP-151	Features Subject to Overall Cap of 10% in para.4 of PNAP APP-151
Disregarded GFA under Regulation 23(3)(b) of the Building (Planning) Regulations (B(P)R)				
1.	Carpark and loading/unloading area excluding public transport terminus	PNAP APP-2 and APP-111		
2.	**Plant rooms and similar services**			
2.1	Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, such as lift machine room,TBE room, refuse storage chamber, etc. [1]	PNAP APP-35 & APP-84		
2.2	Mandatory feature or essential plant room, areas of which is NOT limited by any PNAP or regulation, such as room occupied solely by FSI and equipment, meter room, transformer room, potable and flushing water tank, etc. [2]	PNAP APP-2 and APP-42		
2.3	Non-mandatory or non-essential plant room, such as A/C plant room, AHU room, etc. [3]	PNAP APP-2 and APP-42	✓	✓
Disregarded GFA under Regulation 23A(3) of the B(P)R				
3.	Area for picking up and setting down persons departing from or arriving at the hotel by vehicle	PNAP APP-40		
4.	Supporting facilities for a hotel	PNAP APP-40		
Green Features under Joint Practice Notes (JPNs)				
5.	Balcony for residential buildings	JPN1	✓	✓
6.	Wider common corridor and lift lobby	JPN1	✓	✓
7.	Communal sky garden	JPN1 & 2 PNAP APP-122	✓	
8.	Communal podium garden for non-residential buildings	JPN1	✓	
9.	Acoustic fin	JPN1	✓	
10.	Wing wall, wind catcher and funnel	JPN1	✓	
11.	Non-structural prefabricated external wall	JPN2	✓	✓
12.	Utility platform	JPN2	✓	✓
13.	Noise barrier	JPN2	✓	
Amenity Features				
14.	Counter, office, store, guard room and lavatory for watchman and management staff, Owners' Corporation Office	PNAP APP-42	✓	✓
15.	Residential recreational facilities including void, plant room, swimming pool filtration plant room, covered walkway etc serving solely the recreational facilities	PNAP APP-2, APP-42 and APP-104	✓	✓
16.	Covered landscaped and play area	PNAP APP-42	✓	

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17.	Horizontal screen/covered walkway, trellis	PNAP APP-42	✓	✓[3]
18.	Larger lift shaft	PNAP APP-89	✓	✓
19.	Chimney shaft	PNAP APP-2	✓	✓
20.	Other non-mandatory or non-essential plant room, such as boiler room, SMATV room [3]	PNAP APP-2	✓	✓
21.	Pipe duct, air duct for mandatory feature or essential plant room[3]	PNAP APP-2 & APP-95		
22.	Pipe duct, air duct for non-mandatory or non-essential plant room[3]	PNAP APP-2	✓	✓
23.	Plant room, pipe duct, air duct for environmentally friendly system and feature[3]	PNAP APP-2	✓	
24.	High headroom and void in front of cinema, shopping arcade etc. in non-domestic development[4]	PNAP APP-2	✓	
25.	Void over main common entrance (prestige entrance) in non-domestic development	PNAP APP-2 & APP-42	✓	✓
26.	Void in duplex domestic flat and house	PNAP APP-2	✓	✓
27.	Sunshade and reflector	PNAP APP-19, APP-67 & APP-156		
28.	Minor projection such as AC box, window sill, projecting window	PNAP APP-19 & APP-42		
29.	Other projection such as air-conditioning box and platform with a projection of more than 750mm from the external wall	PNAP APP-19	✓	✓
Other Items				
30.	Refuge floor including refuge floor cum sky garden	PNAP APP-2 & APP-122		
31.	Covered area under large projecting/overhanging feature	PNAP APP-19		
32.	Public transport terminus (PTT)	PNAP APP-2		
33.	Party structure and common staircase	PNAP ADM-2		
34.	Horizontal area of staircase, lift shaft and vertical duct solely serving floor accepted as not being accountable for GFA	PNAP APP-2		
35.	Public passage	PNAP APP-108		
36.	Covered set back area	PNAP APP-152		
Bonus GFA				
37.	Bonus GFA	PNAP APP-108		

Notes:

1 Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, include duct for basement smoke extraction system, lift machine room, telecommunications and broadcasting room, refuse storage chamber, refuse storage and material recovery chamber, material recovery chamber, refuse storage and material recovery room, or similar feature / plant room, and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

2 Mandatory feature or essential plant room, area of which is NOT limited by any PNAP or regulation*, include electrical switch room, meter room, transformer room, generator room, potable and flushing water tank and pump room, sewage treatment plant room, refuse chute, refuse hopper room, room occupied solely by fire service installations and equipment such as fire service / sprinkler water tank and pump room, fire control centre, CO2 room, fan for smoke extraction system / staircase pressurization system, hose reel closet, sump pump room/ pump room for rainwater, soil and waste disposal, or similar feature / plant room and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

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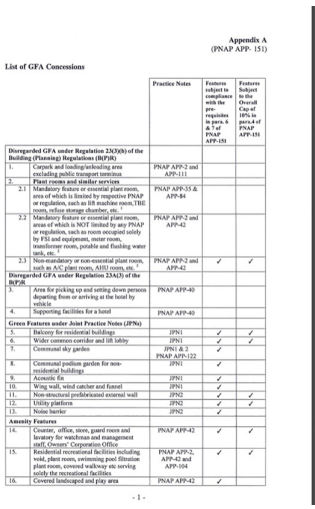
BIM Example

