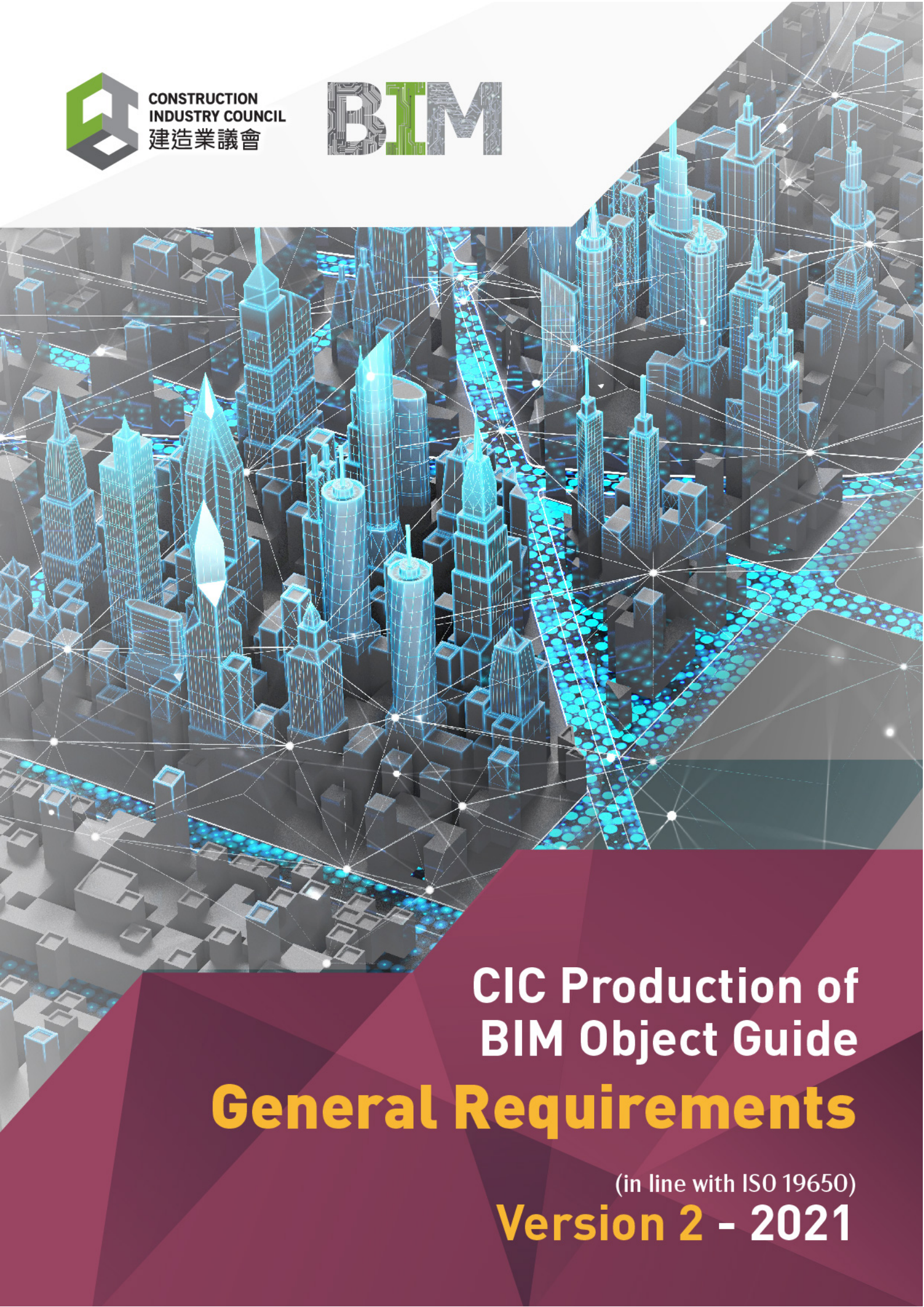**CONSTRUCTION INDUSTRY COUNCIL**
建造業議會

BIM

CIC Production of BIM Object Guide

General Requirements

(in line with ISO 19650)

Version 2 - 2021

Disclaimer

Whilst reasonable efforts have been made to ensure the accuracy of the information contained in this publication, the CIC nevertheless encourages readers to seek appropriate independent advice from their professional advisers where possible. Readers should not treat or rely on this publication (Reference Materials) as a substitute for such professional advice.

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Document Revision Tracking

Issue Date	Notes
June 2018	Title of the document is CIC Production of BIM Object Guide - General Requirements (June 2018)
August 2019	A few points were elaborated with enhanced images and correct a few typos.
December 2021	Align with ISO19650 and CIC BIM Standards - General (Version 2.1 - 2021) Updated Section includes 3.1, 3.2, 4.1, 4.3, 4.4, 7.1, 8.2, 10 Added LOD-G in sample of object sheet in Section 8.1, 8.2

Contents

1 Foreword

I am glad to see the release of **Construction Industry Council (CIC) Production of BIM Object Guide – General Requirements (Version 2 – 2021)**. This CIC Production of BIM Object Guide shall be read in conjunction with the CIC BIM Standards General Version 2.1 – 2021, which contains major enhancements to align with ISO 19650's Information Management principles, workflows and requirements, also providing Hong Kong Local Annex of ISO 19650-2:2018.

Background

In 2014, the CIC published a report named "Roadmap for the Strategic Implementation of Building Information Modelling (BIM) in Hong Kong's Construction Industry" with an aim to establishing a blueprint for the promotion and adoption of BIM in Hong Kong's Construction Industry. The BIM Roadmap suggested 17 initiatives in nine areas with three imminent actions. Establishment of a local BIM standards is one of the imminent actions aiming to set out a common platform and language for Hong Kong's BIM practitioners. The CIC's BIM Standards will be implemented in stages. The first Standards, renamed as CIC BIM Standards – General was published in September 2015.

Since then, BIM practitioners have gained more practical project experience, and there has been much wider adoption of BIM in various areas of the Architecture, Engineering, Construction, Owner and Operator (AECOO) industry in Hong Kong. With the release of the Technical Circular (Works) Nos. 7/2017, 18/2018, 9/2019 & 12/2020 by the Development Bureau (DEVB) of The Government of the Hong Kong Special Administrative Region (HKSAR), capital works projects with project estimates more than $30 Million are mandated to use BIM from 1st January 2018 onwards. All along the CIC has been continuing to develop and establish the CIC BIM Standards for specific BIM usages and disciplines, and to conduct consultations with relevant stakeholders, as an established practice.

With the establishment of the Task Force on BIM Standards under the Committee on BIM on 21 November 2017, the CIC has been identifying and aligning the common practices as well as setting up new standards and guidelines to facilitate better implementation and adoption of BIM in project execution. The full suite of CIC BIM standards have been published and/or updated covering specific BIM usages or disciplines separately.

In response to demands from the industry, a Task Force on BIM Specifications and Agreement under the ambit of Committee on BIM was established on 23 October 2019. The Task Force is co-chaired by Committee on BIM and Committee on Construction Business Development, and underpinned by two Task Groups, namely Task Group 1 (BIM Specifications) and Task Group 2 (BIM Special Conditions of Contract & Services Agreement). The Task Force developed CIC BIM Exchange Information Requirements (EIR) Template (BIM Specifications), CIC BIM Special Conditions of Contract, and CIC BIM Services Agreements.

