BIM SPECIFICATION TEMPLATE FOR DESIGN CONSULTANCIES

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Amendment History

Change Number	Revision Description	Sections Affected on Respective Version	Revision / Version Number	Date	Approval Reference
1	1st Draft to Survey Division	All	0.1	17.05.2021	
2	2nd Draft to Survey Division	All	0.2	28.06.2021	
3	3rd Draft to Survey Division	All	0.3	23.07.2021	
4	4th Draft - Circulation to BSWG	All	0.4	06.08.2021	
5	5th Draft - Updated according to feedback from BSWG	All	0.5	10.09.2021	
6	6th Draft - Updated according to feedback from LWD	Annex 1	0.6	27.09.2021	
7	7th - Updated according to feedback from GEO	All	0.7	15.10.2021	
8	Updated according to feedback from GEO; 1st Final – Circulation to BSSG	Section 2.1.1, 3.3, 3.5.5.1, 3.3.2.1, 3.4.1.1, 3.4.3.1, 3.5.2.2, 3.5.2.3	1.0	11.11.2021	
9	Updated according to new DEVB TC(W) requirements	All	1.1	xx.07.2023	

PREFACE

1.1 General Guideline

1.1.1.1 The template shall be edited as necessary to suit the respective project nature. Items with brackets [ ] are editable text that the project officers may edit and reformat before sending out. Items in italics with yellow highlight are guidelines. Items with "*" means delete as appropriate.

1.1.1.2 Project officers shall review and update the Section 3.2, Annex 1-4 according to specific requirements of the Service.

1.1.1.3 The template is developed as a reference material for project officers to develop the study brief for the consultancy agreement. Project officers may select and apply all or part of the relevant clauses in this template according to the nature of each project.

1.1.1.4 The template shall be used in conjunction with the departmental BIM Execution Plan (BEP) template and guideline, Modelling Manual and the LOIN Specifications.

1.2 Structure

1.2.1.1 Section 1 describes the specific project BIM objectives to be achieved in the project. The template only specifies some main objectives for workflow enhancement, early collaboration, and asset management and **DO NOT** cover project specific needs. The project officers may consider adding project specific objectives in this section. All high-level objectives shall be project specific and further specified the deliverables, schedule of submission and process requirements in Section 3.

1.2.1.2 Section 2 lists the general requirements regarding schedules, standards, information management and training requirements. Project officers should review the standards according to latest development of Development Bureau, CEDD and Maintenance parties of the Services.

1.2.1.3 Section 3 describes the delivery schedule, process and requirements of the project and BIM deliverables. The template lists typical examples for the project officers to develop their own project deliverables. The deliverables shall be reviewed according to project objectives and Services. The BIM deliverables shall be clear, specify and timely to support project decisions and/or generation of project deliverables.

1.2.1.4 Section 4 specifies the competence and qualification of the BIM team. The project officers shall review the latest requirements of Development Bureau and CEDD.

1.2.1.5 The Annex 1 provides a template for the project officers to summary of deliverables and the expected submission schedule for interim and final deliverables.

1.2.1.6 Annex 1 allows the project officers to specify the project required deliverables, and the content and format of their related BIM deliverables, interim and final submission

schedules. The Annex 1 should be **project specific and must be** updated and developed by the project officers.

1.2.1.7 The Annex 2 lists a table of content for the BIM project execution plan (BEP).

1.2.1.8 The table of content of section 5 of the BEP may be slightly different according to the deliverables required in the Services. The project officers shall review the table of content with the Departmental BIM Execution Plan (BEP) template and guideline to update the Annex 2.

1.2.1.9 The Annex 3 and Annex 4 provides a generic guideline for model federation and breakdown structure. They could vary among projects. The project officers shall review the scheme of the identified of works against the Annex 3 and 4.

1.2.1.10 Project officers may request the Consultant to propose the federation and breakdown structure in their BEP with reference to the Departmental Modelling Manual of model federation and breakdown requirement if necessary.

1.2.1.11 The Annex 4 lists a reference of LOIN requirements for the project officers. It should be used in conjunction with the Modelling Manual and LOIN Specification. Typical examples for 4 major services areas of CEDD are listed for project officers to review.

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LIST OF ABBREVIATION

Abbreviation	Full Expression
2D	Two Dimensional
3D	Three Dimensional
4D	Four Dimensional (i.e. Three Dimensional with Time)
5D	Five Dimensional (i.e. Three Dimensional with Time and Cost)
AB	As-Built Stage
AM	Asset Management
AIR	Asset Information Requirements
AIM	Asset Information Model
BEP	BIM Execution Plan
BIM	Building Information Modelling / Building Information Model
BoQ	Bills of Quantity
CAD	Computer Aid Design
CAT	Category Code for BIM matrix model elements
CDE	Common Data Environment
BIM CDCP	Common Data Collaboration Platform for BIM
CEDD	Civil Engineering and Development Department, HKSAR Government
CIC	Construction Industry Council, Hong Kong
CITF	Construction Innovation and Technology Fund
CT	Construction Stage
COBie	Construction Operation Building Information Exchange
CSDI	Common Spatial Data Infrastructure
CSWP	CAD Standard for Works Projects
DD	Detailed Design Stage
DEVB	Development Bureau, HKSAR Government
EIR	Exchange Information Requirements
GIS	Geographic Information System
IFC	Industrial Foundation Class
LandsD	Lands Department, HKSAR Government
LoD	Level of Development
LoD-G	Level of Graphics
LoD-I	Level of Information
LOIN	Level of Information Need
PIM	Project Information Model (Project BIM Model)
PIR	Project Information Requirements
QA	Quality Assurance
QC	Quality Control
SSSS	Smart Site Safety System
TC(W)	Technical Circular (Works)
WIP	Work In Progress
VR	Virtual Reality

1. INTRODUCTION

1.1 Employer's BIM Objectives

1.1.1.1 The Consultant shall reengineer the traditional workflow and fully utilise BIM technology for collaboration among various stakeholders during the [investigation, design and construction phases] of the Services with an aim to improve productivity [of (type/area of work)], reduce abortive works [in (type/area of work)], enhance construction safety [of (type/area of work)] and/or optimise the operation efficiency [of (type/area of work)]. The Consultant shall demonstrate the feasibility / constructability of the design by using BIM.

The project officers shall consider adding specific area of interest inside the (area/type of works) bracket.

1.1.1.2 The Consultant shall progressively develop the Project Information Model (PIM) to facilitate the early collaboration of information among various stakeholders before the key dates. A comprehensive process should be developed to allow the Employer's Agent to participate in the planning and design process with interim PIMs and/or related simulation and/or visualizations. The Consultant shall generate the required deliverables from the PIM as far as practicable.

1.1.1.3 The Consultant shall produce a comprehensive design stage BIM model for the generation of tendering drawings. [The final design stage BIM model shall be developed to enable the contractor to estimate the tender and further develop the deliverables required in the construction stage.]

*The template only specifies some main objectives for workflow enhancement, early collaboration, and asset management and **DO NOT** cover project specific needs. The project officers may consider adding project specific objectives in this section. All high-level objectives should be project specific and further specified the deliverables, schedule of submission and process requirements in Section 3.*

2. GENERAL REQUIREMENT

2.1 BIM Use Requirements

2.1.1.1 The Consultant shall reengineer the traditional workflow and adopt the following BIM uses during investigation, feasibility, planning and design process to achieve the Employer's BIM objectives mentioned in Section 1.1 above.

	BIM Use [1]	**Investigation, Feasibility and Planning**	**Design**
1	Design Authoring	[Yes/No*]	Yes

[1] Explanations of each of the BIM use shall be referred latest technical circular from Development Bureau, DEVB TC(W) No. [2/2021].

	BIM Use [1]	Investigation, Feasibility and Planning	Design
2	Design Reviews	[Yes/No*]	Yes
3	Existing Conditions Modelling	[Yes/No*]	Yes
4	Site Analysis	[Yes/No*]	Yes
5	3D Coordination		Yes
6	Cost Estimation	[Yes/No]	[Yes/No*]
7	Engineering Analysis		[Yes/No*]
8	Facility Energy Analysis		[Yes/No]
9	Sustainability Evaluation	[Yes/No]	[Yes/No*]
10	Space Programming	[Yes/No]	[Yes/No*]
11	Phase Planning (4D Modelling)		[Yes/No*]
12	Digital Fabrication		[Yes/No*]
20	Drawing Generation (Drawing Production)		Yes

Note:
(1) Explanations of each of the above BIM uses shall be referred to the explanation notes given in DEVB TC(W) No. [2/2021].

** BIM uses with asterisk are mandatory subject to specific objectives/conditions. Project officers shall review the latest requirements in the DEVB TC(W) on "Adoption of BIM for Capital Works Projects in Hong Kong", in particular the notes to the BIM uses table. Project officers shall also update this table together with Section 3 and Annex 1.*

2.2 Schedule of Delivery

2.2.1.1 The PIM shall be progressively developed with the planning and design programme. A collaborative review of the scheduled and progressive submission of the PIM and the required deliverables should be adopted to enhance the Services and achieve the BIM objectives. The Consultant shall submit the PIM and the interim deliverables at agreed interval before the final submission date of the BIM and deliverables stipulated in Annex 1.

2.2.1.2 Within [2 months] from the commencement of the Services, the Consultant shall agree the progressive submission schedule of the deliverables required in the Services with the Employer's Agent.

2.2.1.3 The Consultant is responsible for review and update of the delivery schedule regularly according to the master programme of the Services and agreed with the Employer's Agent for any updates and changes.

2.2.1.4 The Consultant shall document and communicate the status of all the interim deliverables as according to the Section LA.4.2 and LA.4.3 of the Hong Kong Local Annex of

ISO19650-2:2018 in the CIC Building Information Modelling Standards – General, Version 2.1 - 2021, using metadata in the CDE or spreadsheet tables.

2.3 Reference Standards

2.3.1.1 The Consultant shall adopt the latest version of the following BIM modelling standards/guidelines and industrial best practice in the Services. Reference shall be made to the relevant Technical Circular, CEDD BIM Standards, CIC BIM Standards and BS EN ISO 19650 in the following order:

- DEVB TC(W) No. [2/2021] – Adoption of BIM for Capital Works Projects in Hong Kong
- DEVB TC(W) No. [8/2021] - BIM Harmonisation Guidelines for Capital Works Projects in Hong Kong
- DEVB GC No. [01/2021] – Common Spatial Data Infrastructure for Digital Hong Kong
- BIM Harmonisation Guidelines for Works Departments published by DEVB
- CEDD TC No. xx/2023 – Adoption of BIM in CEDD
- BIM Modelling Manual published by CEDD
- LOIN Specifications published by CEDD
- Asset Information Requirements published by relevant maintenance parties
- CIC Building Information Modelling Standards – General, Version 2.1 - 2021
- CIC BIM Dictionary, 2021
- CIC Production of Building Information Modelling Object Guide General Requirements, Version 2 - 2021
- BS EN ISO 19650-1:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling, Part 1: Concepts and principles
- BS EN ISO 19650-2:2018 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling, Part 2: Delivery phase of the assets
- BS EN ISO 19650-3:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM). Information management using building information modelling.
- BS EN ISO 19650-5:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM). Information management using building information modelling.
- BS 1192-4:2014 Collaborative production of information. Fulfilling Employer's information exchange requirements using COBie. Code of Practice.
- BS EN 12006-2:2015 Building construction - Organization of information about construction works - Part 2: Framework for classification

This section describes the common standard available up to the July 2023. There are known conflicts among standards from different sources. Project officers should clearly mention the priority of standards in this section and remove unnecessary standards. In general, the standards should be considered in the following sequence:

- *Policy from Development Bureau (DEVB TC(W) No. 2/2021, DEVB GC No. 1/2021 or its latest version)*
- *DEVB BIM Harmonisation Guidelines for Works Departments*
- *Departmental Standards and Guidelines (BIM Modelling Manual & LOIN Specification published by CEDD)*
- *Asset Information Requirement published by relevant maintenance parties*
- *CIC Standards*
- *International standards/best practices*

2.4 Data Interoperability

2.4.1 3D Models

2.4.1.1 3D models include, but not limited to the progressively developed BIM/PIM models, existing condition models, Virtual Reality models, coordination models, 4D/5D models, engineering analysis models, as-built models, and Asset Information Models.

2.4.1.2 Upon request by the Employer, the Consultant shall submit the 3D model(s) in native and editable format as well as open format (e.g. IFC, exe, etc.) through exporting from 3D model(s) in the format and version agreed by the Employer's Agent. The Consultant shall ensure that the data in the file is in order, without data loss and is in consistence with those in the native file. The Consultant shall ensure all the BIM deliverables comply with the approved software versions during the period of the Consultancy and at the time of delivery.

2.4.1.3 The Consultant is required to upgrade the final BIM deliverables to the version specified by the Employer's Agent. The Consultant shall also propose the information compatibility measures and conversion procedure in the BEP. All submitted file formats, as agreed with the Employer's Agent shall be compatible with the platform and software currently in use by the Employer.

2.4.2 BIM Deliverables

2.4.2.1 All BIM deliverables or other files shall be submitted in formats agreed by the Employer or other formats specified in the latest version of OGCIO – The HKSARG Interoperability Framework (S18); which include, but not limited to, the following:

- Native and editable BIM models and drawings
- Open BIM format (.ifc)
- Design reports, documentations, and drawings (.docx, .xlsx, .pdf)
- BIM Execution Plan, progress reports, clash reports (.docx, .xlsx, .pdf)
- Project Programme Files (.xer, .mpp)
- GIS data (.shp, .gml)
- Videos (.wmv, .mp4)

- Design Review Models (.exe, nwd)
- Laser Scanning and Point Cloud data (.las, .xyz, .asc, e57)
- 3D Mesh Model (.cesium 3D Tiles, .s3mb, .x3d)

2.4.2.2 The Consultant may propose the alternative formats and versions in the BEP and agreed with the Employer's Agent if necessary before submission.

2.4.2.3 All models and the related files shall be submitted digitally in solid state digital storage as according to those standards specified in the BIM Modelling Manual and LoD Specifications published by CEDD and in the formats agreed with the Employer's Agent.

This section covers the format of deliverables. It is non-project specific. No changes are expected.

2.5 Ownerships and Liabilities

2.5.1 BIM Model and Information

2.5.1.1 The ownership of all data contained in PIM remains to the information originators, while the information originators shall grant the full ownership of all object libraries and data contained in PIM, AIM and other deliverables created, developed, and provided to the Employer and their relevant maintenance parties.

2.5.1.2 The information originators of all data contained in PIM and other deliverables created, developed, and provided shall grant the right of use to all other stakeholders involved in the Services.

2.5.2 Handling of Project Information

2.5.2.1 All 3D models (PIM and AIM), Virtual Reality models, 4D models and other BIM related information produced are confidential. All BIM models and information provided under the Consultancy are intended for use by authorized stakeholders only. At all times before commencement, during and after completion of the Services, the authorized users are required to exercise reasonable care when handling documents relating to the project information. It is the responsibility of the Consultant in disseminating the information to assure that the recipient is an authorized user and to keep record of the recipients.

2.5.2.2 At all times during and after completion of the Services, authorized users should store PIM models and related deliverables in a password protected environment. Necessary record copies for legal purposes (such as those retained by the information originators) must be safeguarded against unauthorized use for the term of retention.

2.5.2.3 Except the information originator, all project BIM information and deliverables shall be destroyed after the completion of the required Services. Destruction shall be done by burning or shredding hardcopies and/or physically destroying CDs, deleting, and removing files from the electronic recycling bins, and removing material from computer hard drives using permanent erase utility or similar software. A written agreement of disposal must be provided to the Employer upon the completion of the required Services.

This section covers the ownership of information and deliverables. It is non-project specific. No changes are expected.

2.6 BIM Training

2.6.1 BIM Trainings Provided by the Consultant

2.6.1.1 The Consultant shall, within [3] months from the commencement of the Services, provide BIM training plan in different levels to project participants, including Employer's staff and the Consultant's project team members, to enable the project participants to view, use and manipulate the BIM models and the BIM deliverables in a systematic and effective manner. The Consultant shall use project data or sample data with similar project nature as training materials as far as practicable. The provided training course shall include but not limited to the followings.