AREA OF GFA CONCESSIONS	
Name	AREA (SQ.M)
TBE ROOM	23.455 m²
POTABLE & FLUSHING WATER TANK TRANSFER PUMP ROOM	37.307 m²
ELECTRICAL ROOM	9.720 m²
MAIN SWITCH ROOM	20.494 m²
TRANSFORMER ROOM	25.753 m²
TRANSFORMER ROOM	22.446 m²
SPRINKLER PUMP RM.	27.943 m²
ELECTRICAL ROOM	3.950 m²
FILTRATION PLANT ROOM	49.183 m²
CLEANSING WATER PUMP RM	19.653 m²
WATER METER RM.	3.500 m²
ELECT. RM.	2.849 m²
ELEC. RM.	1.457 m²
EMERGENCY GENERATOR ROOM	25.980 m²
NON-ESSENTIAL GENEARATOR RM.	16.745 m²
LOADING/ UNLOADING	24.500 m²
METER ROOM	2.821 m²
REFUSE STORAGE MATERIAL RECOVERY CHAMBER	13.517 m²
METER ROOM	2.010 m²
TOTAL	333.284 m²

Format	Calculations	Statutory Submittal	Exempted GFA of Amenity Features	Area of Concern
PNAP	APP-42, APP-151, ADM-2			3.4.2 Checking of GFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	N/A			
Regulation Link	N/A			
Objectives	Amenity features are loosely defined as those elements of design that whilst not statutory requirements are desirable to improve the standard and quality of a building or a development project. Provision of such features enhances the sense of care and pride for buildings, thereby inducing proper maintenance and repair.			
Logics	Refer relevant PNAPs			
Specifications	Demarcate area on an area diagram view and list out			
BIM Approach	Use "Area Plan" to demarcate area and Schedule to list out			

Relevant Table

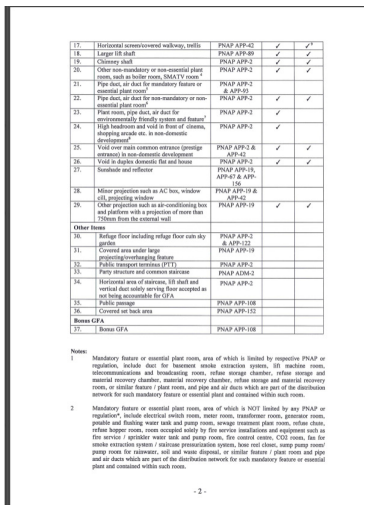


Appendix A
(PNAP APP- 151)

List of GFA Concessions

		Practice Notes	Features subject to compliance with the pre-requisites in para. 6 & 7 of PNAP APP-151	Features Subject to Overall Cap of 10% in para.4 of PNAP APP-151
Disregarded GFA under Regulation 23(3)(b) of the Building (Planning) Regulations (B(P)R)				
1.	Carpark and loading/unloading area excluding public transport terminus	PNAP APP-2 and APP-111		
2.	**Plant rooms and similar services**			
2.1	Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, such as lift machine room,TBE room, refuse storage chamber, etc. [1]	PNAP APP-35 & APP-84		
2.2	Mandatory feature or essential plant room, areas of which is NOT limited by any PNAP or regulation, such as room occupied solely by FSI and equipment, meter room, transformer room, potable and flushing water tank, etc. [2]	PNAP APP-2 and APP-42		
2.3	Non-mandatory or non-essential plant room, such as A/C plant room, AHU room, etc. [3]	PNAP APP-2 and APP-42	✓	✓
Disregarded GFA under Regulation 23A(3) of the B(P)R				
3.	Area for picking up and setting down persons departing from or arriving at the hotel by vehicle	PNAP APP-40		
4.	Supporting facilities for a hotel	PNAP APP-40		
Green Features under Joint Practice Notes (JPNs)				
5.	Balcony for residential buildings	JPN1	✓	✓
6.	Wider common corridor and lift lobby	JPN1	✓	✓
7.	Communal sky garden	JPN1 & 2 PNAP APP-122	✓	
8.	Communal podium garden for non-residential buildings	JPN1	✓	
9.	Acoustic fin	JPN1	✓	
10.	Wing wall, wind catcher and funnel	JPN1	✓	
11.	Non-structural prefabricated external wall	JPN2	✓	✓
12.	Utility platform	JPN2	✓	✓
13.	Noise barrier	JPN2	✓	
Amenity Features				
14.	Counter, office, store, guard room and lavatory for watchman and management staff, Owners' Corporation Office	PNAP APP-42	✓	✓
15.	Residential recreational facilities including void, plant room, swimming pool filtration plant room, covered walkway etc serving solely the recreational facilities	PNAP APP-2, APP-42 and APP-104	✓	✓
16.	Covered landscaped and play area	PNAP APP-42	✓	