As at December 2021, the full suite of CIC BIM Standards is as follows:

(i)   CIC BIM Standards – General (August 2019); (Version 2 - December 2020) and (Version 2.1 - 2021);

(ii)   CIC BIM Standards for Architecture and Structural Engineering (Version 2 - December 2020); and (Version 2.1 - 2021);

(iii)   CIC BIM Standards for Underground Utilities (August 2019); and (Version 2 - 2021);

(iv)   CIC BIM Standards for Mechanical, Electrical and Plumbing (August 2019); and (Version 2 - 2021);

(v)   CIC BIM Standards for Preparation of Statutory Plan Submissions (December 2020); and (Version 1.1 - 2021);

(vi)   CIC Production of BIM Objects Guide – General Requirements (August 2019); and (Version 2 - 2021);

(vii)   CIC BIM Dictionary (December 2020); and (2021);

(viii) CIC BIM Exchange Information Requirements (EIR) Template (December 2020); and (Version 1.1 - 2021);

(ix)   CIC BIM Special Conditions of Contract (September 2021);

(x)   CIC BIM Services Agreements (September 2021); and

(xi)   CIC BIM Guide for using BIM in generation of MEP digital drawings for statutory submissions (2021).

We welcome feedback on the CIC Production of BIM Object Guide from practitioners subsequent to the issuance of this publication will be considered in future revisions.

On behalf of the CIC, I would like to thank everyone who has contributed to producing this CIC Production of BIM Object Guide, in particular to the members of the Task Force on BIM Standards.

Ar. Prof. Ada FUNG, BBS

Chairperson

Committee on Building Information Modelling

Construction Industry Council

December 2021

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2 Preface

The Construction Industry Council (CIC) is committed to seeking continuous improvement in all aspects of the construction industry in Hong Kong. To achieve this aim, the CIC forms Committees, Task Forces and other forums to review specific areas of work with the intention of producing Alerts, Reference Materials, Guidelines and Codes of Conduct to assist participants in the industry to strive for excellence.

The CIC appreciates that some improvements and practices can be implemented immediately whilst others may take more time for implementation. It is for this reason that four separate categories of publication have been adopted, the purposes of which are as follows:

Alerts	**The Alerts are reminders in the form of brief leaflets produced quickly to draw the immediate attention of relevant stakeholders to the need to follow some good practices or to implement some preventive measures in relation to the construction industry.**
Reference Materials	The Reference Materials are standards or methodologies generally adopted and regarded by the industry as good practices. The CIC recommends the adoption of the Reference Materials by industry stakeholders where appropriate.
Guidelines	The Guidelines provide information and guidance on particular topics relevant to the construction industry. The CIC expects all industry stakeholders to adopt the recommendations set out in the Guidelines where applicable.
Codes of Conduct	The Codes of Conduct set out the principles that all relevant industry participants should follow. Under the Construction Industry Council (Cap 587), the CIC is tasked to formulate codes of conduct and enforce such codes. The CIC may take necessary actions to ensure compliance with the codes.

If you have read this publication, we encourage you to share your feedback with us. Please take a moment to fill out the Feedback Form attached to this publication in order that we can further enhance it for the benefit of all concerned. With our joint efforts, we believe our construction industry will develop further and will continue to prosper for years to come.

3 Introduction

3.1 Background

Building Information Modelling (BIM) is not just a three-dimensional drawing tool but a new tool to holistically manage information relating to construction projects from the planning stage, to the design, construction and operational stages. It is a new way of using new technology to facilitate project management and execution, better construction process control, cross-disciplinary collaboration, internal coordination, external communication, problem solving, decision making support, productivity management, and risk management.

BIM is a new way of working – it facilitates construction professionals to work together and communicate in one PLATFORM and all team members should be working to the same standards. BIM creates value from the combined efforts of people, processes and technology.

The Development Bureau of the Government of the Hong Kong Special Administrative Region issued Technical Circular (Works) No. 7/2017 **Adoption of Building Information Modelling for Capital Works Projects in Hong Kong,** which took effect from January 2018. This circular sets out the policy and requirements on the adoption of Building Information Modelling (BIM) technology and applies to works by in-house government staff, consultants and contractors.

The Circular has mandatory requirements to use BIM for production of drawings at the design and construction phases. **Drawing production** is one of the most important deliverables of the industry, both statutorily and contractually, as the drawings usually form part of the statutory and contractual documents. A value-driven BIM process should be able to generate drawings suitable for presentation, statutory and tender purposes.

A BIM project is made up of numerous BIM objects such as walls, floors, columns, windows, door, furniture or even pictures on a wall. To achieve the drawing production objective, a digital component that contains both geometrical and non-geometrical information about a product or element in the building needs to be standardised.

This Guide is intended to standardise the **minimum** requirements for production for BIM object creators such as manufacturers, the construction industry and other BIM developers. Standardising production of BIM objects is a pre-requisite to the compilation of a comprehensive and usable BIM object library to help improve the efficiency of the whole construction industry in Hong Kong.

3.2 BIM Platforms

This Guide aims to provide guidelines for good practice in the production of BIM objects for the Hong Kong construction industry.

While BIM technology involves different software platforms, this Guide specifies general requirements in terms of geometry, non-geometry and function for all BIM objects common to all BIM platforms. This Guide considers the common aspects of all BIM objects, i.e. coordination, drawing production, and purposes, with the intention to facilitate exchange of/ smooth geometrical and other information among various BIM platforms and phases of a project.

It is recommended that users to use objects developed from the CIC BIM Object Library instead of creating own object to maintain the consistency, such as insertion point and BIM attributes of the object. If there is new object developed for special purpose, please also register the object in the CIC Object Library in the future to maintain the consistency and versioning.

A specific Technical BIM Object Guide including the workflow of widely-used BIM platforms such as Autodesk Revit, Graphisoft ArchiCAD and Bentley AECOsim / OpenBuildings Designer may be developed by the vendor or developer of respective BIM platforms. This is illustrated diagrammatically below.
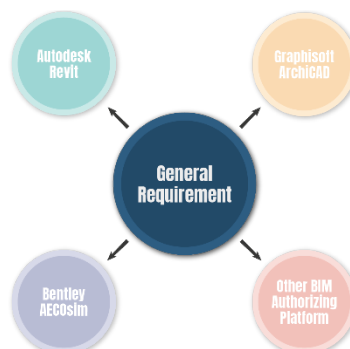
4 General Requirements

This section describes the general requirements for the production of BIM objects, including object categorisation and Level of Information Need (LOIN).

4.1 General

1. The word 'shall' is used to indicate requirements in this Guide. The word 'should' is used to indicate recommendations. The word 'may' is used to indicate preference, e.g. among alternative recommendations.
2. Terms in bold and red font indicate similar concepts or terms used in different BIM platforms, e.g. **category / classification / catalog** (Revit / ArchiCAD / OpenBuildings Designer).
3. The BIM object shall be delivered as either a design phase object, construction phase object or facility management phase object.
4. The BIM object shall be created with the intention of using it for drawing production with easy control.
5. The BIM object shall not be modelled with excessive detail. It is not suitable nor necessary to model BIM objects with 100% of reality, given the limitations of hardware and software, and the purpose of using BIM. Refer to the Level of Information Need to decide minimum components of the BIM object.
6. The BIM object shall be reusable across different projects with the same or similar BIM requirements.
7. It is acknowledged that software platforms will be upgraded at regular intervals, and that most platforms are NOT backward compatible, i.e. cannot be saved as a previous version. Therefore the whole project team needs to come to an agreement on the upgrading strategy. In general it is not recommended to upgrade the platform as soon as an upgraded version is released, as bugs and inconsistencies may need to be fixed with a few patches before the new version is reasonably stable.
8. The BIM object is recommended to refer to CIC BIM Standards General or DEVB BIM Harmonisation Guidelines for Works Department for common attribute list.
9. For LOD-Information requirements or common attributes of BIM objects, please refer to the respective CIC BIM Standards for Architecture and Structural Engineering / Mechanical Electrical and Plumbing / Underground Utilities.

