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Development Bureau

BIM HARMONISATION GUIDELINES FOR WORKS DEPARTMENTS

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Abbreviation	Definition
ArchSD	Architectural Services Department
BEP	BIM Execution Plan, which is the document explaining how the information modelling aspects of a project will be carried out throughout the project life cycle
BIM	Building Information Modelling
BIM DR	BIM Data Repository
BIM attribute	A piece of data forming a partial description of an object or entity, where entities and objects are synonyms, meaning items having a state, behaviour and unique identity, that is, a thing that can think or talk about, such as a wall. (source from PAS 1192-2:2013: Specification for information management for the capital/delivery phase of construction projects using building information modelling (now replaced by BS EN ISO 19650 Parts 1 and 2) defines the requirements for achieving building information modelling (BIM) Level 2.)
CDE	Common Data Environment: agreed source of information for any given project or asset, for collecting, managing and disseminating each information container through a managed process. A CDE workflow describes the processes to be used and a CDE solution can provide the technology to support those processes. (Source: ISO 19650-1:2018)
CEDD	Civil Engineering and Development Department
CIC	Construction Industry Council
CityGML	An open data model and XML-based format for the storage and exchange of virtual 3D city models
COBie	Construction Operations Building Information Exchange Subset of BS ISO 16739 documented as a buildingSMART model view definition (MVD) which includes operational information used to supply data to the organisation to populate decision-making tools and asset management systems. (Source: CIC BIM Dictionary December 2020)
DEVB	Development Bureau
DEVB (PLB)	Development Bureau – Planning and Lands Branch
DEVB (WB)	Development Bureau – Works Branch
DSD	Drainage Services Department
EMSD	Electrical and Mechanical Services Department
EPD	Environmental Protection Department
FME	Feature Manipulation Engine
GIS	Geographic Information System
HKSAR	Hong Kong Special Administrative Region of the People's Republic of China
HyD	Highways Department

Abbreviation	Definition
IFC	Industrial Foundation Class
ITB	Information Technology Bureau
LandsD	Lands Department
LOD-G	Level of Development – Geometry
LOD-I	Level of Development – Information
LOIN	Level of Information Need
MEP	Mechanical, Electrical and Plumbing
N/A	Not Applicable
NDA	New Development Area
OCGIO	Office of the Government Chief Information Officer
OFCA	Office of the Communications Authority
TIDP	Task Information Delivery Plan
UAT	user acceptance test
UU	Underground Utilities
WB	Works Branch
WBS	Work Breakdown Structure
WDs	Works Departments under Development Bureau
WSD	Water Supplies Department

Foreword

The Development Bureau (DEVB) is pleased to announce the publication of DEVB BIM Harmonisation Guidelines for Work Departments (the Guideline) with the goal to align BIM implementation, delivery and management for capital works projects. Using this Guideline for information exchange between Works Departments (WDs) and Lands Department (LandsD), it would support the Smart City planning. The industry would also benefit from the use of BIM, GIS and 3D data for more efficient design, construction, operation and asset management workflows in the project lifecycle.

At the onset of this harmonisation initiative, a consultancy study (the Study) on BIM Harmonisation for BIM/GIS Integration under First Phase Development of KTN and FLN NDA was commissioned by the Civil Engineering and Development Department (CEDD). As one of the key deliverables, it formulated a BIM Harmonisation Guidelines for WDs for the assets under the study. This harmonisation initiative was then taken further to cover capital works projects outside the scope of the study. With concerted efforts of the WDs and LandsD, this Guideline is formulated.

This Guideline shall be adhered to for upcoming BIM adopting capital works projects to ensure consistency when authoring, reviewing and managing BIM files, BIM models and BIM objects. The adoption of the Guideline would facilitate the sharing and maintenance of BIM models and information exchange among WDs and LandsD. The Guideline is to be reviewed regularly under the DEVB BIM Working Group so as to upkeep with technological advancements and industry developments.

DEVB would like to thank everyone who has contributed to the success of the Publication, in particular the Project Steering Group and Project Working Group members of the Study:

- Architectural Services Department
- Civil Engineering and Development Department
- Construction Industry Council
- Development Bureau – Planning and Lands Branch
- Development Bureau – Works Branch
- Drainage Services Department
- Electrical and Mechanical Services Department
- Highways Department
- Lands Department
- Water Supplies Department

Finally, contributions and efforts given by the consultant of the Study, AECOM Asia Company Limited, is also highly appreciated.

1. Introduction

1.1. Background

1.1.1. CEDD commissioned a consultancy to carry out a BIM horizontal harmonisation study for the First Phase Development of KTN and FLN NDA (the Study) and produced a BIM Harmonisation Guidelines. The said guidelines encompass standards governing the design BIM models, construction BIM models and shareable BIM models enabling BIM/GIS integration to facilitate LandsD's continuous study and production of the 3D digital maps for Hong Kong. Under the Study, a BIM Data Repository (BIM DR) will be established to store the BIM models of the First Phase Development of KTN and FLN NDA for effective and efficient information exchange among Works Departments (WDs) and LandsD.

1.1.2. Subsequent to the endorsement of the BIM Harmonisation Guidelines of the Study, DEVB took the opportunity to expand and generalise the document and formulate the DEVB BIM Harmonisation Guidelines for WDs (this document) to use for projects outside the First Phase Development of KTN and FLN NDA. WDs shall adopt the harmonisation standards outlined in the DEVB BIM Harmonisation Guidelines for WDs (this document, thereafter referred to as the Guide) in the upcoming capital works projects adopting BIM.

1.1.3. The harmonization components of this Guide include:

a) Information requirements and exchange (Section 2)

b) BIM object (Section 3)

c) Federation and BIM model naming (Section 4)

d) LOIN implementation (Section 5)

1.1.4. The integrated platform (BIM DR) and conversion engine have been documented separately in other submissions of the Study of CEDD.

1.1.5. This Guide addresses the standardisation of the digital models comprising BIM models, objects, and attributes:

a) BIM Models, which include native and shareable models;

b) BIM Objects, which are parametric elements used to author BIM models. They are usually resided on the CIC BIM Portal or authored in accordance with principles of this Guide; and

c) BIM Attributes, which could facilitate BIM model and object management.

1.2. Objectives

1.2.1. The objectives of this Guide are:

a) To enable sharing, dissemination and maintenance of BIM models and BIM attributes across the WDs and LandsD;

b) To support sharing of BIM objects with CIC;

c) To form the standards to support LandsD's BIM Data Repository, 3D digital map initiatives, and the forthcoming 3D Land Information System;

d) To provide aligned BIM standards horizontally across WDs for adoption in their upcoming projects with emphasis on consistent modelling approaches.

1.3. Harmonisation Approach

1.3.1. This harmonisation exercise makes reference to the following documents:

a) The BIM Harmonization Guidelines for the First Phase Development of KTN and FLN NDA of the CEDD;

b) Parts 1 and 2 (2018 version) of BS EN ISO 19650 (ISO 19650): to adopt a common approach for collaborative production of information and information exchange requirements;

c) ISO 19650 terminologies (refer to Appendix I);

d) WDs' current BIM development, standards, documents, practice notes, guidelines, regulations and legislations, including data owners' graphical and non-graphical information (geometrical and non-geometrical information in ISO 19650 terms) requirements;

e) DEVB's Technical Circular (Works) No. 12/2020 – Adopting of Building Information Modelling for Capital Works Projects in Hong Kong;

f) CIC BIM Standards - General: December 2020 Edition, and

g) CIC Production of BIM Object Guide - General Requirements (August 2019)

1.3.2. The following key harmonisation focuses will be addressed in details in the coming sections of this Guide:

a) Naming Convention: BIM file naming (information container identification as in National Annex NA.2 of BS EN ISO 19650-2:2018) for BIM models and BIM objects and their abbreviations are inconsistent;

b) Information Storage and Sharing: There are varying model division strategies amongst WDs;

c) Project Information Requirements: There are varying information demands between WDs and LandsD, and smooth access of information may be limited by hardware and software capability (IT environment); and

d) Project Delivery: Some WDs do not have project closeout protocols.

2. Information Requirements and Exchange

2.1. Information Ownership

2.1.1. Information ownership shall be defined at onset of a project.

2.1.2. As soon as the asset owner is identified, asset owner-specific requirements, including departmental BIM documents, should be followed. If asset owner could not be identified, the BIM Execution Plan (BEP) should be followed, prior to adopting the CIC BIM Standards (the latest version). The practices should be properly documented in the BEP.

2.1.3. WDs should adhere to this Guide when preparing the BIM models (in native and open format) and objects for sharing with others.

2.1.4. WDs share the design BIM model (after tender stage) and as-built model (after construction) as the input files for necessary conversion of BIM models as per stipulated in paragraph 19 of the Technical Circular (Works) No. 12/2020. The circular will be updated from time to time.

2.1.5. WDs are suggested to review the BIM models to confirm whether such information could be shared.

2.1.6. To facilitate information exchange, a BIM DR has been established under the Study of CEDD which will be handed over to LandsD. The BIM DR serves to host native BIM models (developed in accordance with this Guide), shareable BIM models (IFC) and 3D GIS Open Format (CityGML).

2.2. IT Environment

Hardware, software and internet speed should meet minimum operability requirements to optimize interdepartmental information exchange.

2.2.1. Hardware

2.2.1.1. Not applicable.

2.2.2. Software

2.2.2.1. A single, common or interoperable BIM modelling software that is able to generate open format files should be used for a project (composing of several contracts) as far as practicable. This is to enable seamless flow and sharing of information within the project.

2.2.2.2. When selecting software, project information requirements and support of open format such as IFC should be considered.

2.2.2.3. Segregation of BIM models and software for modelling should be practised to balance modelling efficiency, drawing generation needs and non-geometrical

information interoperability. For example, the following principles could be adopted for design stage:

a) Stormwater drainage and sewerage were demarcated at the agreed connection point between building drainage and civil drainage.

b) Water supply, electrical power supply, gas supply, telecommunications were demarcated at the agreed interface point between building works and civil works.

2.2.2.4. For preparation of the BIM models, project officers should consult the departmental BIM Support Team on the recommended software and software version for model development.

2.2.2.5. For the shareable BIM format, IFC v4 will be used.

2.2.3. Internet Speed

2.2.3.1. Limitation in internet speed could adversely affect the access to BIM DR and reduce smoothness in viewing 3D models. Therefore, adequate internet speed is essential for effective information exchange.

2.3. BIM File Size

2.3.1. For WDs without departmental BIM model file size limits, it is recommended that the maximum file size for each BIM model should be capped at 500MB. This size limit is suggested to be adopted in departmental standards. Due to varying project sizes and requirements, this Guide does not provide limit or standard to the total project file size. WDs should avoid, as far as practicable, large file sizes which would require substantial amount of storage, thereby unnecessarily increasing the time and cost to establish and operate the BIM DR.

2.3.2. To help control the BIM model file size, the maximum size of each BIM object file used should be kept at the minimum, preferably under 5MB.

2.4. Level of Information Need (LOIN) Gap Analysis

2.4.1. In accordance with the principles of ISO 19650, information is required for performing a task or supporting a decision. The LOIN is defined as the appropriate level (or “richness”) of information to be provided for each information exchange, avoiding risk (too little information) or waste (too much information). LOIN could either be expressed in the richness of geometric details (LOD-G) or richness of datasets (LOD-I).

2.4.2. LOIN stems from the fundamental information requirement, which is a description of the extent and detail of information exchange in terms of geometry, information and documentation. Specifically, when collaborating within project participants, information approved for sharing includes:

a) The lead appointed party’s information requirements;

b) The level of information need; and

c) Information needed for coordination by other task teams.

2.4.3. A comparison was conducted for LOIN and LOD-I/LOD-G in CIC BIM Standards - General: December 2020 Edition as adopted by most of the WDs. The results could be summarised in the following three scenarios:

a) LOIN and LOD-I/LOD-G have aligned concepts as described in Section 2.4.4;

b) LOIN and LOD-I/LOD-G have aligned concepts and WDs have basic awareness, but requiring further clarification to enhance the awareness, as described in Section 2.4.5; and

c) There are gaps between LOIN and LOD-I/LOD-G, and suggested actions are provided in Section 2.4.6.

2.4.4. Concepts that are aligned between LOIN and CIC's LOD-I and LOD-G include:

a) Each BIM model element has an object ID;

b) Each BIM model element has an object name;

c) Each BIM model element has an object definition;

d) Each BIM model element has an object description;

e) Each BIM model element has a LOD-G which includes detail, dimensionality, location, appearance, and parametric behaviour;

f) Each BIM model element has a LOD-I which includes identification of properties and information content properties; and

g) Documentation requirements which includes identification of documentation and format e.g. IFC, PDF, DWG, XML, etc. are necessary.

2.4.5. Concepts that are aligned between LOIN and CIC's LOD-I and LOD-G but requiring more awareness include:

a) Information delivery milestones could be specified to clarify when the information is needed, with an emphasis on lifecycle and asset management requirements.

b) BIM model elements within a federation structure (information container breakdown structure as defined in ISO 19650) could be identified by function, spatial arrangement and geometrical composition. For example, WDs are suggested to add "spatial requirements" to rooms, spaces, corridors, plants and equipment rooms to define how they interact spatially, by means of geometrical (e.g. dynamic envelopes for clearance or tolerance) or non-geometrical (e.g. parametric attribute fields containing length, area, volume requirements, etc.). The spatial requirements for civil and infrastructural disciplines should also be considered.

c) In view of the aforementioned spatial composition and requirements, WDs are suggested to utilise federation strategies and naming to facilitate work breakdown structure (WBS).

2.4.6. Identified gaps between LOIN and CIC's LOD-I and LOD-G include:

a) LOIN identifies the BIM model's purposes for information delivery, while LOD identifies the development maturity of elements. LOD-I and LOD-G can

differ for elements in the same stage. WDs are suggested to utilise information container identification (ID) to specify the purpose of BIM models.

b) Stakeholders who require and deliver the information shall be identified. Stakeholders are suggested to adopt the concept of RACI (ISO 19650-2:2018 Annex A's information management assignment matrix) and describes in BEP. The acronyms of RACI are defined as followed:

R - Responsible for undertaking activity
A - Accountable for activity completion
C - Consulted during activity
I - Informed following activity completion

Appendix II – Information Responsibility Assignment Matrix for details.

2.4.7. Way Forward of LOIN Implementation

LOIN aims to strengthen LOD-G and LOD-I on the basis of CIC BIM Standards - General: December 2020 Edition. Refer to Section 5 for details.

2.5. Information Exchange Formats and Mechanism

2.5.1. To facilitate the data exchange and extraction needs of WDs, a clear set of criteria should be established. The sharing of commonly used BIM data across WDs in a self-service manner via a centrally managed BIM DR is efficient with fast turnaround time. It facilitates site selection, site analysis, planning of location of services with a view to achieve design quality and efficiency, and minimise risks of clashes and time for reworks. Understanding the demands from WDs LandsD give rise to the subsequent design of the conversion engine and the shareable BIM.

2.5.2. Appendix III – Data Filtering Rule Table shows the data required from specific departments. LandsD prefers having a full set of BIM models in native format, while other WDs have certain department-specific data extraction rules.

2.5.3. To enable interoperability, open formats, such as IFC, shall be adopted to facilitate geometrical and non-geometrical information exchange. Geometrical information exchange aims to export BIM models to open BIM formats. Non-geometrical information exchange aims to export BIM attributes to tabular format such as COBie (Construction Operations Building Information Exchange). COBie is an international standard for data exchange, and it is the most commonly used standard for data handover from construction to operations. Through a conversion engine, the open format CityGML will be made available and stored in the BIM DR.

2.5.4. Information exchange mechanism relies on the followings:

a) Information container ID, which entails consistent ID field definitions and abbreviation codes to facilitate file-based data filtering;

b) Data filtering rules, which outlines the key criteria for data exchange and extraction; and

c) WDs' BIM files, which shall be in compliance with the defined naming convention of this Guide.

2.6. Data Security Classification

2.6.1. Data security considerations include user access level and data classification.

2.6.2. Upon the establishment of BIM DR, WDs' users would be allowed to access the BIM DR based on WDs' information needs. Departmental users are assigned with appropriate access rights. No restricted, sensitive or confidential data should be shared.

2.6.3. Standardised data classification could further ensure security in the data exchange process in the future. Refer to Section 6.6.4 for details.

3. BIM Object

3.1. Principles

3.1.1. The principles of authoring BIM objects should follow CIC BIM Object Guide, which contains LOD-G (geometrical) and LOD-I (non-geometrical) requirements. In addition, Appendix V and Appendix VI provide further examples for handling BIM objects' LOD-G and LOD-I.

3.1.2. CIC BIM Portal has provided an industry-wide, centralised and publicly accessible platform for sharing of BIM objects. BIM objects authored by the WDs or from capital works projects should be incorporated into the CIC BIM Portal upon certification by CIC. WDs should follow Section 3.7 to provide BIM objects to CIC. WDs should notify project awardees to utilise BIM objects shared at CIC BIM Portal as far as practicable and make reference to WDs' BIM objects that have been internally certified for use.

3.1.3. BIM objects' naming convention should follow Section 3.4, which is derived from CIC BIM Object Guide's principles and further developed.

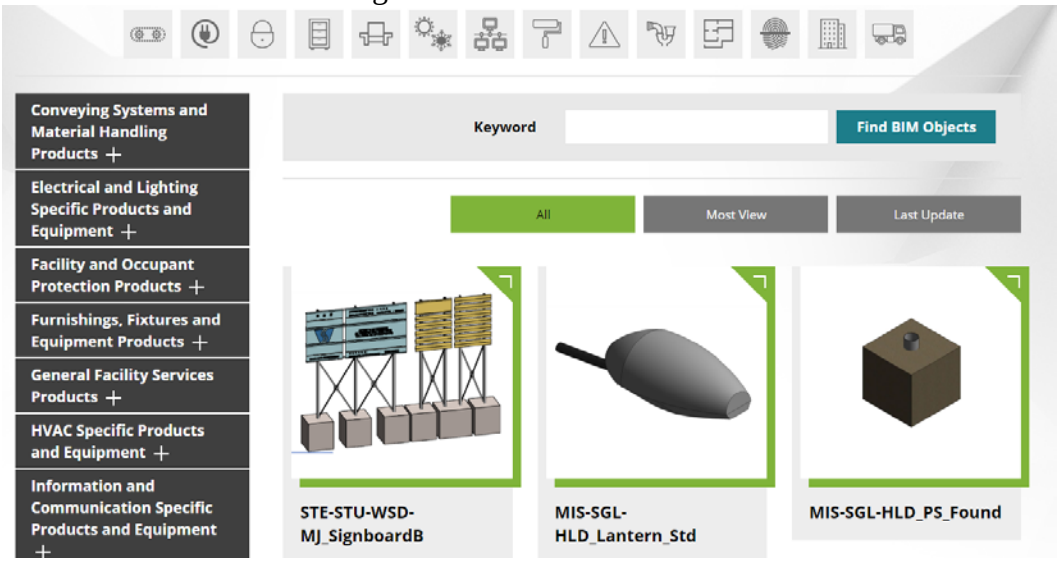
3.1.4. To minimise information loss during conversion, the appropriate category type for the BIM objects should be defined. The use of generic model for BIM object authoring should be minimised as far as practicable.

3.1.5. To optimise information management within BIM models, replicable BIM objects (e.g. windows, doors, signage, fittings) should be used to compose BIM models as far as practicable.

3.2. CIC BIM Object Guide and Portal

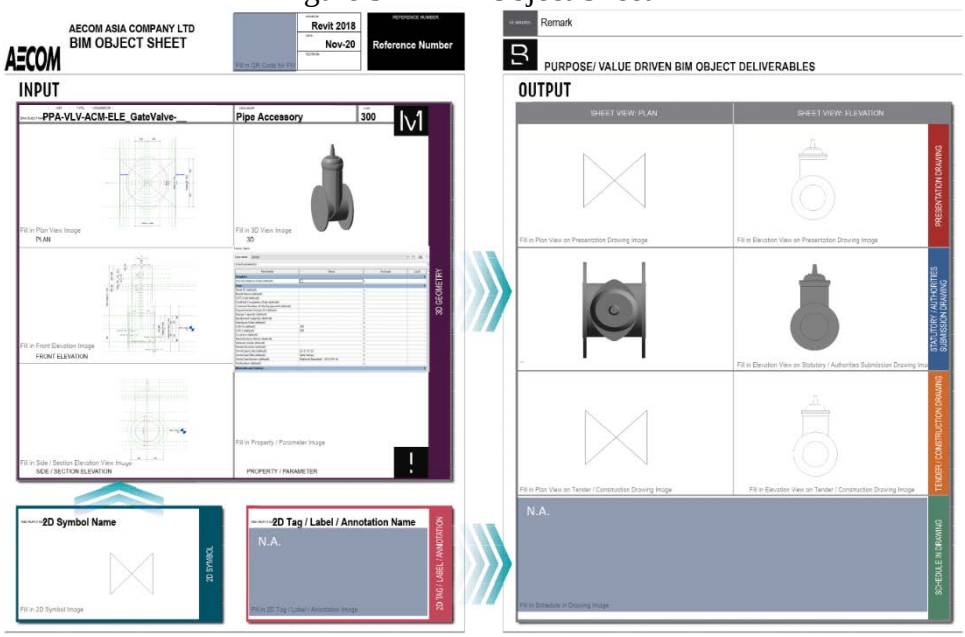
3.2.1. Since 2019, CIC has set up a BIM portal for public to access the BIM objects. A BIM object library has been established on the CIC BIM Portal, and it contains BIM objects under OmniClass classifications. Refer to Figure 3-1 for CIC BIM Portal (located at https://www.bim.cic.hk/en/resources/bim_objects).

Figure 3-1 CIC BIM Portal



3.2.2. Each BIM object is accompanied by a BIM object sheet which contained 3D geometry and 2D presentation. To fulfil drawing generation needs, 2D presentation may be in the form of layout, elevation view, sectional view, 2D symbols, and tag / label / annotations. The BIM object sheet serves to indicate that the BIM object has been completed and satisfied all requirements and functions for drawing production (refer to Figure 3-2).

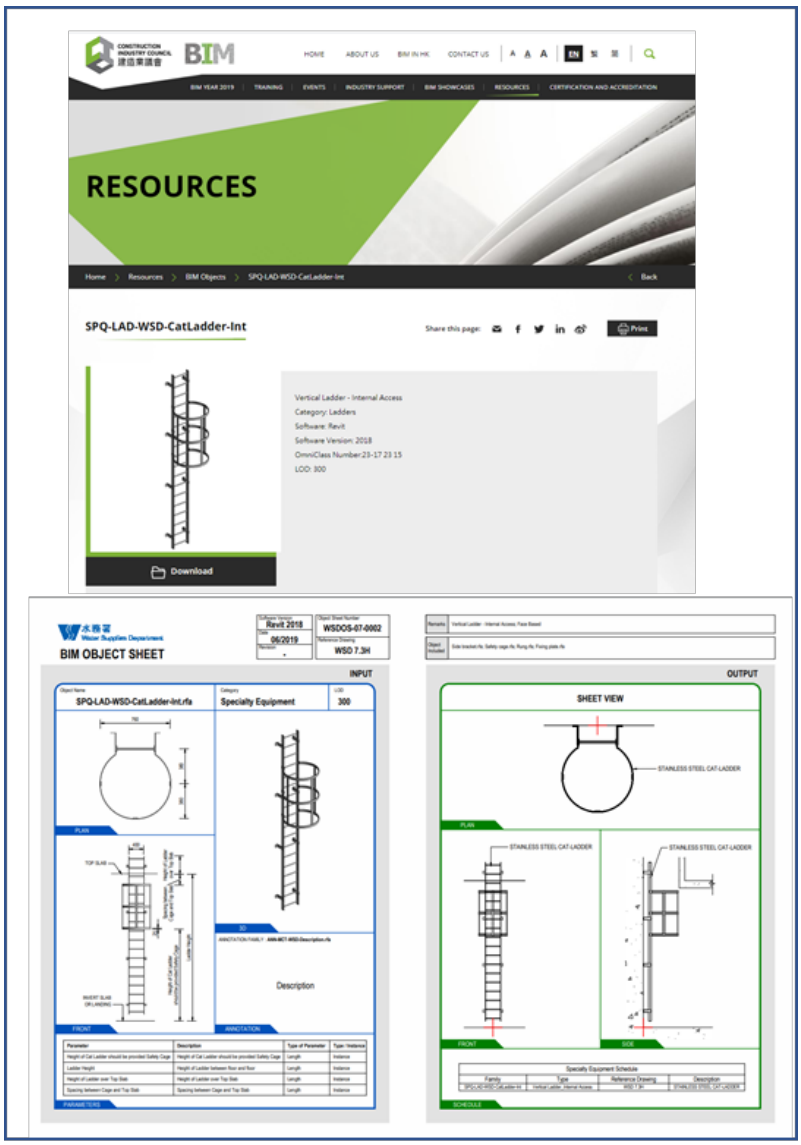
Figure 3-2 BIM Object Sheet



3.3. Process of Adopting CIC BIM Objects

3.3.1. In order to utilise the CIC BIM objects as far as practicable, a process has been developed to adopt CIC BIM objects. Refer to Figure 3-3 below for an example of BIM object found on CIC BIM Portal.

Figure 3-3 An Example of BIM object found on CIC BIM Portal



3.3.2. There are three scenarios for adopting CIC BIM objects, which depend on whether the four criteria, including appearance, 2D presentation, attributes (LOD-I) and naming convention, are fulfilled:

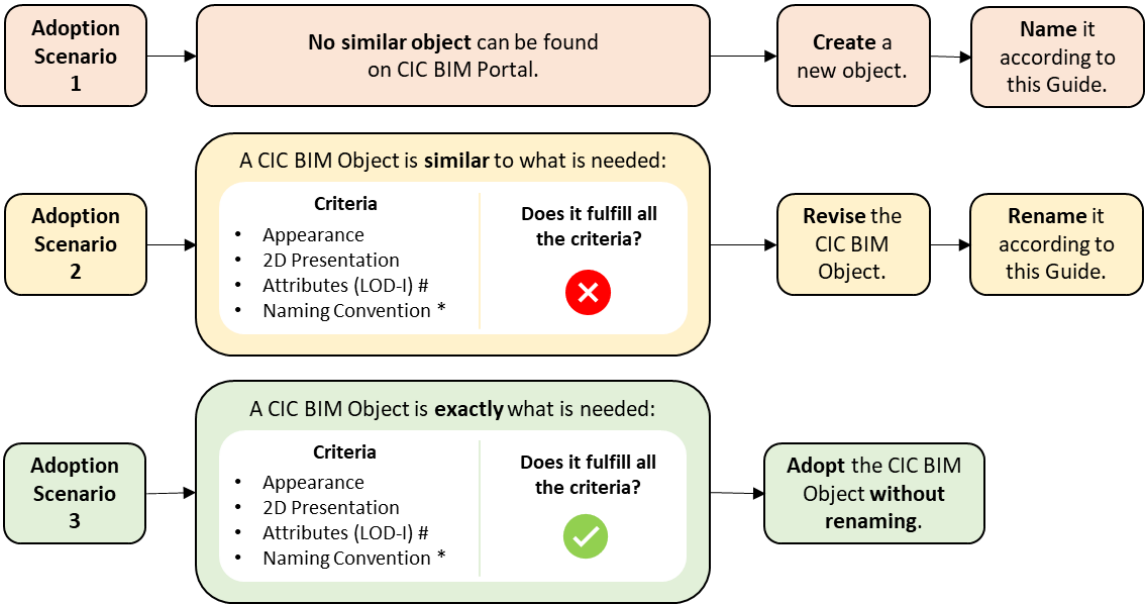
Adoption Scenario 1: If no similar CIC BIM object is found, a new object shall be created and named according to this Guide.

Adoption Scenario 2: If a CIC BIM object is similar to what is needed but does not fulfil all the four criteria, it shall be revised and renamed according to this Guide.

Adoption Scenario 3: If a CIC BIM object is exactly what is needed and fulfils all the four criteria, it shall be adopted without renaming.

Refer to Figure 3-4 below for BIM object adoption scenarios.

Figure 3-4 BIM Object Adoption Scenarios



Remarks:

- Refer to Appendix VI

* - Refer to Section 3.4

3.4. Naming of BIM Objects

3.4.1. BIM objects shall be modelled for a specific purpose and assigned with the most appropriate and representative category. BIM objects shall be named systematically and logically for the understanding of users and for easy BIM object management.

In accordance with CIC BIM Object Guide, BIM object naming should be in the format as shown below.

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

3.4.2. Based on the CIC BIM Object Guide, following principles are set:

Table 3-1 Descriptions and Guidelines for the BIM Object Naming Fields

Field No.	BIM Object Naming Fields	Obligation	Field Length and Format	Guidelines
1	Category	Required	3 alpha-numeric	These two fields shall follow Appendix IV - Master Type List. a) Field 1 shall be kept unique in value and meaning (e.g. ECD, SCH) b) 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"). c) 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. d) When Field 2 is not necessary to describe at the second level, three underscores (___) should be used. e) As EMSD has advised they will adopt FLIP for BIM object naming in the future, EMSD's current codes were not included in Appendix IV.
2	Functional Type	Required	3 alpha-numeric	
3	Originator	Required	3 alpha-numeric	For BIM objects originating from WDs, corresponding department names should be used as originator names. However, other consultant or contractors who create the new BIM objects should follow Agent Responsible Code **(**ARC**)** list for originator. For those consultant or contractors, this field shall follow the up-to-date version of the ARC

Field No.	BIM Object Naming Fields	Obligation	Field Length and Format	Guidelines
				published by DEVB under the CAD Standard for Works Projects (ARC full list can be found at: https://www.devb.gov.hk/en/construction_sector_matters/electronic_services/cad_standard/computer_aided_drafting/cad/index.html) If a BIM object is fully adopted without change, its name should be maintained. However, if the BIM object is modified, its originator code should be updated and saved as another BIM object.
4	Descriptor 1	Required	1-15 alpha-numeric	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 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).

Field No.	BIM Object Naming Fields	Obligation	Field Length and Format	Guidelines
				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	Required	2 alpha-numeric	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)

3.4.3. The file name length of BIM objects should be 30 characters maximum, including delimiters but excluding the file extension. BIM object file name is expected to be as short as possible and should follow CIC's file name length for BIM objects.

3.4.4. Only alphanumeric characters, hyphen (-) and underscore (_) are allowed. Hyphens should be used as the delimiter between each naming field.

3.4.5. Space, special symbols and invalid characters (including ~ " # % & * : < > ? / \ { | }.) shall not be used within BIM object names.

3.5. Guidelines for BIM Object Authoring

While the principles of authoring BIM object should be followed CIC BIM Object Guide, this section provides further guidelines for handling BIM objects.

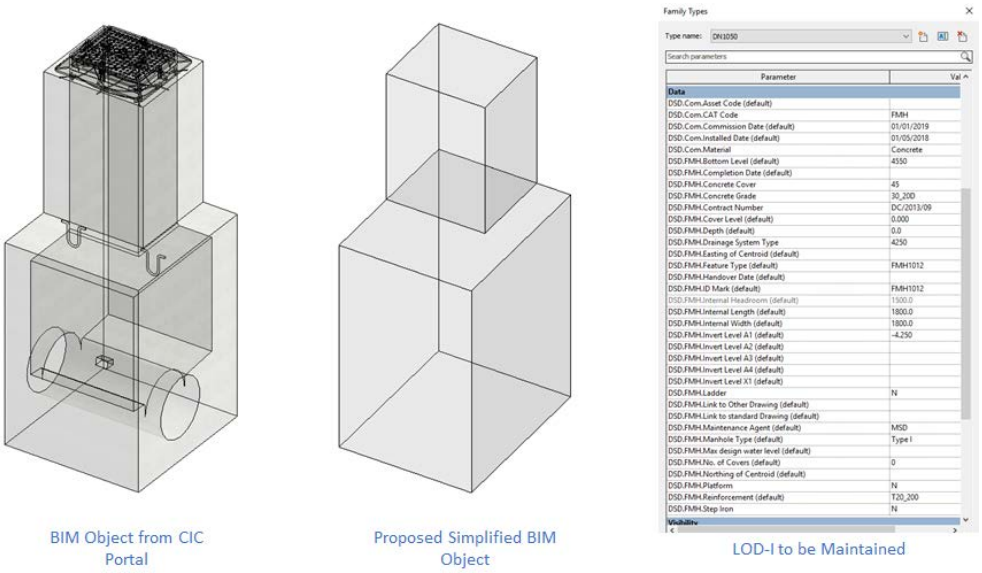
3.5.1. Simplifying and Enhancing BIM Objects

Before using a BIM object, BIM authors should check if it could be simplified or enhanced to meet the project requirements. The basic principle when conducting the modelling works using the BIM objects should be as follows:

a) At the same LOD-G, utilising the same BIM object without change as far as practicable.

b) When the LOD-G is too detailed for the project, simplifying the BIM object should be considered while ensuring that the same LOD-I is maintained. The naming of the simplified object should follow Section 3.4 for details and Field 3 of the BIM object naming shall be renamed after the Originator who altered the BIM object. Refer to Figure 3-5 below for a sample simplified BIM object.

Figure 3-5 Sample Simplified BIM Object based on Detailed BIM Object

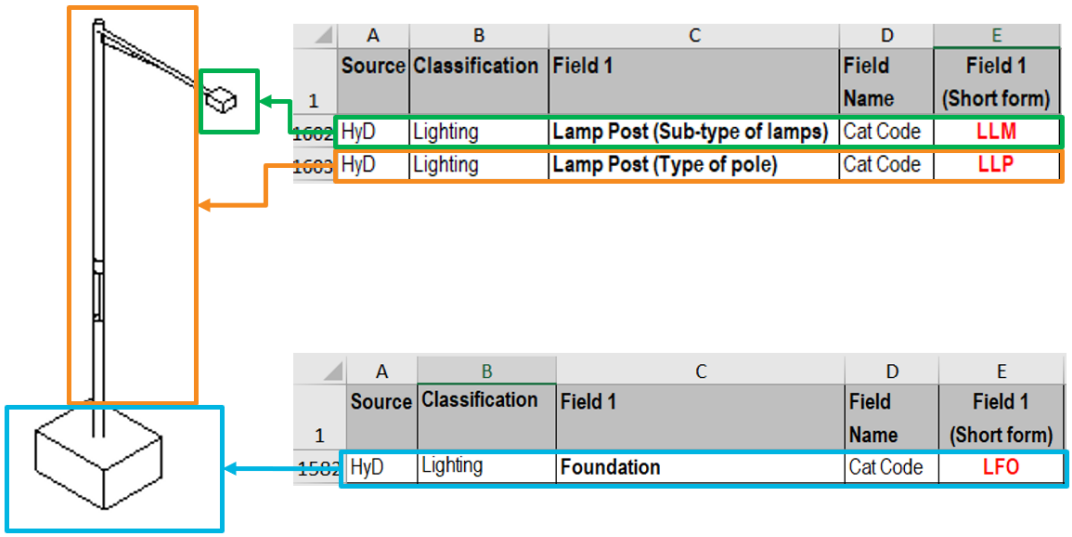


c) When the LOD-G is insufficient to meet the project requirement, developing the BIM object based on existing BIM object.

3.5.2. BIM Object Division

Appendix IV Master Type List shows the current set of BIM object's departmental classification and codifications. A model element may be authored using more than one BIM object. For example, a lamp post may contain three BIM objects: type of pole, sub type of lamps and foundation (refer to Figure 3-6).

Figure 3-6 Sample Lamp Post BIM Object Division



	A	B	C	D	E
1	Source	Classification	Field 1	Field Name	Field 1 (Short form)
1602	HyD	Lighting	Lamp Post (Sub-type of lamps)	Cat Code	LLM
1603	HyD	Lighting	Lamp Post (Type of pole)	Cat Code	LLP

	A	B	C	D	E
1	Source	Classification	Field 1	Field Name	Field 1 (Short form)
1582	HyD	Lighting	Foundation	Cat Code	LFO

3.5.3. LOD-G and LOD-I for different model elements may vary but should ultimately facilitate project needs. The attributes "LOD-G" and "LOD-I" should be added to the newly created BIM objects to indicate the LOD level number. Refer to Appendix VI for details.

3.5.4. Common BIM software have built-in templates or tools to facilitate the authoring of BIM objects. These templates or tools have the capability to embed 2D presentation, but the methods may vary. After inserting BIM objects into BIM models, project-specific attributes should be added and populated. Refer to Appendix V for examples of BIM object authoring.

3.6. BIM Object Management

3.6.1. CIC BIM Portal supports OmniClass classification. To facilitate logical BIM object organisation and searching, BIM objects could be organised in a folder structure as the first level of OmniClass according to "OmniClass version 2012 Table 23" (https://www.csiresources.org/standards/omniclass/standards-omniclass-about). Table 3-2 below shows an example for the corresponding Level 1 title with OmniClass numbers as folder names.

Table 3-2 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

3.6.2. In addition to managing the folder structure, OmniClass classification information should also be inputted in BIM objects' classification attributes. Refer to Appendix VI for details.

3.6.3. WDs are recommended to adopt and customise Appendix VII – Sample BIM Object Check Form for departmental use. The corresponding BIM Support Team should upkeep their own check forms in the future.

3.7. Workflow for Sharing BIM Object

3.7.1. WD's BIM Support Team should collect, review and register BIM object packages (BIM objects, CIC BIM Object Sheets and CIC BIM Object Check Forms) for submission to CIC.

3.7.2. If CIC deems the BIM objects not ready to be accepted, comments should be provided to the BIM Support Team concerned for following up. After CIC certifies and accepts the BIM objects, the BIM objects would be made available on CIC BIM Portal. Feedback regarding the acceptance status should be provided to the respective BIM Support Team within three months after receiving the BIM object packages.

3.7.3. WDs should notify project awardees to utilise BIM objects shared at CIC BIM Portal as far as practicable and make reference to WDs' BIM objects that have been internally accepted for use.

4. Federation and BIM Model Naming

4.1. BIM Model Naming Principle

4.1.1. This section provides the principle to set out the BIM model naming (information container ID) and federation strategy to achieve consistent BIM model federation. A hierarchical and logical model organisation can serve to facilitate BIM management and subsequent LOIN implementation such as LOD-I management and colour appearance.

4.1.2. ISO 19650-2:2018 Part 2 Section 5.1.7(a) states that each information container shall have a unique ID, based upon agreed and documented convention comprising fields separated by a delimiter, within a project Common Data Environment (CDE). Unique ID should be consistent among WDs to facilitate interdepartmental information exchange via the BIM DR. The hierarchy should include the following descriptions:

a) What asset is the BIM model related to;

b) Who is the originator of information;

c) Which geospatial zone and system(s) it belongs to;

d) Where it is located;

e) Which discipline it is related to;

f) What type of information the model contains; and

g) What unique information is necessary to further distinguish the model from others.

4.1.3. ISO 19650-2:2018 Part 2 Section 5.1.7(b) states that the project's common data environment shall enable each field to be assigned a value from an agreed and documented codification standard. The codification standard would set out:

a) Field sequence;

b) Information container ID fields (and sub-fields if applicable);

c) Description of each information container ID field and sub-field;

d) Whether the field is required or optional;

e) Format which defines length and alphabetic, numeric or alphanumeric;

f) Whether the codification is common or project-specific; and

g) Where the detailed list of codification information can be located.

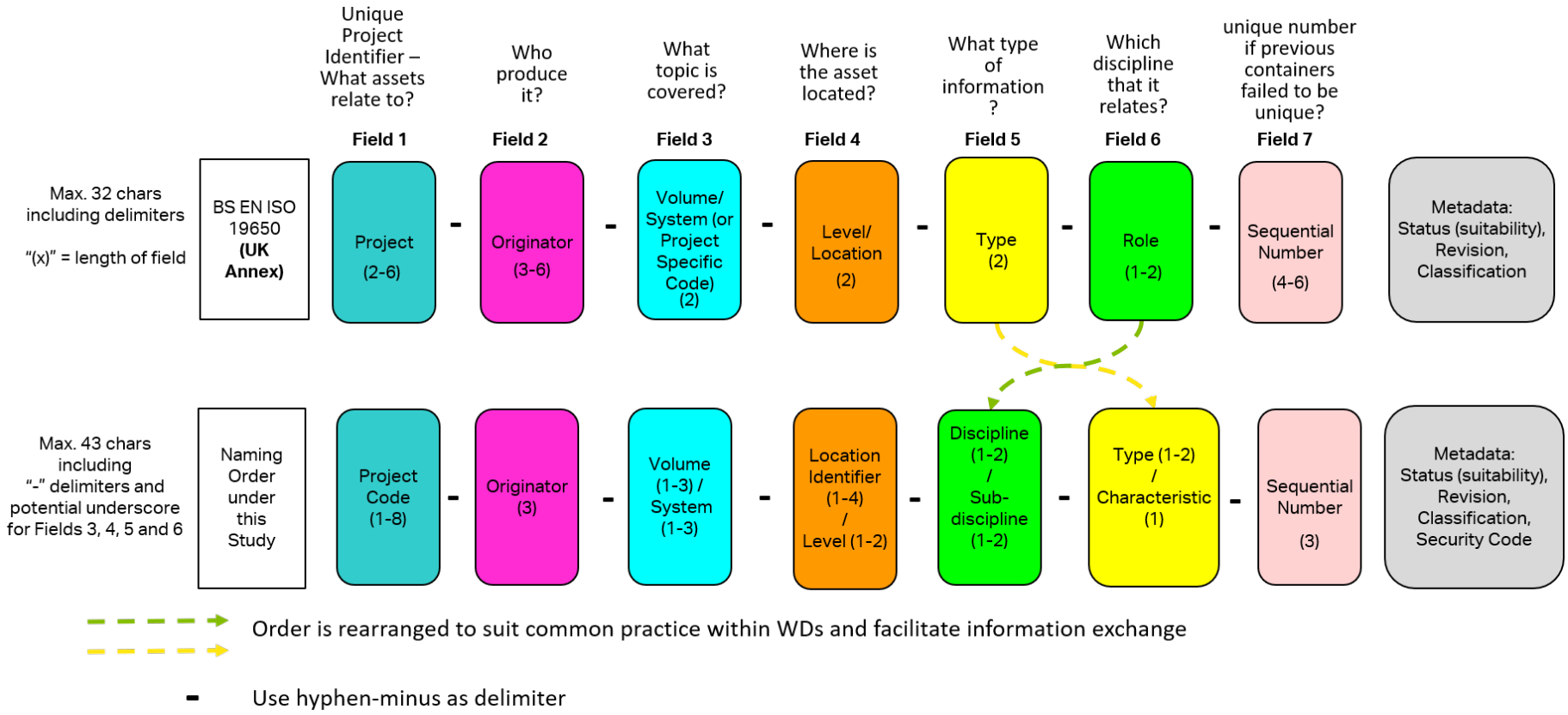
4.1.4. Information container ID, model division, federation and corresponding abbreviation codes should be sustainable and consider the future potential use of metadata.

4.2. Information Container Identification Fields

4.2.1. Model naming shall follow the information container ID fields sequence and corresponding abbreviation codes. The arrangement of information container ID fields is primarily derived from the principles in ISO 19650 to suit the common practices within WDs. UK Annex mentioned in ISO 19650 was referenced to develop the naming sequence. Naming convention under the "CIC BIM Standards - General: December 2020 Edition" (with Hong Kong Local Annex of ISO 19650-2:2018) was also aligned with the naming convention of this Guide.

4.2.2. Refer to Figure 4-1 below for the comparison between information container ID fields of the UK Annex and naming convention of this Guide.

Figure 4-1 Information Container ID Fields - UK Annex vs Naming of this Guide



4.2.2.1. The proposed federation strategy and naming convention differs from the ISO 19650 UK Annex to suit the local need, which was aligned with the "CIC BIM Standards - General: December 2020 Edition".

4.2.2.2. Contents of Field "Volume" are modified from UK Annex, and Field "Discipline" is used instead of Field "Role" to facilitate information exchange among the WDs and LandsD.

4.2.2.3. The maximum total length of model names is 43 characters (including delimiters and information dividers; excluding file extension). Appendix VIII – Federation Strategy Diagrams and Naming Examples shows examples for reference.

4.2.2.4. Information container ID fields are reserved for information pertinent to information exchange between WDs. To ensure that the total length of model naming is manageable, metadata should only be used when:

a) The information container ID field is only relevant to individual WDs;

b) The identification does not facilitate work breakdown structure;

c) The length of the information container ID field is relatively long; or

d) The detailed descriptions would lose the meaning and adversely affect information exchange if abbreviated.

The input format for metadata that facilitate data filtering (e.g. security code) should be consistent. Flexibility on the input format is allowed for other cases.

4.2.2.5. Mapping tables (Appendices XII to XVII) have been provided for the WDs to bridge the existing codes and harmonised codes.

4.2.3. Table 4-1 describes the Information Container ID Fields.

Table 4-1 Information Container ID Fields

Field No.	ISO 19650's Information Container ID Field (UK Annex)	Information Container ID Field	Sub-field No.	Information Container ID Field Description	Obligation	Field Length and Format	Nature of Codification
1	Project	Project	N/A	A unique identifier should be used to serve as the project code (e.g. agreement, contract, future asset categorisation). A unique code should be assigned to each project stage (e.g. design, construction and operations) to determine the relationship with a particular asset.	Required	1-8 alphanumeric	Project-specific (Appendix IX, Table App IX-1)
2	Originator	Originator	N/A	A unique identifier based on Agent Responsible Code (ARC) should be used to indicate the model's responsible authoring party. The ARC is updated from time to time, which could be found at https://www.devb.gov.hk/en/construction_sector_matters/electronic_services/cad_standard/computer_aided_drafting/cad/index.html	Required	3 alphanumeric	Common (Agent Responsible Codes)
3	Volume/ System (or Project	Volume (and System when applicable)	3.1	A unique identifier should be used to indicate specific geospatial zone or volume within a project.	Required	1-3 alphanumeric	Project-specific (Appendix IX, Table App IX-2)

Field No.	ISO 19650's Information Container ID Field (UK Annex)	Information Container ID Field	Sub-field No.	Information Container ID Field Description	Obligation	Field Length and Format	Nature of Codification
	Specific Code)		3.2	An identifier should be used to indicate a collection of interconnected model elements across main disciplines under a system (e.g. sewerage system, water supply system, highway). System is used to facilitate data sharing instead of creating multiple interdisciplinary data sets.	Optional	1-3 alphanumeric	Common (Appendix X, Table App X-1)
4	Level/ Location	Location (and Sub-location when applicable)	4.1	An identifier should be used to indicate a specific location (e.g. slope number, feature code, building code) for geospatial coordination and future asset management. Common abbreviation codes should be used as far as practicable.	Required	1-4 alphanumeric	Common (Appendix X, Table App X-2) and Project-specific (Appendix IX, Table App IX-3)
			4.2	An identifier should be used to indicate a sub-location (e.g. level) within the same location. Additional sub-locations, if any, should be defined in the project information standard. This field's value should not duplicate that of Field 4.1.	Optional	1-2 alphanumeric	Common (Appendix X, Table App X-3 and X-4)
5	Role	Discipline (and Sub-discipline when applicable)	5.1	An identifier should be defined for each primary discipline to facilitate appearance settings and information filtering for interdepartmental coordination. In the case that data filtering and collaboration is required, BIM models should be authored separately for each sub-discipline.	Required	1-2 alphabetic	Common (Appendix X, Table App X-5)

Field No.	ISO 19650's Information Container ID Field (UK Annex)	Information Container ID Field	Sub-field No.	Information Container ID Field Description	Obligation	Field Length and Format	Nature of Codification
			5.2	An identifier should be used to indicate each sub-discipline appointment. Additional sub-disciplines, if any, should be defined in the project information standard. Additional abbreviations should be based on those currently used by WDs as far as practicable.	Optional	1-2 alphabetic	Common (Appendix X, Table App X-6)
6	Type	Type (and Characteristic when applicable)	6.1	An identifier should be used to indicate the information held within the container. As ISO 19650 states "this list can be expanded with project-specific codes," Type is not limited to information unique to BIM models.	Required	1-2 alphabetic	Common (Appendix X, Table App X-7)
			6.2	An identifier should be used to indicate the model's characteristic when relevant.	Optional	1 alphabetic	Common (Appendix X, Table App X-8)
7	Sequential Number	Sequential Number	7	A sequential number should be assigned when it is necessary to further distinguish the model from the others. It can also be used to distinguish other documents such as drawings. Refer to Appendix VIII for details.	Optional	3 numeric	Project-specific

4.2.4. Required and Optional Information Container ID Fields

The column "Obligation" in Table 4-1 indicates whether the field is required or optional. Optional information container ID could be omitted at the discretion of the WDs.

4.2.5. Abbreviation Codes

4.2.5.1. The column "Nature of Codification" in Table 4-1 indicates whether the field is project-specific pertaining to individual projects, or common which could be applicable universally to all projects.

4.2.5.2. Abbreviation codes serve to facilitate information container ID generation and BIM model upload validation for BIM DR. WDs should utilise these codes for model naming. There are two types of abbreviation codes, including:

a) Common codes should be used as far as practicable. Refer to Appendix X for details.

b) Project-specific codes should be documented in BEP. Refer to Appendix IX which contains examples of project-specific codes.

4.2.5.3. The universal codes of ZZ and XX for required information container ID fields shall be used when the conditions below exist. Appendix X for applying the universal codes in different information container ID fields for details.

a) ZZ – multiple exist within a BIM model.

b) XX – none or not applicable.

4.2.6. Delimiter and Information Divider

4.2.6.1. Hyphen (-, also known as minus) should be used as the delimiter to separate information container ID fields.

4.2.6.2. Underscore (_) should be used as an information divider between the sub-fields within each field when applicable.

4.2.6.3. When optional field is not required, it should be left empty, and the preceding delimiter "-" (hyphen) or information divider "_" (underscore) should be eliminated.

4.2.7. Space and Special Symbols

Space, special symbols and invalid characters (including ~ " # % & * : < > ? / \ { | } .) shall not be used within information container IDs.

4.3. Federation Strategy

4.3.1. In coherence with the sequence of information container ID fields, federation diagrams are established to describe the federation structure in a WBS as shown in Appendix VIII.

4.3.2. In accordance with principles stated in Sections 4.1 and 4.2, federation strategy should ensure:

a) The information container breakdown (model division) conforms to requirements from departmental information owners (if known);

b) The breakdown is sufficient to facilitate data filtering for information sharing according to Appendix III for details;

c) File size limitation conforms to the maximum as stated in Section 2.3.1; and

d) The information is clearly grouped.

4.4. BIM Model Naming

In accordance with Sections 4.1 – 4.3, model naming should be in the format as shown below.

<project code> - <originator> - <volume_system> - <location_sub-location> - <discipline_subdiscipline> - <type_characteristic> - <sequential number> . <file extension>

Refer to Appendix VIII for examples.

4.5. Naming of Drawings Generated from BIM model

WDs should consider adopting the model naming format for drawing file naming. Refer to Appendix VIII for an example.

5. LOIN Implementation

To enable future information exchange using the BIM DR, WDs shall follow the subsequent principles when authoring BIM files.

5.1. Aligned BIM Standards

5.1.1. This Guide should serve as the aligned standards for future information exchange.

5.2. BEP

5.2.1. Referring to Section 2.1.2, BEP should be authored with consideration of asset owner requirements. BEP should specify the BIM standards applicable to the project in addition to this Guide.

5.2.2. BEP should be authored in accordance with departmental BEP templates or DEVB's BEP reference template (if the former is unavailable). In addition, BEP should document the following:

a) Information owner's identification;

b) Project information requirements (e.g. element-specific LOD-I attributes in table or list formats);

c) Project-specific federation strategy; and

d) Project-specific codes for BIM model naming (e.g. project code(s), location codes).