- 1 -



17.	Horizontal screen/covered walkway, trellis	PNAP APP-42	✓	✓[3]
18.	Larger lift shaft	PNAP APP-89	✓	✓
19.	Chimney shaft	PNAP APP-2	✓	✓
20.	Other non-mandatory or non-essential plant room, such as boiler room, SMATV room [3]	PNAP APP-2	✓	✓
21.	Pipe duct, air duct for mandatory feature or essential plant room[1]	PNAP APP-2 & APP-95		
22.	Pipe duct, air duct for non-mandatory or non-essential plant room[3]	PNAP APP-2	✓	✓
23.	Plant room, pipe duct, air duct for environmentally friendly system and feature[3]	PNAP APP-2	✓	
24.	High headroom and void in front of cinema, shopping arcade etc. in non-domestic development[4]	PNAP APP-2	✓	
25.	Void over main common entrance (prestige entrance) in non-domestic development	PNAP APP-2 & APP-42	✓	✓
26.	Void in duplex domestic flat and house	PNAP APP-2	✓	✓
27.	Sunshade and reflector	PNAP APP-19, APP-67 & APP-156		
28.	Minor projection such as AC box, window sill, projecting window	PNAP APP-19 & APP-42		
29.	Other projection such as air-conditioning box and platform with a projection of more than 750mm from the external wall	PNAP APP-19	✓	✓
Other Items				
30.	Refuge floor including refuge floor cum sky garden	PNAP APP-2 & APP-122		
31.	Covered area under large projecting/overhanging feature	PNAP APP-19		
32.	Public transport terminus (PTT)	PNAP APP-2		
33.	Party structure and common staircase	PNAP ADM-2		
34.	Horizontal area of staircase, lift shaft and vertical duct solely serving floor accepted as not being accountable for GFA	PNAP APP-2		
35.	Public passage	PNAP APP-108		
36.	Covered set back area	PNAP APP-152		
Bonus GFA				
37.	Bonus GFA	PNAP APP-108		

Notes:

1 Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, include duct for basement smoke extraction system, lift machine room, telecommunications and broadcasting room, refuse storage chamber, refuse storage and material recovery chamber, material recovery chamber, refuse storage and material recovery room, or similar feature / plant room, and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

2 Mandatory feature or essential plant room, area of which is NOT limited by any PNAP or regulation*, include electrical switch room, meter room, transformer room, generator room, potable and flushing water tank and pump room, sewage treatment plant room, refuse chute, refuse hopper room, room occupied solely by fire service installations and equipment such as fire service / sprinkler water tank and pump room, fire control centre, CO2 room, fan for smoke extraction system / staircase pressurization system, hose reel closet, sump pump room/ pump room for rainwater, soil and waste disposal, or similar feature / plant room and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

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BIM Example

AREA OF GFA CONCESSIONS	
Name	AREA (SQ.M)
TBE ROOM	23.455 m²
POTABLE & FLUSHING WATER TANK TRANSFER PUMP ROOM	37.307 m²
ELECTRICAL ROOM	9.720 m²
MAIN SWITCH ROOM	20.494 m²
TRANSFORMER ROOM	25.753 m²
TRANSFORMER ROOM	22.446 m²
SPRINKLER PUMP RM.	27.943 m²
ELECTRICAL ROOM	3.950 m²
FILTRATION PLANT ROOM	49.183 m²
CLEANSING WATER PUMP RM	19.653 m²
WATER METER RM.	3.500 m²
ELECT. RM.	2.849 m²
ELEC. RM.	1.457 m²
EMERGENCY GENERATOR ROOM	25.980 m²
NON-ESSENTIAL GENEARATOR RM.	16.745 m²
LOADING/ UNLOADING	24.500 m²
METER ROOM	2.821 m²
REFUSE STORAGE MATERIAL RECOVERY CHAMBER	13.517 m²
METER ROOM	2.010 m²
TOTAL	333.284 m²

Format	Calculations	Statutory Submittal	Required Open Space	Area of Concern

PNAP	APP-132	3.4.2 Checking of GFA
PNAP Link	http://www.bd.gov.hk/english/documents/pnap/APP/APP132.pdf	
Building Ordinance/ Regulations/ COP	Cap 123F reg 25	
Regulation Link	http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/25C2868DA2669A12482575EE003F079B/$FILE/CAP_123F_e_b5.pdf	
Objectives	(1) (a) Every domestic building on a class A or B site or on a class C site shall have within the site an open space at the rear, or partly at the rear and partly at the side, at a level of not less than 150 mm below the floor of the lowermost storey in accordance with the Second Schedule:	
Logics	Lookup B(P)R second schedule	
Specifications	Lookup B(P)R second schedule X Roofed over area	
BIM Approach	Lookup B(P)R second schedule X Roofed over area	

Relevant Table

Item	Class of site	Open space required
1.	Class A site.	Not less than one-half of the roofed-over area of the building.
2.	Class B site.	Not less than one-third of the roofed-over area of the building.
3.	Class C site.	Not less than one-quarter of the roofed-over area of the building.

(G.N.A. 97 of 1962; L.N. 82 of 1963)

