

BIM STANDARD

A GUIDE FOR IMPLEMENTING
BIM FOR BUILDING PERMIT
APPLICATIONS

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Part 1 – INTRODUCTION AND GENERAL REQUIREMENTS

1. INTRODUCTION

1.1. CONTEXT

The building permit authorities in Dubai have been collaborating to leverage the level of customer satisfaction through providing high-quality for building permit/building control & inspection services and ensure fast processing of building permitting procedures and enhance Dubai's competitiveness and investment environment.

The collaboration has included three entities that have a role in the building permitting process in Dubai; (1) Dubai Municipality, (2) Department of Planning and Development – Trakhees and (3) Dubai Development Authority. The Authorities' strategy ensures accelerate the process of acquiring building permits from concerned government entities to assist investors in the real estate sector. The new strategy aims to enhance Dubai's prominent positioning as a city where the active building and construction sector plays an important role as a key component of economic development.

The strategy is built upon three pillars; first, developing and streamlining building permit procedures, then unifying systems and requirements, and thirdly providing a 'one-stop-shop' where all the procedures and building permits processes in Dubai can be completed. The three pillars represent a comprehensive scheme that will ensure accelerate the process of acquiring permits in all its stages.

1.2. PURPOSE

The purpose of this document is to drive consistent processes into the submission of building permit applications using a collaborative approach to the digitisation of construction information, commonly referred to as Building Information Modelling (BIM) within the scope set out in this document.

The Building Permit Authorities have set out a BIM roadmap (2020-2023) for expanding the use of BIM across the Emirate of Dubai in the building sector based on and put the previous circulars (196/2013 and 207/2015) of Dubai Municipality in action (Dubai Municipality, 2013) (Dubai Municipality, 2015) in action.

This will be achieved through the introduction of mandates that encourage the use of the BIM process in preparation of architectural, engineering and construction information.

As a receiving party of information, through the building permit process, the intent is to have a set of standards for information submitted to enable an efficient building permit process and provide information that can be reused in other activities to benefit the objectives of the Authorities.

1.3. SCOPE

The scope of this standard is to set out the general exchange information requirements for submission during the building permit process in the context of BIM in accordance with ISO19650-1:2018 (International Standards Organisation, 2018) and ISO19650-2:2018 (International Standards Organisation, 2018).

This document is only applicable to information that is being submitted to one of the Authorities for the purpose of obtaining a building permit at any point during the project lifecycle.

This document does not supersede information requirements from an appointed party, but any submissions to the building permit process shall follow what is set out within. It is recommended that appointing parties incorporate these requirements into their project and exchange information requirements as appropriate. Where there are contradictory or conflicting requirements between this document and the appointing parties' requirements, the appointed party should apply the one that has the higher/more detailed obligation. There may initially be some duplication of effort required in preparing submissions for building permit submissions, but this will be offset over time and by the use of automation, as such this is not seen as a barrier to implementation by the authorities.

2. GLOSSARY

Term / Acronym	Definition
3D model	Graphical Data communicating the facility/assets height, width and depth (X, Y and Z coordinates) characteristics
Activities	Activities are general tasks that need to be carried as part of accomplishing Critical Success Factors. Each activity or groups of activity shall have a specific target against which performance may be measured.
Architecture, Engineering, Construction (AEC)	Term used to collectively describe those responsible for the creation, use, management and operation of digital and physical assets
Asset	Something that provides use or value, generally made up of components / assemblies and/or systems
BIM Execution Plan (BEP)	The BEP is the document produced by the lead appointed party(ies) to set out their methodology in

	compliance with the appointed parties information requirements.
BIM	BIM is a process for creating and managing information on a construction project throughout its whole life cycle. In ISO 19650 part 1, BIM refers to the "use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions"
Building Card	A building card consists of key project information and is usually filled by the applicant upon permit application (usually filled via online portal). Typical information hosted in the building card can be the building name, type, height and area.
CDE	Common Data Environment is a central information repository that can be accessed by all stakeholders in a project.
Classification	A standardised structure for categorising and indexing data and information
Coordination	The linking of graphical information models to ensure there are no conflicts within the project information model
Cost estimation	Enabling an information model to produce a bill of quantities and/or cost estimation
Data	Set of values, stored but not yet interpreted or analysed, in a form that is convenient to move or process
Database	Collection of data that is organised so that its contents can easily be accessed, managed, and updated
Design authoring	Graphical representation of a design in 3-dimensional space with associated non-graphical information linked

Design reviews	Use of the information models, particularly graphical, to review the progress and technical content of a design
E-Submission (Model)	A model that complies with all the requirements for BIM e-submission and is submitted to respective regulatory agencies.
Federated Model	A combined Building Information Model that has been compiled by linking or combining several different models into one
GIS: Geographic information system	A Geographic Information System (GIS) is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface.
Information	Data which has been interpreted and processed (such as formatting and printing) to take on meaning in some context for its intended receiver
Information Model	Information models form the cornerstone of all digitisation of AEC information as it is the repository of data that are required for all intended uses and analyses. As such, the validity of the data inside information models should be dictated by its suitability for use.
Model	Generic term for a virtual representation of an asset
Project information model	A digital representation of the Project or part of the Project, and used to describe a two-dimensional representation, three-dimensional representation, as well as other data representations
Schema	A representation of a plan in the form of an outline structure
Spaces / rooms	In this instance, either a space or a room is a defined area within a model file that has attributes and boundaries providing a basis for compliance checking.

3. CONCEPTS AND PRINCIPLES

3.1. Building Information Modelling - BIM

BIM is defined as the, “*use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions process*” (ISO 19650 - Organisation and digitisation of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using BIM - Part 1: Concepts and principles, 2018).

Building Permit Authorities in Dubai have identified BIM as the route to drive a more efficient building permit process. BIM for the Authorities has been defined, in addition to the ISO-19650 definition as, “*the digitisation of construction information to be used and re-used throughout the project lifecycle to improve the quality and efficiency in the building permit process*”(Roadmap for BIM implementation, 2020).