4.2 Level of Information Need (LOIN)

1. The Level of Information Need (LOIN) (formerly known as Level of Development (LOD)) enables Appointing Parties / Clients, architects, engineers, contractors, quantity surveyors and facility managers to clearly specify the content of models at each stage of a project.
2. LOIN should only be used to describe model elements and not models as a whole. An element has only progressed to a given LOIN when all the stated requirements have been met.
3. The LOIN refers to the following three components of the Information Model.
4. The Level of Graphics (LOD-G) refers to the graphical representation which deals with geometric representation, symbology, and visualisation.
5. The Level of Information (LOD-I) identifies the properties to be attached to each type of object to meet the intended uses.
6. The attributes LOD-G and LOD-I should be added to the newly created BIM objects to indicate the LOIN level number.
7. The LOIN level number indicate the level of development required at each stage of the design, tender, construction, and as-built stages shall be read in conjunction with the CIC BIM Standards - General Clause 2.6 Level of Information Need.
8. The Level of Documentation (DOC) refers to the kind of documentation to be associated with the uses to meet the identified requirements.
9. Supplementary details can be found from the CIC BIM Standards - General (Version 2.1 – 2021).

4.3 Object Category / Classification / Catalog

1. The **category / classification / catalog** system may vary among different BIM platforms. Nevertheless, any BIM object shall be assigned with the most appropriate and representative **category / classification / catalog** based on its platform system, e.g. a door BIM object shall be assigned to the "Door" **category / classification / catalog**.

2. The BIM object may also be assigned with a **category / classification / catalog** based on another classification system, such as The *OmniClass® Construction Classification System*, if that is available on the BIM platform used for a project, or can be stated as an additional property.

3. To facilitate the exchange of BIM objects and related information, the BIM object shall be assigned with appropriate Industrial Foundation Classes (IFC) parameters.

4. IFC classes are not recommend to be added in the user defined attribute as this will interrupt the mapping details to IFC conversion.

5. About Classification (classification system), the OmniClass® Table 23 is recommended (and note that version 2012 should be used, instead of version 2006) if there are no other specific requirements from the project Appointing Party / Client. For Revit users, they need to update the OmniClass® version in Revit from 2006 to 2012, procedure can be found from this link:
   https://help.autodesk.com/view/RVT/2021/ENU/?guid=GUID-BA0B2713-ADA0-4E51-A7CD-85D85511F3ED

6. BIM objects from generic type or category should be minimised, due to the conversion to open format (.IFC) may potentially affect the LOD-G representation.

4.4 Guidelines for assigning OmniClass®

This section defines the guidelines of classifying construction results, construction resources and construction processes according to an international standard, OmniClass®. It enables an object-oriented classification for the whole life cycle of a structure. OmniClass® version 2012 consists of 15 hierarchical tables, each of which represents a different facet of construction information. Details of each table can refer to this link: https://www.csiresources.org/standards/omniclass/standards-omniclass-about

To facilitate logical BIM object organisation and searching, BIM objects could be organised in a folder structure as the first level of OmniClass® Version 2012. The format of OmniClass® code should align with the official numbering format of Construction Specifications Institute as "##-## ## ##", where # is numeric. The table below shows an example for the corresponding Level 1 title with OmniClass® numbers as folder names.

If a specific OmniClass® designation cannot be identified, a similar designation should be used to establish a searchable object database for the ease of information identification in the future.

Folder Structure of BIM Object Library

OmniClass® Table 23	Products
Folder Name	**Level 1 Title**
23-11	Site Products
23-13	Structural and Exterior Enclosure Products
23-15	Interior and Finish Products
23-17	Openings, Passages, and Protection Products
23-19	Specialty Products
23-21	Furnishings, Fixtures and Equipment Products
23-23	Conveying Systems and Material Handling Products
23-25	Medical and Laboratory Equipment
23-27	General Facility Services Products
23-29	Facility and Occupant Protection Products
23-31	Plumbing Specific Products and Equipment
23-33	HVAC Specific Products and Equipment
23-35	Electrical and Lighting Specific Products and Equipment
23-37	Information and Communication Specific Products and Equipment
23-39	Utility and Transportation Products

In BIM authoring software, there are different methods for defining and assigning OmniClass®, by using the default parameters, if available, or by creating a common parameter, if relevant default parameter is not available.

Users are recommended to check user manuals developed by respective software developers or their vendors for the recommended methodology for assigning OmniClass®. When possible, automated process is preferable.

5 Level of Graphics (LOD-G) Requirements

This section defines the minimum geometrical requirements for the production of BIM objects, including aspects of shape, symbolic items, space and material.

Regarding BIM objects with 2D-symbolic details, it is recommended to follow Computer-Aided-Drafting Standard for Works Projects (CSWP), more details can be found from:

https://www.devb.gov.hk/en/construction_sector_matters/electronic_services/cad_standard/computer_aided_drafting/cad/index.html.

5.1 General

1. The BIM object shall have a modelled geometry at a scale of 1:1.
2. The BIM object shall include a suitable insertion point for its intended use, as follows:
    -   Normally, the insertion point shall be located at the geometrical centre in plan view (as known as the XY plane in a three-dimensional coordinate system) and at the geometrical base in elevation view (XZ plane or YZ plane). The following figure indicates insertion points of a simple cubical geometry by red crosses.
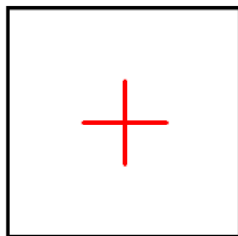

PLAN VIEW
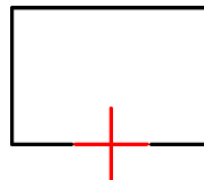
ELEVATION VIEW

-   The insertion point can be located at other positions if reasonable, e.g. a lighting switch is always aligned on a wall surface, in which case the insertion point in plan (XY plane) should be located at the back of the switch surface.
    -   BIM objects shall include an insertion point like in the above images, but the indication marks shall not be visible in the BIM project environment.
3. The BIM object shall not contain temporary modelling information such as construction lines and reference material. The BIM object shall be purged before submission.
4. The BIM object shall be assigned with suitable host / placement behaviour based on the BIM platform system. If a BIM object has not been assigned host / placement behaviour, it is called a standalone / free-standing object.
5. Certain kinds of BIM object might be required to connect to the MEP system. These BIM objects shall have a build-up connection with the MEP system in the BIM project environment based on the BIM platform system.
6. The BIM object shall be created using metric geometry with units of millimetres and degrees if necessary.
7. The BIM object shall be assigned suitable dimensions.
8. The BIM object shall have controlled visible geometry and symbolic components to facilitate drawing production.
9. BIM objects at the design phase shall be provided with appropriate geometrical parameters to facilitate the demand for various sizes.

10. BIM objects at the construction phase shall be provided with appropriate geometrical parameters to satisfy the design requirements.
11. BIM objects at the facility management phase shall be produced with the actual geometry based on product catalogues, and are not intended to be modifiable but independently replaceable.
12. If the BIM object contains angular parameters, including 3D geometry and 2D symbolic items, it shall be produced by a bearing system used by the BIM platform. If the BIM platform does not include a bearing system, the angular parameters shall be defined by Cartesian bearing, unless otherwise required, as illustrated in the following diagram:

True Bearing	Cartesian Bearing
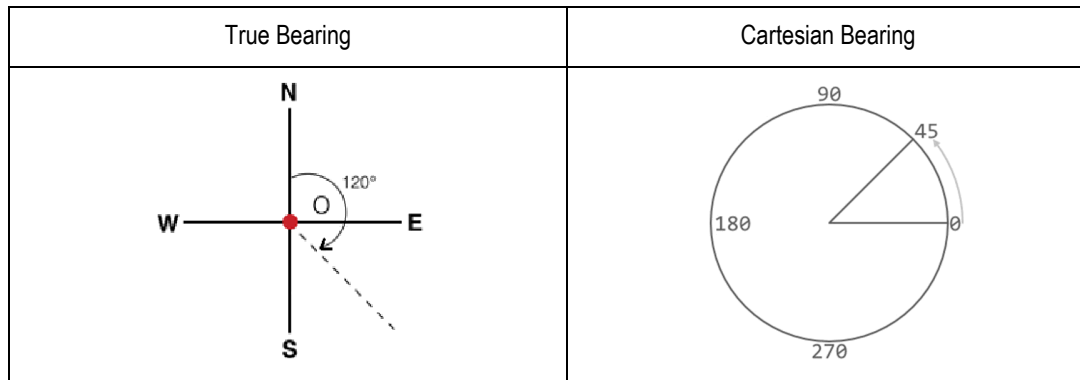
13. Cuttable BIM objects are those capable of displaying as cut when the cut plane of a view intersects that BIM objects in all types of views. Due to software limitations, not all BIM objects are cuttable in any software, and some previous modelling practice resorted to the use of generic model category which is cuttable in order to fulfil required BIM uses. Practitioners should carefully select the type or category for the creation of BIM objects.