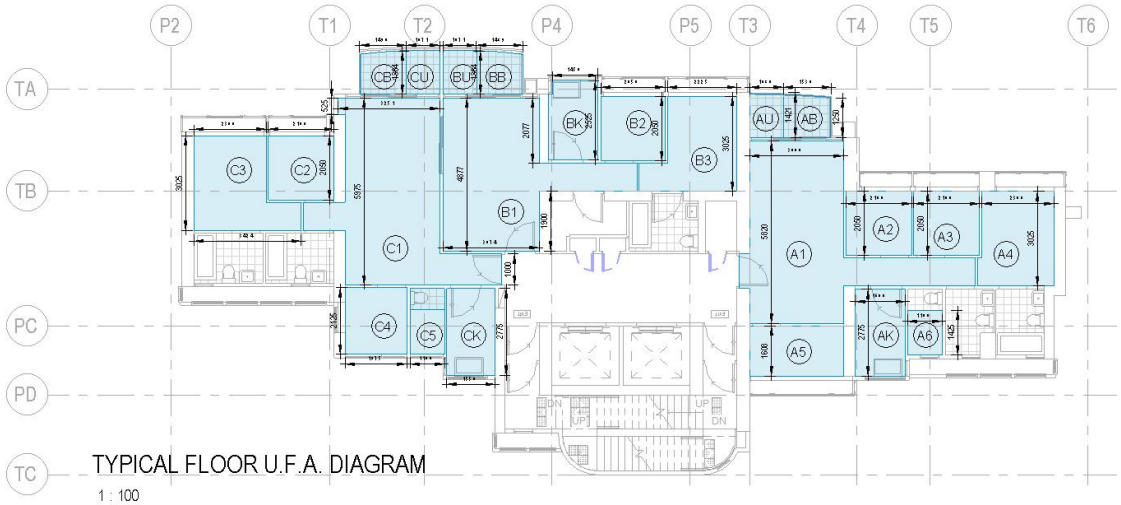
BIM Example

Format	Calculations	Statutory Submittal	Usable Floor Area	Area of Concern
PNAP	N/A			3.4.3.1 Checking of UFA
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Section 3			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf			
Objectives	N/A			
Logics	"Usable floor area" means the aggregate of the areas of the floor or floors in a storey or a building excluding, unless otherwise specified, any staircase, public circulation space, lift landings, lavatories, water-closets, kitchens in flats, and any space occupied by machinery for any lift, air-conditioning system or similar service provided for the building.			
Specifications	Demarcate internal room area on an area plan diagram view			
BIM Approach	Use "Room" tool to measure area & create Schedule			

Relevant Table

usable floor space (實用樓面空間) means any floor space other than staircases, staircase halls, lift landings, the space used in providing water-closet fitments, urinals and lavatory basins and the space occupied by machinery for any lift, air-conditioning system or similar service; (G.N.A. 97 of 1962)

BIM Example



Format	Calculations	Statutory Submittal	Use Classification	Area of Concern
PNAP	N/A			3.4.3 Checking of Means of Escape
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Table B1			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf			
Objectives	N/A			
Logics	"Use Classification" means the categories of use of premises stipulated in Table A1 of FS CODE 2011			
Specifications	Lookup FS CODE 2011Table A1			
BIM Approach	Lookup FS CODE 2011Table A1			

Relevant Table

Subsection A7 - Use Classification

Use Classifications are stipulated in Table A1.

Table A1: Use Classification

Types of Premises		Typical Examples / Interpretations
1. Residential	1a. House type dwellings	Single family house up to three storeys high.
	1b. Flats	Flats including serviced apartments.
	1c. Tenement houses	A building in the domestic part of which any living room, as a place for cooking or sleeping, is intended or adapted for the use of more than one tenant or sub-tenant.
2. Hotel and similar Transient Accommodation		Hotels, guesthouses, barracks, dormitories, hostels, boarding houses, motels, etc.
3. Institutional	3a. Health/child care facilities	Hospitals, purpose-built clinic, nurseries, child care centres, day care centres, drug dependent person treatment areas, homes for the elderly.
	3b. Detention and correctional centres	Detention centres, correctional centres, etc.
4. Commercial	4a. Business facilities	Offices and associated business spaces.
	4b. Mercantile facilities	Retail shops, markets, supermarkets, department stores, food courts, cafés, restaurants, lounges, bars and pubs, banking halls, betting halls, showrooms, etc.
5. Assembly	5a. Places of Public Entertainment	The uses listed in Places of Public Entertainment Ordinance (Cap. 172), such as cinemas, theatres, exhibition centres, stadia.
	5b. Educational establishments	Classrooms, lecture rooms, libraries and study rooms in schools, kindergarten, colleges or universities.
	5c. Transport facilities	Passenger terminals for air, rail, road or sea. Airports, bus termini, railway stations, etc.
	5d. Other Assembly Premises	Places of assembly not specifically listed in Type 5a-c, such as conference centres, skating rinks, gymnasia, churches, public halls and columbaria, etc.
6. Industrial	6a. Industrial workplaces	Industrial workplaces for manufacturing and processing any article, power generation facilities, depots, aircraft maintenance facilities, film production facilities, commercial kitchens, commercial laundries, commercial laboratories etc.
	6b. Warehouses	Container terminals, freight stations, warehouses for general goods storage and logistic centres.
	6c. Storage, manufacturing of hazardous/ dangerous goods premises	Storage or manufacturing premises for flammable goods, explosive goods, explosives production and flammable/hazardous chemical processing.
7. Carparks		Parking structure and garage, including car ports.
8. Plant rooms & the like		Mechanical and electrical plant rooms, IT equipment room, access facilities for telecommunication and broadcasting services etc.

BIM Example

LEVEL	NAME	CLASS
G/F	LOADING / UNLOADING	
G/F	MAIN ENTRANCE	1a (Residential - House type dwellings)
G/F	SHOP	4a (Commercial - Business facilities)
1/F	TRANSFER PUMP ROOM	
1/F	ELECTRICAL ROOM	
1/F	TBE ROOM	
1/F	MAIN SWITCH ROOM	
1/F	TRANSFORMER ROOM	
2/F	SPRINKLER PUMP RM.	
2/F	MAIN SWITCH ROOM	
2/F	TRANSFORMER ROOM	
3/F	FS PUMP RM.	
3/F	CLEANSING WATER PUMP RM	
5/F	E/M ROOM	
5/F	E/M ROOM	
5/F	E/M ROOM	
5/F	READING ROOM	5a (Assembly - Places of Public Entertainment)
5/F	SWIMMING POOL	5a (Assembly - Places of Public Entertainment)
5/F	GYMNASIUM	5d (Assembly - Other Assembly Premises)
6/F	E/M ROOM	
6/F	SKY GARDEN	
7/F LOWER FLOOR	REFUGE FLOOR	1a (Residential - House type dwellings)
7/F LOWER FLOOR	REFUGE FLOOR	1a (Residential - House type dwellings)
8/F	DOMESTIC	1b (Residential - Flats)
LIFT MACHINE ROOM LEVEL	LIFT MACHINE ROOM	
LIFT MACHINE ROOM LEVEL	METER ROOM	
EMERGENCY GENERATOR & WATER PUMP ROOM	LIFT MACHINE ROOM	
EMERGENCY GENERATOR & WATER PUMP ROOM	PUMP ROOM	