Dubai BIM roadmap sets out the vision and mission of the Authorities in regards to BIM and can be demonstrated through the vision to create the ideal [digital] construction ecosystem for Dubai and the mission to create an innovative and sustainable digital ecosystem for building permits in Dubai using consistent BIM standards, methods, and procedures with an innovative submission portal (Project: Dubai BIM Roadmap Design and Implementation for Building Construction, 2020-2021)

3.2. INFORMATION MANAGEMENT

Information and how it is exchanged and managed is a crucial aspect of implementing and using BIM successfully. The ISO 19650 standards are an internationally recognised set of documents for managing BIM related information through the whole life cycle of a built asset, from design through construction and onto project handover. The Authorities recognises this as the information management standard to be followed and expect, without mandate, all parties to be familiar with the ISO19650-1:2018 concepts and principles and follow the process in ISO19650-2:2018, ISO19650-3:2020 and ISO19650-5:2020.

In the absence of a national annex for the Emirate of Dubai or the United Arab Emirates, the contents of this document shall be considered as an addendum applicable to the building permit process.

3.2.1. RELATIONSHIPS BETWEEN PARTIES

The member organisations of the Building Permit Authorities do not have any contractual relationships with the parties involved in the production of AEC information. The member organisations still play a significant role in the project delivery process through the building permit process as a receiving party of information.

This engagement is mapped, in terms of ISO19650-1:2018 in Figure 1 below, with the definitions for each party for clarity.

- **Receiving Party** – Building Permit Authority
- **Appointing Party** – Client (e.g. developer, government agency, landowner)
- **Lead Appointed Party** – Lead Consultant/Architect or Lead Contractor¹
- **Appointed Party** – Consultants or Contractors contracted to the Lead Appointed Party and not the Appointing Party

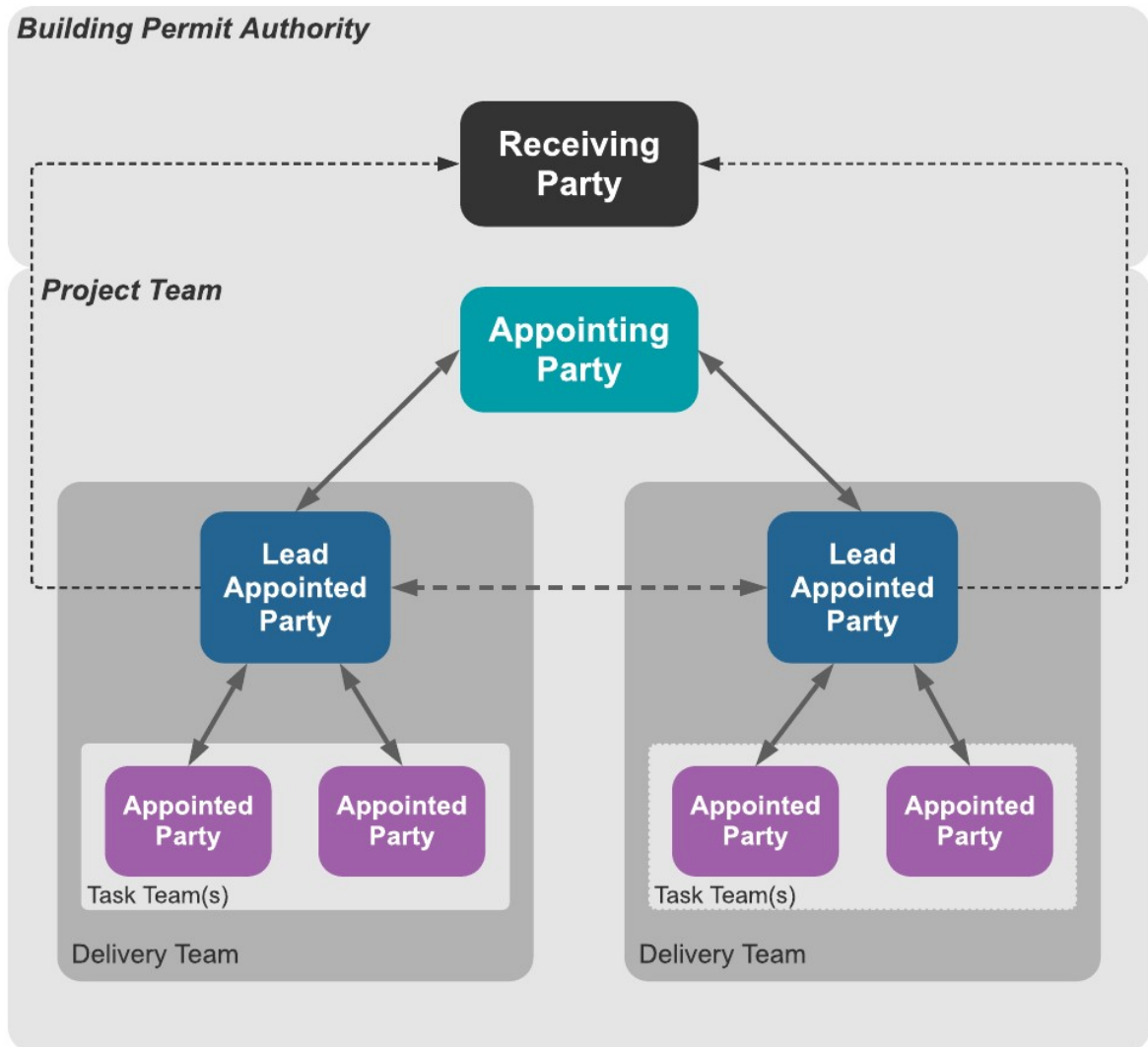


Figure 1 - Project Team hierarchy as per ISO 19650

For example, the figure above could represent the appointing party having two lead appointed parties with one lead appointed party being the architectural consultant, and the other the structural consultant. It could also represent the lead consultant and the lead contractor with various sub-consultants and sub-contractors. The number of appointed parties will vary depending on project size and type.