5.2 3D-Geometry

1. The BIM object shall have modelled geometrical parameters which are supported by the BIM platform if appropriate.
2. The BIM object shall be modelled with a fixed geometry where the facility management phase object has a fixed shape and is not intended to be modifiable but independently replaceable.
3. The BIM object shall be modelled with a suitable geometry which shows a reasonable size for major components of the product for a design-phase object, and actual size for a construction-phase object and facility-management phase object.

5.3 2D-Symbolic Items

1. The 2D-symbolic items of a BIM object include a symbol and a **tag / label / annotation**.
2. The BIM object shall include, where appropriate, a set of symbolic items at scales of 1:20 and 1:100 for general use. Users requiring a different scale shall create / modify the BIM object in accordance to their own need.
3. The **tag / label / annotation** shall be created as a separate BIM object if available on the BIM platform system. The information relating to the **tag / label / annotation** shall be extracted from the **property / parameter / attributes** of the BIM object.
4. The BIM object symbol shall follow change in its location or geometry, i.e. if a BIM object is moved in a project, its symbol will follow that change automatically.
5. The BIM object symbol shall be modelled, where appropriate, as size-dependent with its own 3D geometry.
6. The BIM object symbol shall be used for drawing production, and shall include:
   - Symbol shown orthogonal to the BIM object geometry;
   - Controllable offset(s) for overlapping objects in the BIM model.
   - The following figure is an example showing the lighting switch symbol orthogonal and offset in plan view and elevation view.

- Subject to approving party's acceptance, symbols may not need to be offset in plan views, and a 3D view can be added to illustrate and elaborate the design layout of the switches. The intention is to produce drawings, when necessary, in an intelligent way and minimise manual work. This will increase productivity and reduce risk human errors or mistakes.

PLAN VIEW   ELEVATION VIEW
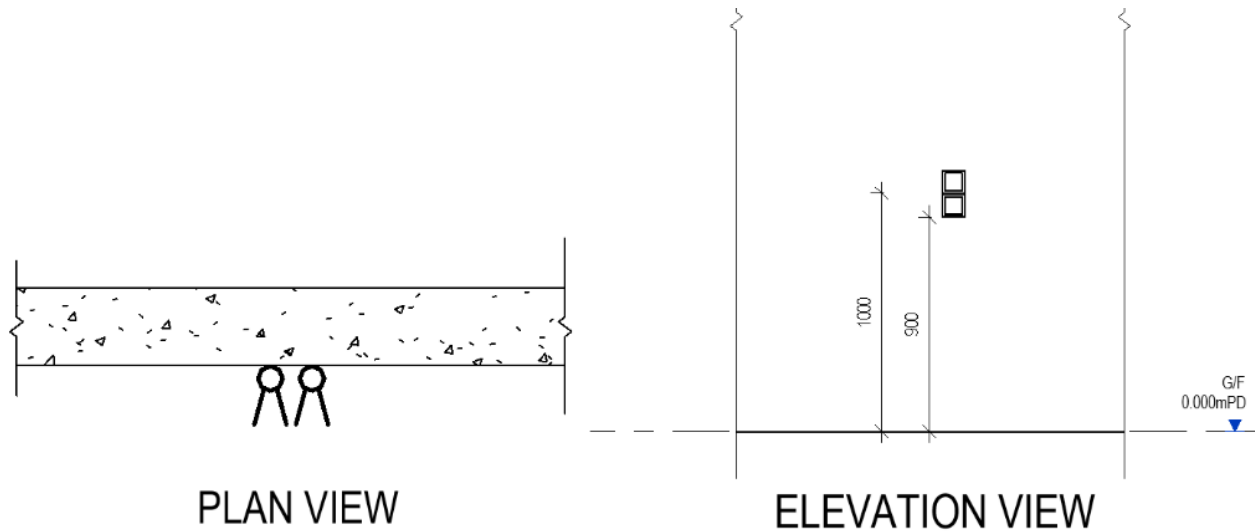
7. The BIM object symbolic items shall be consistent with local practice.
8. The BIM object symbolic items shall be readable on the produced drawings.

5.4 Space

1. The BIM object shall include indications of 2D and 3D space requirements for construction-phase and facility management-phase objects. The design-phase BIM object should also include indications of suitable space. The following list is sample of the common space requirements:

- Access space
- Clearance space
- Installation space
- Maintenance space

5.5 Appearance

1. The BIM object shall include suitable colours, surface patterns or texture images.
2. The BIM object at the design and construction phases should have representative colours and surface patterns for display in the relevant graphical view.
3. The BIM object at the facility management phase shall reflect the product material, colour and surface.
4. The BIM object may be shown with default materials provided by the BIM software if no specific requirements are stated otherwise.

6 Level of Information (LOD-I) Requirements

This section defines the non-geometrical requirements (information) contained within a BIM object, including aspects such as property, value, units and property naming convention.

6.1 General

1. The BIM object shall contain properties that are suitably assigned as **type** or **instance / component**. All instance of the BIM object in the project will be affected by the **type** property. The **instance / component** property can be customised for each instance of the BIM object in the project.
2. The BIM object shall contain minimum information for the purpose of phasing, e.g. placeholder (space occupation) at the design phase, coordination at the construction phase and reality reflection at the facility management phase.
3. Unless otherwise required, the BIM object shall not include undefined values. Every additional property shall be completed and shall not include unset or undefined values.
4. The BIM object may contain additional information which helps to describe the product.
5. The BIM object shall use appropriate units of measurements. Basically, millimetre (mm) is the most commonly used unit in local practice. The units of measurements shall be consistent with the EMSD Building Information Modelling for Asset Management (BIM-AM) Standards and Guidelines. Any units of measurements which are not stated in the document shall be based on the International System of Units (SI).
6. Field names of attributes shall be in English to ensure information exchange and extraction. For values of the field, non-English language may exist and is allowed due to project-specific needs or manufacturing location outside of HKSAR. For example, common names for plants in Chinese may be used instead of Latin botanical names. Based on the origin of building products and equipment, brand names and locations in native language may be used.

6.2 Property / Parameter

1. The BIM object property shall provide accurate information.
2. The BIM object property shall be an unambiguous definition to facilitate consistent BIM object selection and submission between different stages. Besides any default property provided by the BIM platform, additional BIM object properties shall have a consistent order of definition, property name and unit. These method of referencing is suggested to all BIM developers to increase information exchange at different stages in a project, although it is recognised that certain BIM developers will have variations in accordance to their needs based on project and client requirements.
3. The BIM object property shall not include user defined parameters with the same name as the system built-in parameters. Using a prefix such as departmental abbreviation code to differentiate the system built-in parameters from the user-defined parameters.
4. The BIM object property assists in describing its geometrical and non-geometrical characteristics. The property value may be presented as a single value, list value or range value. However, the BIM platform system may have restrictions in assigning a property value, e.g. only a single value is allowed for each numerical data item, or only numerical data is allowed to be added in an arithmetic formula. The following table gives guidance for choosing a suitable data type and format for assigning BIM object property values;

Present Format	Usage	Data Type	Example	Remark
Single Value	Description Only	Text / Numerical	Creator Name (Mr. Chan) Net Weight (40 kg)	
Single Value	Calculation	Numerical	Dimension (200 mm)	
List Value	Description Only	Text	Colour Option (Black, White) Optional Wattage / Lumen (13/1055, 33/4000)	
List Value	Calculation	Numerical	Optional Size (3000mm 3500mm 4000mm)	If restricted by the system, consider breaking to a separate property or BIM object type.
Range Value	Description Only	Text	Allowable Setting Value (-4ºC ~ 0ºC)	
Range Value	Calculation	Numerical	Input Voltage (100V~230V)	Range value shall be separated into two properties to represent its lower bound and upper bound values.