Format	Calculations	Statutory Submittal	Occupant Capacity of room, fire compartment or storey	Area of Concern
PNAP	N/A			3.4.5 Checking of Fire Compartment and FRC
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Table B1			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf			
Objectives	N/A			
Logics	"Occupant capacity" means the number of persons, which the room or storey or fire compartment of a building, for the purposes of this Code, is capable of holding. Provided that where there is on any storey the entrance to a maisonette, that storey shall, for the purpose of this definition, be deemed to include all floors of the maisonette.			
Specifications	Lookup table FS CODE 2011 Table B1			
BIM Approach	Lookup table FS CODE 2011 Table B1			

Relevant Table

Table B1: Assessment of Occupant Capacity

Use Classification	Type of Accommodation	Occupancy Factor (usable floor area in m^2 per person) or otherwise as specified
1b	Flats:	
	- with corridor or balcony access having five or more flats on each floor served by each staircase	4.5
	- flats not covered by the above	9
1c	Tenement houses	3
2	Boarding houses, hostels, hotels, motels, guesthouses	Number of bedspaces
	Dormitories	3
3a	Day care centres, nurseries, child care centres	4
	Hospitals (areas other than the patient care areas)	9
	Patient care areas	Number of bedspaces
3b	Detention and Correctional Centres	Number of bedspaces
4a	Offices	9
	- Board rooms, conference rooms, function rooms	10
	- Staff rooms	9
4b	Retail shops / Department Stores (including arcade and common areas)	
	Basement, G/F, 1/F & 2/F	3
	3rd floor & above	4.5

BIM Example

SCHEDULE OF MINIMUM NUMBER & WIDTH OF EXIT DOOR & EXIT ROUTE FROM EACH FLOOR

LEVEL	FLOOR CAPACITY	MIN. NO. OF EXIT ROUTE		MIN. TOTAL WIDTH OF				MIN. WIDTH OF EACH			
		REQ'D	PRO'D	EXIT DOORS		EXIT ROUTES		EXIT DOOR		EXIT ROUTE	
				REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D
5/F	64	2	2	1750	1750	2100	2100	850	875	1050	1050
8/F	39	2	2	1750		2100	2100	850		1050	1050

Format	Calculations	Statutory Submittal	Minimum number and width of exit doors and exit routes from a room, fire compartment or storey	Area of Concern
PNAP	N/A			3.4.3 Checking of Means of Escape
PNAP Link	http://N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Table B2			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf			
Objectives	N/A			
Logics	Base on Occupant Capacity, to look up COP 2011 Table B2			
Specifications	Lookup table FS CODE 2011 Table B2			
BIM Approach	Lookup table FS CODE 2011 Table B2			

Relevant Table

Table B2

Table B2: Minimum number and width of exit doors and exit routes from a room, fire compartment or storey

Occupant Capacity of room, fire compartment or storey (No. of persons)	Minimum No. of exit doors or exit routes	Minimum total width (in mm)		Minimum Width (in mm) of each	
		Exit doors	Exit routes	Exit door	Exit route
4- 30	1			750	1050
31-200	2	1750	2100	850	1050
201-300	2	2500	2500	1050	1050
301-500	2	3000	3000	1050	1050
501-750	3	4500	4500	1200	1200
751-1000	4	6000	6000	1200	1200
1001-1250	5	7500	7500	1350	1350
1251-1500	6	9000	9000	1350	1350
1501-1750	7	10500	10500	1500	1500
1751-2000	8	12000	12000	1500	1500
2001-2500	10	15000	15000	1500	1500
2501-3000	12	18000	18000	1500	1500
>3000 persons - the number of exit doors, exit routes and their width to be determined by the Building Authority					