¹ Note - you can have more than one lead appointed party on a project

3.2.2. INFORMATION MANAGEMENT PROCESS

The principles of the information management process are covered by ISO19650-2:2018; in this document due to the nature of the relationship between parties and the Authorities, the interaction between the (lead) appointed parties and the receiving party during this process are shown.

The information exchange process is eight separate activities, as shown in Figure 2 below. Figure 2 is adapted from Figure 3 of ISO19650-2, the difference being that the activities that are impacted by this document are highlighted for reference.

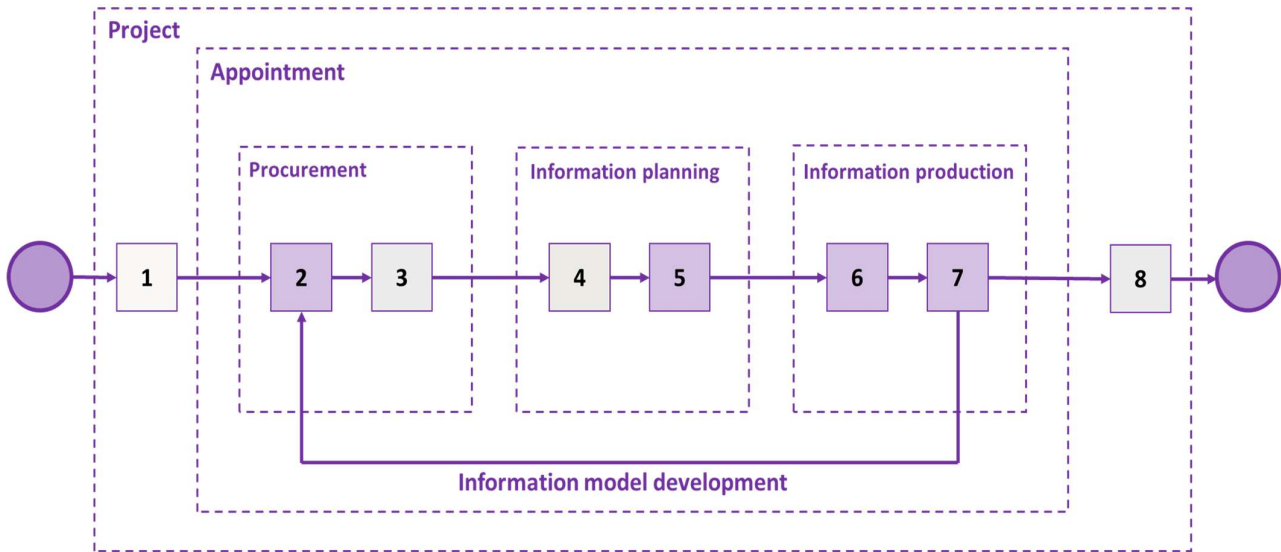


Figure 2 – Information management process as per ISO19650-2 with highlighted stages appropriate to this document.

Key to figure 3:

- 1 - Assessment and need
- 2 – Invitation to tender
- 3 – Tender response
- 4 – Appointment
- 5 – Mobilization
- 6 – Collaborative production of information
- 7 – Information model delivery
- 8 – Project close-out (end of delivery phase)

The table below set out what the recommended action is in relation to this document for each activity and the party responsible. Only relevant activities are shown, full information on these activities shall be taken from ISO19650-2.

Please note that the application of these actions is only mandated based on any BIM mandate issued by the Building Permit Authorities.

BIM Process (ISO 19650-2)			Responsible Party	Recommended action
2.	Invitation to tender	Establish the information requirements including information standards, production methods and procedures and protocol	Appointing Party (e.g. Client/ building owner)	It is recommended that this document in its entirety is appended by the Appointing Party to their information requirements
4.	Appointment	Confirm the appointed parties' approach and documents pertaining to information management	Appointed Party & Lead Appointed Party / Appointed Parties (Consultants/Contractors)	Appointed parties are to include within their BIM execution plan and their information delivery plan the approach to comply with this document when submitting to building permit authorities.
5.	Mobilisation	Preparation for delivery of the project	Lead Appointed Party/Appointed Parties	Ensure that they are prepared to create information containers in accordance with this document. Please note that normally where there is negotiation and agreement between the appointing party and appointed party on the requirements, the requirements in this document cannot be amended or ignored.
6.	Collaborative production of information	Development of the project information model	Lead Appointed Party/Appointed Parties	Create and curate the information required for submission to building permit authorities within the project information model for permits within this activity's place in the programme

7.	Information model delivery	Submission of project information model for Appointing Party authorisation	Lead Appointed Party/Appointed Parties	Create and curate the information required for submission to building permit authorities within the project information model for permits within this activity's place in the programme
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Table 1 – Information workflow stages and associated deliverables as per ISO 19650

3.2.3. BIM EXECUTION PLAN (BEP)

There are no requirements at moment for a BIM execution plan to be submitted to or checked by the building permit authorities. It is recommended that appointed parties include the requirements within this document within their BEP, checked by the appointing party or their information manager, to ensure that the project is delivered efficiently and that no issues develop in complying with this document when submitting to the building permit authorities.

4. GENERAL EXCHANGE INFORMATION REQUIREMENTS

This section will outline the Building Permit Authorities' exchange information requirements to submit information models to the building permit authorities successfully.

This section provides an overview of the requirements found in more detail in **Part 2 – EXCHANGE INFORMATION REQUIREMENTS** of this document.

4.1. INFORMATION CONTAINER REQUIREMENTS AND EXCHANGE FORMATS

This standard does not limit any party's approach to the implementation of BIM on projects or within organisations. However, some requirements shall be met for compliance with the building permit authorities' BIM approach, and these are summarised below and set out in Part 2 under the following headings:

4.1.1. INFORMATION CONTAINERS

The authorities are the receiving party and as such the models issued to the permitting authorities will be in [Industry Foundation Class \(IFC\)](#) format.

Templates with the appropriate mapping for major vendor authoring applications will be made available in accompaniment to this document to assist the process of information container metadata mapping correctly and appropriate [Model View Definitions \(MVD\)](#).

These information containers are also limited to certain file sizes and have a required container and object naming convention that shall be adhered to when submitting to the building permit authorities.