6.3 Property Naming

1. The BIM object property shall use Camel Case and title casing for parameter naming, e.g. Coefficient of Performance; Point of Shipment.
2. The BIM object property shall use descriptive naming. The name shall describe the property's meaning or definition rather than describing the product component.
3. The BIM object property shall not be ended with a space or full stop.
4. The BIM object property should be named as short as possible.
5. The BIM object property should avoid abbreviation and truncation in cases where there is no unambiguous definition or industrial consensus.
6. The BIM object property should use the most common descriptor for a group as the first part of the name so that the property can be sorted logically (e.g., Filter Face Area; Filter Efficiency).
7. The BIM object property shall avoid using symbols in property naming.
8. The BIM object property naming with boolean (YES/NO) data types shall be named such that they clearly imply a YES/NO value is returned, e.g. Is Energy Efficient, Show Hoods.

7 Functional Requirements

This section defines functional requirements of BIM objects, including BIM object naming conventions and expected behaviour.

7.1 Naming Conventions

1. BIM objects shall be named systematically and logically for the understanding of users and for easy BIM object management.

Field No.	Fields	Mandatory or Optional	Field Length	Guidelines
1	Category	Mandatory	3	These two fields shall follow the CIC Master Type List.
2	Functional Type	Mandatory	3	Please highlight items that are not following the CIC Master Type List, for CIC's confirmation. Field 1 shall be kept unique. Value of Field 2 could be the same for different meaning (e.g. 3PH means three phase isolator when it is under Field 1 "EIS". 3PH means 16A 3 phase 5 pin switched socket outlet when it is under Field 1 "ESO"). Fields 2 can have the same value as Field 1 if Field 2 has different meaning and is necessary to describe the BIM object at the second level. When Field 2 is not necessary to describe at the second level, three underscores (___) should be used.
3	Originator	Mandatory	3	For BIM objects originating from Works Departments, corresponding department names should be used as originator names. However, other consultants or contractors who create the new BIM objects should follow Agent Responsible Code (ARC) list for originator. For those consultants or contractors, this field shall follow the up-to-date version of the ARC published by DEVB under the CAD Standard for Works Projects. ARC full list can be referred to this link: https://www.devb.gov.hk/en/construction_sector_matters/electronic_services/cad_standard/computer_aided_drafting/cad/index.html Users to update the originator field with their own abbreviation(s) when revising the downloaded BIM object from CIC BIM Portal.
4	Descriptor 1	Mandatory	1-15	Descriptor 1 contains information about primary use and material when applicable. a. Duplicate information with the Category and Functional Type should be avoided. For example, if category is "WDW" (means window), "window" should not be used in this field. If functional type is "DBL" (means double), then "double" should not be used in this field. b. Capital letters should be used for first letter of each word (e.g. WallMounted, GlobalValve). c. All capital short forms should be used to indicate materials when applicable (e.g. CONC for concrete, WD for Wood). If Descriptor 1

Field No.	Fields	Mandatory or Optional	Field Length	Guidelines
				starts with all capital short form, an underscore (_) should be used to separate the short form and the following word (e.g. CONC_Kerb, WD_Slash).
				d. If Descriptor 1 is blank, three nos. of underscores (___) should be used in place of Descriptor 1 (e.g. SFM-RCB-ACM-___-01.rfa).
				e. Descriptor 1 should be kept as concise as practicable with the maximum length of 15 characters in order to reserve space for 2 digit sequential number in Descriptor 2 for potential future expansion.
5	Descriptor 2	Mandatory	2	Descriptor 2 is a 2-digit sequential number (e.g. 01 to 99) to distinguish different types that cannot be sufficiently identified by preceding fields. (e.g. STE-STA-ACM-NB_Pier-01.rfa) If Descriptor 2 is blank, two underscores (__) should be used in place of Descriptor 2. (e.g. PPF-UPV-ACM-BendSocket-__.rfa)

2. Certain kinds of BIM object may be modelled for a specific purpose such as model submission to Works Departments, in which case DEVB BIM Harmonisation Guidelines for WDs should be referred.
3. Unless otherwise required, all BIM developers shall apply the methodology of naming conventions specified in this Guide, including Format, Field Definition and Limitation, in their own BIM object library.
4. The naming conventions shall include abbreviations of category, functional type, originator and descriptor fields.
5. The category field shall indicate the BIM object category / classification / catalog based on the BIM platform system.
6. The originator field shall indicate who owns or creates the BIM object.
7. The descriptor fields shall indicate the critical characteristic of the BIM object.

Format

<Category> - <Functional Type> - <Originator> - <Descriptor 1> - <Descriptor 2>.<File Format Extension>

Limitations on Number of Characters in the Name

- Maximum 30 characters for the entire name, including hyphen marks (file names exceeding 30 characters may result in invalid file paths due to computer operating system limitations).
- Keep file names as short as possible

Example

Field	Example	Description
Category	**DOR**-SGL-AEC-Wood-01.xxx	A Door, DOR, is the abbreviation of the **category / classification / catalog** "**door**".
Functional Type	DOR-**SGL**-AEC-Wood-01.xxx	A Single Door, SGL, is the abbreviation of the sub-type "**single**".
Originator	DOR-SGL-**AEC**-Wood-01.xxx	AEC is the abbreviation of **Architecture, Engineering and Construction**. It represents a common standard of the industry. Alternatively this can be replaced by the abbreviated name of the owner / creator
Descriptor 1	DOR-SGL-AEC-**Wood**-01.xxx	A door is made of **Wood** (Material). An optional descriptive text.
Descriptor 2	DOR-SGL-AEC-Wood-**01**.xxx	A door is built **with a Louvre**. This text further describes the BIM object.
File Format Extension	DOR-SGL-AEC-Wood-01.**xxx**	File Format Extension

The CIC will maintain and upkeep a master list of 'Category' and 'Functional Type' for naming convention of BIM object as well as a BIM object library for reference by the industry. The CIC's master list of 'Category' and 'Functional Type' and the BIM object library are supported by DEVB and Works Departments, including ArchSD, CEDD, DSD, EMSD, HyD and WSD.

The CIC's Master list of 'Category' and 'Functional Type' (also known as 'Cat-Code' and 'Sub-Cat Code') of BIM object is software-neutral and applicable to any projects for the Hong Kong construction industry. Practitioners may verify existing 'Category' and/or 'Functional Type' at the CIC BIM object library, and may apply for a new 'Category' and 'Functional Type' at the CIC BIM object library.

Note that the (i) 'Family Library Interchange Programme (F.L.I.P.) Master Type List', which was collaborated between Autodesk Far East Ltd and local BIM Consultant Advanced Construction Information Development Ltd (A.C.I.D.) and Synnex Technology International (HK) Ltd, and hosted in the website of Autodesk Industry Advisory Board; and (ii) The "Master Type List" of Cat-Code and Sub-Cat Code in the DEVB BIM Harmonisation Guidelines for WDs has been shared to the CIC in 2021 for incorporating into CIC's Master list of 'Category' and 'Functional Type'.

7.2 BIM Object Behaviour

1. The BIM object shall not be compromised by the performance of the project model in which it is placed, and shall not model to a higher LOD-G than is required for its intended purpose. Exact replication of all life details is NOT recommended and is not necessary.
2. The BIM object shall be modelled such that its behaviour can be easily controlled by different users.
3. The BIM object shall be modelled such that it can be associated and connected with other objects where the association is appropriate to the project model and its analysis.
4. The BIM object shall be available to be scheduled in the project.
5. The BIM object shall be used for drawing production, and thus shall contain appropriate symbolic items with visibility that can be controlled to suit both 2D & 3D purposes.