5.3. BIM Modelling Setting

5.3.1. Coordinate System

All BIM files shall be authored and annotated directly with reference to the Hong Kong 1980 Grid (HK 1980 Grid) and Hong Kong Principal Datum (HKPD).

5.3.2. BIM Template

Project-specific BIM template should be prepared for required software used and file formats (e.g. .rte for Revit and .dwt for Civil 3D). The template should include:

a) Project and zone boundaries;

b) Coordinate system;

c) Grid; and

d) Common attributes relevant to the project.

5.3.3. Mandatory Requirements for BIM modelling

a) Use the object developed from the BIM Object library, instead of creating own object, as far as practicable to maintain the consistency, such as inserting point and BIM attributes of the object.

b) If new object is developed, register the object in the CIC object library timely.

c) Do not add user defined parameter with the same name as the system built-in parameters. Use a prefix such as departmental abbreviation code to differentiate the system built-in parameters from the user-defined parameters.

d) Linked files will not be exported to IFC by default, keep them in the native file format for conversion, if needed.

e) Use the common object types in Civil 3D for modelling:

Item no.	Recommended object type	remark
1	Tin surface	- These object types can be exported to IFC - Technical details of these types can be maintained when exporting to IFC
2	Pipe	
3	Structure	
4	Pressure pipe	
5	Fitting	
6	Appurtenance	
7	3D solid (Extracted from corridor)	

f) Do not add IFC classes in the user defined attribute as this will mix up the mapping to IFC conversion.

g) Do not set the Properties - “Phase Created” and “Phase Demolished” to the same value, otherwise it would be treated as temp or not exist feature and will not be exported to IFC.

5.4. LOD-G

5.4.1. LOD-G Requirements

The table below describes LOD-G requirements of LOD 100 to 500 which are consistent with the principles of CIC BIM Standards (the latest version). LOD-G refers to the graphical representation which deals with geometric representation, symbology, and visualisation. This is generally related to the deliverable (scale of documentation) which controls the graphical precision of the elements represented. This in turn enables identification of which parts of the objects can be disregarded or simplified while keeping the object functional to meet the BIM Uses.

Table 5-1 LOD-G Definition

LOD-G	**Description**
100	The model element is graphically represented within the model by a symbol or generic representation or rough 3D shape.

LOD-G	Description
200	The model element is graphically represented within the model as a generic system, object or assembly with approximate quantities, assumed size, shape, location, and orientation. The assumed spaces required for access and maintenance shall be indicated.
300	The model element is graphically represented within the model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. The model shall include details of the spaces required for handling installation, operation and maintenance, and the interface details for checking and coordinating with other models / objects.
400	The model element is graphically represented within the model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation with detailing for fabrication, assembly, and installation.
500	Not used. Refer to Section 2.6.7 and 2.6.8 of CIC BIM Standards - General: December 2020 Edition for details.

5.4.2. Overlapping Elements

Overlapping elements should be avoided and minimised. When overlapping elements cannot be eliminated, the reason and associated parameter for filtering should be documented in the BEP.

5.4.3. Large Spanning Continuous Elements

Model elements spanning over one level (e.g. walls spanning over 1 storey high) or across buildings (e.g. floor plates spanning between buildings through connection bridges) should be split into separate model elements.

5.4.4. Complex Geometry

For constructability, especially for design-stage considerations, complex geometries such as two-way curves and non-uniform rational basis spline surfaces shall be avoided whenever possible. When complex geometries cannot be eliminated, its modelling method shall be documented in BEP.

5.4.5. Room

To facilitate spatial identification and drawing generation (e.g. display of room tags), room should be modelled as far as practicable for spaces bounded by architectural and structural elements, such as public access area of Government buildings. It may also be modelled by either manually assigning the centre point or drawing an enclosed boundary.

5.4.6. Operation and Maintenance Space

For building services and mechanical type of BIM elements, the operation and maintenance space are concerned information for asset owner. It is suggested to model the operation and maintenance space for these kinds of BIM elements, such as control panel/switch box with panel door, vent relief valve (VRV) unit with control valve set, etc.

5.5. LOD-I

5.5.1. LOD-I Grouping

Attributes (LOD-I) could be grouped by general properties, design properties, classification properties (e.g. OmniClass) and installation information. Under each grouping, the list of attributes may differ due to WDs' LOD-I requirements. The creation methods of attributes for BIM objects would vary by software. Refer to Appendix VI for details.

5.5.2. Project Information

To facilitate conversion engine's processes, all relevant project information (such as Organisation Name, Project Issue Date, Client Name, Project Address, Project Name and Project Number) should be inputted in all BIM files as part of the LOD-I for metadata extraction and geolocation. Refer to Appendix VI which shows the project information input methods of Revit and Civil 3D.

5.5.3. BIM Attributes (Attributes)

BIM models and BIM objects should be authored with required general properties and attributes. Refer to Appendix VI for details.

5.5.4. Language

Unless specifically required by the BEP, all project information and attributes should be in the English language.

5.6. Appearance

5.6.1. Within each WD, model elements' shading colours shall follow RGB codes specified based on the prevailing systems in WDs' guidelines for design authoring. For 3D coordination, WDs' own colour standards may be adopted. Deviations, if any, should be documented in BEP.

5.6.2. For interdepartmental 3D coordination between WDs, colour appearance should be based on Discipline (Field 5.1 of the naming convention) as specified in Section 4.2. BIM DR will be capable of setting the colour appearance of various Disciplines in accordance with Tables 5-2 and 5-3.

Table 5-2 Colour Appearance by Discipline for Underground Utilities

Codes	Discipline	Colour (RGB)	Reference	Colour Appearance
CD	Chilled Water Distribution	0-255-0	ArchSD, EMSD	
FO	Sewerage	255-0-0	DSD	
FW	Fresh Water System	228-232-225	WSD	
GS	Gas Supply	255-0-255	N/A	
IR	Irrigation	0-255-255	ArchSD, EMSD	
PS	Electrical Power Supply	93-173-115	DSD, WSD	
RW	Raw Water System	77-166-190	WSD	
SD	Stormwater Drainage	0-0-255	DSD	
SW	Salt Water System	106-108-60	WSD	
TC	Telecommunication	230-205-255	N/A	
WR	Recycled Water System	0-128-255	ArchSD, EMSD	

Table 5-3 Colour Appearance by Discipline for Above-grade

Codes	Discipline	Colour (RGB)	Reference	Colour Appearance
AR	Architectural	255-255-255	N/A	
BS	Building Services	255-128-0	N/A	
EL	Electrical	93-173-115	DSD, WSD	
FS	Fire Services	255-0-0	ArchSD, EMSD	
LA	Landscape	0-255-0	N/A	
ME	Mechanical	233-193-0	DSD	
RD	Road	191-191-191	N/A	
SF	Site Formation	226-183-120	N/A	
SL	Slope	143-91-63	N/A	
ST	Structural	119-104-93	DSD	

6. The Way Forward

This Guide provides harmonised BIM standards for the use by WDs in capital works projects adopting BIM. This Guide and its appendices may be subject to change and adaptation to be applicable across all WDs' projects. It is therefore important to set out the recommended upkeeping and project close-out protocols.

6.1. Regular Review and Update

6.1.1. DEVB(WB) is the responsible party of this Guide. Corresponding BIM Support Teams of the WDs shall coordinate any departmental comments and recommendations for necessary discussion at the DEVB BIM Work Group Meeting.

6.1.2. This Guide should be up kept and updated periodically. The appendices that would need updating include:

a) Appendix III – Data Filtering Rule Table should be reviewed when the WDs' data requirements have been changed.

b) Appendix X – Common Codes for Naming should be centrally managed and updated. Additional codes should be added to the list when commonly used. Obsolete codes should be removed from active use but kept reference for back tracing, if and when needed.

c) Appendix VIII – Federation Strategy Diagrams and Naming Examples should be reviewed and updated as necessary to support proper data filtering.

d) Appendix VI – LOD-I Requirements, Creation and Extraction may be subject to update if more LOD-I is required in the future (especially for asset management), or if information creation and extraction are changed due to technological advancement.

6.2. Codification Management

6.2.1. Each project would have its project specific codes, which, together with the common codes listed in Appendix X, could be used to facilitate validation of the BIM file names. It is recommended to conduct validation processes through CDEs, BIM DR or other relevant systematic methods. Appendix XI contains a Sample Spreadsheet for BIM File Name Validation of this Guide for a sample spreadsheet to validate BIM file names.

6.3. Project Close-out Protocols

In accordance with Section 5.8.3 of ISO 19650-2:2018, project close-out activities include "archiving the project information model" and "compiling lessons learned for future projects". This section contains recommended project close-out protocols for WDs' consideration.

6.3.1. A project-specific checklist could be authored and included in each project's BEP, with reference to:

a) Asset owners' checklists of BIM attributes (which may have detailed LOD-I requirements);

b) WDs' and project awardees' own checklists;

c) Sample BIM Object Check Form (refer to Appendix VII); and

d) Sample Project Close-out Checklist (refer to Appendix XVIII).

6.4. BIM / GIS Integration

6.4.1. A geospatial-based federation strategy and open format should be adopted to ensure coherence amongst BIM models. These BIM models should conform to requirements outlined in previous sections to facilitate open format conversion for BIM DR, as well as BIM / GIS integration amongst WDs and LandsD.

6.4.2. Going forward, consistent BIM data could facilitate interdepartmental and intradepartmental BIM / GIS integration and applications via a standard approach. The success of such integration would be contingent upon consistent approaches, including the adoption of:

a) Information container sequence and code;

b) Availability to share more information to the extent that it does not conflict with restricted or confidential information; and

c) Support of open format use.

6.5. Departmental Transition

6.5.1. This Guide aims to facilitate information exchange between WDs and LandsD. The mapping tables in Appendices XII to XVII have outlined differences between this Guide and the departmental standards, at the time the Study of CEDD was carried out, that are relevant to interdepartmental information exchange. WDs are suggested to reconcile these differences within their respective departmental standards.

6.6. Information Management

6.6.1. As BIM maturity increases among WDs, information management conforming to ISO 19650 will become more relevant.

6.6.2. It is suggested to dedicate a section in the BEP on Project Information Standard, which sets out the standards and protocols that the project should be followed. It should contain the following:

a) A list of the standards that are to be followed;

b) Naming conventions that are to be used or any specific project codes;

c) Method(s) to generate applicable 2D / CAD drawings from the relevant BIM object / models;

d) Define what classification of WBS and Task Information Delivery Plan (TIDP) should be used in detail, which relates to information container breakdown structure on project-specific basis; and

e) How LOIN should be described.

6.6.3. Information Delivery Plan

6.6.3.1. While BEPs have already been prevalently used by most WDs as one of the information management tools in BIM projects, in accordance with ISO 19650, an information delivery plan is required in addition to BEP to manage information in the lifecycle of a project. Information delivery plan should not only outline the principles of information management using BIM, but also be applicable to other information management aspects of a project, such as drawings, data files, visualisation and simulations.

6.6.3.2. The conversion engine utilises a common key approach to link attributes and geometries. This could facilitate LandsD's 3D digital map development and allow single query for 3D models. To maintain the attributes in tabular format in the long term, the common key approach should be regularly reviewed.

6.6.4. Data Security Classification

6.6.4.1. There are three security tiers, namely unclassified, restricted and confidential. If future BIM DR access expands beyond WDs, additional security definitions may be created by adding abbreviation codes to the "Security" metadata field or CDE folder management.

6.6.5. CDE

6.6.5.1. Establishment of project-CDE, as an overarching CDE for its constituent consultancy studies and works contracts, if appropriate, should take into consideration of information security issues. As per ISO19650, CDE is an "agreed source of information for any given project or asset, for collecting, managing and disseminating each information container through a managed process". CDE may serve more functions than data repositories. CDE capabilities could ultimately surpass those defined in ISO 19650 to fulfil project needs as the single source of truth (e.g. central information depository and lifecycle management for documents, contracts, reports, bids and model information).

End of the Guide

Appendix I – ISO 19650 Terminologies

For ISO Terminologies Adoption, according to Transition guidance to BS EN ISO 19650, the following terms pertaining to ISO 19650 deviates from previous ISO 1192 terms. ISO 19650 terms be adopted for ISO 19650 when applicable.

Item No.	1192 Term	19650 Term	Comment & Interpretation
1	BIM execution plan	Information delivery plan (BS EN ISO 19650-1) BIM execution plan (BS EN ISO 19650-2)	BS EN ISO 19650-1 uses information delivery plan as the generic term for any plan in support of information delivery not limited to BIM. BIM execution plan shall be used to refer to project-specific plans only.
2	Container/ file / document	Information container	ISO 19650 standardizes on the term Information container “information container” is about a named persistent set of information retrievable from within a file, system or application storage hierarchy.
3	Employer	Appointing party/ lead appointed party/ appointed party	ISO 19650 term depends on where in the hierarchy the employer is located. Lead appointed party is not the same as design lead or construction lead in PAS 1192-2. Refer Appendix II for details.
4	Employer’s information requirements (EIR)	Exchange information requirements (EIR)	These are synonymous. “EIR" is about information requirements in relation to an appointment.
5	Graphical / non-graphical	Geometrical /non-geometrical	Geometrical is more appropriate to describe spatial positioning and relationships.
6	Level of model definition/ level of detail (LOD) / level of information (LOI)	Level of information need (no acronym)	Level of information need is a more generic term than any of the existing “Level of …” terms used in 1192. It is not supposed to be shortened to an acronym.

Item No.	1192 Term	19650 Term	Comment & Interpretation
7	N/A	Metadata	A set of data embedded in the file that describes and gives information about other data.
8	N/A	Information management standard*	Information management standard governs the creation, management and sharing of enterprise information.
9	Plain language questions (PLQ)	Project information requirements (PIR)	PLQ and PIR are both expressions of the high-level information needed by the client and/or their stakeholders to make key decisions concerning the project. The PIR, like the PLQ, are used to develop the detailed and contractual EIR. However, PIR can also include non-technical requirements and therefore can be broader than PLQ.
10	Responsibility matrix	Responsibility matrix / Assignment matrix	There is a principle to develop responsibility matrices to cover information management activities and information delivery. The former is illustrated as the assignment matrix in BS EN ISO 19650-2:2019, Annex A.
11	Roles	Function	Information management roles are not included within BS EN ISO 19650-2. Instead, all activities within the information management process are to be undertaken by a single "information management function". BS EN ISO 19650-2:2019, Annex A provides a template for an information management function assignment matrix, which can be used by the appointing party to assign each activity (requirement) to themselves, to an appointed party or a third-party. Once an activity has been assigned, it is for the relevant party to identify the role that is responsible for the activity.

Item No.	1192 Term	19650 Term	Comment & Interpretation
12	WIP/ Shared/ Published/ Archived #	WIP/ Shared/ Published/ Archived #	The WIP (work in progress), SHARED and PUBLISHED states (areas) of the CDE are unchanged from BS 1192:2007+A2:2016. The ARCHIVED state is used to record all transitions (gates) from one state to another and all changes of status (suitability) or revision that take place during the CDE workflow (process).
13	Volume strategy	Federation strategy	The concept of volumes for sub-division of an information model is now described in terms of the reasons for which separate information models might need to be federated. This was an easier concept for non-UK countries to understand.

Note – * indicates not part of ISO19650 terminology; # indicates unchanged terminology

Appendix II – Information Responsibility Assignment Matrix

WDs can use the table below to define project-specific responsibilities.

To align with ISO 19650 terminologies, the definition for the following members of the project team shall be adopted:

a) **Appointing Party** refers to the party 'owning' the appointment/project, such as a client or are managing information on behalf of a client.

b) **Appointed Party** refers to team member tendering for or appointed to a project generally. Appointed party is a member of both the project team and a delivery team.

c) **Lead Appointed Party** is an appointed party that is responsible for coordinating information between this delivery team and the appointing party.

d) **Third Party** refers to a member of the project team or delivery team that is neither an appointing party or any appointed party.

ISO Sec. Ref.	Task	Appointing Party	Third Party	Lead Appointed Party / Leading Team	Appointed Party	
		[Name of Appointing Party]	[Name of Third Party	[Name of Lead Appoint. Party / Leading Team]	[Name of Appointed Party]	[Name of Appointed Party]
5.1.1	Appoint individuals to undertake the information management function	[R; A]	N/A	[I]	[I]	[I]
5.1.2	Establish the project's information requirements	[R; A]	N/A	[I]	[I]	[I]
5.1.3	Establish the project's information delivery milestones	[R; A]	N/A	[I]	[I]	[I]
5.1.4	Establish the project's information standard	[R; A]	N/A	[I]	[I]	[I]
5.1.5	Establish the project's information production methods and procedures	[I]	N/A	[R; A]	[C]	[C]
5.1.6	Establish the project's reference information and shared resources	[I]	N/A	[R; A]	[C]	[C]
5.1.7	Establish the project's common data environment	[I]	N/A	[R; A]	[C]	[C]
5.1.8	Establish the project's information protocol	[I]	N/A	[R; A]	[C]	[C]

ISO Sec. Ref.	Task	Appointing Party	Third Party	Lead Appointed Party / Leading Team	Appointed Party	
		[Name of Appointing Party]	[Name of Third Party	[Name of Lead Appoint. Party / Leading Team]	[Name of Appointed Party]	[Name of Appointed Party]
5.2.1	Establish the appointing party's exchange information requirements	[C]	[C]	[R; A]	[I]	[I]
5.2.2	Assemble reference information and shared resources	[I]	[C]	[R; A]	[I]	[I]
5.2.3	Establish tender response requirements and evaluation criteria	[I]	N/A	[R; A]	[I]	[I]
5.2.4	Compile invitation to tender information	[I]	N/A	[R; A]	[I]	[I]
5.3.1	Nominate individuals to undertake the information management function	[I]	N/A	[R; A]	[R; A]	[R; A]
5.3.2	Establish the delivery team's (pre-appointment) BIM execution plan	[I]	N/A	[R; A]	[I]	[I]
5.3.3	Assess each task team capability and capacity	[I]	N/A	[R; A]	[I]	[I]
5.3.4	Establish the delivery team's capability and capacity	[I]	N/A	[R; A]	[I]	[I]
5.3.5	Establish the delivery team's mobilization plan	[I]	N/A	[R; A]	[I]	[I]
5.3.6	Establish the delivery team's risk register	[I]	N/A	[R; A]	[I]	[I]
5.3.7	Compile the delivery team's tender response	[I]	N/A	[R; A]	[I]	[I]
5.4.1	Confirm the delivery team's BIM execution plan	[I]	N/A	[R; A]	[I]	[I]
5.4.2	Establish the delivery team's detailed responsibility matrix	[I]	N/A	[R; A]	[R; A]	[R; A]

ISO Sec. Ref.	Task	Appointing Party	Third Party	Lead Appointed Party / Leading Team	Appointed Party	
		[Name of Appointing Party]	[Name of Third Party	[Name of Lead Appoint. Party / Leading Team]	[Name of Appointed Party]	[Name of Appointed Party]
5.4.3	Establish the lead appointed party's exchange information requirements	[I]	[C]	[R; A]	[I]	[I]
5.4.4	Establish the task information delivery plan(s)	[I]	[I]	[R; A]	[C]	[C]
5.4.5	Establish the master information delivery plan	[I]	[I]	[R; A]	[C]	[C]
5.4.6	Complete lead appointed party's appointment documents	[R; A]	N/A	[I]	[I]	[I]
5.4.7	Complete appointed party's appointment documents	[R; A]	N/A	[R; A]	[I]	[I]
5.5.1	Mobilize resources	[I]	N/A	[R; A]	[R; A]	[R; A]
5.5.2	Mobilize information technology	[I]	N/A	[R; A]	[R; A]	[R; A]
5.5.3	Test the project's information production methods and procedures	[C]	N/A	[R; A]	[R; A]	[R; A]
5.6.1	Check availability of reference information and shared resources	[C]	N/A	[R; A]	[R; A]	[R; A]
5.6.2	Generate information	[I]	N/A	[R; A]	[R; A]	[R; A]
5.6.3	Undertake quality assurance check	[I]	N/A	[R; A]	[R; A]	[R; A]
5.6.4	Review information and approve for sharing	[I]	[I]	[R; A]	[R; A]	[R; A]
5.6.5	Conduct information model review	[I]	N/A	[R; A]	[R; A]	[R; A]
5.7.1	Submit information model for lead appointed party authorisation	[I]	N/A	[I]	[R; A]	[R; A]
5.7.2	Review and authorise the information model	[C]	N/A	[R; A]	[]	[I]

ISO Sec. Ref.	Task	Appointing Party	Third Party	Lead Appointed Party / Leading Team	Appointed Party	
		[Name of Appointing Party]	[Name of Third Party	[Name of Lead Appoint. Party / Leading Team]	[Name of Appointed Party]	[Name of Appointed Party]
5.7.3	Submit information model for appointing party acceptance	[I]	N/A	[R; A; I]	[R; A; I]	[R; A; I]
5.7.4	Review and accept the information model	[R; A]	N/A	[R; A]	[I]	[I]
5.8.1	Archive the project information model	[I]	[I]	[R; A]	[R; A]	[R; A]
5.8.2	Capture lessons learned for future projects	[R; A]	[I]	[R; A]	[I]	[I]

Note: RACI are defined as followed:

R - Responsible for undertaking activity
A - Accountable for activity completion
C - Consulted during activity
I - Informed following activity completion

Appendix III – Data Filtering Rule Table

Data Provider / Data Receiver	ArchSD	CEDD	DSD	EMSD	HyD	LandsD	WSD
ArchSD		Site terrain and feature, slope, bridge, road, tunnel, cavern, foundation, utilities, tree	Plant, mains, pipes, manhole, drainage-related underground structure e.g. box culvert, tunnel, stormwater storage structure, etc.	E&M installations, utilities	Road, bridge, railway structure and substructure, street lighting, traffic light, noise barrier, tree	Site boundary, existing buildings, registered slope and site features	Plant, reservoir, mains, pipes, manholes
CEDD	External features and outlines of structures		Drainage and Sewage system, Pump room and Treatment plant	E&M Installations and Utilities	Road, Bridge, Railway structure, Street furniture, Drain, Noise barrier, Slope and Tree	Land status information, 3D spatial data, Digital aerial photos, and Slope	Water Supply system
DSD	Terminal manhole and pipework			DCS Pipe and associated structures	Terminal manhole and pipework	3D topographical and photogrammetry data and images	Terminal manhole and pipework
	Project boundaries			Project boundaries		Land lot boundaries and land status plans	Project boundaries
	General external configuration and appearance of structures			General external configuration and appearance of structures		N/A	General external configuration and appearance of structures
	Full set of BIM Models in Native Format for works to be handed over to DSD			N/A	Full set of BIM Models in Native Format for works to be handed over to DSD	N/A	Full set of BIM Models in Native Format for works to be handed over to DSD
	N/A			N/A	Underground utilities	N/A	Underground assets
EMSD	General building plans/ E&M Installation	Building plans for plant building/ E&M Installation/ Utilities for DCS pipe laying	Utilities for DCS pipe laying		Street Furniture / Footbridge lift / Lighting / MEP Installation	N/A	Utilities for DCS pipe laying
HyD	Building, Bridge, Foundation, Road, Slope, Tree	Bridge, Foundation, Road, Slope, Tree, Tunnel, Utilities	Drainage, Road, Slope, Tree, Utilities	E&M Installation, Utilities		Existing Ground Condition, Road, Slope, Tree	Road, Slope, Tree, Utilities, Waterworks
LandsD	● Full set of As-built BIM and Shareable BIM						ditto
WSD	BIM models of underground structures and features (especially within unallocated land and waterworks reserve, e.g. bridge foundations, subways, box culvert, etc.) and underground utilities						
	Only external features and outlines/appearance of buildings for above ground structures						

● Full Set of As-built BIM Models in Native Format

Appendix IV – Master Type List

Remarks: To maintain the tabular nature and for easier readability on screen, the list will be sent by CD-ROM with the hard copy of the Guide.

The List contains with FLIP, CEDD, DSD and HyD's codes. Due to the list is huge, it will be sent by CD-ROM with the hard copy of the Guide

Appendix V – Examples of BIM Object Authoring and Importing Civil 3D BIM Objects into BIM Models

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1. Introduction

BIM object authoring and insertion methods into BIM models may vary between software. In this Appendix, Revit and Civil 3D are used as examples to outline the creation methods. If software other than the two software is adopted, the methods for creating BIM object should be properly documented in the BEP.

Irrespective of software used, built-in templates, functions and built-in attributes within the authoring software should be used as far as practicable.

2. Revit BIM Objects

2.1. Revit Family Templates for BIM Object

Revit provides family templates for creating BIM object. The table below shows the Revit family templates that would be used for the types of revamped BIM object.

Table 2-1 Revit Family Template to be Used for the Types of BIM Objects

Item No.	Type of BIM Object	Revit Family Template to be Used
1.	Electrical switch, socket outlet, control box, sensor	Electrical Fixture
2.	LV switch board, genset, motor	Electrical Equipment
3.	Lighting, lamp	Lighting Fixture
4.	Pump, air-conditioning	Mechanical Equipment
5.	Manhole, gully, U-channel	Plumbing Fixture
6.	Road sign, sign gantry, road furniture, noise barrier	Site
7.	Pipe accessories such as valve, water meter, fire hydrant	Pipe Accessories
8.	Louvre	Window
9.	Silencer, damper	Duct Accessories
10.	Diffuser	Air Terminal
11.	Sign, symbol	Detail Item

3. Civil 3D BIM Objects

3.1. Name of Civil 3D Tool for BIM Object

Civil 3D provides tools for creating BIM object. The table below shows the tools that would be used for the types of BIM objects.

Table 3-1 Civil 3D Tools to be Used for the Types of BIM Objects

Item No.	Type of BIM Object	Civil 3D Tool to be Used
1.	Manhole, gully, chamber, pit, outlet, etc.	Part Builder
2.	Gravity pipe and culvert	Part Builder
3.	Pressure pipe, fitting, valve, pipe accessory, etc.	Content Catalog Editor
4.	Channel, trench, pipe/culvert of irregular shape, etc.	Subassembly Composer
5.	Carriage way, footway, cycleway and other pavements	Subassembly Composer
6.	Kerb, edging, concrete backing, barrier, etc.	Subassembly Composer

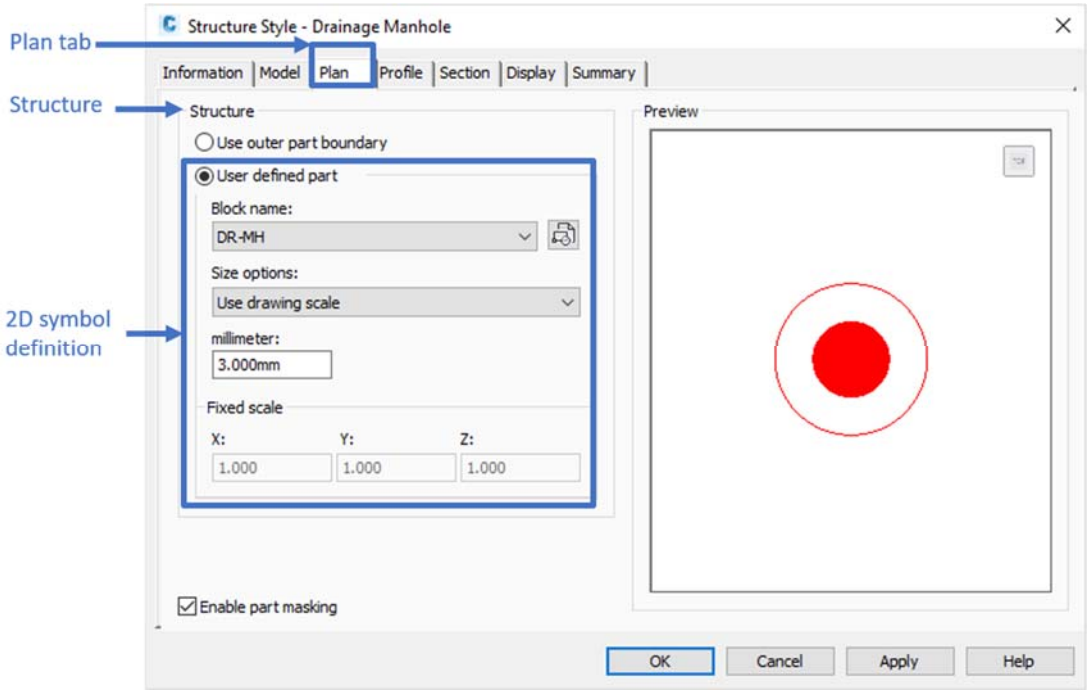
3.2. Use of Civil 3D Object Style for 2D Presentation

3.2.1. In Civil 3D, 2D symbols cannot be embedded in BIM objects. To handle 2D presentation, Civil 3D Object Style would be used for the types of Civil 3D BIM objects.

3.2.2. Civil 3D Object Style includes general attributes for handling 2D symbol for BIM object, object colour, visibility of object components, object fill patterns, etc. Below is an example of settings Object Style for drainage manhole.

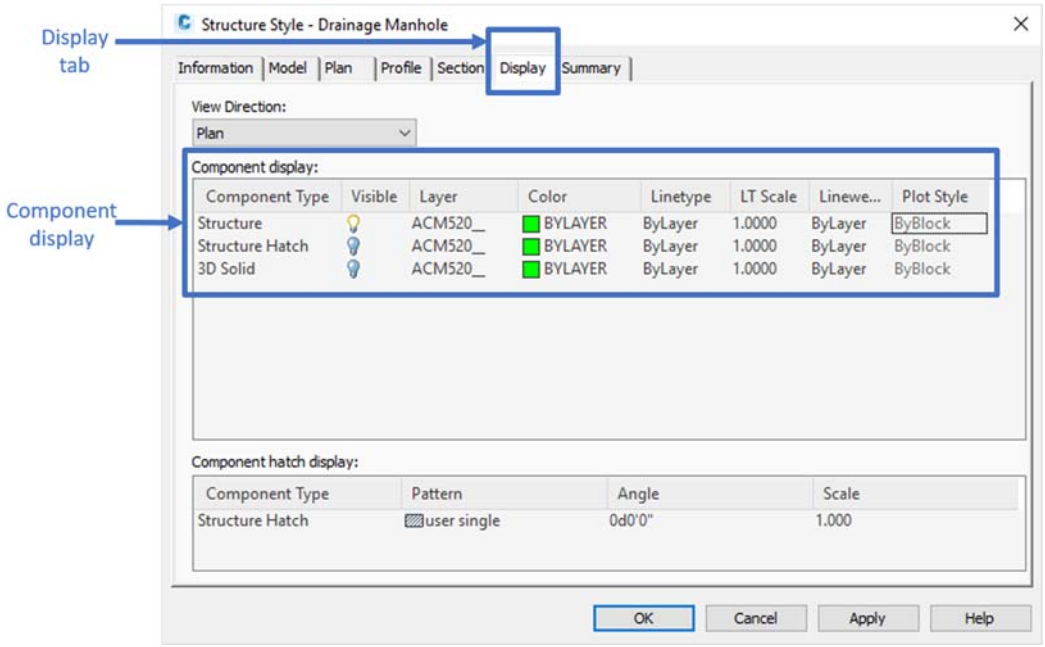
a) 2D presentation of drainage manhole could be set under tabs of "**Plan**", "**Profile**" and "**Section**". 2D symbol could be defined in the "**Structure**" under "**Plan**" tab as illustrated in the figure below.

Figure 3-1 Setting of Structure Style for 2D Symbol



b) Layer, color, line type, line scale, line weight and visibility of object components could be set in "**Component display**" under "**Display**" tab as illustrated in the figure below:

Figure 3-2 Setting of Component Display



4. Insertion of Civil 3D BIM Objects into BIM Models

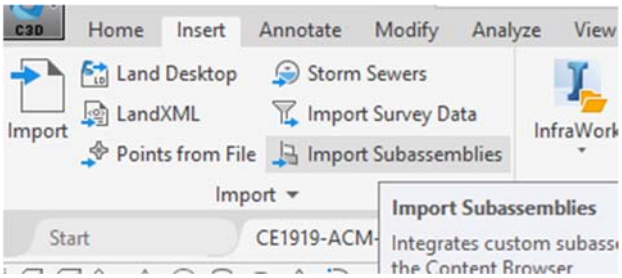
For the two types of Civil 3D BIM objects, subassemblies and pipes catalog, the steps for insertion of Civil 3D BIM objects into BIM model using the import function are described in the sections below.

4.1. Subassemblies

4.1.1. A .pkt file is a subassembly file for creating assemblies and corridor in Civil 3D. Autodesk Subassembly Composer should be used for creating subassemblies. Except the layout of the subassemblies, the super elevation, target and component parameters can be set when creating a subassembly. All parameters can be exported to Civil 3D.

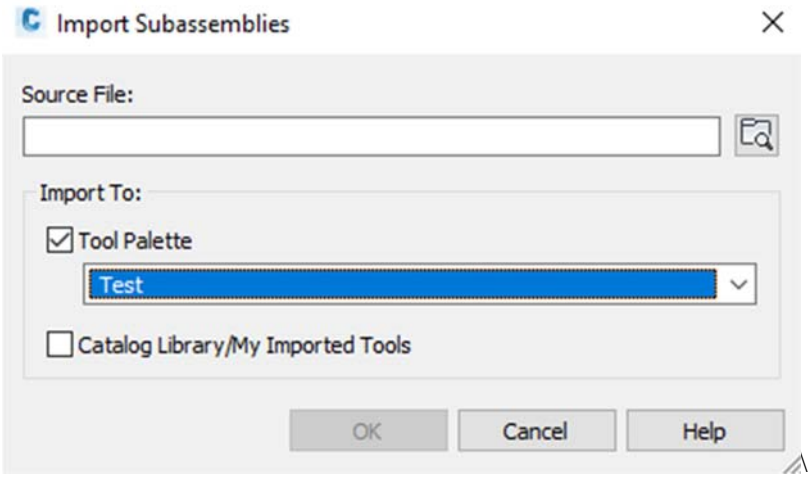
4.1.2. In Civil 3D, "Import Subassemblies" button can be found in "Insert" tab to import the .pkt file.

Figure 4-1 "Import Subassemblies" Panel



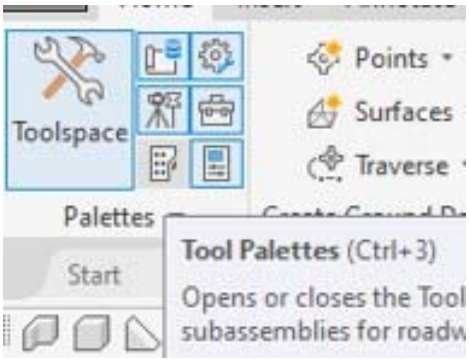
4.1.3. Search the .pkt file which needs to be imported via "Source File". New tool palette can be created in "Tool Palette" to organise those subassemblies by project.

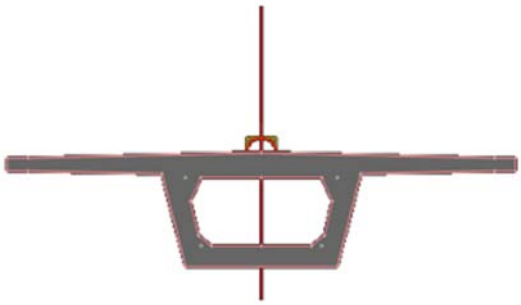
Figure 4-2 Input Source File for "Import Subassemblies"



4.1.4. To utilise the subassemblies file, turn on the “Tool Palettes” after creating an assembly. Drag the subassemblies into assembly. Then create a corridor by using the same assembly.

Figure 4-3 "Tool Palettes" Panel



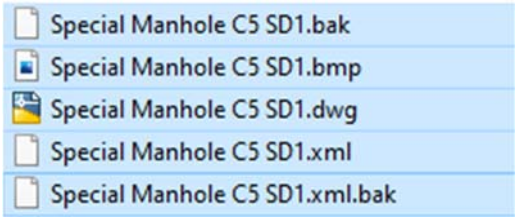


4.2. Pipes Catalog

4.2.1. "Pipes Catalog" is stored in a folder which contains all required structures and pipes. The required structures and pipes should be created by Part Builder, a built-in creator in Civil 3D that generates five types of file (.bak, .bmp, .xml, .dwg, .xml.bak) for one component. The component with all structure and pipes should be saved at the folder path below or (similar):

Figure 4-4 Files for "Pipes Catalog"

C:\ProgramData\Autodesk\C3D 20XX\enu\Pipes Catalog

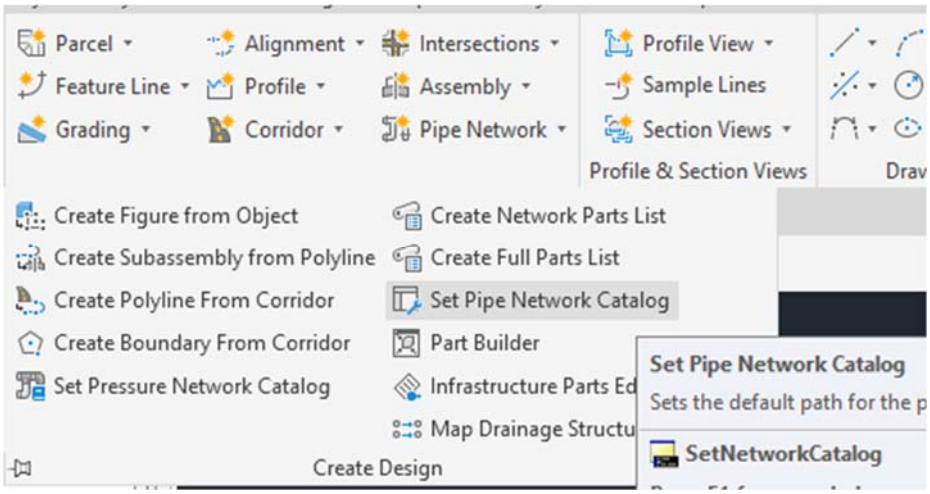


4.2.2. To importing pipes catalog into Civil 3D:

a) Move the customized pipe/structure folder into "Pipes Catalog" or into "Metric Pipe/Structure Catalog". The five file types should be moved into the same folder.

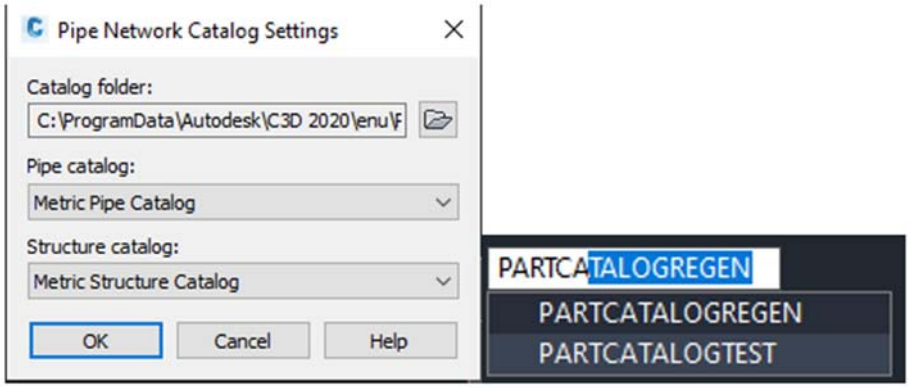
b) Set the "Pipe Network Catalog" to the folder which stored the five file types.

Figure 4-5 Set "Pipe Network Catalog"



c) Regenerate the pipes catalog by using the command "PARTCATALOGREGEN".

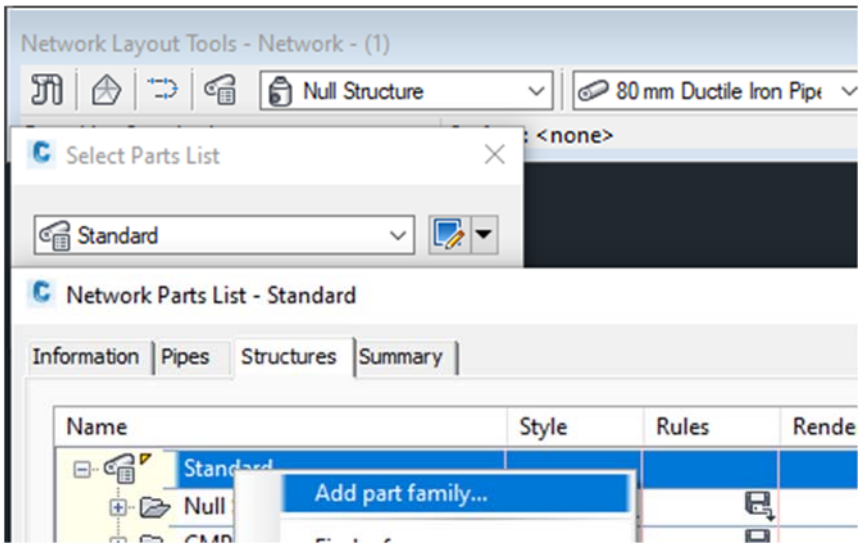
Figure 4-6 Pipe Network Catalog Settings



d) The structures and pipes should be added to Pipe Network after importing the pipe catalog using the following commands:

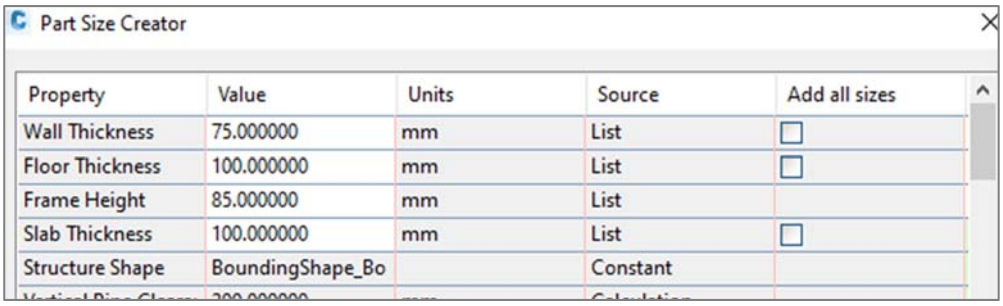
"Edit Network" > "Select Parts List" > "Add part family" in both Pipe and Structures tab. Right click the part just added into the list >"Add part size" > tick "Add all sizes".

Figure 4-7 Edit Network Parts List



e) The properties of Part Size Creator are as follows:

Figure 4-8 Properties of Part Size Creator



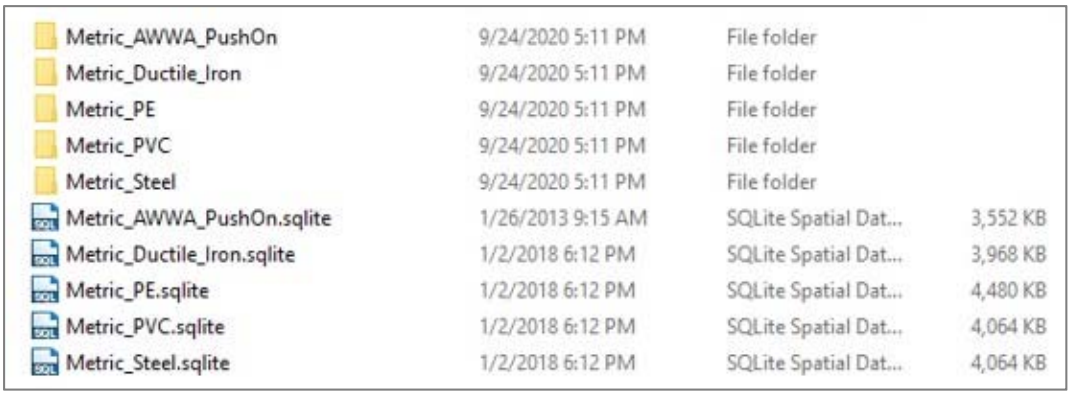
4.3. Pressure Pipes Catalog

4.3.1. Different from pipes catalog, pressure pipes catalog should be created using .sqlite format with different creation procedures.

4.3.2. The "Pressure Pipes Catalog" is stored in "C:\ProgramData\Autodesk\C3D 2020\enu\Pressure Pipes Catalog\Metric".

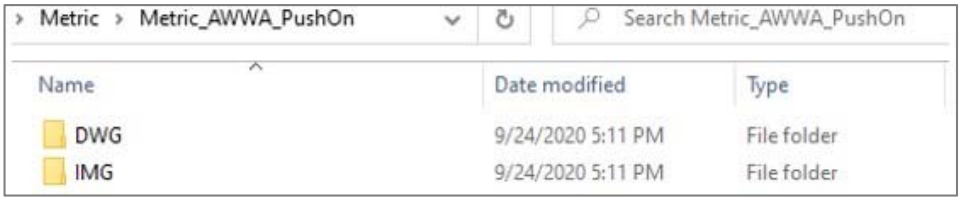
The default catalog includes:

Figure 4-9 Default Catalog



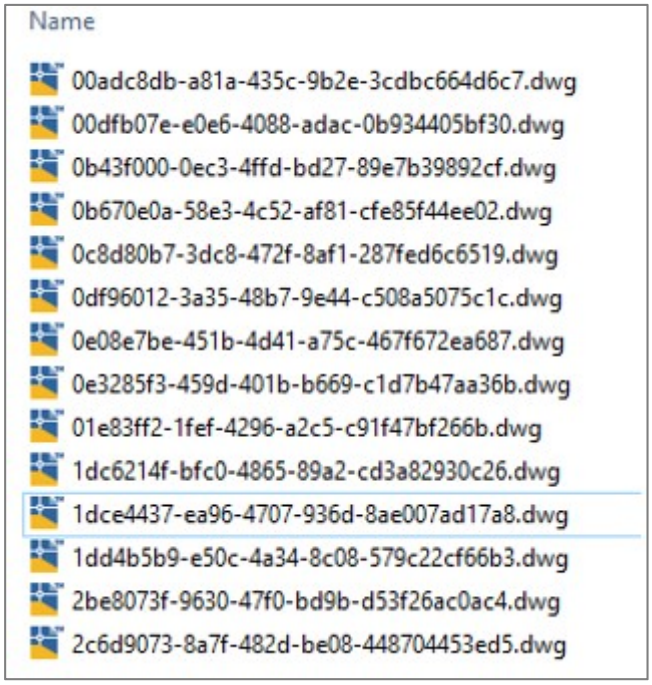
4.3.3. Inside a folder, the parts stored in two folders: DWG and IMG.

Figure 4-10 Each Folder stored with below Two Folders



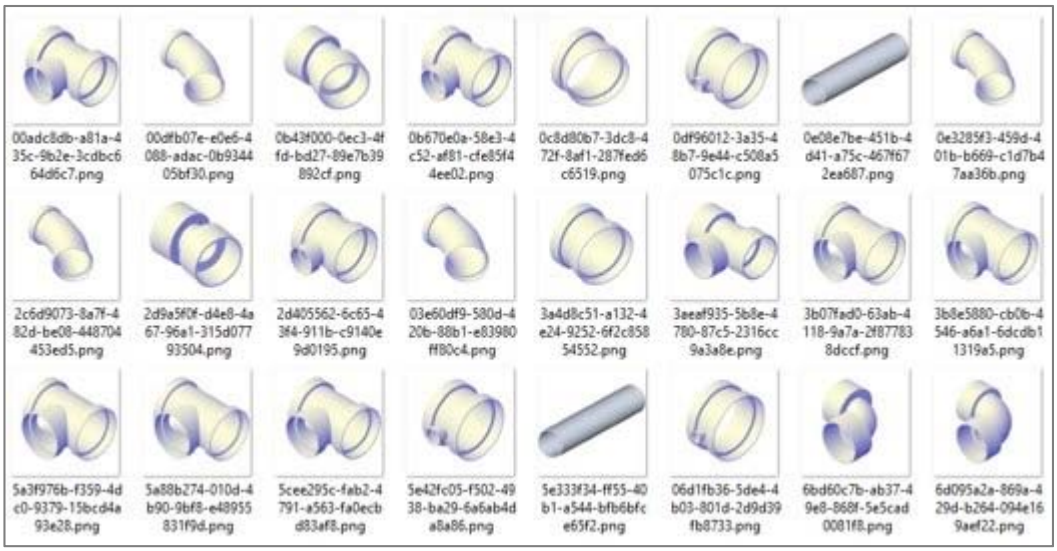
4.3.4. In DWG folder, the .dwg drawings are typically not identifiable by default names.

Figure 4-11 Default Names of the Drawings in the DWG Folder



4.3.5. The IMG folder contains images (in .png formats) whose names match the corresponding .dwg files.

Figure 4-12 Images in IMG Folder



4.3.6. Creating a Pressure Pipe Fitting in Civil 3D

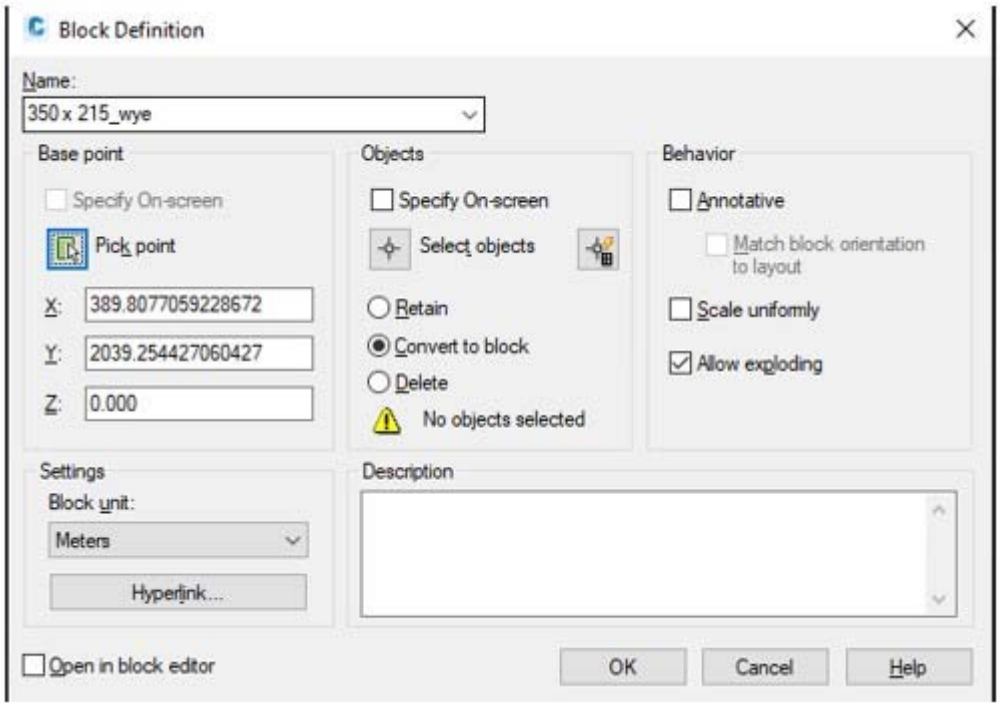
To create a new part, Civil 3D's "Content Catalog Editor" could be used to create a database. "Content Catalog Editor" is a plug-in for Civil 3D, it is not a function or a panel in Civil 3D. To open the "Content Catalog Editor", type "Content Catalog Editor" in the Window Search panel. Refer to below steps (a to p) for details.

a) Draw lines to represent the run and branch.