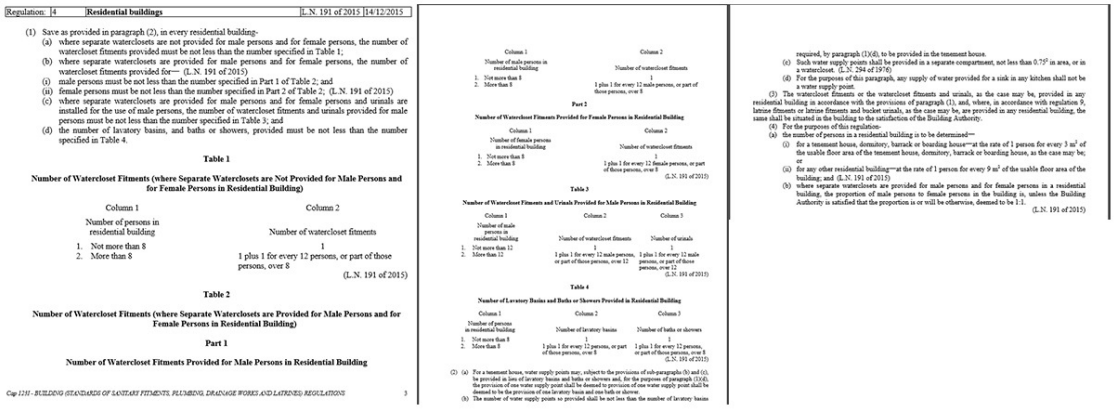
BIM Example

SCHEDULE OF MINIMUM NUMBER & WIDTH OF EXIT DOOR & EXIT ROUTE FROM EACH FLOOR

LEVEL	FLOOR CAPACITY	MIN. NO. OF EXIT ROUTE		MIN. TOTAL WIDTH OF				MIN. WIDTH OF EACH			
		REQ'D	PRO'D	EXIT DOORS		EXIT ROUTES		EXIT DOOR		EXIT ROUTE	
				REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D
5/F	64	2	2	1750	1750	2100	2100	850	875	1050	1050
8/F	39	2	2	1750		2100	2100	850		1050	1050

Format	Calculations	Statutory Submittal	Sanitary Fitment Provision	Area of Concern
PNAP	N/A			3.4.4 Checking of Sanitary Fitment Provision
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123I reg 4, 5, 6, 6A, 7, 7A, &B, 7C, 8			
Regulation Link	http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/182338FA79710018482575EE003F2DBE/$FILE/CAP_123I_e_b5.pdf			
Objectives	The number of watercloset fitments, urinals, lavatory basins, baths or showers, must not be less than the number specified their respective tables in the regulations.			
Logics	The use of area (factor) and the usable floor area determine the number of sanitary provision.			
Specifications	Lookup related regulation, Room area x factor (use) = Sanitary Fitment Provision of the area			
BIM Approach	Use "Schedule" to calculate the Sanitary Fitment required by the use and area of the Room, then create a Sanitary Fitment Schedule			

Relevant Table



Regulation: 4 | **Residential buildings** | L.N. 191 of 2015 | 14/12/2015

(1) Save as provided in paragraph (2), in every residential building-
(a) where separate waterclosets are not provided for male persons and for female persons, the number of watercloset fitments provided must be not less than the number specified in Table 1;
(b) where separate waterclosets are provided for male persons and for female persons, the number of watercloset fitments provided for— (L.N. 191 of 2015)
(i) male persons must be not less than the number specified in Part 1 of Table 2; and
(ii) female persons must be not less than the number specified in Part 2 of Table 2; (L.N. 191 of 2015)
(c) where separate waterclosets are provided for male persons and for female persons and urinals are installed for the use of male persons, the number of watercloset fitments and urinals provided for male persons must be not less than the number specified in Table 3; and
(d) the number of lavatory basins, and baths or showers, provided must be not less than the number specified in Table 4.

Table 1

Number of Watercloset Fitments (where Separate Waterclosets are Not Provided for Male Persons and for Female Persons in Residential Building)

Column 1	Column 2
Number of persons in residential building	Number of watercloset fitments
1. Not more than 8	1
2. More than 8	1 plus 1 for every 12 persons, or part of those persons, over 8

(L.N. 191 of 2015)

Table 2

Number of Watercloset Fitments (where Separate Waterclosets are Provided for Male Persons and for Female Persons in Residential Building)

Part 1

Number of Watercloset Fitments Provided for Male Persons in Residential Building

Column 1	Column 2
Number of male persons in residential building	Number of watercloset fitments
1. Not more than 8	1
2. More than 8	1 plus 1 for every 12 male persons, or part of those persons, over 8

Part 2

Number of Watercloset Fitments Provided for Female Persons in Residential Building

Column 1	Column 2
Number of female persons in residential building	Number of watercloset fitments
1. Not more than 8	1
2. More than 8	1 plus 1 for every 12 female persons, or part of those persons, over 8

(L.N. 191 of 2015)

Table 3

Number of Watercloset Fitments and Urinals Provided for Male Persons in Residential Building

Column 1	Column 2	Column 3
Number of male persons in residential building	Number of watercloset fitments	Number of urinals
1. Not more than 12	1	1
2. More than 12	1 plus 1 for every 12 male persons, or part of those persons, over 12	1 plus 1 for every 12 male persons, or part of those persons, over 12

(L.N. 191 of 2015)

Table 4

Number of Lavatory Basins and Baths or Showers Provided in Residential Building

Column 1	Column 2	Column 3
Number of persons in residential building	Number of lavatory basins	Number of baths or showers
1. Not more than 8	1	1
2. More than 8	1 plus 1 for every 12 persons, or part of those persons, over 8	1 plus 1 for every 12 persons, or part of those persons, over 8

(L.N. 191 of 2015)