8 Purpose-Driven BIM Objects

BIM object need to have purpose and value. A high-quality BIM object should satisfy all the requirements in this Guide, including suitable geometrical and non-geometrical information, functional requirements of the project and capable of generating production of drawings.

Drawing production is the most important purpose of all BIM objects, due to drawings being the only widely-accepted tool of submission and communication in local practice nowadays. BIM objects shall be designed and modelled to enable generation of drawings without extra handling or modification. The value of a BIM object is created through having correct information in all aspects, including geometrical and non-geometrical components. Hence, the BIM object can then be used for direct coordination in BIM models and enable production of drawings and schedules.
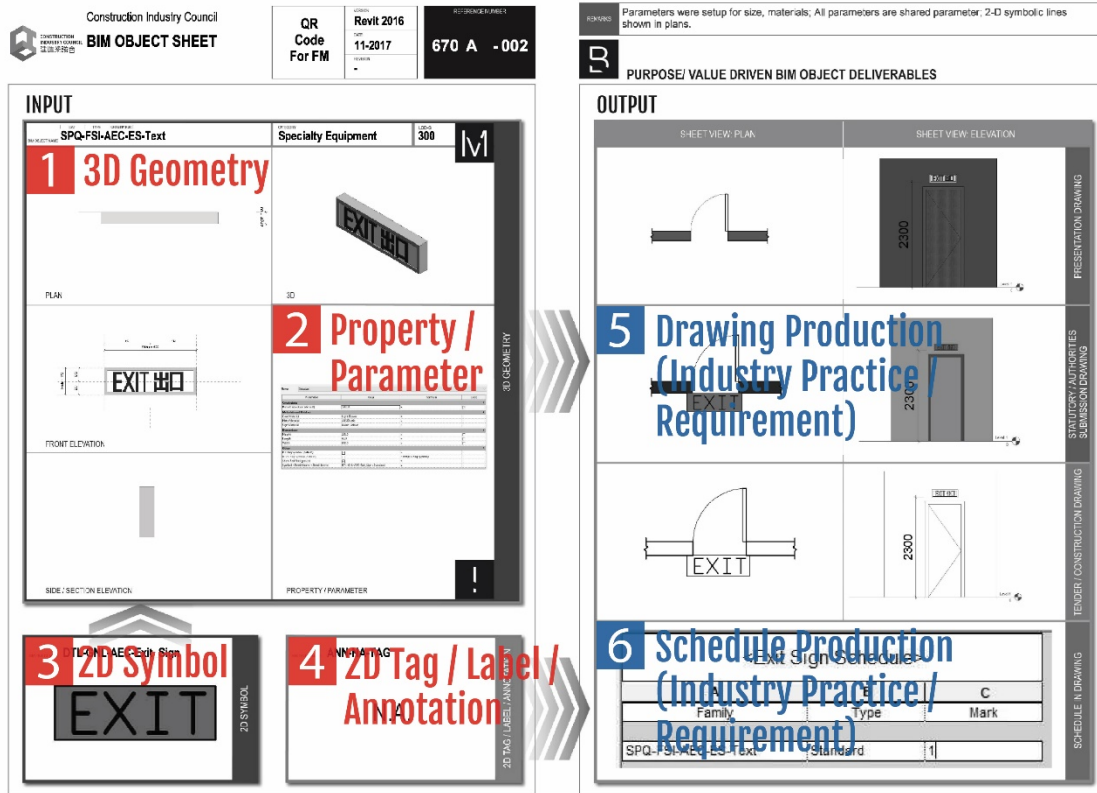
8.1 BIM Object Sheet

The BIM object shall contain 3D components of geometry and 2D components of symbols and **tag / label / annotations**. All of these contents are intended for production of presentation drawings, statutory / authorities submission drawings, and tender / construction drawings. In addition, the BIM object shall be capable of being scheduled in the project environment with correct information. The production of drawings and schedules shall follow industry practice and requirements of the project and client.

The BIM object shall be provided together with a comprehensive cover sheet to convince clients, receivers and users that the BIM object is complete and satisfies all requirements and functions for drawing production.

The BIM object cover sheet shall contain the items shown in the following table. An example of a BIM object sheet is shown below the table.

Item	Description
1. **3D Geometry**	- Views to be shown on the sheet (plan view, front and side elevation view, 3D view) - (2D symbolic items are not shown in this part)
2. **Property / Parameter**	- Property / Parameter / Attribute sets and values
3. **2D – Symbol**	- 2D symbolic items for drawing production
4. **2D – Tag / Label / Annotation**	- 2D symbolic items for drawing production
5. **Drawing Production**	- Plan view and elevation view for presentation purposes - Plan view and elevation view for statutory / authority submission purposes - Plan view and elevation view for tender / construction purposes
6. **Schedule Production**	- Schedules with appropriate property / parameter, starting with the name of the BIM object

The BIM Object Sheet shall follow the following layout:

8.2 Quality Assurance

The BIM object shall be checked by using a comprehensive check form and shall be endorsed by the inspector to verify the BIM object functions and behaviour. This quality assurance check form should also be provided by BIM object creators for self-checking, and to the client or receiver for inspection.

The check form shall include the following items:

Major Item	Content	Nature of Check	Recommended Acceptable Result
3D Geometry	File Size	Is it too large?	Refer to BIM platform document. Generally recommended to be <1 MB. When a large size is required, please reference to DEVB BIM Harmonisation Guidelines, the maximum size of each BIM object file used should be kept at the minimum, preferably under 5 MB, it aims to help control the BIM model file size.
	Visibility Control	Suitable setting? Is unnecessary geometry hidden on plan and elevation?	Only essential geometry are visible on plan and elevation with an aim to fit for purpose.
	Category	Is the BIM object of the correct category?	Correct category Shall be chosen
	Insertion Point	Is the insertion point appropriate?	Refer to Chapter 5.1.
	Unit	Are units of measurement correct?	Normally use the International System of Units (SI), i.e. millimetres and degrees.
	Space	Does it require Access / Clearance / Installation / Maintenance space? Does the space conform to local practice?	Large equipment may have a particular space requirement. If space is required, it needs to conform to local practice.
	Parametric Properties	Is the parametric property necessary? Is parametric behaviour as expected?	Design phase and construction phase objects shall have parametric properties for modelling. The parametric behaviour must be tested in BIM project environment.
	Host / Placement	Is the object assigned with suitable host / placement behaviour?	Based on the BIM platform system, this behaviour will obviously affect the BIM object usage method and difficulty of modification in the BIM project environment. The host / placement behaviour shall be tested in the BIM project environment.
	MEP Connection	Is connection to the MEP system required?	Based on the BIM platform system, the BIM object may need additional modelling for connection to the MEP system in the BIM project environment.
Property / Parameter	Management	Are properties classified in suitable grouping and naming?	Refer to Section 6.3.

Major Item	Content	Nature of Check	Recommended Acceptable Result
	Information	Is all non-geometrical information necessary and exhaustive for the user?	Refer to Section 6.1.
2D-Symbolic Item (Symbol)	Symbol	Does the symbol conform to local practice or client requirements?	The symbol shall conform to the local practice or client requirement. Refer to Section 5.
	Geometry Dependency	Can the symbol follow change of location of the 3D geometry in the BIM project environment?	The symbol shall automatically follow any change of location.
	Symbol Offset	If necessary, can the symbol offset be adjusted for overlapping in the BIM model?	Strict requirements are needed for BIM objects which commonly overlapping plan view, such as lighting switches.
	Symbol Orientation	Is the symbol orthogonal to the BIM object geometry? If necessary, can the symbol orientation be controlled?	The symbol orientation shall be suitable for drawing production, with symbols normally placed orthogonally.
	Drawing Production	Is the drawing readable and accurate when printed?	Drawings shall be readable and accurate.
2D-Symbolic Item (Tag / Label / Annotation)	**Tag / Label / Annotation**	Does the **tag / label / annotation** conform to local practice or the client requirement?	The **tag / label / annotation** shall conform to local practice or the client requirement.
	Drawing Production	Are drawings readable and accurate when printed at the appropriate scale?	Drawings shall be readable and accurate.