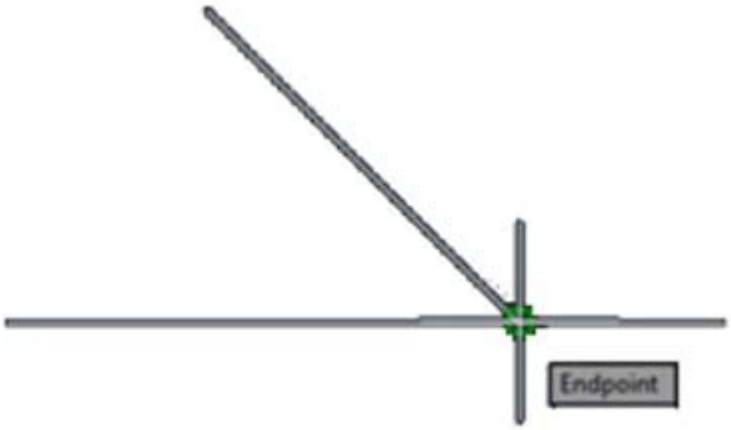
b) Copy lines to prepare for 3D model creation.

c) Convert the original lines into a block to display a single line fitting.

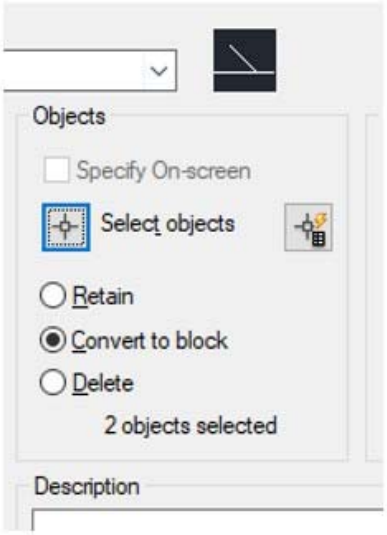
d) Type "BLOCK". When block definition window pops up, define the part's name.



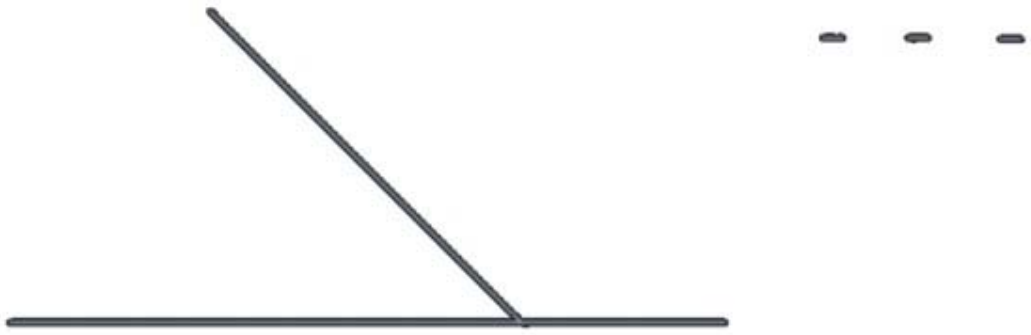
e) Pick the intersection point for the base point.



f) Select the original lines as Objects and click “convert to block”.

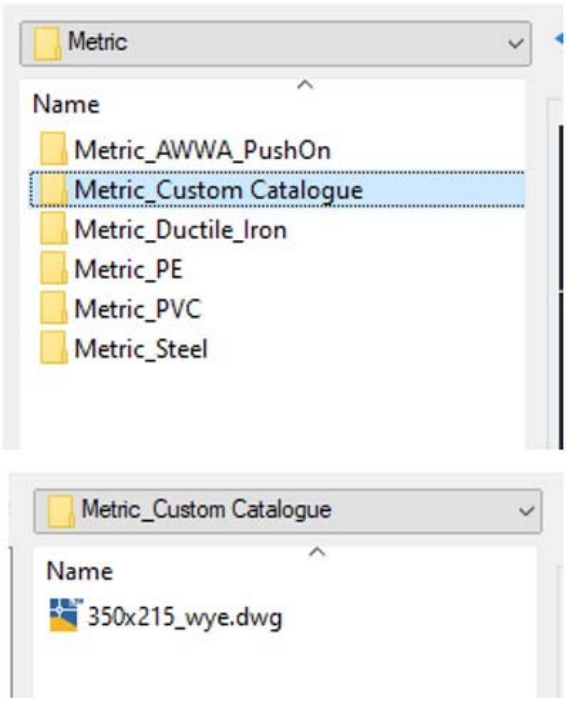


g) After the block is created, return to the copied lines and draw few lines to represent the thickness of the flanges.



h) Create circles with inner diameter and outer diameter for the body. Then, create three more circles for the flanges.

i) Before forming the model, save the drawing as a .dwg into the "Pressure Pipes Catalog" first. It is suggested to create a new custom catalog instead of saving into the default catalog.



j) Back in the drawing, right click on the panel (as shown in Figure j-1) to choose the "Modelling" function (Figure j-2), and use "Sweep" function (Figure j-3) to create the 3D model.

Figure j-1

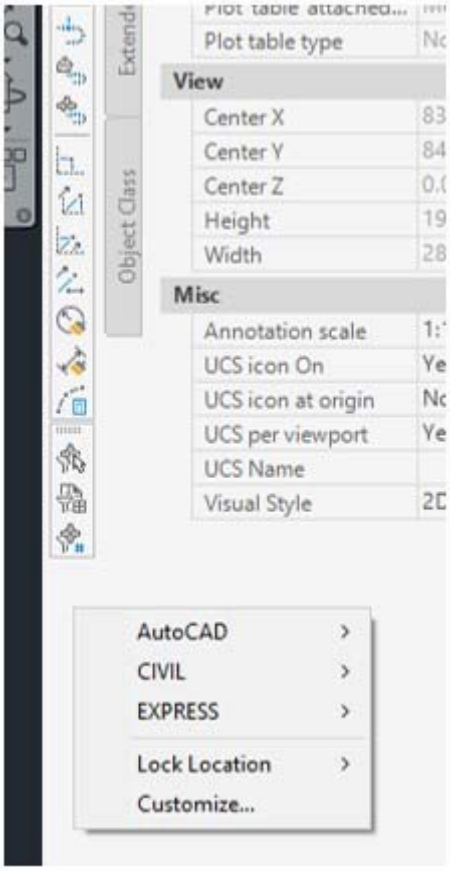


Figure j-2

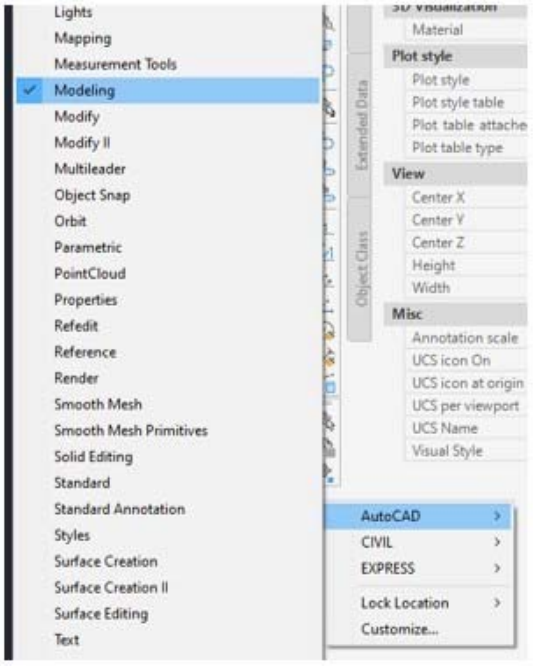
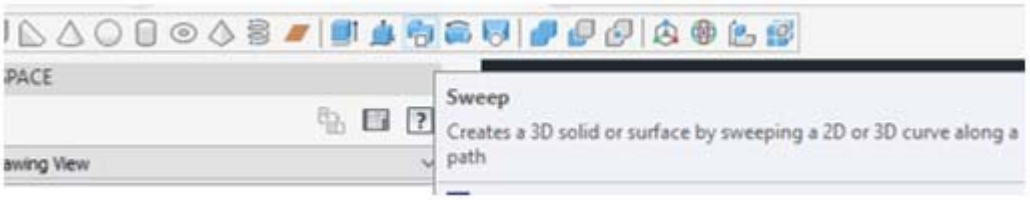
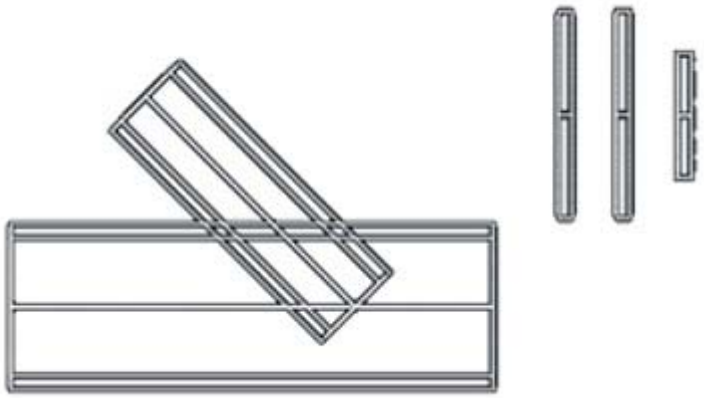


Figure j-3 for the Sweep function toolbar:

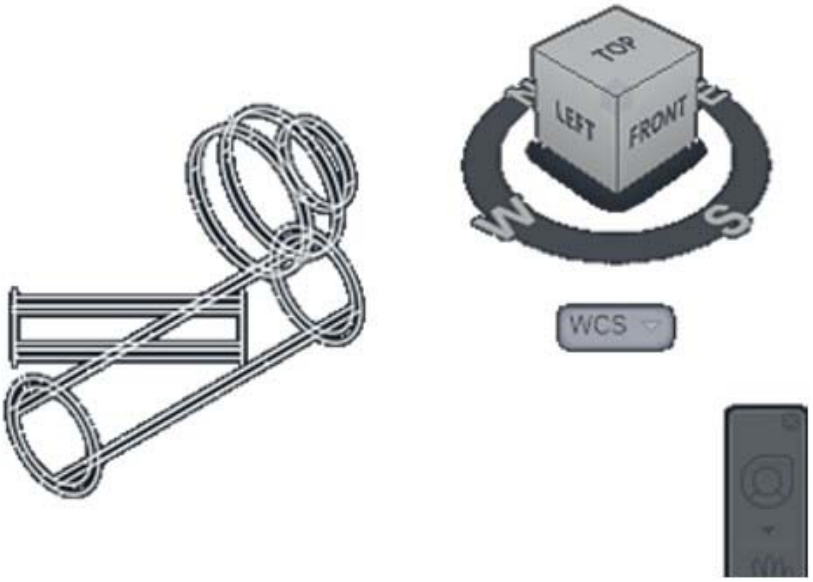


k) Select the sweep objects (circles) first; then select the sweep path (lines).

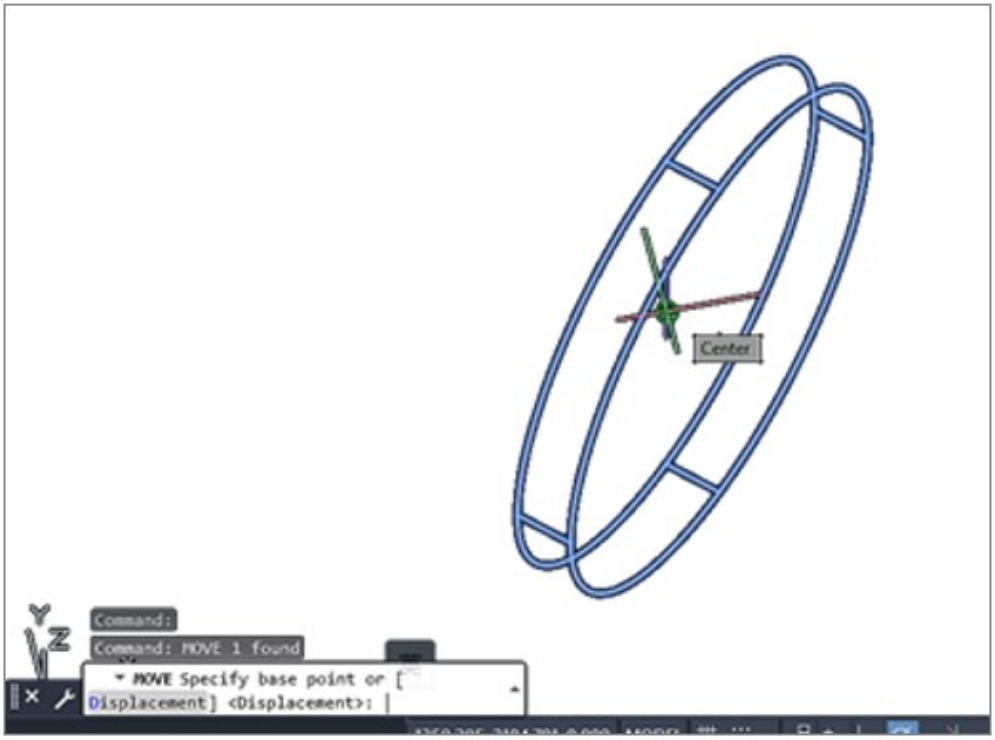


l) Change to 3D view (Screen l-1). For easier modelling, type “MOVE”, set the base point center to the flange object (Screen l-2), and move the flanges center to the end of the wye (Screen l-3).

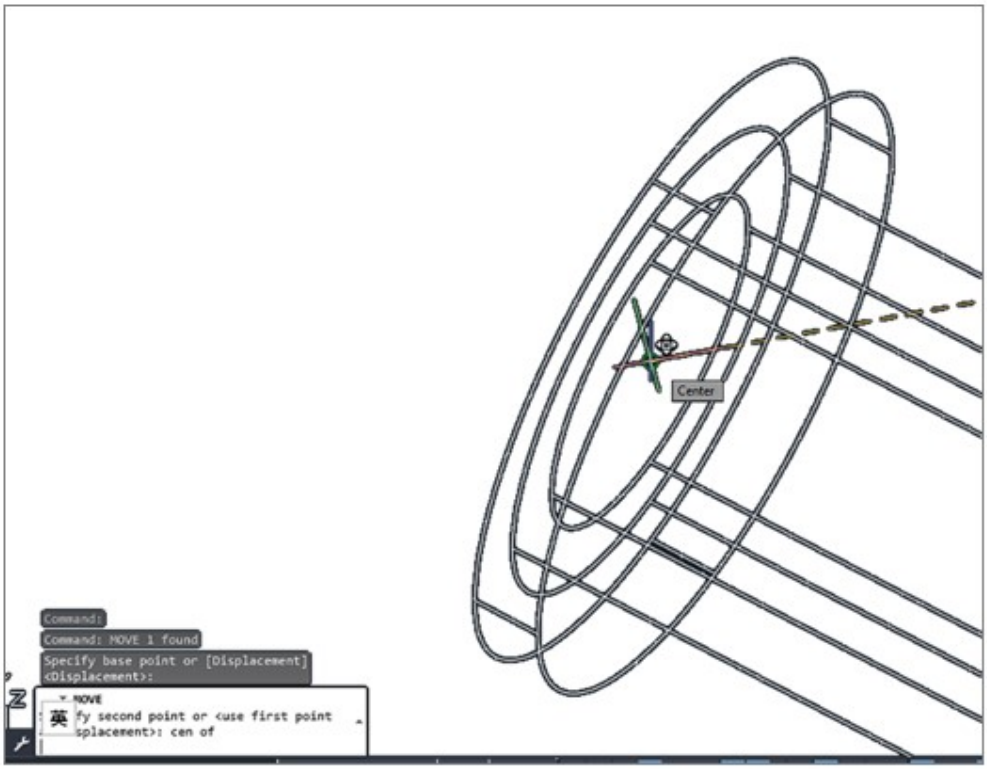
Screen l-1



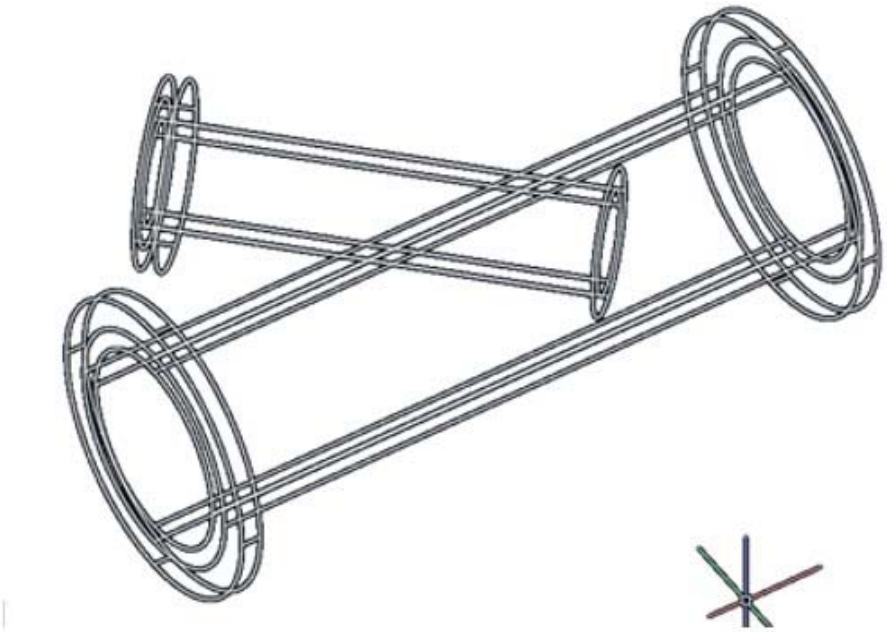
Screen l-2



Screen l-3

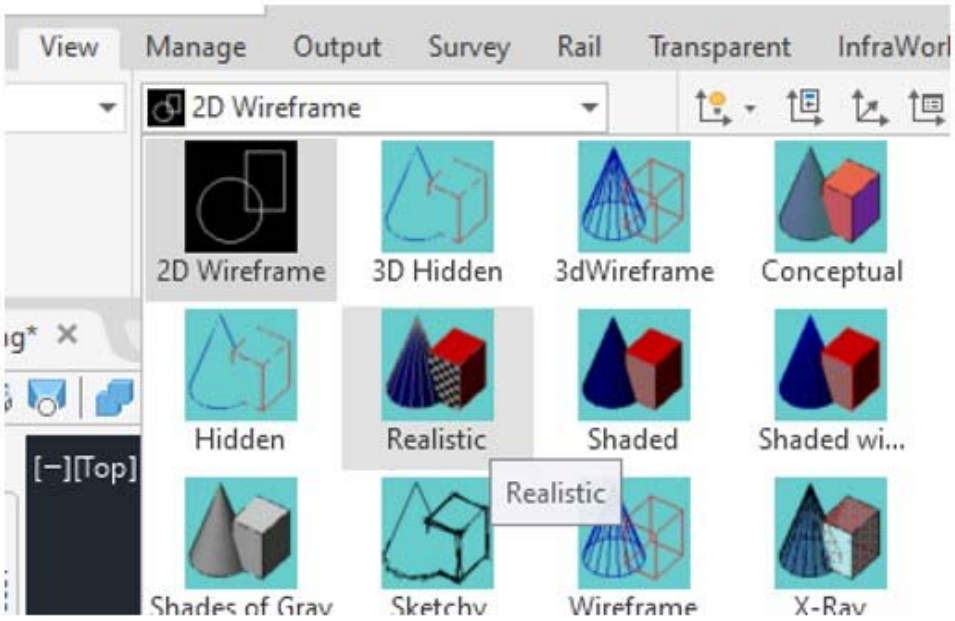


The result after moving the flanges to the object is as follows:

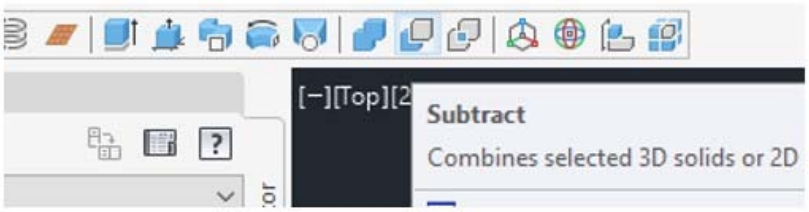


m) Change the view to "Realistic", and use the "Subtract" function to connect all the parts. Select all outer cylinder first (Figure m-1) then select the inner cylinder for subtraction (Figure m-2).

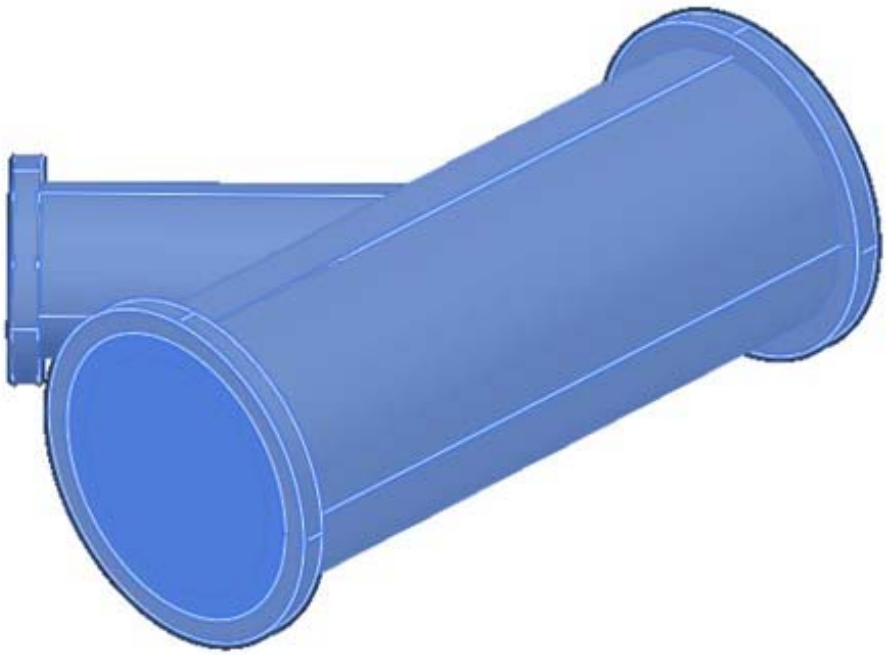
The display panel view is as follows:



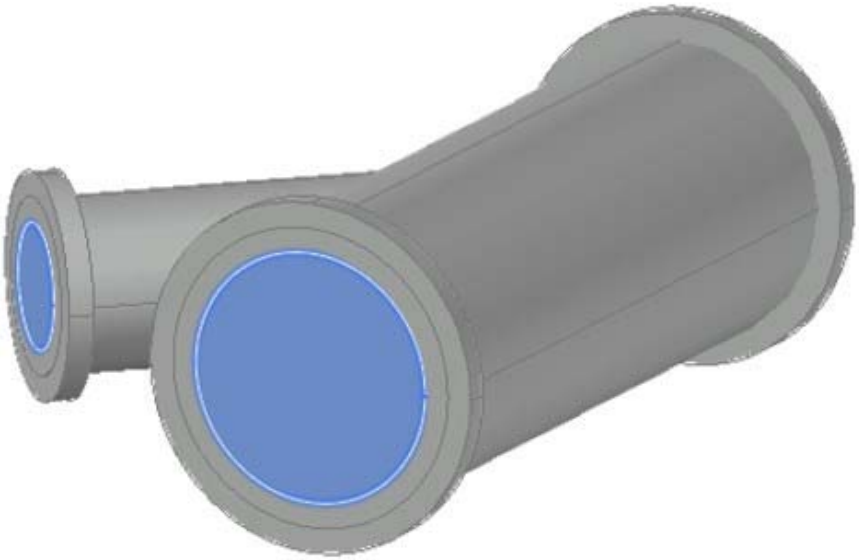
The subtract toolbar is as follows:



Screen m-1

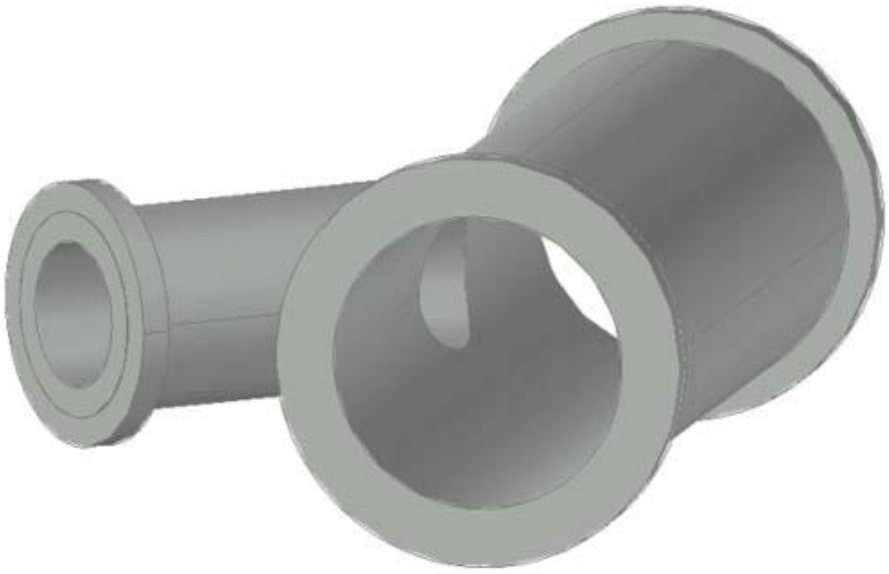


Screen m-2

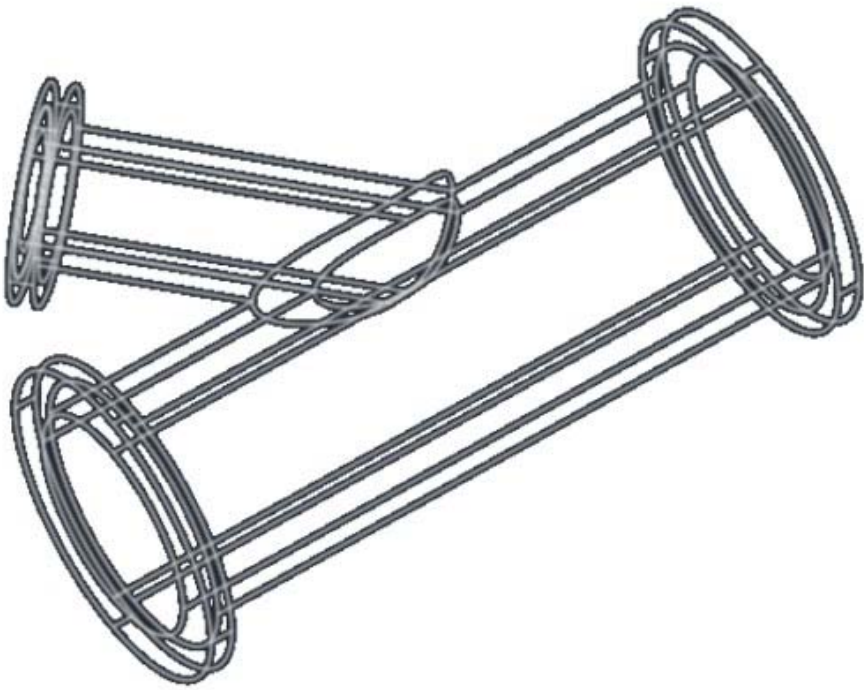


The result after subtracting the inner cylinder is as follows:

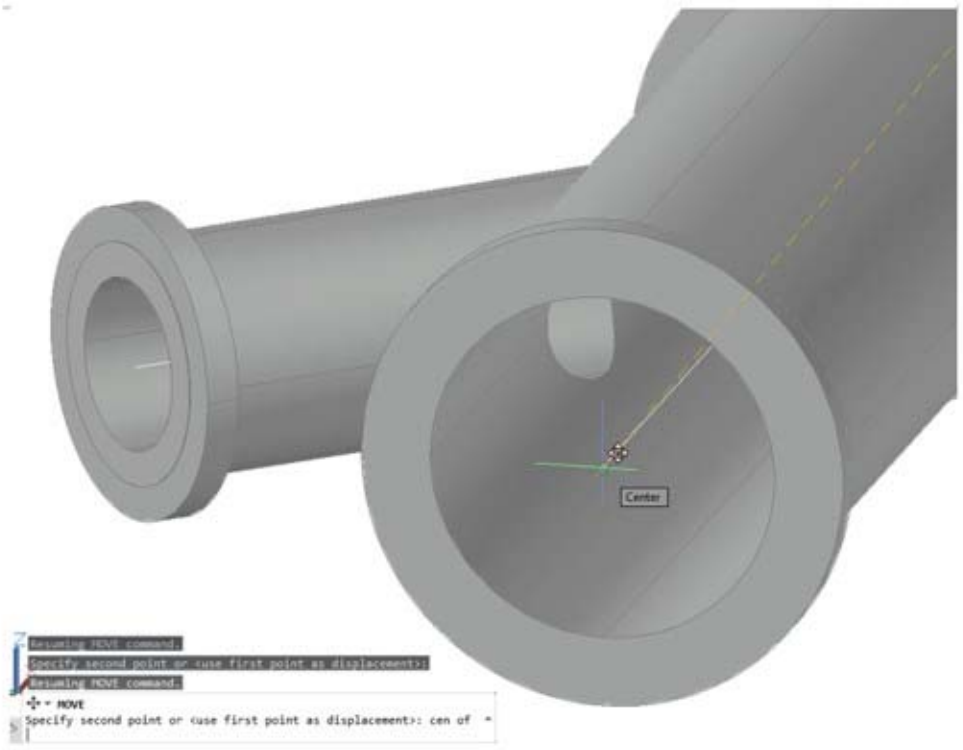
Realistic:



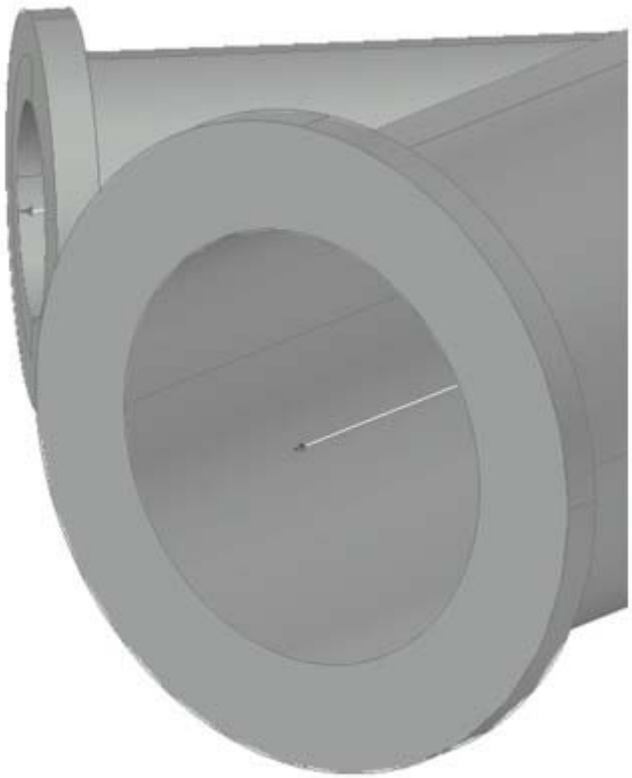
Wireframe:



n) Move the block (Created in Step f) center to the 3D object.

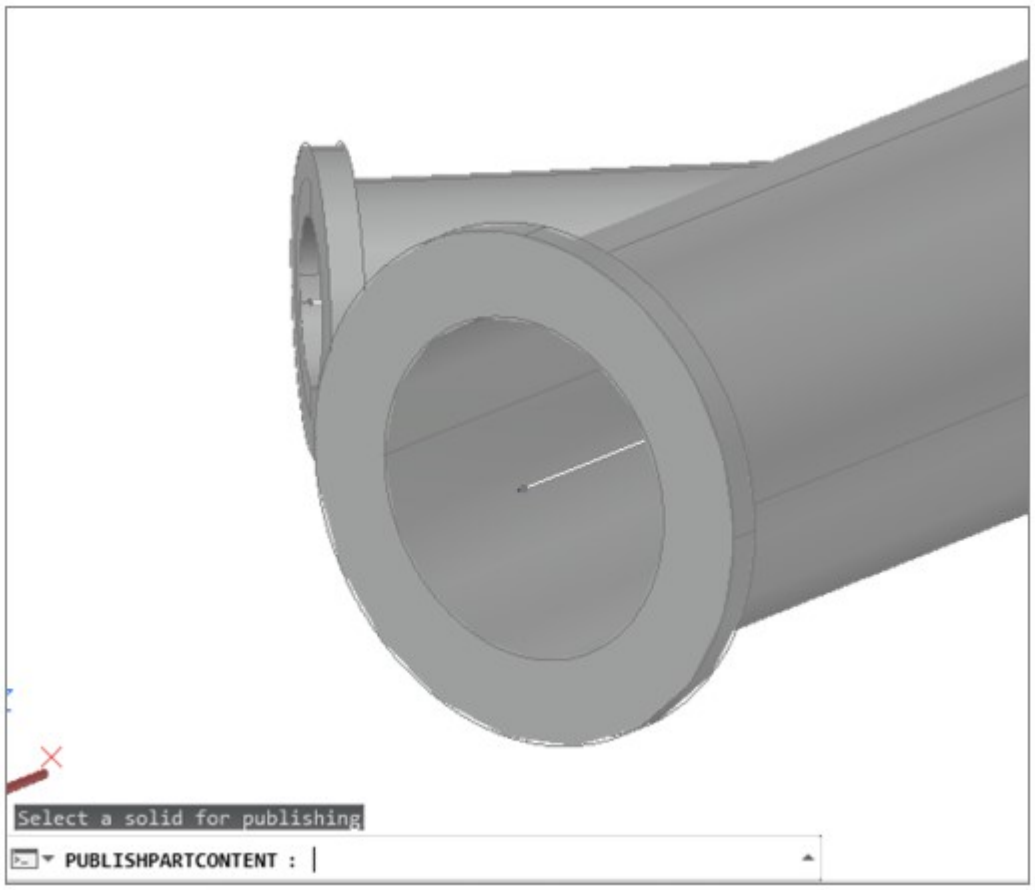


o) Under “Insert” Panel, select “Connection Point” tab, and insert the connection point into the objects.

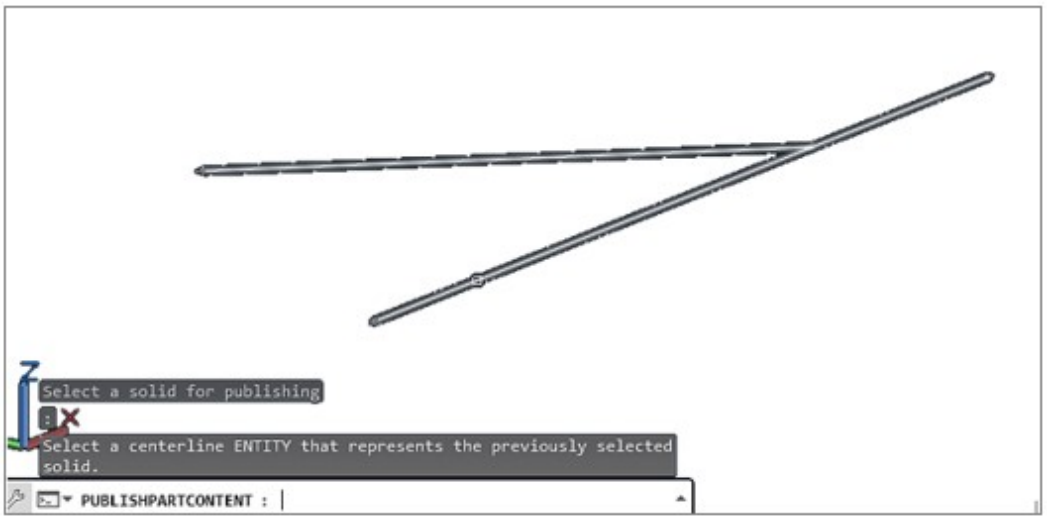


p) Type “PUBLISHPARTCONTENT” command and select the object (Figure p-1) and block (Figure p-2). Define the measuring unit (Figure p-3) and part type (Figure p-4). Save the content file in the same “Custom_Catalog” folder.

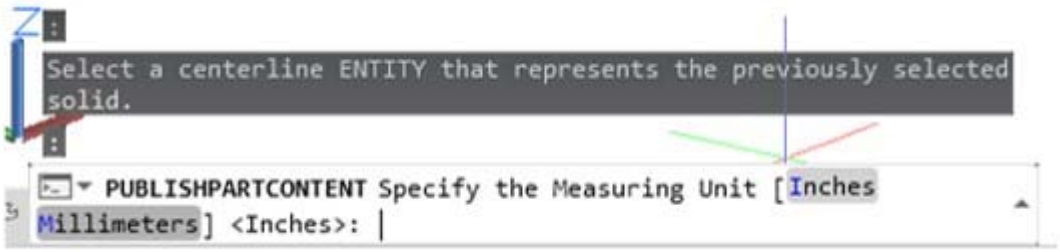
Screen p-1



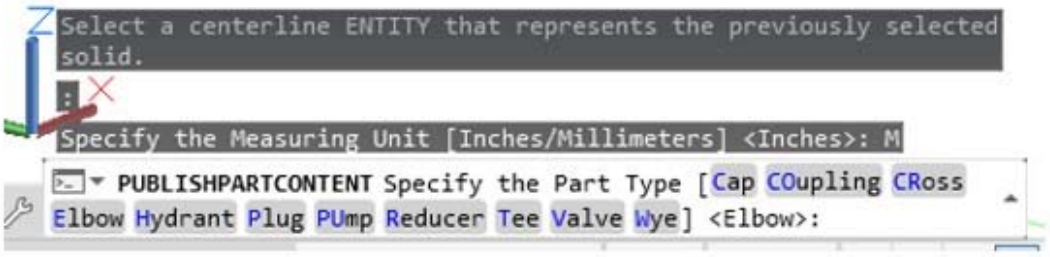
Screen p-2



Screen p-3



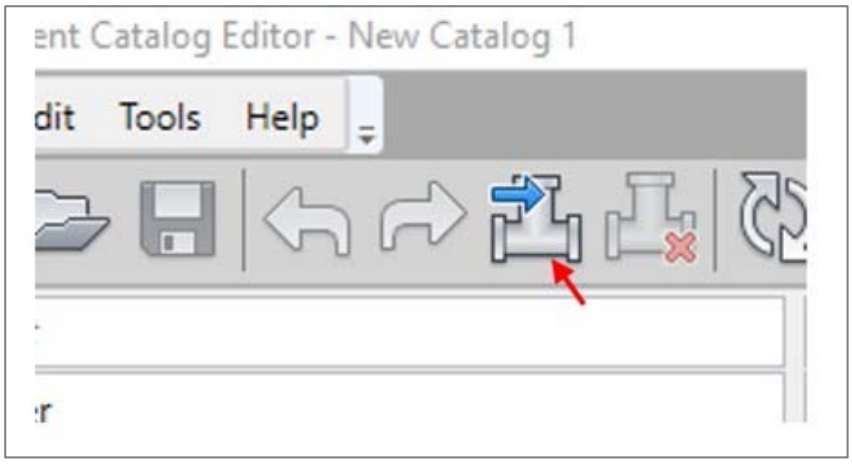
Screen p-4



4.3.7. Using “Content Catalog Editor” to Create .sqlite File.

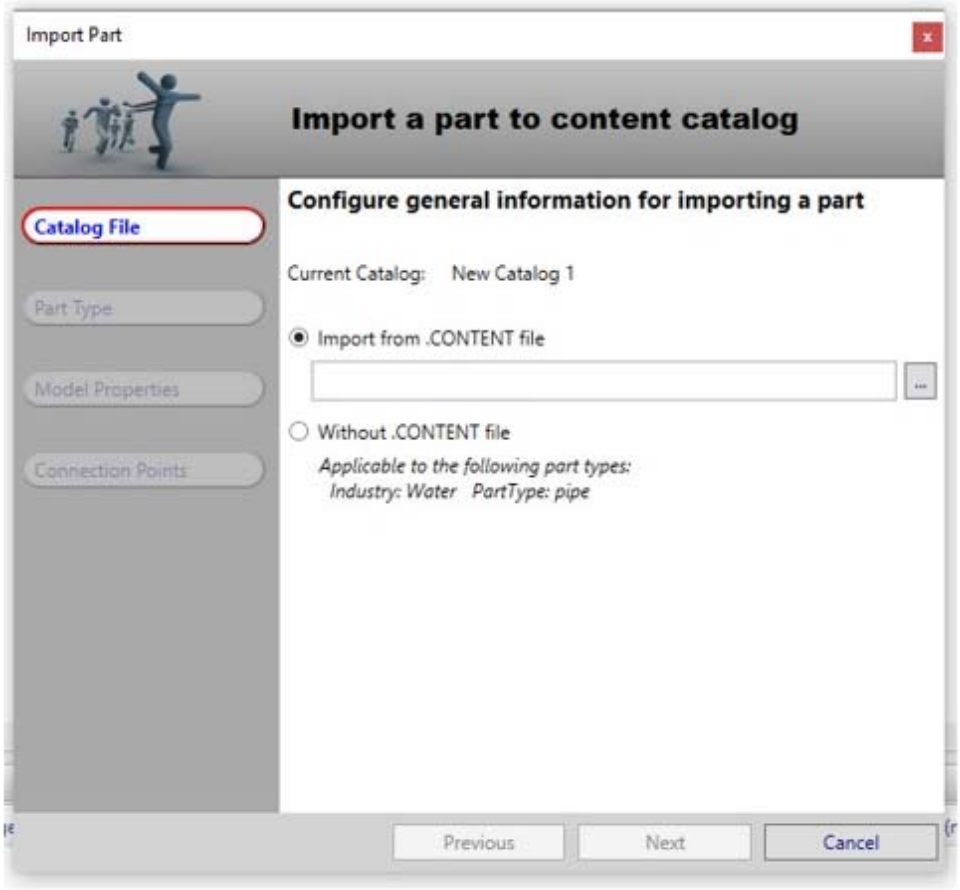
a) In “Content Catalog Editor”, create a new file and import the content file (Figure below). The attributes should be input properly to complete the importing.

Figure 4-13 Panel of “Content Catalog Editor”



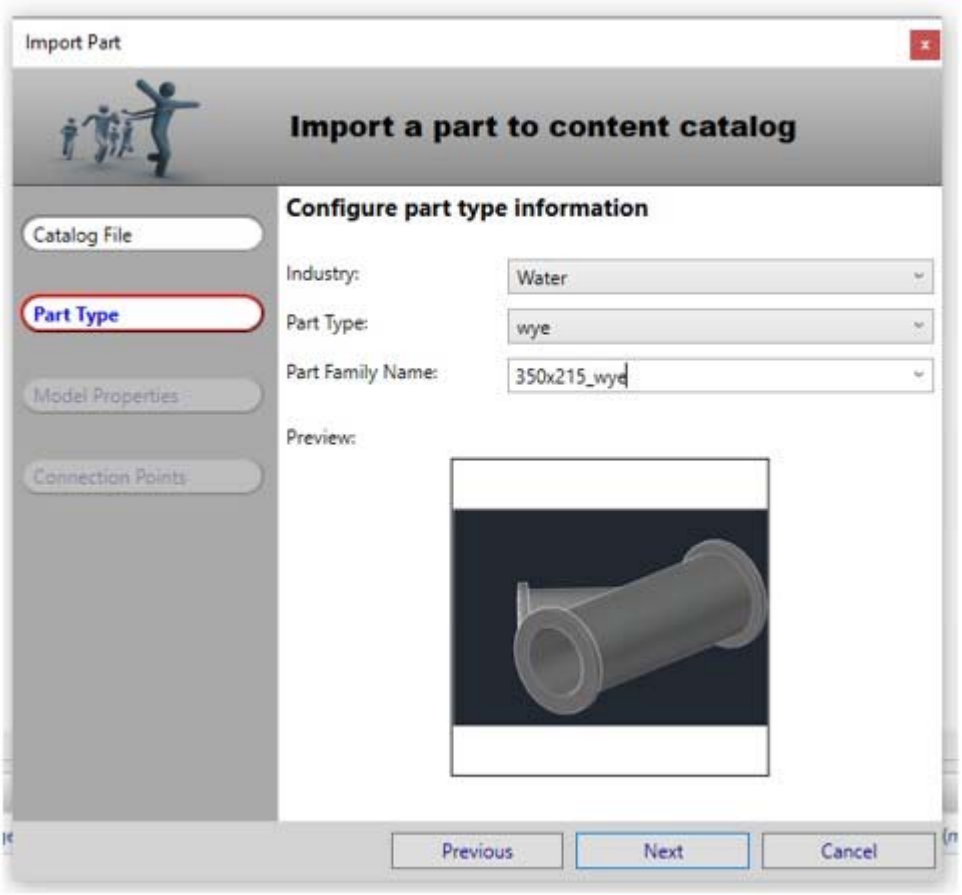
b) Import a part to content catalog under Catalog File:

Figure 4-14 Configure General Information for Importing a Part



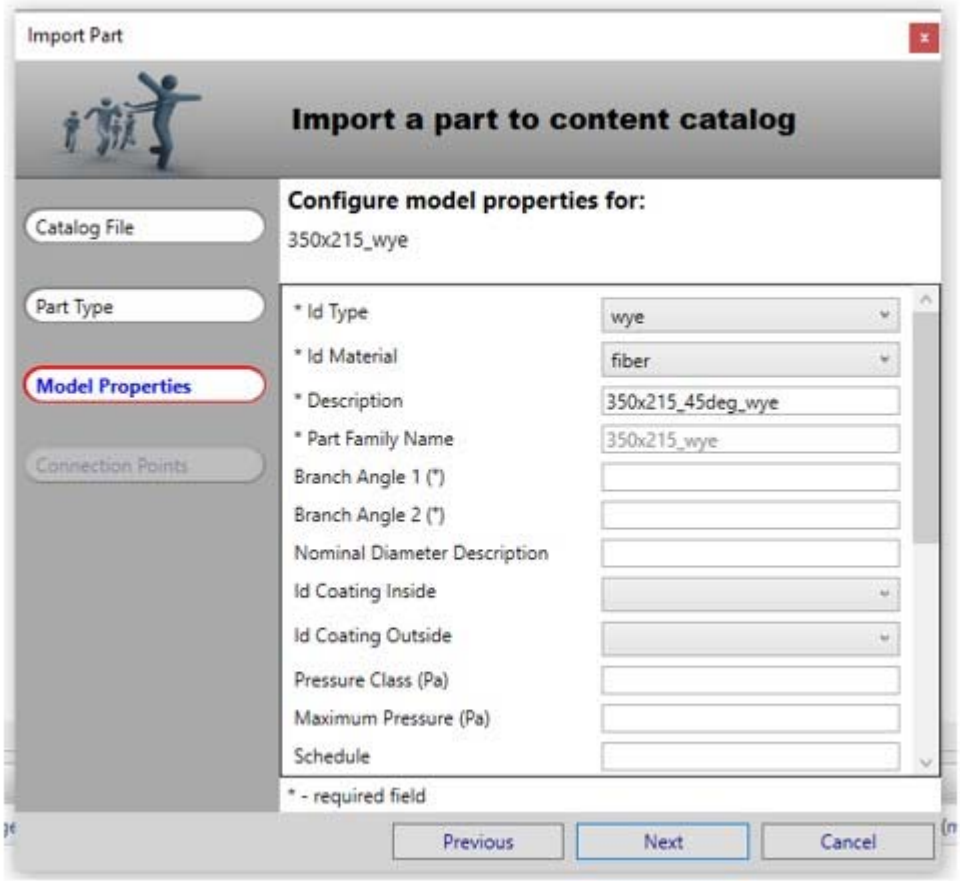
c) Configure part type information:

Figure 4-15 Configure Part Type Information



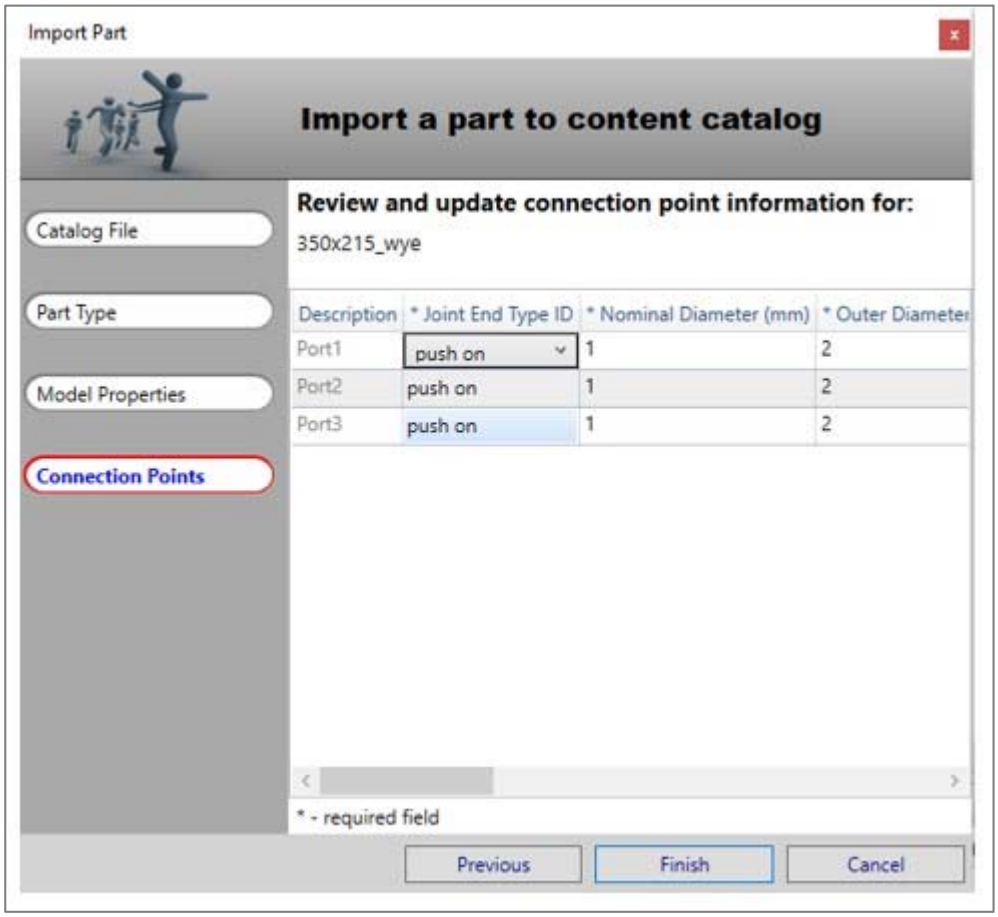
d) Configure model properties:

Figure 4-16 Configure Model Properties



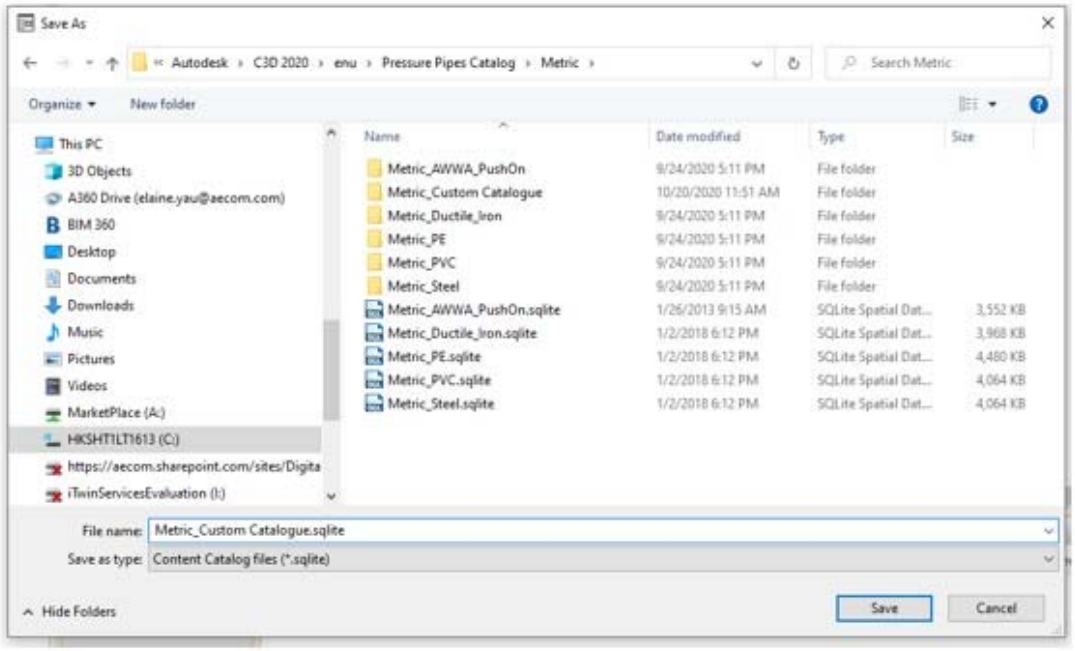
e) Review and update connection point information:

Figure 4-17 Review and Update Connection Point Information



f) After input the attributes, save as a new .sqlite file. The .sqlite file name should be same with the customed Catalog.