4.1.2. GEO-REFERENCING

The Dubai permitting authorities require that all models produced for the purpose of attaining building permits shall contain geospatial information at 1:1 scale that is correctly referenced between a permanent geographical coordinate system such as Dubai Local Transverse Mercator and the coordinate system in the model space.

Government organisations associated with the Dubai permitting authorities utilise their own respective GIS systems, and integrating the information models with these databases is vital to the development and efficiency of these systems.

4.2. INFORMATION MODEL

4.2.1. LEVEL OF INFORMATION NEED

Depended on the building permit application being applied for, there are different levels of information needs (ISO 17412-1 - Building Information Modelling - Level of Information Need - Part 1: concepts and principles, 2020); within the Exchange Information Requirements, the Dubai permitting authorities set out the minimum geometrical and alphanumerical information required for each submission to ensure compliance with Dubai Building code during the information model review.

4.2.2. CLASSIFICATION

Dubai permitting authorities recognise that many different classification standards can be used in an information model and that these are based on the information requirements of the asset owner/operator. In this document, the Dubai permitting authorities set out the classification system required within the information containers submitted to the building permit authority which shall be Uniclass 2015 (Uniclass 2015, 2021).

5. ROLES AND RESPONSIBILITIES

From the outset of any project implementing BIM, roles and responsibilities should be identified. As a normal practice in the industry, these roles and responsibilities will be defined in the project BIM Execution Plan.

The roles defined below are solely in relation to the relationship between the Receiving Party and Lead Appointed Parties and the application of the requirements within this document. These do not supersede other roles defined in the information model delivery process and can be performed as standalone roles or as additional responsibilities for existing members of the project delivery team(s).

These roles and responsibilities need to be read in conjunction with the [BIM E-Submission Model Development Guideline](#)

PARTY	ROLE	RESPONSIBILITIES
Receiving Party	Permitting authority engineer	<ul style="list-style-type: none"> Check and verify all the required elements of the information model related to the building permit are complete. Check and verify the information model integration to GIS system is carried out correctly and successfully. Run the Automated Code Compliance Checking Engine and analyse results. Provide feedback/ comments on the submitted information model material. Communicate with the Lead Appointed Party if required, to review the model comments, and provide any required clarification. Authorise submitted information model for associated building permit application.
Lead Appointed Party / Appointed Party	Information managers	<ul style="list-style-type: none"> Check and verify all the required information model deliverables (3D models and drawings, information, and schedules generated from the model) for the requested building permit are complete, undergone quality assurance processes, and in accordance with the information requirements in this document. Issue the information models to the building permit authority
Lead Appointed Party / Appointed Party	Information model authors	<ul style="list-style-type: none"> Check and verify that the model geometry elements are correctly modelled. Check and verify the information model is in compliance with the QA/ QC Checklist. Check and verify the compliance of model elements with the required level of information need. Check and verify that the container/object naming convention is correct. Check and verify that the rooms/spaces have been set up correctly. Check and verify that the model coordinates (Project Base Point and Survey Point) are set up correctly. Check and verify that all the required shared parameters and associated attributes are populated correctly to allow for the auto-generation of the Building Card information, and successful code compliance and quality compliance tests. Check and verify that the model generated drawings are in line with drawings requirements of permitting Authority. Ensure that the correct authoring tool template files are being used. Ensure that the model IFC export settings are configured correctly.

Part 2 – EXCHANGE INFORMATION REQUIREMENTS

6. INFORMATION CONTAINER REQUIREMENTS AND EXCHANGE FORMATS

6.1. FILE REQUIREMENTS

6.1.1. FILE FORMAT

As outlined in the General Requirements section of the document, the permitting authorities will practice Open BIM standards. All primary BIM files submitted to DBDPC stakeholders should be in the IFC (Industry foundation classes) format. An IFC file can be identified by the three-letter extension ".ifc" at the end of the file name.

All native BIM files shall be exported into the IFC2x3 or IFC4 schema when submitting to permitting authorities. Applicants shall ensure that the IFC file generated consists of both geometric and alphanumeric data in accordance with the authority's graphical and information requirements. The Dubai permitting authorities have developed BIM templates for common BIM modelling softwares based on the IFC 2x3 and IFC4 schema; these files are available to download at <https://bim.geodubai.ae>

Building permit applicants may also be required to submit BIM files in their native format to permitting authorities. Native BIM files will be treated as supplementary to the primary IFC model file and will not be accepted by permitting authorities as a standalone deliverable.

Format	Open Format?	Description	BIM Use	Delivery
Open BIM format (.IFC)	Yes	Industry Foundation Class by buildingSMART	Information/Model exchange	Required for all building permit submissions where BIM is mandated
Native file format	No	Proprietary BIM Software Platform	Design Authoring	Required for all building permit submissions where BIM is mandated (supplementary file)
AutoCAD – .DWG/.DWF	No	CAD software platform – exported directly from BIM	Drawings	Required for all building permit submissions where BIM is mandated
Portable Document Format (.PDF)	Yes	PDF exported directly from BIM	Drawings	Required for all building permit submissions where BIM is mandated

BIM Collaboration format (.BCF)	Yes	BIM Collaboration format by buildingSMART	Design Review/Information exchange	Issued by permitting authority to applicant to highlight design issues
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Table 2 - File Formats

6.1.2. FILE SIZE

BIM file sizes should be kept to a limit to ensure good performance for the users on both the applicant and permitting end. Applicants should also consider the file sizes to be practical to ensure efficient upload and download times. In most cases, any project using BIM will have file size limits set out in the project BEP. The hardware requirements defined in **Section 2.5** will manage sizeable models efficiently.

The following table outlines file sizes recommended by the Dubai permitting authorities for information models (IFC and native formats). Depending on the hardware or software being used, larger file sizes may be adopted if they do not compromise the model's performance.

Optimal model file size	Maximum model file size
100 MB	200 MB

Table 3 - Recommended model file size

6.1.3. FILE NAMING

All information models submitted to permitting authorities should follow a consistent file naming convention. In most cases, the Client or the Appointing Party will define file naming conventions in the project BEP as a standard practice. However, the Dubai permitting authorities will require a specific file naming convention developed explicitly for building permit submissions.