- [xx training places on BIM project implementation. Duration of the training is about 3 hours x 1 session];
- [xx training places on BIM fundamentals and Common Data Collaboration Platform for BIM (BIM CDCP) management. Duration of the training is about 3 hours x 2 sessions];
- [xx training places on BIM software operation (basic level). Duration of the training is about 3 hours x 10 sessions];
- [xx training places on BIM software operation (advanced level). Duration of the training is about 3 hours x 10 sessions];
- [xx training places on BIM data management - training including data quality verification processes and data exchanges. Duration of the training is about 3 hours x 3 sessions].

2.6.1.2 The Consultant shall provide training venue and provide each attendee with a workstation with necessary BIM software and hands-on exercise based on the Services.

2.6.1.3 After the completion of training, the Consultant shall submit a training log to the Employer's Agent for record. The training log should list out, but not limit to, the training course, date, duration, venue and attendee's name and position. The content of the training log shall be commented and agreed by the Employer's Agent. The training log should be reviewed and updated quarterly.

This template lists a full coverage of training required for the project team to plan, implement, collaborate, and check the BIM process with recommended duration of training classes. The project officers should review the needs according to the size of the Services, knowledge of the project team, knowledge of interfacing stakeholders, quality of the consultant team, etc. It is recommended to include the following course for the Employer's team

- *Basic operation of design review software: 1/2 day*
- *Basic operation of BIM CDCP software: 1/2 day*

2.6.2 BIM Training Requirements for the Consultant

2.6.2.1 The Consultant is required to nominate his staff and sub-consultant's staff to attend, within [6] months from the commencement of the Services, suitable BIM skill training courses under the pre-approved list of the CITF managed by the CIC and ensure their successful completion of the attended training courses:

- [4] staff members for the Consultant; and
- [4] staff members for the engaged sub-consultant(s), if any.

The BIM training requirements for the Consultant will be reviewed regularly by DEVB and project officers shall refer to the latest DEVB TC(W) on "Adoption of BIM for Capital Works Projects in Hong Kong" for update. The number of staff members to be nominated is for reference only and could be adjusted according to the project size and specific need of individual contract.

2.6.2.2 The Consultant shall submit the completion certificates of training courses attended by the nominated staff members to the Employer's Agent for record. In case the nominated staff members fail to complete the BIM training course, the Consultant / Sub-consultant shall arrange additional BIM training courses to their staff members to fulfil the above-mentioned requirements at their own cost within [12 months] from the commencement of the Services.

2.7 [Project Interfacing]

2.7.1.1 The Consultant is responsible for aligning the modelling conventions and practices, such as coordinate systems, units, project basepoint and naming conventions, among interfacing projects according to the agreed modelling manual, LOIN specifications and standards.

2.7.1.2 Interface procedures, such as regular model sharing protocol, spatial coordination procedures, role and responsibilities of interfacing zones, etc. shall be proposed in BEP and agreed among interfacing projects.

Section 2.7 is only applicable to large scale projects, which requires a consolidation of BIM models from different parties. It is critical to align the modelling standards and practices among all projects to avoid additional cost of model integration.

3. BIM PROCESS AND DELIVERABLES

3.1 Management Deliverables

3.1.1 BIM Execution Plan (BEP)

3.1.1.1 The Consultant shall develop the BIM Execution Plan (BEP) according to the contents in Annex 2. The BEP must be submitted to the Employer's Agent for approval within 1 month after the Services commence.

3.1.1.2 The BEP is a formal document to propose the approaches of project information delivery and provide the baseline for Quality Check and Quality Control of all deliverables. The BEP shall confirm and agreed the role and responsibility of all involved parties, schedule of software, hardware, BIM CDCP, IT infrastructures, delivery schedules, modelling standards and procedures with the Employer. It is the Consultant's obligation to fully implement the BEP agreed by the Employer's Agent.

3.1.1.3 The Consultant shall deploy a document change management process during the regular review/updating of the BEP.

3.1.1.4 The Consultant shall propose the LOIN of the interim and final PIM according to the requirements of the deliverables in Annex 1 and minimum LOIN requirement in Annex 4 in the BEP and agreed with the Employer.

The LOIN requirement of each object element can be different and subjected to different deliverables, key dates, and design scheme. Subject to the availability of information, the consultant may not be able to establish a LoD-G 300 model for all object elements even in the final design model. This is the reason why the proposed LOIN for each model elements shall be defined clearly and agreed in the BEP. The project officers may filter the elements from the Annex 4 to establish the minimum requirement of the Services of each deliverable. The CEDD officer may specify the LOIN with reference to the Departmental LOIN Specification.

3.1.1.5 The Consultant shall setup a BIM kick-off meeting to describe the BIM approaches, schedule of deliverables, the role and responsibility of this Services for the approval of the BEP.

3.1.1.6 During the commissioning stage of the Services, The Consultant shall update the BEP to document the final model federation, breakdown structure, and LOIN of the PIM. The finalized BEP shall be submitted with the final Design BIM model.

3.1.2 Progress Report and Meeting

3.1.2.1 The Consultant shall setup [monthly/quarterly] progress meeting with the Employer's Agent to facilitate information sharing, review critical clashes/issues, report and monitor the progress. The [monthly/quarterly] submitted progress reports and WIP models shall be reviewed in the meeting to facilitate the discussion.

3.1.2.2 The progress meeting shall review the schedule of deliverables. The Consultant shall summarize the progress of deliverables and updated delivery schedule in the progress meeting.

3.1.2.3 The Consultant shall submit the progress report [Monthly/Quarterly/ [2 weeks before the progress meetings] to the Employer to summarize the status of PIM and its deliverables.

3.1.2.4 The progress report shall include but not limited to the following information:

- Summary of current and upcoming activities

- A set of latest versions of WIP models which allow interactive walkthrough, measurement and dimensioning
- LoD Documentation of the released/shared WIP models
- Information history summary, changes and model update history
- Clash/Issue Summary
- Availability and challenges to update drawings / information, Coordination Information into the WIP model against the Delivery Schedules
- Progress summary against the proposed project delivery schedule

3.1.3 Quality Assurance

3.1.3.1 The Consultant is responsible for ensuring the integrity of the PIM, drawings, and BIM deliverables, as well as the compliance with the agreed format and standards in the BEP, and/or any agreed BIM standards. A quality assurance plan shall be proposed in the BEP.

3.1.3.2 The Consultant shall carry out appropriate quality check [every 3/6 months] [and submit the quality check report] to the Employer's Agent.

3.1.3.3 The quality check process shall include but not limited to the following:

- Consistency among shared/published models/drawings against the information registers
- Modelling Standard compliance check against agreed modelling manual and standards, such as formats, versions, naming conventions, model setup, coordination systems and configuration, etc.
- Modelling Methodology compliance check against proposed in BEP, such as model federation, break down structure, tools, categories, constraints and
- Modelling completeness, geometry, and information accuracy against agreed LOIN, and delivery schedule in the BEP
- Model presentation settings against agreed modelling manual and standards, such as model view cleansing, objects and drawings presentation styles, symbols, annotations, and layers settings, etc.
- File sharing requirement check against the proposed in BEP, such as version, format, extension, resolutions, etc.

Section 3.1 describe the management deliverables from the Consultant's BIM Team including a Pre-appointment BEP, BEP, Progress report and Quality Check Report to demonstrate the Consultant's ability to plan, implement, deliver and check BIM deliverables required in this project.

BEP, Progress report and Quality Check Report are deliverables to support planning and management of BIM deliverables. The project officers are advised to review the submission frequency of progress report [and quality check report] based on the project size and Key Dates.

3.2 Project Information Model

3.2.1 Existing Conditions Model

3.2.1.1 The Consultant shall base on the specified [study area/ project boundary] to submit an existing conditions model [in LoD-G 250 minimum / according to the requirements in Annex 4] to support the development of deliverables required in the Services. The Consultant shall propose the model breakdown structure and respective LOIN in the BEP and agree with the Employer's Agent.

All projects require an existing condition model to support the generation of other BIM deliverables. The modelling objects and their LOIN required in the Existing Condition Model may vary according to offices and project nature. For example:

- *Land and Infrastructure Services: Higher LoD-G (250) requirement for road objects such as barrier, man-holes, kerbs, underground utilities, but lower LoD-G (100) for on-slope features*
- *Geotechnical Services: Lower LOD-G (100) for street furniture, but higher LoD-G (250) for U-channel, Staircases, access ladders, flexible barriers, soil nails, etc on the slopes.*
- *Port and Marine Services: High LoD-G (300) for shoreline, bathymetry, but Lower LoD-G (200) for other features*
- *Environmental and Sustainability Service: High LoD-G (300) for land boundary, (250) for man-holes, but lower LoD-G (100) for street furniture*

The project officers may update the Table 4.5 in Annex 4 to specify the LOIN requirement of the existing condition model of the project.

3.2.1.2 The existing conditions model shall be progressively developed according to the site condition and information availability. The existing condition model must be completed [2 months] before the design of the related portions of site. The Consultant shall propose and justify the submission schedule in the BEP for the approval of the Employer's Agent.

3.2.1.3 The Consultant shall agree the accuracy and reliability of available spatial data with the Employer's Agent before they are passed to BIM Team for the development of project deliverables. The final surveying data shall be organized, agreed, and submitted in required formats after the completion of existing condition survey. [Besides, existing conditional model shall be supplemented with photographic records.]

3.2.1.4 The Consultant shall propose the data collection, surveying, and/or 3D digital scanning strategies in the BEP.

3.2.2 Design Model (Design Authoring)

3.2.2.1 The PIM shall always be up to date to support the project team to develop other project deliverables. The Consultant shall progressively develop and regularly submit the PIM according to the agreed delivery schedule with reference to the Annex 1. The Consultant shall ensure the deployment of adequate resources to update and submit the PIM in 2 weeks under the instruction of the Employer.

Depending on the size and complexity of the works, the modelling elements will be different. The project officer may refer to the model federation and model breakdown in annex 3 and annex 4 as the baseline reference to define the minimum requirement in the consultancy.

- *Land and Infrastructure Services: Section 3.1 in Annex 3 and Section 4.1 in Annex 4*
- *Geotechnical Services: Section 3.2 in Annex 3 and Section 4.2 in Annex 4*
- *Port and Marine Service: Section 3.3 in Annex 3 and Section 4.3 in Annex 4*
- *Environmental and Sustainability Services: Section 3.4 in Annex 3 and Section 4.4 in Annex 4*

3.2.2.2 The Consultant shall organize coordination workshops regularly to communicate and resolve inter-disciplinary clashes. The agreed solution shall be documented and updated to the PIM within 1 month.

3.2.2.3 The Consultant shall progressively develop the PIM and submit the interim PIM with project deliverables according to the Consultant's Master Programme and the delivery schedule required in Annex 1.

3.2.2.4 The PIM shall always be maintained in the project BIM CDCP. The related drawings, coordination reports, approval history, information originator, state and status[2] shall be always traceable from the project BIM CDCP.

3.2.2.5 The Consultant shall establish the modelling strategies to create, maintain and update the PIM according to the model federation structure requirement in Annex 3 and the LOIN requirement in Annex 4. The Consultant shall update model federation structure and LOIN of each PIM generated deliverable with the Employer in the BEP if necessary.

3.2.2.6 Unless agreed with the Employer, the Consultant shall follow the BIM Modelling Manual and LOIN Specification published by CEDD to create, update, and maintain the PIM. The Consultant shall propose and justify the amendments to the modelling standards and requirement published by CEDD in the BEP if necessary.

3.2.2.7 The Consultant shall follow the master model federation strategies in the Annex 4 and the BIM Modelling Manual published by CEDD to create, update, and maintain the PIM. The Consultant may purpose further federation in the BEP to ensure the effective operation of the disciplinary models/sub-models if applicable. For each federated disciplinary model, the Consultant shall clearly propose and justify the model breakdown structure in the BEP according to the required LOIN and project deliverables.

3.2.2.8 The Consultant shall follow the LOIN in Annex 4 and the delivery schedule in Annex 1 to propose the attributes/share parameters in the BIM objects to support the direct generation

[2] Refer to section LA.4.2 and LA.4.3 of the Hong Kong Local Annex of ISO19650-2:2018 in the CIC Building Information Modeling standards – General, Version 2.1 - 2021

of project deliverables from the PIM models. The Consultant shall propose and agreed the attributes (LoD-I) with the Employer in the BEP.

3.2.2.9 The modelling methodologies include the selection of modelling software, selection of modelling functions, classification categories, modelling parameters and constraints. The object elements should be modelled in true size to reflect their behaviour, relationship, physical and functional performance in real world as far as practical. Envelope objects should be used to occupy estimated dimension of physical room and space if necessary.

3.2.2.10 The Consultant shall propose the modelling methodologies in the BEP and agree with the Employer. The Consultant shall ensure the proposed methodologies supports the Employer to efficiently reproduce the project deliverables and required analysis according to the required BIM use.

3.2.2.11 The Consultant shall carry out compliance check against design standards, headroom issues and illogical arrangement before sharing or publishing the model for the generation of other deliverables. The Consultant shall share or publish the WIP model with LOIN documentation of all the object elements.

3.2.3 BIM Objects Package

3.2.3.1 All BIM objects package (including the BIM object, BIM object Sheets and Object Check Form) must comply with the BIM Modelling Manual published by CEDD [and support the specific BIM Use requirement of the Services].

3.2.3.2 The Consultant shall submit the project specific BIM objects created in the PIM in native and editable format for the Employer to reproduce the PIM or deliverables in the platform currently in use by the Employer.

3.2.4 Final Design Model

3.2.4.1 The Consultant shall develop the final design model by progressively enhancing the design information into the PIM according to the feedbacks from design reviews and engineering analysis. It is the obligation for the Consultant to ensure the final design BIM model shall be a design-error free BIM model without any design conflict. The final design BIM model shall be delivered in their native and editable format and purged of all unused content including but not limited to line types, line styles, line weights, families, and views. All errors and warnings shall have been resolved or, if agreed to, listed on the approved BIM exception list.

3.2.4.2 The Consultant shall finalize the design BIM model from the PIM before the tendering process. The final design BIM model shall be developed to facilitate the Employer to extract information or include the BIM models as part of tender information as far as practicable.

3.2.4.3 Unless otherwise agreed with the Employer, the Consultant shall always prepare and submit the final design model and related files according to the LOIN Specification and BIM Modelling Manual published by CEDD. The Consultant shall propose any necessary alternatives in the BEP. The Consultant shall also facilitate the Employer to submit the final design BIM model to CEDD BIM Data Repository (BIMDR) and LandsD's Government BIM Data Repository (GBDR) in accordance with the CEDD TC No. xx/2023 and Guidelines for Submission of Design and As-built BIM Models to Lands Department respectively.

3.2.4.4 The Consultant shall include all the attributes/information requirement in the Annex 4 and the LOIN Specification and BIM Modelling Manual published by CEDD for all BIM objects in the final design model, whenever applicable.

Technical deliverables from BIM refer to the interim deliverables to provide necessary information for the project officers/supervising officers to acquire necessary information in key decision points/before Key Dates. Instead of a completed and error-free model, it may be an interim deliverable of project deliverables that present the latest available information for identifying and resolving issues.

The deliverable in section 3.2 includes regular updating work in progress (WIP) PIM, existing condition model and final design model. These deliverables refer to the BIM use requirement of Design Authoring and Existing Condition Modelling. They are the basic elements for extracting information for other BIM uses. Except the final design model, they should be progressively developed and submitted regularly with the progress report to support the project officers to carry out interactive walk-through review and/or extracting information for decision. The CEDD officer should review the submission frequency, format and schedule of item 1-3 & 6 in Annex 1 based on the Services and Key Dates.

3.3 Collaboration, Version and Revision Control

3.3.1 General

3.3.1.1 A Common Data Collaboration Platform for BIM (BIM CDCP) is a single repository to support information management. The Consultant shall setup the BIM CDCP to provide i) a single version of traceable true information, ii) review and approval processes and workflows, and iii) an audit trail of documents and process [as far as practicable].