The check form shall follow the following layout:

BIM Object Check Form

Legend:
- A Acceptable
- R Reject
- O Outstanding
- N Inapplicable

Categories:
- 3D Geometry
- Property / Parameter
- 2D Symbol
- 2D Tag / Label / Annotation

3D Geometry

☐ **Space**
Does it require Access / Clearance / Installation / Maintenance space? Is space conformed to local practice?

☐ **Host / Placement**
Is it assigned suitable host / placement behavior?

☐ **Category**
Is the BIM object of correct category?

☐ **Insertion Point**
Is the insertion point appropriate?

☐ **Parametric**
Is it necessary to be parametric? Is parametric behavior as expected?

Property / Parameter

☐ **Property Management**
Are properties classified in suitable grouping and naming?

☐ **Property Information**
Is all information necessary or exhaustive for the user?

2D Symbol

☐ **Symbol**
Is the symbol conformed to local practice or client requirement?

☐ **Visibility Control**
Suitable setting? Hide unnecessary geometry on plan and elevation?

☐ **Symbol Drawing Production**
Is symbol readable when printing out in appropriate scale?

☐ **Symbol Orientation**
Is the symbol orthogonal to the BIM object geometry? If necessary, can the symbol orientation be controlled?

☐ **Geometry Dependency**
Can the symbol follow the location change of the 3D geometry in BIM project environment?

☐ **Symbol Offset**
If necessary, can the symbol offset adjustable?

☐ **Symbol Drawing Production**
Is it readable and accurate when printing out in appropriate scale?

2D Tag / Label / Annotation

☐ **Tag / Label / Annotation**
Is the tag / label / annotation conformed to local practice or client requirement?

☐ **Tag / Label / Annotation Drawing Production**
Is it readable and accurate when printing out in appropriate scale?

MEP Connection

☐ **MEP Connection**
Is it required connection to MEP system?

File Size

☐ **File Size**
Is it too large?

Unit

☐ **Unit**
Is unit of measurements correct?

Comment:

BIM Object Name		Ref. No.	
Date		Assessment	APPROVED/ DISAPPROVED/ RESUBMIT
Inspector		Signature	

8.3 Workflow

The BIM object shall follow the workflow illustrated in the diagram below regarding its creation, inspection and approval.

```
┌──────────────────────────┐          ┌──────────────────────────┐
│ Define BIM Object        │  ──────> │                          │
│ Requirement from This     │          │ BIM Object Modelling.    │
│ Guideline, Client and    │          │                          │
│ Project.                 │          └──────────────────────────┘
└──────────────────────────┘                      │
                                                   ▼
                                        ┌──────────────────────────┐
                                        │ BIM Object Sheet.        │
                                        └──────────────────────────┘
                                                   │ Submission
                                                   ▼
                Disapproved             ┌──────────────────────────┐
            <───────────────────────────│ Inspection by Receiver / │
                                        │ Client.                  │
                                        └──────────────────────────┘
                                                   │ Approved
                                                   ▼
                                        ┌──────────────────────────┐
                                        │ Complete.                │
                                        └──────────────────────────┘
                                                   │
                                                   ▼
                                        ┌──────────────────────────┐
                                        │ BIM Object to be used in │
                                        │ Project. And recorded in │
                                        │ CIC BIM Object Library   │
                                        └──────────────────────────┘
```
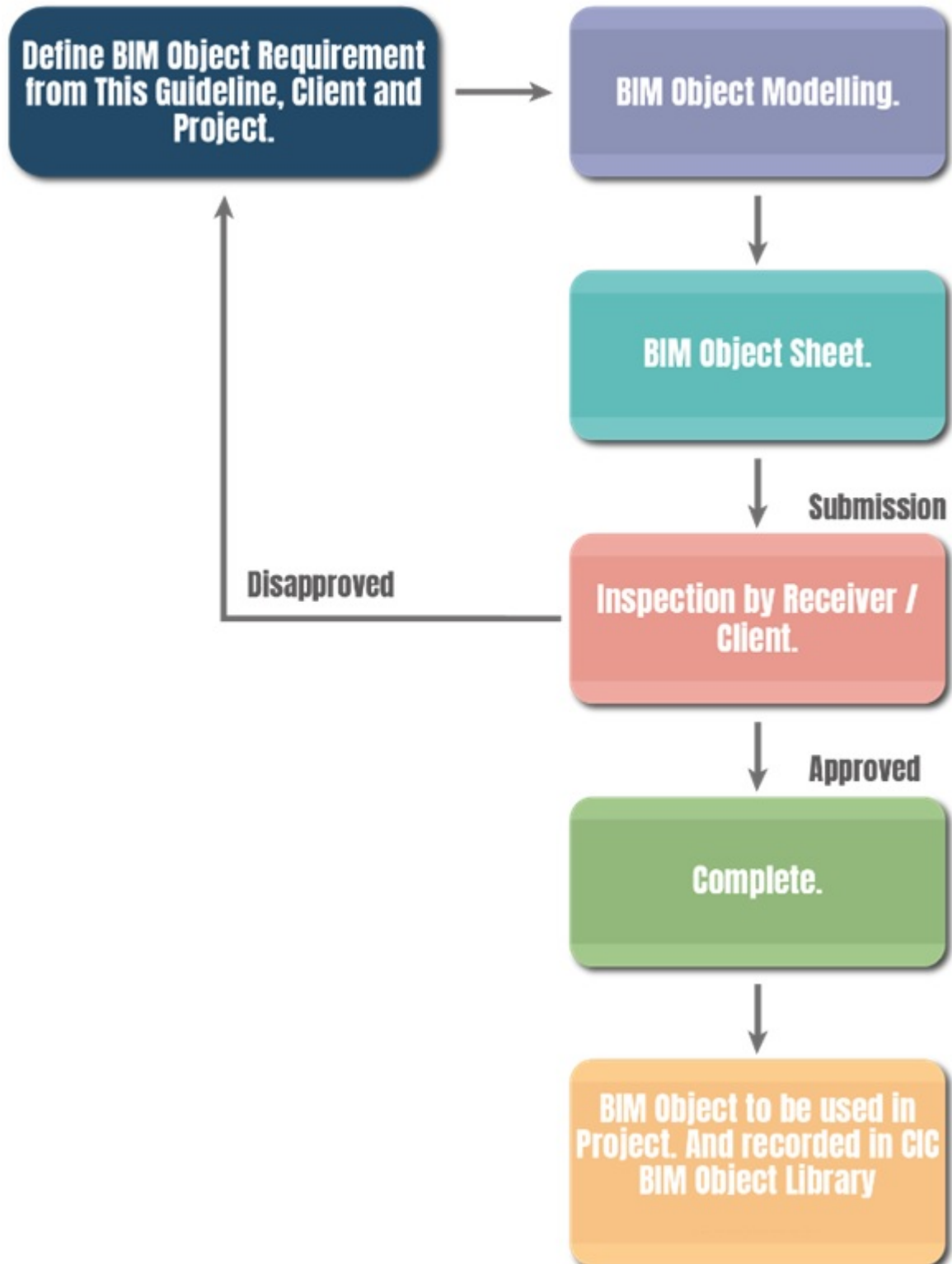
9 BIM Object Library

This section is prepared in order to contribute a comprehensive and open source CIC BIM object library for all construction industry users and BIM developers. The BIM object library provides a platform for the whole BIM industry to submit their BIM objects and benefit from sharing with each other. The CIC welcomes practitioners, such as contractor, manufacturers and material suppliers to contribute BIM objects to the CIC and share with the industry free of charge.