The naming convention defined below should be used for all BIM submissions to permitting authorities.

Project Number	-	Building ID	-	Parcel ID	-	Model Discipline	-	Model Number
PN123456	-	BI123456	-	PA1234567	-	AR	-	001

The naming convention will consist of 5 individual fields with an underscore character separating each field.

Field	Description	Character format
Project Number	Project identification number generated and issued by permitting authority.	Abbreviation "PN" followed by a unique 6-digit number
Building ID	Building identification number generated and issued by permitting authority. On projects/developments where the parcel of land may have more than one building, the Building ID will identify each individual building.	Abbreviation "BI" followed by a unique 6-digit number.
Parcel ID	Land parcel identification number. Parcel ID is predefined by the permitting authority. Generally included with affection plan data issued by permitting authority.	Abbreviation "PA" followed by unique 7-digit number.
Model Discipline	Identifies the model discipline, e.g., Architecture, Structural, MEP etc.	2 character abbreviation of model discipline (refer to Table 5 for model discipline codes)
Model Number	Identifies the individual model number.	3 digit numerical field.

Table 4 – Naming convention field descriptions

ID	Discipline
AR	Architecture
ST	Structural
ME	Building Services (all inclusive)

Table 5 - Model discipline abbreviations

7. INFORMATION MODEL

7.1. LEVEL OF INFORMATION NEED

The Level of Information Need is a framework defined in ISO 19650 the Appointing Party/Client to specify the graphical and informational content of a BIM at each stage of a project.

Similarly, the Dubai permitting authorities apply the Level of Information Need concept to information models being submitted as building permit applications. As models for construction can become detailed with both graphical and information content, the Level of Information Need defined by the Dubai permitting authorities will provide the relevant information required for building permits.

The Dubai permitting authorities Level of Information Need is defined using a combination of geometrical and alphanumerical information requirements. All model elements are assigned specific information requirements based on the detail needed for a particular permit or permitting stage. For example, a conceptual stage permit may require less model detail than a permit at the construction stage. The Consultants and Contractors' responsibility is to ensure models meet the information requirements when submitting to permitting authorities.

To be noted:

- Level of Information Need does not define anything unless accompanied by geometrical and alphanumerical requirements.
- Level of Information Need may differ for different model elements, model disciplines and building permits.

Please refer to **Appendix A – Model Element Matrix** for a comprehensive list of information requirements.

NOTE

What is now referred to as **Level of Information Need** has also been commonly referred to as **LOD**, “level of detail” or “level of definition” in the past.

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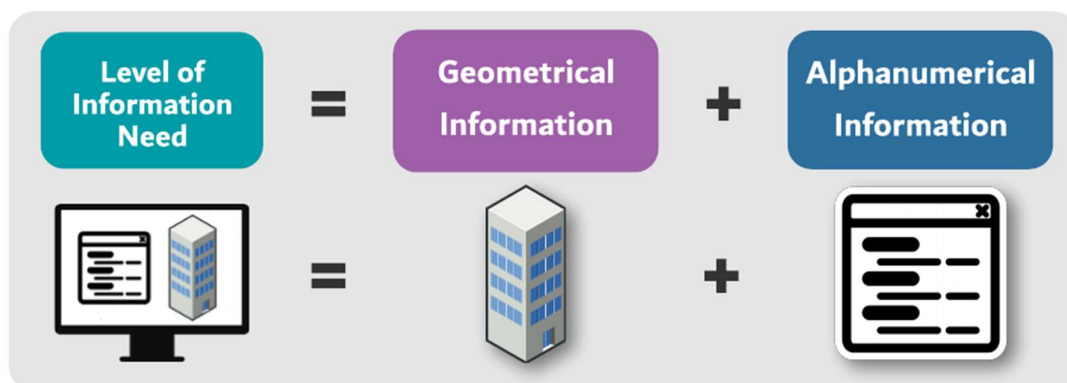


Figure 3 – Level of Information Need graphic

7.1.1. GEOMETRICAL INFORMATION

Geometrical information can relate to an object/model elements or set of objects/elements that are represented graphically within a BIM model. This information can be broken down into several independent categories as outlined below:

- **Detail** - the complexity of the object's geometry compared to the real-world object.
- **Dimensionality** – the spatial dimensions depicting the object i.e., 0D, 1D, 2D, 3D.
- **Location** – the object's position and orientation; can be absolute or relative.
- **Appearance** – the visual appearance of an object compared to the real-world object.
- **Parametric behaviour** – describes whether or not the shape, position, and orientation of an object is dependent on other information or objects in the BIM.

In most cases, geometrical information will get more complex as the project and the BIM model progress. General geometrical requirements and how they develop are defined in levels ranging from 100 to 500 as shown in the table below. These levels do not define the information model as a whole but rather each model element; hence this table is just a general guide. Please refer to **Appendix A – Model Element Matrix** for a comprehensive list of model elements' geometrical requirements for the Dubai permitting authorities.

The model detail to which the physical characteristics, of the asset(s), are represented (as graphical data) within model files, at each stage of the project are typically:

PROJECT/PERMIT PHASE	GEOMETRICAL – LEVEL OF DETAIL	DEFINITION
Pre-construction Preliminary permits	100	The object/model element is graphically represented within the information model as a symbol or generic model object.
Pre-Construction Preliminary permits	200	The object/model element is graphically represented within the information model as a generic system, object, or assembly along with approximate quantities, sizes, shape, location, and orientation.
Pre-Construction - Construction Final permit	300	The object/model element is graphically represented within the information model as a specific system, object, or assembly in terms of quantity, size, shape, location, and orientation.