3.3.1.2 The Consultant shall setup the BIM CDCP [within 3 months] after commencement of the Services. The BIM CDCP shall be configured to share and store information securely with the following metadata:

- Files identification (file properties, names, drawing numbers, titles)
- Document Versioning (Version and Revision)
- State code and Status code[3]
- [Approval status and history, as well as related model copy]

[3] Refer to section LA.4.2 and LA.4.3 of the Hong Kong Local Annex of ISO19650-2:2018 in the CIC Building Information Modelling Standards – General, Version 2.1 - 2021

- Ownership / Information Originator

3.3.1.3 The Consultant shall maintain a change register of the records using the audit trail features of the BIM CDCP or sharing a separated spreadsheets to trace the relationship of files/models in the BIM CDCP. The Consultant shall propose and agree the format and content of the change register with the Employer.

3.3.1.4 The Consultant shall maintain the BIM CDCP until [the award of the construction contract]. The Consultant shall handover an offline digital copy of all required models/data, deliverables, meta data, review and approval history, audit trail, etc. on the BIM CDCP to CEDD at the end of the Services.

3.3.1.5 The Consultant shall deploy necessary measures to ensure the system availability, security and redundancy of the data stored in the BIM CDCP. The Consultant shall propose and justify the backup and security strategies in the BEP and agreed with the Employer.

3.3.1.6 The Consultant shall provide the briefing to all stakeholders to introduce the major processes and functions to all stakeholders in carrying out their duties on reviewing and commenting the project deliverables through the BIM CDCP.

3.3.2 Collaboration Process

3.3.2.1 The Consultant shall always upload the work-in-progress (WIP) information on the CDE, [or a centralised information system] [weekly/bi-weekly/ "on need basis"] to allow the Employer to understand the progress of the Services. The Consultant shall carry out quality check and clean up the WIP model before share the model for interdisciplinary coordination, design evaluation/review, or approval at [monthly/quarterly] interval. The version and revision history of the WIP, SHARED, APPROVED models shall be maintained in the BIM CDCP, [or a centralised information system] platform.

3.3.2.2 [The Consultant shall publish statutory and contractual deliverables with the proposed BIM CDCP, [or a centralised information system] using workflows and/or transmittal functions to document the deliverables version, stakeholder's review, and approval history.]

3.3.2.3 [The proposed BIM CDCP, [or a centralised information system] should be configured to notify other stakeholder by email during the sharing and/or assignment of information by authorized information provider.]

3.3.2.4 The Consultant shall propose the review and approval process and workflows, such as change tracking, sharing frequency, security settings, and communication protocols in the BEP, and agreed with the Employer.

3.3.3 Common Data Collaboration Platform for BIM (BIM CDCP)

3.3.3.1 The Consultant shall propose the [BIM CDCP software/platform / centralised information system] in the BEP to support the collaboration, versioning, and revision control

requirement according to the best practices in BS EN ISO19650-2 and the naming conventions in BIM Modelling Manual published by CEDD.

3.3.3.2 The infrastructure of the [BIM CDCP software/platform / centralised information system] shall be hosted with business continuity measures, servers, connection, and power redundancy to provide system availability of not less than 99.5%.

3.3.3.3 The [BIM CDCP software/platform / centralised information system] shall comply with Security Regulations, and the Baseline IT security Policy of the CEDD's IT policy. The hosting environment shall be configured, deployed and managed to meet the data confidentiality, integrity, availability and privacy aspect in the compliance with the globally recognised industrial security standard, e.g. TIA-942 certified data center, ISO27001, or OGCIO circular no 2/2016.

3.3.3.4 The [BIM CDCP software/platform / centralised information system] shall provide the following document management features:

- User-configurable folder structure
- Addition of user-configurable metadata
- Uploading, downloading, version control [and version comparison of BIM models]
- Authentication and Access rights settings and control
- Sufficient capacity to store all project models, deliverables, and files throughout the project period.

3.3.3.5 The [BIM CDCP software/platform / centralised information system]shall provide the following BIM Collaboration features:

- [Support online review and navigation of BIM models, including relevant attributes and objects, directly through standard web browsers.]
- [Provide an issue tracking workflow system for the registering, mark up, review, tracking, and coordination of issues.]
- Generation of issue summary and audit trail

3.3.3.6 [The [BIM CDCP software/platform / centralised information system] shall provide the following correspondence and workflow management features:]

- [Allow users to setup workflows for submission, review, and approval process.]
- [Record and track the status and review history of the correspondence and submissions.]
- [Auto-generated email notification of action items]

3.3.3.7 The [BIM CDCP software/platform / centralised information system] should provide the following security control features:

- Transport Layer Security v1.2
- AES-256 advanced encryption of all uploaded files
- Role-based, user-based, and/or folder-based security control settings
- User audit trail

[BIM CDCP software/platform / centralised information system] is used to facilitate the effective collaboration of information in a centralize share environment among all stakeholders. This section describes the IT infrastructure, functional features, and security requirements of the BIM CDCP with reference to the CIC BIM Standards – General, Version 2.1 - 2021 Chapter 4.

3.3.3.8 The [BIM CDCP software/platform / centralised information system] shall provide Application Programming Interface (API) to allow third party developers to download the model files, retrieve review and approval history, as well as their metadata.

API is usually required for sharing BIM models or information in the information system to another management system. The Project officers shall consider include 3.3.3.8 if any integration portal, inter-CDCP data sharing is required in the works.

3.3.3.9 The Consultant shall supply [5 user licenses] of [BIM CDCP software/platform / centralised information system] for the Employer's staff to carry out the required BIM uses, reviewing and checking of the BIM deliverables.

It is recommended to provide a unique ID/login for each stakeholder in the Services to allow effective tracking of project history. Project officers shall review the number of licenses required for carrying the review and collaboration process during the Services.

3.4 Coordination Process

3.4.1 Interdisciplinary 3D Coordination

3.4.1.1 The Consultant shall carry out inter-disciplinary coordination at [bi-weekly / monthly interval / "on need basis"] based on the shared models from various disciplinary modellers/designers to resolve all major design issues prior to the tendering by identifying and resolving spatial conflicts among different disciplines. The spatial requirement for equipment delivery, installation, construction, operation, and maintenance should also be considered.

3.4.2 Coordination Process

3.4.2.1 The coordination process should include, but not limited to the following procedure:

i Compare selected objects from the shared models according to the sequences agreed in coordination matrix
ii Identify and visualize spatial conflicts and/or illogical arrangements.
iii Filter false alarm, group and organize the issues.
iv Prepare clash reports (if applicable)
v Document the issues in the clash/issue summary.
vi Resolve the issues via coordination meetings, sketches, or employer's instructions.
vii Update the clash/issue summary.
viii Update the WIP model and uploaded to the BIM CDCP software/platform / centralised information system]

ix Perform another round of analysis until all major issues are resolved.

3.4.2.2 The Consultant shall develop a systematic sequence and coordination matrix to detect, group and resolve major spatial conflicts among different disciplines. The Consultant shall propose the detection methodologies, rules, tolerance, resolutions workflow/sequence, tools, duration, owners, roles, and responsibility in the BEP. The coordination status and result should be submitted with the progress report.

3.4.2.3 The Consultant shall maintain a clash/issue summary to trace the updated information, contractual correspondents against the updating disciplinary models. The clash/issue summary should at least include:

- A summary of the clash statistic among discipline(s) / clash detection matrix
- Version and revision of WIP PIM
- General description of the issues, locations, discipline, tolerance, 3D close-up images, status, solutions, and owners
- Reference drawings (if applicable)

3.4.3 Coordination Meeting

3.4.3.1 The Consultant shall setup coordination meeting with all involved stakeholders at [regular interval / "on need basis"] to review design options and resolve critical issues.

3.4.3.2 The Consultant shall issue the clash report(s) and/or the PIM to the involved stakeholders [1 week] before the meeting. The clash report should include, but not limited to the following:

- General description of the Clashes/issues
- Locations and disciplines involved.
- Screen capture of the Clashes/Issues (plans and or section views)
- Drawings, site sketches, versions of the coordinating disciplinary models
- Tolerance settings
- Version/Revision of the disciplinary PIM
- Reference to drawings (if applicable)
- Latest version of clash/issue summary

3.4.3.3 The Consultant shall update and maintain the clash/issue summary with the solutions, findings, action items, and/or agreement made in the coordination meeting for each issue.

Section 3.4 describe the process to generate deliverables for 3D Coordination. The process and history (Clash register) of detecting and resolving temporal, spatial and constructability issues are usually more important than the submission of "Clash-free Report". Project officers shall review and update the frequency of coordination meeting against the Key dates and schedule of interim WIP deliverables in Annex 1.

3.5 Design Evaluation

(Design Review, Site Analysis, Cost Estimation, Space programme, Sustainability Evaluation)

3.5.1 General

3.5.1.1 The Consultant shall utilise the PIM to carry out site analysis, cost estimation (as far as practicable), [space programming, sustainability evaluation] to justify the selection of improvement zone/design scheme, site extend, alignment layout, capacity of utilities, transportation networks and/or [other environmental impact to be specified by project officers] in terms of cost, feasibility, constructability, space programme and sustainability requirement. The Consultant shall extract material schedules of cost significant items from WIP Design Models and compare the quantity, volume, and dimension of cost significant items.

3.5.1.2 The Consultant shall utilise the progressively developed PIM to generate simulation and design analysis report for the required design scheme deliverables, such as proposed construction sequence simulation video (Phase Planning), site selection (Site Analysis), quantities estimation (Cost Estimation) and Space Programming, as well as storm drainage analysis, structural analysis, solar analysis, swept path analysis, and construction & demolition materials management, etc. (engineering analysis).

3.5.1.3 [The Consultant shall fully integrate BIM into the daily coordination of design teams, carry out construction cost estimation, as well as development of construction sequence schedule during the planning and design stage to comply with BIM integration (IDCM 16) assessment in the BEAM Plus for New Buildings Version 2.0[4] or its latest version.]

Clause 3.5.1.3 refers to the requirements in adopting the BIM use "Sustainability Evaluation". It is applicable to the design and construction of building works only and may not suitable for GEO.

3.5.1.4 The Consultant shall describe the tools and workflow to generate the design evaluation deliverables from the PIM in the BEP and provide the necessary tools to enable the Employer's Agent to carry out necessary analysis, validation and/or checking.

3.5.1.5 In additional to the design report, drawings and/or animated visualisation, the Consultant shall always submit the related WIP PIM, simulated/analysis models with the raw and editable format for the Employer's Agent to carry out necessary analysis, validation and/or checking.

3.5.1.6 The Consultant shall publish the related models in Interactive Visualization Models to allow the Employer to carry out design reviews and visual inspection by means of interactive walk-through and measurements in 3D model viewers before the Key Dates.

[4] https://www.hkgbc.org.hk/eng/beam-plus/file/BEAMPlus_New_Buildings_v2_0.pdf

3.5.1.7 The Consultant shall propose the delivery schedules of interim deliverables to ensure several rounds of necessary design review and coordination process before the Key Dates or stage approval. The schedule of the delivery of the interim deliverables should be proposed in the BEP and agree with the Employer. The Consultant shall propose and justify the LOIN and submission schedule of interim deliverables in the BEP for the approval of the Employer.

3.5.1.8 The interim deliverables of the design scheme evaluation shall be shared with progress report during design evaluation submissions, review and discussion meetings to allow the Employer's Agent to carry out progressive design review process based on the agreed objectives. The Consultant shall propose the delivery schedule of interim deliverables in the BEP according to the Annex 1 and agreed with the Employer.

3.5.2 Design Review

3.5.2.1 The Consultant shall export the PIM into Interactive Visualization Models to allow the Employer's Agent to carry out visual inspection at regular interval by means of interactive walk-through and measurements in 3D model viewers.

3.5.2.2 The Consultant shall enhance the PIM to develop Interactive Visualization Models by addition of true colour and/or material textures [as far as practicable]. The Consultant shall propose the colour convention and material mapping scheme in the BEP [to achieve the *project specific visualization requirements].

**Visualization in planning and design stage is mainly used for supporting public consultation, determination of colour scheme, and/or previewing the landscaping against proposed works. The project officer may consider the following applications:*

- *Land and Infrastructure Services: i) Evaluation of the finishes of above ground structure, such as footbridge, retaining structure; ii) Evaluation of the visibility of signs and accessibility facilities.*
- *Geotechnical Services: Colour scheme of flexible barriers and retaining facilities*
- *Port and Marine Services: i) Evaluation of the visual impact of the roof structure of the marine facilities; ii) evaluation of visibility of the public facilities, such as notice boards, accessibility facilities; iii) Harmony of the colours of the furniture*
- *Environmental and Sustainability Service: Evaluation of visibility of the public facilities, such as notice boards, accessibility facilities.*

3.5.2.3 The Consultant shall ensure the compatibility of the submitted Interactive Visualization Models, proposed free model viewers [and the proposed VR equipment] within [3 months] after the Services commence.

3.5.2.4 The Interactive Visualization Models of the latest combined WIP models shall be submitted with the progress report to review the overall progress of the Services

Interactive Visualization Models refers to a PIM rendered with texture/materials to enable an interactive walk-through and measurement in a 3D model viewer. The exporting/rendering in an immersive 3D VR environment is optional.

3.5.3 Site Analysis

3.5.3.1 The Consultant shall utilise the PIM and the existing condition model to justify the selection of the site area such as the [*identification of improvement zone, site boundary, alignment layout, evaluation of the capacity of existing utilities, traffic analysis, etc.].

**Site Analysis in planning and design stage is mainly used for selection of site location. The project officer may consider the following applications:*

- *Land and Infrastructure Services: Determination of Site Boundary and road alignment based on environmental impact analysis, traffic impact analysis, etc*
- *Geotechnical Services: i) Identification of high priority slopes; ii) tree preservation analysis*
- *Port and Marine Services: i) Location of Marine facilities; ii) sun and shadow studies*
- *Environmental and Sustainability Service: i) vantage point/sightline analysis; ii) environmental impact and air ventilation assessment*

3.5.3.2 The Consultant shall overlay the analysis result with the PIM and existing condition model to allow the Employer's Agent to visualize and validate the site analysis results.

3.5.4 [Phase Planning]

3.5.4.1 In additional to animated videos, the Consultant shall develop Phase Planning models by incorporating proposed construction sequence and space requirement with the PIM to allow the Employer's Agent to review the construction planning and carry out temporal coordination by means of interactive walk-through, sectioning, measurements, time selection in free viewers.

3.5.4.2 The Consultant shall develop the phase planning model by linking the proposed construction methodologies and sequence with the PIM. The major construction plant and equipment shall be included in the phase planning model to demonstrate the feasibility and effectiveness of the Consultant's proposed construction sequence of the Services. The envelopes of temporary works and site logistic arrangements shall be modelled to allow the Employer to evaluate the feasibility, constructability, and buildability of the proposal. The Consultant shall propose the LOIN for the phase planning model in the BEP and agreed with the Employer.

3.5.4.3 The Consultant shall describe the tools and workflow to generate the overall construction programme simulation (phase planning), from the PIM in the BEP and provide the necessary tools to ensure the Employer's Agent to carry out necessary analysis, validation and/or checking.

3.5.4.4 The Consultant shall collaborate with the Employer to review the proposed construction sequence through coordination meetings, storyboards, and preliminary/interim animations, etc. The construction method simulation video should be submitted with the proposed construction sequence. The Consultant should agree the PIM versions, contents, views, colouring, material textures, lighting, etc. of the proposed Construction Sequence

Simulation video with the Employer with a storyboard before the generation of the simulation/animation videos.

3.5.4.5 The Consultant shall develop detail Construction Sequence Simulation video at Full HD 1080p resolution (1920 x 1080) with not less than 30 frames per seconds for the following design scheme:

- Overall Construction sequence: not less than 300 seconds
- [Construction of footbridge: not less than 120 seconds]
- [Demolition of existing footbridge: not less than 120 seconds]
- [….]

Clause 3.5.4.5 are example of the simulation. Project officers shall clearly specify the area of concern, duration requirement, and format requirement of the construction sequence simulation video in clause 3.5.4.5.