(2) (a) For a tenement house, water supply points may, subject to the provisions of sub-paragraphs (b) and (c), be provided in lieu of lavatory basins and baths or showers and, for the purposes of paragraph (1)(d), the provision of one water supply point shall be deemed to provision of one water supply point shall be deemed to be the provision of one lavatory basin and one bath or shower.
(b) The number of water supply points so provided shall be not less than the number of lavatory basins required, by paragraph (1)(d), to be provided in the tenement house.
(c) Such water supply points shall be provided in a separate compartment, not less than 0.75^2 in area, or in a watercloset. (L.N. 284 of 1978)
(d) For the purposes of this paragraph, any supply of water provided for a sink in any kitchen shall not be a water supply point.
(3) The watercloset fitments or the watercloset fitments and urinals, as the case may be, provided in any residential building in accordance with the provisions of paragraph (1), and, where, in accordance with regulation 9, latrine fitments or latrine fitments and bucket urinals, as the case may be, are provided in any residential building, the same shall be situated in the building to the satisfaction of the Building Authority.
(4) For the purposes of this regulation-
(a) the number of persons in a residential building is to be determined—
(i) for a tenement house, dormitory, barrack or boarding house—at the rate of 1 person for every 3 m^2 of the usable floor area of the tenement house, dormitory, barrack or boarding house, as the case may be; or
(ii) for any other residential building—at the rate of 1 person for every 9 m^2 of the usable floor area of the building; and (L.N. 191 of 2015)
(b) where separate waterclosets are provided for male persons and for female persons in a residential building, the proportion of male persons to female persons in the building is, unless the Building Authority is satisfied that the proportion is or will be otherwise, deemed to be 1:1.

(L.N. 191 of 2015)

BIM Example

SCHEDULE OF SANITARY FITMENTS PROVISIONS

LOCATION	USE	AREA (SQ.M)	CAPACITY			W.C.				BASIN				URINAL		BATH			
				M.	F.	M.		F.		M.		F.				M.		F.	
			TOTAL			REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D	REQ'D	PRO'D
G/F	SHOP/DEPARTMENT STORE	67.167	6	3	2	1	1	1	1	1	1	1	1	0	-	0	-	0	-
5/F RECREATIONAL FASCILITIES GYMNASIUM	DOMESTIC	40.739	14	7	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5/F RECREATIONAL FASCILITIES READING ROOM	DOMESTIC	38.192	39	20	19	2	2	2	1	2	2	2	2	2	2	2	2	2	2
5/F RECREATIONAL FASCILITIES RECEPTION LOBBY	DOMESTIC	51.516	6	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5/F RECREATIONAL FASCILITIES SWIMMING POOL	DOMESTIC	87.38	30	15	15	2	2	2	2	2	2	2	2	2	2	2	2	2	2
6/F - 35/F (DOMESTIC) (LARGEST UNIT) * UNIT A	DOMESTIC		10	-	-	2	2	0	-	2	2	0	-	0	-	2	2	0	-
6/F - 35/F (DOMESTIC) (LARGEST UNIT) * UNIT B	DOMESTIC		7	-	-	1	2	0	-	1	2	0	-	0	-	1	2	0	-
6/F - 35/F (DOMESTIC) (LARGEST UNIT) * UNIT C	DOMESTIC		9	-	-	2	2	0	-	2	2	0	-	0	-	2	2	0	-
36/F (DOMESTIC) UNIT A	DOMESTIC		8	-	-	1	1	0	-	1	1	0	-	0	-	1	1	0	-
36/F (DOMESTIC) UNIT B	DOMESTIC		9	-	-	2	2	0	-	2	2	0	-	0	-	2	2	0	-

Format	Calculations	Statutory Submittal	Maximum fire compartment area	Area of Concern

PNAP	N/A	3.4.5 Checking of Fire Compartment and FRC
PNAP Link	N/A	
Building Ordinance/ Regulations/ COP	FS CODE 2011 Subsection C3	
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs2011/fs2011_full.pdf	
Objectives	Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.	
Logics	To look up FS2011 Table C1	
Specifications	To look up FS2011 Table C1	
BIM Approach	To look up FS2011 Table C1	

Relevant Table

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m^2	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m^2	60
4b. Mercantile Facilities	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120

BIM Example

5th Fire Compartmentation Diagram

Format	Calculations	Statutory Submittal	Maximum fire compartment volume	Area of Concern
PNAP	N/A			3.4.5 Checking of Fire Compartment and FRC
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Subsection C3			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs2011/fs2011_full.pdf			
Objectives	Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.			
Logics	To look up FS2011 Table C1			
Specifications	To look up FS2011 Table C1			
BIM Approach	To look up FS2011 Table C1			

Relevant Table

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m^2	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m^2	60
4b. Mercantile Facilities	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120

BIM Example

5th Fire Compartmentation Diagram

Format	Calculations	Statutory Submittal	Actual fire compartment area	Area of Concern
PNAP	N/A			3.4.5 Checking of Fire Compartment and FRC
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Subsection C3			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs2011/fs2011_full.pdf			
Objectives	Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.			
Logics	"Fire compartment" means a space enclosed by fire barriers or appropriate construction to all sides such that fire will not spread from the space; or spread into adjoining space.			
Specifications	The Compartment Area and the Fire Resisting Rating will be limited by the use of the building			
BIM Approach	Use of "Area Plan" to outline all the Compartment Area of the floor			

Relevant Table

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m^2	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m^2	60
4b. Mercantile Facilities	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120

BIM Example

5th Fire Compartmentation Diagram

Format	Calculations	Statutory Submittal	Actual fire compartment volume	Area of Concern
PNAP	N/A			3.4.5 Checking of Fire Compartment and FRC
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Clause C3.1			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs2011/fs2011_full.pdf			
Objectives	Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.			
Logics	"Fire compartment" means a space enclosed by fire barriers or appropriate construction to all sides such that fire will not spread from the space; or spread into adjoining space.			
Specifications	The Compartment Volume and the Fire Resisting Rating will be limited by the use of the building			
BIM Approach	Use "Schedule" to calculate Room height and Compartment Area			

Relevant Table

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m^2	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m^2	60
4b. Mercantile Facilities	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120