Construction Not applicable for building permits	400	<p>The object/model element is graphically represented with the information model as a specific system, object or assembly in terms of quantity, size, shape, location and orientation along with detailing, fabrication, assembly, and installation information.</p> <p>*At this stage the information model reaches the highest level of detail from a geometrical standpoint.</p>
Post-Construction/ As-Built Not applicable for building permits	500	<p>The object/model element is a field-verified representation in terms of quantity, size, shape, location, and orientation.</p>

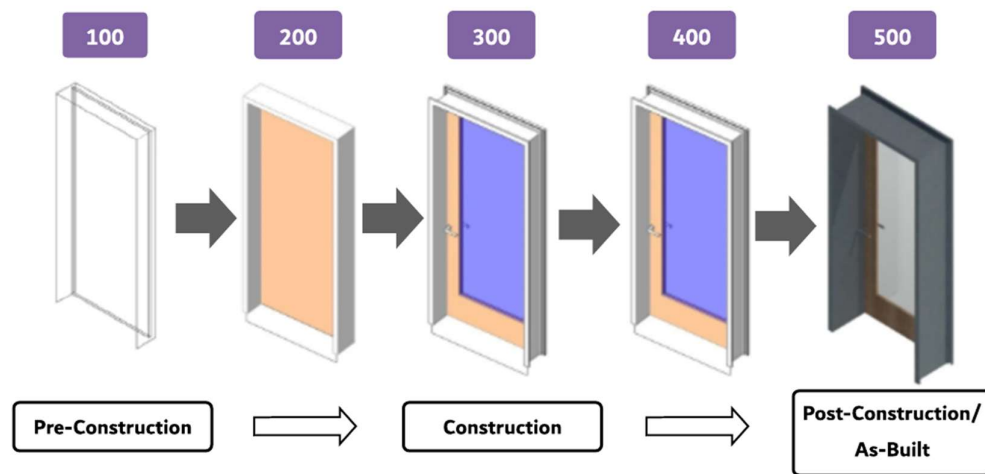


Figure 4 - Typical geometrical development of a door object/element

7.1.2. ALPHANUMERICAL INFORMATION

Alphanumerical information relates to any non-graphical/geometrical information for an object/model element or set of objects/elements. It is a means of identifying and hosting information of an object/model element beyond the visual representation in the information model. Depending on the software being used, alphanumerical information may be referred to as object "parameters," "properties," or "attributes." Examples of an objects alphanumerical information can include but are not limited to the following:

- **Name**
- **Type Name**
- **Classification**
- **Codification**
- **Reference structuring**
- **Index**
- **Numbering**

Alphanumeric information will be added to objects/model elements as the information model/project progresses. It is recommended that a comprehensive list of element-specific alphanumeric information requirements is clearly defined before any project commences. General requirements for alphanumeric information are defined in levels ranging from 200 to 500, as shown in the table below.

ALPHANUMERICAL – LEVEL OF DETAIL	DEFINITION	PROJECT/PERMIT PHASE
100	Not applicable	
200	The object/model element is represented with key attributes that enable its identification. Key information for GIS integration should be included in the information model at this level (e.g. Room/space names and types)	Preliminary permits
300	The object/model element is represented with detailed performance information to support asset data, specifications, quantities, and cost estimation. Updates of information added in the previous stage (200) should also be included.	Final permit
400	The object/model element is represented with information added and updated to reflect data that has been verified following installation, i.e., As-Built data.	<i>Not applicable for building permits</i>
500	The object/model element is represented with specific maintenance information, which is analysed and updated on an on-going basis throughout the project/building's life.	<i>Not applicable for building permits</i>

Table 6 - Levels of alphanumeric information

The Model Attribute Matrix outlines some alphanumeric information that is commonly attached to model elements/objects. Information attributed to model elements can vary depending on the type of element, project

phase, and building permit being applied for. All model element properties will be mapped to the appropriate IFC class or property set for efficient IFC integration. For a detailed model element/object attribute requirements that meet the needs of the Dubai permitting authorities, please refer to the **Appendix B- Model Attribute Matrix**.

7.2. MODEL ELEMENT/OBJECT REQUIREMENTS

This section aims to provide good practice methods for producing and using model elements/objects in information models submitted to the Dubai permitting authorities. All geometric and alphanumeric information for model elements/objects should follow the levels defined in the 'Level of Information Need' section of this document.

Terminology can vary and is often interchanged based on the software platform being used. The basic concept of an information model element/object refers to an individual item or collection of items that comprise the information model for the design, construction, and maintenance of a building.

For ease of reading, for this section, model elements/objects will be referred to as "objects."

7.2.1. GENERAL

- All objects should be modeled as components or system objects.
 - **Component object** -Building products/elements that have fixed geometrical shapes, i.e., windows, doors.
 - **System object** - Building products/elements that do not have a fixed shape or size and are usually layered objects, i.e., walls, floor slabs, and ceilings.
- In general, objects should not be modeled with excessive detail. Hardware and software limitations mean that it is not suitable or necessary to model objects with 100% reality.
- Depending on the authoring tool, objects can be categorised in different ways within the software; for example, doors, windows, and walls are examples of general object categories within an authoring tool. As such, all objects should be modeled in and assigned to the most appropriate object category based on the authoring tool's system; for example, a door shall be modeled under the door category. The use of model objects for purposes other than intended, such as modeling a roof under the floor slab category, can lead to a breakdown in the model structure.
- All BIM objects are to be assigned with the appropriate IFC classes and parameters to facilitate information exchange, as per the Dubai permitting authorities open BIM adoption.

7.2.2. OBJECT NAMING CONVENTIONS

The naming convention defined below should be used for all model objects included in information model submissions to permitting authorities.

General

- All objects should be named systematically and logically to ensure easy understanding for users.
- Description fields should refer to critical characteristics of the object only.
- All abbreviations used should be unique (Please refer to the abbreviation list in Appendix E).

Naming Format

Category	-	Functional Type	-	Discipline	-	Description 1	-	Description 2
ABC	-	ABC	-	ABC	-	Abc	-	Abc

- The naming convention will consist of 5 individual fields with an underscore (_) character separating each field.
- All abbreviated terms should use upper case characters only.
- For the description fields where one or more words are present, Pascal Case formatting should be used.
- If dimensional information is referred to in the name, it should be followed by the unit of measure i.e., mm for millimetres.
- None of the following symbols should be used in the object naming convention (! " , \$ % ^ & * { } [] + - = < > ? / \ | @ #).
- There should be no spaces present in the object name.
- Maximum of 30 characters for the entire name (inclusive of letters, numbers, and underscores).