3.5.4.6 The Consultant shall submit the Phase Planning (4D Modelling) containing the following but not limited to

- Description of the Phase Planning (4D Modelling), including the assumptions, time interval, guide for accessing the files and BIM etc.
- Video(s) of the simulation(s)
- Native and editable BIM
- Interactive 4D Models(s) for the Phase Planning
- Linked project programme or Excel spreadsheet

3.5.5 Cost Estimation

3.5.5.1 The Consultant shall utilise the PIM to estimate the cost of materials of the proposed design [as far as practicable], by extracting the quantities of cost significant items, such as [Volume of Concrete, Volume of earthworks (hard and soft material), Weight of steelworks, Length of pipe works, number of manholes, Length of Fenders (by type), etc.].

3.5.5.2 During the changes of design scheme / materials / construction sequence, the Consultant shall extract the material cost from the new design scheme models. The variation of the material cost shall be submitted to the Employer to justify the cost-efficiency of the selected design scheme.

3.5.5.3 This high-level cost estimation model shall be submitted with each design scheme submission during design review/evaluation process.

There are known technical limitations to extract a "SMM-compatible" BQ directly from the BIM model. Yet, material quantities of concrete volume, steel weight, length of pipe, earthwork volumes, number of man-holes, etc. could be easily extracted from BIM model to enable a high-level cost estimation to support logistic/financial planning. Project officers shall review the Service and update the Section 3.5.5.1 with the "works-related" materials.

3.5.6 [Design Validation (Engineering Analysis)]

3.5.6.1 The Consultant shall utilise the PIM to carry out model-based engineering analysis to ensure the integrity, standard compliance, and operability of the proposed design, such as [alignment integrity and compliance check, swept path analysis, line of sight analysis, storm drainage/sewerage capacity analysis, structural stability/load analysis, lighting simulation, construction & demolition materials management, etc.].

**Design Validation in planning and design stage is mainly used for integrity checking of design against standards and operation requirements. The project officer may consider the following applications:*

- *Land and Infrastructure Services: i) Integrity compliance to Transport Planning and Design Manual; ii) Swept path and line of sight analysis; iii) Storm drainage/sewerage capacity analysis*
- *Geotechnical Services: i) Storm drainage/sewerage capacity analysis*
- *Port and Marine Services: i) Structural stability/load analysis; ii) Lighting simulation*
- *Environmental and Sustainability Service: i) Structural stability/load analysis*

3.5.6.2 The Consultant shall develop workflow to extract the information from the proposed PIM and existing condition model and import into the specific analysis software during the engineering analysis process as far as practicable. The analysis result shall be used to update the proposed PIM to optimise the design proposal. The tools and workflow process should be proposed in the BEP for the agreement of the Employer's Agent.

3.5.6.3 The optimized design model and the analysis results shall be submitted with each design scheme submission during the design review/evaluation process.

3.5.7 [Greenery Coverage Validation (Spacing Programming)]

3.5.7.1 The Consultant shall utilise the PIM to check the site coverage of greenery requirement to ensure the compliance to the Employer's space programming requirement. The proposed design model and the analysis results shall be submitted with the with each design scheme submission and shared during the design review/evaluation process.

3.5.8 [Design for Modular Construction Units (Digital Fabrication)]

3.5.8.1 The Consultant shall utilise the PIM to develop modularize construction units, such as noise enclosure panels, structural steel framing, manholes and chambers, street furniture, bridge segments, rebar layout, etc. to enable cost-effective offsite/onsite prefabrication, site delivery and installation [as far as practicable].

3.5.8.2 The Consultant shall propose the modularize construction units and justify the prefabrication, site delivery and installation cost-efficiency with the PIM during each design scheme submission during the design review/evaluation process.

Section 3.5 describes the BIM process and deliverables that should be included in the traditional design reports, covering the BIM Use requirement for Design Review, Site Analysis, Phase Planning, Cost Estimation, Engineering Analysis (design validation), Sustainability Evaluation (BEAM PLUS BIM integration), Space Programming (Greenery Coverage Validation), and Digital Fabrication (Design for Modular Construction Units).

The Consultants are required to generate their design reports with the WIP BIM models developed in Section 3.2. Project officers shall always update this section with the BIM objectives in section 1, BIM use requirement table in Section 2.1 and the delivery schedule in Annex 1.

The BIM Use and deliverables in Section 3.5 are usually project specific and may be only applicable to specific Service types and objectives. This template may list examples of deliverables that may not related to the initial design scheme identified in the Services. CEDD officers shall review and update the deliverables in Services specific detail. For example, project officers shall clearly specify the area of concern, duration requirement, format requirement of the construction method simulation video in clause 3.5.4.5.

The Schedule of Interim deliverables are important to allow the project officers to review, resolve and make decision at early stage (before Key Dates). Project officers shall clearly indicate the Schedule of interim deliverables in Annex 1 by considering the Key Dates of the Services.

3.6 2D Drawings

3.6.1 Drawing Production

3.6.1.1 The Consultant shall use the PIM to produce the site sketches and tender drawings as far as practical. The Consultant shall always use the PIM to generate the layout plans and sections of tender drawings according to the BIM Modelling Manual published by CEDD and the annotations, object tags, presentation styles, data-driven objects requirements in the Statutory Submission Guide and Modelling Object Guide by CIC. The 2D annotation and schedules of the drawings shall be always linked with the BIM objects to ensure the live update upon changes.

3.6.1.2 [The Consultant may propose the alternative solutions for site sketches, such as 3D views and respective drawing standards in the BEP and agreed with Employer according to the efficiency and specific limitations of the Services if applicable.]

3.6.1.3 The WIP design model and site sketches/drawing should be submitted together to the Employer [at least 2 weeks] before the agreed project Key Dates. The Consultant shall prepare design sketches from PIM to support the design reviews at Key Dates and relevant revisions in design circulation/submission to relevant departments/authorities. The Consultant shall refer to the Annex 1 to develop a drawing list in the BEP to propose the list of BIM-generated drawing/site sketches and agreed with the Employer.

3.6.1.4 The Consultant shall utilise the PIM and final design model to generate the schedules and tender drawings. The Consultant shall produce, but not limited to the following drawings:

- General layout plans
- Schedules and Setting out plans
- [Superstructure plans]
- [Foundation plans]
- [Demolition plans]

- [Excavation and Lateral Support (ELS) plans]
- [Site formation plans]
- [Ground Investigation plans]
- [Drainage / Sewerage / waterworks plans]

3.6.1.5 The Consultant shall always update the PIM before the drawing revision process. Typical sections and standard drawings are not required to be generated from the PIM for tendering purpose. The Consultant shall refer to the Annex 1 to develop a drawing list in the BEP to summarize the tentative BIM and non-BIM generated drawing list and agreed with the Employer.

3.6.1.6 All the tender drawings, including the BIM and non-BIM generated 2D drawings, typical details, schedules and standard drawings should be submitted together with respective SHARED/PUBLISHED PIM, drawing production files, exported drawings, and drawing register to the Employer's Agent [at least 2 weeks] before the agreed Key Dates. The Consultant shall refer to the Annex 1 to develop a submission schedule in the BEP to summarize the tentative submission schedule and agreed with the Employer's Agent.

3.6.2 Drawing Integrity

3.6.2.1 The Consultant must ensure the integrity between the models and the drawings during PIM update, such as using BIM CDCP, sharing non-editable format, model referencing, etc. The Consultant shall propose the drawing production and control process in the BEP and agreed with the Employer.

3.6.2.2 The Consultant shall maintain and submit the drawing register to document the linkage between the disciplinary PIMs and the tender/published drawings. The register shall record the view/sheet names, related disciplinary models, versions, status, date, DIS/DAN number, etc. The Consultant shall propose and agree the format of the drawing register with the Employer in the BEP. The combined PIM, drawing production files, export drawings and drawing register shall be submitted with the drawing submission.

3.6.2.3 The Consultant shall produce the tender drawings from the final design BIM model as far as practicable according to the above drawing production requirement. The final design model, updated BEP, and the tendering drawings should be submitted together to the Employer [4 weeks] before the tendering stage.

3.6.2.4 [The Consultant shall ensure the format, quality, documentation, integrity, and compliance of the final design model against the tendering drawings. The final design model should be checked for handover to the Contractor to extract information for e-tendering, if required, at the tendering stage, as well as supporting the Contractor to develop the final as-built model at the construction stage.]

Section 3.6 describes the process and supporting deliverables for managing the drawing production BIM Use requirement. There are known limitation of producing drawing from

BIM model. The BIM generated drawings may not fully comply with the traditional CAD standards (Drafting Specification for Engineering Survey specified in section 2.3). Project officers are recommended to consider if these requirements could be released during the production of interim deliverables, such as, site sketches in Section 3.6.1.2.

Project officers shall list out the drawings required to be generated directly from BIM model in Section 3.6.1.4. In general, the CIC BIM standards for Preparation of Statutory Plan Submission (Dec 2020) guideline have documented the standard and process to generate statutory plan.

Section 3.6.2.4 is mandatory for Services required e-tendering only.

3.7 BIM Software

3.7.1.1 The Consultant shall propose the list of tools to be adopted in the project to prepare the BIM Deliverables and other output as required. The Consultant is required to describe and justify the functionalities of tools in terms of the BIM use requirement, compatibility, and interoperability in the BEP. The Consultant shall also propose the version upgrade frequency, policy, and quality checking procedures in the BEP for the approval by the Employer.

3.7.1.2 The Consultant shall avoid the use of automated scripts and third parties' plugins to generate the BIM deliverables. In case of unavoidable circumstances, the Consultant shall ensure the automated scripts and third parties' plugins are made available for the Employer to reproduce the PIM or deliverables in the platform currently in use by the Employer.

Section 3.7 is a general statement to ensure the models received could be easily reproduced with CEDD in-house environment. No changes are expected in this section.

4. BIM TEAM REQUIREMENTS

4.1 Role and Responsibility of Project Team

4.1.1.1 The role and responsibility of all parties involved in this Services does not change during the adoption of BIM technologies. All parties are responsible to provide up-to-date information to the BIM Team to facilitate the BIM delivery ahead of the Key Dates.

4.1.1.2 The BIM Team shall provide the following services:

- to coordinate all parties including but not limited to different design disciplines, sub-Consultants, Specialist Sub-Consultants, Specialist Consultants, suppliers, Employer and his Agent, Government Departments and utility undertakings and collecting suitable information and data from them.
- to build and develop the BIM models and all deliverables based on the information and data collected, to manage the BIM databases, to report any clash/conflict or difficulties in BIM model production and to resolve such difficulties with relevant parties.
- to utilise BIM for avoidance of risks and minimisation of changes, to monitor project costs and programmes in various stages, and to support optimal design for construction and operation.

- to input the updated information and data, including but not limited to all variations, from time to time; to create, manage, develop and update the BIM models to all deliverables for the Services; to ensure the updated BIM models are coordinated and always kept ahead of the project Key Dates to allow early review of the project delivery process through BIM adoption.
- to coordinate the BIM models and all deliverables to ensure consistency among all deliverables; to use the best practice in setting up the system for coordinating BIM models among all parties,
- to provide technical support and guidance to the Employer and his Agent in using the BIM models, managing the BIM database, and resolving potential construction difficulties

4.2 BIM Team Structure

4.2.1.1 The Consultant shall propose and establish a BIM Team that is appropriate for the scale and complexity of the Consultancy, highlighting key roles and responsibilities of each position, within [4 weeks] after commencement of Services. The BIM Team shall be led by a BIM Team Leader who holds a key position in the Consultant's project team structure. The BIM Team shall include sufficient and technically competent resources to complete all BIM tasks, BIM and project deliverables specified in the Services. Notwithstanding, the BIM Team shall comprise at least 1 BIM Team Leader, [1 BIM Coordinators and 3 BIM Modellers] with proven experience in relevant disciplines.

Project officers shall review Clause 4.2.1.1 to specify the minimum resources required for the BIM Team. Some general guidelines below for reference:

Mini. Ratio of modellers to Coordinators/Manager	*- 3 :1*
Number of BIM modellers	*- at least 1 for 2 disciplines*
Size of the project	*- at least 2 modellers for M3 project*
No. animation/simulation required	*- add 1 coordinator for over 2 animations per year.*

4.3 BIM Team Leader

4.3.1.1 BIM Team Leader shall be a CIC-Certified BIM Manager (CCBM) with proven experience on similar projects.

Project officers shall review the latest requirements of BIM Team Leader in the DEVB TC(W) on "Adoption of BIM for Capital Works Projects in Hong Kong" and update Clause 4.3.1.1 and 4.3.1.2 accordingly.

4.3.1.2 The BIM Team Leader shall be responsible for the overall BIM management and BIM process controls, such as:

- lead and manage the BIM Team and shall be responsible for the overall BIM management and provide control to ensure the deliverables are issued on time
- coordinate with the Employer and his Agent and the Employer 's consultants
- plan, develop and manage the project BIM standard and implementation strategy.

- maintain the integrity of information among all parties and deliverables.
- provide quality control and checking procedures.
- schedule and ensure all the deliverables are issued on time
- provide advice/guidance to the Employer in reviewing BIM modelling formats/protocol and co-ordination; reviewing analysis and findings on application by using different software such as the clash detection and resolving the clashes; and providing technical support to the Employer regarding modelling enquiries.

4.4 BIM Coordinator

4.4.1.1 The BIM Team Leader shall delegate BIM Coordinator(s) for handling BIM tasks such as BIM modelling, collaborate information exchange among related stakeholders and maintain a drawing/information register to record the information to be incorporated in the model.

4.4.1.2 The BIM Coordinator(s) shall have (i) a minimum of three years related construction project experience; and (ii) a minimum of one-year practical experience in BIM projects; and (iii) shall complete the CIC-accredited BIM Coordinator course with effect from 1 July 2022 if the engaged BIM Coordinator are not CIC-Certified BIM Coordinator (CCBC); or shall be a CCBC.

For technical & fee proposal to be invited on or after 1 January 2024, the BIM Coordinator(s) shall be a CIC-Certified BIM Coordinator (CCBC) or CIC-Certified BIM Coordinator (Associate) but with at least half of the BIM Coordinators attained the qualification of CCBC in the BIM Team. Project officers shall review the latest requirements of BIM Coordinator in the DEVB TC(W) on "Adoption of BIM for Capital Works Projects in Hong Kong" and update Clause 4.4.1.2 accordingly.

4.5 [BIM Modellers]

4.5.1.1 [Within 6 months from the commencement of the Services, the BIM modellers shall be or shall have been certified with the basic modelling course of the proposed BIM modelling, design review and coordination software.]

4.6 Staff Movement Arrangement

4.6.1.1 For any proposed staff movement or change in the BIM Team, the Consultant shall provide a CV of the replacement personnel together with evidence of equivalent BIM competency to the Employer within [2 weeks] for approval.

4.7 Subcontracting of BIM Services

4.7.1.1 If the Consultant does not have the necessary expertise, the Consultant shall engage a sub-consultant with suitable expertise for the performance of BIM related tasks. If the Consultant intends to or is required to subcontract the BIM services to a BIM sub-consultant, the Consultant shall obtain approval from the Employer before formal

engagement and shall indicate this clearly in the project team structure. The positions of the staff members from the BIM sub-consultant shall also be indicated clearly in the BIM Team organisation structure.

Section 4 is a general description on the requirement of the project team structure and subject to change according to the size and scope of the Services. The project officers shall review the latest technical circular from Development Bureau for latest requirement.

Annex 1: Deliverables and Submission Programme

Annex 1 serves as an example only. Annex 1 shall be specified by the project officer according to size, complexity and key dates of the Services. All deliverables required in the Section 3 should be listed in the table of Annex 1. Project officers shall include the requirements of interim deliverables (e.g. S1 and S2) of each submission to allow few rounds of review process before the key dates.