BIM Example

5th Fire Compartmentation Diagram

Format	Calculations	Statutory Submittal	Required Fire Resistance Rating of Fire compartment	Area of Concern
PNAP	N/A			3.4.5 Checking of Fire Compartment and FRC
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	FS CODE 2011 Clause C4.1, Table C1			
Regulation Link	http://www.bd.gov.hk/english/documents/code/fs2011/fs2011_full.pdf			
Objectives	Every element of construction within each fire compartment and every fire barrier of each fire compartment should have an FRR of not less than that as specified in Table C1.			
Logics	To look up FS2011 Table C1			
Specifications	To look up FS2011 Table C1			
BIM Approach	To look up FS2011 Table C1			

Relevant Table

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m^2	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m^2	60
4b. Mercantile Facilities	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120
5. Assembly:		
5a & 5d. PPE & Other assembly premises	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120
5b.Educational establishments	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120
5c. Transport facilities	Not exceeding 10,500m^2	120
6. Industrial:		
6a. Industrial workplaces	Not exceeding 10,500m^2	120
6b. Bulk storage, Warehouses	Not exceeding 28,000m^3 and 10,500m^2	120
6c. Storage, manufacturing of hazardous/dangerous goods premises	Not exceeding 7,000m^3	120
7. Carparks	Not exceeding 10,500m^2	60

BIM Example

FIRE RESISTANCE REQUIREMENT FOR ELEMENTS OF CONSTRUCTION

LEVEL	NAME	CLASS	TOTAL VOLUME (CU.M)	FRP REQ'D	R.C. WALL => 1% V.R.		R.C. BEAM		R.C. COLUMN		R.C. SLAB		R.C. STAIR	
					THK.	COVER TO STEEL	THK.	COVER TO STEEL	THK.	COVER TO STEEL	THK.	COVER TO STEEL	THK.	COVER TO STEEL
G/F	LOADING / UNLOADING		102.288	60	75	15	200	30	200	25	100	20	95	20
G/F	MAIN ENTRANCE	1a (Residential - House type dwellings)	146.388	60	75	15	200	30	200	25	100	20	95	20
G/F	SHOP	4a (Commercial - Business facilities)	280.422	60	75	15	200	30	200	25	100	20	95	20
1/F	TRANSFER PUMP ROOM		524.655	120	100	25	200	40	300	35	125	25	125	35
1/F	ELECTRICAL ROOM		524.655	120	100	25	200	40	300	35	125	25	125	35
1/F	TBE ROOM		524.655	120	100	25	200	40	300	35	125	25	125	35
1/F	MAIN SWITCH ROOM		144.483	120	100	25	200	40	300	35	125	25	125	35
1/F	TRANSFORMER ROOM		347.727	240	180	25	280	60*	450	35	170	45*	170	55*
2/F	SPRINKLER PUMP RM.		524.655	120	100	25	200	40	300	35	125	25	125	35
2/F	MAIN SWITCH ROOM		144.483	120	100	25	200	40	300	35	125	25	125	35
2/F	TRANSFORMER ROOM		347.727	240	180	25	280	60*	450	35	170	45*	170	55*
3/F	FS PUMP RM.		524.655	120	100	25	200	40	300	35	125	25	125	35
3/F	CLEANSING WATER PUMP RM		524.655	120	100	25	200	40	300	35	125	25	125	35
5/F	READING ROOM	5a (Assembly - Places of Public Entertainment)	320.431	60	75	15	200	30	200	25	100	20	95	20
5/F	SWIMMING POOL	5a (Assembly - Places of Public Entertainment)	320.431	60	75	15	200	30	200	25	100	20	95	20
5/F	GYMNASIUM	5d (Assembly - Other Assembly Premises)	341.600	60	75	15	200	30	200	25	100	20	95	20

Format	Calculations	Statutory Submittal	Fireman's lifts	Area of Concern
PNAP	N/A			3.4.5 Checking of Fire Compartment and FRC
PNAP Link	N/A			
Building Ordinance/ Regulations/ COP	Cap 123F reg 41B, 41C FS2011 Clause D3.1			
Regulation Link	http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/25C2868DA2669A12482575EE003F079B/$FILE/CAP_123F_e_b5.pdf			
Objectives	Such numbers of access staircases, fireman' s lifts and firefighting and rescue stairways should be provided in a building as required by the Building (Planning) Regulations 41A, 41B and 41C. The number of these means of access for firefighting and rescue as required are summarised in Table D1.			
Logics	To look up FS2011 Table D1			
Specifications	Annotate the selected fireman's lift			
BIM Approach	Use specific annotation and model to indicate the fireman's lift in use			

Relevant Table

Table D1 : Number of Access Staircases, Fireman's Lift and Firefighting and Rescue Stairways Required

Type of Building		No. of Access Staircases required	No. of Fireman's Lifts required	No. of Firefighting and Rescue Stairways required
(1) All buildings and all basements	Not exceeding 1 storey	-	-	-
(2) Domestic buildings for single family	Not exceeding 3 main storeys	-	-	-
(3) Domestic buildings or offices with G/F shop or carport	(a) exceeding 1 storey but not exceeding 6 storeys and uppermost floor not exceeding 13m above ground and usable floor area not exceeding 250m² per floor	One	-	-
	(b) exceeding 1 storey but not exceeding 6 storeys and uppermost floor exceeding 13m but not exceeding 17m above ground and usable floor area not exceeding 150 m² per floor	One	-	-

BIM Example