Figure 4-18 Save the Content Catalog file



g) This pressure pipe fitting can be reused for other projects by sharing the .sqlite, .dwg and Content Catalog File.

4.3.8. Incorporating the Revit BIM Model into Civil 3D

Revit BIM models could be incorporated into Civil 3D for authoring and coordination purposes. The steps are as follows:

a) Export Revit BIM models to *.dwg 3D solids.

b) In Civil 3D, open the *.dwg 3D solids and then insert Connection Points. “Connection Point” tab is under “Insert” Panel (refer to step o of Section 4.3.1).

c) Use command “PUBLISHPARTCONTENT” to publish a *.content file (refer to step p of Section 4.3.1).

d) In “Content Catalog Editor”, import the *.content file to “Pressure Network” content and customize the required attributes.

Appendix VI – LOD-I Requirements, Creation and Extraction

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1. Introduction

This Appendix describes Level of Information (LOD-I) for BIM models and BIM objects. Section 2 lists out and describes LOD-I across the WDs. Section 3 describes how to create attribute fields in different sample authoring software. Section 4 outlines different types of BIM attributes, and Section 5 describes principles of BIM attribute mapping and extraction.

2. LOD-I Across the WDs

Table App VI-1 describes general LOD-I requirements of LOD 100 to 500. The groupings of attributes have been developed based on principles set out in CIC BIM Standards - General: December 2020 Edition. Further descriptions of the attribute table are as follows:

2.1. WDs' Attributes Requirements

Asset owner could define additional information needs. In accordance with paragraph 17 of the Technical Circular (Works) No. 12/2020, WDs should review and collaborate with maintenance agencies of the built assets regarding asset information requirements (AIR). Asset owners who have not defined their information needs should refer to the table below as the basis. Asset owners who have already defined their own required attribute(s) should ensure the pre-defined attributes could cover relevant LOD-I.

2.2. The Groups of Attributes in the LOD-I Requirements

The list of attributes is formulated based on common approaches as discussed with WDs. Table App VI-1 contains the following groups of attributes:

a) Project Information is used to facilitate geolocation and data conversion via the Conversion Engine.

b) General Properties are used to enable information grouping and identification.

c) Design Properties are used to facilitate design review, drawing generation and quantity take-off.

d) Classification Properties are used to facilitate asset classification. Departmental classification(s) in addition to or instead of OmniClass could be defined by WDs.

e) Manufacturer's Equipment Properties, Condition Properties and Verification Properties are used to facilitate asset information management.

2.3. Mandatory and Required Attributes

"M" indicates mandatory information to facilitate metadata extraction and geolocation for Conversion Engine. "R" indicates required information to the WDs. To facilitate information exchange, Table App VI-1 shows the minimum required LOD-I and should be inputted into BIM models as far as practicable. Exemptions to exclude required information to WDs should be sought from **maintenance agencies**, and the records on the decisions should be kept and documented in BEP.

2.4. BIM Authoring Software

Attributes that are built-in to BIM authoring software should be utilised as far as practicable. In the last two columns of Table App VI-1, Revit and Civil 3D are used as examples for the attributes' creation methods. If software other than these two software is adopted, the methods for creating attributes should be properly documented in the BEP.

2.5. Samples of Attributes Files

To facilitate WDs' adoption of the LOD-I across the WDs, a project-specific shared parameter text file for Autodesk Revit (refer to Figure App VI-1) and a .dwg file including for Autodesk Civil 3D with those attributes will be sent by CD-ROM with the final hard copy of this Guide.

Figure App VI-1 Shared Parameter File for Revit

Revamp Model Common Attributes.txt

```
# This is a Revit shared parameter file.
# Do not edit manually.
*META   VERSION MINVERSION
META    2   1
*GROUP  ID  NAME
GROUP   1   Classification Properties
GROUP   2   General Properties
GROUP   3   Design Properties
GROUP   4   Manufacturer's Equipment Properties
GROUP   5   Condition Properties
GROUP   6   Verification Properties
*PARAM  GUID    NAME    DATATYPE    DATACATEGORY    GROUP   VISIBLE DESCRIPTION USERMODIFIABLE
PARAM   ba3c3418-a4ba-460d-bb47-f25ba4d56a8e    Equipment Capacity  TEXT        4   1       1
PARAM   f184fa44-50fe-4e0d-be15-f9e776181cd2    Contract Number of the Equipment    TEXT        4   1       1
PARAM   87dabc67-a110-4bca-982b-548150a66ed8    Verification    TEXT        6   1       1
PARAM   24d8fb6d-3f01-4a8c-b254-f55a95dda970    Material Grade  TEXT        3   1       1
PARAM   71f6107b-59c8-486f-8b2d-82f6c1aea810    CAT Code    TEXT        2   1       1
PARAM   de760a88-d846-4697-a9d2-b04bd0f58115    Manufacturer Name   TEXT        4   1       1
PARAM   7b262c88-0db1-4a8d-9b70-f8730a0a33ec    Design Capacity TEXT        3   1       1
PARAM   2be8dc88-6137-48ab-8a7e-564259dd95c4    Model Number    TEXT        4   1       1
PARAM   56848590-dd58-45b4-8561-4d90e97168bc    Departmental Unique ID  TEXT        2   1       1
PARAM   8979349f-9719-4416-9204-af0f333e75d1    Certified Completion Date   TEXT        5   1       1
PARAM   2a3681ac-2d41-47e6-922e-3282c823b9dd    Handover Date   TEXT        5   1       1
PARAM   c92b6fc2-f76c-4065-908f-adf5f22eb83e    Asset ID    TEXT        4   1       1
PARAM   cac282cd-9403-4c82-aeb4-a88757c778b7    OmniClassTitle  TEXT        1   1       1
PARAM   d06feedf-d592-495f-8db5-b0aafea86e98    LOD-G   TEXT        1   1       1
PARAM   e3f4d6e5-b221-42b4-ad34-49282662d045    Brand Name  TEXT        4   1       1
PARAM   56cb03ea-0752-490e-812b-19bfb0c50a5e    OmniClassVersion    TEXT        1   1       1
PARAM   676bb5f6-a71b-4a20-bf4e-5e8c143862a9    OmniClassCode   TEXT        1   1       1
PARAM   de1780f8-89a1-4175-a779-00e83675ad1a    Location    TEXT        2   1       1
PARAM   28e1f8f9-479b-4de7-8a8f-53525653f350    LOD-I   TEXT        1   1       1
```

Table App VI-1 LOD-I Across the WDs

No.	Grouping	Attribute Name	Description	LOD-I					Proposed Input Format	Creation Method for Sample Authoring Software	
				100	200	300	400	500		Revit	Civil 3D
1	Project Information	Organisation Name	Client name (per agreement/ contract)	M	M	M	M	M	Alphanumeric	Use default attribute in Project Information Dialog Box Refer to Section 3.1	Use Custom Property in Drawing Properties Dialog Box Refer to Section 3.2
		Project Issue Date	Project Commencement date	M	M	M	M	M	MMM YYYY (eg. Nov 2014)		
		Project Address	The street address of the project	M	M	M	M	M	Alphanumeric		
		Project Name	The project name as shown on the drawing sheet's title block	M	M	M	M	M	Alphanumeric		
		Project Number	The project number as shown on the drawing sheet's title block	M	M	M	M	M	Alphanumeric		
2	General Properties	CAT Code	Departmental category **(see Remark 1)**	R	R	R	R	R	Alphanumeric	Shared Parameter Refer to Section 3.3	Property Set Refer to Section 3.4
		Locations	Location (e.g. district code for outdoor object)		R	R	R	R	Alphanumeric		
		Departmental Unique ID	The unique ID for departmental information management		R	R	R	R	Alphanumeric		

No.	Grouping	Attribute Name	Description	LOD-I					Proposed Input Format	Creation Method for Sample Authoring Software	
				100	200	300	400	500		Revit	Civil 3D
3	Design Properties	Material	Singular material or all materials pertaining to the assembly		R	R	R	R	Alphanumeric	Family parameter Refer to Section 3.7	Property Set Refer to Section 3.4
		Material Grade	Material grade (e.g. concrete grade, steel grade)		R	R	R	R	Alphanumeric	Shared Parameter Refer to Section 3.3	
		Design Capacity	Design capacity		R	R	R	R	Alphanumeric		
		Number	Room Number				R	R	Alphanumeric	Use default attributes under "Room" Refer to Section 3.8	N/A
		Name	Room Name				R	R	Alphanumeric		
4	Classification Properties **(see Remark 2)**	OmniClassCode	OmniClass code			R	R	R	Alphanumeric	Classification Refer to Section 3.5	Classification Refer to Section 3.6
		OmniClassTitle	OmniClass title			R	R	R	Alphanumeric		
		OmniClassVersion	OmniClass version			R	R	R	Alphanumeric		

No.	Grouping	Attribute Name	Description	LOD-I					Proposed Input Format	Creation Method for Sample Authoring Software	
				100	200	300	400	500		Revit	Civil 3D
5	Manufacturer's Equipment Properties	Brand Name	Brand name				R	R	Alphanumeric	Shared Parameter Refer to Section 3.3	Property Set Refer to Section 3.4
		Manufacturer Name	Manufacturer name				R	R	Alphanumeric		
		Model Number of element / equipment	Model number				R	R	Alphanumeric		
		Equipment Capacity	Equipment capacity				R	R	Alphanumeric		
		Asset ID	Asset ID				R	R	Alphanumeric		
		Contract Number of the Equipment	The equipment's contract number				R	R	Alphanumeric		
6	Condition Properties	Certified Completion Date	Certified completion date				R	R	MMM YYYY (eg. Nov 2014)	Shared Parameter Refer to Section 3.3	Property Set Refer to Section 3.4
		Handover Date	Handover date				R	R	MMM YYYY (eg. Nov 2014)		

No.	Grouping	Attribute Name	Description	LOD-I					Proposed Input Format	Creation Method for Sample Authoring Software	
				100	200	300	400	500		Revit	Civil 3D
7	Verification Property	Verification	Verification method (input A for "field verified by visual inspection" and B for "field verified by a measured survey")					R	Text (e.g. A or B)	Shared Parameter Refer to Section 3.3	Property Set Refer to Section 3.4

Remarks:

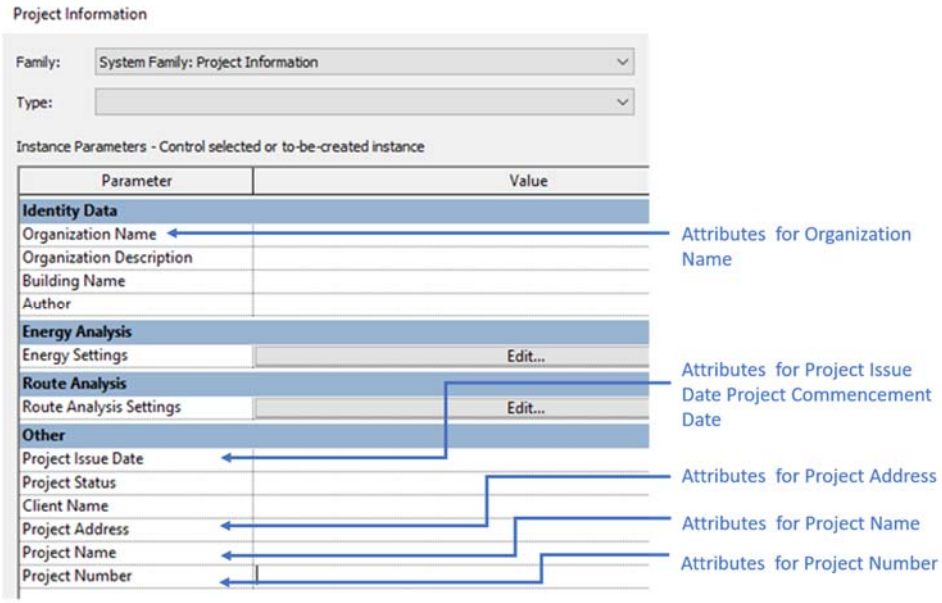
1. Category (in the form of the shared parameter “CAT Code” under “General Properties”) could facilitate grouping and data filtering. In addition, “category” may refer to:
   a) The use of appropriate category or object types when creating BIM objects to minimize data loss (especially LOD-G) during open format exchange.
   b) BIM Object naming's abbreviation code fields 1 & 2 to facilitate BIM object library management and consistency of information container ID naming.
2. Department-specified classification(s) in addition to or instead of OmniClass could be defined by WDs.

3. Creation of Attributes for Required Information

3.1. Creation of Project Information Attributes in Revit

In Revit, default attributes can be utilised for inputting Project Information under **Manage** tab → **Settings** panel → **Project Information**. The figure below illustrates the Revit Parameters used for Project Information.

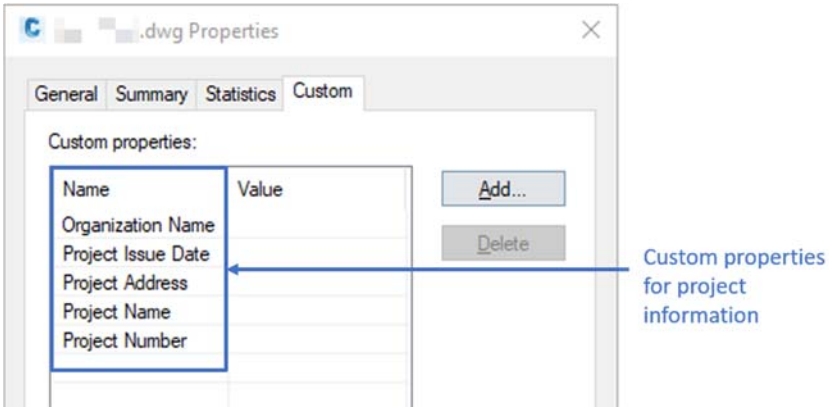
Figure App VI-2 Project Information Attributes in Revit



3.2. Creation of Project Information Attributes in Civil 3D

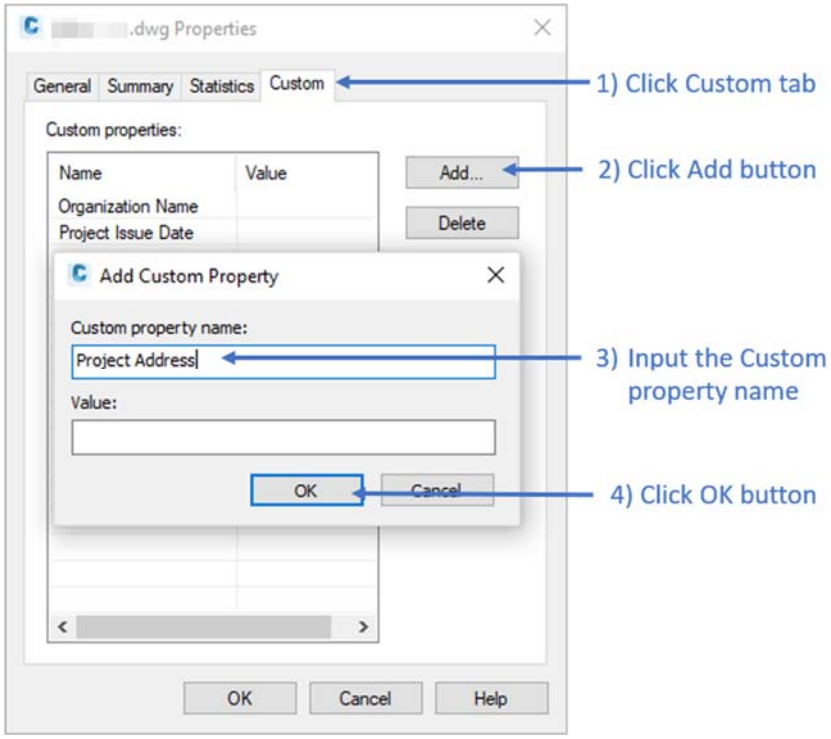
In Civil 3D, Project Information attributes can be created by using **Custom Property** in **Drawing Properties** dialog box.

Figure App VI-3 Project Information Attributes in Civil 3D



To create the Custom Property, first input "**DWGPROPS**" in the command line to show the **Drawing Properties** dialog box, then follow the steps as illustrated in the figure below to add the Project Information attributes.

Figure App VI-4 Adding Custom Property Name in Civil 3D



3.3. Creation of Shared Parameters in Revit

3.3.1. In Revit, Shared Parameters are identified by unique GUIDs to facilitate attribute consistency across BIM files. Shared Parameters could be applied to BIM object and BIM model.

3.3.2. Adding Shared Parameters to Revit Family Files (BIM objects in .rfa format)

a) Create a new family or open an existing one.

b) Click **Create** tab ➤ **Properties** panel ➤ (**Family Types**).

c) In the **Family Types** dialog, under the **Parameters** group box, click **Add**.

d) In the **Parameter Properties** dialog, select **Shared Parameter**.

e) Click **Select** and choose the appropriate shared parameter from the appropriate parameter group. If desired, click **Edit**; this will return to the **Edit Shared Parameters** dialog which allows opening a different shared parameter file or adding new parameters (refer to the steps in Section 3.3.4).

f) Choose whether to store the parameter by instance or type.

g) Click **OK**. The parameter name appears in the **Family Types** dialog.

h) Optionally, enter a value for the shared parameter or create a formula to calculate its value.

3.3.3. Adding Shared Parameters to Revit Project Files (BIM models in .rvt format)

a) Create a new project or open an existing one.

b) Click **Manage** tab ➤ **Settings** panel ➤ (**Project Parameters**).

c) In the **Project Parameters** dialog, click Add.

d) In the **Parameter Properties** dialog, select **Shared parameter**.

e) Click **Select** and choose the appropriate shared parameter from the appropriate parameter group. If desired, click Edit; this will return to the **Edit Shared Parameters** dialog which allows opening a different shared parameter file or adding new parameters (refer to the steps in Section 3.3.4).

f) Choose whether to store the parameter by instance or type.

g) Select the categories to add the shared parameter on the right-hand side.

h) Click **OK**. The parameter will appear in the elements.

i) Optionally, enter a value for the shared parameter or create a formula to calculate its value.

3.3.4. Adding new Shared Parameters in Edit Shared Parameters Dialog

a) Click **Create**.

b) In the **Create Shared Parameter File** dialog, enter a file name, and save the dialog to a desired location.

c) In the **Groups** box, click **New** and enter a name for the parameter group.

d) From the **Parameter Group** drop-down menu, select a group.

e) In the **Parameters Group** box, click New.

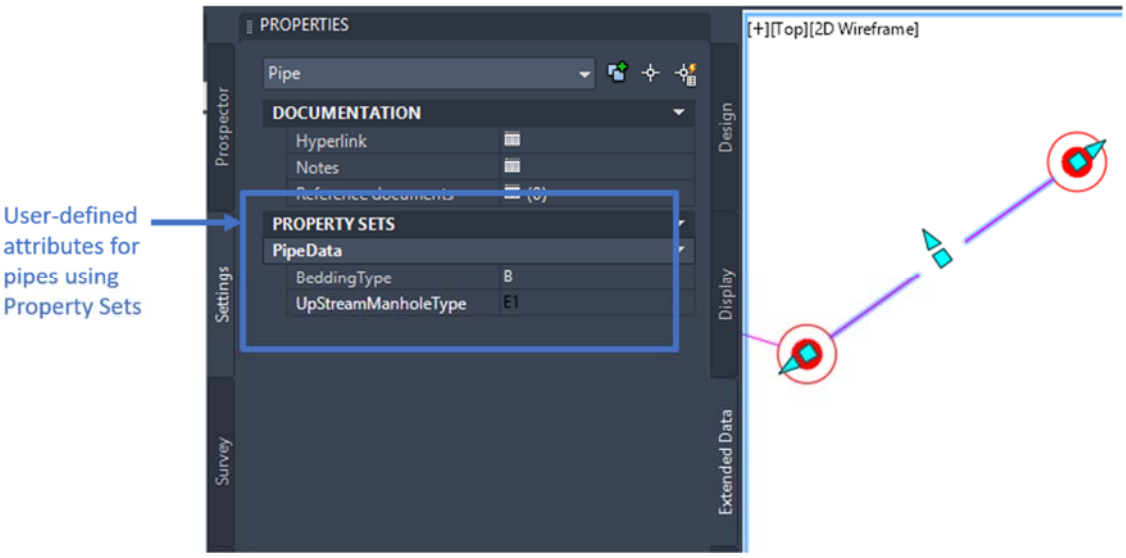
f) In the **Parameter Properties** dialog, enter a name, discipline, and type for the parameter.

g) Optionally, under **Tooltip Description**, click **Edit Tooltip**. In the **Edit Tooltip** dialog, enter the tooltip text, up to 250 characters.

3.4. Creation of Property Set in Civil 3D

3.4.1. In Civil 3D, **Property Sets** could be used for user-defined attributes for BIM model elements. Below is an example of user-define attribute for pipe using **Property Sets**.

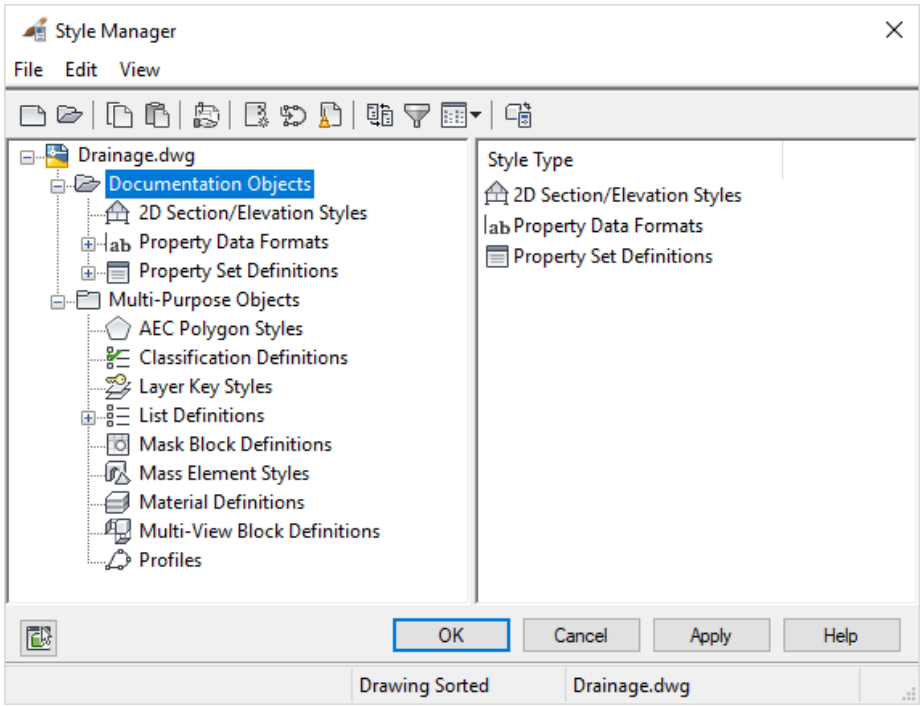
Figure App VI-5 An Example of User-define Attribute for Pipe Using Property Sets



3.4.2. **Property Sets** could be defined in **Style Manager**. The following are key steps for setting up **Property Set**s for user-defined attributes for Civil 3D BIM object.

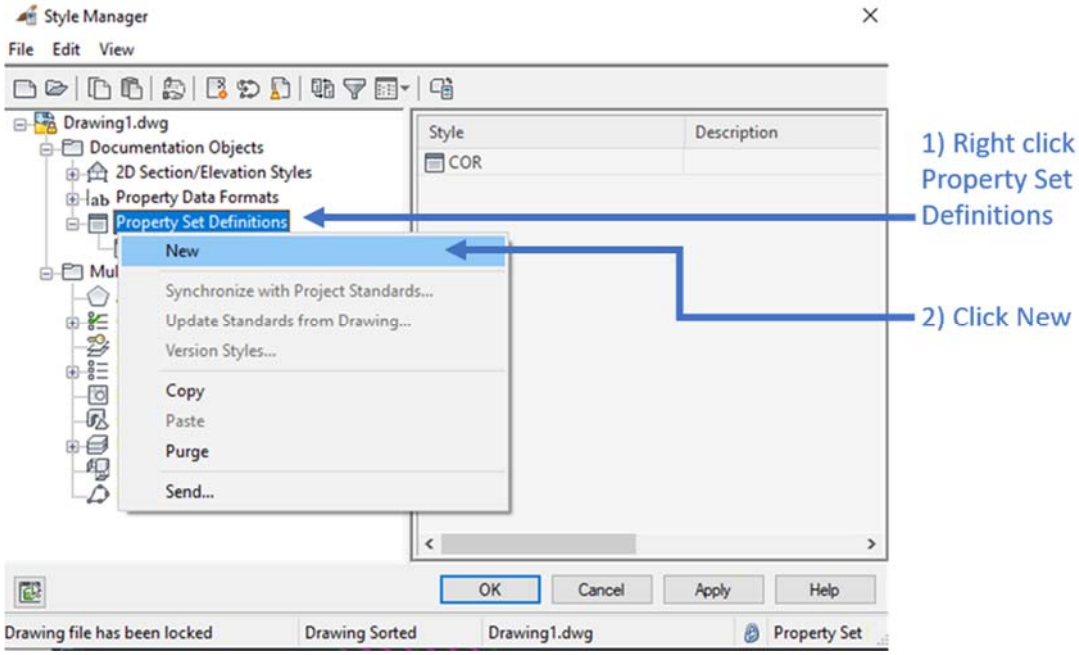
a) Input command "**STYLEMANAGER**" in the command line to open the **Style Manager** which is shown as below Figure:

Figure App VI-6 Step a of Setting up Property Sets for Civil 3D BIM Object



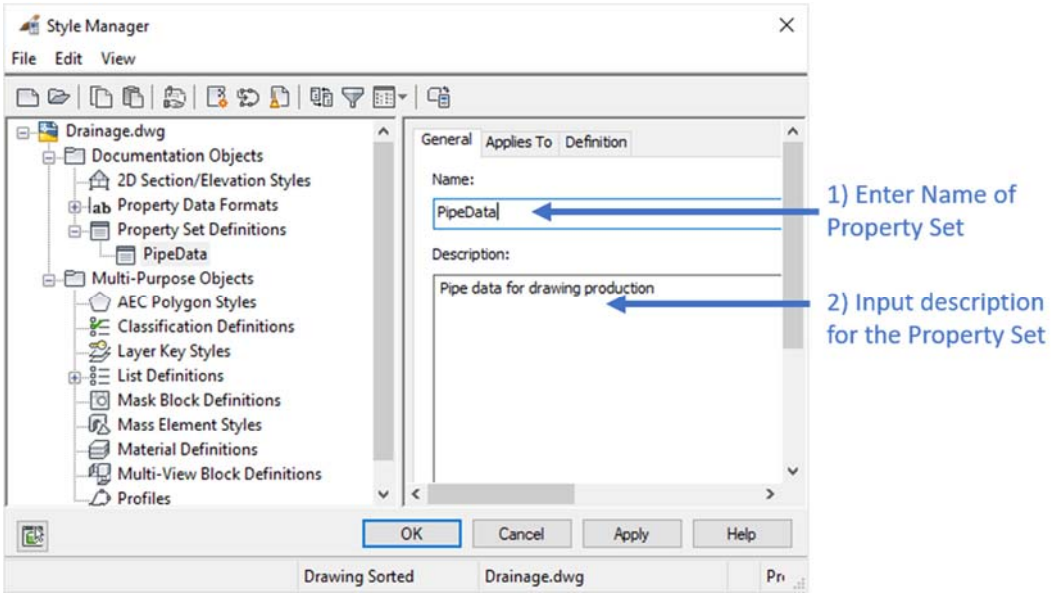
b) Under **Style Manager**, right click **Property Set Definitions** under **Documentation Objects**, then click **New**.

Figure App VI-7 Step b of Setting up Property Sets for Civil 3D BIM Object



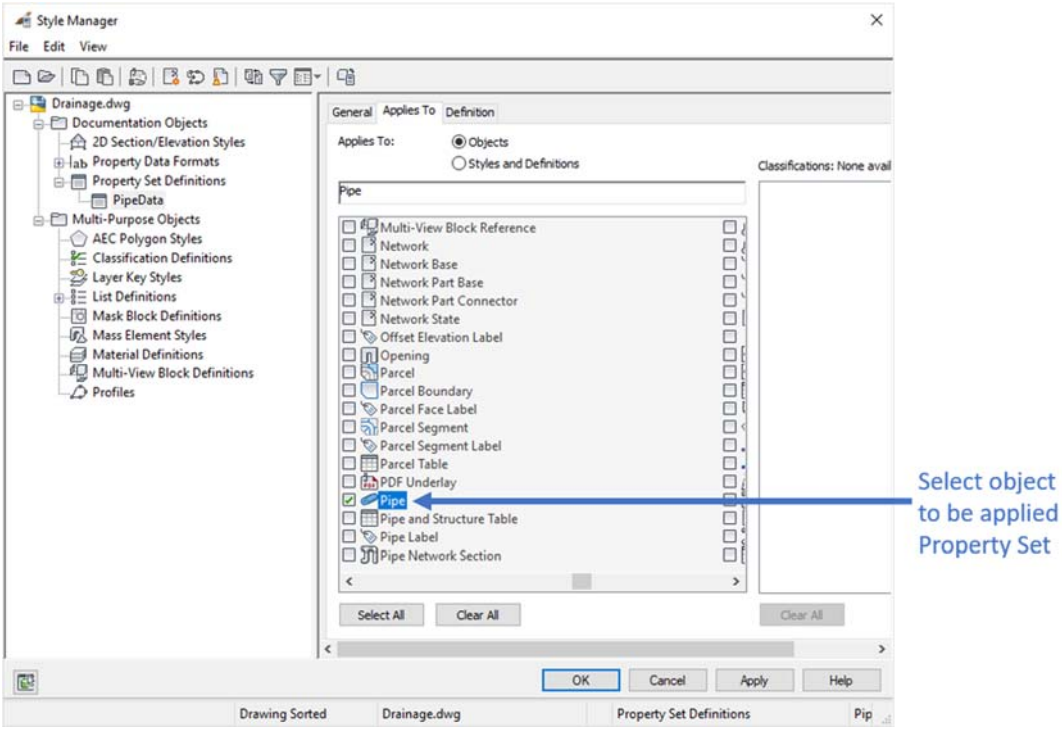
c) Input the **Name** and **Description** of the **Property Set** in **General** tab.

Figure App VI-8 Step c of Setting up Property Sets for Civil 3D BIM Object



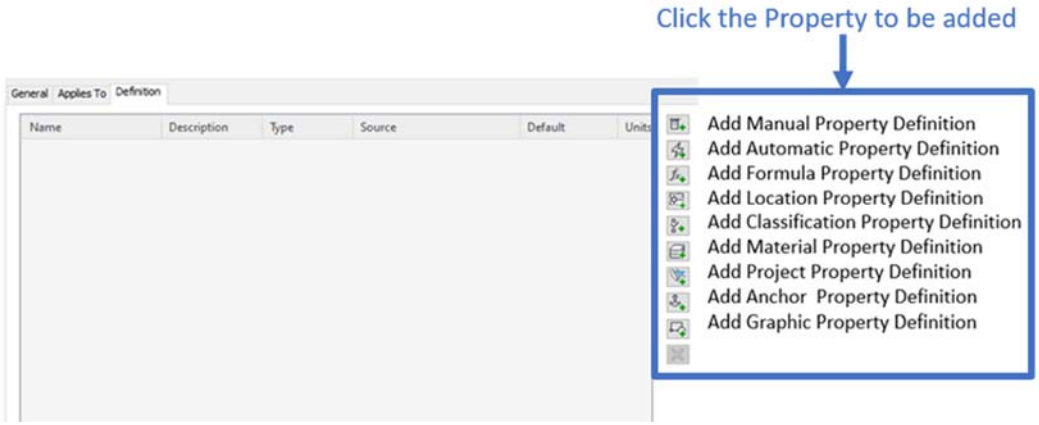
d) Under **Applies To** tab, select the types of object (e.g. Pipe) to be applied in the **Property Set**.

Figure App VI-9 Step d of Setting up Property Sets for Civil 3D BIM Object



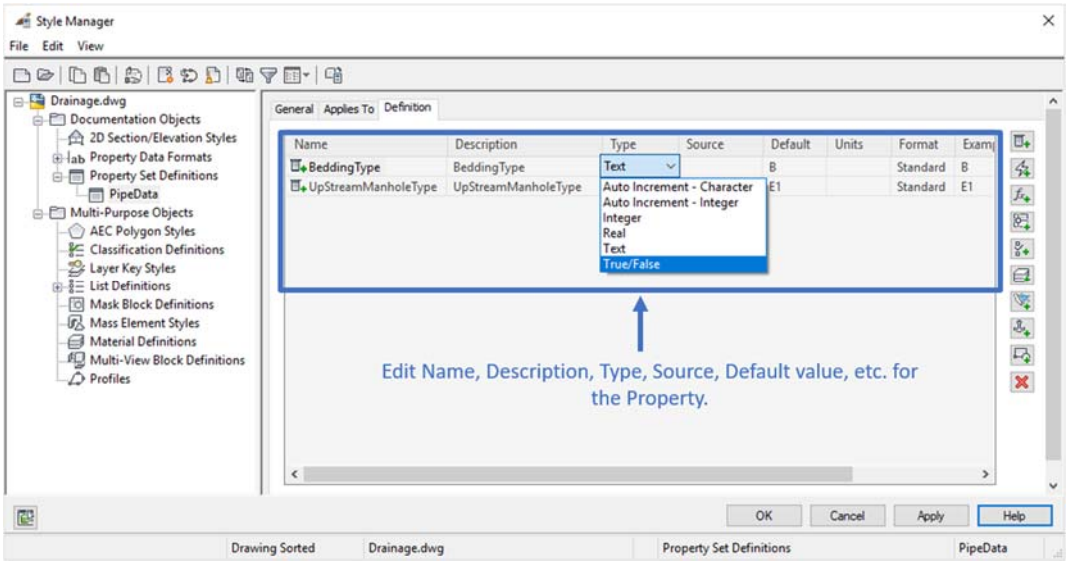
e) In **Definition** tab, click the properties as required to be added to the **Property Set**.

Figure App VI-10 Step e of Setting up Property Sets for Civil 3D BIM Object



f) Edit the Name, Description, Type, Source, Default value, etc. for the properties.

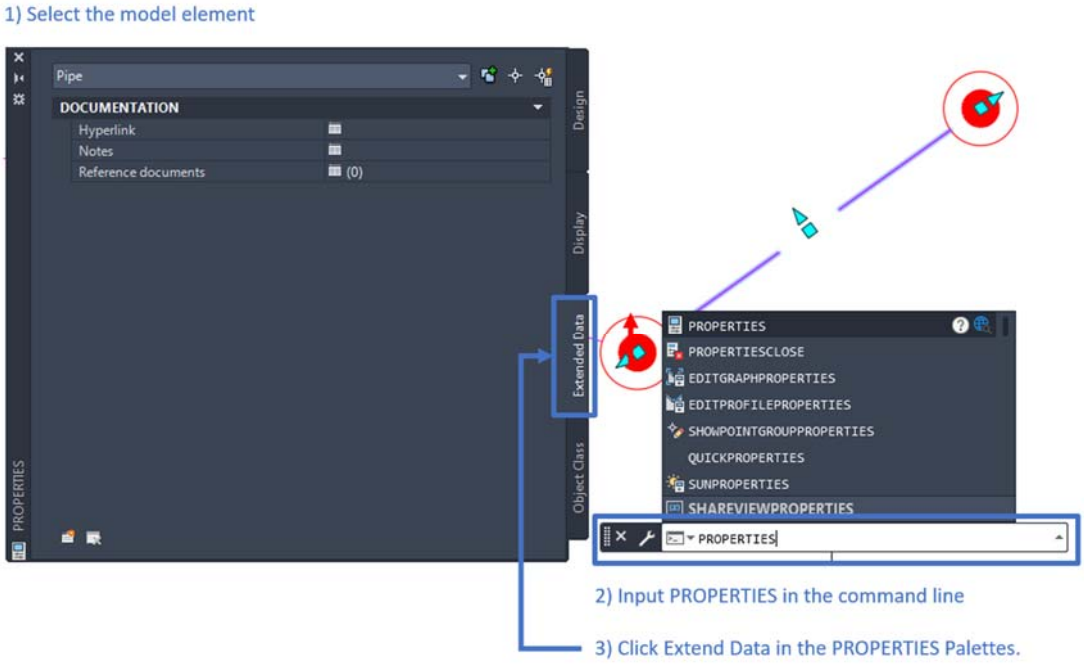
Figure App VI-11 Step f of Setting up Property Sets for Civil 3D BIM Object



3.4.3. The steps for applying **Property Set** to Civil 3D BIM objects are as follows:

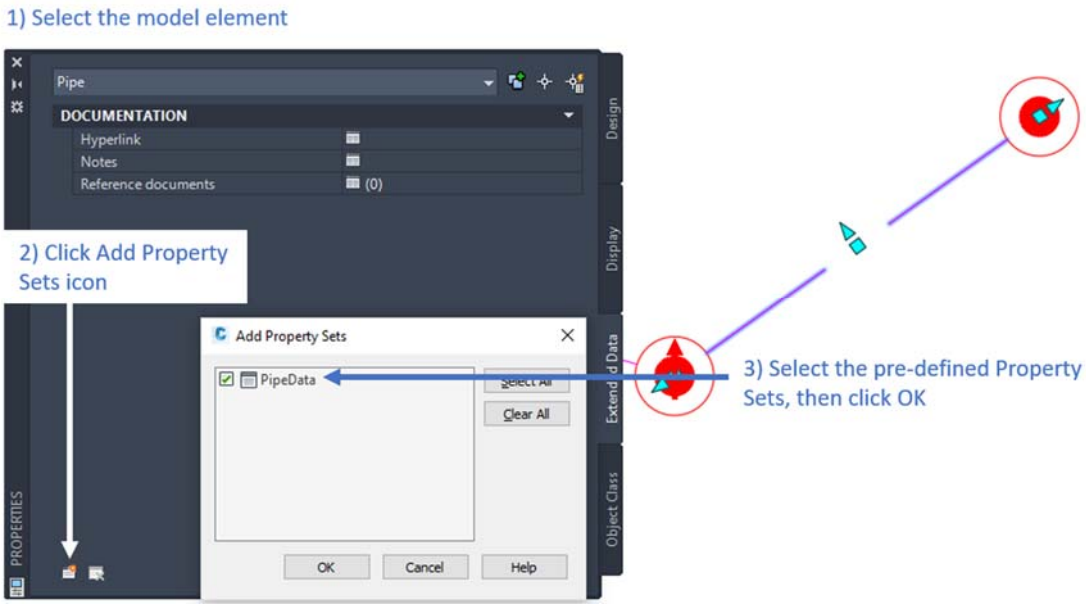
a) Select the model element, input **PROPERTIES** command in the command line, then click **Extend Data** in the **PROPERTIES** palettes.

Figure App VI-12 Step a of Applying Property Sets to Civil 3D BIM Object



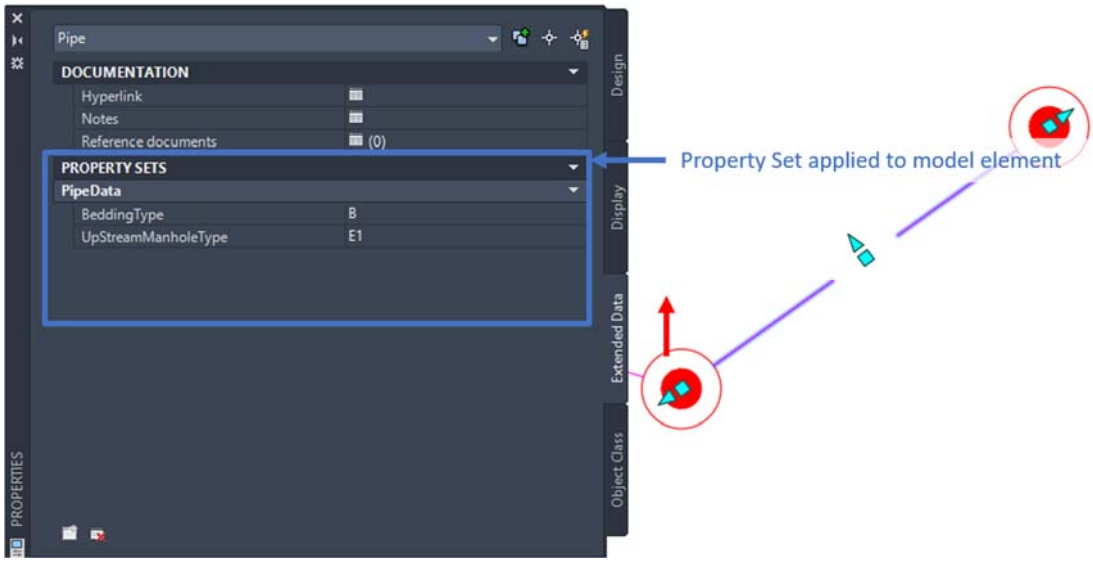
b) Click **Add Property Sets** icon in the bottom left of the **PROPERTIES** palettes. In the **Add Property Sets** dialog, click to select the pre-defined Property Set **"PipeData"**, then click the **OK** button.

Figure App VI-13 Step b of Applying Property Sets to Civil 3D BIM Object



c) The "**PipeData**" of **Property Set** is now added to BIM object shown as below Figure.

Figure App VI-14 Step c of Applying Property Sets to Civil 3D BIM Object

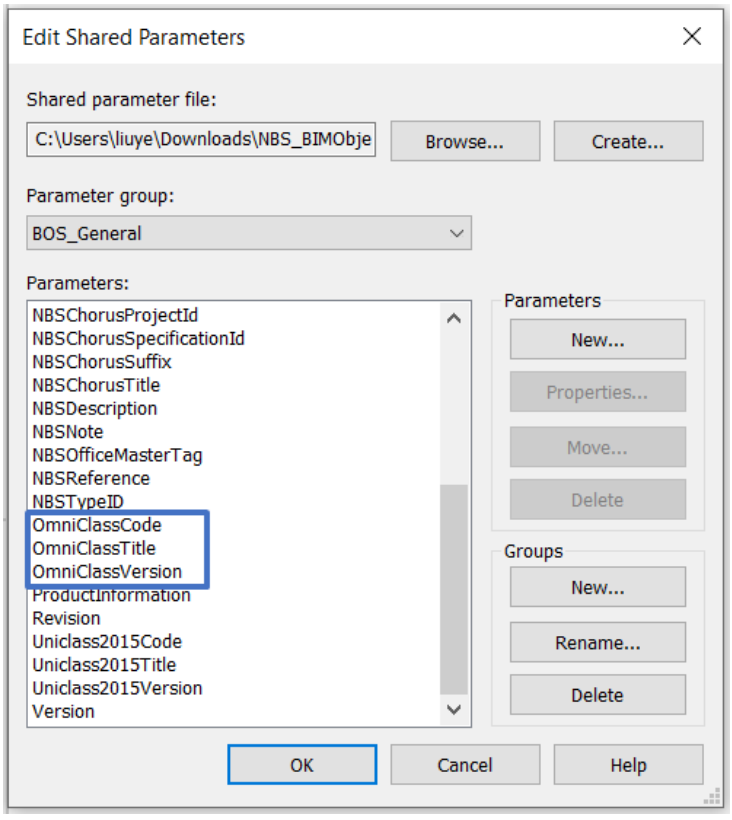


3.5. Creation of Classification in Revit

This section describes the methods of adding classification information in Revit. Classification information could be department-specified classification(s), additional classification (e.g. OmniClass), or both. If department-specified classification(s) are used, classification information could be created as Shared Parameters (refer to Section 3.3 for details). If OmniClass classification is used, there are three creation methods as described in sections below.

3.5.1. This section describes a sample creation method for classification information especially for OmniClass, as this method is not limited by OmniClass and Revit's updates. Considering OmniClass version would be updated from time to time, to ensure consistency, if OmniClass is the project-specific or stakeholder-specified classification system, OmniClass information should be inputted as Shared Parameters. Refer to the figure below for an example and Section 3.3. for details.

Figure App VI-15 An Example of Adding OmniClass Information as Shared Parameter in Revit

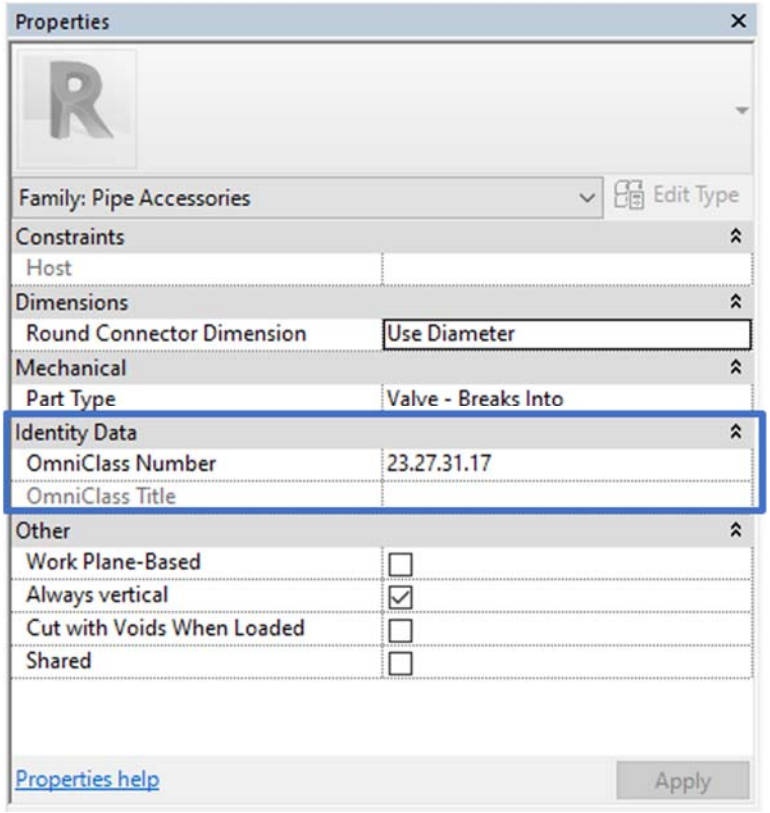


3.5.2. Revit has an add-in program named as "Classification Manager" for classification management. Refer to the below link for the details of the add-in program.

https://knowledge.autodesk.com/support/revit-products/getting-started/caas/simplecontent/content/classification-manager-for-revit-quick-start.html?st=classification%20manager

3.5.3. Revit provides pre-set parameters "OmniClass Number" and "OmniClass Title" under Identity Data for Revit families. These parameters correspond to OmniClass "Table 23 – Products" in Revit Family. Classification number could be defined by editing the Revit family's properties. Refer to the figure below for an example.

Figure App VI-16 An Example of Pre-set Parameters "OmniClass Number" and "OmniClass Title" under Identity Data in Revit Family



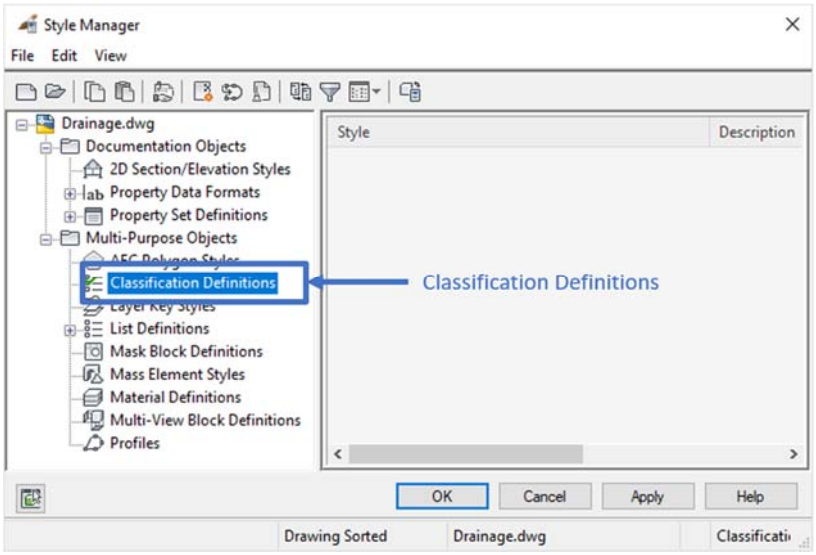
If OmniClass 2012 standards is assigned to be used and the OmniClass numbers supplied in Revit are incorrect, please refer to below link and update the OmniClass Taxonomy File accordingly.
https://knowledge.autodesk.com/support/revit-products/troubleshooting/caas/CloudHelp/cloudhelp/2020/ENU/Revit-Troubleshooting/files/GUID-BA0B2713-ADA0-4E51-A7CD-85D85511F3ED-htm.html

3.6. Creation of Classification in Civil 3D

3.6.1. In Civil 3D, there are no pre-set parameters function for OmniClass. **Classification Definitions** could be used for setup OmniClass information for the Civil 3D BIM objects under **Style Manager**. The key steps are as follows:

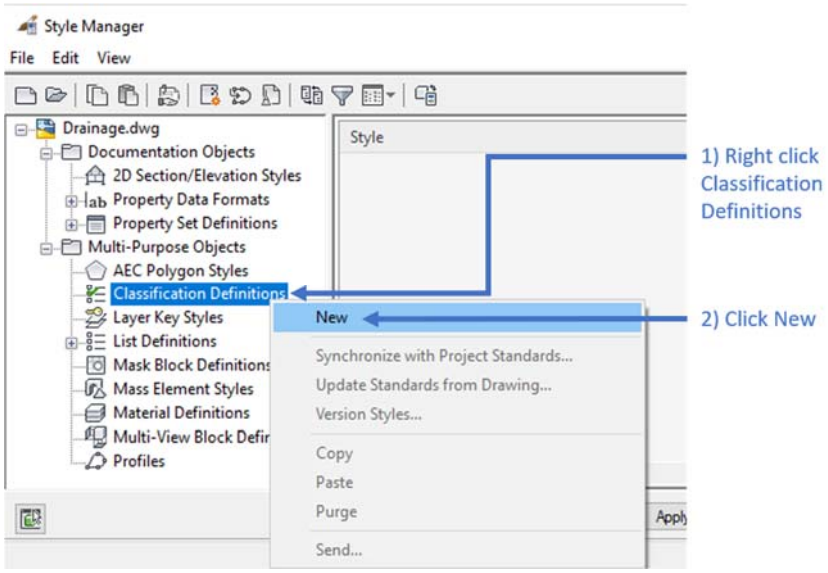
a) Input command "**STYLEMANAGER**" in the command line to open the Style Manager. **Classification Definitions** could be found under **Style Manager**.