1.1 Sample deliverables for Land and Infrastructure Services

No	Clause in Contract	BIM USE	BIM Deliverables	Status	Format/Content	Schedule
1			BIM Execution Plan	S3	DOC/PDF	[1 month] after the Services commence
				S6	DOC/PDF	[3 months] after the Services commence
2		Site Condition Model (Existing Condition Modelling)	Existing site Model	S4	Interactive Visualization Models	[3 months] after the Service commence
3		Progress PIM Model (Design Authoring) (Design Review)	WIP PIM model	S2	Interactive Visualization Models	With Progress Report
4		Utilities clash free report (3D Coordination)	Combined underground utilities model	S1	Interactive Visualization Models, clash report	[2 weeks] before coordination events
				S4	Interactive Visualization Models, clash/issue summary	[4 months] before Tender commence
				S6	Interactive Visualization Models	[2 weeks] before Tender preparation
[5]		[Road design report] (engineering analysis) (Cost Estimation) (Site Analysis) (Drawing Production)	[Interim Road PIM]	[S2]	[Interactive Visualization Models]	[3 months] before Key Date 1
			[Setting out Schedule]	[S3]	[Interactive Visualization Models, [Drawings]	[2 months] before Key Date 2
			[Design Model, Tender Drawings]	[S6]	[Interactive Visualization Models, Drawings]	[At Key Date 2]
[6]		[Earthwork Estimation] (Cost Estimation) (Drawing Production)	[Interim Site Formation PIM]	[S2]	[Interactive Visualization Models]	[6 months before Key Date 1]
			[Schedule of Materials and layout plans]	[S3]	[Interactive Visualization Models, Drawings]	[2 months before Key Date 2]
			[Construction Stage Model]	[S6]	[Interactive Visualization Models, Drawings]	[At Key Date 2]

No	Clause in Contract	BIM USE	BIM Deliverables	Status	Format/Content	Schedule
7		Tender Drawing (e-tendering) (Drawing Production)	Tender BIM Model	S2	Interactive Visualization Models	[2 months after the portion completed]
			Zonal Tender BIM Model	S3	Interactive Visualization Models	[1 month after the zone completed]
			Final Tender model, tender drawings, BEP	S4	Interactive Visualization Models, Drawings, Doc/PDF	[2 months after the zone completed]

Notes:
S0 – Initial Status or WIP
S1 – Shared for Coordination
S2 – Shared for Information
S3 – Shared for Lead Consultant Review and Comment
S4 – Shared for Lead Consultant Comment and Approval
S5 – Shared for Employer Review, Comment and Approval
S6 – Shared for PIM stage Authorisation

Annex 2: Contents of BIM Execution Plan

The BIM Execution Plan (BEP) is a live document to describe the means and methodology for the Consultant to deliver the project deliverables with BIM technology. It should be reviewed regularly and approved by the Employer. The BEP shall include but not limited to the following sections:

1. **1. Overview**
   - 1.1. Introduction
   - 1.2. BIM Scope/Goal
2. **Project Information**
   - 2.1. Project Background
   - 2.2. Project Key Dates
3. **BIM Management**
   - 3.1. Project Organisation
     - 3.1.1. Organisation Chart
     - 3.1.2. Role, Responsibility and Authority
     - 3.1.3. BIM Team Resources and Competency
   - 3.2. Management Deliverables
     - 3.2.1. BIM Project Execution Plan (BEP)
     - 3.2.2. Progress Reporting
     - 3.2.3. [Quality Control Report]
   - 3.3. Information/Security Management Plan
     - 3.3.1. Information Security Roles and Responsibility
     - 3.3.2. Human Resource Security
     - 3.3.3. Asset Management
     - 3.3.4. Information Access Control
     - 3.3.5. User Access Control
     - 3.3.6. Physical and Environmental Security
     - 3.3.7. Operational Procedure
     - 3.3.8. Backup and Recovery
     - 3.3.9. Usage Monitoring
   - 3.4. Quality Control and Quality Assurance Plan
     - 3.4.1. Scope of Quality Check
     - 3.4.2. Checking Methodologies and Frequency
   - 3.5. Training and Development Plan
     - 3.5.1. [BIM Fundamental Training course]
     - 3.5.2. [BIM operation of design review software course]
4. **Project BIM Requirements**
   - 4.1. Application of BIM uses
     - 4.1.1. Design Authoring
     - 4.1.2. Design Review

The project officers shall update the Annex 2 according to the project deliverable and specifications. It should be already read with the BEP template guideline.

Annex 3 : Model Federation Structure

Model Federation refers to a systematic organization of modelling objects into model files to facilitate effective information sharing. The Consultant shall follow the CEDD Modelling Manual and further breakdown the model federation structure according to the below framework if necessary. The Consultant shall propose the final structure in BEP and agree with the Employer's Agent.

- *This annex should be read in conjunction with Annex 4. This annex describes the model federation structure for the 4 service areas identified during the consultancy and the CEDD BIM Modelling Manual – Model Naming Convention. This federation system targets to establish a centralise system to support the storage and management of all CEDD BIM data.*
- *The project officers shall select the Federation Structure of their service area and encourage the Consultant to adopt this structure as far as practicable. The project officers may also remove federated models that will not be included in their Services. In case of necessary, the Consultant may further federate the model under this structure.*
- *The project officers shall read this Annex with the CEDD Modelling Manual.*

3.1 Model Federation for Land and Infrastructure Services

PROJECT MODEL	1ST LEVEL FEDERATION	2ND LEVEL FEDERATION (DISCIPLINARY MODELS)	3RD LEVEL FEDERATION	DESCRIPTION
Project Information Model	Existing Condition Model	Existing Site Topography	N/A	Topology (Digital Terrain Model) of the site area, include GI data and bore hole data
		Existing Street Furniture	N/A	Relevant existing planters, traffic sign, road markings, railings, street lighting, barriers, kerbs etc
		Existing Structure	N/A	All existing above ground and underground structures of the Service area
		Existing Underground Utilities	N/A	All existing underground utilities systems of the Service area
	Proposed Works Model	Geotechnical Slope Model	N/A	Site boundary, Geological elements, Slope works and related stabilisation system
		Roadworks Model	N/A	Road works systems including traffic systems and related dwarf wall and slope works
		Landscape Model	N/A	Outdoor landscape systems including planting, parks, recreation facilities, etc
		Sewerage Model	N/A	Proposed/Rediverted Sewerage network of the Service
		Stormwater Model	N/A	Proposed/Rediverted Stormwater network of the Service
		Water Supplies Model	N/A	Proposed/Rediverted freshwater supplies network of the Service
		Telecommunications Model	N/A	Proposed/Rediverted Telecommunication system of the Services
		Electrical Power Supply Model	N/A	Proposed/Rediverted Power supply system of the Services
		Gas Supply Model	N/A	Proposed/Rediverted Gas Supply system of the Services
		Highway Structure Model	Sub Structure Model	Underground structure for foundation supports
			Super Structure Model	Above ground structure of highways
			Concrete Structure Model	Other structure such as Tunnel linings
		Specialised Systems Model	Tunnel Ventilation system	Tunnel Ventilation system
			Tunnel Fire Service System	Tunnel Fire Services System
			TCSS	Traffic Control and Surveillance System
		Architectural Model	N/A	Architectural elements of each building / plant room /etc

PROJECT MODEL	1ST LEVEL FEDERATION	2ND LEVEL FEDERATION (DISCIPLINARY MODELS)	3RD LEVEL FEDERATION	DESCRIPTION
	Proposed Building(s) Model	Structural Model	N/A	Structure elements of each building / plant room /etc
		Building Services Model	N/A	MEP elements of each building / plant room /etc

- *The 3rd level federation should be adopted at larger scale (M4) project. For in-house smaller scale projects, the CEDD officers may consider adopting level 1 and level 2 federation only*
- *Building(s) Model should be federated based on each building / plants / facility. For example, there should be two architectural models if the Service includes one administration building and one ventilation building.*
- *The building services elements may require further federated for large size building works. The CEDD officers may refer to the BIM Modelling Manual of CEDD.*

3.2 Model Federation for Port and Marine Services

PROJECT MODEL	1ST LEVEL FEDERATION	2ND LEVEL FEDERATION (DISCIPLINARY MODELS)	DESCRIPTION
Project Information Model	Existing Condition Model	Existing Site Topography	Topology (Digital Terrain Model) of the site area, include GI data and bore hole data
		Existing Street Furniture	Relevant existing planters, traffic sign, road markings, railings, street lighting, barriers, kerbs etc
		Existing Structure	All existing above ground and underground structures of the Service area
		Existing Underground Utilities	All existing underground utilities systems of the Service area
	Proposed Works Model	Fender System Model	Fender systems and related object elements
		Marine Civil Model	Furnitures within marine facilities, including Site boundary, proposed topologies and bathymetry
		Marine Structural Model	Structural elements classified by PWD
		Building Services Model	E&M equipment and related systems and concrete works
		Architectural Model	Architectural elements/fixtures within marine facilities

3.3 Model Federation for Geotechnical and Engineering Services

PROJECT MODEL	1ST LEVEL FEDERATION	2ND LEVEL FEDERATION (DISCIPLINARY MODELS)	DESCRIPTION
Project Information Model	Existing Condition Model	Existing Site Topography	Topology (Digital Terrain Model) of the site area, include GI data and bore hole data
		Existing Street Furniture	Relevant existing planters, traffic sign, road markings, railings, street lighting, barriers, kerbs etc
		Existing Structure	All existing above ground and underground structures of the Service area
		Existing Underground Utilities	All existing underground utilities systems of the Service area
	Proposed Works Model	Geotechnical Slope Model	Site boundary, Geological elements, Slope works and related stabilisation system
		Geotechnical Structure Model	Concrete structures, foundations and access elements
		Stormwater Model	Proposed Stormwater systems of the Services area
		Landscape Model	Vegetation, planters, and recreation elements

3.4 Model Federation for Environmental and Sustainability Services

PROJECT MODEL	1ST LEVEL FEDERATION	2ND LEVEL FEDERATION (DISCIPLINARY MODELS)	DESCRIPTION
Project Information Model	Existing Condition Model	Existing Site Topography	Topology (Digital Terrain Model) of the site area, include GI data and bore hole data
		Existing Street Furniture	Relevant existing planters, traffic sign, road markings, railings, street lighting, barriers, kerbs etc
		Existing Structure	All existing above ground and underground structures of the Service area
		Existing Underground Utilities	All existing underground utilities systems of the Service area
	Proposed Works Model	Geotechnical Slope Model	Site boundary, Geological elements, Slope works and related stabilisation system
		Stormwater Model	Proposed Stormwater systems of the Services area
		Sewerage Model	Proposed Sewerage systems of the Service area
		Water Supply Model	Proposed Water Supply systems of the Service area
	Proposed Building Model	Architectural Model	Architectural Elements, finishes of the Service
		Structural Model	Structural Elements of the Service
		Mechanical Model	Plant/Specialised Mechanical Elements of the Service
		Building Services Model	MEP systems of the Service

Annex 4 : Level of Information Need (LOIN) (to be developed by project officer)

Level of Information Needed is used to describe the geometrical, information and documentation requirement of specific model elements for a specific purpose. The Consultant shall refer to the below minimum LOIN requirements and the CEDD LOIN Specification[5] to develop the project required deliverables. The Consultant may further develop the LOIN and breakdown structure according to the project condition and requirements in the CEDD Modelling Manual.

The Consultant are required to propose the Model Federation, Model breakdown structure and the LOIN in the BEP based on the below structure and agree with the Employer's Agent.

- *This Annex should be always read with Annex 3. The CEDD officer should select the disciplinary model breakdown structure according to the selection made in Annex 3.*
- *These tables are the basic object elements required in each disciplinary model. They may not include all modelling elements in a Services. The CEDD officers should select the review if any project specific objects are not listed /not required in the Service.*
- *This Annex should read with the LOIN Specification of CEDD. Project officers shall review the latest CEDD LOIN specification to update the CAT code of the selected modelling objects*

4.1 LOIN for Land and Infrastructure Services

4.1.1 Proposed Geotechnical Slope Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Baffle	GSM	300	300	300	300	300	300	300	300	300	300	
2	Earthwork (cut/fill) (for slopeworks)	SUS	300	300	300	300	300	300	300	300	300	300	
3	Flexible barrier net, shackle for net, round clip	GSM	300	300	300	300	300	300	300	300	300	300	

[5] Pls refer to the CEDD LOIN Specification on the CAT Code requirement

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
4	Flexible Barrier Post, Base plate, Footing, shackle on post, running wheel	GSM	300	300	300	300	300	300	300	300	300	300	
5	Flexible barrier cable rope, rope clip, braking element	GSM	300	300	300	300	300	300	300	300	300	300	
6	Man-made slope (Registered)	GSM	300	300	300	300	300	300	300	300	300	300	
7	Natural slope	GSM	300	300	300	300	300	300	300	300	300	300	
8	Raking Drains	GSM	300	300	300	300	300	300	300	300	300	300	
9	Rigid barrier	GSM	300	300	300	300	300	300	300	300	300	300	
10	Soil Nail	GSM	300	300	300	300	300	300	300	300	300	300	
11	Site/Slope Boundary Polygon	LOT	200	200	200	200	200	200	200	200	200	200	
12	Terrain (Site formation)	DTM	200	200	200	200	200	200	200	200	200	200	
13	Geological model												
13a	Borehole	GEO	300	300	300	300	300	300	300	300	300	300	
13b	Fill	GEO	200	200	200	200	200	200	200	200	200	200	
13c	Compacted Fill	GEO	200	200	200	200	200	200	200	200	200	200	
13d	Design Groundwater profile	GEO	200	200	200	200	200	200	200	200	200	200	
14	Ground anchors	GSM	300	300	300	300	300	300	300	300	300	300	
15	Gabion for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
16	Cushioning Material for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
17	Steel Grating for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
18	Tree Ring	GSM	300	300	300	300	300	300	300	300	300	300	
19	Erosion Control Mat	GSM	300	300	300	300	300	300	300	300	300	300	
20	Wire Mesh	GSM	300	300	300	300	300	300	300	300	300	300	

4.1.2 Proposed Roadworks Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Earthwork (Cut/Fill)	SUS	300	200	300	200	300	200	300	200	300	300	
2	Kerb	RKB	300	200	300	200	300	200	300	200	300	300	
3	Man-made slope (for road construction)	SRS/SUS	250	200	250	200	250	200	250	200	250	300	
4	Pavement												
4a	Carriage way	RCW	300	200	300	200	300	200	300	200	300	300	
4b	Cycle Track	RCT	300	200	300	200	300	200	300	200	300	300	
4c	Foot path	RFW	300	200	300	200	300	200	300	200	300	300	
5	Retaining Structure	SFD	300	300	300	300	300	300	300	300	300	300	
6	Road Marking	RMK	200	N/A	200	N/A	200	N/A	200	N/A	200	N/A	
7	Site Boundary Polygon	LOT	300	300	300	300	300	300	300	300	300	300	
8	Traffic Island-Other	RIO	300	300	300	300	300	300	300	300	300	300	
9	Traffic Island-Refuge Island	RIR	300	300	300	300	300	300	300	300	300	300	
10	Terrain (Roadworks)	DTM	300	300	300	300	300	300	300	300	300	300	

4.1.3 **Proposed Landscape Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Barrier	FBF	300	200	300	200	300	200	300	200	300	300	
2	Bollard	FBL	300	200	300	200	300	200	300	200	300	300	
3	Hard Surface Cover (e.g. shotcrete)	GSM	300	200	300	200	300	200	300	200	300	300	
4	Lighting	LSL	200	N/A	200	N/A	200	N/A	200	N/A	200	300	
5	Planter (including planter for slope)	LTW	300	200	300	200	300	200	300	200	300	300	
6	Railing / Handrail	FRA	300	200	300	200	300	200	300	200	300	300	
7	Recreation area/facilities	LOT	200	200	300	200	300	200	300	200	300	300	
8	Retaining Wall Finishes	DTL	200	200	300	200	300	200	300	200	300	300	
9	Signage / Traffic Sign	FTW	200	200	300	200	300	200	300	200	300	300	
10	Sign Gantry	VRS	200	200	300	200	300	200	300	200	300	300	
11	Tree (New plant)	LTP	200	200	300	200	300	200	300	200	300	300	
12	Vegetation Surface Cover	GSM	200	200	300	200	300	200	300	200	300	300	