Field	Description	Example
Category	The general type or category of an object.	Door or "DOR" abbreviated.
Functional Type	The functional or sub-type of the object will vary depending on the object. For example, doors sub-type may be internal or external.	Internal/interior or "INT" abbreviated.
Discipline	Indicates what discipline the object is aligned to. Abbreviations should stay consistent with those used for file naming.	Architectural or "ARC" abbreviated. Abbreviations should stay consistent with those used for file naming.
Description 1 (optional)	Used to describe additional information required to identify the object. This information will vary depending on the object. For example, a description field for a door may refer to size or material.	Size – 850x2100mm

Description 2 (optional)	Used to further identify an object by referring to an additional feature not highlighted in descriptor 1.	Material – Timber
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Table 7 - Object naming convention table

Example:

DOR_INT_AR_850x2100mm_Timber

7.2.3. IFC CLASSIFICATION

Interoperability is critical to the Dubai permitting authorities use of BIM; the IFC classification system enables this interoperability.

To ensure adherence to IFC protocol, all objects/elements in the information model shall be assigned to the correct IFC class as per the IFC schema before exporting from native authoring software. As an example, Table 8 below refers to specific model objects and their associated IFC class.

Object (Authoring tool)	IFC Class (IfcElement)
Wall	IfcWall
Floor	IfcSlab
Room/Space	IfcSpace

Table 8 - IFC object mapping example

7.2.4. OBJECT CLASSIFICATION SYSTEM

All model objects will be assigned to a specific classification code and description as per the Uniclass classification system. These classification codes will be exported from the native authoring tools to the IFC file. It is important to classify objects to improve model information quality and to aid permitting authorities in model review and code checking processes.

As an example, the table below refers to specific model objects and their associated Uniclass classification information.

Classification System	Classification Code	Classification Title
Uniclass 2015	EF_30	Roofs, floor and paving elements
	EF_30_10	Roofs
	EF_30_20	Floors
	EF_30_60_60	Pedestrian paving

Table 9 - Example of object classification as per Uniclass EF table

The Uniclass tables are updated annually. It is essential for users to ensure they are using the latest Uniclass tables; these tables can be found at <https://www.thenbs.com/our-tools/uniclass-2015>.

7.3. SPACE/ROOM MODELING

7.3.1. GENERAL

The inclusion of space/room objects in information models is required for all submissions to permitting authorities. Space/room objects and the information they contain are vital to the model's quality and the permitting authority's ability to use this space information to verify code compliance. Users must consistently name and classify space/room objects in the model to ensure accurate information for gross floor area, net floor area, built-up area, floor-area ratio, and occupancy can be calculated.

A space/room in the context of an information model can be defined as a bounded area or volume created in the BIM authoring tool using the software's dedicated space definition tool. Individual space objects must be added to the model for each functional space within the information model.

7.3.2. SPACE/ROOM NUMBERING

Space/room numbering convention should be consistent throughout the information model. Defined below is a two field space/room numbering convention that should be used for all information models being submitted to permitting authorities.

Floor	-	Number
F1	-	001

Field	Description	Character format
Floor	Indicates the floor or level on which the room/space is placed on or associated with.	Max. 2 character as identification of level, i.e., B1, G, M1, F1, F2, R <i>*Should match floor level naming outlined in "Level Naming" section.</i>
Number	Indicates space/room number in ascending sequential value.	3 digit numerical value.

- No instances of space/room numbers should be the same.
- Fields should be separated using hyphen (-) symbol only.
- None of the following symbols should be used in the space/room numbering (! " , \$ % ^ & * { } [] + _ = < > ? / \ | @ #).
- There should be no spaces present in the space/room numbering.

7.3.3. SPACE/ROOM NAMING

Space/room naming is at the discretion of the consultant, although the space/room name parameter should always be populated and should indicate how the space/room is being used.

It should be noted that space/room naming is a separate model property/parameter to room/space classification outlined below.

7.3.4. SPACE/ROOM CLASSIFICATION

All spaces/rooms placed into the information model shall be assigned a specific classification code that identifies the spaces/rooms function.

All space classifications will be exported to the IFC file and assigned to the correct properties using the following IFC properties;

- IfcClassification – to refer to the classification system being used, i.e., Uniclass, Omniclass, etc.
- IfcClassificationReference – to refer to specific model element classification code, which is made up of a series of digits.

The below table shows an example of the Uniclass 2015 classification for residential spaces.

Classification System	Classification Code	Classification Title
Uniclass 2015	SL_45	Residential spaces
	SL_45_10	Living spaces
	SL_45_10_06	Balconies
	SL_45_10_09	Bedrooms

Table 10 - Example of Uniclass 2015 classification codes

All spaces must be classified according to Uniclass 2015 SL tables. For a comprehensive list of space types and classification codes, please refer to **Appendix C – Space/Room Categorisation List**.

7.4. LEVEL NAMING

A level name relates to a building floor plan name in the information model authoring tool. As it is a Dubai permitting authorities' requirement that all Information models being submitted are in the IFC format, this type of view and subsequent naming of that view becomes critical. Each building level in a project will export to the IFC class *ifcbuildingstorey*. This IFC class will be a primary method of model navigation when a permitting authority is reviewing information models, and as such, views should be named efficiently and logically in native authoring software to give the user key information in a concise manner.

The naming convention defined below should be used for all model levels included in BIM submissions to permitting authorities.

7.4.1. NAMING FORMAT

Level Abbreviation	-	Level Identification
F1	-	FLOOR1

Field	Description	Character format
Level Abbreviation	Identifies the level abbreviation	Min. 2 character as identification of level, i.e., B1, GA, GR, M1, F1, F2, RF, RD
Level Identification	Identifies the level description of each level	Characters differ based on the level it describes, i.e., B1: BASEMENT1 M1: MEZZANINE1 F1: FLOOR1 RF: ROOF

Table 11 - Level Naming convention field descriptions

- The naming convention will consist of 2 individual fields with an underscore (_) character separating each field.
- All abbreviated terms (Level Abbreviation Field) should use upper case characters only.
- Letters used in (Level Identification) field should use the upper case only.
- Each floor/level in a building should be represented by a corresponding view.