Figure App VI-17 Step a of Setting up OmniClass information under Style Manager for Civil 3D BIM Objects



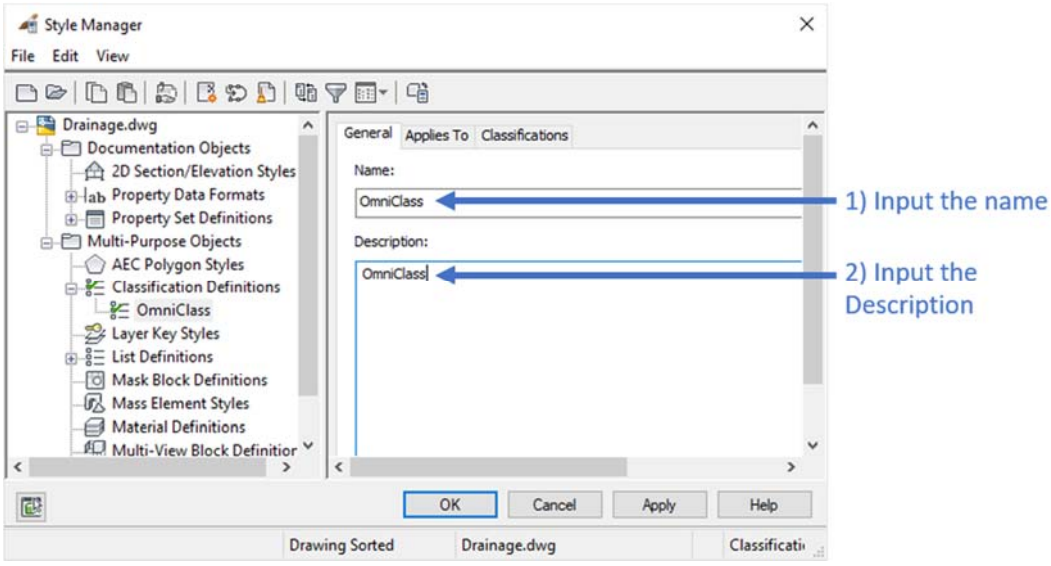
b) In **Style Manager**, right click **Classification Definitions** under **Multi-Purpose Objects**, then click **New** to create new classifications.

Figure App VI-18 Step b of Setting up OmniClass information under Style Manager for Civil 3D BIM Objects



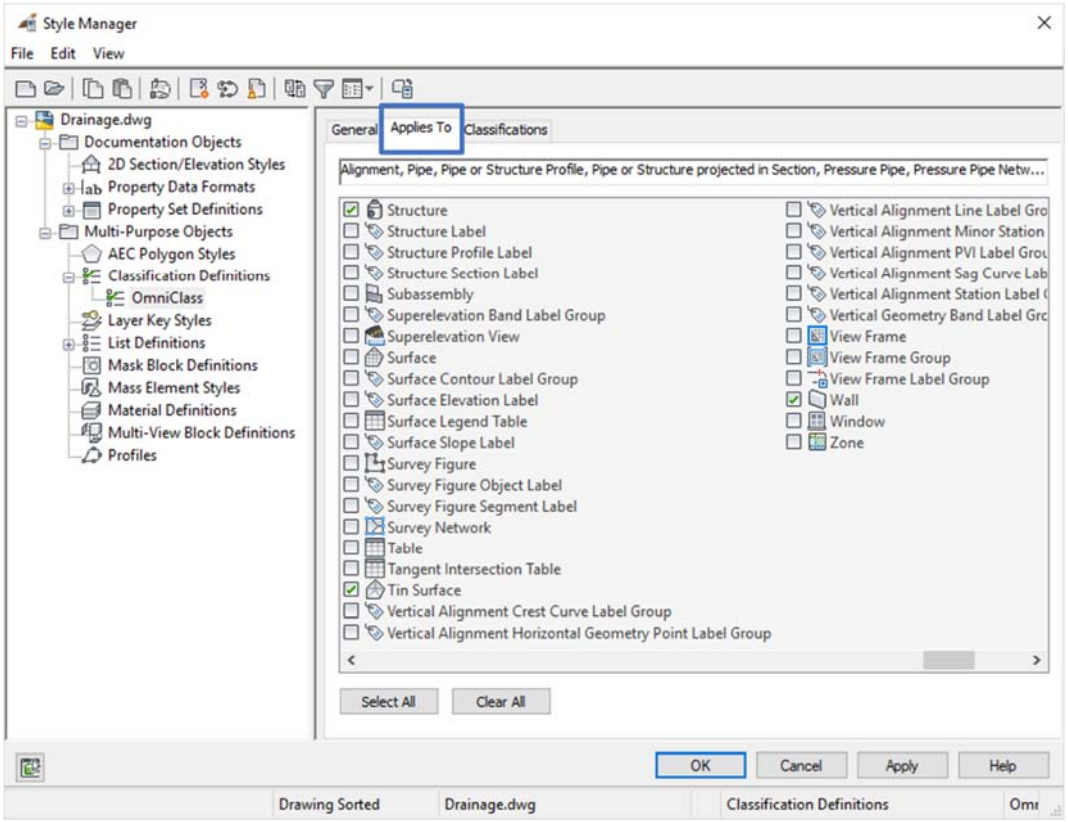
c) On **General** tab, enter the **Name** and input the **Description.**

Figure App VI-19 Step c of Setting up OmniClass information under Style Manager for Civil 3D BIM Objects



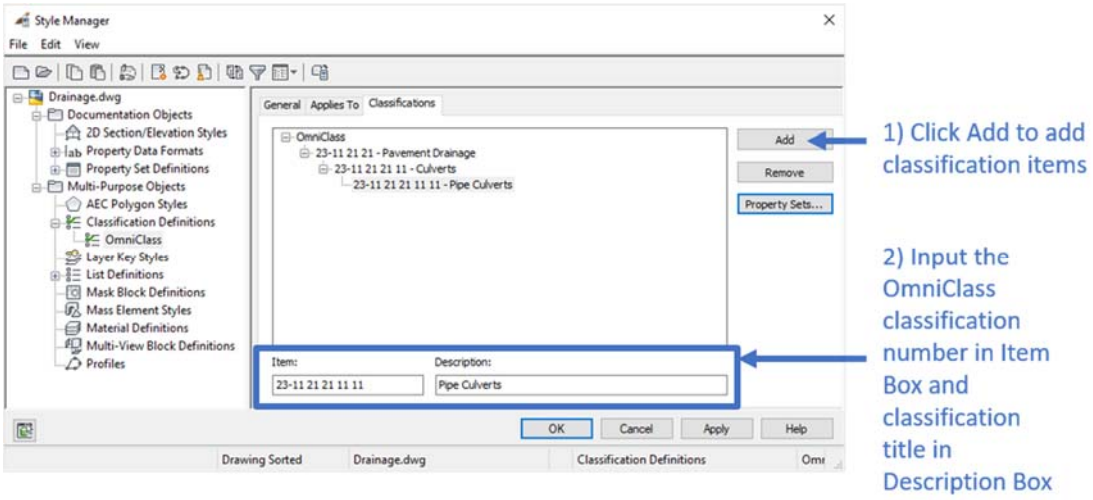
d) On **Applies To** tab, select the BIM object with the OmniClass information.

Figure App VI-20 Step d of Setting up OmniClass information under Style Manager for Civil 3D BIM Objects



e) On **Classification** tab, click **Add** to enter classification items which are **Item** and **Description** ("Item" is equivalent to OmniClass classification number while "Description" is equivalent to OmniClass classification title). Click the **OK** button when classification information is entered.

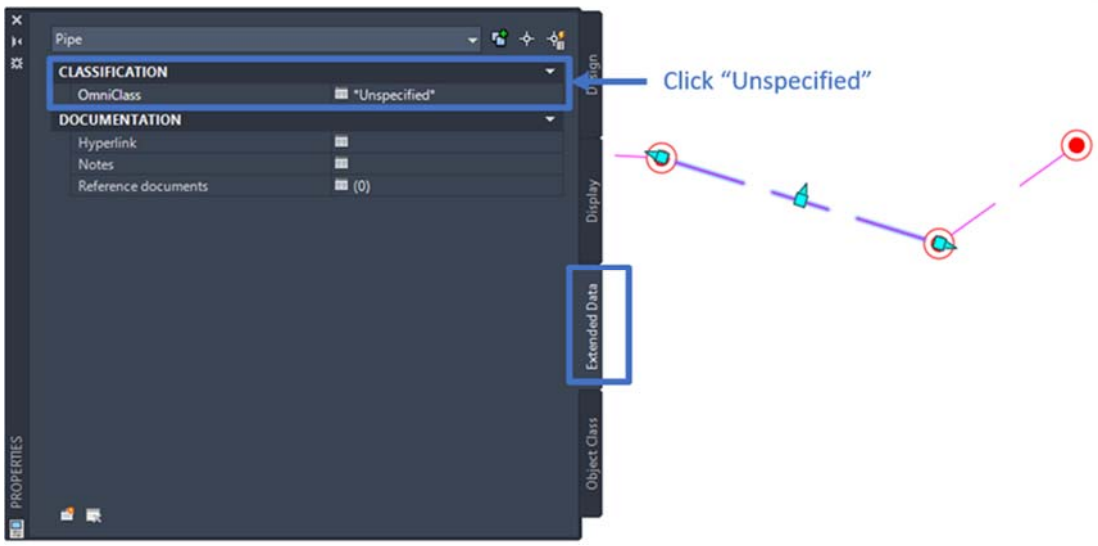
Figure App VI-21 Step e of Setting up OmniClass information under Style Manager for Civil 3D BIM Objects



3.6.2. Apply OmniClass classification number to Civil 3D BIM objects

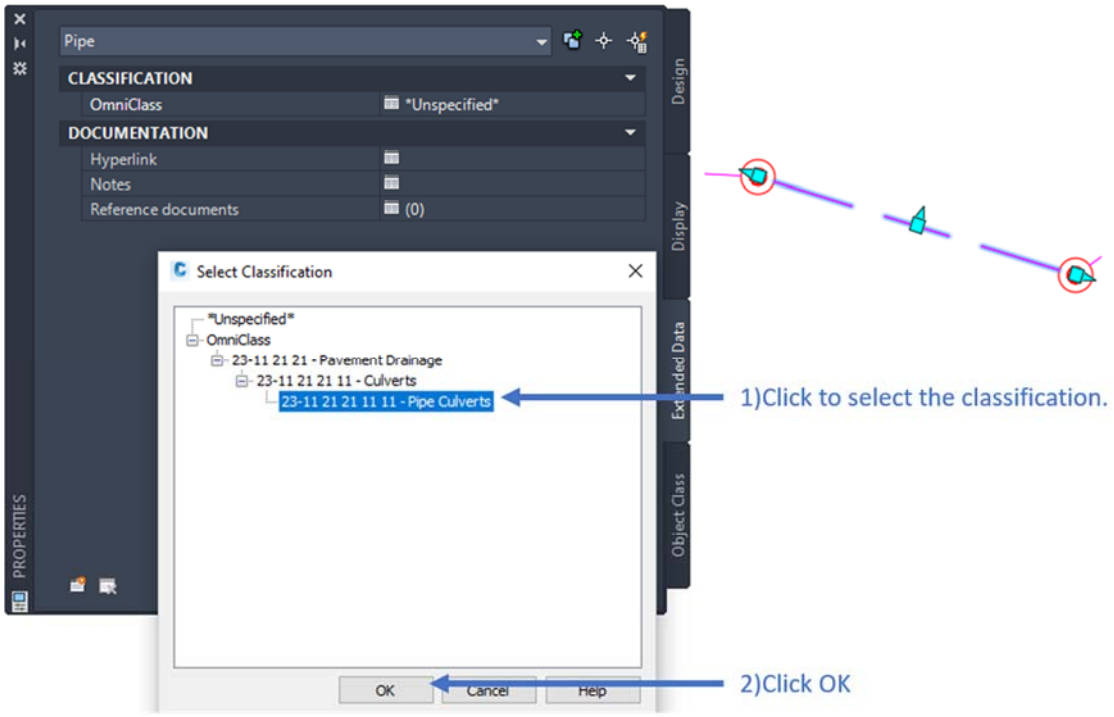
a) Select the BIM object, in the **Extended Data** tab of **PROPERTIES** Palettes, click "**Unspecified**".

Figure App VI-22 Step a of Applying OmniClass Classification Number to Civil 3D BIM Objects



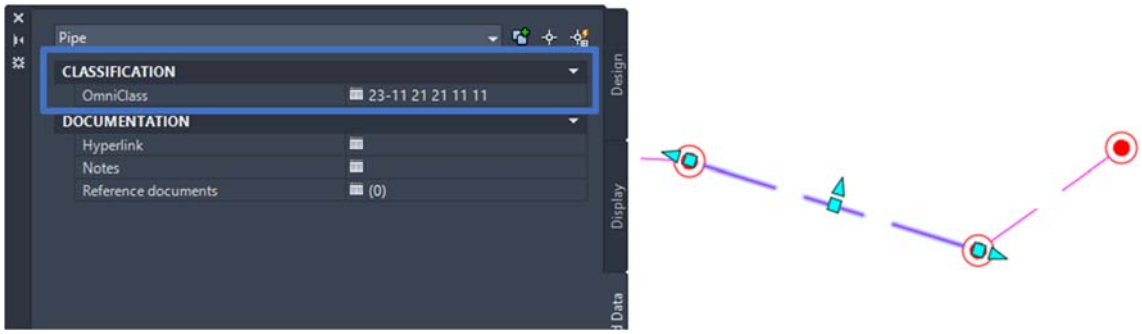
b) In the **Select Classification** dialog, select the pre-defined classification information, then click **OK**.

Figure App VI-23 Step b of Applying OmniClass Classification Number to Civil 3D BIM Objects



c) After the selection, the OmniClass classification number is shown as below Figure.

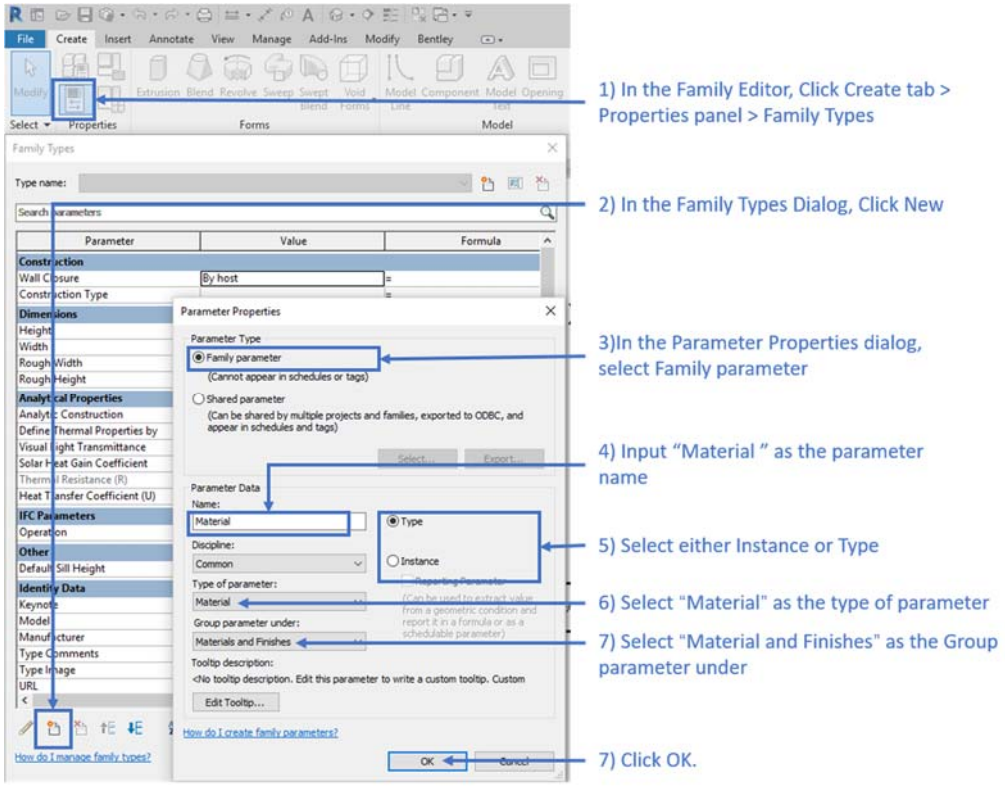
Figure App VI-24 Step c of Applying OmniClass Classification Number to Civil 3D BIM Objects



3.7. Creation of Material Attribute in Revit

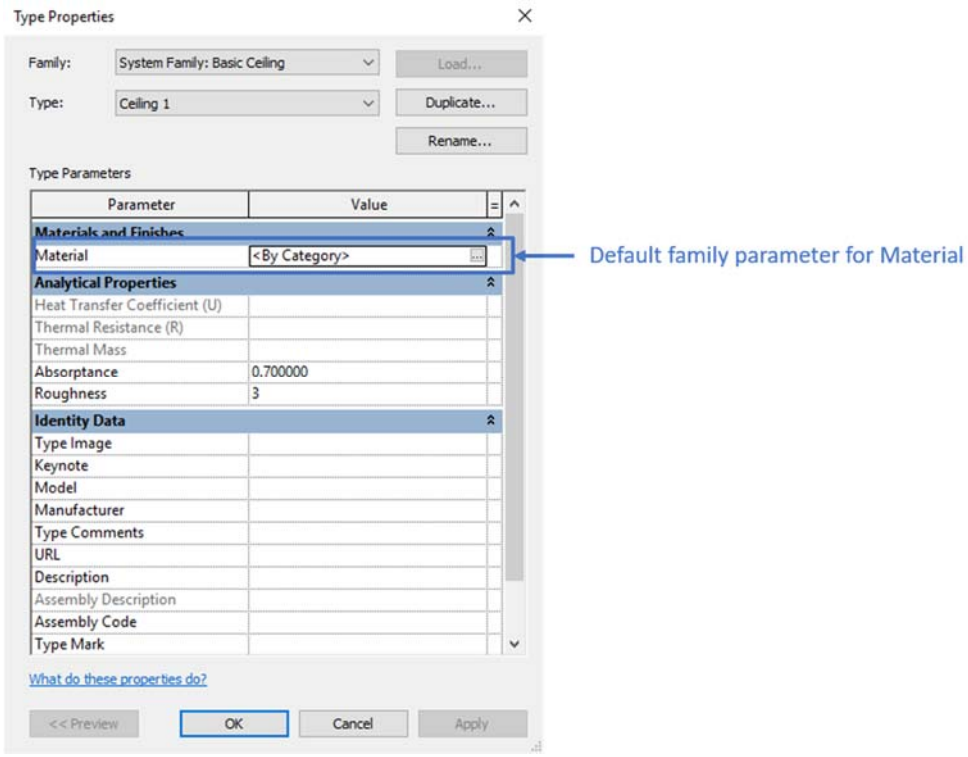
3.7.1. In Revit, Family parameters for loadable families can be added as material attributes in the **Family Editor**. Key steps for adding a material attribute are described as follows:

Figure App VI-25 Adding Material Attributes to Family Parameters for Loadable Families



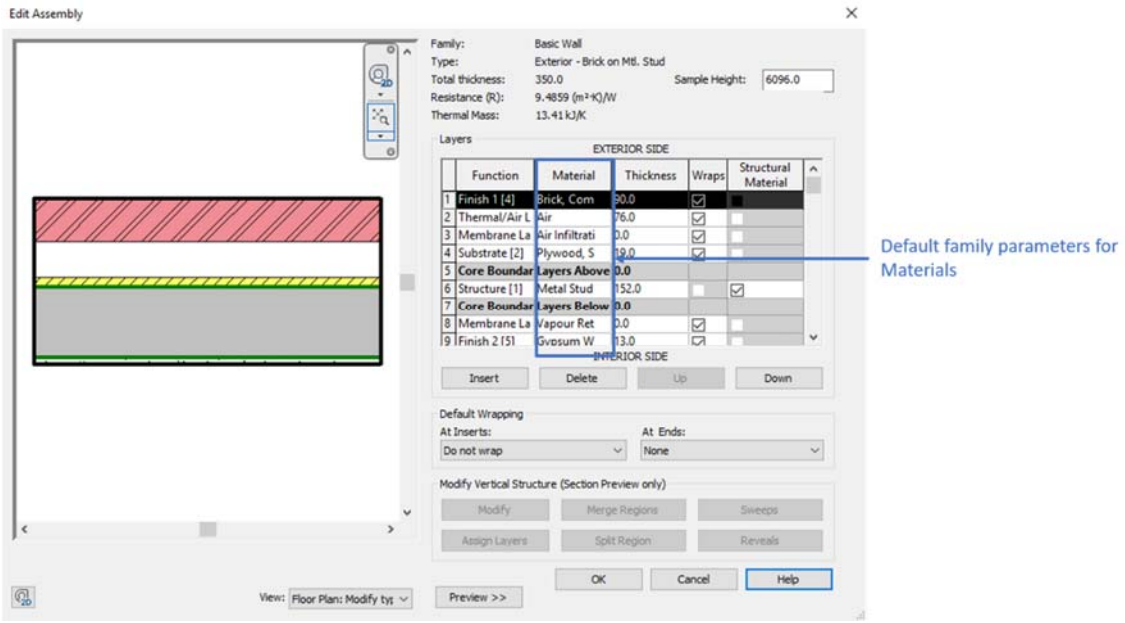
3.7.2. For Revit system families (e.g. basic ceilings, ramps), material should be set using the built-in "Material" parameter in the **Type Properties** dialog under **Materials and Finishes**. Refer to the figure below for details.

Figure App VI-26 Adding Built-in Material Attributes to System Families



3.7.3. For compound structures, which are system families composed of parallel layers (e.g. walls, floors, compound ceilings and roofs), material should be set using the built-in "Material" parameter for each compound structure layer in the **Type Properties** dialog under **Materials and Finishes**.

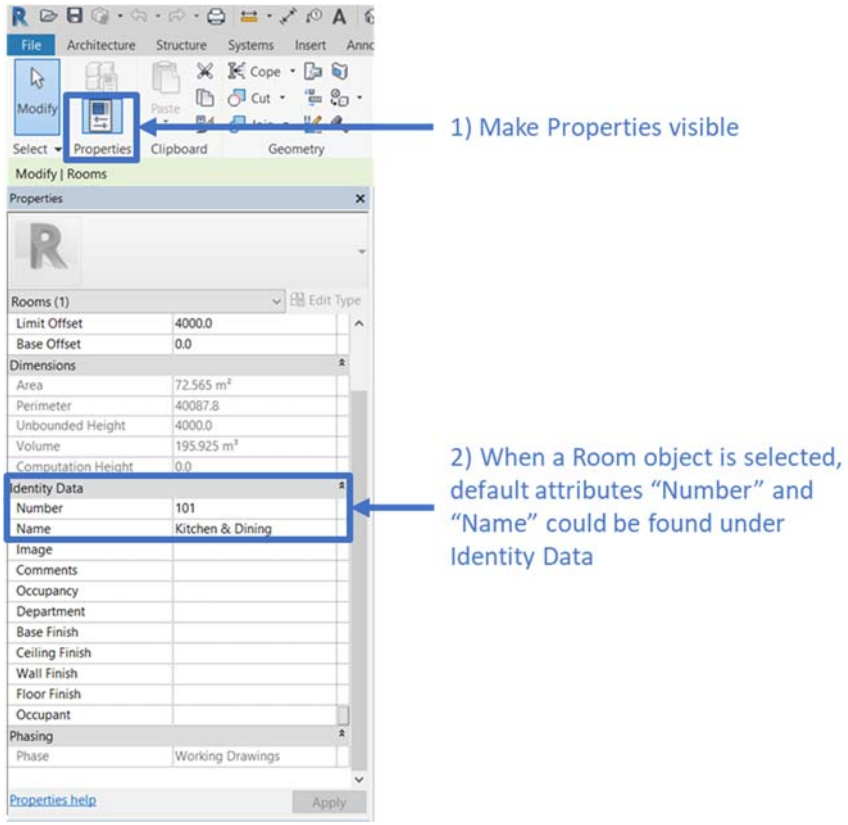
Figure App VI-27 Adding Built-in Material Attributes to Compound Structure System Families



3.8. Filling in Default Attributes under Room in Revit

In Revit, Room objects already contain Name and Number as default parameters. The location of these attribute on "**Properties**" tab are described as follows:

Figure App VI- 28 Filling in Default Attributes under Room in Revit



4. Types of BIM Model Attribute

Prior to the publication of this Guide, some WDs have already defined and implemented asset owner-specific attributes. A mapping approach is utilised to consolidate the information whilst allowing WDs who needs to keep their pre-defined attributes. Four different types of LOD-I attributes exist, with different degrees of the alignment. This section explains their definitions and harmonisation approaches.

4.1. Common Attributes

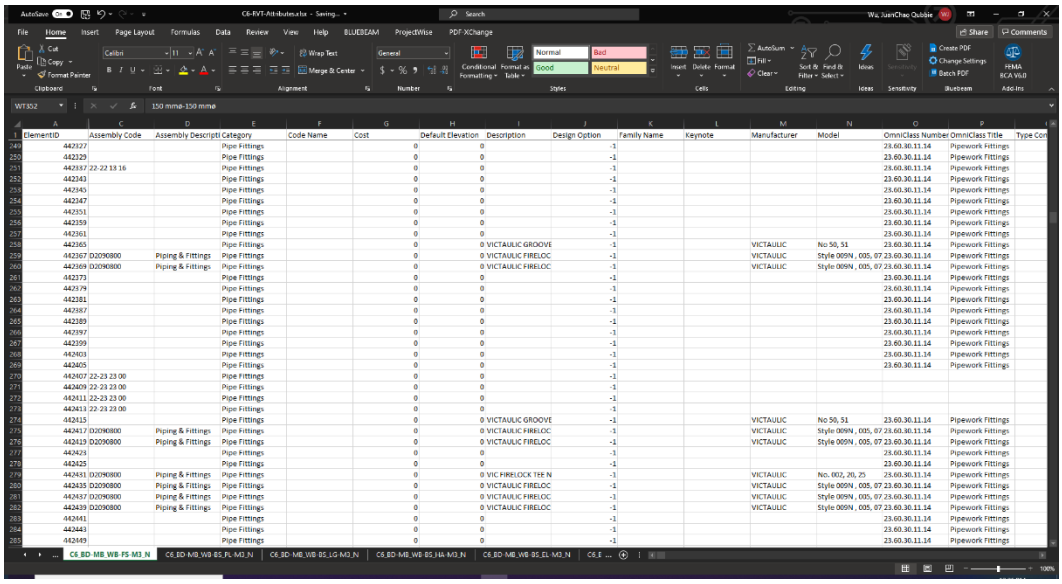
Common attributes are those with the same attribute names and GUID with those listed in Table App VI-1 of this appendix. This kind of attribute name are aligned, and the information could be stored with the same nature for ease query.

4.2. Common Attributes with Alternative Attribute Names

The common attributes with alternative attribute names are those who contain the same information as one of the common attributes with an alternative name as pre-defined by the WDs. Mapping is required to associate the WDs' attribute names with the common attribute. With mapping defined, naming of the attributes from different WDs but with the same nature could be mapped and stored for ease query.

For example, if multiple attributes meaning "Asset Code" exist with names such as DSD.Com.Asset Code, EMSD.Common.Asset Code, which could all be mapped into the same column in the tabular format. Refer to figure below for an example.

Figure App VI-29 Sample Tabular Format for Storing Attributes



4.3. General Attributes

The general attributes are those commonly adopted across more than one WD but without aligned attribute names. Similar to Section 4.2, review is required to group those attributes with similar nature, prior to map these attribute names into the same column of the tabular format.

4.4. Remaining Attributes

Remaining attributes are the attributes that not classified as the common attributes and general attributes. Those attributes are discipline-oriented and not necessary to be aligned. Thus, the remaining attributes list could be stored without alterations to maintain the completeness of the information.

5. Mapping and Extraction of Attributes from BIM Models

5.1. Extraction Method Overview

After attribute mapping, extraction of attributes from BIM models could be conducted through authoring software's built-in functions, scripts or plug-ins. The sections below describe principles of attribute extraction from Revit and Civil 3D.

5.2. Extraction of Attributes from Revit

The attributes in Revit can be exported to an external dataset in tabular format. The software default attributes and user defined attributes could be identified and extracted to tabular format. For example, Dynamo for Revit may be used to view and extract element parameters.

5.3. Extraction of Attributes from Civil 3D

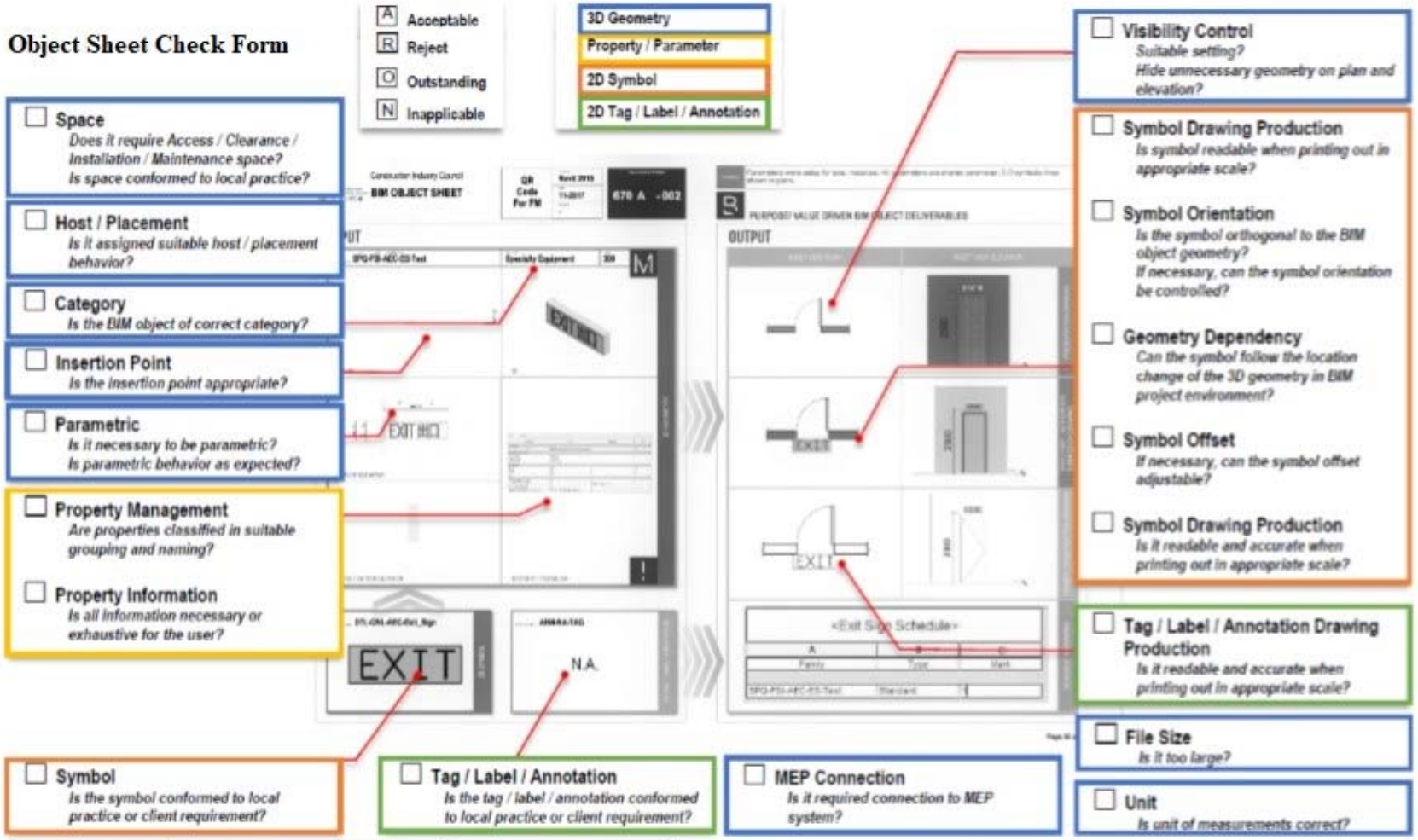
For Autodesk Civil 3D, since COBie spreadsheet cannot be exported directly from Civil 3D currently, **Property Set** should be defined in Civil 3D in order to extract the attributes in IFC format. Refer to Section 3.4 for details on **Property Set**.

Appendix VII - Sample BIM Object Check Form

Object Name:_____ **3D Object** ☐ **2D Annotation** ☐

No.	Check Item	Content	Check Result (Y/N?)	Recommends
1	BIM Object Format	Does the BIM object have the correct file extension (.rfa, .pkt, .dwg) and software version?		
2	Naming Compliance Check	Does the BIM object's name conform to CIC naming convention?		
3	Category Type Check	Is the BIM object assign to the correct category?		
4	Parameter Capability Check	Do all necessary parametric properties exist and conform to the expected parametric behaviour?		
5	Visual Check	5.1 Does 2D presentation conform to local practice or client requirements?		
		5.2 Can the presentation /symbol follow change of location of the 3D geometry in the BIM project environment?		
		5.3 Does 3D model assign the correct material and visibility setting?		
		5.4a Does this BIM object need to be connected to MEP systems?		
		5.4b If yes, is MEP connector(s) correctly assigned to 3D model faces?		
		5.5 Is the BIM object's file size too large? (Generally recommended to be <5MB)		
		5.6 Does visibility setting correctly?		
		5.7 Is the unit of measurement correct?		
		5.8a Does it require Access / Clearance / Installation / Maintenance space?		
		5.8b If yes, does the space conform to local practice?		

		5.9 Is the BIM object assigned with suitable host / placement behaviour?		
		The following check items are applicable to 2D annotation objects only:		
		5.10 Do the tag, label and annotation conform to local practice or the client requirement?		
		5.11 Is the label information linked to correct parameter as designed?		
		5.12 Is the label/tag/annotation have different sizes for different scale of drawing production?		
6	BIM Object Sheet Check	6.1 Is the **CIC's Object Sheet Check Form** (next page) submitted?		
		6.2 Does this BIM object fulfil all BIM Object Sheet check items?		


Object Sheet Check Form
A Acceptable
R Reject
O Outstanding
N Inapplicable
3D Geometry
Property / Parameter
2D Symbol
2D Tag / Label / Annotation
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 Management
Are properties classified in suitable grouping and naming?
Property Information
Is all information necessary or exhaustive for the user?
Symbol
Is the symbol conformed to local practice or client requirement?
Tag / Label / Annotation
Is the tag / label / annotation conformed to local practice or client requirement?
MEP Connection
Is it required connection to MEP system?
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?
Tag / Label / Annotation Drawing Production
Is it readable and accurate when printing out in appropriate scale?
File Size
Is it too large?
Unit
Is unit of measurements correct?
BIM OBJECT SHEET
OUTPUT
EXIT
N.A.
<Exit Sign Schedule>
BIM Object Name
Ref. No.
Date
Assessment
APPROVED/
DISAPPROVED/
RESUBMIT
Inspector
Signature
Comment:

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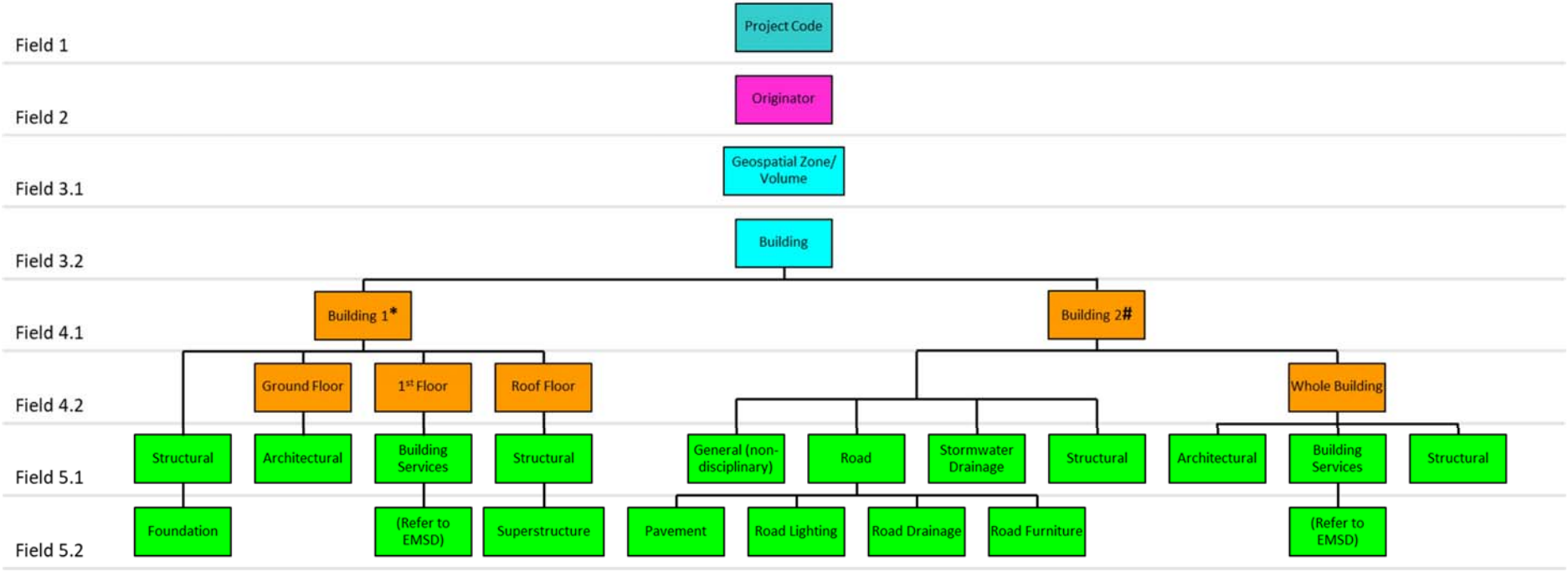
1. Federation Strategy

Figure App VIII-1 to Figure App VIII-6 are examples demonstrating the federation strategies for different systems within a project. As some items may not be included in the figures, refer to Appendix X for the list of common codes.

In Figure App VIII-1 below, it is not mandatory for Architectural, Structural and Stormwater Drainage disciplines to be further subdivided into subdiscipline model files. Also, in Figure App VIII-6, pavement, road drainage, road lighting, road furniture and noise barrier are known subdisciplines, while walkway cover, subway cover and concrete structural frame of lift tower should belong to other disciplines such as Architectural and Structural to facilitate information container breakdown.

1.1. Federation Strategy for Field 3.2 (System): Building

Figure App VIII-1 Federation Strategy for Field 3.2 (System): Building

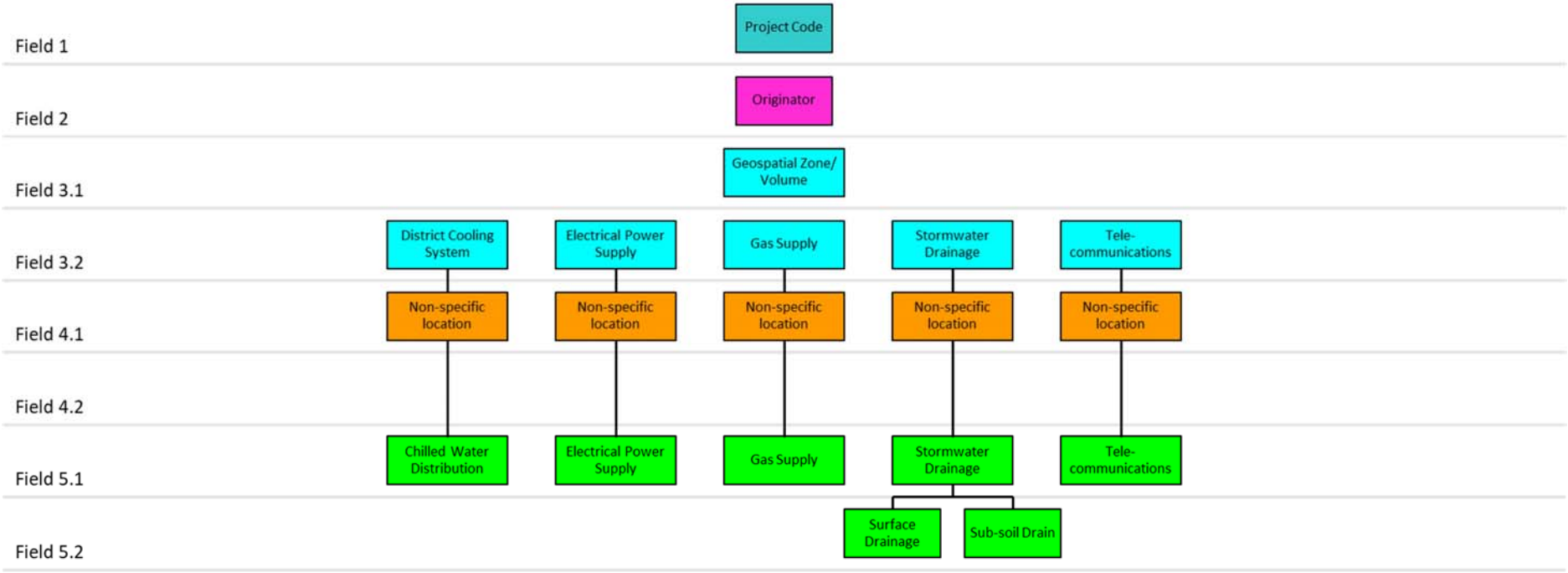


* Building 1 demonstrates a multi-story building, such as residential buildings and shopping malls, for which field 4.2 (sub-location) shall be used to indicate different levels within the building.

Building 2 demonstrates a whole building, such as pumping stations (or as specified by information owner), for which “Whole Building” could be adopted for field 4.2.

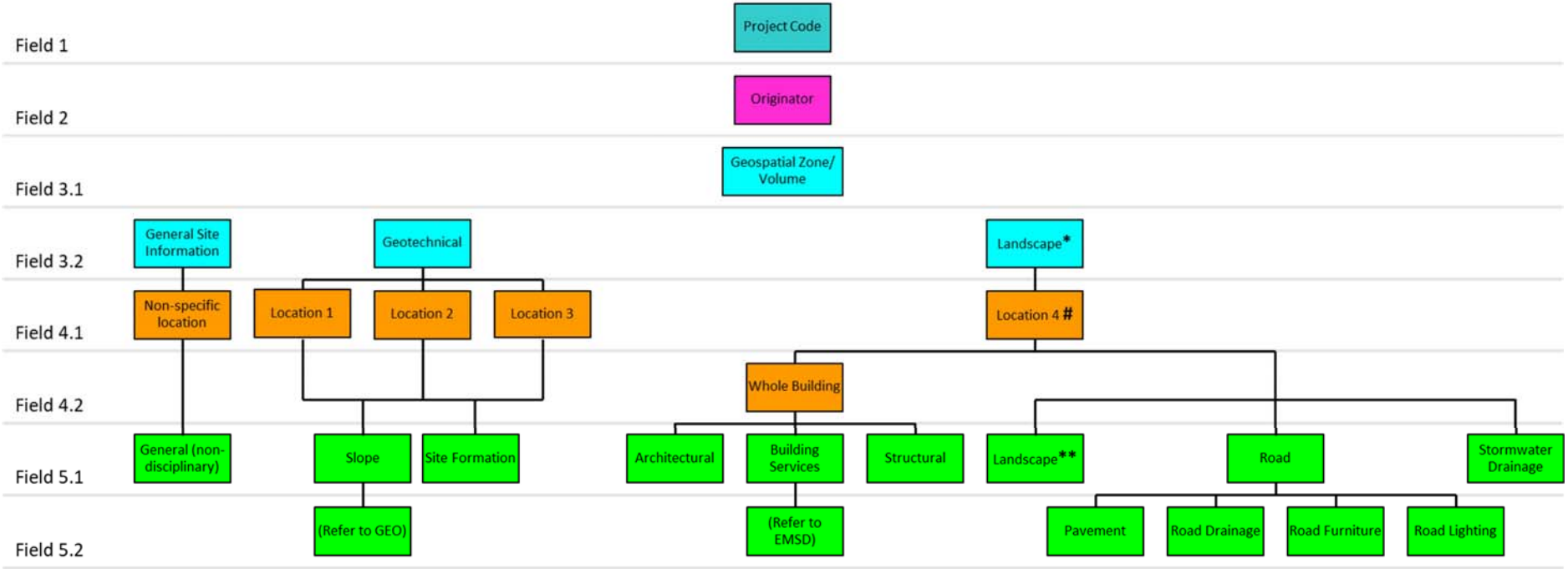
1.2. Federation Strategy for Field 3.2 (System): District Cooling System, Electrical Power Supply, Gas Supply, Stormwater Drainage, Telecommunications

Figure App VIII-2 Federation Strategy for Field 3.2 (System): District Cooling System, Electrical Power Supply, Gas Supply, Stormwater Drainage, Telecommunications



1.3. Federation Strategy for Field 3.2 (System): General Site Information, Geotechnical, Landscape

Figure App VIII-3 Federation Strategy for Field 3.2 (System): General Site Information, Geotechnical, Landscape



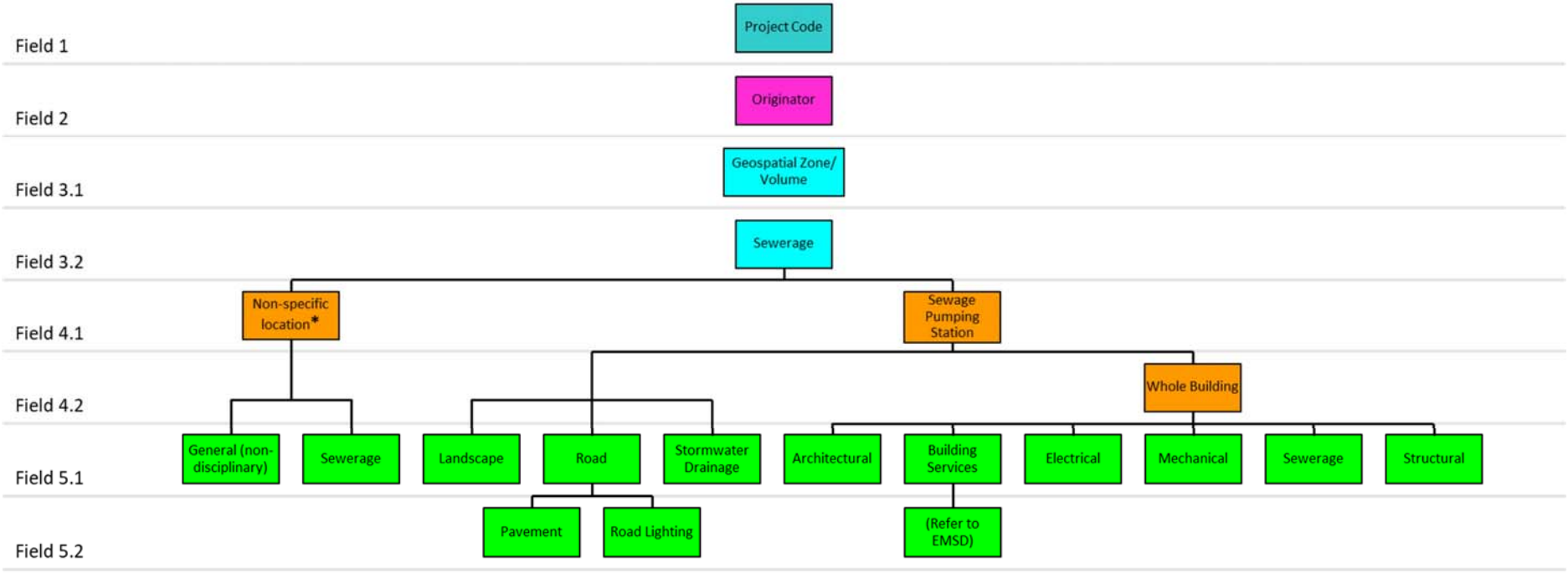
* Landscape is Field 3.2 (System) when it is used to define all elements within a boundary of a country park, neighbourhood park, etc.

** Landscape is Field 5.1 (Discipline) when it deals specifically with landscape elements such as hardscape, softscape, planting, landscape features, etc.

Location IDs for country parks, marine parks, parks and gardens may include public toilets, recreational facilities, campsites, etc.

1.4. Federation Strategy for Field 3.2 (System): Sewerage

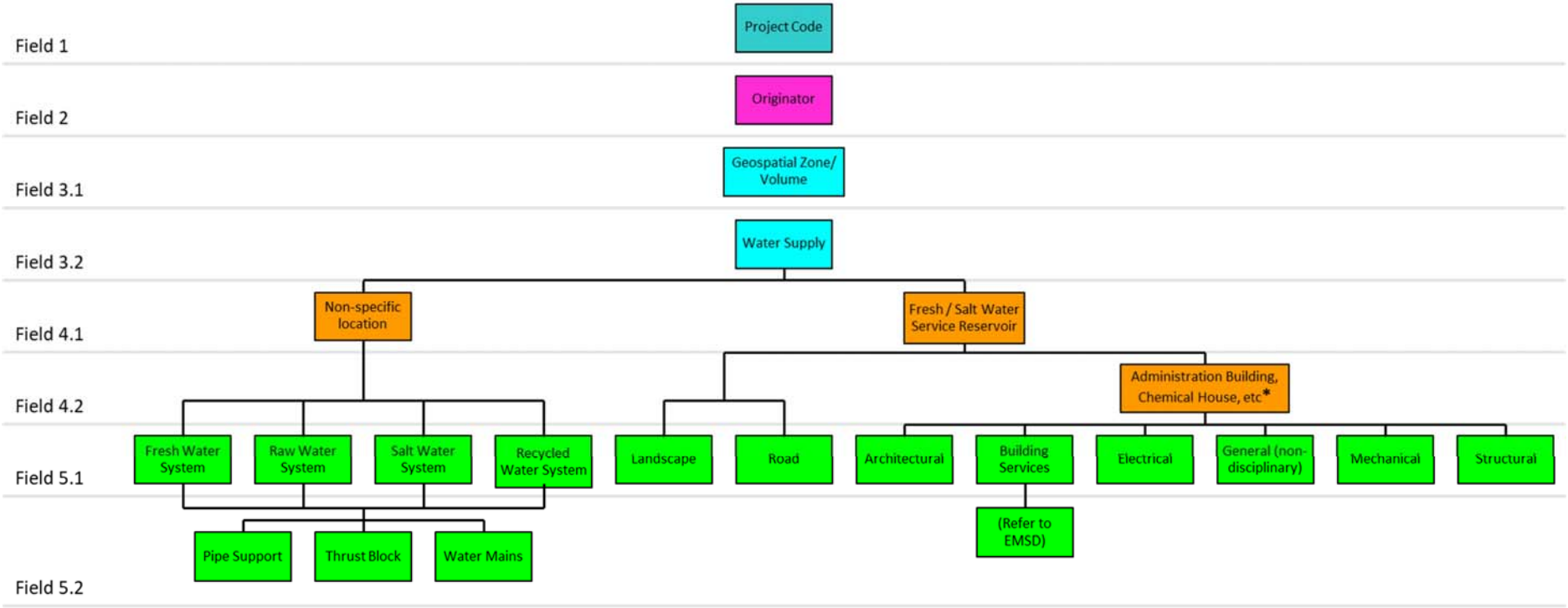
Figure App VIII-4 Federation Strategy for Field 3.2 (System): Sewerage



* Non-specific location pertains to the area outside of Sewage Pumping Station.