4.1.4 **Proposed Sewerage Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Box Culvert (Sewerage)	FBP	300	200	300	200	300	400	300	200	300	300	
2	Chamber	FCH	300	200	300	200	300	400	300	200	300	300	
3	Rising Main	FRM	300	200	300	200	300	400	300	200	300	300	
4	Sewerage Manhole	FMH	300	200	300	200	300	400	300	200	300	300	
5	Sewerage Manhole Cover	FMC	300	200	300	200	300	400	300	200	300	300	
6	Sewerage Gravity Sewer	FWD	300	200	300	200	300	400	300	200	300	300	
7	Special Manhole	FSH	300	200	300	200	300	400	300	200	300	300	
8	Terminal Manhole	FLH	300	200	300	200	300	400	300	200	300	300	
9	Tunnel (Sewerage)	FTP	300	200	300	200	300	400	300	200	300	300	

4.1.5 **Proposed Stormwater Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Box Culvert	SBP	300	200	300	200	300	200	300	200	300	200	
2	Catchpit	SCH	300	200	300	200	300	200	300	200	300	200	
3	Chamber	SBH	300	200	300	200	300	200	300	200	300	200	
4	Decked Nullah	SDP	300	200	300	200	300	200	300	200	300	200	
5	Inlet	SIH	300	200	300	200	300	200	300	200	300	200	
6	Nullah	SNP	300	200	300	200	300	200	300	200	300	200	
7	Outlet	SNF	300	200	300	200	300	200	300	200	300	200	
8	Gully	GUL	300	200	300	200	300	200	300	200	300	200	
9	Gully Pipe	SWD	300	200	300	200	300	200	300	200	300	200	
10	Sand Trap	SPH	300	200	300	200	300	200	300	200	300	200	
11	Stepped Channel	SSP	300	200	300	200	300	200	300	200	300	200	
12	Stormwater Manhole cover	SMC	300	200	300	200	300	200	300	200	300	200	
13	Stormwater Manhole	SMH	300	200	300	200	300	200	300	200	300	200	
14	Stormwater pipe	SWD	300	200	300	200	300	200	300	200	300	200	
15	Terminal manhole	SLH	300	200	300	200	300	200	300	200	300	200	
16	U-Channel/ Covered U-Channels	SUP	300	200	300	200	300	200	300	200	300	200	
17	Concrete Cover for Channels	SUP	300	200	300	200	300	200	300	200	300	200	
18	Cast Iron Grating for Channels	SUP	300	200	300	200	300	200	300	200	300	200	

4.1.6 Proposed Water Supply Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Fresh watermain	WSD	300	200	300	200	300	400	300	200	300	300	
2	Salt Watermain	SSD	300	200	300	200	300	400	300	200	300	300	
3	Chamber /Pump Pit	SBH	300	200	300	200	300	400	300	200	300	300	
4	Fittings	PPF	300	200	300	200	300	400	300	200	300	300	
5	Valve	PPA	300	200	300	200	300	400	300	200	300	300	
6	Thrust Block	THB	300	200	300	200	300	400	300	200	300	300	
7	Fire Hydrant	FS_	200	200	200	200	200	300	200	200	200	300	

4.1.7 Proposed Gas Supply Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Gas Pipe	GAP	100	200	100	200	100	300	100	200	100	300	
2	Gas Inspection pit	GIP	300	200	300	200	300	300	300	200	300	300	
4	Gas Value	PPA	100	200	200	200	200	300	200	200	200	300	

4.1.8 Proposed Electric Power Supply Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Electric Box	ELQ	300	200	300	200	300	300	300	200	300	300	
2	Electric Inspection pit	EIP	300	200	300	200	300	300	300	200	300	300	
3	Electric Manholes	EMH	300	200	300	200	300	300	300	200	300	300	
4	Power Cables/lines	EPD	100	200	100	200	100	300	100	200	100	300	
5	Transformers	ETR	300	200	300	200	300	300	300	200	300	300	

4.1.9 Proposed Telecommunication Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Telecommunication lines	TED	100	200	200	200	100	300	100	200	200	300	
2	Tel Inspection pit	TIP	300	200	300	200	300	300	300	200	300	300	
3	Tel Manholes / Drawpits	TMN	300	200	300	200	300	300	300	200	300	300	

4.1.10 Proposed Highways Structural Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Super structure model: Bridge												
1a	Abutment	TBR	200	200	200	200	200	300	200	200	200	300	
1b	Bearings	TBR	300	300	300	300	N/A	N/A	300	300	300	300	
1c	Deck/Segment	TBR	200	200	200	200	200	300	200	200	200	300	
1d	Girder/main beams/webs	TBR	200	200	200	200	200	300	200	200	200	300	
1e	Pier/Column/Soffit	TBR	200	200	200	200	200	300	200	200	200	300	
2	Noise Enclosure systems												
2a	Noise Enclosure	TNE	300	300	300	300	300	300	300	300	200	300	
2b	Noise Barrier	TNB	300	300	300	300	300	300	300	300	200	300	
3	Super structure model: Footbridge												
3a	Abutment	TFB	200	200	200	200	200	300	200	200	200	300	
3b	Bearings	TFB	300	300	300	300	N/A	N/A	300	300	300	300	
3c	Deck/Segment	TFB	200	200	200	200	200	300	200	200	200	300	
3d	Girder/main beams/webs	TFB	200	200	200	200	200	300	200	200	200	300	
3e	Pier/Column/Soffit	TFB	200	200	200	200	200	300	200	200	200	300	
3f	Staircases (bridge)	TFB	200	200	200	200	200	300	200	200	200	300	
3g	Pier/Column/Soffit	TFB	200	200	200	200	200	300	200	200	200	300	
3h	Lift Tower (Bridge)	TLT	200	200	200	200	200	300	200	200	200	300	
4	Sub- Structure Model												
4a	Pile	SFD	300	200	300	200	300	300	300	200	300	300	
4b	Pile Cap	SFD	300	200	300	200	300	300	300	200	300	300	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
4c	Cable Trench	CTF	300	200	300	200	300	200	300	200	300	200	
4d	Excavation and refill for sub-structure	EXL	200	200	200	200	N/A	N/A	200	200	200	200	
4e	Foundation	Multiple*	300	200	300	200	300	200	300	200	300	300	
5	Other Structural elements												
5a	Diaphragm Wall	EXL	300	300	300	300	300	300	300	300	200	300	
5b	Lining	UCL	300	200	300	200	300	200	300	200	300	300	
5c	Tunnel Structure Segments	TIS	300	300	300	300	300	300	300	300	200	300	
5d	Panel Wall	UPL	300	200	300	200	N/A	N/A	300	200	300	300	
5e	Temp. Support Structure	EXL	200	200	200	200	N/A	N/A	300	200	300	200	

4.1.11 **Specialised Systems Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	TCSS	SPQ	200	200	200	200	N/A	N/A	200	200	200	300	
2	Tunnel Ventilation System	UFC	200	200	200	200	200	200	200	200	200	200	

4.1.12 **Proposed Architectural Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Access Ladders and Catwalks	ALA	300	200	300	200	N/A	N/A	300	200	300	300	
2	Architectural Wall	TWL	300	200	300	200	N/A	N/A	300	200	300	300	
3	Blue Colour Paint	MAO 6	300	200	300	200	N/A	N/A	300	200	300	300	
4	Ceiling	CEL	300	200	300	200	N/A	N/A	300	200	300	300	
5	Curtain wall/ glass wall	CTP	300	200	300	200	N/A	N/A	300	200	300	300	
6	Door/Entrance	ADO	300	200	300	200	N/A	N/A	300	200	300	300	
7	Elevator / Lift Shaft space	MCO	300	200	300	200	N/A	N/A	300	200	300	300	
8	Finishes	DTL	300	200	300	200	N/A	N/A	300	200	300	300	
9	Floor, Slab	TLA	300	200	300	200	N/A	N/A	300	200	300	300	
10	Furniture	FUR	300	200	300	200	N/A	N/A	300	200	300	300	
11	Gate	AGT	300	200	300	200	N/A	N/A	300	200	300	300	
12	Louvers	WDW	300	200	300	200	N/A	N/A	300	200	300	300	
13	Mass concrete fill	SFD	300	200	300	200	N/A	N/A	300	200	300	300	
14	Non-Slip Yellow Nosing	MAO	300	200	300	200	N/A	N/A	300	200	300	300	
15	Precast Facade	TWL	300	200	300	200	N/A	N/A	300	200	300	300	
16	Railing, handrail	FRA	300	200	300	200	N/A	N/A	300	200	300	300	
17	Ramp	TPD	300	200	300	200	N/A	N/A	300	200	300	300	
18	Roof / Architectural Roof	Multiple*	300	200	300	200	N/A	N/A	300	200	300	300	

[6] [Note: To facilitate the review purpose, the codes not available in the BIM harmonisation guideline are highlighted in Yellow]

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
19	Roof Gutter		300	200	300	200	N/A	N/A	300	200	300	300	
20	Skylight	WDW	300	200	300	200	N/A	N/A	300	200	300	300	
21	Stairs	TTE	300	200	300	200	N/A	N/A	300	200	300	300	
22	Tactile Warning strip	FWS	300	200	300	200	N/A	N/A	300	200	300	300	
23	Window	WDW	300	200	300	200	N/A	N/A	300	200	300	300	

4.1.13 Proposed Structural Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Base Plates, Blots, clip angles, fixing etc.	SFM	300	200	300	200	N/A	N/A	300	200	300	300	
2	Beams	TBS	300	200	300	200	300	300	300	200	300	300	
3	Columns	SCL	300	200	300	200	300	300	300	200	300	300	
4	Foundation (Pile, pile cap, ground beams & Footings)	SFD	300	200	300	200	300	300	300	200	300	300	
5	Mass concrete fill	SFD	300	200	300	200	N/A	N/A	300	200	300	300	
6	Slabs	TLA	300	200	300	200	300	300	300	200	300	300	
7	Ramp	TPD	300	200	300	200	300	300	300	200	300	300	
8	Stairs	TTE	300	200	300	200	N/A	N/A	300	200	300	300	
9	Structural Wall	TWL	300	200	300	200	300	300	300	200	300	300	
10	Tank structures	SFD	300	200	300	200	300	300	300	200	300	300	

4.1.14 **Proposed Building Services Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	MVAC System												
1a	Exhaust (extract) air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1b	Fresh air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1c	Return air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1ed	Supply air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1e	Access panel	AAP	200	200	200	200	200	300	200	200	200	300	
1f	Air handling unit	BAC	200	200	200	200	200	300	200	200	200	300	
1g	Chillers	MC Q	200	200	200	200	200	300	200	200	200	300	
1h	Chilled water supply pipe	MC Q	200	200	200	200	200	300	200	200	200	300	
1i	Chilled water return pipe	MC Q	200	200	200	200	200	300	200	200	200	300	
1j	Condensate drainpipe	MPI	200	200	200	200	200	300	200	200	200	300	
1k	Damper	BDA	200	200	200	200	200	300	200	200	200	300	
1l	Diffuser, air-boot, air grill, air filter, register	BDI	200	200	200	200	200	300	200	200	200	300	
1m	Fan	BFA	200	200	200	200	200	300	200	200	200	300	
1n	Fan Coil Unit	BFC	200	200	200	200	200	300	200	200	200	300	
1o	Fire damper	BDA	200	200	200	200	200	300	200	200	200	300	
1p	Insulation	PIS	200	200	200	200	200	300	200	200	200	300	
1q	Primary air unit	BAC	200	200	200	200	200	300	200	200	200	300	
1r	Silencer	BSI	200	200	200	200	200	300	200	200	200	300	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1s	Smoke extraction system	MCQ	200	200	200	200	200	300	200	200	200	300	
1t	Variable control damper	BDA	200	200	200	200	200	300	200	200	200	300	
1u	Dynamic envelope in MVAC model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
2	Plumbing System												
2a	Flush water piping	PLM	200	200	200	200	200	400	200	200	200	400	
2b	Fresh water piping (water supplies)	WSD	200	200	200	200	200	400	200	200	200	400	
2c	Tap, faucet	PLM	200	200	200	200	200	400	200	200	200	400	
2d	Valve	MV A	200	200	200	200	200	400	200	200	200	400	
2e	Dynamic envelope in plumbing & water supply model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
3	Drainage and Sewerage												
3a	Floor drain	DTH	200	200	200	200	200	200	200	200	200	200	
3b	Gully, sealed trapped gully, clean outs and vent	GUL	200	200	200	200	200	200	200	200	200	200	
3c	Kitchen waste pipe work including floor drain, open trapped	MPA	200	200	200	200	200	200	200	200	200	200	
3d	Rainwater, storm water	STP	200	200	200	200	200	200	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
	pipe, storm drain												
3e	Rainwater outlet	SNF	200	200	200	200	200	200	200	200	200	200	
3f	Surface channel, slot channel, external drainage	SUP	200	200	200	200	200	200	200	200	200	200	
3g	Sewerage pipe, foul sewer drains	FWD	200	200	200	200	200	200	200	200	200	200	
3h	Vent pipe	MPI	200	200	200	200	200	200	200	200	200	200	
3i	Dynamic envelope in drainage & sewage model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
4	Fire Services System												
4a	Fire Alarm Control Panel	BFP	300	200	300	200	200	200	200	200	200	200	
4b	Fire Alarm Audio/ Visual	BFS	300	200	300	200	200	200	200	200	200	200	
4c	Fire Alarm Devices	ALM	300	200	300	200	200	200	200	200	200	200	
4d	Break glass unit	BFB	300	200	300	200	200	200	200	200	200	200	
4e	Fire detection system, heat or smoke detectors	BFD	300	200	300	200	200	200	200	200	200	200	
4f	Fire hydrant/hose reel system	BFH	300	200	300	200	200	200	200	200	200	200	
4g	Sprinkler pipe work	SRK	300	200	300	200	200	200	200	200	200	200	
4h	Sprinkler head	SRK	200	200	200	200	N/A	N/A	200	200	200	200	
4i	Sprinkler valve & flow switch	SRK	200	200	200	200	N/A	N/A	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
4j	Dynamic envelope fire services model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
5	Electrical System / MEP System for Marine and Ports												
5a	Cable Draw pit	ECD	200	200	200	200	N/A	N/A	200	200	200	200	
5b	CCTV Camera	BCA	200	200	200	200	N/A	N/A	200	200	200	200	
5c	Corrosion Monitoring Pit	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5d	Corrosion Monitoring Terminal Box	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5e	Directional Exit Sign	BFX	200	200	200	200	N/A	N/A	200	200	200	200	
5f	Earthing and Lightning equipment	Multiple*	200	200	200	200	N/A	N/A	200	200	200	200	
5g	Electrical Cable tray, cable containment, power feed, cable ducting	CTF	200	200	200	200	N/A	N/A	200	200	200	200	
5h	Emergency lighting	BLF	200	200	200	200	N/A	N/A	200	200	200	200	
5i	Exit sign	BFX	200	200	200	200	N/A	N/A	200	200	200	200	
5j	GovWifi equipment	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5k	ICCP Transformer Rectifier	ETR	200	200	200	200	N/A	N/A	200	200	200	200	
5l	Inspection manhole	UMH	200	200	200	200	N/A	N/A	200	200	200	200	
5m	Light fitting/Lighting	BLF	200	200	200	200	N/A	N/A	200	200	200	200	
5n	Panel board, motor control center	ECP	200	200	200	200	N/A	N/A	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
5o	Pillar box (including ICCP AC power supply pillar box and electric pillar box)	ETR	200	200	200	200	N/A	N/A	200	200	200	200	
5p	Sensors	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5q	Solar Panel	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5r	Trucking, bus duct, busbar, busway	CTF	200	200	200	200	N/A	N/A	200	200	200	200	
5s	Dynamic envelope electrical model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	

4.2 LOIN for Port and Marine Services

4.2.1 Proposed Fender System Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Capping (Rubber or Timber)	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
2	Chain for Fender System	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
3	Eye blot for Fender System	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
4	Frontal Pad	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
5	Horizontal Fender (plastic, timber, rubber)	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
6	Horizontal/Inclined fender wailing	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
7	Rubber Buffer	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
8	Step Block (Rubber or Timber)	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
9	Steel Bracket	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
10	Steel Plate for Wailing system	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
11	Vertical Fender (plastic, timber, rubber)	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code