The scope of this section includes the platform operation structure and submission structure.

9.1 Platform Operation Structure

As illustrated below, the platform consists of the BIM object library, end-users and contributions from the industry BIM practitioners such as BIM developers. The library is open source and allows end-users to review, download and use any BIM objects from the library. The library allows BIM practitioners to submit their own BIM objects and hence contribute to increasing the entire value of the library to the industry.
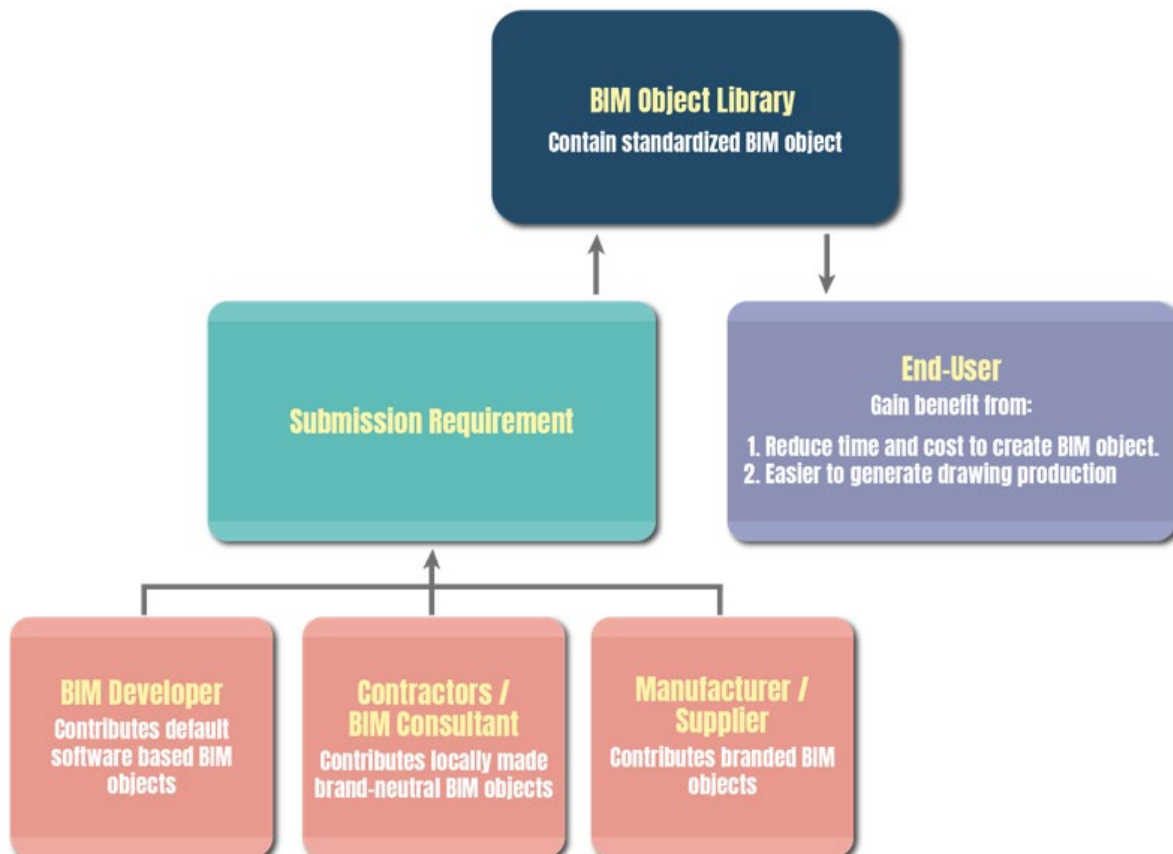
9.2 Submission Requirements

The BIM object shall be provided with a completed BIM object sheet and check form to prove that the object is complete and satisfies the requirements of this Guide.

The BIM object and relevant documents shall be submitted as a package and follow a standardised folder structure, as follows:

Folder Name (The BIM object name without file format extension)

├ The BIM object file

├ Image Folder (Storage of the BIM object geometry and property images)

├ Symbol Folder (Storage of the symbol object file(s) and its image(s))   If Applicable

├ Tag Folder (Storage of the tag object file(s) and its image(s))   If Applicable

└ Document Folder (Storage of the completed BIM Object sheet and BIM Object check form)

10 References

The following documents or information are generally applicable to this Guide, and are listed for general reference.

General:

- NBS BIM Object Standard (https://www.nationalbimlibrary.com/nbs-bim-object-standard)
- BIM-MEP^AUS (http://www.bimmepaus.com.au/initiative/)

Autodesk Revit:

- Family Library Interchange Program (http://aiab.org/index.php/background)
- International Revit User Group (www.revitcity.com)

GRAPHISOFT ArchiCAD:

- GDL Object Description (http://gdl.graphisoft.com/)
- BIM Classification Systems (https://www.graphisoft.com/downloads/archicad/BIM_Data.html)
- Overview of Creating Custom Objects (https://helpcenter.graphisoft.com/guides/archicad-21/archicad-21-reference-guide/elements-of-the-virtual-building/parametric-objects/create-custom-library-parts-and-components/)
- Expression Defined Property Values – Overview (https://youtu.be/SnDYdbUAwv0?list=PLnXY6vLUwlWUv8rM2RYu5RQnXVlZ-xdd7)

Bentley AECOsim / OpenBuildings Designer:

- AECOsim speedikon (https://communities.bentley.com/products/building/building_analysis___design/w/)

Reference Guidelines:

- DSD BIM Modelling Manual

- EMSD Building Information Modelling for Asset Management (BIM-AM) Standards and Guidelines

- DEVB BIM Harmonisation Guidelines for WDs

This BIM Object Guide also made reference to the libraries and documents from the following major local organisations with BIM capability:

- ArchSD (Architectural Services Department)
- CEDD (Civil Engineering and Development Department)
- DSD (Drainage Services Department)
- EMSD (Electrical and Mechanical Services Department)
- WSD (Water Supplies Department)
- HyD (Highways Department)
- HKHA (Hong Kong Housing Authority)

11 Acknowledgement

In order to achieve a standardised technical BIM approach for the industry, it is inevitable that certain portions of this Guide share similar approaches to those of other organisations. The CIC acknowledges that some methodologies recommended in this Guide originate from the Housing Authority Building Information Modelling Standards and Guidelines (HABIMSG) study to be published by Hong Kong Housing Authority and Housing Department.

The CIC would also like to acknowledge the following organisations for providing valuable graphics, information and comment for this Guide:

- Development Bureau
- ArchSD (Architectural Services Department)
- CEDD (Civil Engineering and Development Department)
- DSD (Drainage Services Department)
- EMSD (Electrical and Mechanical Services Department)
- WSD (Water Supplies Department)
- HyD (Highways Department)
- HKHA (Hong Kong Housing Authority)
- Autodesk Far East Ltd.
- Autodesk Industry Advisory Board
- A.C.I.D. (Advanced Construction Information Development Ltd.)
- Synnex Technology International (HK) Ltd.
- GRAPHISOFT Asia Ltd.
- Bentley Systems Hong Kong Ltd.

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(Please put a "✓" in the appropriate box.)

1. As a whole, I feel that the publication is:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Informative	❏	❏	❏	❏	❏
Comprehensive	❏	❏	❏	❏	❏
Useful	❏	❏	❏	❏	❏
Practical	❏	❏	❏	❏	❏

2. Does the publication enable you to understand more about the subject?	Yes		No		No Comment
	❏		❏		❏

3. Have you made reference to the publication in your work?	Quite Often		Sometimes		Never
	❏		❏		❏

4. To what extent have you incorporated the recommendations of the publication in your work?	Most		Some		None
	❏		❏		❏

5. Overall, how would you rate our publication?	Excellent	Very Good	Satisfactory	Fair	Poor
	❏	❏	❏	❏	❏

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