1.5. Federation Strategy for Field 3.2 (System): Water Supply

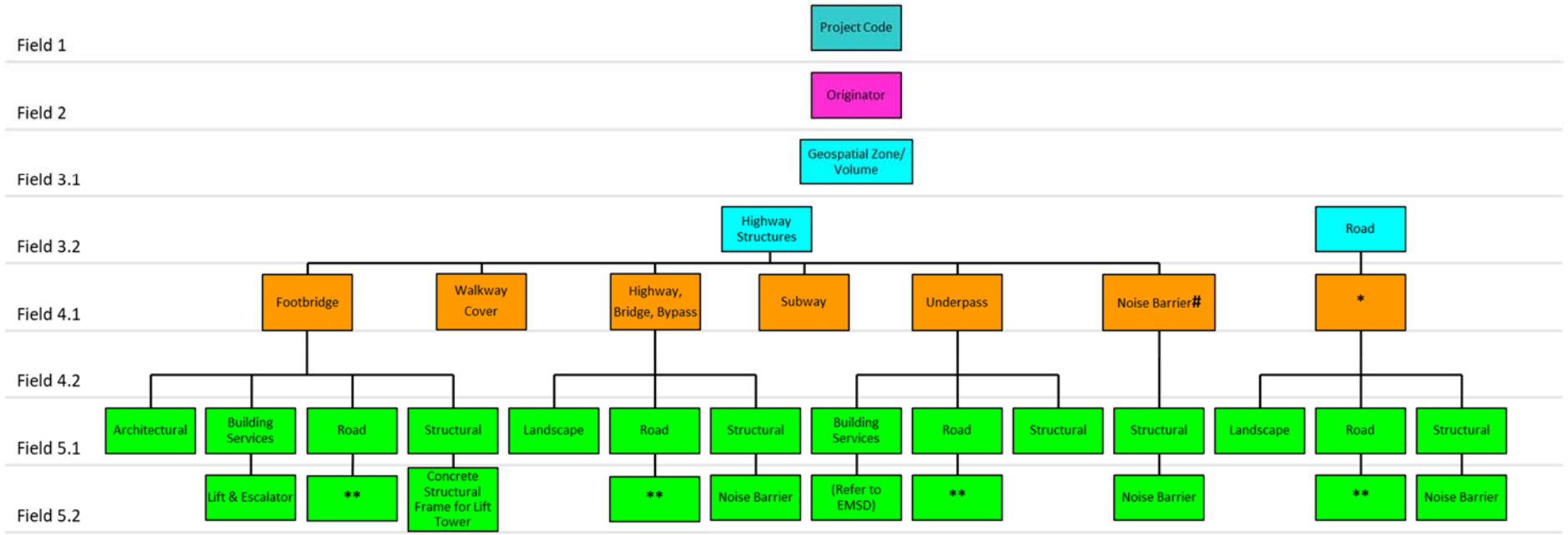
Figure App VIII-5 Federation Strategy for Field 3.2 (System): Water Supply



* Building blocks without water supply functions (e.g. Offices, Staff Quarters, Customer Enquiry Centre) are suggested to be grouped under Building System.

1.6. Federation Strategy for Field 3.2 (System): Road and Highway Structures

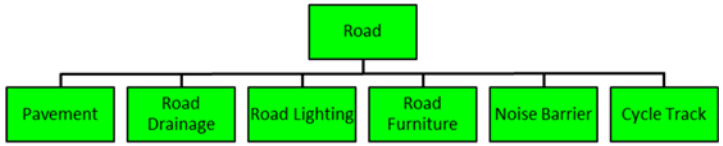
Figure App VIII-6 Federation Strategy for Field 3.2 (System): Road and Highway Structures



Noise barrier can be assigned as Location ID independent of the adjacent road. If the noise barrier exceeds a certain size, it should be assigned under the discipline "Structural".

* Location ID for roads (e.g. abbreviation of road names)

** The following sub-disciplines are applicable to Road discipline models.

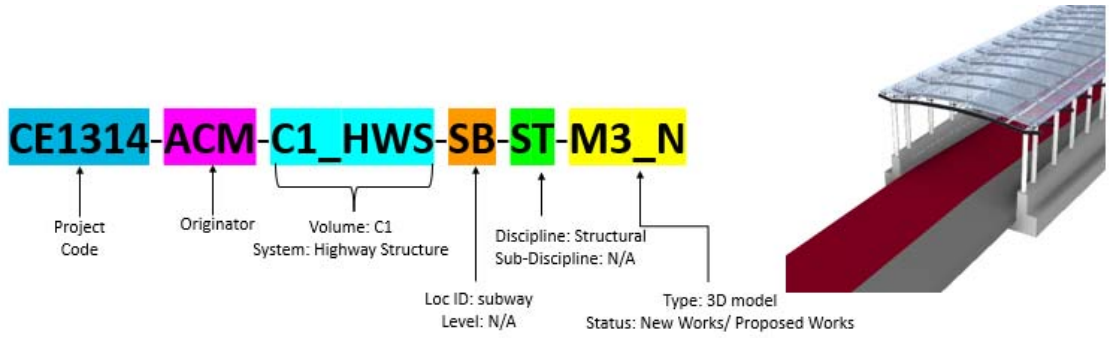


2. Naming Examples for BIM Model

2.1. Naming Example – a Subway Located in Volume C1

a) Naming example for a subway BIM model is as follows.

Figure App VIII-7 Naming Example for a Subway

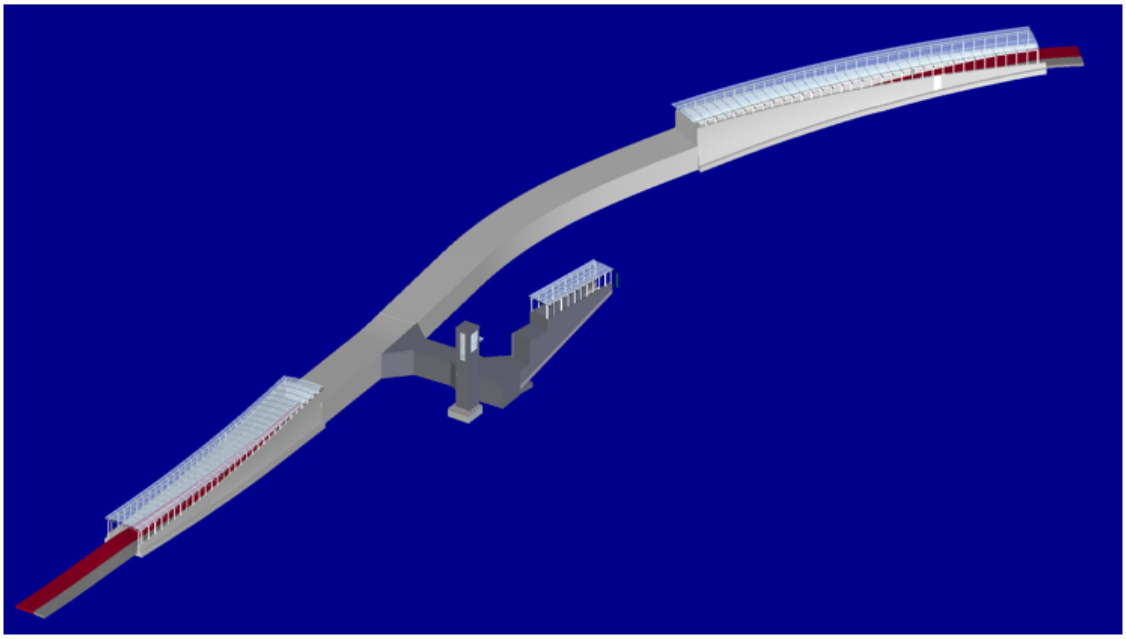


CE1314-ACM-C1_HWS-SB-ST-M3_N	Structural model includes structural wall, steel column, framing, glass, tunnel structure
CE1314-ACM-C1_HWS-SB-RD_PV-M3_N	Road model for pavements

b) Naming example for the subway BIM model combined with multiple disciplines' BIM models is as follows. These BIM models can be combined as one model based on the defined naming.

Figure App VIII-8 Naming Example for Combined Model

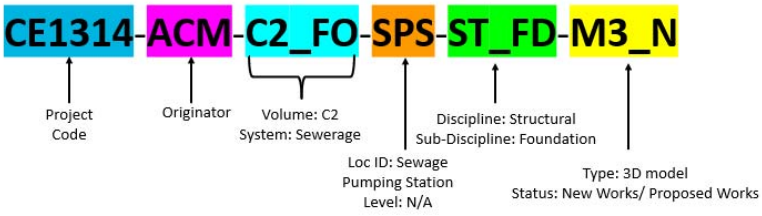
CE1314-ACM-C1_HWS-SB-ZZ-CM_N	Combined multi-discipline model for Subway

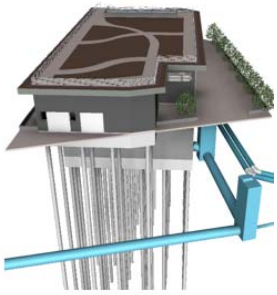


2.2. Naming Example – Sewage Pumping Station in Volume C2

a) Naming example for sewage pumping station BIM model is as follows.

Figure App VIII-9 Naming Example for Sewage Pumping Station

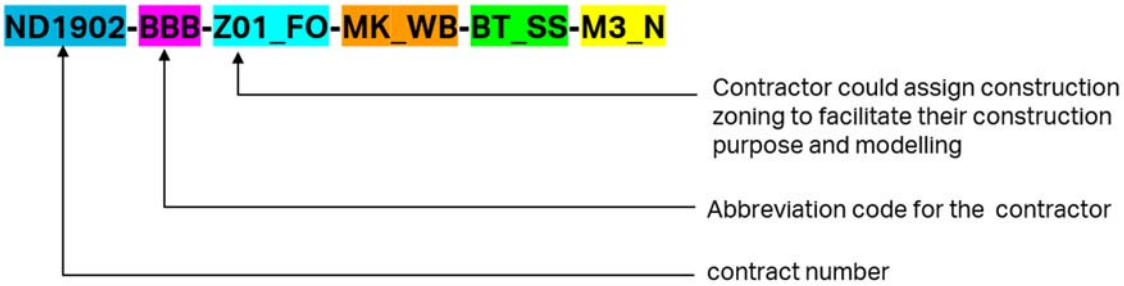




CE1314-ACM-C2_FO-SPS_WB-ME-M3_N	Sewage pumping station whole building – mechanical model
CE1314-ACM-C2_FO-SPS_WB-ST_SS-M3_N	Sewage pumping station whole building – superstructure model
CE1314-ACM-C2_FO-XX-FO-M3_N	Sewerage UU network within C2 boundary
CE1314-ACM-C2_FO-XX-FO-M3_E	Existing sewerage UU network within C2 boundary, "E" = existing model
CE1314-ACM-C2_FO-ZZ-ZZ-CM_N	Combined model for all sewerage related models in Contract 2

b) When project is in construction stage, some naming fields should be updated accordingly. An example with updated naming fields is as follows.

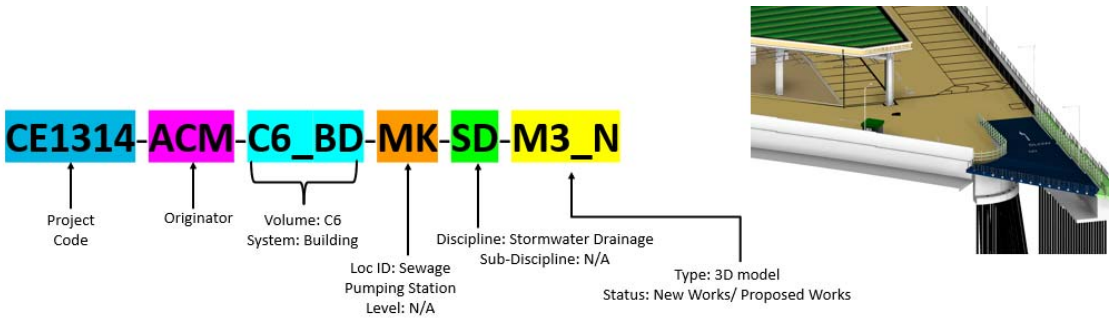
Figure App VIII-10 Naming Example for Different Project



2.3. Naming Example – a Market in Volume C6

a) Naming example for a market BIM model is as follows.

Figure App VIII-11 Naming Example for a Market Building



CE1314-ACM-C6_BD-MK_WB-AR-M3_N	Market whole building – architectural model
CE1314-ACM-C6_BD-MK_WB-BS_LG-M3_N	Market whole building – building services (lighting) model
CE1314-ACM-C6_BD-MK_WB-ST-M3_N	Market whole building – structural model
CE1314-ACM-C6_BD-MK-ST-M3_N	Market – structural (geotechnical elements within market boundary)
CE1314-ACM-C6_BD-MK-ZZ-CM_N	Market's combined model

b) In addition, for MEP details of the market building, the naming would be handled as follows:

Figure App VIII-12 Naming Example for the Market Building with MEP BIM Models

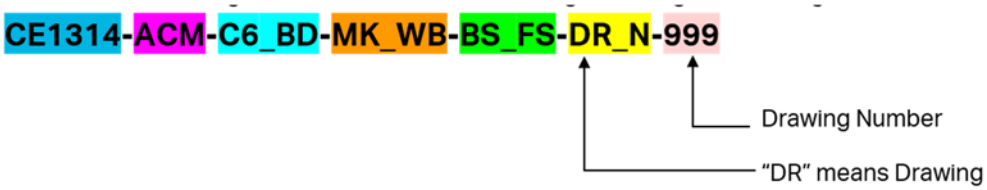
CE1314-ACM-C6_BD-MK_WB-FS-M3_N Market whole building – fire services model
CE1314-ACM-C6_BD-MK_WB-BS_LG-M3_N Market whole building – building services (lighting) model
CE1314-ACM-C6_BD-MK_WB-BS_HA-M3_N Market whole building – building services (HVAC) model
CE1314-ACM-C6_BD-MK_WB-BS_DR-M3_N Market whole building – building services (drainage) model
CE1314-ACM-C6_BD-MK-RD_RL-M3_N Market ground floor road lighting model

3. Naming Example for Drawings Generated from BIM Model

3.1. Naming Example of Drawings

WDs could consider to adopt the model naming format for drawing file naming. For example, abbreviation code of "DR" (meaning 2D Drawings) under Field 6.1 (Types) and 3-digit codes acting as the drawing number under Field 7 (Sequential Number) could be used. Naming example of drawings is as follows

Figure App VIII-13 Naming Example of Drawings Generated from BIM Model



Appendix IX – Sample Project-specific Codes for Naming

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1. Introduction

For easier understanding, the sample project-specific codes in sections below are from the project of Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDA), Phase 1. The sections below have been incorporated into the corresponding project-specific validation list.

2. Codes for Field 1 – Project

Field 1 – Project is a unique identifier which serves to indicate the project code (e.g. agreement number, contract number, future asset categorisation). This identifier should be assigned to each project stage (e.g. design, construction and operations) to determine the relationship with a particular asset.

Table App IX-1 Codes for Field 1 – Project

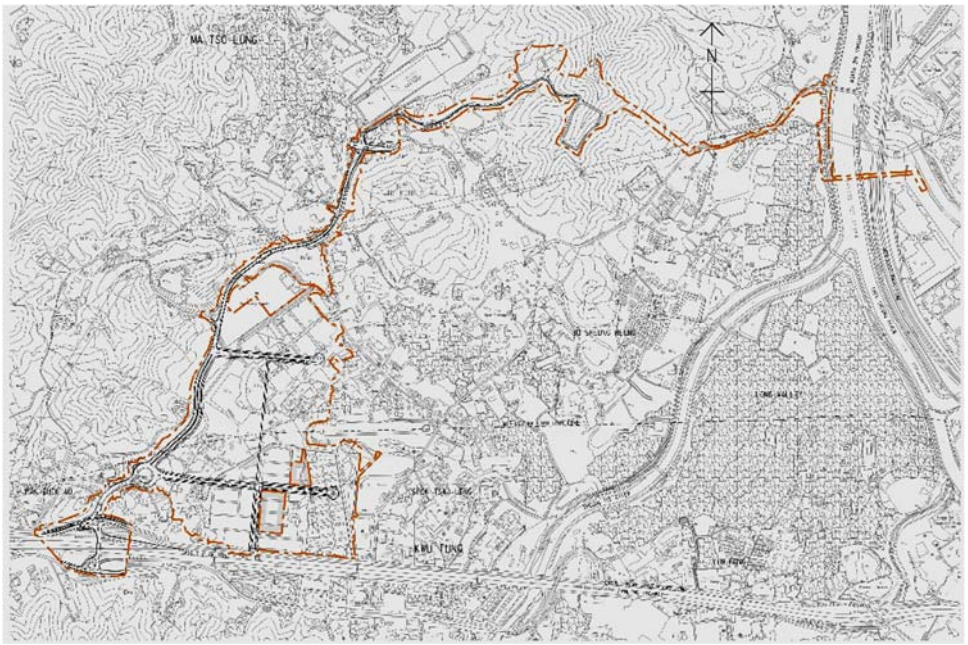
Field 1 - Project	Project Stage	Agreement No., Contract No. or Asset Categorization	Description
CE1314	Design (Agreements)	CE13/2014	Agreement No. CE 13/2014 (CE) Development of Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDA), Phase 1 – Design and Construction
ND1901	Construction (Contracts)	ND/2019/01	Kwu Tung North New Development Area, Phase 1: Site Formation and Infrastructure Works
ND1902		ND/2019/02	Kwu Tung North New Development Area, Phase 1: Roads and Drains between Kwu Tung North New Development Area and Shek Wu Hui
ND1903		ND/2019/03	Kwu Tung North and Fanling North New Development Areas, Phase 1: Development of Long Valley Nature Park
ND1904		ND/2019/04	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shek Wu San Tsuen North to Lung Yeuk Tau)
ND1905		ND/2019/05	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shung Him Tong to Kau Lung Hang)
ND1906		ND/2019/06	Fanling North New Development Area, Phase 1: Reprovisioning of North District Temporary

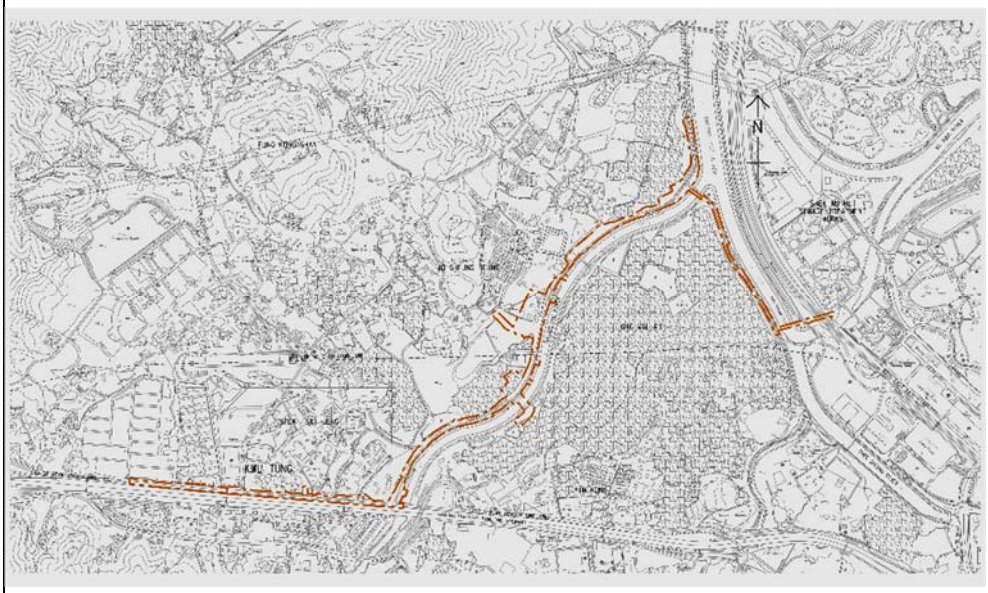
Field 1 - Project	Project Stage	Agreement No., Contract No. or Asset Categorization	Description
			Wholesale Market for Agricultural Products
ND1907		ND/2019/07	Fanling North New Development Area, Phase 1: Site Formation and Infrastructure Works
To be defined by during operation stage	Operations	N/A	N/A

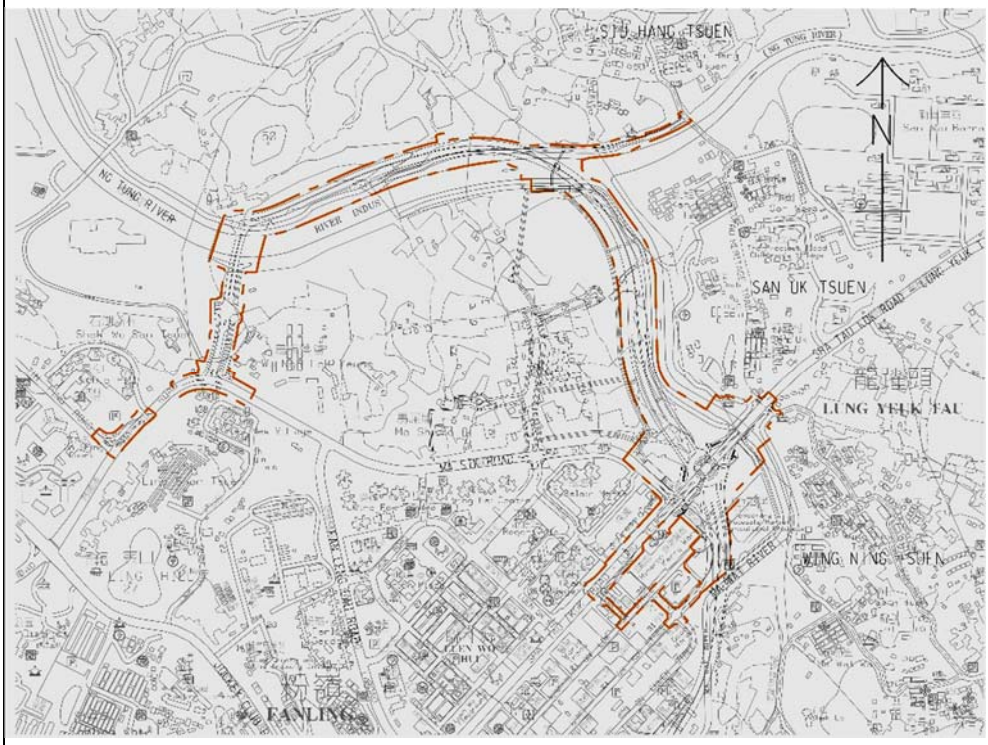
3. Codes for Field 3.1 – Volume

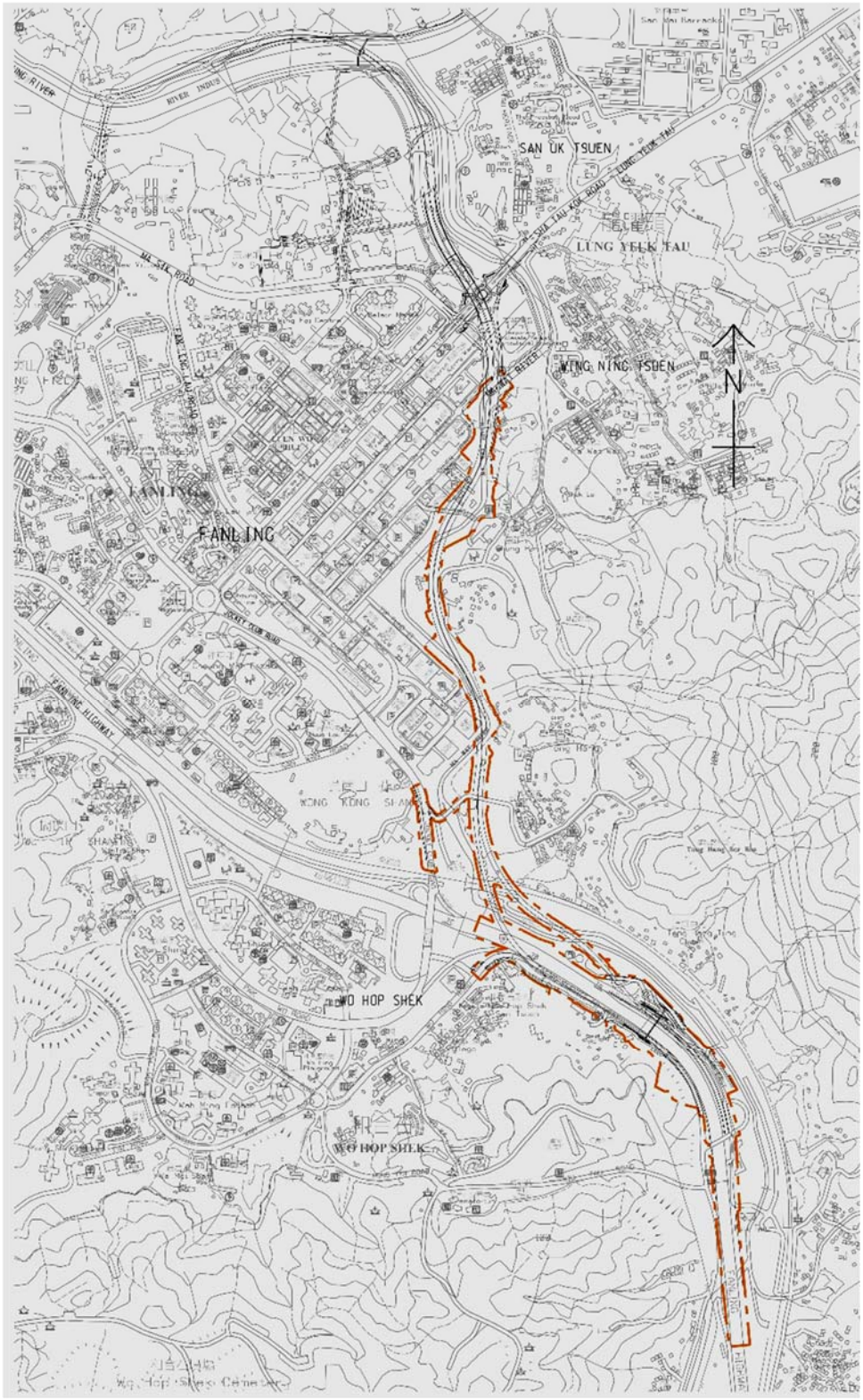
Field 3.1 – Volume is a unique identifier which serves to indicate specific geospatial zone or volume within a project.

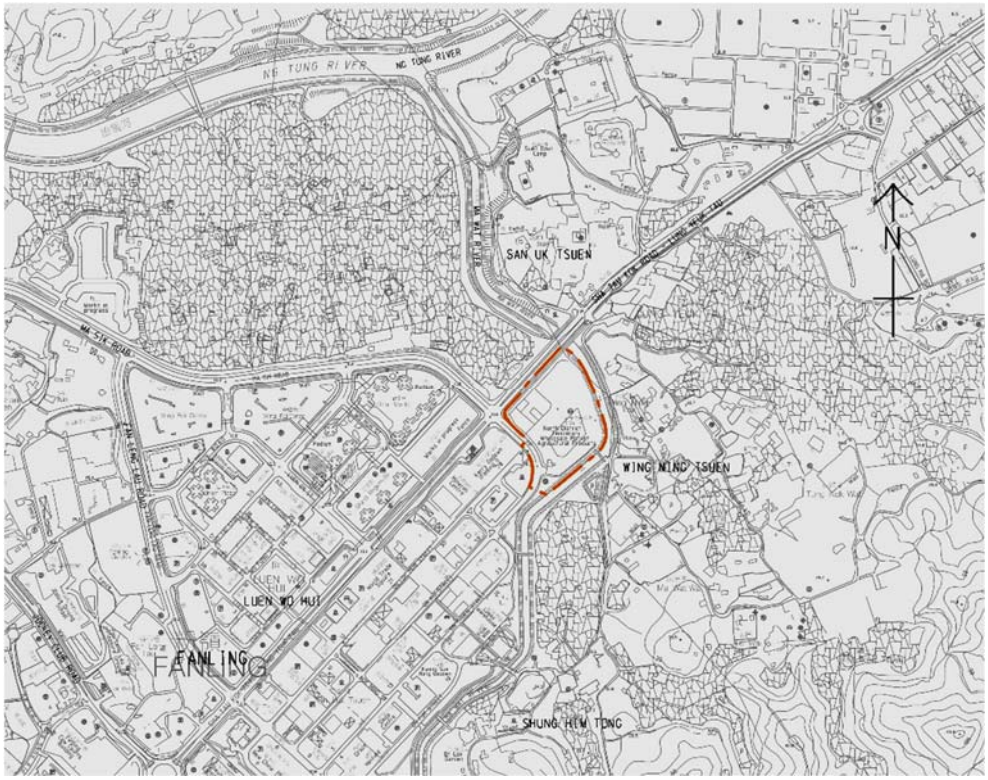
Table App IX-2 Codes for Field 3.1 – Volume

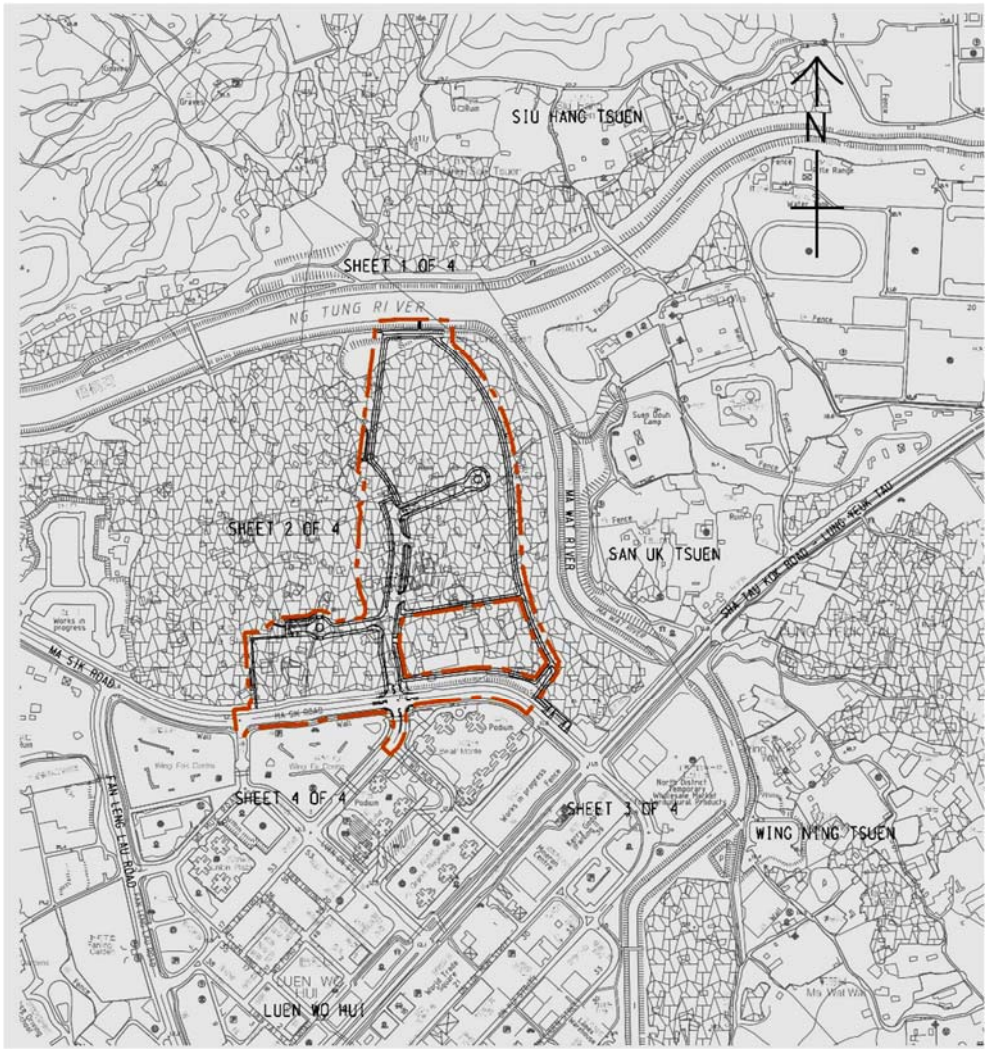
Field 3.1 - Volume	Description and Boundary
C1	Kwu Tung North New Development Area, Phase 1:Site Formation and Infrastructure Works 

Field 3.1 - Volume	Description and Boundary
C2	Kwu Tung North New Development Area, Phase 1:Roads and Drains between Kwu Tung North New Development Area and Shek Wu Hui 
C3	Kwu Tung North and Fanling North New Development Areas, Phase 1: Development of Long Valley Nature Park 

Field 3.1 - Volume	Description and Boundary
C4	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shek Wu San Tsuen North to Lung Yeuk Tau) 

Field 3.1 - Volume	Description and Boundary
C5	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shung Him Tong to Kau Lung Hang) 

Field 3.1 - Volume	Description and Boundary
C6	Fanling North New Development Area, Phase 1: Reprovisioning of North District Temporary Wholesale Market for Agricultural Products 

Field 3.1 - Volume	Description and Boundary
C7	Fanling North New Development Area, Phase 1: Site Formation and Infrastructure Works 

4. Codes for Field 4.1 – Location

Field 4.1 – Location is an identifier which serves to indicate specific location (e.g. slope number, feature code, building code) for geospatial coordination and future asset management. Common abbreviation codes (referring to Appendix X) should be used as far as practicable.

For locations that cannot be sufficiently covered by common abbreviation codes, additional location codes should be documented in the BEP for project.

Table App IX-3 Codes for Field 4.1 – Location Identifier

Field 4.1 - Location	Located in Which Volume	Definition	Currently Used By
RDW1	C1	Road W1	N/A
SRHO	C1	Special Residential Home Ownership Scheme Area	N/A
A6	C2	Road A6	N/A
A100	C2	Road A100	N/A
VRE	C2	Village Resite Area	N/A
BW	C3	Boardwalk	N/A
LVNP	C3	Long Valley Nature Park	N/A
PD	C3	Pedestrian Walkway	N/A
SS	C3	Typical Storage Shed	N/A
ST01	C3	Storage House Type 1 (ST01)	N/A
ST02	C3	Tea House Pavilion (ST02)	N/A
ST03	C3	Compositing Facility (ST03)	N/A
ST04	C3	Bird Hide (ST04)	N/A
ST06	C3	Outdoor classroom shelter (ST06)	N/A
ST07	C3	Storage House Type 2 (ST07)	N/A
WSR	C3	Wa Shan Road	N/A
YKR	C3	Yin Kong Road	N/A
FBF4	C4	Footbridge F4	N/A
FBF6	C4	Footbridge F6	N/A
MSR	C4	Ma Sik Road	N/A
RO	C4	Roundabout	N/A
HKYFB	C5	FootBridge (Ho Ka Yuen)	N/A
PD	C5	Pedestrian Walkway	N/A

Field 4.1 - Location	Located in Which Volume	Definition	Currently Used By
UD	C5	Under Deck	N/A
MWRV	C6	Ma Wat River	N/A
HOLF	C7	Home of Loving Faithfulness	N/A

*Similar abbreviations for different locations should be assigned sequential numbering, e.g., ST01, ST02, ST03…etc.

Appendix X – Common Codes for Information Container ID Fields

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Table App X-1 Abbreviation Codes for Field 3.2 – System

Sorted by Codes

Codes	Definition	Currently Used By
BD	Building	None
DCS	District Cooling System	None
FO	Sewerage	None
GE	Geotechnical	None
GS	Gas Supply [1]	None
HWS	Highway Structures	None
LA	Landscape [2]	None
PS	Electrical Power Supply [3]	None
RD	Road	None
SD	Stormwater Drainage	None
SI	General Site Information (including existing condition)	None
TC	Telecommunication [4]	None
WS	Water Supply	None
ZZ	Multiple systems for combined model	ISO UK Annex

1 For example, Towngas

2 Landscape is a system when it is used to define the all elements within a boundary of a country park, neighbourhood park, etc. It would contain both landscape discipline models and models of structures within these parks. (When "Landscape" is a discipline, it deals specifically with landscape elements such as hardscape, softscape, planting, landscape features, etc.)

3 For example, CLP (China Light and Power), HK Electric

4 For example, Smartone, HKT, HKBN, PCCW etc.

Table App X-2 Abbreviation Codes for Field 4.1 – Location

Sorted by Revamped Location ID

Known Codes	Revamped Location ID	Definition	Currently Used By
ADB	AB	Administration Building	WSD
N/A	AC	Ancillary Block	This Study
AET	AET	Aerobic Tank	DSD
ANT	ANT	Anaerobic Tank	DSD
ASPS	ASPS	Activated Sludge Pumping Station	DSD
AXT	AXT	Anoxic Tank	DSD
BB	BB	Barrack/ Bungalow	WSD
BD	BD	Building	WSD
BG	BG	Bridge	WSD
BOC	BOC	Box Culvert	DSD
BRC	BRC	Bioreactor	DSD
CAP	CAP	Car Park	DSD
CEPTW	CEPT	Chemical Enhanced Primary Treatment Works	DSD
CHL	CHL	Channel	DSD
CL	CL	Clarifier	WSD
N/A	CLS	Collection Site	This Study
CH	CMH	Chemical House	WSD
CS	CS	Chlorination Station	WSD
CSF	CSF	Coarse Screen Facility	DSD
CWS	CWS	Chemical Waste Store	DSD
DF	DF	DAF	WSD
DG	DG	Dangerous Goods Store	WSD
DM	DM	Dam	WSD
DQ	DQ	Staff Quarters	WSD
DS	DS	Desalination Plant	WSD
DTR	DTR	Detritor	DSD
DUN	DUN	Drainage Tunnel	DSD
DWFI	DWFI	Dry Weather Flow Interceptor	DSD
EC	EC	Customer Enquiry Centre	WSD
EPS	EPS	Effluent Pumping Station	DSD
N/A	ERS	Egretry Site	This Study
ESP	ESP	Engineering Survey Products	DSD
N/A	FB	Footbridge	This Study
N/A	FP	Footpath	This Study
FR	FR	Filter	WSD
FSF	FSF	Fine Screen Facility	DSD
FST	FST	Final Sedimentation Tank	DSD

Known Codes	Revamped Location ID	Definition	Currently Used By
FWPSAB	FWAB	Fresh Water Pumping Station - Annex Building	WSD
FWPSHECB	FWHB	Fresh Water Pumping Station - HEC Building	WSD
FWPH	FWPH	Fresh Water Pump House	WSD
FWPSPH	FWPH	Fresh Water Pumping Station - Pump Hall	WSD
FWPS	FWPS	Fresh Water Pumping Station	WSD
FWSR	FWSR	Fresh Water Service Reservoir	WSD
FWWT	FWWT	Fresh Water Water Tank	WSD
GP	GP	Grey Water Treatment Plant	WSD
GTF	GTF	Grit Trap Facility	DSD
IPS	IPS	Inlet Pumping Station	DSD
LB	LB	Laboratory	WSD
LC	LC	Logistic Centre	WSD
MAS	MAS	Maintenance Access	DSD
MASTW	MAST	Major Secondary Treatment Works	DSD
N/A	MB	Management Office Building	This Study
MBBR	MBBR	Moving Bed Biofilm Reactor	DSD
MISTW	MIST	Minor Secondary Treatment Works	DSD
N/A	MK	Market	This Study
ML	ML	Mainlaying	WSD
NUL	NUL	Nullah	DSD
OF	OF	Office	WSD
N/A	PG	Playground	This Study
PPB	PPB	Pipe Bridge	DSD
PST	PST	Primary Sedimentation Tank	DSD
PSTW	PSTW	Preliminary / Screening Treatment Works	DSD
PTW	PTW	Primary Treatment Works	DSD
PUH	PUH	Pump House	DSD
N/A	RCP	Refuse Collection Point	This Study
N/A	RD	Road	This Study
RH	RH	Recorder House	WSD
RM	RM	Rising Main	DSD
ROF	ROF	Reverse Osmosis Facility	DSD
RP	RP	Water Reclamation Plant	WSD
RS	RS	Reservoir	WSD
RWPH	RWPH	Raw Water Pump House	WSD
RWPS	RWPS	Raw Water Pumping Station	WSD
RWSR	RWSR	Raw Water Service Reservoir	WSD

Known Codes	Revamped Location ID	Definition	Currently Used By
RWWT	RWWT	Raw Water Water Tank	WSD
SAA	SAA	Storage Area	DSD
N/A	SB	Subway	This Study
SBO	SBO	Submarine Outfall	DSD
SCT	SCT	Sludge Consolidation Tank	DSD
SDH	SDH	Sludge Dewatering House	DSD
SDR	SDR	Sludge Digester	DSD
ST	SDT	Sedimentation Tank	WSD
SL	SL	Sludge Thickening Tank	WSD
SLPS	SLPS	Sludge Pumping Station	DSD
SmPS	SmPS	Stormwater Pumping Station	DSD
SP	SP	Spillway	WSD
N/A	SPS	Sewage Pumping Station	DSD
SPV	SPV	Solar PV Farm	DSD
SST	SST	Secondary Sedimentation Tank	DSD
STH	STH	Sludge Thickening House	DSD
STT	STT	Storage Tank	DSD
SUN	SUN	Sewage Tunnel	DSD
N/A	SV	Service Block	This Study
SWPSAB	SWAB	Salt Water Pumping Station - Annex Building	WSD
SWPSHECB	SWHB	Salt Water Pumping Station - HEC Building	WSD
SWPH	SWPH	Salt Water Pump House	WSD
SWPSPH	SWPH	Salt Water Pumping Station - Pump Hall	WSD
SWPS	SWPS	Salt Water Pumping Station	WSD
SWSR	SWSR	Salt Water Service Reservoir	WSD
SWSR	SWSR	Salt Water Service Reservoir	WSD
SWWT	SWWT	Salt Water Water Tank	WSD
TA	TA	Tunnel Alignment	WSD
TER	TER	Terrain	DSD
TFR	TFR	Trickling Filter	DSD
N/A	TL	Toilet	This Study
TMR	TMR	Transformer Room	DSD
TS	TNS	Tunnel Shaft	WSD
TP	TP	Tunnel Portal	WSD
TT	TT	Tunnel Shaft Tower	WSD
TTW	TTW	Tertiary Treatment Works	DSD
TUN	TUN	Tunnel	WSD
TW	TW	Treatment Works	WSD
TX	TX	Transformer Room	WSD

Known Codes	Revamped Location ID	Definition	Currently Used By
N/A	UP	Underpass	This Study
UUS	UUS	Utilities	DSD
UVF	UVF	UV disinfection facility	DSD
N/A	VC	Visitor Centre	This Study
-	WC	Walkway Cover	This Study
WRPH	WRPH	Recycled Water Pump House	WSD
WRPS	WRPS	Recycled Water Pumping Station	WSD
WRS	WRS	Water Rehabilitation System	DSD
WRSR	WRSR	Recycled Water Service Reservoir	WSD
WRWT	WRWT	Recycled Water Water Tank	WSD
WS	WS	Water Selling Kiosk	WSD
WSH	WSH	Water Sampling House	DSD
WTW	WTW	Water Treatment Works	WSD
-	XX	Non-specific location	ISO UK Annex
-	ZZ	Multiple locations for combined model	ISO UK Annex

Table App X-3 Abbreviation Codes for Field 4.2 – Sub-location

Sorted by Revamped Location ID

Known Codes	Revamped Location ID	Definition	Currently Used By
AB	AB	Administration Building	WSD
N/A	AC	Ancillary Block	This Study
BB	BB	Barrack/ Bungalow	WSD
BD	BD	Building	WSD
BG	BG	Bridge	WSD
CL	CL	Clarifier	WSD
CS	CS	Chlorination Station	WSD
DF	DF	DAF	WSD
DG	DG	Dangerous Goods Store	WSD
DM	DM	Dam	WSD
DQ	DQ	Staff Quarters	WSD
DS	DS	Desalination Plant	WSD
E	E	East Wing	EMSD
EC	EC	Customer Enquiry Centre	WSD
FR	FR	Filter	WSD
GP	GP	Grey Water Treatment Plant	WSD
B2	K1	Block 1	EMSD
B1	K2	Block 2	EMSD
LB	LB	Laboratory	WSD
LC	LC	Logistic Centre	WSD
N/A	MB	Management Office Building	This Study
N/A	MK	Market	This Study
ML	ML	Mainlaying	WSD
N	N	North Wing	EMSD
OF	OF	Office	WSD
N/A	PG	Playground	This Study
RH	RH	Recorder House	WSD
RM	RM	Rising Main	DSD
RP	RP	Water Reclamation Plant	WSD
RS	RS	Reservoir	WSD
S	S	South Wing	EMSD
SL	SL	Sludge Thickening Tank	WSD
SP	SP	Spillway	WSD
N/A	SV	Service Block	This Study
T1	T1	Tower 1	EMSD
T2	T2	Tower 2	EMSD
TA	TA	Tunnel Alignment	WSD
N/A	TL	Toilet	This Study

Known Codes	Revamped Location ID	Definition	Currently Used By
TP	TP	Tunnel Portal	WSD
TT	TT	Tunnel Shaft Tower	WSD
TW	TW	Treatment Works	WSD
TX	TX	Transformer Room	WSD
N/A	VC	Visitor Centre	This Study
W	W	West Wing	EMSD
WS	WS	Water Selling Kiosk	WSD
-	XX	Non-specific location	ISO UK Annex
-	ZZ	Multiple locations for combined model	ISO UK Annex

Table App X-4 Abbreviation Codes for Field 4.2 – Sub-location (Levels)

Sorted by Level Height

Known Codes	Revamped Codes	Definition	Currently Used By
B2	B2	Basement Level 2	ISO UK Annex, ArchSD, DSD
B1	B1	Basement Level 1	ISO UK Annex, ArchSD, DSD
LG	LG	Lower Ground Floor	ArchSD
GF	GF	Ground Floor	ArchSD
UG	UG	Upper Ground Floor	ArchSD
ESP	ES	Reference level from engineering survey	DSD
01	01	Level 01	ISO UK Annex
02	02	Level 02	ISO UK Annex
…	…	2-digital level number	ISO UK Annex
99	99	Level 99	ISO UK Annex
MF	MF	Mezzanine Floor	ArchSD
M1	M1	Mezzanine above level 01	ISO UK Annex
M2	M2	Mezzanine Above Level 02	ISO UK Annex
PL	PL	Podium Level	ArchSD
RF	RF	Roof	ArchSD, DSD
UR	UR	Upper Roof	ArchSD
WB	WB	Whole Building	DSD
AL	AL	All levels (of a specific building zone)	ArchSD

Table App X-5 Abbreviation Codes for Field 5.1 – Discipline

Sorted by Codes

Codes	Definition	Currently Used By	Underground Utilities (UU) / Above-grade (AG)
AR	Architectural	CIC, DSD	AG
BS	Building Services	ArchSD, DSD	AG
CD	Chilled Water Distribution	None	UU
EL	Electrical	DSD	AG
FO	Sewerage	None	UU
FS	Fire Services	CIC	AG
FW	Fresh Water System	WSD	UU
GS	Gas Supply [1]	None	UU
IR	Irrigation	None	UU
LA	Landscape [2]	CIC	AG
ME	Mechanical	DSD	AG
PS	Electrical Power Supply [3]	None	UU
RD	Road	None	AG
RW	Raw Water System	WSD	UU
SD	Stormwater Drainage	None	UU
SF	Site Formation	None	AG
SL	Slope	None	AG
ST	Structural	CIC, DSD	AG
SW	Salt Water System	WSD	UU
TC	Telecommunication [4]	None	UU
WR	Recycled Water System	WSD	UU
XX	General (non-disciplinary)	None	N/A
ZZ	Multiple disciplines for combined model	None	N/A

[1] For example, Towngas

[2] Landscape is a discipline when deals specifically with landscape elements such as hardscape, softscape, planting, landscape features, etc. (When Landscape is a system, it is used to define the all elements within a boundary of a country park, neighbourhood park, etc. It would contain both landscape discipline models and models of structures within these parks.)

[3] For example, CLP (China Light and Power), HK Electric

[4] For example, Smartone, HKT, HKBN, PCCW etc.