4.2.2 **Proposed Marine Civil Model (General)**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Access/Cat Ladder	ALA	300	200	300	200	300	200	300	200	300	300	PWD_Code
2	Terrain (Proposed Profile or Tunnel Seabed Levels)	DTM	200	200	200	200	200	200	200	200	200	300	PWD_Code
3	Barrier Bollard	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
4	Bench	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
5	Concrete Plinth	SFD	300	200	300	200	300	200	300	200	300	300	PWD_Code
6	Fence	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
7	Gate	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
8	Lifebuoy	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
9	Marine Notice Board	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
10	Mooring eye	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
11	Mooring Bollard	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
12	Navigation Light Post	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
13	Pier Notice board	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
14	Terrain (Site formation)	DTM	300	200	300	200	300	200	300	200	300	300	PWD_Code
15	Railing/Handrail	FRA	300	200	300	200	300	200	300	200	300	300	PWD_Code
16	Signage/information plate (include landing /structural no. plate, pier)	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
17	Step iron	FEN	300	200	300	200	300	200	300	200	300	300	PWD_Code
18	Site Boundary Polygon	LOT	300	200	300	200	300	200	300	200	300	300	
19	Tidal Gauge House	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code
20	Tidal Gauge Tubes	SIT	300	200	300	200	300	200	300	200	300	300	PWD_Code

4.2.3 **Proposed Marine Structural Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Terrain (Shoreline / Beach Finish Level)	DTM	300	200	300	200	300	200	300	200	300	300	
2	Pile Cap	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code
3	Pile Foundation	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code
4	Concrete Foundation for Beacon	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code
5	Anchor Blot/Post	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code
6	Structural Beam (Concrete Beam, Steel Beam and Tie Beam)	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code
7	Structural Column (Concrete Column, Steel Column and Post)	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
8	Bracing (Horizontal/Vertical)	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code
9	Slab/Pier Deck	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
10	Precast Beam Slab Panel	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
11	Ramp	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
12	Corbel/Concrete Bracket for Pier	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
13	Structural wall / retaining wall	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
14	Concrete structure for Beacon, Dolphin, vertical seawall, and a solid pier	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
15	Steel structure for Beacon	MSO	300	200	300	200	300	200	300	200	200	300	PWD_Code
16	Access Structure	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
17	Landing Platform	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
18	Landing Staircase Structure	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
19	Landing Step	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
20	Concrete Coping	MSF	300	200	300	200	300	200	300	200	300	300	PWD_Code
21	Gabion Wall	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
22	Wave Absorption Chamber	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
23	Precast Concrete Block (include seawall block, solid pier concrete block, wave wall/barrier)	MSO	300	200	300	200	300	200	300	200	300	300	PWD_Code
24	Rock Armour for seawall and breakwater	MSO	200	200	200	200	N/A	N/A	200	200	200	300	PWD_Code
25	Rock Fill	MSO	200	200	200	200	N/A	N/A	200	200	200	300	PWD_Code
26	Berm Stone	MSO	200	200	200	200	N/A	N/A	200	200	200	300	PWD_Code
27	Bagged Concrete	MSO	200	200	200	200	N/A	N/A	200	200	200	300	PWD_Code
28	Levelling Stone	MSO	200	200	200	200	N/A	N/A	200	200	200	300	PWD_Code
29	Pell Mell Rubble	MSO	200	200	200	200	N/A	N/A	200	200	200	300	PWD_Code

4.2.4 Proposed Building Services Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	MVAC System												
1a	Exhaust (extract) air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1b	Fresh air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1c	Return air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1ed	Supply air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1e	Access panel	AAP	200	200	200	200	200	300	200	200	200	300	
1f	Air handling unit	BAC	200	200	200	200	200	300	200	200	200	300	
1g	Chillers	MC Q	200	200	200	200	200	300	200	200	200	300	
1h	Chilled water supply pipe	MC Q	200	200	200	200	200	300	200	200	200	300	
1i	Chilled water return pipe	MC Q	200	200	200	200	200	300	200	200	200	300	
1j	Condensate drainpipe	MPI	200	200	200	200	200	300	200	200	200	300	
1k	Damper	BDA	200	200	200	200	200	300	200	200	200	300	
1l	Diffuser, air-boot, air grill, air filter, register	BDI	200	200	200	200	200	300	200	200	200	300	
1m	Fan	BFA	200	200	200	200	200	300	200	200	200	300	
1n	Fan Coil Unit	BFC	200	200	200	200	200	300	200	200	200	300	
1o	Fire damper	BDA	200	200	200	200	200	300	200	200	200	300	
1p	Insulation	PIS	200	200	200	200	200	300	200	200	200	300	
1q	Primary air unit	BAC	200	200	200	200	200	300	200	200	200	300	
1r	Silencer	BSI	200	200	200	200	200	300	200	200	200	300	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1s	Smoke extraction system	MCQ	200	200	200	200	200	300	200	200	200	300	
1t	Variable control damper	BDA	200	200	200	200	200	300	200	200	200	300	
1u	Dynamic envelope in MVAC model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
2	Plumbing System												
2a	Flush water piping	PLM	200	200	200	200	200	400	200	200	200	400	
2b	Fresh water piping (water supplies)	WSD	200	200	200	200	200	400	200	200	200	400	
2c	Tap, faucet	PLM	200	200	200	200	200	400	200	200	200	400	
2d	Valve	MV A	200	200	200	200	200	400	200	200	200	400	
2e	Dynamic envelope in plumbing & water supply model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
3	Drainage and Sewerage												
3a	Floor drain	DTH	200	200	200	200	200	200	200	200	200	200	
3b	Gully, sealed trapped gully, clean outs and vent	GUL	200	200	200	200	200	200	200	200	200	200	
3c	Kitchen waste pipe work including floor drain, open trapped	MPA	200	200	200	200	200	200	200	200	200	200	
3d	Rainwater, storm water	STP	200	200	200	200	200	200	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
	pipe, storm drain												
3e	Rainwater outlet	SNF	200	200	200	200	200	200	200	200	200	200	
3f	Surface channel, slot channel, external drainage	SUP	200	200	200	200	200	200	200	200	200	200	
3g	Sewerage pipe, foul sewer drains	FWD	200	200	200	200	200	200	200	200	200	200	
3h	Vent pipe	MPI	200	200	200	200	200	200	200	200	200	200	
3i	Dynamic envelope in drainage & sewage model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
4	Fire Services System												
4a	Fire Alarm Control Panel	BFP	300	200	300	200	200	200	200	200	200	200	
4b	Fire Alarm Audio/ Visual	BFS	300	200	300	200	200	200	200	200	200	200	
4c	Fire Alarm Devices	ALM	300	200	300	200	200	200	200	200	200	200	
4d	Break glass unit	BFB	300	200	300	200	200	200	200	200	200	200	
4e	Fire detection system, heat or smoke detectors	BFD	300	200	300	200	200	200	200	200	200	200	
4f	Fire hydrant/hose reel system	BFH	300	200	300	200	200	200	200	200	200	200	
4g	Sprinkler pipe work	SRK	300	200	300	200	200	200	200	200	200	200	
4h	Sprinkler head	SRK	200	200	200	200	N/A	N/A	200	200	200	200	
4i	Sprinkler valve & flow switch	SRK	200	200	200	200	N/A	N/A	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
4j	Dynamic envelope fire services model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
5	Electrical System / MEP System for Marine and Ports												
5a	Cable Draw pit	ECD	200	200	200	200	N/A	N/A	200	200	200	200	
5b	CCTV Camera	BCA	200	200	200	200	N/A	N/A	200	200	200	200	
5c	Corrosion Monitoring Pit	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5d	Corrosion Monitoring Terminal Box	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5e	Directional Exit Sign	BFX	200	200	200	200	N/A	N/A	200	200	200	200	
5f	Earthing and Lightning equipment	Multiple*	200	200	200	200	N/A	N/A	200	200	200	200	
5g	Electrical Cable tray, cable containment, power feed, cable ducting	CTF	200	200	200	200	N/A	N/A	200	200	200	200	
5h	Emergency lighting	BLF	200	200	200	200	N/A	N/A	200	200	200	200	
5i	Exit sign	BFX	200	200	200	200	N/A	N/A	200	200	200	200	
5j	GovWifi equipment	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5k	ICCP Transformer Rectifier	ETR	200	200	200	200	N/A	N/A	200	200	200	200	
5l	Inspection manhole	UMH	200	200	200	200	N/A	N/A	200	200	200	200	
5m	Light fitting/Lighting	BLF	200	200	200	200	N/A	N/A	200	200	200	200	
5n	Panel board, motor control center	ECP	200	200	200	200	N/A	N/A	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
5o	Pillar box (including ICCP AC power supply pillar box and electric pillar box)	ETR	200	200	200	200	N/A	N/A	200	200	200	200	
5p	Sensors	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5q	Solar Panel	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5r	Trucking, bus duct, busbar, busway	CTF	200	200	200	200	N/A	N/A	200	200	200	200	
5s	Dynamic envelope electrical model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	

4.2.5 **Proposed Architectural Model**

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Access Ladders and Catwalks	ALA	300	200	300	200	N/A	N/A	300	200	300	300	
2	Architectural Wall	TWL	300	200	300	200	N/A	N/A	300	200	300	300	
3	Blue Colour Paint	MAO 7	300	200	300	200	N/A	N/A	300	200	300	300	
4	Ceiling	CEL	300	200	300	200	N/A	N/A	300	200	300	300	
5	Curtain wall/ glass wall	CTP	300	200	300	200	N/A	N/A	300	200	300	300	
6	Door/Entrance	ADO	300	200	300	200	N/A	N/A	300	200	300	300	
7	Elevator / Lift Shaft space	MCO	300	200	300	200	N/A	N/A	300	200	300	300	
8	Finishes	DTL	300	200	300	200	N/A	N/A	300	200	300	300	
9	Floor, Slab	TLA	300	200	300	200	N/A	N/A	300	200	300	300	
10	Furniture	FUR	300	200	300	200	N/A	N/A	300	200	300	300	
11	Gate	AGT	300	200	300	200	N/A	N/A	300	200	300	300	
12	Louvers	WDW	300	200	300	200	N/A	N/A	300	200	300	300	
13	Mass concrete fill	SFD	300	200	300	200	N/A	N/A	300	200	300	300	
14	Non-Slip Yellow Nosing	MAO	300	200	300	200	N/A	N/A	300	200	300	300	
15	Precast Facade	TWL	300	200	300	200	N/A	N/A	300	200	300	300	
16	Railing, handrail	FRA	300	200	300	200	N/A	N/A	300	200	300	300	
17	Ramp	TPD	300	200	300	200	N/A	N/A	300	200	300	300	
18	Roof / Architectural Roof	Multiple*	300	200	300	200	N/A	N/A	300	200	300	300	

[7] [Note: To facilitate the review purpose, the codes not available in the BIM harmonisation guideline are highlighted in Yellow]

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
19	Roof Gutter		300	200	300	200	N/A	N/A	300	200	300	300	
20	Skylight	WDW	300	200	300	200	N/A	N/A	300	200	300	300	
21	Stairs	TTE	300	200	300	200	N/A	N/A	300	200	300	300	
22	Tactile Warning strip	FWS	300	200	300	200	N/A	N/A	300	200	300	300	
23	Window	WDW	300	200	300	200	N/A	N/A	300	200	300	300	

4.3 LOIN for Geotechnical and Engineering Services

4.3.1 Proposed Geotechnical Slope Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Baffle	GSM	300	300	300	300	300	300	300	300	300	300	
2	Earthwork (cut/fill) (for slopeworks)	SUS	300	300	300	300	300	300	300	300	300	300	
3	Flexible barrier net, shackle for net, round clip	GSM	300	300	300	300	300	300	300	300	300	300	
4	Flexible Barrier Post, Base plate, Footing, shackle on post, running wheel	GSM	300	300	300	300	300	300	300	300	300	300	
5	Flexible barrier cable rope, rope clip, braking element	GSM	300	300	300	300	300	300	300	300	300	300	
6	Man-made slope (Registered)	GSM	300	300	300	300	300	300	300	300	300	300	
7	Natural slope	GSM	300	300	300	300	300	300	300	300	300	300	
8	Raking Drains	GSM	300	300	300	300	300	300	300	300	300	300	
9	Rigid barrier	GSM	300	300	300	300	300	300	300	300	300	300	
10	Soil Nail	GSM	300	300	300	300	300	300	300	300	300	300	
11	Site/Slope Boundary Polygon	LOT	200	200	200	200	200	200	200	200	200	200	
12	Terrain (Site formation)	DTM	200	200	200	200	200	200	200	200	200	200	
13	Geological model												
13a	Borehole	GEO	300	300	300	300	300	300	300	300	300	300	
13b	Fill	GEO	200	200	200	200	200	200	200	200	200	200	
13c	Compacted Fill	GEO	200	200	200	200	200	200	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
13d	Design Groundwater profile	GEO	200	200	200	200	200	200	200	200	200	200	
14	Ground anchors	GSM	300	300	300	300	300	300	300	300	300	300	
15	Gabion for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
16	Cushioning Material for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
17	Steel Grating for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
18	Tree Ring	GSM	300	300	300	300	300	300	300	300	300	300	
19	Erosion Control Mat	GSM	300	300	300	300	300	300	300	300	300	300	
20	Wire Mesh	GSM	300	300	300	300	300	300	300	300	300	300	

4.3.2 Proposed Geotechnical Structure Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Foundation (pile)	SFD	300	200	300	200	300	200	300	200	300	200	
2	Foundation (pile cap)	SFD	300	200	300	200	300	200	300	200	300	200	
3	Foundation (ground beam)	SFD	300	200	300	200	300	200	300	200	300	200	
4	Footing	SFD	300	200	300	200	300	200	300	200	300	200	
5	Mass Concrete Infill (including No-fines Concrete)	GSM	300	200	300	200	300	200	300	200	300	200	
6	Retaining Wall on Slope	SUS	300	200	300	200	300	200	300	200	300	200	
7	Structural concrete beam	GSM	300	200	300	200	300	200	300	200	300	200	
8	Structural concrete wall	GSM	300	200	300	200	300	200	300	200	300	200	
9	Structural concrete column	GSM	300	200	300	200	300	200	300	200	300	200	
10	Structural concrete slab	GSM	300	200	300	200	300	200	300	200	300	200	
11	Structural steel column, post	GSM	300	200	300	200	300	200	300	200	300	200	
12	Steel access ladder	GSM	300	200	300	200	300	200	300	200	300	200	
13	Temporary work, temporary structure, platform	GSM	200	200	200	200	200	200	200	200	200	200	
14	Steel Handrailing (to Maintenance Stairway on Slope)	GSM	300	200	300	200	300	200	300	200	300	200	
15	Steel Staircase	GSM	300	200	300	200	300	200	300	200	300	200	
16	Steel Gate	GSM	300	200	300	200	300	200	300	200	300	200	
17	Maintenance Access (incl.	GSM	300	200	300	200	300	200	300	200	300	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
	Concrete Stairway/Berm)												
18	Foundation (Other)	SFD	300	200	300	200	300	200	300	200	300	200	
19	Chain Link Fence on Slope	GSM	300	200	300	200	300	200	300	200	300	200	
20	Skin Wall	GSM	300	200	300	200	300	200	300	200	300	200	

4.3.3 Proposed Stormwater Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Box Culvert	SBP	300	200	300	200	300	200	300	200	300	200	
2	Catchpit	SCH	300	200	300	200	300	200	300	200	300	200	
3	Chamber	SBH	300	200	300	200	300	200	300	200	300	200	
4	Decked Nullah	SDP	300	200	300	200	300	200	300	200	300	200	
5	Inlet	SIH	300	200	300	200	300	200	300	200	300	200	
6	Nullah	SNP	300	200	300	200	300	200	300	200	300	200	
7	Outlet	SNF	300	200	300	200	300	200	300	200	300	200	
8	Gully	GUL	300	200	300	200	300	200	300	200	300	200	
9	Gully Pipe	SWD	300	200	300	200	300	200	300	200	300	200	
10	Sand Trap	SPH	300	200	300	200	300	200	300	200	300	200	
11	Stepped Channel	SSP	300	200	300	200	300	200	300	200	300	200	
12	Stormwater Manhole cover	SMC	300	200	300	200	300	200	300	200	300	200	
13	Stormwater Manhole	SMH	300	200	300	200	300	200	300	200	300	200	
14	Stormwater pipe	SWD	300	200	300	200	300	200	300	200	300	200	
15	Terminal manhole	SLH	300	200	300	200	300	200	300	200	300	200	
16	U-Channel/ Covered U-Channels	SUP	300	200	300	200	300	200	300	200	300	200	
17	Concrete Cover for Channels	SUP	300	200	300	200	300	200	300	200	300	200	
18	Cast Iron Grating for Channels	SUP	300	200	300	200	300	200	300	200	300	200	