Sample building figures and table below, highlighting how particular floors will be identified and numbered.

Building Floor/Level description	
Level Name	Level description
B1_BASEMENT1	First Basement
RD_ROADLEVEL	Road Level
GA_GATE LEVEL	Gate Level
GR_GROUND FLOOR	Ground Floor
M1_MEZZANINE1	First Mezzanine
F1_FLOOR1	First Floor

Table 12 - Building Floor/Level ID Example

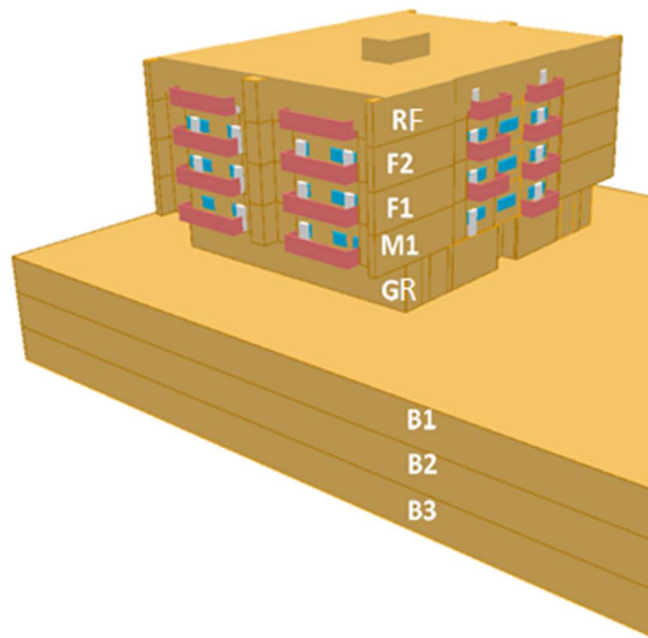


Figure 5 – Building Floor/Level ID

In the case of a complex structure, where we can find multiple buildings placed on top of a podium, these buildings should be regarded as two separate buildings. However, the level number should be continued from the podium levels as shown in the example below.

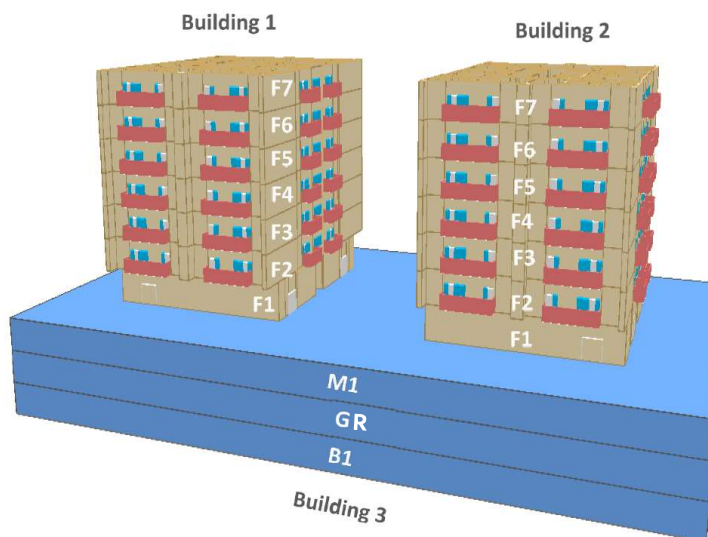


Figure 6 – Building Floor/Level ID (Complex structure)

7.5. MODEL LOCATION AND ORIENTATION

All information models submitted to permitting authorities must be geo-located to real-world coordinates using the appropriate easting, northing and elevation values. These coordinates must be integrated into the IFC file when submitting.

It is common practice during the model authoring process for the information model to be orientated to project north.

The majority of BIM authoring tools being used in the Dubai AEC industry all have the capability of geo-referencing and can export these geo-referencing values with the IFC export. In addition, these software will give the user the option to assign a coordinate system to their project, in this case, the following coordinate system should be used:

Name: EPSG:3997

Description: WGS 84/ Dubai Local TM

A detailed description of model geo-locating for selected softwares is given in the appendices section of the Dubai **BIM E-Submission Model Development Guidelines**.

APPENDIX

A. MODEL ELEMENT MATRIX

The Dubai Building Permit Model Element Matrix defines what elements need to be included in information models being submitted to permitting authorities. It identifies permitting stages and to what level of detail elements should be modeled based on the Level of Information Need outlined in the BIM Standard.

B. MODEL ATTRIBUTE MATRIX

The Model Element Attribute Matrix defines the information requirements for building elements. The Model Attribute Matrix refers to all elements referred to in the Model Element Matrix. It lists all element attributes (properties) required for each permitting stage, including information on IFC Reference, Property Set, User Input and Data Type.

C. SPACE/ROOM CATEGORISATION LIST

List of common room/space categories used in the AEC industry in Dubai. Also shown are their Uniclass 2015 equivalents as an example. All rooms/spaces should be assigned to the relevant category in.

D. QA/QC CHECKLIST

The checklist should be used by Consultants/Contractors who are using the BIM E-Submission platform. The purpose of this checklist is to ensure that the quality of each uploaded BIM meets the minimum requirements set out by the permitting authority in relation to BIM E-Submissions. It will also confirm that the BIM model complies with the **BIM Standards** and the **BIM E-Submission Model Development Guideline** for each of the project submissions.

E. OBJECT NAMING ABBREVIATIONS LIST

The Object Naming Abbreviation List is a document where all Object Categories are listed along with their abbreviation and Functional Type Description, and it should be referred to when naming BIM objects/elements for BIM submissions to the Dubai Building Permit.

Latest version of this document and appendixes can be downloaded from Dubai BIM e-Submission Platform website: <https://bim.geodubai.ae>

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