Table App X-6 Abbreviation Codes for Field 5.2 – Sub-discipline

Sorted by Revamped Discipline and then Sub-discipline Code

Discipline		Sub-discipline Known Codes		Definition	Currently Used By
Code	Definition	Original	Revamped		
AR	Architectural	N/A	CW	Curtain Wall	CIC
		N/A	CL	Ceiling	CIC
		EW	EW	External Work	ArchSD
		N/A	FE	Furniture and Fixed Equipment	CIC
		N/A	FL	Flooring	CIC
BS	Building Services	AUS	AU	Audio Electronics System	EMSD
		AV	AV	Audio Video System	EMSD
		BA	BA	Burglar Alarm	EMSD
		BLR	BL	Boiler System	EMSD
		BR	BR	Broadcast Reception	EMSD
		CCTV	CC	Closed Circuit TV System	EMSD
		DR	DR	Drainage	EMSD
		EMG	EG	Emergency Generator	EMSD
		EL	EL	Electrical Distribution	EMSD
		FP	FP	Filtration Plant	EMSD
		HVAC	HA	Heating, ventilation, and air conditioning	EMSD
		LDS	LD	Water Leakage Detection System	EMSD
		LAE	LE	Lift & Escalator	EMSD
		LTG	LG	Lighting	EMSD
		LVS	LV	LV Switchboard	EMSD
		MLS	ML	Microwave Link System	EMSD
		PL	PL	Plumbing	EMSD
		PTS	PT	Pneumatic Tube Transport	EMSD
		RNS	RN	Radar and Navigation System	EMSD
		RS	RS	Radio System	EMSD
		TDS	TD	Timing & Display System	EMSD
		UPS	UP	Uninterrupted Power Supply	EMSD
CD	Chilled Water Distribution	N/A	N/A	N/A	N/A
EL	Electrical	N/A	N/A	N/A	DSD

Discipline		Sub-discipline Known Codes		Definition	Currently Used By
Code	Definition	Original	Revamped		
FO	Sewerage	N/A	N/A	N/A	N/A
FS	Fire Services	N/A	N/A	N/A	CIC
FW	Fresh Water System	N/A	PP	Pipe Support	WSD
		N/A	TB	Thrust Block	WSD
		N/A	WM	Water Mains	WSD
GS	Gas Supply	N/A	N/A	N/A	N/A
IR	Irrigation	N/A	N/A	N/A	N/A
LA	Landscape	N/A	CT	Compensatory Tree	N/A
		N/A	GC	Groundcover	N/A
		N/A	RT	Retained Tree	N/A
		N/A	SH	Shrubs	N/A
		N/A	TR	Transplanted Tree	N/A
		N/A	VE	Vegetative Slope	N/A
ME	Mechanical	N/A	N/A	N/A	DSD
PS	Electrical Power Supply	N/A	N/A	N/A	N/A
RD	Road	CYT	CT	Cycle Track	HyD
		DR	DR	Road Drainage	HyD
		LG	LG	Road Lighting	HyD
		N/A	NB	Noise Barrier	N/A
		N/A	PV	Pavement	N/A
		N/A	RF	Road Furniture	N/A
		TA	TA	Traffic Aids	HyD
RW	Raw Water System	N/A	PP	Pipe Support	WSD
		N/A	TB	Thrust Block	WSD
		N/A	WM	Water Mains	WSD
SD	Stormwater Drainage	N/A	SB	Sub-soil Drain	N/A
		SD	SD	Surface Drainage	CEDD GEO, WSD
SF	Site Formation	N/A	GI	Ground Investigation	ArchSD
SL	Slope	BO	BO	Rock Bolt	CEDD GEO
		N/A	BP	Bored Pile Wall	N/A
		BU	BU	Buttress	CEDD GEO
		BW	BW	Baffle Wall	CEDD GEO
		CB	CB	Concrete Berm	CEDD GEO
		DSM	DS	Ground Surface	CEDD GEO
		DW	DW	Dowel	CEDD GEO
		FB	FB	Flexible Barrier	CEDD GEO
		GI	GI	Geological	CEDD GEO

Discipline		Sub-discipline Known Codes		Definition	Currently Used By
Code	Definition	Original	Revamped		
		GS	GS	Grillage System	CEDD GEO
		GW	GW	Gabion Wall	CEDD GEO
		MA	MA	Maintenance Access	CEDD GEO
		MW	MW	Masonry Wall	CEDD GEO
		N/A	PG	Planting	N/A
		PW	PW	Planter Wall	CEDD GEO
		RB	RB	Rigid Barrier	CEDD GEO
		RW	RW	Retaining Wall	CEDD GEO
		SD	SD	Surface Drainage	CEDD GEO, WSD
		SN	SN	Soil Nail	CEDD GEO
ST	Structural	N/A	BG	Bridge	WSD
		N/A	DM	Dam	WSD
		N/A	FD	Foundation	CEDD GEO
		LE	LE	Structural Frame for Lift Tower and Escalator	N/A
		N/A	NB	Noise Barrier	N/A
		N/A	PC	Pile Cap	ArchSD
		N/A	PW	Planter Wall (within building structure)	ArchSD
		N/A	RC	Reinforced Concrete	CIC, WSD
		N/A	RW	Retaining Structure	ArchSD
		SC	SC	Staircase	N/A
		N/A	SS	Structural Steel	WSD
		N/A	SU	Superstructure	WSD
SW	Salt Water System	N/A	PP	Pipe Support	WSD
		N/A	TB	Thrust Block	WSD
		N/A	WM	Water Mains	WSD
TC	Telecommunication	N/A	N/A	N/A	N/A
WR	Recycled Water System	N/A	PP	Pipe Support	WSD
		N/A	TB	Thrust Block	WSD
		N/A	WM	Water Mains	WSD
XX	General (non-disciplinary)	N/A	N/A	N/A	N/A
ZZ	Multiple disciplines for combined model	N/A	N/A	N/A	N/A

Table App X-7 Abbreviation Codes for Field 6.1 – Type

Sorted by Codes

Codes	Definition	Currently Used By
AF	Animation File (of a model)	ISO UK Annex
BQ	Bill of Quantities	ISO UK Annex
CA	Calculations	ISO UK Annex
CM	Combined Model (Combined Multidiscipline Model)	ISO UK Annex
CO	Correspondence	ISO UK Annex
CP	Cost Plan	ISO UK Annex
CR	Clash Rendition	ISO UK Annex
DB	Database	ISO UK Annex
DD	Drawing – Detail	Modified from CSWP View Field (D)
DE	Drawing – Elevation	Modified from CSWP View Field (E)
DI	Drawing – Isometric	Modified from CSWP View Field (I)
DP	Drawing – Plan	Modified from CSWP View Field (P)
DR	2D Drawing Rendition (General)	ISO UK Annex
DS	Drawing – Section	Modified from CSWP View Field (S)
FN	File note	ISO UK Annex
HS	Health & Safety	ISO UK Annex
IE	Information Exchange File	ISO UK Annex
L	Link File	DSD, HyD
M2	2D Model File	ISO UK Annex
M3	3D Model File	ISO UK Annex
MI	Minutes / Action Notes	ISO UK Annex
MR	Model Rendition File (for Example Thermal Analysis)	ISO UK Annex
MS	Method Statement	ISO UK Annex
PP	Presentation	ISO UK Annex
PR	Programme	ISO UK Annex
RD	Room data sheet	ISO UK Annex
RI	Request for information	ISO UK Annex
RP	Report	ISO UK Annex
SA	Schedule of accommodation	ISO UK Annex
SC	SCCU Submission	ArchSD
SD	Dangerous Goods Submission	ArchSD
SF	FSD Submission	ArchSD
SH	Schedule	ISO UK Annex
SI	Site Instruction Drawing	ArchSD
SK	Sketch	ISO UK Annex
SN	Snagging list	ISO UK Annex

Codes	Definition	Currently Used By
SO	Design Options	ArchSD
SP	Specification	ISO UK Annex
ST	Tender Drawing	ArchSD
SU	Survey	ISO UK Annex
VS	Visualisation of a model	ISO UK Annex

Table App X-8 Abbreviation Codes for Field 6.2 – Characteristic

Sorted by Codes

Codes	Definition	Currently Used By
A	As-built	ArchSD, CSWP
D	Demolition	ArchSD
E	Existing, to remain	ArchSD, CSWP, DSD
M	Maintenance or record	ArchSD, CSWP, DSD
N	New Works/ Proposed Works	ArchSD, CSWP, DSD
T	Temporary Works	ArchSD, CSWP, DSD
W	All Works (combination of above works)	ArchSD, CSWP

Appendix XI – A Sample Spreadsheet for BIM File Name Validation

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1. Introduction

1.1. BIM file name validation process can be embedded in CDE, BIM DR or spreadsheet.

1.2. This Appendix provides an example of BIM file name validation process using the spreadsheet approach. This process is not required if the CDE has validation capabilities.

1.3. This Appendix is composed of the following:

1.3.1. A spreadsheet file containing worksheets for code management and BIM model name generation (which will be sent by CD-ROM with this Guide); and

1.3.2. The step-by-step instructions in the section below on how to utilise the spreadsheet to facilitate the data validation process.

2. BIM File Name Validation Process Using Spreadsheet

2.1. In this example, a data spreadsheet has been created based on the project of Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDA), Phase 1.

2.2. To ensure that the data going through conversion engine into BIM DR to be shared with other parties have consistent naming (information container ID), a validation list is formed based on two types of codes:

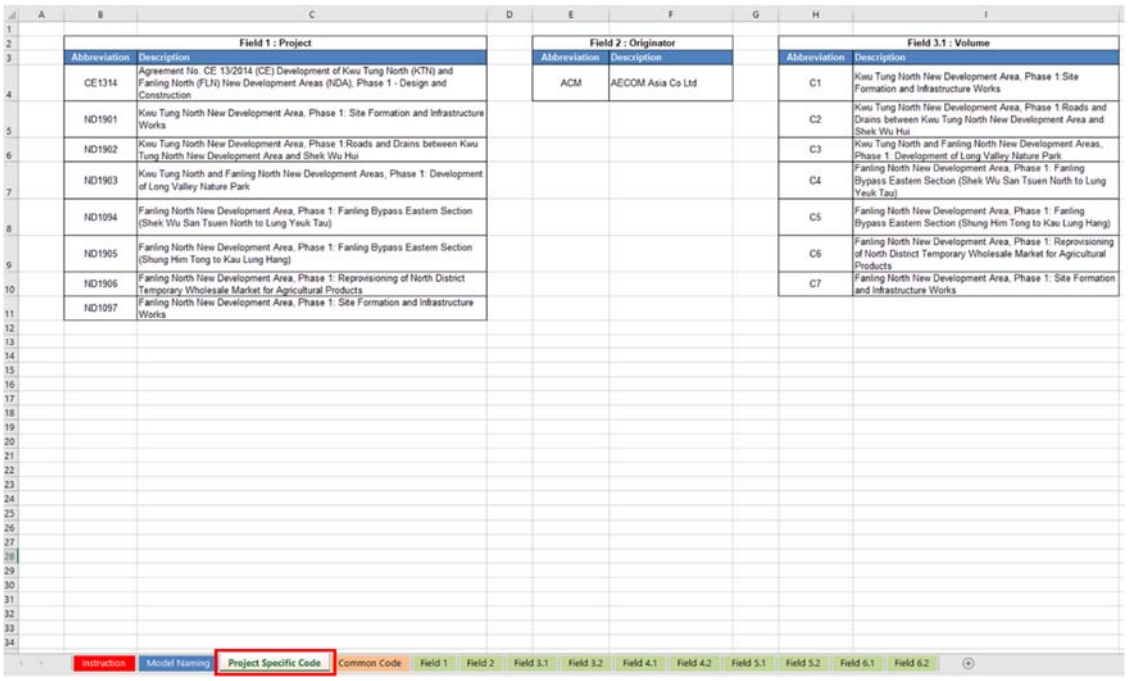
2.2.1. **Common Codes** in accordance with Appendix X – Common Codes for Naming; and

2.2.2. **Project-specific Codes** which would be different for different projects. An example of project-specific codes is provided in Appendix IX – Sample Project Specific Codes for Naming.

2.3. To add codes to the list:

2.3.1. Go to the "Project Specific Code" worksheet (orange coloured tab). The “Common Code” worksheet should not be modified without consensus between all WDs.

Figure App XI-1 - The “Project Specified Code” Worksheet



Field 1 : Project	
Abbreviation	Description
CE1314	Agreement No. CE 13/2014 (CE) Development of Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDA), Phase 1 - Design and Construction
ND1901	Kwu Tung North New Development Area, Phase 1: Site Formation and Infrastructure Works
ND1902	Kwu Tung North New Development Area, Phase 1:Roads and Drains between Kwu Tung North New Development Area and Shek Wu Hui
ND1903	Kwu Tung North and Fanling North New Development Areas, Phase 1: Development of Long Valley Nature Park
ND1094	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shek Wu San Tsuen North to Lung Yeuk Tau)
ND1905	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shung Him Tong to Kau Lung Hang)
ND1906	Fanling North New Development Area, Phase 1: Reprovisioning of North District Temporary Wholesale Market for Agricultural Products
ND1097	Fanling North New Development Area, Phase 1: Site Formation and Infrastructure Works

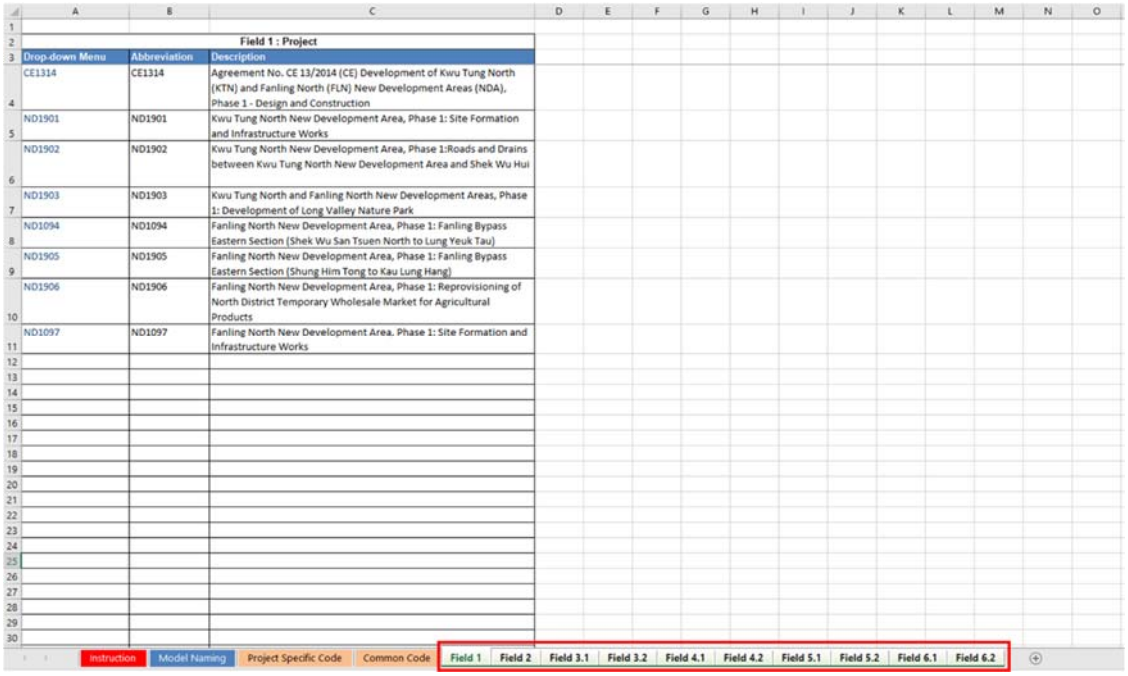
Field 2 : Originator	
Abbreviation	Description
ACM	AECOM Asia Co Ltd

Field 3.1 : Volume	
Abbreviation	Description
C1	Kwu Tung North New Development Area, Phase 1:Site Formation and Infrastructure Works
C2	Kwu Tung North New Development Area, Phase 1:Roads and Drains between Kwu Tung North New Development Area and Shek Wu Hui
C3	Kwu Tung North and Fanling North New Development Areas, Phase 1: Development of Long Valley Nature Park
C4	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shek Wu San Tsuen North to Lung Yeuk Tau)
C5	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shung Him Tong to Kau Lung Hang)
C6	Fanling North New Development Area, Phase 1: Reprovisioning of North District Temporary Wholesale Market for Agricultural Products
C7	Fanling North New Development Area, Phase 1: Site Formation and Infrastructure Works

2.3.2. Find the corresponding field and add the information to the bottom of the list. The field length and format as specified in the Guide should be followed.

2.3.3. The value of the field will be automatically updated in the corresponding field worksheet (green coloured tabs).

Figure App XI-2 –The Worksheets for Each Field

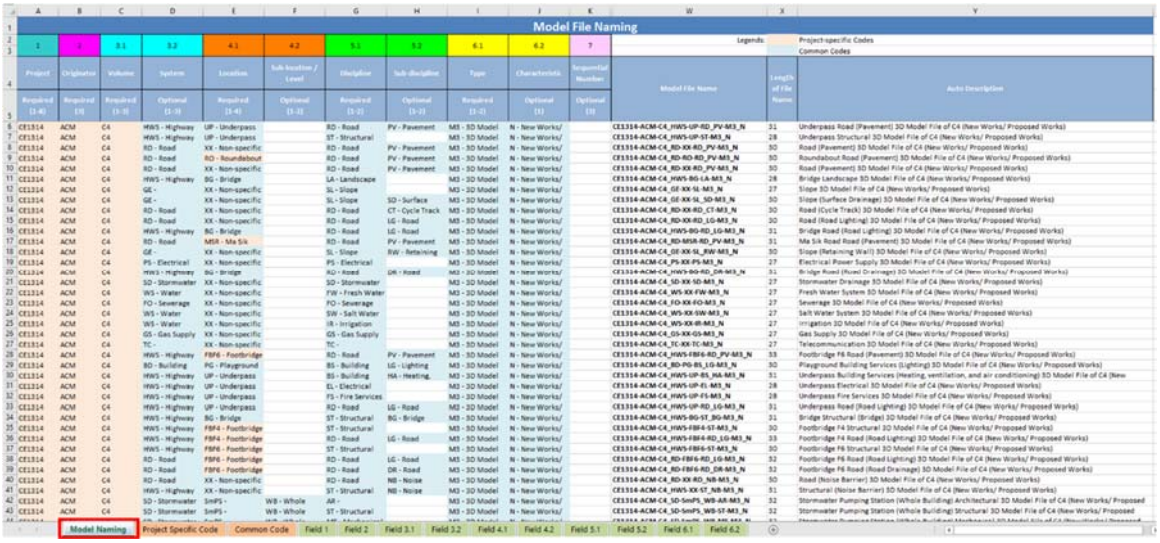


Field 1 : Project		
Drop-down Menu	Abbreviation	Description
CE1314	CE1314	Agreement No. CE 13/2014 (CE) Development of Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDA), Phase 1 - Design and Construction
ND1901	ND1901	Kwu Tung North New Development Area, Phase 1: Site Formation and Infrastructure Works
ND1902	ND1902	Kwu Tung North New Development Area, Phase 1:Roads and Drains between Kwu Tung North New Development Area and Shek Wu Hui
ND1903	ND1903	Kwu Tung North and Fanling North New Development Areas, Phase 1: Development of Long Valley Nature Park
ND1094	ND1094	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shek Wu San Tsuen North to Lung Yeuk Tau)
ND1905	ND1905	Fanling North New Development Area, Phase 1: Fanling Bypass Eastern Section (Shung Him Tong to Kau Lung Hang)
ND1906	ND1906	Fanling North New Development Area, Phase 1: Reprovisioning of North District Temporary Wholesale Market for Agricultural Products
ND1097	ND1097	Fanling North New Development Area, Phase 1: Site Formation and Infrastructure Works

Instruction | Model Naming | Project Specific Code | Common Code | Field 1 | Field 2 | Field 3.1 | Field 3.2 | Field 4.1 | Field 4.2 | Field 5.1 | Field 5.2 | Field 6.1 | Field 6.2

2.3.4. The updated codes can now be selected from the "Model Naming" worksheet (blue coloured tabs).

Figure App XI-3 - The "Model Naming" Worksheets



Model File Naming

Legends: Project-specific Codes | Common Codes

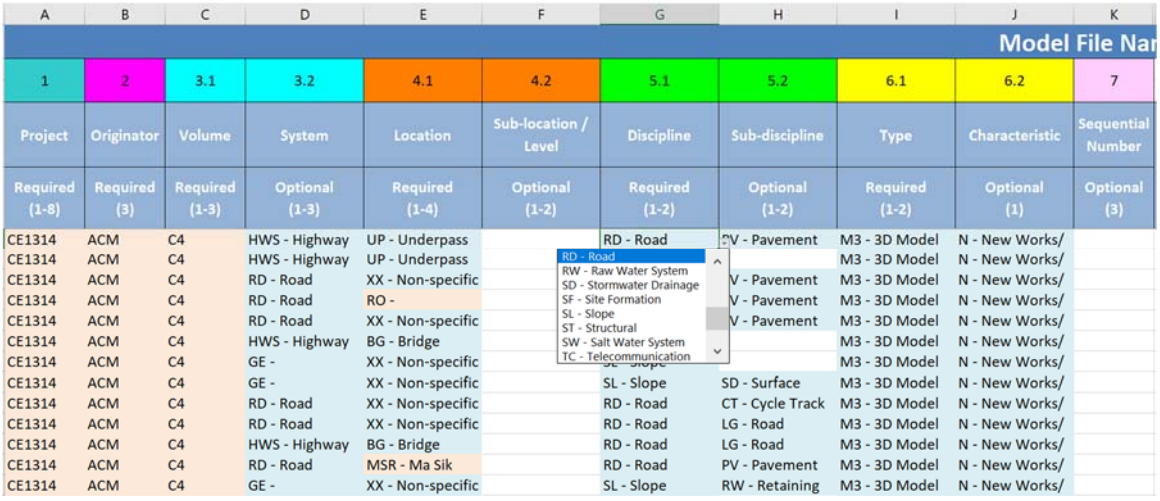
Model Naming | Project Specific Code | Common Code | Field 1 | Field 2 | Field 3.1 | Field 3.2 | Field 4.1 | Field 4.2 | Field 5.1 | Field 5.2 | Field 6.1 | Field 6.2

2.4. To automatically generate a list of model names for the model registers:

2.4.1. Go to the "Model Naming" worksheet.

2.4.2. Use the drop-down list of each field (from Column A to Column K) to select the correct code. Required fields must not be omitted. The cells with project-specific code selected would be automatically highlighted with orange colour while that with common code selected would be automatically highlighted with blue colour.

Figure App XI-4 – Example of Drop-Down List for Selecting Codes

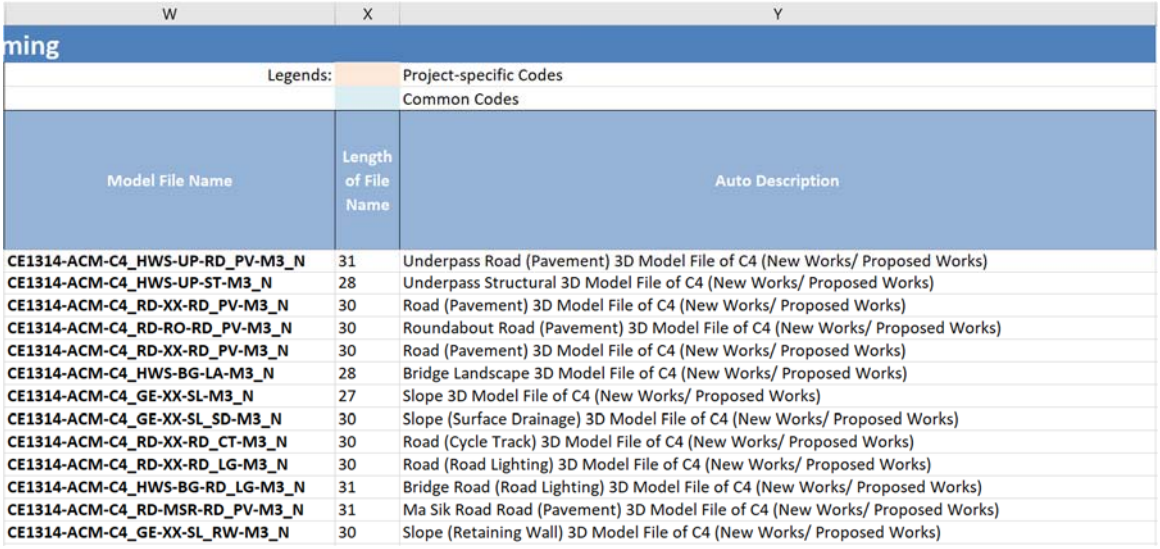


A	B	C	D	E	F	G	H	I	J	K
									Model File Nar	
1	2	3.1	3.2	4.1	4.2	5.1	5.2	6.1	6.2	7
Project	Originator	Volume	System	Location	Sub-location / Level	Discipline	Sub-discipline	Type	Characteristic	Sequential Number
Required (1-8)	Required (3)	Required (1-3)	Optional (1-3)	Required (1-4)	Optional (1-2)	Required (1-2)	Optional (1-2)	Required (1-2)	Optional (1)	Optional (3)
CE1314	ACM	C4	HWS - Highway	UP - Underpass		RD - Road	V - Pavement	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	HWS - Highway	UP - Underpass				M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	RD - Road	XX - Non-specific			V - Pavement	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	RD - Road	RO -			V - Pavement	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	RD - Road	XX - Non-specific			V - Pavement	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	HWS - Highway	BG - Bridge				M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	GE -	XX - Non-specific				M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	GE -	XX - Non-specific		SL - Slope	SD - Surface	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	RD - Road	XX - Non-specific		RD - Road	CT - Cycle Track	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	RD - Road	XX - Non-specific		RD - Road	LG - Road	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	HWS - Highway	BG - Bridge		RD - Road	LG - Road	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	RD - Road	MSR - Ma Sik		RD - Road	PV - Pavement	M3 - 3D Model	N - New Works/	
CE1314	ACM	C4	GE -	XX - Non-specific		SL - Slope	RW - Retaining	M3 - 3D Model	N - New Works/	

RD - Road
RW - Raw Water System
SD - Stormwater Drainage
SF - Site Formation
SL - Slope
ST - Structural
SW - Salt Water System
TC - Telecommunication

2.4.3. After selecting the codes for all required fields, the model file name, length of file name and description (from Column W to Column Y) would be generated automatically.

Figure App XI-5 - Example of Auto-Generated Information for Model Files



W	X	Y
ming		
Legends:		Project-specific Codes
		Common Codes
Model File Name	Length of File Name	Auto Description
CE1314-ACM-C4_HWS-UP-RD_PV-M3_N	31	Underpass Road (Pavement) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_HWS-UP-ST-M3_N	28	Underpass Structural 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_RD-XX-RD_PV-M3_N	30	Road (Pavement) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_RD-RO-RD_PV-M3_N	30	Roundabout Road (Pavement) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_RD-XX-RD_PV-M3_N	30	Road (Pavement) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_HWS-BG-LA-M3_N	28	Bridge Landscape 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_GE-XX-SL-M3_N	27	Slope 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_GE-XX-SL_SD-M3_N	30	Slope (Surface Drainage) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_RD-XX-RD_CT-M3_N	30	Road (Cycle Track) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_RD-XX-RD_LG-M3_N	30	Road (Road Lighting) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_HWS-BG-RD_LG-M3_N	31	Bridge Road (Road Lighting) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_RD-MSR-RD_PV-M3_N	31	Ma Sik Road Road (Pavement) 3D Model File of C4 (New Works/ Proposed Works)
CE1314-ACM-C4_GE-XX-SL_RW-M3_N	30	Slope (Retaining Wall) 3D Model File of C4 (New Works/ Proposed Works)

2.5. The limitations of the sample spreadsheet for BIM file name validation should be noted. To keep this spreadsheet's file size manageable, the numbers of rows for the "Model Naming" worksheet and the worksheets for each field are capped at 10,000.

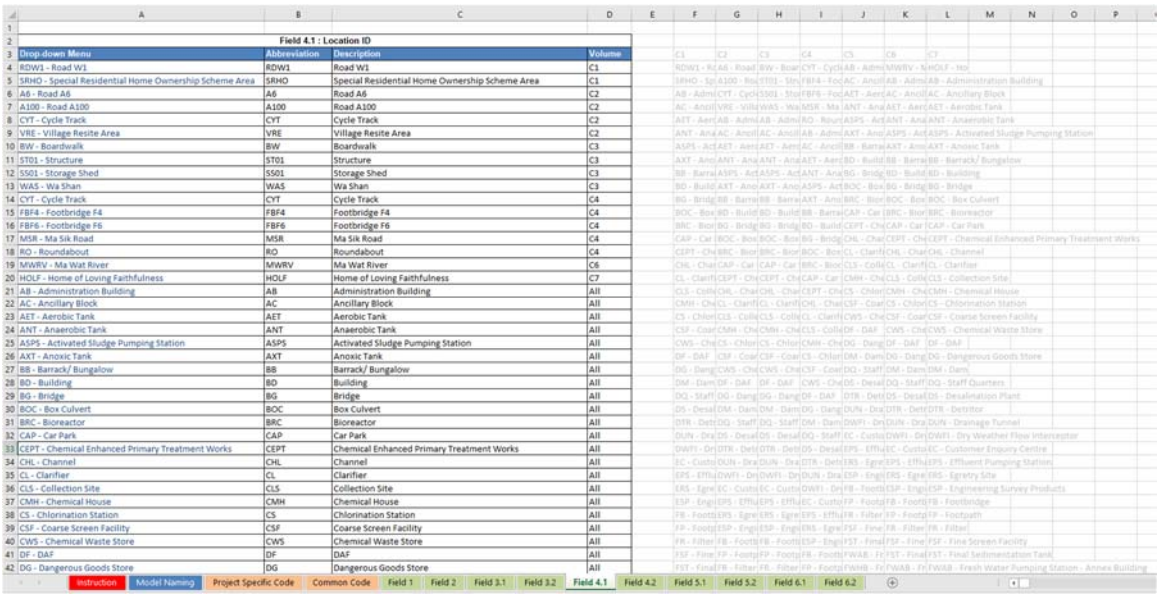
2.6. On the "Model Naming" worksheet, the cells from Column L to Column V are input with formulas for background control of Data. Since users don't need to input or view these cells, they are hidden for better user experience.

Figure App XI-6 - Hidden Columns on the "Model Naming" Worksheet

L	M	N	O	P	Q	R	S	T	U	V	W
Model File Naming											
1	2	3.1	3.2	4.1	4.2	5.1	5.2	6.1	6.2	7	Legends:
Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Common / Project-Specific	Model File Name
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_HWS-UP-RD_PV-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_HWS-UP-ST-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_RD-XX-RD_PV-M3_N
Project-specific	Project-specific	Project-specific	Common	Project-specific		Common	Common	Common	Common		CE1314-ACM-C4_RD-RO-RD_PV-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_RD-XX-RD_PV-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_HWS-BG-LA-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_GE-XX-SL-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_GE-XX-SL_SD-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_RD-XX-RD_CT-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_RD-XX-RD_LG-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_HWS-BG-RD_LG-M3_N
Project-specific	Project-specific	Project-specific	Common	Project-specific		Common	Common	Common	Common		CE1314-ACM-C4_RD-MSR-RD_PV-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_GE-XX-SL_RW-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_PS-XX-PS-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_HWS-BG-RD_DR-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_SD-XX-SD-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_WS-XX-FW-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_FO-XX-FO-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_WS-XX-SW-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_WS-XX-IR-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_GS-XX-GS-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common		Common	Common		CE1314-ACM-C4_TC-XX-TC-M3_N
Project-specific	Project-specific	Project-specific	Common	Project-specific		Common	Common	Common	Common		CE1314-ACM-C4_HWS-FBF6-RD_PV-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_BD-PG-BS_LG-M3_N
Project-specific	Project-specific	Project-specific	Common	Common		Common	Common	Common	Common		CE1314-ACM-C4_HWS-UP-BS_HA-M3_N

2.7. On the "Field 4.1" and "Field 5.2" worksheets, the cells with grey font colour are input with formulas for generating the drop-down lists. They should not be modified, cleared or deleted.

Figure App XI-7 – Example of Cells with Grey Font Colour



	A	B	C	D
1				
2		Field 4.1 : Location ID		
3	Drop-down Menu	Abbreviation	Description	Volume
4	RDW1 - Road W1	RDW1	Road W1	C1
5	SRHO - Special Residential Home Ownership Scheme Area	SRHO	Special Residential Home Ownership Scheme Area	C1
6	A6 - Road A6	A6	Road A6	C2
7	A100 - Road A100	A100	Road A100	C2
8	CYT - Cycle Track	CYT	Cycle Track	C2
9	VRE - Village Resite Area	VRE	Village Resite Area	C2
10	BW - Boardwalk	BW	Boardwalk	C3
11	ST01 - Structure	ST01	Structure	C3
12	SS01 - Storage Shed	SS01	Storage Shed	C3
13	WAS - Wa Shan	WAS	Wa Shan	C3
14	CYT - Cycle Track	CYT	Cycle Track	C4
15	FBF4 - Footbridge F4	FBF4	Footbridge F4	C4
16	FBF6 - Footbridge F6	FBF6	Footbridge F6	C4
17	MSR - Ma Sik Road	MSR	Ma Sik Road	C4
18	RO - Roundabout	RO	Roundabout	C4
19	MWRV - Ma Wat River	MWRV	Ma Wat River	C6
20	HOLF - Home of Loving Faithfulness	HOLF	Home of Loving Faithfulness	C7
21	AB - Administration Building	AB	Administration Building	All
22	AC - Ancillary Block	AC	Ancillary Block	All
23	AET - Aerobic Tank	AET	Aerobic Tank	All
24	ANT - Anaerobic Tank	ANT	Anaerobic Tank	All
25	ASPS - Activated Sludge Pumping Station	ASPS	Activated Sludge Pumping Station	All
26	AXT - Anoxic Tank	AXT	Anoxic Tank	All
27	BB - Barrack/ Bungalow	BB	Barrack/ Bungalow	All
28	BD - Building	BD	Building	All
29	BG - Bridge	BG	Bridge	All
30	BOC - Box Culvert	BOC	Box Culvert	All
31	BRC - Bioreactor	BRC	Bioreactor	All
32	CAP - Car Park	CAP	Car Park	All
33	CEPT - Chemical Enhanced Primary Treatment Works	CEPT	Chemical Enhanced Primary Treatment Works	All
34	CHL - Channel	CHL	Channel	All
35	CL - Clarifier	CL	Clarifier	All
36	CLS - Collection Site	CLS	Collection Site	All
37	CMH - Chemical House	CMH	Chemical House	All
38	CS - Chlorination Station	CS	Chlorination Station	All
39	CSF - Coarse Screen Facility	CSF	Coarse Screen Facility	All
40	CWS - Chemical Waste Store	CWS	Chemical Waste Store	All
41	DF - DAF	DF	DAF	All
42	DG - Dangerous Goods Store	DG	Dangerous Goods Store	All

Appendix XII – Mapping Table for Information Container ID Fields – ArchSD

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1. ArchSD - Architectural Design

1.1. Fields Mapping Table

The naming convention of ArchSD BIM Guide for Architectural Design (thereafter referred to as ArchSD AR Guide) is extracted below:

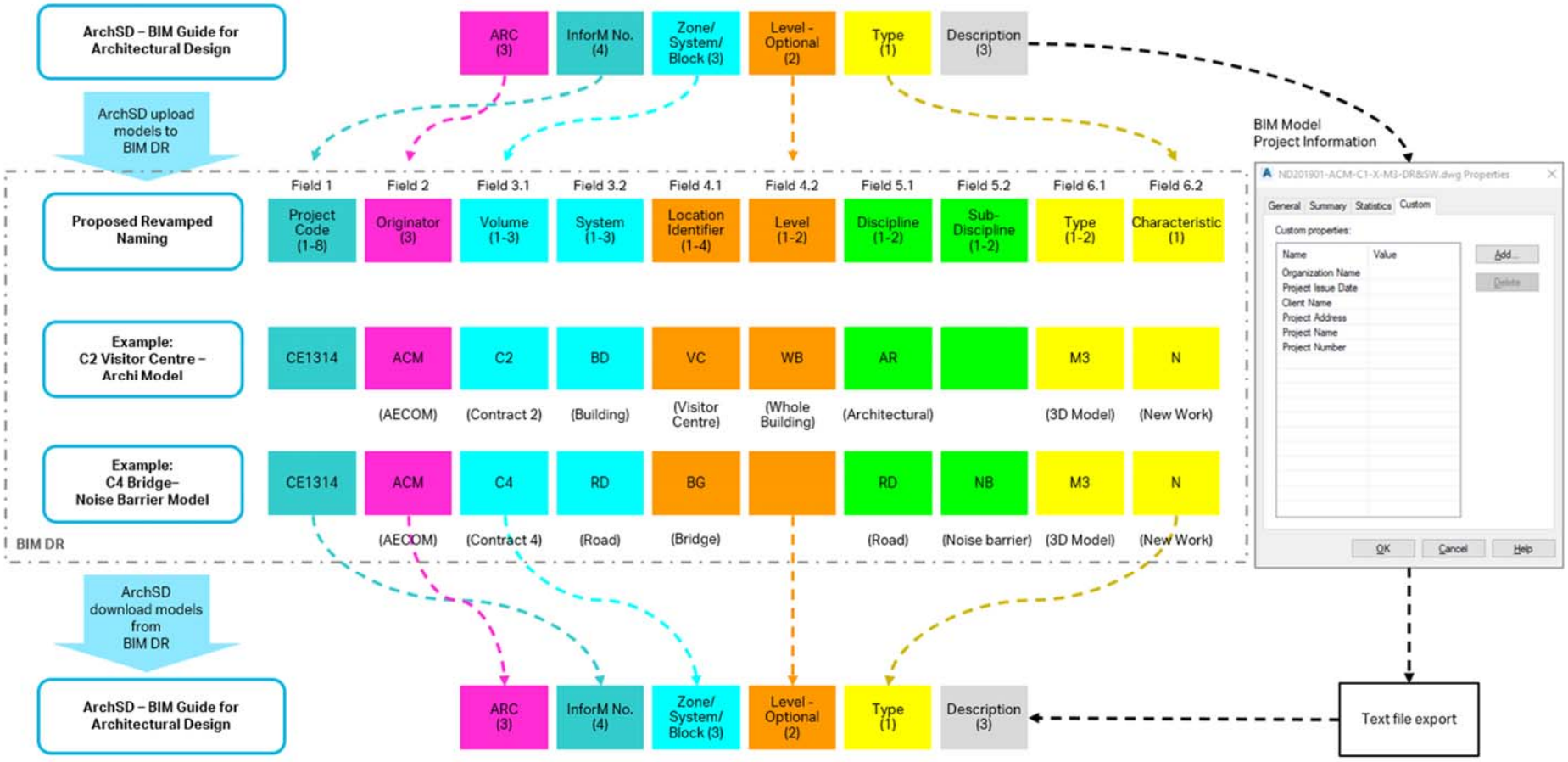
Table App XII-1 Field Mapping for ArchSD AR Guide

This Guide			ArchSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
1	Project Code		InforM No.	The unique number identifying the project	Not required
2	Originator		Agent Responsible Code	Agent Responsible Codes referenced in CAD Standard for Works Projects (CSWP), e.g.: ADA for Architectural Branch ADS for Structural Engineering Branch ADB for Building Services Branch	Not required
3.1	Volume		Zone/System/ Block	Identifier of which building, area, phase or zone of the project, the model file relates to if the project is sub-divided by zones). If the project has zoning, “Z01” should be added in this field. If the project has no zoning, “ALL” should be added in this field.	Not required
4.2	Sub-location		Level	Identifier of which level, or group of levels, the model file relates to if the project is sub-divided by levels.	Required
6.2	Characteristic		Type	Descriptive field defines the type of the project	Not required

This Guide			ArchSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
N/A	N/A	BIM Model Project Information	Description	Descriptive field defines the use of drawing, e.g. 01 for First Submission, 02 for Second Submission, etc.	N/A

1.2. Fields Mapping Diagram

Figure App XII-1 Field Mapping Diagram for ArchSD AR Guide



1.3. Fields that match with this Guide

Some naming fields of ArchSD AR Guide do not require mapping when sharing to (or downloading from) the BIM DR.:

a) Field 1 Agent Responsible Code and Field 5 Type are the same as the Originator and Characteristic fields of this Guide.

b) Fields 2 InforM No. and Field 3 Zone/System/Block are equivalent to the Project Code and Volume fields of this Guide. As these fields are project specific with no standard codification system, mapping is not required.

c) Field 6 Description could be included in the BIM Model Project Information as BIM attributes. BIM Model Project Information should be inputted in all BIM files as part of the LOD-I for metadata extraction and geolocation. Appendix VI of this Guide shown some examples of project information input methods. This field could be automatically read by the BIM DR and exported upon request.

1.4. Fields that Needs to be Mapped

For the remaining fields, the following code mapping should apply:

Table App XII-2 Code Mapping for ArchSD AR Guide

ArchSD AR Guide		**BIM Harmonisation Guidelines**	
Field 4: Level (2 characters)		**Field 4.2 Sub-location (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
B2	Basement Level 2	B2	Basement Level 2
B1	Basement Level 1	B1	Basement Level 1
LG	Lower Ground Floor	LG	Lower Ground Floor
UG	Upper Ground Floor	UG	Upper Ground Floor
GF	Ground Floor	GF	Ground Floor
1F	1st Floor	01	Level 01
MF	Mezzanine Floor	MF	Mezzanine Floor
RF	Roof	RF	Roof
UR	Upper Roof	UR	Upper Roof
AL	All Levels (a single model contain all levels)	AL	All levels (of a specific building zone)
N/A	N/A	ES	Reference level from engineering survey
N/A	N/A	M1	Mezzanine above level 01
N/A	N/A	M2	Mezzanine Above Level 02
N/A	N/A	PL	Podium Level
N/A	N/A	WB	Whole Building

2. ArchSD – Building Services Installation

2.1. Fields Mapping Table

The naming convention of ArchSD BIM Guide for Building Services Installation (thereafter referred to as ArchSD BS Guide) is extracted below:

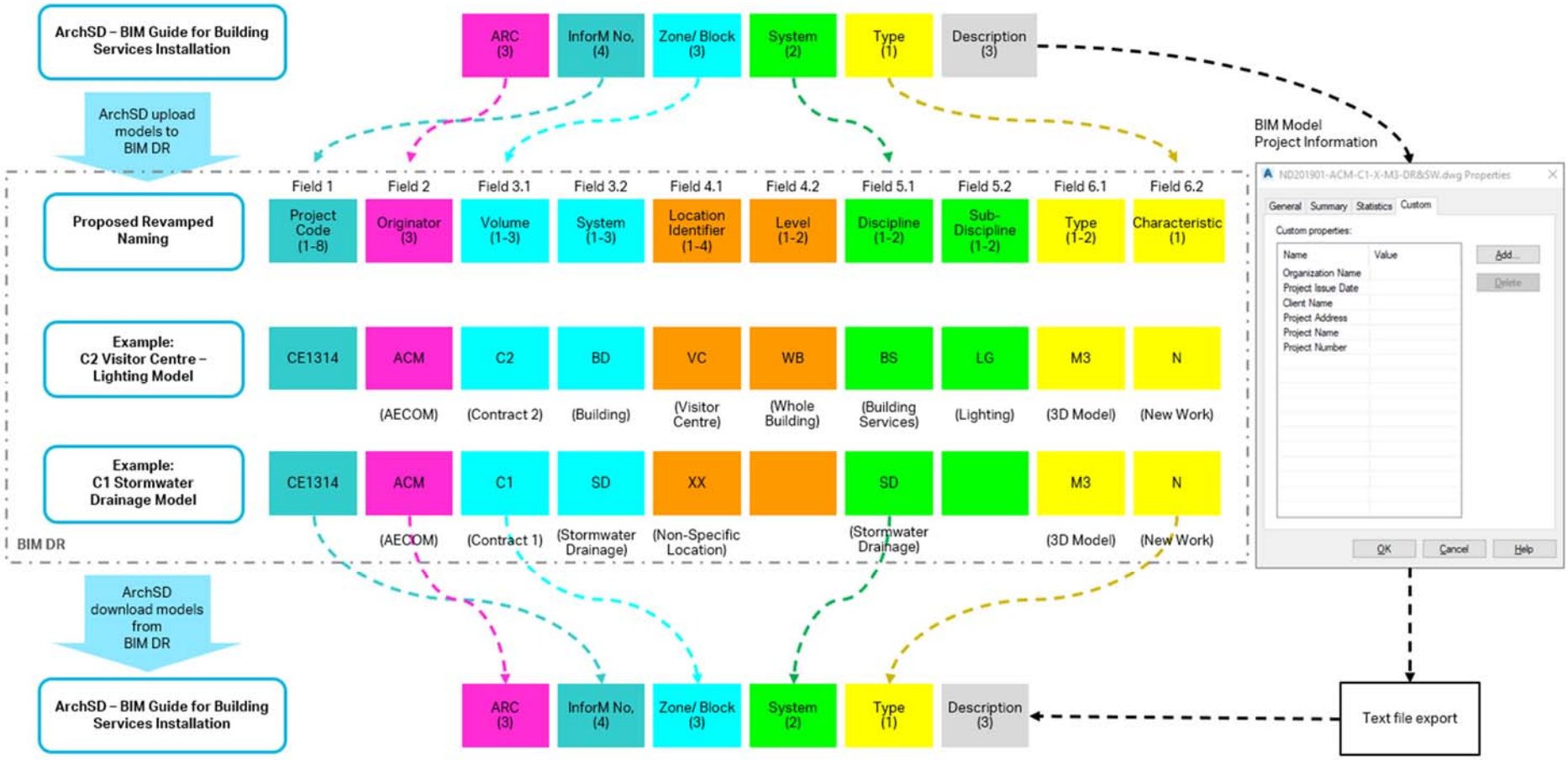
Table App XII-3 Field Mapping for ArchSD BS Guide

This Guide			ArchSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**Field Description**	**Code Mapping**
1	Project Code		InForM Number	InForM number of the project	Not required
2	Originator		Agent Responsible Code	3 characters (alphanumeric) for Agent Responsible Code, e.g.: ADA for architectural discipline of ArchSD ADB for building services discipline of ArchSD ADS for structural discipline of ArchSD	Not required
3.1	Volume		Zone / Block	Identifier of building zone, block or phase of the project, e.g.: Zone 1 : "Z01" No zoning : "All" should be used in this field	Not required
5.1	Discipline		System	2 characters (alphabetic) for short form of system	Required
6.2	Characteristic		Type	1 character (alphabetic) define the status of the project	Not required

This Guide			ArchSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**Field Description**	**Code Mapping**
N/A	N/A	BIM Model Project Information	Description	3 characters (alphabetic) describe the use of model, e.g.: Code Use Workstage involved P01 Presentation 1-6 D01 SCCU Drainage Submission 3-6 T01 Tender 4 WIP Work in Progress 1-6 X01 Design Option 1-4	N/A

2.2. Fields Mapping Diagram

Figure App XII-2 Field Mapping Diagram for ArchSD BS Guide



2.3. ArchSD's Fields that Match with this Guide

Some naming fields of ArchSD BS Guide do not require mapping when sharing to (or downloading from) the BIM DR.

a) Field 1 Agent Responsible Code and Field 5 Type are the same as the Originator and Characteristic fields of this Guide.

b) Fields 2 InForM No. and Field 3 Zone/System/Block are equivalent to the Project Code and Volume fields of this Guide. As these fields are project specific with no standard codification system, mapping is not required.

c) Field 6 Description could be included in the BIM Model Project Information as BIM attributes. BIM Model Project Information should be inputted in all BIM files as part of the LOD-I for metadata extraction and geolocation. Appendix VI of this Guide shown some examples of project information input methods. This field could be automatically read by the BIM DR and exported upon request.

2.4. ArchSD's Fields that Needs to be Mapped

For the remaining fields, the following code mapping should apply:

Table App XII-4 Codes Mapping for ArchSD BS Guide

ArchSD BS Guide		**BIM Harmonisation Guidelines**	
Field 4: System (2 characters)		**Field 5.1 Discipline (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
BS	Building Services	BS	Building Services
EE	Electrical	EL	Electrical
FS	Fire Service	FS	Fire Services
AC	Air-conditioning	Suggest to rearrange as a sub-discipline under Building Services (refer to EMSD)	
N/A	N/A	AR	Architectural
N/A	N/A	CD	Chilled Water Distribution
N/A	N/A	FO	Sewerage
N/A	N/A	FW	Fresh Water System
N/A	N/A	GS	Gas Supply
N/A	N/A	IR	Irrigation
N/A	N/A	LA	Landscape
N/A	N/A	ME	Mechanical
N/A	N/A	PS	Electrical Power Supply
N/A	N/A	RD	Road
N/A	N/A	RW	Raw Water System
N/A	N/A	SD	Stormwater Drainage
N/A	N/A	SF	Site Formation

ArchSD BS Guide		BIM Harmonisation Guidelines	
Field 4: System (2 characters)		Field 5.1 Discipline (2 characters)	
Codes	Definition	Codes	Definition
N/A	N/A	SL	Slope
N/A	N/A	ST	Structural
N/A	N/A	SW	Salt Water System
N/A	N/A	TC	Telecommunication
N/A	N/A	WR	Recycled Water System
N/A	N/A	XX	General (non-disciplinary)
N/A	N/A	ZZ	Multiple disciplines for combined model

3. ArchSD – Structural Engineering

3.1. Fields Mapping Table

The naming convention of ArchSD BIM Guide for Structural Engineering (thereafter referred to as ArchSD SE Guide) is extracted below:

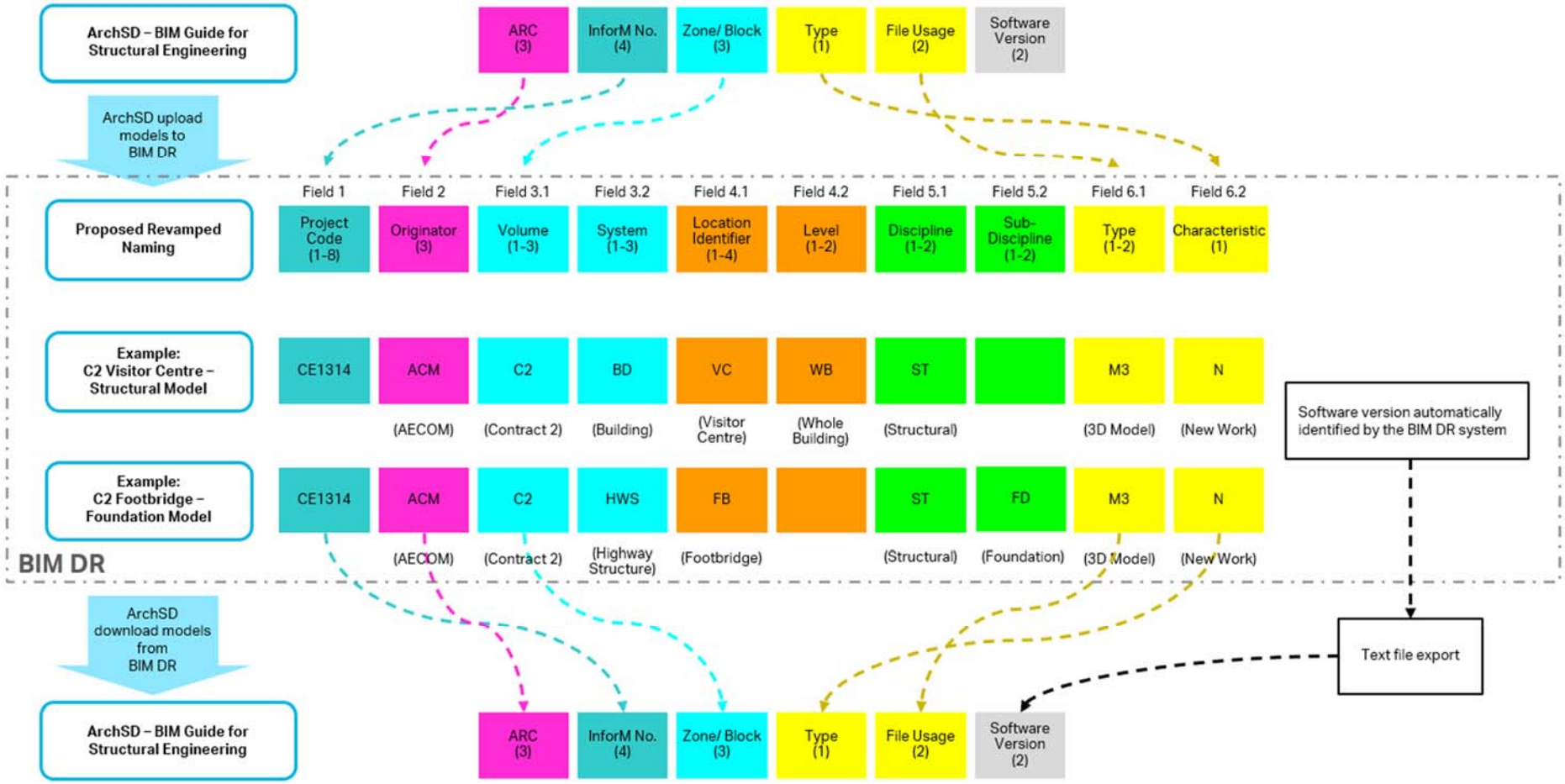
Table App XII-5 Field Mapping for ArchSD SE Guide

This Guide			ArchSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**Field Description**	**Code Mapping**
1	Project Code		InforM No.	InForM No. (Project Number)	Not required
2	Originator		Agent Responsible Code	Agent Responsible Code "**ADS**" stand for Architectural Services Department, Structural Engineer Branch	Not required
3.1	Volume		Zone/ Block	Required if project is subdivided by zone or block (default=**ALL**)	Not required
4.2	Sub-location		Type	Type N: New work, T: Temporary work, E: EXIIsting, D: Demolition, W: All work	Not required
6.1	Type		File Usage	File Usage: **MO** for Structural Model **SH** for Drawing Sheet Set **CO** for Combined with Structural and Drawing Sheet Set	Required

This Guide			ArchSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**Field Description**	**Code Mapping**
				GI for Site Formation and Ground Investigation Model	
N/A	N/A		Software Version	Software Version 16 for version 2016	N/A

3.2. Fields Mapping Diagram

Figure App XII-3 Field Mapping Diagram for ArchSD SE Guide



3.3. Fields that Match with this Guide

Some naming fields of ArchSD SE Guide do not require mapping when sharing to (or downloading from) the BIM DR.

a) Field 1 Agent Responsible Code and Field 4 Type are the same as the Originator and Characteristic fields of this Guide.

b) Fields 2 InforM No. and Field 3 Zone/System/Block are equivalent to the Project Code and Volume fields of this Guide. As these fields are project specific with no standard codification system, mapping is not required.

c) Software (and its version if applicable) by which a model is produced shall be automatically identified by the BIM DR system. Therefore, the Software Version as in Field 6 of the naming convention of ArchSD SE Guide need not be provided to the BIM DR. The software versions could be exported from the BIM DR upon request.