4.3.4 Proposed Landscape Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Barrier	FBF	300	200	300	200	300	200	300	200	300	300	
2	Bollard	FBL	300	200	300	200	300	200	300	200	300	300	
3	Hard Surface Cover (e.g. shotcrete)	GSM	300	200	300	200	300	200	300	200	300	300	
4	Lighting	LSL	200	N/A	200	N/A	200	N/A	200	N/A	200	300	
5	Planter (including planter for slope)	LTW	300	200	300	200	300	200	300	200	300	300	
6	Railing / Handrail	FRA	300	200	300	200	300	200	300	200	300	300	
7	Recreation area/facilities	LOT	200	200	300	200	300	200	300	200	300	300	
8	Retaining Wall Finishes	DTL	200	200	300	200	300	200	300	200	300	300	
9	Signage / Traffic Sign	FTW	200	200	300	200	300	200	300	200	300	300	
10	Sign Gantry	VRS	200	200	300	200	300	200	300	200	300	300	
11	Tree (New plant)	LTP	200	200	300	200	300	200	300	200	300	300	
12	Vegetation Surface Cover	GSM	200	200	300	200	300	200	300	200	300	300	

4.4 LOIN for Environmental and Sustainability Services

4.4.1 Proposed Geotechnical Slope Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Baffle	GSM	300	300	300	300	300	300	300	300	300	300	
2	Earthwork (cut/fill) (for slopeworks)	SUS	300	300	300	300	300	300	300	300	300	300	
3	Flexible barrier net, shackle for net, round clip	GSM	300	300	300	300	300	300	300	300	300	300	
4	Flexible Barrier Post, Base plate, Footing, shackle on post, running wheel	GSM	300	300	300	300	300	300	300	300	300	300	
5	Flexible barrier cable rope, rope clip, braking element	GSM	300	300	300	300	300	300	300	300	300	300	
6	Man-made slope (Registered)	GSM	300	300	300	300	300	300	300	300	300	300	
7	Natural slope	GSM	300	300	300	300	300	300	300	300	300	300	
8	Raking Drains	GSM	300	300	300	300	300	300	300	300	300	300	
9	Rigid barrier	GSM	300	300	300	300	300	300	300	300	300	300	
10	Soil Nail	GSM	300	300	300	300	300	300	300	300	300	300	
11	Site/Slope Boundary Polygon	LOT	200	200	200	200	200	200	200	200	200	200	
12	Terrain (Site formation)	DTM	200	200	200	200	200	200	200	200	200	200	
13	Geological model												
13a	Borehole	GEO	300	300	300	300	300	300	300	300	300	300	
13b	Fill	GEO	200	200	200	200	200	200	200	200	200	200	
13c	Compacted Fill	GEO	200	200	200	200	200	200	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
13d	Design Groundwater profile	GEO	200	200	200	200	200	200	200	200	200	200	
14	Ground anchors	GSM	300	300	300	300	300	300	300	300	300	300	
15	Gabion for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
16	Cushioning Material for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
17	Steel Grating for Rigid Barrier	GSM	300	300	300	300	300	300	300	300	300	300	
18	Tree Ring	GSM	300	300	300	300	300	300	300	300	300	300	
19	Erosion Control Mat	GSM	300	300	300	300	300	300	300	300	300	300	
20	Wire Mesh	GSM	300	300	300	300	300	300	300	300	300	300	

4.4.2 Proposed Stormwater Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Box Culvert	SBP	300	200	300	200	300	200	300	200	300	200	
2	Catchpit	SCH	300	200	300	200	300	200	300	200	300	200	
3	Chamber	SBH	300	200	300	200	300	200	300	200	300	200	
4	Decked Nullah	SDP	300	200	300	200	300	200	300	200	300	200	
5	Inlet	SIH	300	200	300	200	300	200	300	200	300	200	
6	Nullah	SNP	300	200	300	200	300	200	300	200	300	200	
7	Outlet	SNF	300	200	300	200	300	200	300	200	300	200	
8	Gully	GUL	300	200	300	200	300	200	300	200	300	200	
9	Gully Pipe	SWD	300	200	300	200	300	200	300	200	300	200	
10	Sand Trap	SPH	300	200	300	200	300	200	300	200	300	200	
11	Stepped Channel	SSP	300	200	300	200	300	200	300	200	300	200	
12	Stormwater Manhole cover	SMC	300	200	300	200	300	200	300	200	300	200	
13	Stormwater Manhole	SMH	300	200	300	200	300	200	300	200	300	200	
14	Stormwater pipe	SWD	300	200	300	200	300	200	300	200	300	200	
15	Terminal manhole	SLH	300	200	300	200	300	200	300	200	300	200	
16	U-Channel/ Covered U-Channels	SUP	300	200	300	200	300	200	300	200	300	200	
17	Concrete Cover for Channels	SUP	300	200	300	200	300	200	300	200	300	200	
18	Cast Iron Grating for Channels	SUP	300	200	300	200	300	200	300	200	300	200	

4.4.3 Proposed Sewerage Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Box Culvert (Sewerage)	FBP	300	200	300	200	300	400	300	200	300	300	
2	Chamber	FCH	300	200	300	200	300	400	300	200	300	300	
3	Rising Main	FRM	300	200	300	200	300	400	300	200	300	300	
4	Sewerage Manhole	FMH	300	200	300	200	300	400	300	200	300	300	
5	Sewerage Manhole Cover	FMC	300	200	300	200	300	400	300	200	300	300	
6	Sewerage Gravity Sewer	FWD	300	200	300	200	300	400	300	200	300	300	
7	Special Manhole	FSH	300	200	300	200	300	400	300	200	300	300	
8	Terminal Manhole	FLH	300	200	300	200	300	400	300	200	300	300	
9	Tunnel (Sewerage)	FTP	300	200	300	200	300	400	300	200	300	300	

4.4.4 Proposed Water Supply Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Fresh watermain	WSD	300	200	300	200	300	400	300	200	300	300	
2	Salt Watermain	SSD	300	200	300	200	300	400	300	200	300	300	
3	Chamber /Pump Pit	SBH	300	200	300	200	300	400	300	200	300	300	
4	Fittings	PPF	300	200	300	200	300	400	300	200	300	300	
5	Valve	PPA	300	200	300	200	300	400	300	200	300	300	
6	Thrust Block	THB	300	200	300	200	300	400	300	200	300	300	
7	Fire Hydrant	FS_	200	200	200	200	200	300	200	200	200	300	

4.4.5 Proposed Architectural Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Access Ladders and Catwalks	ALA	300	200	300	200	N/A	N/A	300	200	300	300	
2	Architectural Wall	TWL	300	200	300	200	N/A	N/A	300	200	300	300	
3	Blue Colour Paint	MAO 8	300	200	300	200	N/A	N/A	300	200	300	300	
4	Ceiling	CEL	300	200	300	200	N/A	N/A	300	200	300	300	
5	Curtain wall/ glass wall	CTP	300	200	300	200	N/A	N/A	300	200	300	300	
6	Door/Entrance	ADO	300	200	300	200	N/A	N/A	300	200	300	300	
7	Elevator / Lift Shaft space	MCO	300	200	300	200	N/A	N/A	300	200	300	300	
8	Finishes	DTL	300	200	300	200	N/A	N/A	300	200	300	300	
9	Floor, Slab	TLA	300	200	300	200	N/A	N/A	300	200	300	300	
10	Furniture	FUR	300	200	300	200	N/A	N/A	300	200	300	300	
11	Gate	AGT	300	200	300	200	N/A	N/A	300	200	300	300	
12	Louvers	WDW	300	200	300	200	N/A	N/A	300	200	300	300	
13	Mass concrete fill	SFD	300	200	300	200	N/A	N/A	300	200	300	300	
14	Non-Slip Yellow Nosing	MAO	300	200	300	200	N/A	N/A	300	200	300	300	
15	Precast Facade	TWL	300	200	300	200	N/A	N/A	300	200	300	300	
16	Railing, handrail	FRA	300	200	300	200	N/A	N/A	300	200	300	300	
17	Ramp	TPD	300	200	300	200	N/A	N/A	300	200	300	300	
18	Roof / Architectural Roof	Multiple*	300	200	300	200	N/A	N/A	300	200	300	300	

[8] [Note: To facilitate the review purpose, the codes not available in the BIM harmonisation guideline are highlighted in Yellow]

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
19	Roof Gutter		300	200	300	200	N/A	N/A	300	200	300	300	
20	Skylight	WDW	300	200	300	200	N/A	N/A	300	200	300	300	
21	Stairs	TTE	300	200	300	200	N/A	N/A	300	200	300	300	
22	Tactile Warning strip	FWS	300	200	300	200	N/A	N/A	300	200	300	300	
23	Window	WDW	300	200	300	200	N/A	N/A	300	200	300	300	

4.4.6 Proposed Structural Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	Base Plates, Blots, clip angles, fixing etc.	SFM	300	200	300	200	N/A	N/A	300	200	300	300	
2	Beams	TBS	300	200	300	200	300	300	300	200	300	300	
3	Columns	SCL	300	200	300	200	300	300	300	200	300	300	
4	Foundation (Pile, pile cap, ground beams & Footings)	SFD	300	200	300	200	300	300	300	200	300	300	
5	Mass concrete fill	SFD	300	200	300	200	N/A	N/A	300	200	300	300	
6	Slabs	TLA	300	200	300	200	300	300	300	200	300	300	
7	Ramp	TPD	300	200	300	200	300	300	300	200	300	300	
8	Stairs	TTE	300	200	300	200	N/A	N/A	300	200	300	300	
9	Structural Wall	TWL	300	200	300	200	300	300	300	200	300	300	
10	Tank structures	SFD	300	200	300	200	300	300	300	200	300	300	

4.4.7 Proposed Building Services Model

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1	MVAC System												
1a	Exhaust (extract) air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1b	Fresh air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1c	Return air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1ed	Supply air duct	BDU	200	200	200	200	200	300	200	200	200	300	
1e	Access panel	AAP	200	200	200	200	200	300	200	200	200	300	
1f	Air handling unit	BAC	200	200	200	200	200	300	200	200	200	300	
1g	Chillers	MC Q	200	200	200	200	200	300	200	200	200	300	
1h	Chilled water supply pipe	MC Q	200	200	200	200	200	300	200	200	200	300	
1i	Chilled water return pipe	MC Q	200	200	200	200	200	300	200	200	200	300	
1j	Condensate drainpipe	MPI	200	200	200	200	200	300	200	200	200	300	
1k	Damper	BDA	200	200	200	200	200	300	200	200	200	300	
1l	Diffuser, air-boot, air grill, air filter, register	BDI	200	200	200	200	200	300	200	200	200	300	
1m	Fan	BFA	200	200	200	200	200	300	200	200	200	300	
1n	Fan Coil Unit	BFC	200	200	200	200	200	300	200	200	200	300	
1o	Fire damper	BDA	200	200	200	200	200	300	200	200	200	300	
1p	Insulation	PIS	200	200	200	200	200	300	200	200	200	300	
1q	Primary air unit	BAC	200	200	200	200	200	300	200	200	200	300	
1r	Silencer	BSI	200	200	200	200	200	300	200	200	200	300	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
1s	Smoke extraction system	MCQ	200	200	200	200	200	300	200	200	200	300	
1t	Variable control damper	BDA	200	200	200	200	200	300	200	200	200	300	
1u	Dynamic envelope in MVAC model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
2	Plumbing System												
2a	Flush water piping	PLM	200	200	200	200	200	400	200	200	200	400	
2b	Fresh water piping (water supplies)	WSD	200	200	200	200	200	400	200	200	200	400	
2c	Tap, faucet	PLM	200	200	200	200	200	400	200	200	200	400	
2d	Valve	MV A	200	200	200	200	200	400	200	200	200	400	
2e	Dynamic envelope in plumbing & water supply model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
3	Drainage and Sewerage												
3a	Floor drain	DTH	200	200	200	200	200	200	200	200	200	200	
3b	Gully, sealed trapped gully, clean outs and vent	GUL	200	200	200	200	200	200	200	200	200	200	
3c	Kitchen waste pipe work including floor drain, open trapped	MPA	200	200	200	200	200	200	200	200	200	200	
3d	Rainwater, storm water	STP	200	200	200	200	200	200	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
	pipe, storm drain												
3e	Rainwater outlet	SNF	200	200	200	200	200	200	200	200	200	200	
3f	Surface channel, slot channel, external drainage	SUP	200	200	200	200	200	200	200	200	200	200	
3g	Sewerage pipe, foul sewer drains	FWD	200	200	200	200	200	200	200	200	200	200	
3h	Vent pipe	MPI	200	200	200	200	200	200	200	200	200	200	
3i	Dynamic envelope in drainage & sewage model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
4	Fire Services System												
4a	Fire Alarm Control Panel	BFP	300	200	300	200	200	200	200	200	200	200	
4b	Fire Alarm Audio/ Visual	BFS	300	200	300	200	200	200	200	200	200	200	
4c	Fire Alarm Devices	ALM	300	200	300	200	200	200	200	200	200	200	
4d	Break glass unit	BFB	300	200	300	200	200	200	200	200	200	200	
4e	Fire detection system, heat or smoke detectors	BFD	300	200	300	200	200	200	200	200	200	200	
4f	Fire hydrant/hose reel system	BFH	300	200	300	200	200	200	200	200	200	200	
4g	Sprinkler pipe work	SRK	300	200	300	200	200	200	200	200	200	200	
4h	Sprinkler head	SRK	200	200	200	200	N/A	N/A	200	200	200	200	
4i	Sprinkler valve & flow switch	SRK	200	200	200	200	N/A	N/A	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
4j	Dynamic envelope fire services model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	
5	Electrical System / MEP System for Marine and Ports												
5a	Cable Draw pit	ECD	200	200	200	200	N/A	N/A	200	200	200	200	
5b	CCTV Camera	BCA	200	200	200	200	N/A	N/A	200	200	200	200	
5c	Corrosion Monitoring Pit	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5d	Corrosion Monitoring Terminal Box	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5e	Directional Exit Sign	BFX	200	200	200	200	N/A	N/A	200	200	200	200	
5f	Earthing and Lightning equipment	Multiple*	200	200	200	200	N/A	N/A	200	200	200	200	
5g	Electrical Cable tray, cable containment, power feed, cable ducting	CTF	200	200	200	200	N/A	N/A	200	200	200	200	
5h	Emergency lighting	BLF	200	200	200	200	N/A	N/A	200	200	200	200	
5i	Exit sign	BFX	200	200	200	200	N/A	N/A	200	200	200	200	
5j	GovWifi equipment	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5k	ICCP Transformer Rectifier	ETR	200	200	200	200	N/A	N/A	200	200	200	200	
5l	Inspection manhole	UMH	200	200	200	200	N/A	N/A	200	200	200	200	
5m	Light fitting/Lighting	BLF	200	200	200	200	N/A	N/A	200	200	200	200	
5n	Panel board, motor control center	ECP	200	200	200	200	N/A	N/A	200	200	200	200	

Item	Object Name	CAT Code	Initial PIM		3D Coordination		Design Evaluation		Drawing Production		Final Design Model		Additional Information Needed
			LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	LoD-G	LoD-I	
5o	Pillar box (including ICCP AC power supply pillar box and electric pillar box)	ETR	200	200	200	200	N/A	N/A	200	200	200	200	
5p	Sensors	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5q	Solar Panel	CSE	200	200	200	200	N/A	N/A	200	200	200	200	
5r	Trucking, bus duct, busbar, busway	CTF	200	200	200	200	N/A	N/A	200	200	200	200	
5s	Dynamic envelope electrical model	DNE	100	100	100	100	N/A	N/A	100	100	100	100	