3.4. Fields that Needs to be Mapped

The nature of Field 5 File Usage is equivalent to the Type field which is adopted as Field 6.1 of this Guide. It is suggested that the list of standard codes for Type to be extended in the future to incorporate the File Usage codes from ArchSD SE.

Table App XII-6 Codes Mapping for ArchSD SE Guide

ArchSD SE Guide		**BIM Harmonisation Guidelines**	
Field 5: File Usage (2 characters)		**Field 6.1 Type (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
MO	Structural Model	M3	3D Model File
SH	Drawing Sheet Set	DR	2D Drawing Rendition (General)
CO	Combined with Structural and Drawing Sheet Set	CM	Combined Model (Combined Multidiscipline Model)

ArchSD SE Guide		**BIM Harmonisation Guidelines**	
Field 5: File Usage (2 characters)		**Field 5.1 and 5.2 Discipline and Sub-discipline**	
Codes	**Definition**	**Codes**	**Definition**
GI	Ground Investigation Model	SF_GI	Ground Investigation

Appendix XIII – Mapping Table for Information Container ID Fields – CEDD GEO

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1. CEDD GEO

1.1 Fields Mapping Table

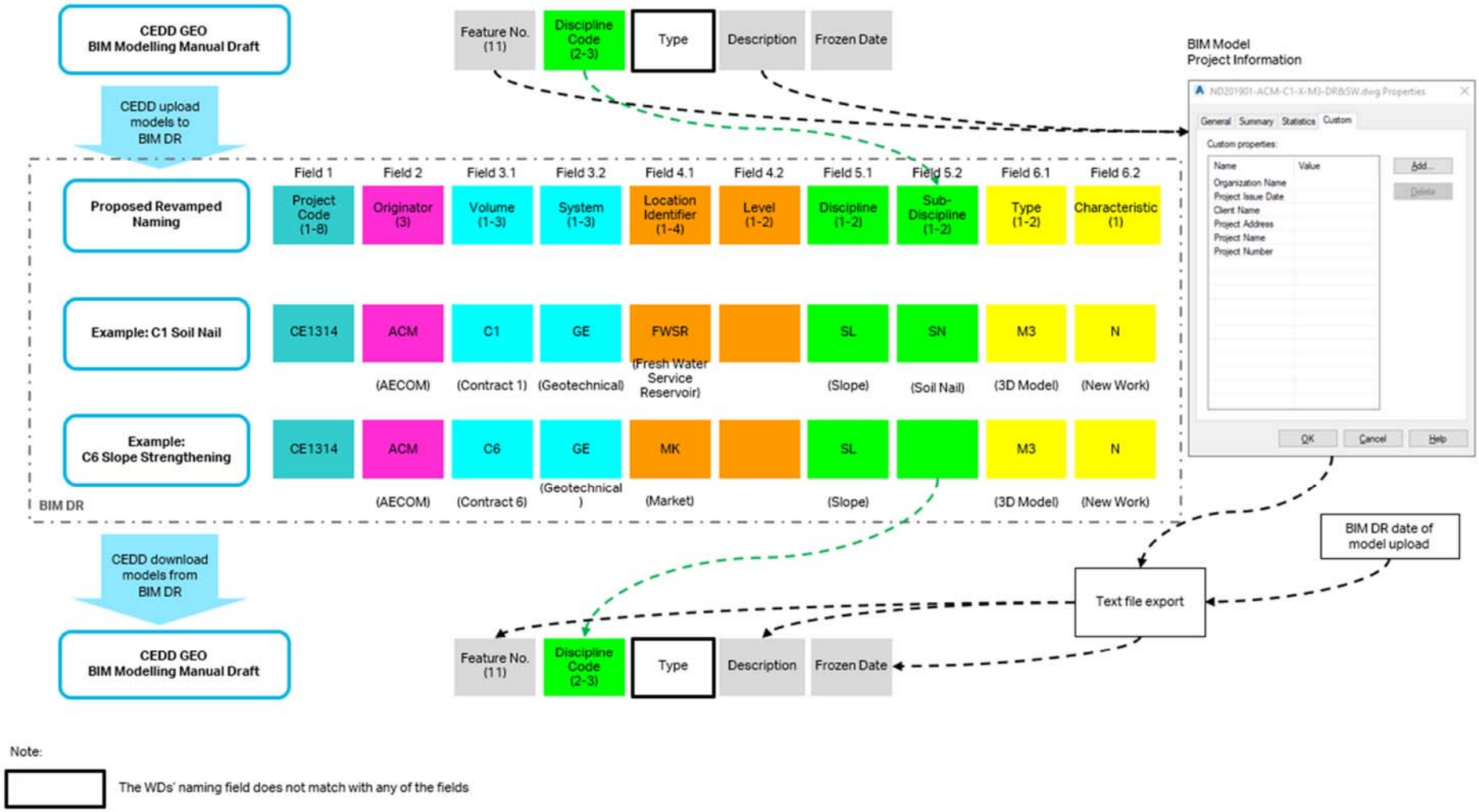
The naming convention of CEDD GEO BIM Modelling Manual Draft (thereafter referred to as GEO BIM Manual) is extracted below:

Table App XIII-1 Field Mapping for GEO BIM Manual

This Guide			CEDD GEO		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**Field Description**	**Code Mapping**
5.2	Sub-discipline		Discipline Code	The Discipline Code should be adopted in the following list. If a new discipline has not included on the list, a new code shall be assigned by GEO BIM support team for ease of internal administration.	Required
N/A	N/A	BIM Model Project Information	Feature no.	Feature number of each registered slope	N/A
N/A	N/A		Type	Not specified	N/A
N/A	N/A	BIM Model Project Information	Description	Not specified	N/A
N/A	N/A		Frozen Date	Before revising the model file, save a copy with the frozen date and leave the current file name unchanged	N/A

1.2 Fields Mapping Diagram

Figure App XIII-1 Field Mapping Diagram for GEO BIM Manual



Field 1 Feature No. and Field 3 Type of GEO BIM Manual could not be mapped into any of the information container ID fields due to the following reasons:

a) It is suggested each model file would contain more than one slope within a pre-defined area, instead of one model for one slope. Therefore, slope registration number is not suggested to be included as any part of the information container ID (model file name). Instead, the slope registration numbers for slopes within a model are suggested to be included in the BIM Model Project Information as a BIM attributes which should be inputted in all BIM files as part of the LOD-I for metadata extraction and geolocation. Appendix VI of this Guide shown some examples of project information input methods. This field could be automatically read by the BIM DR and exported upon request.

b) The GEO BIM Manual Draft has not provided the definition for the Type field. However, based on the examples given by CEDD GEO, this field refers to different types of individual elements of a slope, e.g. different types of soil nails. It is suggested that these classifications of elements be handled by BIM objects instead of BIM models. For example, soil nails as BIM objects embedded within a BIM model where different type of soil nails objects may be present within a single model.

1.3 Fields that matches with this Guide

Some naming fields of GEO BIM Manual do not require mapping when sharing to (or downloading from) the BIM DR.

a) Field 4 Description shall be included in the BIM Model Project Information as BIM attributes which should be inputted in all BIM files as part of the LOD-I for metadata extraction and geolocation. Appendix VI of this Guide shown some examples of project information input methods. This field could be automatically read by the BIM DR and exported upon request.

b) According to GEO BIM Manual, Field 5 Frozen Date shall be applied when a model file is to be revised, so that a frozen model shall be archived with a frozen date added to its file name. However, models uploaded to the BIM DR are for sharing purpose and are not expected to be revised. Upload dates of the model files shall be recorded by the BIM DR and could be exported upon request.

1.4 Fields That Needs to be Mapped

For the remaining fields, the following code mapping should apply:

Table App XIII-2 Code Mapping for GEO BIM Manual

GEO BIM Manual		**BIM Harmonisation Guidelines**			
Field 2: Discipline Code (2-3 characters)		**Field 5.1 Discipline (2 characters)**		**Field 5.2 Sub-discipline (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**	**Codes**	**Definition**
DSM	Digital Surface Model	SL	Slope	DS	Ground Surface
SN	Soil Nail	SL	Slope	SN	Soil Nail
FB	Flexible Barrier	SL	Slope	FB	Flexible Barrier
RB	Rigid Barrier	SL	Slope	RB	Rigid Barrier
UU	Underground Utilities	Underground Utilities is not classified as a discipline nor sub-discipline in this Guide. See Appendix VIII for the Federation Strategy related to underground utilities.			
SD	Surface Drainage	SD	Stormwater Drainage	SD	Surface Drainage
CB	Concrete Berm	SL	Slope	CB	Concrete Berm
MA	Maintenance Access	SL	Slope	MA	Maintenance Access
SW	Stairway	Stairway is not classified as a discipline nor sub-discipline in this Guide. Stairs are suggested to be grouped under Architectural or Structural models.			
SF	Street Furniture	Street Furniture is not classified as a discipline nor sub-discipline in this Guide. Public road furniture may be placed under Road Furniture (RF) model under Road Discipline (RD). Other miscellaneous street furniture are suggested to be grouped under General (non-disciplinary) model (XX).			
LS	Landscape	LA	Landscape	N/A	N/A
TE	Tree	LA	Landscape	Tree are divided into multiple sub-disciplines according to the type under Landscape (LA). Details please refer to the Field 5.2 Sub-discipline table.	
TR	Tree Ring	XX	General (non-disciplinary)	N/A	N/A
GS	Grillage System	SL	Slope	GS	Grillage System
BU	Buttress	SL	Slope	BU	Buttress
DW	Dowel	SL	Slope	DW	Dowel
BO	Rock Bolt	SL	Slope	BO	Rock Bolt
BW	Baffle Wall	SL	Slope	BW	Baffle Wall
GW	Gabion Wall	SL	Slope	GW	Gabion Wall

GEO BIM Manual		BIM Harmonisation Guidelines			
Field 2: Discipline Code (2-3 characters)		**Field 5.1 Discipline (2 characters)**		**Field 5.2 Sub-discipline (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**	**Codes**	**Definition**
MW	Masonry Wall	SL	Slope	MW	Masonry Wall
PW	Planter Wall	SL	Slope	PW	Planter Wall
RW	Retaining Wall	SL	Slope	RW	Retaining Wall
FD	Foundation	ST	Structural	FD	Foundation
GI	Geological	SL	Slope	GI	Geological
TU	Tunnel	Tunnel is not classified as a discipline nor sub-discipline in this Guide. See Appendix VIII for the Federation Strategy related to tunnel (tunnel, subway and underpass).			
OT	Other Disciplines	XX	General (non-disciplinary)	N/A	N/A

Appendix XIV – Mapping Table for Information Container ID Fields – DSD

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1. DSD

1.1. Fields Mapping Table

The naming convention of DSD BIM Modelling Manual (Second Edition) (thereafter referred to as DSD BIM Manual) is extracted below:

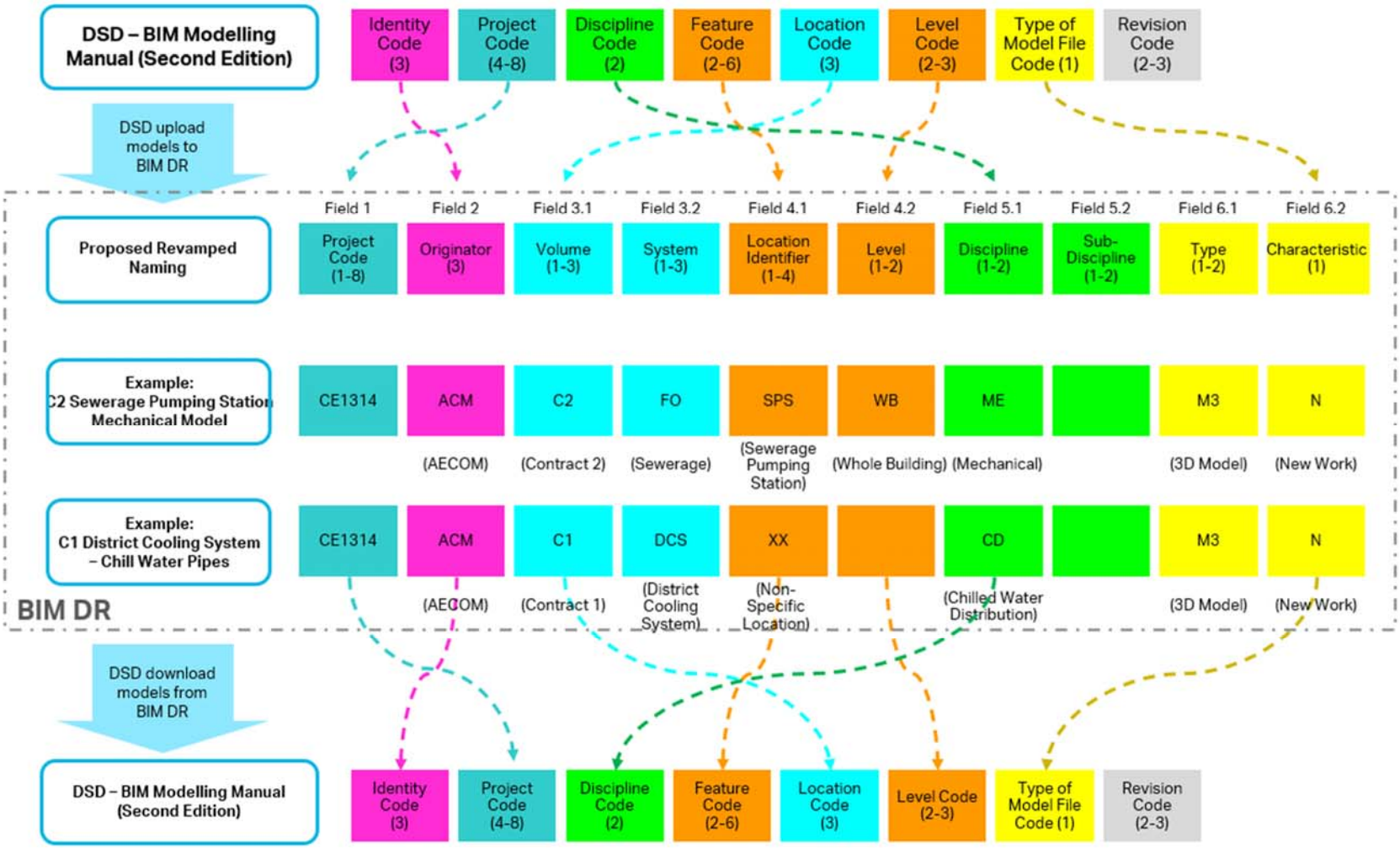
Table App XIV-1 Field Mapping for DSD BIM Manual

This Guide			DSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
1	Project Code		Project Code	The Project Code should be adopted in the sequence as defined in paragraph 2.1.2.5 1 of DSD BIM Modelling Manual. Contract No. should be used whenever available. If the project is in design stage, Agreement No. should be used. If Agreement No. is not available, then the temporary project number assigned by the respective drawing office should be used.	Not required
2	Originator		Identity Code	It refers to the Agent Responsible Codes (ARCs) of consultants/ contractors registered under the Computer-Aided Drafting Standard for Works Project (CSWP) or codes assigned to various divisions / units of DSD defined in paragraph 3.2.1.1 of DSD BIM Modelling Manual.	Not required
3.1	Volume		Location Code	It refers to a location or group of location in a project which the model file relates to.	Not required
4.1/ 4.2	Location/ Sub-location		Feature Code	It refers to an area of a facility or feature in a project which the model file relates to.	Required

This Guide			DSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
4.2	Sub-location		Level Code	It refers to a level, or group of level in a project which the model file relates to.	Required
5.1	Discipline		Discipline Code	It refers to the discipline of a model file.	Required
6.2	Characteristic		Type of Model File Code	It refers to the type of a model file.	Required
N/A	N/A		Revision Code	It refers to the revision of a model file.	N/A

1.2. Fields Mapping Diagram

Figure App XIV-1 Field Mapping Diagram for DSD BIM Manual



1.3. Fields that Matches with this Guide

Some naming fields of DSD BIM Manual do not require mapping when sharing to (or downloading from) the BIM DR.

a) Field 1 Identity Code is the same as the Originator field of this Guide.

b) Field 2 Project Code and Field 5 Location Code are equivalent to the Project Code and Volume of this Guide. As these fields are project specific with no standard codification system, mapping is not required.

Field 6 Revision Code is not required to be included when uploading model files to the BIM DR. The BIM DR would only collect as built and design BIM models. Models on the BIM DR shall not have frequent design changes. Therefore, Revision Code is suggested to be set as "00" after downloading from the BIM DR for DSD's use.

1.4. Fields that Needs to be Mapped

For the remaining fields, the following code mapping should apply. (See Appendix X for common codes of Field 4 Feature Codes)

Table App XIV-2 Code Mapping for DSD BIM Manual (Discipline)

DSD BIM Manual		**BIM Harmonisation Guidelines**	
Field 3: Discipline Code (2 characters)		**Field 5.1 Discipline (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
AR	Architectural	AR	Architectural
BS	Building Services	BS	Building Services
CV	Civil	Civil models for general arrangement drawings are suggested to be rearranged under Architectural, Structural, and General (non-disciplinary) models.	
CI	Control and Instrumentation	Control and Instrumentation model is not existed in this Guide. Therefore, this discipline is not included in this Guide and is suggested to be included in an expanded common discipline standard codes in the future.	
EL	Electrical	EL	Electrical
ES	Engineering Survey	Engineering Surveying models are not existed in this Guide. Therefore, this discipline is not included in this Guide and is suggested to be included in an expanded common discipline standard codes in the future.	
LU	Landscape	LA	Landscape

DSD BIM Manual		BIM Harmonisation Guidelines	
Field 3: Discipline Code (2 characters)		Field 5.1 Discipline (2 characters)	
Codes	**Definition**	**Codes**	**Definition**
ME	Mechanical	ME	Mechanical
ST	Structural	ST	Structural
SW	Stormwater	SD	Stormwater Drainage
FW	Sewerage	FO	Sewerage
MD	Multi-Disciplines	ZZ	Multiple disciplines for combined model
N/A	N/A	CD	Chilled Water Distribution
N/A	N/A	FS	Fire Services
N/A	N/A	FW	Fresh Water System
N/A	N/A	GS	Gas Supply
N/A	N/A	IR	Irrigation
N/A	N/A	PS	Electrical Power Supply
N/A	N/A	RD	Road
N/A	N/A	RW	Raw Water System
N/A	N/A	SF	Site Formation
N/A	N/A	SL	Slope
N/A	N/A	SW	Salt Water System
N/A	N/A	TC	Telecommunication
N/A	N/A	WR	Recycled Water System
N/A	N/A	XX	General (non-disciplinary)

Table App XIV-3 Code Mapping for DSD BIM Manual (Level)

DSD BIM Manual		BIM Harmonisation Guidelines	
Field 6: Level Code (2 to 3 characters)		Level Codes for Field 4.2 Sub-location (2 characters)	
Codes	**Definition**	**Codes**	**Definition**
B2	Basement 2	B2	Basement Level 2
B1	Basement 1	B1	Basement Level 1
ESP	Reference level from engineering survey	ES	Reference level from engineering survey
00F	Ground Floor	GF	Ground Floor
01F	First Floor	01	Level 01
02F	Second Floor	02	Level 02
RF	Roof	RF	Roof
WB	Whole Building	WB	Whole Building
N/A	N/A	LG	Lower Ground Floor
N/A	N/A	UG	Upper Ground Floor
N/A	N/A	MF	Mezzanine Floor

DSD BIM Manual		BIM Harmonisation Guidelines	
Field 6: Level Code (2 to 3 characters)		**Level Codes for Field 4.2 Sub-location (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
N/A	N/A	M1	Mezzanine above level 01
N/A	N/A	M2	Mezzanine Above Level 02
N/A	N/A	PL	Podium Level
N/A	N/A	UR	Upper Roof
N/A	N/A	AL	All levels (of a specific building zone)

Table App XIV-4 Code Mapping for DSD BIM Manual (Characteristic)

DSD BIM Manual		BIM Harmonisation Guidelines	
Field 7: Type of Model File Code (1 character)		**Field 6.2 Characteristic (1 character)**	
Codes	**Definition**	**Codes**	**Definition**
S	Seed File / Template File	Template files should not be used for model sharing on BIM DR, this code is suggested to remain for DSD's internal use.	
M	Proposed Works	N	New Works / Proposed Works
T	Temporary Works	T	Temporary Works
E	Existing Features	E	Existing, to remain
L	Link File	Combined Model (CM) for federated models in Field 6.1 Type.	
N/A	N/A	A	As-built
N/A	N/A	M	Maintenance or record
N/A	N/A	D	Demolition
N/A	N/A	W	All Works (combination of above works)

Appendix XV – Mapping Table for Information Container ID Fields – EMSD

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Figure App XV-1 Field Mapping Diagram for EMSD BIM Guidelines XV-3

1. EMSD

1.1. Fields Mapping Table

The naming convention of EMSD BIM AM Standards Guidelines (thereafter referred to as EMSD BIM Guidelines) is extracted below:

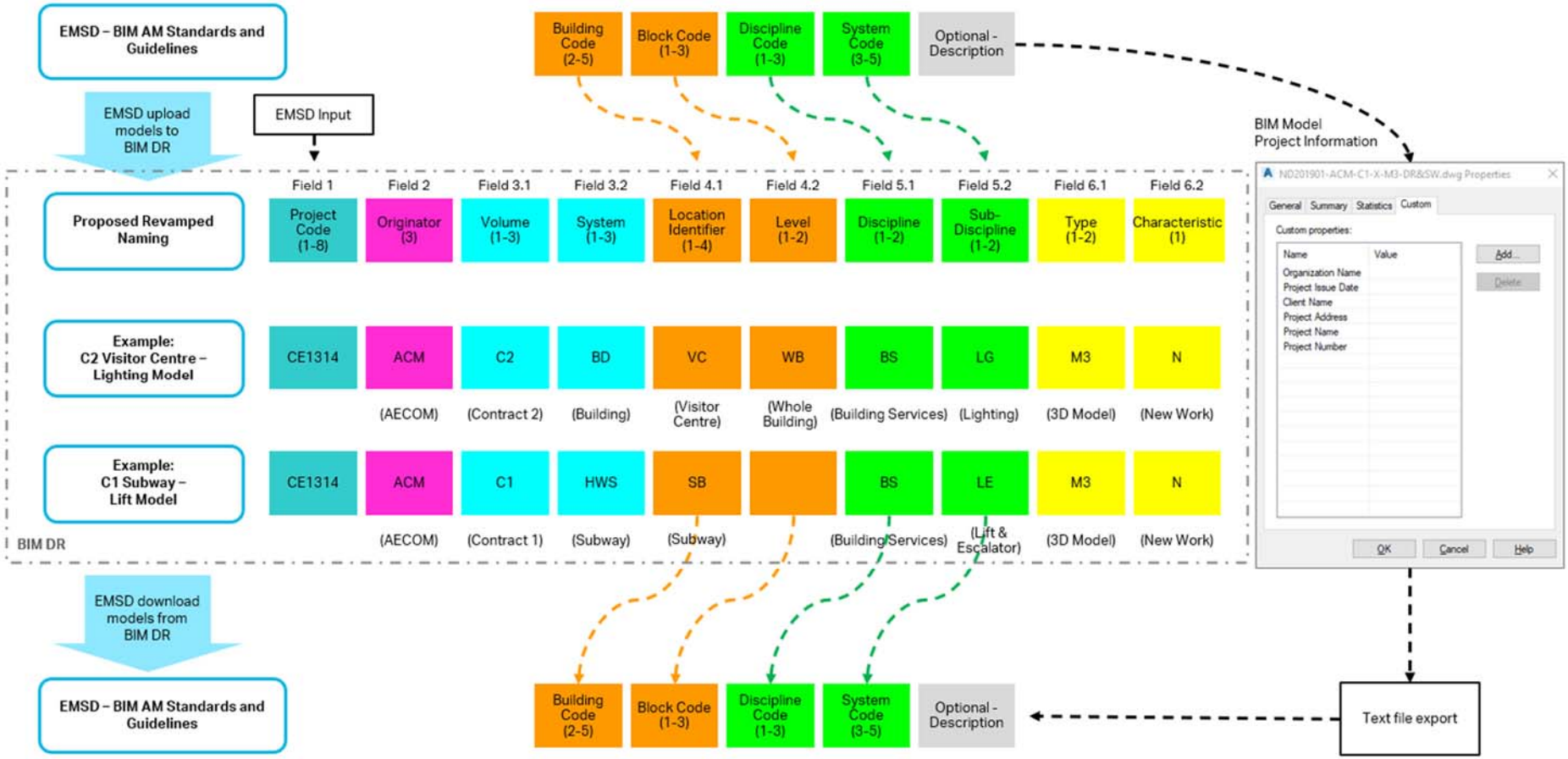
Table App XV-1 Field Mapping for EMSD BIM Guidelines

This Guide			EMSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
4.1	Location		Building Code	The list of buildings and their building code in Hong Kong can be referred to Appendix A of EMSD BIM AM Standards Guidelines.	Not required
4.2	Sub-location		Building Block Code	The coding represents the blocks or towers of a development with multiple buildings. Other coding used in a project should be agreed by all parties and documented in the project execution plan.	Required
5.1	Discipline		Discipline	Alphabetical character represents the class of disciplines.	Required
5.2	Sub-discipline		System	Names and Codes of E&M Systems Note: (1) Systems are not in the EMSD asset templates. (2) Project BIM manager may further create other system types if any specific system is not listed above. The principle for system coding should be for easy identification and drawing production.	Required

This Guide			EMSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
				The system name and coding used in a project should be agreed by all parties and documented in the project execution plan.	
N/A	N/A	BIM Model Project Information	Description	Not specified	N/A

1.2. Fields Mapping Diagram

Figure App XV-1 Field Mapping Diagram for EMSD BIM Guidelines



Since no project number is included in the file names according to EMSD's naming standards, EMSD is expected to provide its internal project numbers when renaming the models before uploading to the BIM DR.

1.3. Fields that Matches with This Guide

Some naming fields of EMSD BIM Guidelines do not require mapping when sharing to (or downloading from) the BIM DR.

a) Field 1 Building Code is equivalent to the Location field of this Guide and this field could be project specific even though common codes are provided on Appendix X. EMSD building codes are specific locations across the entire HK territory instead of reusable codes in future developments. Therefore, the EMSD codes are considered project specific codes and no codification standards would be applied. However, some of the EMSD building codes exceeds the 4 characters limitation; should it be shared on the BIM DR in the future, EMSD would have to shorten the building codes.

b) Field 6 Description shall be included in the BIM Model Project Information as BIM attributes which should be inputted in all BIM files as part of the LOD-I for metadata extraction and geolocation. Project Information includes Organisation Name, Project Issue Date, Client Name, Project Address, Project Name and Project Number. Appendix VI of this Guide shown some examples of project information input methods. This field could be automatically read by the BIM DR and exported upon request.

1.4. Fields that Needs to be Mapped

For the remaining fields, the following code mapping should apply:

Table App XV-2 Code Mapping for EMSD BIM Guidelines (Sub-location)

EMSD BIM Guidelines		**BIM Harmonisation Guidelines**	
Field 2: Building Block Code (1 to 3 characters)		**Field 4.2 Sub-location (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
T1	Tower 1	T1	Tower 1
T2	Tower 2	T2	Tower 2
B1	Block 1	K1	Block 1
B2	Block 2	K2	Block 2
N	North Wing	N	North Wing
S	South Wing	S	South Wing
W	West Wing	W	West Wing
E	East Wing	E	East Wing
NA	Single building block in project	BD	Building

Table App XV-3 Code Mapping for EMSD BIM Guidelines (Discipline)

EMSD BIM Guidelines		**BIM Harmonisation Guidelines**	
Field 3: Discipline (1 to 3 character)		**Field 5.1 Discipline (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
MEP	Mechanical, Electrical and Plumbing (Combined)	BS	Building Services
A	Architecture	AR	Architectural
S	Structure	ST	Structural
C	Civil Engineering	Civil Engineering contains multiple disciplines. It is suggested that the Civil Engineering be redefined to map to other applicable discipline(s) in this Guide. For generic construction elements, XX-General (non-disciplinary) shall be used.	
L	Landscape	LA	Landscape
O	Other Discipline	Other Discipline is not classified as one single discipline in this Guide. It is suggested that the models identified as Other Discipline under the EMSD classification system be mapped to the other applicable discipline(s) in this Guide. For generic construction elements, XX-General (non-disciplinary) could be used.	
N/A	N/A	CD	Chilled Water Distribution
N/A	N/A	EL	Electrical
N/A	N/A	FO	Sewerage
N/A	N/A	FS	Fire Services
N/A	N/A	FW	Fresh Water System
N/A	N/A	GS	Gas Supply
N/A	N/A	IR	Irrigation
N/A	N/A	ME	Mechanical
N/A	N/A	PS	Electrical Power Supply
N/A	N/A	RD	Road
N/A	N/A	RW	Raw Water System
N/A	N/A	SD	Stormwater Drainage
N/A	N/A	SF	Site Formation
N/A	N/A	SL	Slope
N/A	N/A	SW	Salt Water System
N/A	N/A	TC	Telecommunication
N/A	N/A	WR	Recycled Water System
N/A	N/A	XX	General (non-disciplinary)
N/A	N/A	ZZ	Multiple disciplines for combined model

Table App XV-4 Code Mapping for EMSD BIM Guidelines (Sub-discipline)

EMSD BIM Guidelines		**BIM Harmonisation Guidelines**	
Field 4: System (3 to 5 character)		**Field 5.2 Sub-discipline (2 characters) (Main discipline: Building Services)**	
Codes	**Definition**	**Codes**	**Definition**
LAE	Lift & Escalator	LE	Lift & Escalator
LVS	LV Switchboard	LV	LV Switchboard
EMG	Emergency Generator	EG	Emergency Generator
HVAC	Heating, ventilation, and air conditioning	HA	Heating, ventilation, and air conditioning
BLR	Boiler System	BL	Boiler System
FP	Filtration Plant	FP	Filtration Plant
UPS	Uninterrupted Power Supply	UP	Uninterrupted Power Supply
BA	Burglar Alarm	BA	Burglar Alarm
RNS	Radar and Navigation System	RN	Radar and Navigation System
MLS	Microwave Link System	ML	Microwave Link System
TDS	Timing & Display System	TD	Timing & Display System
AV	Audio Video System	AV	Audio Video System
AUS	Audio Electronics System	AU	Audio Electronics System
RS	Radio System	RS	Radio System
CCTV	Closed Circuit TV System	CC	Closed Circuit TV System
BR	Broadcast Reception	BR	Broadcast Reception
LTG	Lighting	LG	Lighting
MG	Medical Gas System	Medical Gas System models are not existed in this Guide. Therefore, this discipline is not included in this Guide and is suggested to be included in an expanded common discipline standard codes in the future.	
EL	Electrical Distribution	EL	Electrical Distribution
PTS	Pneumatic Tube Transport	PT	Pneumatic Tube Transport
PL	Plumbing	PL	Plumbing
DR	Drainage	DR	Drainage
LDS	Water Leakage Detection System	LD	Water Leakage Detection System
MHL	Mechanical Handling & Lifting Installation	Medical Handling & Lifting Installation models are not existed in this Guide. Therefore, this discipline is not included in	

EMSD BIM Guidelines		BIM Harmonisation Guidelines	
Field 4: System (3 to 5 character)		**Field 5.2 Sub-discipline (2 characters) (Main discipline: Building Services)**	
Codes	**Definition**	**Codes**	**Definition**
		this Guide and is suggested to be included in an expanded common discipline standard codes in the future.	

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1. HyD

1.1. Fields Mapping Table

The naming convention HyD BIM Guidelines (draft) (thereafter referred to as HyD BIM Guidelines) is extracted below:

Table App XVI-1 Field Mapping of HyD BIM Guidelines

This Guide			**HyD**		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
1	Project Code		Project Code	Project code should be the abbreviation of the project name.	Not required
2	Originator		Agent Responsible Code	Agent responsible code is used to identify the responsible party who creates the model. The list of the agent responsible codes can be downloaded from the DevB web site and is administered by the Computer-Aided-Drafting Standard for Works Projects (CSWP) Working Group.	Not required
7	Sequential Number		Item Number	A unique item number should be given to each model under a project. Item number shall be a 2-digit number assigned to the models (e.g. structures, road, etc) in sequential order in the same project. The item number shall be started from "01" until "99".	Not required
6.1	Type		Model Code	Model code shall be assigned to the model depending on its file type.	Required
N/A	N/A	BIM Model Project Information	Model File Identifier	The model file identifier shall be the abbreviation of the model components such as pile cap, column, subway, etc. The model file identifier shall keep as precise as possible. When creating the model file identifier, it should not consist	N/A

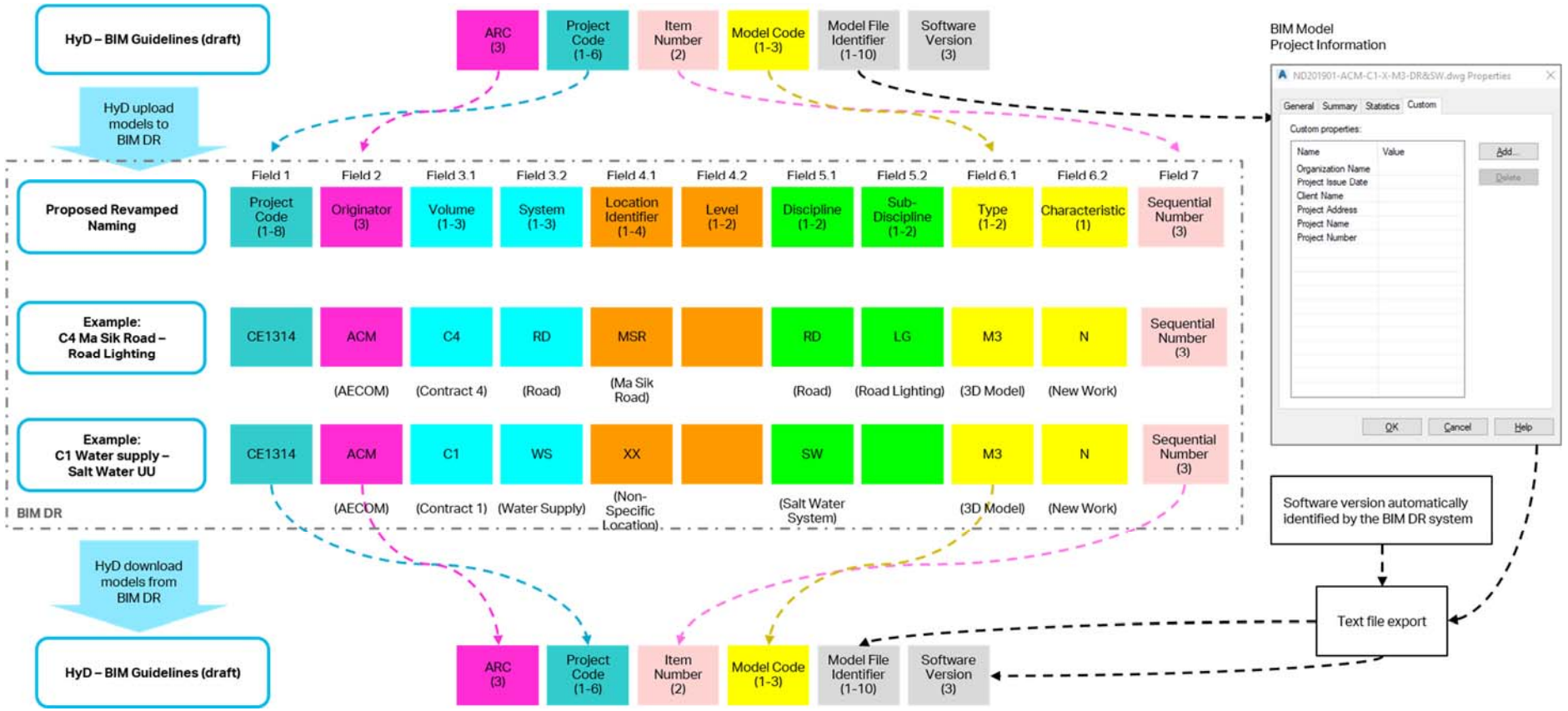
<table>
<tr><th colspan="3">This Guide</th><th colspan="3">HyD</th></tr>
<tr><th>Field/ Sub-field No.</th><th>Information Container ID Field</th><th>Remark</th><th>Naming Field</th><th>ID Field Description</th><th>Code Mapping</th></tr>
<tr><td></td><td></td><td></td><td></td><td>of more than 10 characters. The examples of Model File Identifier are illustrated below.

<table><tr><th>File Identifier</th><th>Description</th></tr><tr><td>GPILCAPA</td><td>Component of Pile Cap A, General Arrangement</td></tr><tr><td>GCOLUMNA</td><td>Component of Column A, General Arrangement</td></tr><tr><td>GABUTA</td><td>Component of Abutment A, General Arrangement</td></tr><tr><td>GSUBWAY</td><td>Component of Subway, General Arrangement</td></tr><tr><td>GDECKA</td><td>Component of Bridge Deck A, General Arrangement</td></tr><tr><td>GTATOPA</td><td>Component of Table Top A, General Arrangement</td></tr><tr><td>GROPOST</td><td>Component of Roof Post, General Arrangement</td></tr><tr><td>GSTAIRA</td><td>Component of Staircase A, General Arrangement</td></tr><tr><td>GRAMPA</td><td>Component of Ramp A, General Arrangement</td></tr><tr><td>GLIFTA</td><td>Component of Lift A, General Arrangement</td></tr><tr><td>GESCALA</td><td>Component of Escalator, General Arrangement</td></tr><tr><td>GPARAP</td><td>Component of Parapet Details, General Arrangement</td></tr></table></td><td></td></tr>
</table>

<table>
<tr><th colspan="3">This Guide</th><th colspan="3">HyD</th></tr>
<tr><th>Field/ Sub-field No.</th><th>Information Container ID Field</th><th>Remark</th><th>Naming Field</th><th>ID Field Description</th><th>Code Mapping</th></tr>
<tr><td></td><td></td><td></td><td></td><td><table><tr><td>GSTEEL</td><td>Component of Structural Steel Connection Details</td></tr></table></td><td></td></tr>
<tr><td>N/A</td><td>N/A</td><td></td><td>Software Version Code</td><td>Software version codes are used to identify the software and corresponding software version used to create and edit the model. Software version shall be presented in 2 digits with 1 character “R” in front. The examples of naming convention for software version are illustrated below.<table><tr><th>Version Code</th><th>Software Version</th></tr><tr><td>R18</td><td>Autodesk Revit 2018</td></tr><tr><td>R19</td><td>Autodesk Civil 3D 2019</td></tr><tr><td>R19</td><td>Autodesk Navisworks 2019</td></tr><tr><td>R[XX]</td><td>[For types that do not fall in the above categories]</td></tr></table></td><td>N/A</td></tr>
</table>

1.2. Fields Mapping Diagram

Figure App XVI-1 Mapping Diagram for HyD BIM Guidelines



1.3. Fields that Matches with this Guide

Some naming fields of HyD BIM Guidelines do not require mapping when sharing to (or downloading from) the BIM DR.

a) Field 1 Agent Responsible Code is the same as the Originator field of this Guide.

b) Field 2 Project Code and Field 3 Item Number are equivalent to the Project Code and Sequential Number of this Guide. As these fields are project specific with no standard codification system, mapping is not required.

c) Field 5 Model File Identifier acts as the description of the model content, and it is suggested to be included in the BIM Model Project Information as BIM attributes which should be inputted in all BIM files as part of the LOD-I for metadata extraction and geolocation. Project Information includes Organisation Name, Project Issue Date, Client Name, Project Address, Project Name and Project Number. Appendix VI of this Guide shown some examples of project information input methods. This field could be automatically read by the BIM DR and exported upon request. Alternatively, this field could be reorganised and utilise Fields 3, 4, 5 or 6 for input.

d) Software (and its version if applicable) by which a model is produced shall be automatically identified by the BIM DR system. Therefore, the Software Version as in Field 6 of the naming convention of HyD BIM Guidelines need not be provided to the BIM DR. The software versions could be exported from the BIM DR upon request.

1.4. Fields that Needs to be Mapped

For the remaining fields, the following code mapping should apply:

Table App XVI-2 Code Mapping for HyD BIM Guidelines

HyD BIM Guidelines		**BIM Harmonisation Guidelines**	
Field 4: Model Code (1 to 3 characters)		**Field 6.1 Type (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
D	Drawings Model	DR	2D Drawing Rendition (General)
CAD	2D CAD	DR	2D Drawing Rendition (General)
C3	Civil 3D Model	M3[1]	3D Model File
L	Linked Model	N/A[2]	N/A
DR	Design Review Model	This code clashes with this Guide and could be mapped to other code under Type.	
N	Federated Model	CM	Combined Model (Combined Multidiscipline Model)
P	Recap Model	M3[1]	3D Model File

HyD BIM Guidelines		BIM Harmonisation Guidelines	
Field 4: Model Code (1 to 3 characters)		Field 6.1 Type (2 characters)	
Codes	**Definition**	**Codes**	**Definition**
R	Revit Design Model	M3[1]	3D Model File
V	Virtual Site Model	N/A[2]	N/A
X	Raw Data of Civil 3D	Code is not adopted as raw data should not be shared on the BIM DR.	
TS	Tekla Structures	M3[1]	3D Model File
XXX	For software that do not fall in the above categories	M3[1]	3D Model File

1. The model code refers to 3D models produced by different software. Software information would be automatically identified by the BIM DR and could be exported upon request.
2. It is suggested that the list of standard codes for Type in Appendix X to be extended in the future to incorporate other Model Codes of HyD BIM Guidelines.

Appendix XVII – Mapping Table for Information Container ID Fields – WSD

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1. WSD

1.1. Fields Mapping

The naming convention of WSD BIM Standards Manual (thereafter referred to as WSD BIM Manual) is extracted below:

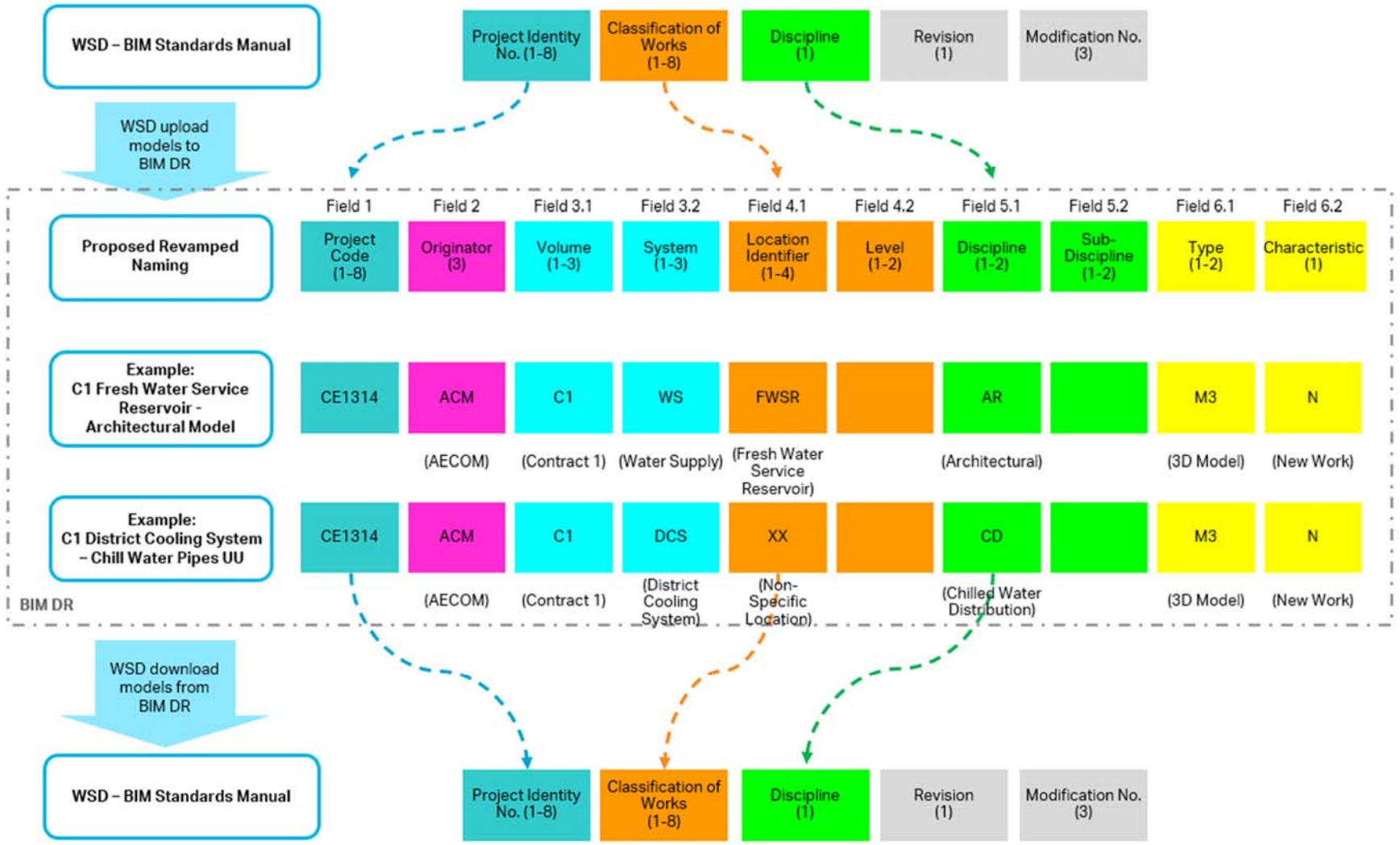
Table App XVII-1 Field Mapping for WSD BIM Manual

This Guide			WSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
1	Project Code		Project Identification Number	A maximum of 8-digit alphanumerical characters with a prefix “W” or “SK” shall be given to every works contract or every works order. Example: - W10346, SK23456.	Not required
4.1/ 4.2	Location/ Sub-location		Classification of Works	A maximum of 8-digit alphanumerical characters shall be allocated to the CODE of the file name for classification of works so as to facilitate the identification of each installation or different nature of works within a works project.	Required
5.1	Discipline		Discipline	A single alphabetical character represents the class of discipline.	Required
N/A	N/A		Revision	A “0” (zero) shall be allocated to a project model once it is being created. Any revision made to an approved BIM model shall be given with an alphabetical character, commencing from “A” to “Z”.	N/A
N/A	N/A		Modification No.	The Modification Number depicts the frequency of amendments made in the course of each revision. Allocating a Modification No. to a newly created model is similar to that for the Revision but with the use of a “000” (3-zero) numerical characters. The Modification Number	N/A

This Guide			WSD		
Field/ Sub-field No.	**Information Container ID Field**	**Remark**	**Naming Field**	**ID Field Description**	**Code Mapping**
				shall be increased by one for each amendment, commencing from "001". Once the revision to a BIM model is approved, the version of Revision shall be changed accordingly, and the Modification Number must be reset to "000" to align with the new Revision.	

1.2. Fields Mapping Diagram

Figure App XVII-1 Field Mapping Diagram for WSD BIM Manual



1.3. Fields that Matches with this Guide

Some naming fields of WSD BIM Manual do not require mapping when sharing to (or downloading from) the BIM DR.

a) Field 1 Project Identification Number is equivalent to the Project Code of this Guide. As this field is project specific with no standard codification system, mapping is not required.

b) Field 5 Revision and Field 6 Modification No. are not required to be included when uploading model files to the BIM DR. The BIM DR would only collect as built and design BIM models. Therefore, Revision and Modification No. are suggested to be set as "0-000" after downloading from the BIM DR for WSD's use.

1.4. Fields That Needs to be Mapped

For the remaining fields, the following code mapping should apply.

Table App XVII-2 Code Mapping for WSD BIM Manual

WSD BIM Manual		**BIM Harmonisation Guidelines**	
Field 3: Discipline (1 character)		**Field 5.1 Discipline (2 characters)**	
Codes	**Definition**	**Codes**	**Definition**
C	Civil Engineering	Civil Engineering contains multiple disciplines. It is suggested that the Civil Engineering be redefined to map to other applicable discipline(s) in this Guide. For generic construction elements, XX-General (non-disciplinary) shall be used.	
M	Mechanical Engineering	ME	Mechanical
E	Electrical Engineering	EL	Electrical
A	A working model that involves different divisions and disciplines to participate	ZZ	Multiple disciplines for combined model
N/A	N/A	AR	Architectural
N/A	N/A	BS	Building Services
N/A	N/A	CD	Chilled Water Distribution
N/A	N/A	FO	Sewerage
N/A	N/A	FS	Fire Services
N/A	N/A	FW	Fresh Water System
N/A	N/A	GS	Gas Supply
N/A	N/A	IR	Irrigation
N/A	N/A	LA	Landscape

WSD BIM Manual		BIM Harmonisation Guidelines	
Field 3: Discipline (1 character)		Field 5.1 Discipline (2 characters)	
Codes	**Definition**	**Codes**	**Definition**
N/A	N/A	PS	Electrical Power Supply
N/A	N/A	RD	Road
N/A	N/A	RW	Raw Water System
N/A	N/A	SD	Stormwater Drainage
N/A	N/A	SF	Site Formation
N/A	N/A	SL	Slope
N/A	N/A	ST	Structural
N/A	N/A	SW	Salt Water System
N/A	N/A	TC	Telecommunication
N/A	N/A	WR	Recycled Water System
N/A	N/A	XX	General (non-disciplinary)

Appendix XVIII – Sample Project Close-out Checklist

The table below shows an example of the Project Close-out Checklist. The checklist could be expanded to include any project-specific check items.

No.	Check Item Description	Fulfils Project-specific Requirement?
1	Information Requirements and Exchange	
a	Do file contents meet project-specific LOIN?	Y / N
b	Are Level of Geometry and Level of Information in compliance with project-specific requirements?	Y / N
c	Has a project-specific Responsibility Matrix been authored and followed?	Y / N
d	Are hardware used in compliance with DEVB's latest requirements?	Y / N
e	Are software versions in compliance with those specified by the BEP?	Y / N
f	Are exchange formats in compliance with those specified by the BEP?	Y / N
2	Federation and Naming	
a	Does the sequence of information container ID field comply with the BIM Harmonisation Guidelines?	Y / N
b	Are any mandatory information container ID fields missing?	Y / N
c	Do common codes used comply with those specified by the BIM Harmonisation Guidelines?	Y / N
d	Do project-specific codes used comply with those specified by the BEP?	Y / N
e	Does model naming comply with information container ID as specified by the BEP?	Y / N
f	Does the naming of drawings generated from BIM comply with WDs' specifications?	Y / N
g	Does the naming of BIM objects comply with the latest version of CIC Production of BIM Object Guide General Requirements?	Y / N
3	Modelling Methodology	
a	Are BIM models authored using BIM objects from CIC BIM Portal and WDs' BIM objects?	Y / N
b	Are the following found in the BIM file(s)? i. Overlapping elements ii. Large-spanning continuous elements iii. Objects authored in generic model category iv. Complex geometry v. Special elements imported from other software If yes, please minimise their use and document any exceptions in the BEP.	Y / N
c	Are indoor spaces modelled using Room?	Y / N

No.	Check Item Description	Fulfils Project-specific Requirement?
d	Do coordinates comply with the BEP?	Y / N
e	Do colour settings comply with the BEP?	Y / N
4	Project Close-out Protocols	
a	Was the checklist completed thoroughly prior to passing the BIM file(s) to BIM DR?	Y / N